

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL SOUTHERN ZONE BENCH
AT CHENNAI**

OA No 73 OF 2021

IN THE MATTER OF:

Visakha Pawan Praja Karmika Sangham,

Andhra Pradesh

.....Applicant

Vs

Union Of India & Others

.....Respondent

COMPLIANCE REPORT FILED BY THE JOINT COMMITTEE

DATE- 13 - 02 - 2024



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BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI

ORIGINAL APPLICATION No. 73 OF 2021 (SZ)

In The Matter of:

Visakha Pawan Praja Karmika Sangham,
Andhra Pradesh

.....Applicant (s)

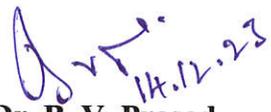
Verses

Union of India and others.

....Respondent (s)

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**REPORT OF THE JOINT COMMITTEE IN THE MATTER OF O. A. NO. 73 / 2021
TITLED: VISAKHA PAWAN PRAJA KARMIKA SANGHAM Vs UNION OF INDIA
AND OTHERS, SUBMITTED TO HON'BLE NATIONAL GREEN TRIBUNAL,
SOUTHERN ZONE, CHENNAI IN COMPLIANCE TO HON'BLE NGT ORDER,
DATED 20.10.2022.**

1. Preamble:

The Hon'ble NGT in its order dated 20.10.2022 in the case of OA 73 of 2021 (SZ) directed the Joint Committee as below:

.....“52. *There is merit in the recommendations of the Joint Committee that HPCL had failed to take effective steps despite the long period between 2011 and 2020. HPCL being a CPSE industry carrying out public utility services has to be a model unit of compliance with the environmental norms which was unfortunately not there in this case for more than a decade.*

53. *Accordingly,*

53.1 *HPCL is directed to take all the required initiative and comply with the observations of the Joint Committee, IISC – Bangalore and enquiry report within a period of six months.*

53.2 *APPCB is to monitor the same and it is not debarred from taking any action against HPCL for any fresh violation under the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 and also initiate appropriate action against the erring officials as per the statutes.*

53.3 *HPCL is directed to deposit the Environmental Compensation assessed at Rs.8,35,20,000/- (Rupees Eight Crores Thirty Five Lakhs and Twenty Thousand only) forthwith.*

53.4 *HPCL is directed to deposit a further sum of Rs.10,00,00,000/- (Rupees TenCrores only) for their wilful negligence being a PSU which can be spent on restoration of environment and public health in the district of Vizag. Such deposit to be made within 2 (Two) months from today to CPCB which will draw a plan to that effect.*

53.5 The Joint Committee to ensure the regular monitoring in implementing the plan.

53.6 An independent Compliance Report may be filed by the Joint Committee after inspection as to the status of the compliance by the HPCL after 6 (Six) months i.e. by 15th May, 2023.

The Original Application No. 73/2021 is disposed off.

The copy of the Hon'ble NGT order dated 20.10.2022 is enclosed (**Annexure – 1**).

2. Inspection of the industry by the Joint Committee:

The Joint Committee, in compliance of the Hon'ble NGT order dated 20.10.2022 has inspected M/s. HPCL, (Visakh Refinery), Malkapuram, Visakhapatnam on 26.09.2023 & 27.09.2023 for compliance verification of the Hon'ble NGT directions by the refinery.

3. Status of Consent to Operate & Authorisation of the Refinery:

APPCB has granted the Consent to Operate (CTO) under section 25/26 Of the Water (Prevention & Control of Pollution) Act, 1974 and Under section 21 of Air (Prevention and Control of Pollution) Act, 1981 and amendments thereof and Authorisation under Rule – 6 of the Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016 to M/s. HPCL (Visakh Refinery, Visakhapatnam for manufacturing the following products:

Table: 1 – Petroleum crude & product quantities		
S. No.	Product	Quantity in TPA (for 15 MMTPA crude)
1	Propylene (Chemical grade)	98,000
2	LPG	5,50,000
3	Naphtha	10,45,000
4	Gasoline (Euro – VI)	16,82,000
5	Aviation Turbine Fuel (ATF)	1,32,000
6	Superior Kerosene Oil (SKO)	6,93,000
7	Diesel (Euro – VI)	89,62,000
8	Bitumen	2,20,000
9	Sulphur	2,95,000
10	Refinery Fuel (fuel gas + fuel oil + Naphtha for GTGs)	8,34,000

11	LDO	31,000
12	SHC / RUF Pitch	2,86,000
Total		1,50,00,000 (approx.)
13	Captive power plant	196 MW

The consent order is valid for a period up to 31.12.2025. Copy of the consent order is enclosed (**Annexure - 2**).

4. Compliance status of the Hon'ble NGT directions by M/s. HPCL (Visakh Refinery), Visakhapatnam:

Table: 2 - Compliance status of the Hon'ble NGT directions by M/s. HPCL		
S. No.	Directions	Point-wise compliance Status
1	<i>HPCL is directed to take all the required initiative and comply with the observations of the Joint Committee, IISC – Bangalore and enquiry report within a period of six months.</i>	HPCL has submitted the compliance status on Hon'ble NGT directions, CFO compliance, deposition of Environmental Compensation and on awareness programmes to Regional Office, APPCB, Visakhapatnam, vide mail dated 28.09.2023 (Annexure - 3).
2	<i>APPCB is to monitor the same and it is not debarred from taking any action against HPCL for any fresh violation under the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 and also initiate appropriate action against the erring officials as per the statutes</i>	APPCB Regional Office, Vishakhapatnam has inspected and submitted the report to Hon'ble NGT, SZ, Chennai, vide report dated 31.10.2023 (Annexure - 4).
3	<i>HPCL is directed to deposit the Environmental Compensation assessed at Rs.8,35,20,000/- (Rupees Eight Crores Thirty Five Lakhs and Twenty Thousand only)</i>	The industry has appealed the Hon'ble NGT order dated 20.10.2022 before the Hon'ble Supreme Court of India, vide Civil appeal No. 9377/2022 and as per the interim stay order Hon'ble Supreme Court, dated

	<i>forthwith.</i>	06.01.2023 (Annexure - 5), HPCL – Visakh Refinery has deposited the EC amount of Rs. 8,35,20,000/- with APPCB, vide DD No. 652353, dated 03.03.2023 (Annexure - 6).
4	<i>HPCL is directed to deposit a further sum of Rs.10,00,00,000/- (Rupees Ten Crores only) for their willful negligence being a PSU which can be spent on restoration of environment and public health in the district of Vizag. Such deposit to be made within 2 (Two) months from today to CPCB which will draw a plan to that effect.</i>	The Hon'ble Supreme Court in the same order dated 06.01.2023 has stayed Hon'ble NGT direction of deposition of a further sum of Rs.10,00,00,000/- (Rupees ten crores only) with CPCB for willful negligence of the refinery until further orders. The stay remains in force as on date.

5. Compliance status of EC conditions by the Refinery:

The Ministry of Environment, Forest and Climate Change has granted six (06) nos. of Environmental Clearances (ECs) to M/s HPCL (Vishak Refinery) located at Malkapuram, Visakhapatnam, Andhra Pradesh. The details of ECs are as follows:

S. No.	EC Letter No.	Date	Subject
1	J-11011/22/94-A II(I)	30.05.1995	Expansion from 4.5 to 7.5 MMTPA
2	J-11011/88/96-IA-II(I)	10.04.1997	Installation of Diesel Hydro-desulphurization
3	J-11013/55/2003-IA II (I)	03.02.2004	Expansion from 7.5 to 10.0 MMTPA
4	J-11011/66/2007-IA II (I)	07.03.2008	Mounded storage for Propylene/LPG
5	J-11011/408/2009-IA-II(I)	02.09.2009	Expansion from 7.5 to 10.0 MMTPA
6	J-11011/63/2013-IA II (I)	11.02.2016	Expansion from 8.33 MMTPA to 15.0 MMTPA

The non-compliances of conditions stipulated in Environmental Clearances apart from the Joint Committee observations are as follows:

- a) Compliance of standards / norms in terms of fugitive emissions and VOC emissions monitoring at ETP area are not being implemented as per Oil Refinery Industry notified under the Environment (Protection) Rules, 1986 vide G.S.R. 186(E) dated 18th March, 2008.
- b) Monitoring of work zone emissions viz., SO₂, NO_x, HC (Methane & Non-methane), VOCs and Benzene from various units is not being done.
- c) The monthly sulphur balance sheet along with the six-monthly compliance report is not being submitted.
- d) It has been observed that the PM₁₀, PM_{2.5} and SO₂ in the ambient air of the project surroundings are exceeding the prescribed limits of National Ambient Air Quality Standards, 2009.
- e) No efforts were made to recycle the treated effluent to achieve zero discharge to achieve zero liquid discharge system and to minimize the fresh water consumption intake.
- f) The comprehensive water audit reports on annual basis are not being submitted to Ministry's Sub Office, Vijayawada.
- g) It has been observed that the PAs are in process of developing green belt in and around the plant premises. However, it has been observed that the plantation around the project area is not satisfactory.
- h) Uploading of Environmental Statement for each financial year ending 31st March in Form-V on company's website is not being done.
- i) It has been observed that the copies of EC letter no. J-11011/22/94-A II(I) dated 30th May, 1995, F. No. J-11011/88/96- IA II (I) dated 10th April, 1997, J-11013/55/2003-IA II (I) dated 3rd February, 2004 and J-11011/66/2007-1A II (I) dated 7th March, 2008 and J-11011/408/2009- IA II (I) dated 2nd September, 2009 along with all environmental monitored data is not uploaded on company's website.

6. Greenbelt development by the Refinery:

Total area of the Refinery after expansion is 860 acres and total green belt developed inside the unit is 112.5 acres. There are no open areas left for greenbelt development within the refinery premises. The industry has planted about 6,70,000 saplings in various locations of Visakhapatnam city covering a total area of 700 acres under “Green Visakha Programme” and as per the conditions of APPCB Consent for Establishment (CFE) for expansion in order dated July 6, 2016.

In addition to the above, 67.5 acres of green belt development is in progress under “Visakha Refinery Modernisation Project” (VRMP) in the north-west and south-east direction of the Refinery boundary, which is expected to be completed by December, 2023, as per the information provided by the refinery.

7. Details of crude processed & products generated:

The refinery has processed the following quantities of crude received from various sources during the financial years, 2021-22 and 2022-23:

Table: 4 - Details of crude processed (TMT)			
S. No.	Types of crude processed	2021-22	2022-23
1	Ravva	232.5	164.5
2	Mumbai High	1851.8	275.4
3	CHAMP	82.4	21
4	Mirri Light	250.8	262.1
5	Labuan	41.4	124.6
6	Brass Light	128.8	---
7	Quaiboe	274.5	---
8	SLEB	76.5	13
9	ERHA	116.0	140.1
10	Okwuibome	130.3	---
11	Cambay Basin	101.6	---
12	Arab Lt	349.0	47.7
13	Arab Ex Lt	1497.1	877.7
14	Arab Hy	556.8	68.9
15	Murban	394.7	---
16	Basrah Medium	424.7	2164.1
17	Basrah Light	966.6	---
18	Das Blend	790.4	903.9
19	Mars Blend	144.0	---
20	Novy Port	---	587.7

21	Tupi	---	134.4
22	Bonga	---	148
23	Quaiboe	---	536.1
24	Amenam Blend	---	125
25	Egina	---	140.7
26	Azeri Light	---	572.1
27	Forcados	---	256.5
28	WTI Midland	---	268.4
29	Sokol	---	96.8
30	Urals	---	1357.8
Total:		8409.8	9286.6
TMT: Thousand metric tons.			

Following are the production details of the refinery during the financial years, 2021-22 and 2022-23:

S. No.	Products	2021-22	2022-23
1	Propylene	48.1	45.1
2	LPG	310.5	362.9
3	Naphtha	211.7	92.8
4	MS	1,593.3	1,758.5
5	ATF	50.3	74.9
6	SKO	95.3	115.7
7	Diesel Streams	3,637.4	3,863.8
8	FO 3.5% S	893.4	1,292.9
9	FO 1.0% S	82.9	133.4
10	Bitumen	569.1	607.4
11	Sulfur	30.0	39.2
12	ISD	207.4	200
13	Refinery Fuel	680.3	700.1
Total		8,409.8	9,286.6
TMT: Thousand metric tons.			

The quantity of crude processed and the total quantities of products manufactured by the refinery during the FYs, 2021-22 & 2022-23 are within the CTO permitted quantities as per the records provided by the industry.

8. Sulphur recovery status during the FY, 2022-23:

Sulphur content of various types of petroleum crude quantities processed by the refinery during the FY, 2022-23:

Table: 6 - Sulphur content of various types of petroleum crude processed during the FY, 2022-23

S. No.	Types of Crude processed	Crude Qty. (TMT)	Sulphur content in Crude (wt. %)	Sulphur (TMT)	Sulphur (MT)
1	Ravva	164.5	0.05	0.082	82.25
2	Mumbai High	275.4	0.15	0.413	413.10
3	Novy Port	587.7	0.16	0.940	940.32
4	Champ	21	0.13	0.027	27.30
5	Mirri Light	262.1	0.08	0.210	209.68
6	Labuan	124.6	0.1	0.125	124.60
7	Tupi	134.4	0.4	0.538	537.60
8	Bonga	148	0.3	0.444	444.00
9	Quaiboe	536.1	0.1	0.536	536.10
10	SLEB	13	0.1	0.013	13.00
11	Erha	140.1	0.21	0.294	294.21
12	Amenam Blend	125	0.24	0.300	300.00
13	Egina	140.7	0.19	0.267	267.33
14	Azeri Light	572.1	0.58	3.318	3,318.18
15	Forcados	256.5	0.17	0.436	436.05
16	WTI Midland	268.4	0.12	0.322	322.08
17	Sokol	96.8	0.31	0.300	300.08
18	Arab Lt	47.7	2.04	0.973	973.08
19	AXL	877.7	1.07	9.391	9,391.39
20	Arab Heavy	68.9	3.19	2.198	2,197.91
21	Basrah Medium	2,164.1	3.25	70.333	70,333.25
22	Urals	1,357.8	1.82	24.712	24,711.96
23	Das Blend	903.9	1.29	11.660	11,660.31
Total:		9,286.6	---	127.834	1,27,833.78

TMT: Thousand metric tons. MT: Metric tons.

Sulphur content of various products generated during processing of above mentioned petroleum crude during the FY, 2022-23:

Table: 7 - Sulphur content of various products generated during processing petroleum crude during the FY, 2022-23

S. No.	Product	Production in TMT	Sulphur content in products (wt. %)	Sulphur content in products (TMT)	Sulphur content in products (MT)
1	Propylene	45.1	0.0004	0.000	0.18
2	LPG	362.9	0.0123	0.045	44.64
3	Naphtha	92.8	0.0136	0.013	12.62
4	MS	1,758.5	0.0006	0.011	10.55
5	ATF	74.9	0.1189	0.089	89.06

6	SKO	115.7	0.2943	0.341	340.51
7	Diesel Streams	3,863.8	0.0382	1.476	1,475.97
8	FO 3.5% S	1,292.9	3.265	42.213	42,213.19
9	FO 1.0% S	133.4	0.5151	0.687	687.14
10	Bitumen	607.4	5.988	36.371	36,371.11
11	Sulphur	39.2	---	---	---
12	ISD (Intermediate Stock Difference)	200	2.154	4.308	4,308
13	Refinery Fuel	700.1	0.22	1.540	1,540.22
Total		9,286.6	---	87.093	87,093.18

TMT: Thousand metric tons. MT: Metric tons.

Sulphur balance statement for the FY, 2022-23:

1	Balance sulphur available for recovery:	40,740.6 MT
2	Sulphur actually recovered by the refinery	39,200 MT
3	Unaccounted sulphur quantity, which may be treated as emitted into the atmosphere as S through various stacks (1 – 2)	1,540.6 MT
4	Unaccounted sulphur quantity, which may be treated as emitted into the atmosphere as SO ₂ per annum	3,081.2 MT
5	Unaccounted sulphur quantity, which may be treated as emitted into the atmosphere as SO ₂ per day on the basis of 365 days of operation of the refinery.	8.44 MT
6	CTO permitted quantity of SO ₂ into atmosphere per day	11.5 MT

The unaccounted sulphur quantity, which is treated as emitted into the atmosphere as SO₂ per day during the FY, 2022-23 is within the APPCB CTO permitted quantity.

9. Effluent sample collection and analysis results:

The Joint Committee, during inspection of the industry has collected the following listed effluent samples on 27.09.2023:

- i) Treated effluent collected at the outlet of guard pond of ETP – 4.
- ii) Once-through cooling water sample collected at the outlet of skimming pond.
- iii) Sample of combined outlet of ETP – 4 & once-through cooling water blow-down collected at MHF – 2.
- iv) Water sample collected from the storm water drain originating from ETP – 4 before joining the combined outlet of treated effluent of ETP – 4 & once-through cooling water after MHF – 2.
- v) Effluent sample collected from the aeration tank of ETP – 4.

vi) Sample of combined outlet of treated effluent of ETP – 1 & cooling water blow-down collected at MHF – 1.

The samples thus collected have been submitted to Zonal Laboratory, APPCB, Visakhapatnam for analysis. The analysis results of the samples are as follows:

Table: 9 – Analysis results of the effluent samples collected								
S. No.	Parameters	Sample results						APPCB stipulated Standards as in CTO
		i (670)	ii (671)	iii (672)	iv (673)	v (674)	vi (675)	
1	pH	6.72	6.86	6.95	7.73	---	7.16	6.50 – 8.50
2	Total Suspended Solids (TSS)	18	10	12	28	---	12	20
3	Total Organic Carbon (TOC)	21.8	7.9	9.8	12.8	---	11.8	---
4	Chemical Oxygen Demand (COD)	56	20	24	32	---	32	125
5	Bio-chemical Oxygen Demand (BOD)	18	6	8	10	---	9	15
6	Oil & Grease	6.2	*0.8	4.5	7.4	8.2	1.6	5.0
7	Hexavalent Chromium (as Cr ⁺⁶)	0.01	BDL	BDL	BDL	---	BDL	0.1
8	Sulfide (as S ⁻²)	5.6	1.7	3.3	3.6	---	3.8	0.5
9	Ammonical Nitrogen (as NH ₃ -N)	19.78	1.05	7.24	26.13	---	1.96	15
10	Phenols (as C ₆ H ₅ OH)	0.12	0.03	0.06	0.08	---	0.04	0.35
11	Ortho Phosphate (as PO ₄ ⁻³)	1.49	0.70	0.51	0.38	---	0.47	---
12	Cyanide (as CN)	0.03	BDL	0.01	0.02	---	BDL	0.2
All values are expressed in mg/lit. except pH. BDL: Below Detectable Limit.								
*Standard limit is 1.0 mg/lit.								
Analysis reports enclosed (Annexure – 7).								

- The values of BOD – 18 mg/lit., oil & grease – 6.2 mg/lit., sulphide – 5.6 mg/lit. and ammonical nitrogen – 19.78 mg/lit. obtained for the treated effluent of ETP - 4 are found exceeding the CTO stipulated standards of BOD – 15 mg/lit., oil & grease – 5.0 mg/lit., sulphide – 0.5 mg/lit. and ammonical nitrogen – 15 mg/lit., respectively.
- The values of oil & grease – 7.4 mg/lit., sulphide – 3.6 mg/lit. and ammonical nitrogen – 26.13 mg/lit. obtained for the water sample collected from the storm

water drain originating from ETP – 4 and flowing outside the industry premises are found exceeding the CTO stipulated standards of oil & grease – 5.0 mg/lit., sulphide – 0.5 mg/lit. and ammonical nitrogen – 15 mg/lit., respectively.

- The value of sulphide – 3.8 mg/lit. obtained for the sample of combined outlet of treated effluent of ETP – 1 & cooling water blow-down collected at MHF – 1 is found exceeding the CTO stipulated standard of 0.5 mg/lit.
- The sample collected from the aeration tank of ETP – 4 is having a concentration of 8.2 mg/lit. of oil & grease.

10. Observations:

- a) The Joint Committee has inspected both the ETPs 1 & 4. It was observed that ETP – 4 was not operational and all the tanks like clarifiers, aeration tanks, etc. were found floating with black waste mineral oil. The treatment of effluent in the ETP – 4 was not observed (Photographs – 1 to 10).
- b) All the tanks, clarifiers, aeration tanks, etc. of ETP – 1 were also found floating with black waste mineral oil.
- c) The Online Continuous Effluent Monitoring System (OCEMS) to monitor the treated effluent quality provided for ETP – 4 was not functioning for the parameters, TSS, COD & BOD. Was found working for pH parameter only.
- d) The OCEMS online treated effluent quality monitoring station provided for ETP – 1 was found functioning for the parameters, pH, TSS, COD & BOD.
- e) These OCEMSs have been installed at the outlet of filtration unit (sand / activated carbon filters), but not at the outlets flowing outside the industry premises.
- f) The drain originating from the ETP – 4 was observed with black waste mineral oil. The drain is provided with oil catcher tank and the collected waste oil is removed with the gully sucker. However, the black waste mineral oil was found flowing outside the industry beyond the oil catcher tank provided in the drain. This shows that the oil catcher is not working properly (Photograph – 11 to 18).

- g) The storm water drains in ETP areas were flowing with black waste oily effluents, and particularly the storm water drain flowing adjacent to ETP - 4 found with flow of black waste oil marks all along the stretch till discharge point (Photograph – 11 to 18). This shows that ETPs are not operated regularly and untreated oily effluent is being discharged outside the refinery premises.
- h) The analysis results of the oil & grease in the storm water drain outside the industry premises was 7.4 mg/L, exceeding the discharge standard stipulated by APPCB in CTO. HPCL has not installed OCEMS at the discharge point for verification.
- i) Provision for measurement of quantity of treated effluent being discharged outside at the outlets of guard ponds is not available. Hence, assessment of quantity of treated effluents being discharged outside the industry cannot be done.
- j) Deposits of oily scum in huge quantity were observed in the baffled skimming ponds provided for the spent once-through cooling water outlet (Photographs – 19 to 22). Which means that considerable amounts of crude and other petroleum products are entering the cooling water system through leakages.
- k) Refinery has provided two High oil sludge waste storage tanks with a capacity of 3,000 tons each. These tanks were filled to their brim and almost about to overflow. Spillages were also observed near the loading & unloading point of the tanks (Photographs – 23 to 26). During rainy season, the oily water may flow outside the refinery.
- l) Oily spillages were found near the bitumen melting facility. Black oily effluents were also found in the storm water drain near the facility (Photographs – 27 to 30).
- m) Construction and installation of new ETP with a capacity of 1,000 KL/hour was found completed. During inspection the Reverse Osmosis and Ultra filtration systems were under trail run.
- n) The three CAAQM stations installed within the industry premises were found in operation. Committee collected the ambient air quality data of all the three stations from APPCB server and found that the PM10 concentrations are exceeding the annual average standard limit of 60 µg/M³ at all the three locations for the years,

2022 & 2023 (up to 30.11.2023). Ambient air quality data obtained from these three CAAQM stations for the period of two years, 2022 & 2023 (up to 30.11.2023) is enclosed herewith (**Annexure – 8**).

- o) The refinery is having 42 stacks to emit flue gases generated during refining processes of petroleum crude. Nine (9) of them are not in use. Twenty seven (27) stacks are in use and have been installed with online continuous emission monitoring systems (CEMS) to monitor the quality of flue gas emissions on real-time basis. Balance six (6) stacks are new ones and will be provided with CEMS once the corresponding refinery units are commissioned, as per the information provided by the representative of the refinery.
- p) Odour Squad to be constituted by APPCB as per the recommendations of IISc, Bengaluru to initiate action and resolve the odour episodes.

11. Conclusions and Recommendations:

- a) The effluent treatment systems is not been operated regularly and the waste mineral oil separation from the process effluents is not properly carried out. All the units including, primary clarifier, aeration tanks, final clarifiers, etc. of ETP – 1 & 4 are found with floating black waste oil. Presence of waste mineral oil in aeration tanks / activated sludge process tanks inhibits the bacterial growth thereby the reduction of COD / BOD is affected. It is evident from the analysis results obtained for the treated effluent of ETP – 4, where the BOD, oil & grease, sulphide and ammonical nitrogen are exceeding the CTO standard limits.
- b) The Committee felt that the presently operating ETP – 1 & 4 performances is not sufficient to handle the oily effluents being generated by the refinery. Hence, the refinery shall adopt suitable treatment techniques to ensure complete oil separation from the process effluents for proper treatment to comply with the standards stipulated.
- c) The new Integrated Effluent Treatment Plant (IETP) of 1,000 M³/hour capacity shall be commissioned & stabilized immediately to ensure proper treatment of refinery process effluents.

- d) HPCL shall install OCEMSs (Online Continuous Effluent Monitoring System) along with the electronic flow measurement equipment at the final outlets of ETPs (at the outlets of guard ponds) to ensure exact assessment of quality of the treated effluent and quantity of effluents discharged by the industry.
- e) The measuring principle of COD / BOD of online effluent water quality monitoring stations installed at the outlets of ETPs is UV light absorption / scanning technique. Suitability of the technique may be reviewed by the refinery and APPCB for measuring COD / BOD in the treated effluents by taking the CPCB Guidelines of Online Continuous Effluent Monitoring Systems (OCEMS), July, 2018 in to consideration.
- f) The storm water drains in the process and as well as in ETP areas are found flowing with black waste mineral oil, which shows that there are leakages of crude oil from the storage tanks. HPCL shall arrest such leakages and clear all the drains to avoid the discharge outside the premises into water bodies.
- g) Huge deposits of oil scum was observed in the skimming ponds provided for the once-through cooling sea water, which can be attributed to joining of considerable amounts of crude and other petroleum products into the cooling water system through leakages. Hence, the refinery shall identify and arrest such leakages of crude and other petroleum products into the tanks of once through cooling water system.
- h) The refinery shall ensure that all the high oily sludge is disposed off as per the APPCB CTO terms & conditions as early as possible to prevent odour nuisance in the surroundings, water / soil pollution through spillages and from possible fire accidents.
- i) The refinery shall identify the sources of dust pollution within the premises and shall take appropriate steps to comply with the National Ambient Air Quality Standards in respect of PM₁₀ & PM_{2.5}.

- j) One of the APPCB CFO conditions is that the refinery shall recover sulphur with 99.9% efficiency in order to maintain the overall emission load of SO₂ less than 11.5 tons per day even after expansion unit.
- k) The Joint Committee has carried out material balance studies on sulphur recovery & SO₂ emission loads during its inspections during March, 2021 and September, 2023. Similarly, APPCB may also verify sulphur recovery efficiency through material balances studies during inspection of the industry on half-yearly basis.
- l) The refinery and APPCB as well shall ensure regular calibration of the online effluent, emission and ambient air quality monitoring systems as per the laid down protocols. Records shall be maintained. APPCB shall ensure that these monitoring systems are not tampered with.
- m) Performance Audit on functioning of CAAQM stations & CEMSs installed to various stacks shall be carried out once in a year by the CPCB empanelled third party independent laboratory other than already engaged for routine calibration & data verification.
- n) APPCB may be directed to constitute the Odour Squad for Visakhapatnam city to address the odour complaints as recommended by the IISc, Bengaluru.

Report dated 14th December, 2023.



Dr. P. Suresh Babu
Scientist-C

Ministry of Environment, Forest & Climate
Change, Vijayawada



Dr. B. V. Prasad

Senior Environmental Scientist (Retd.)
Andhra Pradesh Pollution Control Board
Vijayawada



Smt. Poornima B M
Scientist D
Central Pollution Control Board
Regional Directorate, Chennai



Dr. N. Lingaiah
Senior Principal Scientist
Dept. of Catalysis & Fine Chemicals,
CSIR-IICT, Hyderabad

File No.APPCB-13024/3/2021-LEGAL SEC-APPCB



ANDHRA PRADESH POLLUTION CONTROL BOARD
D.No-33-26-14D/2, Near Sunrise Hospital
Pushpa Hotel Center, Chalamalavari Street, Kasturibaipet,
Vijayawada-520 010

E-mail : hopcblegal@gmail.com

Memo No.41 /APPCB/Legal/NGT/OA-73 of 2021(SZ)/2022 - 04/11/2022 - 1066

Sub: APPCB – Legal – Implementation of Hon'ble NGT, Chennai disposal order dt 20.10.2022 in O.A. No 73 of 2021(SZ) – Instructions - Issued -Reg.

Ref:-Hon'ble NGT(SZ),Chennai disposal order dt. 20.10.2022.

* * *

It is to inform that the Hon'ble NGT, Chennai constituted the Joint Committee in the Order dated 25.02.2021 in O.A. No. 73 of 2021(SZ) in the matter of Visakha Pawan Praja Karmika Sangam vs. M/s. Hindustan Petroleum Corporation Limited, Visakhapatnam. The Joint Committee and APPCB have filed the reports to the Hon'ble NGT, Chennai.

The Hon'ble NGT, Chennai reviewed the reports of the Joint Committee (MoEF &CC, RO-Vijayawada; CPCB, Chennai; APPCB, Vijayawada and IICT, Hyderabad) and A.P.Pollution Control Board from time to time. Finally disposed the matter on 20.10.2022 with other certain directions including the following:

"53.Accordingly,

53.1 HPCL is directed to take all the required initiative and comply with the observations of the Joint Committee, IISC – Bangalore and enquiry report within a period of six months.

53.2 APPCB is to monitor the same and it is not debarred from taking any action against HPCL for any fresh violation under the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 and also initiate appropriate action against the erring officials as per the statutes.

53.3 HPCL is directed to deposit the Environmental Compensation assessed at Rs.8,35,20,000/- (Rupees Eight Crores Thirty Five Lakhs and Twenty Thousand only)forthwith.

53.4 HPCL is directed to deposit a further sum of Rs.10,00,00,000/- (Rupees Ten Crores only) for their wilful negligence being a PSU which can be spent on restoration of environment and public health in the district of Vizag. Such deposit to be made within 2 (Two) months from today to CPCB

which will draw a plan to that effect.

53.5 The Joint Committee to ensure the regular monitoring in implementing the plan.

53.6 An independent Compliance Report may be filed by the Joint Committee after inspection as to the status of the compliance by the HPCL after 6 (Six) months i.e. by 15th May, 2023.

54. Accordingly, the Original Application is disposed of. List the matter in May, 2023 for reporting compliance."

Copy of the disposal order in O.A. No. 73 of 2021(SZ) dt. 20.10.2022 is herewith attached.

The APPCB is required to take appropriate follow-up action to comply with the Hon'ble NGT order dt. 20.10.2022. Further, the Joint Committee has to file an independent compliance report after inspection as to the status of the compliance by M/s. HPCL after 6 (Six) months i.e. by 15th May, 2023.

In view of the above, the following instructions are issued to comply with the Hon'ble NGT directions:

- a. The JCEE, UH-II, Taskforce, APPCB, H.O, Vijayawada has to take follow-up action on implementation of Hon'ble NGT directions by APPCB as per the Hon'ble NGT order dt. 20.10.2022.
- b. Dr. B.V Prasad, SES, Central Lab, APPCB,H.O, Vijayawada has to communicate with other members of Committee on follow up action to be taken as per Hon'ble NGT order dt. 20.10.2022.
- c. The Action Taken Report shall be submitted from time to time.

Encls: a/a

Vijay Kumar Gsrkr Ias
MEMBER SECRETARY

To

The JCEE, UH-II, Taskforce, H.O, APPCB, Vijayawada
Dr. B.V Prasad, SES, Central Lab, APPCB, HO, Vijayawada.

Copy to

1. The JCEE, APPCB, Zonal Office: Visakhapatnam for information and necessary action.
2. The EE, APPCB, RO: Visakhapatnam for information and necessary action.

**BEFORE THE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI**

(Through Video Conference)

Original Application No.73 of 2021 (SZ)

IN THE MATTER OF

Visakha Pawan Praja Karmika Sangam,

A Registered Labour Association No. 799 of 2016,
Rep by its Secretary Mr. Ganga Raju Kola,
H. No. 60-33-49, Ambedkar Colony,
Maikapuram, Vishakhapatnam,
Andhra Pradesh- 53001.

...Applicant(s)

Versus

1. Union of India

Rep by its Secretary,
Ministry of Environment, Forest and Climate Change,
Indira Paryavaran Bhavan,
Jorbagh, New Delhi- 110003

2. Union of India

Rep by its Secretary,
Ministry of Petroleum and Natural Gas,
Sashtri Bhavan, New Delhi-1

3. Central Pollution Control

Rep by its Chairman,
Parivesh Bhavan,
East Arjun Vihar, New Delhi- 110032

4. State of Andhra Pradesh

Rep by its Chief Secretary,
Government Complex,
Velagapudi, Guntur District,
Andhra Pradesh- 522503

5. Andhra Pradesh Pollution Control Board

Rep by its Members Secretary,
D. No. 33-26-14/D2,
Near Sunrise Hospital, Pusha Hotel Center,
Chalamvari Street, Kasturibaipet,
Vijayawada, Andhra Pradesh- 520010.

6. District Collector and Magistrate

Main Road, Krishna Nagar,
Maharani Peta, Vishakhapatnam,
Andhra Pradesh- 530002.

7. M/s Hindustan Petroleum Corporation Limited.

Rep by its Chairman and Managing Director,
Malkapuram Post, Vishakhapatnam,
Andhra Pradesh- 530011.

...Respondent(s)

For Applicant(s): Mr. Sravan Kumar.
For Respondent(s): Mr. G.M. Syed Nurullah Sheriff for R1.
Mr. A.R. Sakthivel for R2.
Mrs. MadhuriDonti Reddy for R4 to R6.
M/s. King & Partridge for R7.

Judgment Reserved on: 26th August, 2022.

Judgment Pronounced on: 20th October, 2022.

CORAM:

HON'BLE Smt. JUSTICE PUSHPA SATHYANARAYANA, JUDICIAL MEMBER
HON'BLE Shri. SAIBAL DASGUPTA, EXPERT MEMBER

JUDGMENT

Delivered by Justice Smt. Pushpa Sathyanarayana, Judicial Member

1. The applicant is challenging the activities of Hindustan Petroleum Corporation Limited (for short 'HPCL') as they are violative of the Air (Prevention and Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Biodiversity Act and also the direction issued by the Andhra Pradesh Pollution Control Board and the conditions imposed by the MoEF&CC.
2. As the authorities, namely, MoEF&CC, the Andhra Pradesh Pollution Control Board and the CRZ have not taken any action against the 'HPCL' which is the 7th respondent, the above application is filed seeking a Committee to be appointed consisting of experts from the Pollution Control Board to conduct a site inspection and get factual findings and also assess air and water pollution etc., and direct the 7th respondent to implement the recommendations of the Indian Institute of Science, Bangalore with respect to the odour nuisance caused in Visakhapatnam.

- 3.** The 7th respondent refinery was established in Visakhapatnam in the year 1957 and the capacity of the plant was increased from 0.65 MMTPA to 8.3MMTPA in the course of time. The industry has been causing smoke, odour nuisance and water pollution for several years. This has resulted in inconvenience and health hazards to the residents of the area. The local residents have made several complaints and given representation to the authorities on the pollution caused by the refinery. In response to those complaints, the Andhra Pradesh Pollution Control Board had also conducted several inspections in the unit and found large number of deficiencies and directed the unit to take precautions.
- 4.** It is further alleged that the bad smell that emanates from the 'HPCL' plant creates nausea, breathlessness, lung, heart, eye and skin diseases to the residents, particularly to the women, children and elderly people. It is alleged that the water samples tested by the Public Health lab confirmed that the ground water was severely contaminated due to untreated water discharge from the industry. The Indian Institute of Science, Bangalore also had made certain recommendations regarding the odour pollution.
- 5.** It is pointed out that the MoEF&CC compliance report found violation in the unit that the mandatory green belt of 33% in the unit was not developed. The conclusion of the monitoring report also stated that the capacity of the unit must be reduced to 70% of the original capacity. In the year 2017, the unit had proposed to extend its capacity from 8.5 MMTPA to 15 MMTPA. Several representations given to the authorities, requesting not to expand the capacity of the unit. Andhra Pradesh Pollution Control Board also conducted an inspection and issued directions on the violations noticed in the unit including directing the unit to submit a bank guarantee of Rs. 64 lakh.
- 6.** It is now complained by the applicant that even the recommendations of the Indian Institute of Science, Bangalore was not implemented. Even during pendency of the application, a major accident occurred due to lack of requisite mandatory maintenance of the plant. On the directions of the Tribunal, a Joint Committee was constituted who had inspected and filed a report. It was recommended that the unit has to pay Rs.24,36,696/- (Rupees Twenty Four Lakhs Thirty Six Thousand Six Hundred and Ninety Six only) as environmental compensation. The

Joint Committee also confirmed the violations raised by the applicant like odour, lack of maintaining 33% of green belt etc. Therefore, the applicant had sought for the above directions in the application.

- 7. The 1st respondent, which is the Ministry of Environment, Forests and Climate Change** has filed its counter affidavit stating that apart from causing odour pollution, there are lot of violations committed in respect of the conditions imposed in the Environmental Clearance granted by them as well as the 'consent to operate' granted by the Pollution Control Board. The operation of the unit with the said violations resulted in serious environmental degradation. As the MoEF&CC is engaged only in policy formulation for abatement, control and prevention of pollution prescribing the environmental standards and they are implemented only through the Central Pollution Control Board and State Pollution Control Board, who are the enforcement authorities. The Pollution Control Boards or the Pollution Control Committees are empowered to take all such measures expedient for the purpose of protection and implementing the quality of the environment as well as prevention.
- 8. The 3rd respondent, who is the Central Pollution Control Board,** has filed its reply stating that the Environment Impact Assessment, Notification mandates the requirement of prior Environmental Clearance to the project listed in the schedule of the said notification. The Environmental Clearance is granted to the project proponent by the MoEF&CC under the said notification and they are also monitored periodically.
- 9. It is alleged that for grant of Environmental Clearance for expansion to the 7th respondent, 'HPCL' the public hearing was not conducted when there were various complaints made by the applicant-Association and others regarding the functioning of the 7th respondent. Already Indian Institute of Science, Bangalore has submitted its report on odour nuisance and submitted a report to the State Pollution Control Board regarding the marine pollution. There are already the conditions and precautions for preservation and protection of the marine environment published by the Indian Coast Guard. The applicant had alleged that the 7th respondent is discharging the untreated water into the sea causing water pollution which has to be addressed only by the State Pollution Control Board.**

- 10. The State Pollution Control Board, who is the 5th respondent,** had in its report stated that a report was called for from it regarding the accident that took place on 25.05.2021 in the 7th respondent unit. The total area of the unit is about 1880 acres which was leased from the Visakhapatnam. The 7th respondent, 'HPCL' is surrounded by various other industries on all the four sides and the green belt developed in the unit is about 45 acres and in an addition the industry has planted about 06 lakh saplings in Greater Visakhapatnam Municipal Corporation limits.
- 11. The industry was issued with 'Consent for Operation' and hazardous waste authorization by the Board on 09.03.2021 which has got the capacity of 10 million metric ton per annum of crude oil. There was an accident on 25.05.2021 and Andhra Pradesh Pollution Control Board had inspected the site along with the scientific staff of the zonal lab, Vishakhapatnam and monitored the ambient air quality and submitted the monitoring report. It is also observed that contaminated waste water was generated due to fire fighting, sea cooling water is used in the fire water network and the fire water used for fire fighting operations collected in surface drains was routed to effluent treatment plant for treatment along with other waste waters. Water samples were collected during fire fighting operations from the drain where analysed and a report was given by the State Pollution Control Board. The industry was also directed to dispose of the oily sludge generated during fire incident to authorised agencies/treatment storage disposal facility for safe disposal.**
- 12. The 7th respondent had also informed that the oily sludge generated will be mechanically treated for oil recovery and the recovered oil pumped to slop tanks for processing along with crude oil. The residual low oily sludge will be bio-remediated within the industry. As per the information given by the 7th respondent to the Andhra Pradesh Pollution Control Board about Rs. 25 Crore worth of works have been undertaken immediately to replace the pipelines and machinery and about 78 metric ton of hydrocarbon was burnt in the fire accident**
- 13. The 6th respondent, who is the District Collector and Magistrate,** also had constituted a Committee on the date of accident and a copy of proceedings was also issued. As per the proceedings, the Committee to enquire and submit a report to find out the cause of

outbreak of fire in the factory, whether sufficient measures have been taken by the management of the factory, whether any negligence or lapses are noticed in avoiding the mishap on the part of the management and whether any departmental failure is noticed were to be discreetly enquired and submitted.

14. The report submitted by the Enquiry Committee constituted by the District Collector and District Magistrate was also submitted to the Andhra Pradesh Pollution Control Board. The report also had identified the lapses and had given the recommendations to the unit to avoid such incidents in future.

15. The 7th respondent, who is the refinery unit, had filed its reply through its Dy. General Manager-Technical. The 7th respondent has specifically stated that it has got the name plate capacity of 8.33 Million Metric Tonnes and also a valid 'Consent for Operation' for 10 MMTPA. But the refinery is operating only in the range of 09 to 9.78 MMTPA. The refinery also had obtained all the necessary environmental consents to operate its refinery and complies with conditions imposed upon it by the environmental authorities. A very detailed reply is filed by the refinery unit setting out in detail the response for all the allegations made in the application.

16. The refinery unit/7th respondent also filed its objection to the Joint Committee report dated 03.12.2021 and reply to the allegations dated 03.10.2021 with respect to the Joint Committee report dated 23.02.2022. There is yet another objection to the report of the Joint committee dated 17.06.2021 filed by the refinery on 16.09.2021.

17. The Learned Counsel appearing for the refinery unit confined his argument only with the following issues, namely, (i) provision of 33% of the green belt, (ii) odour nuisance and (iii) the fire accident.

Odour Nuisance:

18. Pursuant to the complaints received from public of odour problems from several parts of Vizag City, Andhra Pradesh Pollution Control Board (APPCB) and District Administration of Vizag engaged IISC Bangalore to identify the root cause of odour nuisance. The major observation of the IISC is that the compounds responsible for odour

problem in Vizag City could be the cumulative effect of odorous organic and inorganic like unburnt hydrocarbons, BTX solvents, sulphides, amino compounds etc. from the industrial establishment, domestic sewage, municipal solid waste and vehicular exhausts and it is difficult to pinpoint any one industry. Thus the IISC had recommended the following measures for mitigating the pollution from the industries:

i. Even if industries follow good practices and maintain crisis within the limits, there are possibilities of episodic odour issues. In such cases, it is the responsibility of each and every industry in the region towards community to cooperate and participate in taking the order problem in Visakhapatnam area.

ii. APPCB being the model agency, should form an odour squad comprising members from APPCB, each stakeholder industry, prominent community members and experts in environmental field. The task of the squad should include:

- In case of any episode, the APPCB nominate to inform all members about the complaint and location.*
- The squad to visit the site and take ambient air samples in Tedler bags which should be stored under appropriate conditions and transported immediately (for GC-MC analysis) to recognized laboratory.*
- Upon receiving the complaints from the squad, each industry should check for abnormal emissions or operating conditions if any, in their industry and report to APPCB and take necessary actions.*

iii. APPCB should initiate a community medical study to correlate the mortality rate before and after the odour episode for compare the data during non-episodal to evaluate the hazard.

iv. Use of respiratory masks must be encouraged wherever odor is experienced.

v. Public education is an important concept in odor management. The odor squad should strive to impress upon people of Visakhapatnem that the common odor one might smell from the industries or any other sources will not have serious impact on average person's health if released in small amounts. It is important to maintain public decorum and take steps to mitigate the panic among the general public regarding proper education."

19. The Joint Committee had observed that the unit had not provided closed collection system to handle the odorous effluent streams. The oil-water separators and equalization tanks are not covered to trap the VOCs. Hence there was a strong odour of VOCs sensed in the ETP I & IV near bio-remediation ponds.

20. However, the 7th respondent had replied that the odour was localised and intermittent and it was not felt beyond ETP area. VOC recovery system is being implemented in the IETP as part of VRMP which is under mechanical completion stage. The existing ETPs will be non-operational post commissioning of IETP.

- 21.** In its reply, the 7th respondent has stated that a purchase order has been placed by the respondent on M/s. Glens Innovation Labs Private limited, Chennai for conducting odour study at the 7th respondent refinery which will be reviewed and vetted by IIT Madras and that the work will commence in April 2021. The status of the same is not furnished by the 7th respondent.
- 22.** A brief compliance report was also furnished by the refinery unit in which it is stated that despite following good practices and maintaining the emissions within the limits, there are possibilities of episodic odour issues. In such cases, it is the responsibility of the unit to cooperate and participate in tackling the odour problem. It is admitted by the 'HPCL' that checks were carried out inside the refinery and no abnormalities were observed and it was promptly communicated to the complainants and the authorities as applicable. It is also stated that an odour squad comprising members from Andhra Pradesh Pollution Control Board and stakeholders from the industry and prominent community members and experts in environmental area were constituted. The squad would visit the site and take air samples in Tedier bags which would be stored under appropriate conditions and transported to a recognised lab. The unit has stated that as and when complaints were received, the plants were checked for any abnormality and no abnormalities were found. As per the odour squad's recommendation the use of respiratory masks are encouraged.
- 23.** Though the smell from the industries may not have any serious impact on an average person health, the public also should be properly educated on the same as per the recommendation of the odour squad.
- 24.** Albeit, odour control is a major issue in any oil refinery as there is plenty of scope for unpleasant emissions which are inevitable. The 7th respondent refinery is a large scale refinery having the potential to generate odour that can be detected over large distances requiring a high performance odour control measures to minimize the odour impact. The odour impact besides being annoying also impacts the health. Stable petrochemical production may be associated with low but long-term exposure to industrial emissions. Nevertheless, accidents in the plants, such as the one happened in this case may temporarily cause high level of exposure in the population living near the plants.

25. The APPCB in its observation has not specified any well defined sources for the odour:-

"a. The unit is not complying with the majority of conditions stipulated in Environmental Clearances granted to Visakha Refinery.

b. The unit is not complying with the majority of consent & authorization conditions issued by APPCB on March 9, 2021; these are the same conditions given by APPCB at the time of consent & authorization renewal.

c. APPCB had issued 16 points directions for non-compliance on March 19, 2020; the unit is not complying for 6 points and partially complied for one point even after one year.

d. The committee had monitored stack emission at five stacks, manual ambient air quality monitoring at three locations and CAAQM using mobile van at two locations. The stack emissions are meeting the prescribed standards, the ambient air quality for PM10, PM2.5 parameter is exceeding at all the five locations, at one point near the ETP-IV area the concentration value of SO₂ is exceeding the standards.

e. The effluent discharge standards for the ETP outlet of I & IV are not meeting however due to mixing of one time cooling water with the treated effluent at the final discharge point, the prescribed discharge parameters are meeting the standards.

f. The committee calculated the prescribed pollution load for efficiency & emission in CFO and are meeting the prescribed standards.

g. The committee calculated environmental compensation for violation & non compliance of the directions issued by APPCB and levied Rs. 89,04,000 (Rupees eighty nine lakhs and four thousand only). M/s. HPCL, Visakha Refinery has to pay Rs. 89,04,000/- to APPCB.

h. The unit has to ensure self-monitoring, self-compliance and comply with statutory guidelines, safety measures, and directions issued by MOEF & CC, CPCS, APPCB, Directorate of Factories and other Regulatory Authorities.

i. The sulfur content in the crude oil is found to be less than the sulfur content in the all products."

26. From the above report of the APPCB, it can be inferred that most of the odours encountered during the observations were due to normal operations and diffuse emissions.

27. To ascertain the source of pollution, the Joint Committee along with the scientist of APPCB Zonal Laboratory carried out Ambient Air Quality Monitoring at 5 locations (Manual monitoring at 3 locations and Mobile van with CAAQMS at 2 locations) in and around the industrial premises.

"5.0 Monitoring of ambient air quality and stack emission in HPCL:

To ascertain the source of pollution, committee along with scientist of APPCB, Zonal Laboratory carried out ambient air quality monitoring at 5 locations (Manual monitoring at 3 locations & Mobile van with CAAQMS at 2 locations) in and around the industry premises.

Table 4: Details of ambient air quality monitoring locations

S. No.	Location	Latitude	Longitude	Date of monitoring	Parameters
I Manual Stations					
1	North-east side of the industry (near industry CAAQM stations at HLPH)	17.696921	83.251094	25.03.2021 and 26.03.2021	PM 10, PM 2.5, SO ₂ , NO ₂ & NH ₃ .
2	South-west to industry (Yarada park housing colony - S10 building)	17.688231	83.240756		
3	South-east side of the industry (near industry CAAQM station)	17.688419	83.250038		
II Mobile Continuous Ambient Air Quality Monitoring Station (CAAQMS)					
1	North-west corner of the industry near ETP - 4	17.700329	83.237126	25.03.2021 and 26.03.2021	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , NH ₃ , O ₃ , CO, Benzene and VOCs.
2	South-east side of the industry (near industry CAAQM station)	17.688419	83.250038	26.03.2021 and 27.03.2021	

The parameters monitored are PM₁₀, PM_{2.5}, SO₂, NO₂, NH₃, O₃, CO, Benzene and VOCs between 25.03.2021 and 27.03.2021. The monitoring results are depicted in table 5 below:

Table 5: Ambient air quality monitoring results

S. No.	Location	PM ₁₀	PM _{2.5}	SO ₂	NO _x	NH ₃	O ₃	CO	Benzene
I Manual Stations									
1	North-east side of the industry (near industry CAAQM stations at HLPH)	267	92	44	33	29	-	-	-
2	South-west to industry (Yarada park housing colony - S10 building)	115	69	19	17	27	-	-	-
3	South-east side of the industry (near industry CAAQM station)	248	83	48	36	30	-	-	-
II Mobile Continuous Ambient Air Quality Monitoring Station (CAAQMS)									
1	North-west corner of the industry near ETP - 4	320	89	84	39	40	57.7	1.4	2.7
2	South-east side of the industry (near industry CAAQM station)	298	94	52	42	35	66.2	1.7	3.3
24 Hour average standard		100	60	80	80	400	100 (8 hours)	4 (1 hour)	-
Annual average standard		60	40	50	40	100	180 (1)	2 (8)	5

						hour)	hours	
All values are expressed in $\mu\text{g}/\text{m}^3$, except CO. CO values are expressed in mg/m^3 .								
Analysis result of other 49 VOCs is annexed (Annexure - 16).								

The results show that the values of PM_{10} & $\text{PM}_{2.5}$ values are exceeding the 24 hour average standards. The SO_2 value at the North-west corner of the industry near ETP - 4 is exceeding the standard. The values of SO_2 & NO_x , though not exceeding the standard limits found far higher than the values obtained at the locations elsewhere in Visakhapatnam city. This indicates that there are leaks in the process systems through which, PM_{10} , $\text{PM}_{2.5}$, SO_2 , NO_x , etc. are find their way into the ambient air as fugitive emissions. Higher values of PM_{10} & $\text{PM}_{2.5}$ in the ambient air could also be attributed due to the expansion works going on within the premises of the refinery.

M/s. HPCL Refinery has installed three CAAQM stations within the periphery of the industry for continuously monitoring the ambient air quality on real-time basis. The data from these stations is transferred to APPCB & CPCB servers. Data pertaining to the monitoring for the period from January, 2020 to March, 2021 is enclosed (**Annexure - 17**). From the results it is observed that the value of PM_{10} and $\text{PM}_{2.5}$ are exceeding the standard. During February 15 to March 15, 2021 in the CAAQMS station at the southern side of the industry, there is a spike in the SO_2 value.

The Joint Committee requested Zonal Laboratory, APPCB, Visakhapatnam to carry out ambient air quality monitoring using mobile CAAQM Station for three days during May 3-6, 2021 and 06.05.2021 in the residential area of Malkapuram at Ajanta colony which lies south-east direction of M/s. HPCL Refinery to verify the impact of emissions from the refinery. The results obtained are tabulated as below:

Table 6: results of the ambient air quality monitored at Malkapuram in Ajanta colony

S. No	Date	PM_{10}	$\text{PM}_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Benzene
1	03.05.2021 to 04.05.2021	91	25	33	25	16	41.2	0.9	1.5
2	04.05.2021 to 05.05.2021	72	17	25	22	15	29.7	1.0	0.6
3	05.05.2021 to 06.05.2021	67	16	37	24	23	55.1	0.9	0.7
	24 Hour average standard	100	60	80	80	400	100 (8 hour s)	4 (1 hour)	-
	Annual average standard	60	40	50	40	100	180 (1 hour)	2 (8 hour s)	5
All values are expressed in $\mu\text{g}/\text{m}^3$, except CO. CO values are expressed in mg/m^3 .									
Analysis result of other 49 VOCs is enclosed (Annexure - 16).									

From the table above, it is observed that the all the parameters are well within the standards for all the three days.

28.Regarding emissions of stacks, the report of the committee is as follows:

"5.1 Monitoring of emission in stacks

Committee carried out monitoring of flue gas emissions from five important stacks for PM, SO₂ and NO_x during the period of inspection during March 25-27, 2021. Details of stacks monitored and the results are tabulated below:

Table 7: Analysis results of stacks monitored

S. No.	Stack identity	Date of monitoring	Parameter	Value (mg/N M3)	Standard
1	Stack attached to DHDS Reformer-61F11	25.03.2021	PM	39.0	100
			SO ₂	63.5	--
			NO _x	35.7	--
2	Stack attached to combined feed heater and product fractionators reboilers-90F01, 90F02	26.03.2021	PM	24.9	100
			SO ₂	184.7	--
			NO _x	204.9	--
3	Stack attached to Flue gas desulphurization unit FGD-II	26.03.2021	PM	36.0	50
			SO ₂	147.5	--
			NO _x	112.8	--
4	Stack attached to continuous catalytic reforming unit (CCR) 74F1, F2, F3, F4	26.03.2021	PM	22.0	100
			SO ₂	25.1	--
			NO _x	117.4	--
5	Stack attached SRU Train - III Incinerator 79F302	27.03.2021	PM	23.0	100
			SO ₂	32.5	--
			NO _x	35.7	--

Analysis reports enclosed (Annexure -18).

From the results, all the parameters are meeting the prescribed standard by APPCB for all the five stacks monitored.

The Visakha Refinery has installed Online Continuous Emission Monitoring Systems (OCEMS) to 32 stacks to monitor the flue gas emissions for Particulate Matter (PM), Sulfur dioxide (SO₂), Nitrogen dioxide (NO₂) and Carbon monoxide (CO) on real-time basis and connected to APPCB & CPCB server. Analysis data obtained from these stacks for the period from 01.01.2020 to 30.04.2021 has been collected and enclosed (Annexure - 18). There are few exceedances noticed during March, 2021

According to the CFO conditions issued by APPCB has prescribed stipulated standards for pollutant emission loads from the stacks for PM, SO₂, NO_x & hydrocarbons. The Joint Committee calculated pollutant emission load for compliance verification as tabulated below.

Table 8: Emission Load calculation statement for PM, SO₂ and NO_x as per the data obtained from the CEMS connected to stacks - From 01.01.2020 to 30.04.2021

S. No	Stack ID		SPM (TPD)	NO _x (TPD)	SO ₂ (TPD)
	S. No. as per CFO order	As per CEMS	Actual as per CEMS	Actual as per CEMS	Actual as per CEMS

1	Stack 4	Stack 01_CDU_I_2F1	0.028	0.058	0.283
2	Stack 6	Stack02_CDU_I_2F2-	0.008	0.043	0.182
3	Stack 5	Stack03_CDU_I_2F4-	0.016	0.055	0.275
4	Stack 1	Stack04_CDU_II_11F1-	0.068	0.173	0.543
5	Stack 2	Stack05_CDU_II_12F1-	0.015	0.066	0.166
6	Stack 12	Stack06_CDU_III_42F1-	0.057	0.133	0.552
7	Stack 13	Stack07_CDU_III_42F2-	0.01	0.04	0.15
8	Stack 14	Stack08_VBU_46F1-	0.006	0.062	0.137
9	Stack 15	Stack09_FCCU_I_4F51-	0.015	0.02	0.116
10	Stack 16	Stack10_FCCU_I_4F52-	0.094	0.045	0.146
11	Stack 35	Stack11_FCCU_I_FGD1-	0.063	0.42	0.184
12	Stack 3	Stack12_FCCU_II_14F1-	0.012	0.023	0.139
13	Stack 9	Stack13_FCCU_II_14F3-	NA	0.029	0.093
14	Stack 34	Stack14_FCCU_II_FGD2-	0.111	0.31	0.098
15	Stack 8	Stack15_PP_I_WIL8-	NA	NA	NA
16	Stack 27	Stack16_PP_1_IBH-	0.01	0.203	0.273
17	Stack 21	Stack17_DHDS_60F1-	0.002	0.045	0.108
18	Stack 19	Stack_18_DHDS_REFORM ER-	NA	0.042	0.054
19	Stack 20	Stack19_DHDS_HGU_61F I	NA	NA	NA
20	Stack 22	Stack20_DHDS_SRU_65F 001-	NA	0.02	0.042
21	Stack 26	Stack21_DHDS_SRU_79F 302-	NA	0.008	0.176
22	Stack 24	Stack22_CCR_74_F1toF4-	0.021	0.135	0.042
23	Stack 23	Stack23_NHT_72_F1F2-	0.003	0.017	0.02
24	Stack 25	Stack24_FCCNHT_75F1-	0.001	0.004	0.006
25	Stack 17	Stack25_CPP_HRSGIII-	0.083	0.978	0.047
26	Stack 18	Stack26_CPP_HRSGIV-	0.103	0.575	0.06
27	Stack 28	Stack27_CPP_HRSGV-	0.058	0.648	0.192
28	Stack 29	Stack28_CPP_HRSGVI-	0.064	0.74	0.176
29	Stack 30	Stack_29_DHT_FEED_90F 01_02-	0.054	0.092	0.138
30	Stack 32	Stack_30_DHT_HGU_NAP THA_HEATER_91F01-	0	0.002	0.001
31	Stack 31	Stack_31_DHT_HGU_91M 20-	0.063	0.079	0.071
32	Stack 33	Stack_32_DHT_SRU_92M 22-	0.004	0.018	0.051
Total (as calculated from the results obtained from CEMS connected to 32 stacks)			0.969	5.083	4.521
Total emission load (as stipulated to each stack in the CFO Order against the 32 stacks)			5.609	---	---
Total emission load (as stipulated to each stack in the CFO Order against all the 36 stacks)			6.72	---	---
Total emission load prescribed as per CFO Order			1.11	6.5	11.5
Stack monitoring data obtained from the Continuous Emission Monitoring Systems (CEMS) connected to 32 stacks for the period from 01.01.2020 to 30.04.2021. (Annexure - 19).					

From the above calculations, the parameters PM, SO₂ and NO₂ are meeting the prescribed standard for pollution emission loads."

29. As far as the waste water generation and treatment is concerned, there are three Effluent Treatment Plants in HPCL. Treatment effluent along with the ones-through cooling water is discharged into Megadrigedda surplus overflow channel through two numbers of Main Hay Filters, which finally joins the sea of Bay of Bengal.
30. During inspection, the Joint Committee collected treated effluents from three outlets of ETPs and the two final outlets discharged into Megadrigedda surplus overflow channel for compliance verification on 26.03.2021.
31. The Joint Committee had done the **domestic waste water** treatment analysis and observed that all the parameters are meeting the standards.

Groundwater Quality Monitoring:

"HPCL has installed six piezometer wells inside the unit premises to regularly monitor the groundwater quality. During the inspection, it was informed to the committee that four of the wells are dried up and the Joint Committee collected groundwater samples from two piezometer wells located within the industry premises.

Results shows that dissolved solids content in the groundwater within the premises of the refinery are very high exceeding the drinking water standard limits. This may either be attributed to the intrusion of sea water or be attributed to the seepage of sea water drawn by the refinery for cooling purpose."

Sulphur Balance Studies:

"The Joint Committee carried out sulphur balance studies for verification of compliance of stipulated standards. For the study, committee collected Sulphur related data of crude processed and petroleum products produced during the year 2020 (January to December).

Further, the refinery has used three types of fuels viz., fuel gas, low sulphur heavy stock (LSHS) fuel oil and CPP Naphtha for crude distillation, capital power generation, etc. purposes, which again is also having sulphur concentrations. The quantities of various fuels used and their sulphur content have also been verified by the Joint Committee while carrying out sulphur balance studies.

From the analysis sulphur balance studies, it appears that the refinery is not exceeding the sulphur dioxide emission load of 11.5 tons per day stipulated in the APPCB CFO order dated 18.12.2019.

In support of the claim of the refinery that is recovering sulphur from the crude and its products, it has provided the quantity of recovered sulphur for past five years from 2016-17 to 2020-21."

32. After the above analysis, the Joint Committee has observed as follows:-

"9.0 Observations of the committee:

i. Committee inspected HPCL known as Visakha Refinery during March 25-27, 2021. During inspection the unit was operational, however, FCCU-I, SRU train 1&2, Merox unit were not in operation. It was informed that FCCU-I is currently shutdown due to low catalyst circulation rate, and the unit is having four SRU Trains

and total design feed rate of these SRUs is higher than the generated feed gas. Generally, two SRU trains will be in operation. Thus SRU Train-3 and DHT SRU were in operation.

ii. The unit has three ETPs for treating the different streams of effluents generated. ETP -I is of the capacity 3,240 KLD, ETP - II (7,800 KLD) and ETP - IV of 4320KLD capacity. During inspection, ETP I & ETP-IV were fully operational, but, ETP -II was partially operational and was diverted to ETP -IV for further operation. It may be noted that the design capacity of ETP-IV is smaller compared to ETP-II, hence, complete treatment cannot be achieved. This is also reflected in the analysis results of ETP-IV outlet (Table 13). The chance of bypass is highly possible, however, during inspection no by-pass of effluents was observed.

iii. In the ETP-II area, the TPI was broken down and the thick black slurry like effluent was spilled all over and was filled in the drains. The drains near ETP-II section was filled with water and white sand like material.

iv. The storm water drains near the final outlets I & II was filled with water and when enquired, it was told that rain water. The small tank is constructed near the guard pond and it was observed that about four inches oily mark was visible. The water filled in this tank is transported to the rain water harvesting tanks through tankers.

v. The unit has not provided closed collection system to handle the odours effluent streams. The oil-water separators and equalizations tanks are not covered to trap the VOCs. Hence, during inspection a strong odour of VOCs was sensed by the committee members in the ETP I & IV, near bio-remediation ponds and at guard pond.

vi. The guard pond is filled with the treated effluent of ETP-I & II and ones through cooling water. It was observed that the oil was floating on the surface of the guard pond near the inlet of ETP treated water.

vii. The hazardous waste generated by the refinery as per the authorization is stored in a separate shed under lock & key. The different types of wastes are kept separately with demarked. The wastes are disposed accordingly mentioned in the authorization.

viii. Sludge generated from Crude/Product tanks is shifted to Sludge lagoons and is called as high oily sludge. Processing of this sludge to recover the oil is carried out through a temporary facility (Decanter, Centrifuge, RO Tank) installed by external agency. When 3000 to 5000 m³ of sludge is accumulated, tender is placed for processing of sludge. The third party by installing temporary facility such as Decanter, Centrifuge & RO Tank. The recovered oil generated is pumped to slop oil tanks for further reprocessing in CDUS. Low oily residual sludge generated out of sludge processing is taken to Bins for Bio Remediation process.

ix. During inspection, it was noticed spillages in the sludge processing area and scatter of sludge near the sludge lagoon ponds. The sludge lagoon ponds were not covered and the VOC measured by hand held instrument showed 8 - 9 PPM. In this area strong VOC was sensed by the committee members. The industry representative informed that it is only local and is not carried to other area of the refinery.

x. In the bio-remediation process of low oily sludge, 10 bins of 100m³ of each is constructed and filled with low oil sludge, the oil zapper bacteria at 5 kgs/m³ and nutrients of 250g/m³ is mixed along with the sludge. Periodic tilling has to be carried out. After two months the sludge has to be tested for the oil content and if required additional oil zapper bacteria and nutrients have to be added. After 10-12 months, the oil sludge will be completely degraded and can be used as manure.

xi. However, during inspection it was noticed that the 5 bins were empty and the remaining bins was filled with sludge, but on top of the sludge high oil sludge along with biofilms was dumped. The sludge was too dried and appears that it was not tilled and aerated for the growth of bacteria for the treatment.

xii. It was informed that the 1st batch was processed in bin no. 2, 5 & 6 and completed in March, 2020. The treated sludge was utilized for garden soil and road repair works in project Site.

xiii. It has been observed that project had display board at the main entrance gate. However, the critical parameters viz., stack emission, ambient air quality monitoring, water, noise, VOC, etc. data are not being displayed.

xiv. Thick black smoke emissions from the flare stacks were observed during inspection of the refinery. APPCB officials have also recorded in their reports during inspection of the refinery on 16.07.2020 and 30.11.2020, which indicate escape of incomplete and unburnt aromatic and aliphatic hydrocarbon emissions into the atmosphere.

xv. Refinery does not have the inventory of unrecoverable volatile organics venting through the flare stacks for burning.

xvi. It has been observed that, vide EC dated 03.02.2004 and 02.09.2009 project was under expansion from 7.5 to 10.0 MMTPA. As per EC dated 11.02.2016, project is under expansion from 8.33 MMTPA to 15.0 MMTPA. However, during inspection, no information has been provided for expansion of project from 7.5 to 8.33 MMTPA.

xvii. It has been observed that the PAs are submitting the six monthly compliance reports with respect to latest EC dated 11.02.2016 only. However, compliance status of earlier granted EC's and monitored data of air, water, noise, etc. are not being submitted.

xviii. Compliance of standards/norms in terms of fugitive emissions and VOC emissions monitoring at ETP area are not being implemented as per Oil Refinery Industry notified under the Environment (Protection) Rules, 1986 vide G.S.R. 186(E) dated 18th March, 2008.

xix. The project had not provided a mobile laboratory with adequate facility to monitor ambient air quality outside the refinery premises. The condition has been imposed in the EC dated 30.05.1995. However, till date mobile laboratory was not provided.

xx. As per CFO, there were 35 stacks were present in the project. However, continuous on line stack monitoring facilities were provided for 32 stacks only.

xxi. Monitoring of process emissions viz., SO₂, NO_x, HC (Methane & Non-methane), VOCs and Benzene from various units is not being done.

xxii. The monthly Sulphur balance sheet of the refinery along with six monthly compliancereports.

xxiii. Facilities for monitoring of HS, mercaptan, non-methane-HC and Benzene at all CAAQ monitoring stations is not being provided.

xxiv. The comprehensive water audit reports on annual basis are not being submitted to Ministry's Integrated Regional Office.

xxv. It has been observed that the PAs are in process of developing green belt in and around the plant premises. However, it has been observed that the plantation around the project area is not satisfactory.

xxvi. Uploading of environmental statement for each financial year ending 31st March in Form-V on company's website is not being done.

10.0 Suggested remedial measures to mitigate pollution.

The committee suggests the following measures:

i. The unit should comply with the all the conditions mentioned in the CFO and hazardous waste authorization and also the directions issued by APPCB for effective and safe operation of the refinery so as to mitigate the pollution to possible extent.

ii. The unit should take necessary steps to reduce the PM₁₀ & PM_{2.5} values in ambient air within the industry premises, the values in the CAAQMS in all the three locations shows the exceedances throughout the year 2020. The unit should spray water on the road and to plan the timings for the movement of vehicles inside the industry to control the fugitive emissions.

iii. The five stacks monitored are meeting the prescribed standards, however, two stacks which were not monitored due to some issue in the stack monitoring platform has to be rectified.

iv. Refinery has provided OCEMS in 32 stacks to monitor PM, SO₂, NO_x & CO and remaining 4 stacks has to be installed. The OCEMS data are connected to CPCB & APPCB servers. CEMS for

measuring Hydrocarbons are yet to be installed. A few exceedances were observed during March, 2021. The industry should take periodic calibration and maintenance of analysers to avoid the exceedances in standards.

v. The unit should rectify and repair the ETP -II components for effective treatment, the effluent spilled near the TPI area should be cleaned. The storm water drains near the ETP-II and final outlets have to be cleared for free flowing and to avoid stagnations. The small pump has to be installed in the tank constructed to collect the rain water near the guard pond to avoid manual transportation of the rain water to the ETP.

vi. The ETPs should be operated regularly and effectively for meeting the prescribed discharge standards. The unit should install covers either floating /fixed types in the oil water separator and equalization tanks to trap the VOCs for eliminating the odours. The trapped off-gas has to be treated to remove at least 90% of VOCs.

vii. The unit should recycle the treated water to the maximum extent to reduce the fresh water consumption instead of fully discharging into sea along with cooling water.

viii. At present the unit is monitoring the LDAR program annually through third party laboratory. According to the standards for equipment leaks and good practices it is advised to conduct the quarterly monitoring of LDAR for pump seals, compressor seals, pressure relief devices & heat exchangers and annually monitor the process drains & components that are difficult to monitor.

ix. The high oily sludge from the crude and products tanks stored in the sludge lagoons has producing VOCs, the unit has to take necessary steps to eliminate the VOCs odour in the area.

x. The housekeeping at the sludge processing area has to be improved, the unit may take necessary action against the third party laboratory for causing spillages during sludge processing and advise to avoid spillages.

xi. The bio-remediation of the low oily sludge has to be carried out technically and avoid dumping of unwanted waste in the bins. Before using the treated sludge as manure, it is required to analyse to check that the oily sludge is completely degraded. The oil contents in terms of Total Petroleum Hydrocarbon (TPH) after bioremediation are less than 1%.

xii. To develop 33 % of total area as a green belt along the industry premises to stop the odour issues as well as to eliminate the fugitive emissions. The unit may plant the odour eliminating plants suitable for refinery industry.

xiii. Refinery shall work out mass & material balance studies and maintain the inventory of unrecoverable volatile organics venting through the flare stacks for burning. Records to this effect shall be produced before the regulatory officials as and when required.

xiv. Suggested that the refinery shall procure, install and operate one Continuous Ambient Air Quality Monitoring station (CAAQMS) with PM 10, PM2.5, CO, O3, SO2, NO2, NH3, Benzene, H2S and Mercaptans parameters at an appropriate location in the residential areas of Malkapuram to assess the impact of refinery activities.

11.0 Concluding remarks:

a. The unit is not complying the majority of condition stipulated in Environmental Clearances granted to Visakha Refinery.

b. The unit is not complying with the majority of consent & authorisation conditions issued by APPCB on March 9, 2021; these are the same conditions given by APPCB at the time of consent & authorisation renewal.

c. APPCB had issued 16 points directions for non-compliance on March 19, 2020; the unit is not complying for 6 points and partially complied for one point even after one year.

d. The committee had monitored stack emissions at five stacks, manual ambient air quality monitoring at three locations and CAAQM using mobile van at two locations. The stack emissions are meeting the prescribed standards, the ambient air quality for PM10, PM2.5 parameter is exceeding at all the five locations, at one point near the ETP - IV area the concentration value of SO2 is exceeding the standards.

e. The effluent discharge standards for the ETP outlet of I & IV are not meeting, however due to mixing of one time cooling water with the treated effluent at the final discharge point, the prescribed discharge parameters are meeting the standards.

f. The committee calculated the prescribed pollution load for effluent & emission in CFO and are meeting the prescribed standards.

g. The committee calculated environmental compensation for violation & non-compliance of the directions issued by APPCB and levied Rs. 89,04,000/- (Rupees eighty nine lakhs and four thousand only). M/s. HPCL, Visakha Refinery has to pay Rs. 89,04,000/- to APPCB.

h. The unit have to ensure self-monitoring, self-compliance and comply with statutory guidelines, safety measures, and directions issued by MOEF & CC, CPCB, APPCB, Directorate of Factories and other Regulatory Authorities."

33. Therefore, the 7th respondent has decided to follow the specific directions recommended by the EAC (Expert Advisory Committee) to comply with the same.

Greenbelt:

34. Vegetation around the industry or the greenbelt is to mitigate the air pollution as the plants serve as a sink for pollutants and also reduce noise level. Greenbelt development is beneficial in several ways leading in conservation of bio-diversity, retention of soil moisture, recharge of groundwater, improving aesthetics of local environment and maintaining pleasant atmosphere of the region.

35. It would be relevant to advert to the order passed by the Hon'ble High Court of Andhra Pradesh in **W.P. No.259 of 2017** dated 23.09.2019 wherein a direction was given to the HPCL to comply with the CFO conditions including the recommendations of Andhra Pradesh Pollution Control Board (APPCB) of its report dated 25.04.2019 and further directing the Board to monitor the refinery and take appropriate action if necessary. In the said order, the Andhra Pradesh Pollution Control Board (APPCB) had recommended that besides the completion of plantation of 6,50,000 saplings, there was further scope for development of greenbelt in the vacant areas.

"The Board has stipulated Load based standards for the stack emissions. Whereas the Industry is measuring the emissions for concentrations. But the industry is generating load based data randomly duly taking volumetric flow data from third party monitored reports. The industry may be recommended to develop a methodology to correlate the concentration based result to convert to load based values to verify the compliance.

The industry may be recommended to improve housekeeping near ETP-IV.

The industry may be recommended to store used chemical drums in closed sheds.

There is further scope for development of Green Belt in the vacant areas.

There is scope for improvement of Bio-remediation pond management as certain spillages on ground were observed.

The industry may be recommended to comply with CFO conditions."

36.Condition No. 16 of Schedule - B of the CFE Expansion Order dated 06.07.2016 speaks about the greenbelt:

"the total area of the industry after expansion is 860 acres. Green belt is existing in an area of 45.0 acres. The area of the green belt after expansion is 112.5 acres. The industry vide mail dt. 06.07.2016 informed that being a brown field project, there is no adequate space available within the refinery for provision of additional green belt. Further, plantation of trees is not recommended inside the plant area due to safety considerations and development of green belt along the boundary is prohibited considering the associated security risk. The industry under "Green Visakha Programme" about 4,50,000 saplings were planted till 2015. Additional plantation of 2,00,000 saplings is to be undertaken up and completed during 2016-17. The major areas of plantation are Autonagar, Vadlapudi, Parawada, Sheelanagar, Aganampudi, Denkada etc., and the total acreage of block plantation in these areas is approximately 700 acres."

37.From the above it appears that the industry had complied with the greenbelt requirement.

38.Development of greenbelt consisting of 3 tier along the periphery of the project with native species is most important guideline for any type of industry. Green vegetation cover is beneficial in many ways leading to conservation of bio-diversity. The greenbelt species should be selected based on the type/category of the industry and climate conditions. Setting trees around an industry may not serve the purpose of greenbelt without considering the above aspects.

39.Therefore, the APPCB may consult the Andhra Pradesh Forest Department and NEERI in this regard for the delineation of the optimal width of a greenbelt in and around the industry based on pollution attenuation coefficient of selected place species. The 7th respondent may consider contributing to the greenery of the Vizag city.

Fire Accident:

40. It is not a secret that an oil refinery or petroleum product industry is a dangerous job. There is always something that could go wrong. One of the serious risks in these industries is the potential for fire and explosions. It is therefore important to conduct fire risk assessment. The management also put in place several rules and practices and train the employees how to recognize the hazards.

41. On 25.05.2021, there was a fire accident at Crude Distillation Unit III of the 7th respondent. A report was called for in this regard from Andhra Pradesh Pollution Control Board (APPCB) which was submitted along with the detailed report from the enquiry committee submitted to the Collector & District Magistrate. The cause of the outbreak was found to be the hole that developed on the 6" SR pipeline carrying Bitumen due to corrosion or erosion. The report further observed the following lapses of HPCL during inspection.

"1. Deviation in implementing preventive maintenance schedules as per the Standard Operating Procedures (SOP) within the time. During inspection, it was observed that industry was not conducted the Ultra sonic test for 6 inch pipeline in CDU-3 (fire incident was taken place) for which the due date for testing is August 2020.

2. Industry has conducted of hydro-test to the pipelines in August, 2012, and not conducted afterwards this test should be which will be conducted every 4 years which is serious lapse on account of HPCL.

3. Failure in identifying corrosion / erosion of the pipelines carrying hydrocarbons at higher temperatures

4. Preventive maintenance schedules are not implemented properly."

42. The report also furnished the recommendations suggested by the committee as follows:

"In view of the fire incident that occurred at HPCL-Visakha Refinery on 25.05.2021 at 3.10 PM the committee has suggested the following recommendations to avoid such incidents in future:

1. Industry shall conduct timely Hydro Testing of all pipelines for its efficacy and also shall start the Hydro testing of all pipelines of the other two crude distillation units existing in the same premises immediately by the management to avoid this type of fire incidents.

2. Industry shall ensure hydrant pressure of 7 kg / cm² at any point of time in the fire hydrant network

3. Industry shall ensure the operability of Diesel operated pump dedicated to fire hydrant network. A standby Diesel pump may be installed.

4. Industry shall conduct the audit of Foam availability in the plant premises regularly.

5. Industry shall strengthen the mutual aid agreement with the nearby industries

6. Industry shall conduct periodical mock drills and find out any lapses in the mitigation of defined scenario.

7. Industry shall mark the flow directions on the pipelines by indicating arrow marks for easy identification.

8. Industry shall conduct HARA study and implement the recommendations therein from time to time.

9. Industry shall clear accumulated trash and scrap regularly as the industry is under expansion.

10. A detailed metallurgical / micro-structural analysis of the failed pipeline elbow to be carried out to establish the nature of failure by external qualified agency.

11. The management shall follow the directions to be issued by Hon'ble NGT in OA No. 73/2021 which is filed case on the fire incident.

12. HPCL should purchase Hydraulic platform and made it available for any fire mishaps at heights, since most of the pipeline elevated structures are upto 30 meters and above

13. Escape signage boards should be displayed in the entire premises."

43. The report of the HPCL / 7th respondent on CDU-3 fire accident on 25.05.2021 is as follows:-

2.1.1 Ambient Air Quality:

There was no increase in the ground level concentrations of ambient air quality parameters recorded in the two of the three Continuous Ambient Air Monitoring (CAAM) stations during the fire incident. In the third CAAM station located at south gate, even though there was slight increase in NO_x emissions for short duration (15:45 hrs to 16:45 hrs), the 24-hour average value was well within the stipulated limit of National Ambient Air Quality Standards (NAAQS).

Since the wind direction was predominantly towards south east during the incident, the average recorded values of the ambient air quality in CAAMS-1 (South Gate) which is located at south-east in the downwind direction during the incident are provided below:

CAAMS - 1 (South Gate)								
	Nox	So2	CO	PM 10	PM 2.5	Benzene	Ozone	NH3
	µg/m ³							
Average value observed during incident	66	8	1	240	40	0.4	9	0.1
24 hour Average value (8 AM to 8 AM)	27	8	0.8	177	39	0.8	13	0.1
Stipulated limit	80	80	2	100	60	5	100	400

As can be seen from the above table, all the ambient air quality parameters were within the stipulated limits, except PM10, which has been higher before, during & after the incident due to the ongoing construction activities in the area including the approved refinery modernization project. 15-minute average data recorded in the CAAMS-1 (South Gate) from 14:00 hrs to 17:00 hrs of 25.05.2021 is provided in Annexure-I, which shows that the ambient air quality parameters were within stipulated limits

2.1.2 Liquid Effluent

Sea cooling water is the medium used in the fire water network of HPCL-Visakh Refinery. The fire water was mainly used to extinguish fire during the incident besides dry chemical powder (DCP) and aqueous foam. The fire water used for fire-fighting gets

collected in surface drains of CDU-3 and is routed to API separators of ETP-1 (as per design) where the traces of oil (if any) will get removed. This fire water (after oil removal) along with sea water cooling tower blow down is routed back to sea through the normal outlet channel of Refinery at MHF-1 (Main Hay Filter).

The fire water samples from CDU-3 surface drain and the final outlet after treatment in the API separators were collected for analysis. The samples were analyzed by MoEF recognized third party laboratory, M/s SV Enviro Labs & Consultants, and it was found vide reports dated 15.06.2021 that the parameters of final outlet were within the stipulated limits of sea cooling water discharge. Analysis reports are provided in Annexure-II.

3. CONCLUSIONS

From the above, following inference can be drawn:

a) The Refinery operations are carried out as per stipulated norms. There is no violation of Consent For Operation (CFO) granted by the environmental authorities. The emissions and discharges resulting from the fire incident in CDU-3 are within the prescribed parameters.

b) The fire incident has not impacted the environment or surrounding habitation and the ambient air quality was within stipulated limits."

44. In its objections to the Joint Committee report, the 7th respondent had stated that "the hydrotest and other testing activities are carried out during unit shutdown period stretching about one month. During the shutdown, each equipment will be dismantled, tested and refitted and thereafter Hydro testing will be conducted. For carrying out these activities, more than 1000 workers have to be assembled and they work round the clock for about one month. In view of the Nationwide lockdown due to COVID situation prevailing during the mentioned period, the above said activities could not be taken up as a planned activity. However, the UTG (Ultrasonic Thickness Gauging) of the pipelines was initiated in 2020 and the same was in progress till the onset of the COVID lockdowns. UTG of the balance pipelines and hydro test of all the pipelines were completed during the shutdown. In addition, various established alternate testing methods such as on stream inspections (OSI), Visual Inspection (VI) and in house Remaining Life Assessment (RLA) were carried out for all hydrocarbon (HC) circuits to ensure healthiness and longevity of the pipelines."

45. Regarding the environmental damage assessment for contribution of emission into atmosphere, the Joint Committee proposed to levy environmental damage compensation as per the European Union "Environmental Prices Handbook" EU 28 Version, wherein prices are expressed in Euros/kg pollutant emitted into the environment. The committee had used the document as a reference to calculate the

prices of the pollutants emitted into the environment, as the documents indicate 3 types of pricing viz., lower, central and upper, depending upon magnitude of emissions.

46.As the quantities of pollutants emitted were in considerable quantity, but there was no significant damage to the surrounding environment injury or casualties reported, the committee had used central limit environmental prices assigned to SO_2 & CO_2 while calculating the damages. This was objected to by the 7th respondent contending that *"The Environmental Prices Handbook (EU-28 Version) which contains the standards applicable to the European Union and does not apply to India. Furthermore, as per Clause 3.2 of the Environmental Prices Handbook (EU-28 Version) it is stated that "the damage cost of environmental pollution can vary widely according to local circumstances and nature of environmental emission. Prices make no allowance for these differences". For these reasons, these environmental prices cannot simply be applied to specific cases of environmental pollution, for pollution in other countries or for pollution by non-average emission The Joint sources. Committee appears to have failed to consider the above. Without above, prejudice is further submitted that the Joint Committee Report applies central limit environmental prices even after finding that there was no significant damage to the surrounding environment, injury or casualties reported. Hence, this methodology of estimating the compensation is not applicable. Refinery SO_2 emission on the day of incident (25.05.2021) was 5.6 TPD. Even after considering the SO_2 emissions from hydrocarbon burnt during the fire incident (which was 2.3 MT as reported by the joint committee), overall SO_2 emission from the Refinery was 7.9 TPD, which is less than maximum prescribed limit of 11.5 TPD. Thus, the Refinery has not exceeded the prescribed SO_2 emission limit. The tons CO_2 of equivalent emissions per ton of crude ($\text{tCO}_2\text{e} / \text{MT}$) processed is in the range of 0.200 to 0.213 for HPCL - Visakh Refinery. The estimated increase in $\text{tCO}_2\text{e} / \text{MT}$ due to 211 MT of CO_2 as reported by the joint committee is 0.004 $\text{tCO}_2\text{e} / \text{MT}$, which is insignificant. Finally, the committee observed that there is no significant damage to the surrounding environment, the environmental compensation that is linked to the damage, should not have been ascertained. HPCL denies any liability to pay any compensation."*

47. The 7th respondent also disputed the liability of payment of compensation.

48. In this regard, it is useful to refer to the report of enquiry committee on the fire accident wherein the following lapses were identified by the committee:-

"9.0 IDENTIFICATION OF LAPSES

The following lapses of HPCL are observed during the inspection and document verification:

1. Deviation in implementing preventive maintenance schedules as per the Standard Operating Procedures (SOP) within the time. During inspection, it was observed that industry was not conducted the Ultra sonic test for 6 inch pipeline in CDU-3 (fire incident was taken place) for which the due date for testing is August 2020.

2. Industry has conducted of hydro-test to the pipelines in August, 2012, and not conducted afterwards this test should be which will be conducted every 4 years which is serious lapse on account of HPCL.

3. Failure in identifying corrosion / erosion of the pipelines carrying hydrocarbons at high temperatures

4. Preventive maintenance schedules are not implemented properly."

49. The above report clearly indicates that the 7th respondent had admittedly not conducted hydro test after 2012, though it should have been conducted every 4 years. It is only in 2020 as admitted the Covid-19 disabled them from conducting the hydro test. There is no clear answer given by the unit in this regard.

50. The conspectus of the above facts based on the reports of the Joint Committee constituted by the Tribunal and the enquiry committee headed by the District Magistrate on fire accident dated 25.05.2021, the HPCL/7th respondent has complied with most of the directions issued by the APPCB, IISC - Bangalore and the Joint Committee but not completely.

51. In fact, the recommendations of the IISC, Bangalore were not complied with at the time of inspection of Joint Committee. The committee also found that the directions issued by APPCB for non-compliance of Consent for Operation and Consent for Establishment conditions and also for odour nuisances. The APPCB had issued directions to the unit under Section 33 (A) of the Water (Prevention and Control of Pollution) Act, 1974 and Section 31 (A) of the Air (Prevention and Control of Pollution) Act, 1981 for non-compliances

from 14.12.2021 till 19.03.2020. **Therefore, the committee observed that there were repeated violations by the unit from 2011 onwards** and decided to consider the number of violations from 2011 and recommended levying environmental compensation at Rs.8,35,20,000/ (Rupees Eight Crores Thirty Five Lakhs and Twenty Thousand only). The conclusions and recommendations of the Joint Committee are as follows:-

"(i) The unit after expansion consists of 860 acres and 112.5 acres is used for greenbelt development within the premises. At present the unit has no space for developing green belt inside the refinery. However, the unit has developed green belt outside the premises and major areas of Visakhapatnam city viz. Autonagar, Vadlapudi, Parawade, Sheelanagar. Aganampudi, Denkada etc.

(ii) The recommendations made by IISC, Bengaluru pertaining to M/s HPCL, Visakhapatnam (7 respondents) have been complied.

(iii) The committee revisited the no. of days of violations by M/s. HPCL and takes the violations date as the date of directions issued by APPCB on 14/12/2011 till 23/06/2021 the day of committee inspected and observed the non-compliances. Hence, for the repeated violations committed by HPCL, Rupees Eight Crores Thirty Five Lakhs and Twenty Thousand of EC has been calculated and levied.

(iv) M/s. HPCL may be directed to deposit Rs.8,35,20,000/- with APPCB.

(v) M/s HPCL may be directed to comply with all conditions of Environmental Clearance, Consent For Establishment & Consent For Operate and submit the compliance report to APPCB.

(vi) APPCB may be directed to verify compliance submitted by M/s HPCL, and take necessary actions for non-compliances.

(vii) APPCB may be directed to constitute the odour squad as per the recommendations of IISC, Bengaluru to initiate action and resolve the odour episodes. The APPCB and industries shall jointly organize awareness programmes for public on odour and pollution matters."

52. There is merit in the recommendations of the Joint Committee that HPCL had failed to take effective steps despite the long period between 2011 and 2020. HPCL being a CPSE industry carrying out public utility services has to be a model unit of compliance with the environmental norms which was unfortunately not there in this case for more than a decade.

53. Accordingly,

- 53.1** HPCL is directed to take all the required initiative and comply with the observations of the Joint Committee, IISC – Bangalore and enquiry report within a period of six months.
- 53.2** APPCB is to monitor the same and it is not debarred from taking any action against HPCL for any fresh violation under the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 and also initiate appropriate action against the erring officials as per the statutes.
- 53.3** HPCL is directed to deposit the Environmental Compensation assessed at **Rs.8,35,20,000/- (Rupees Eight Crores Thirty Five Lakhs and Twenty Thousand only)** forthwith.
- 53.4** HPCL is directed to deposit a further sum of **Rs.10,00,00,000/- (Rupees Ten Crores only)** for their wilful negligence being a PSU which can be spent on restoration of environment and public health in the district of Vizag. Such deposit to be made **within 2 (Two) months** from today to CPCB which will draw a plan to that effect.
- 53.5** The Joint Committee to ensure the regular monitoring in implementing the plan.
- 53.6** An Independent Compliance Report may be filed by the Joint Committee after inspection as to the status of the compliance by the HPCL after 6 (Six) months i.e. by **15th May, 2023**.

54. Accordingly, the Original Application is disposed of. List the matter in May, 2023 for reporting compliance.

Sd/-

Smt. Justice Pushpa Sathyanarayana, J.M.

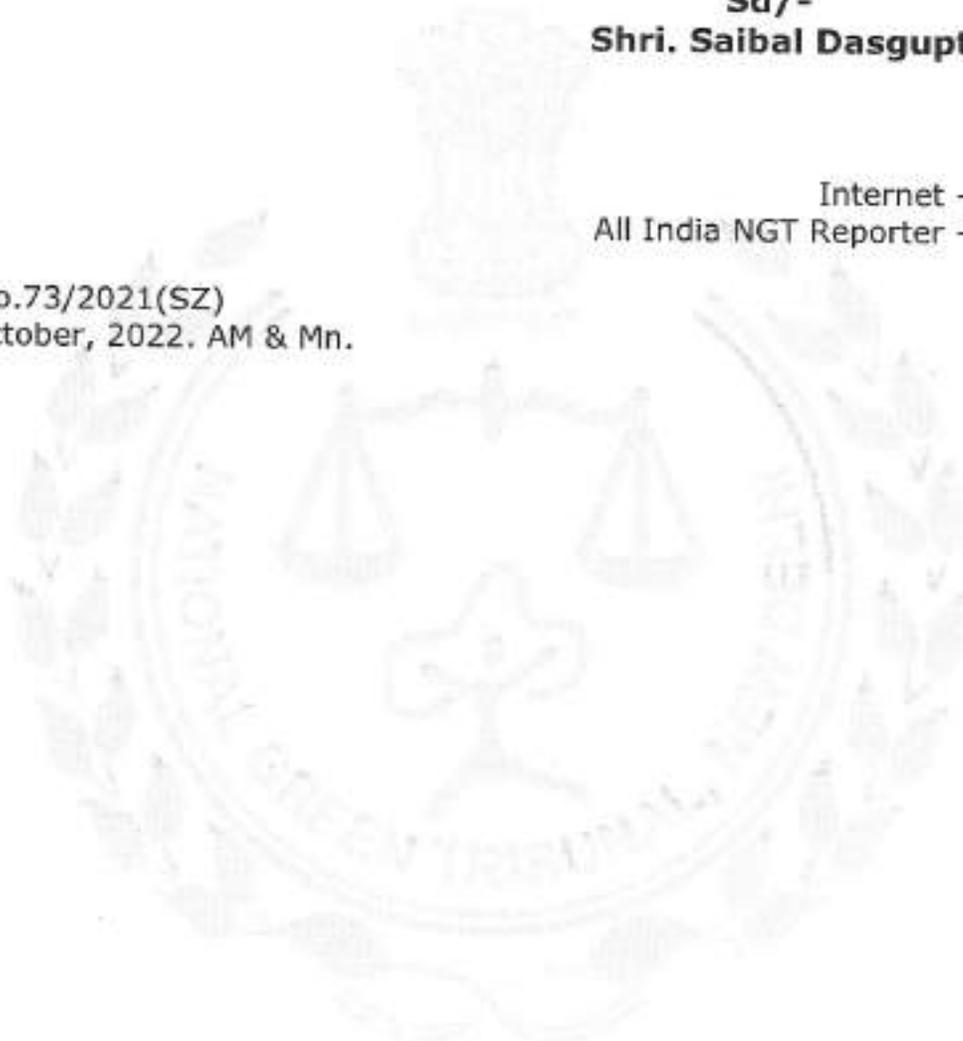
Sd/-

Shri. Saibal Dasgupta, E.M.

Internet – Yes/No

All India NGT Reporter – Yes/No

O.A. No.73/2021(SZ)
20th October, 2022. AM & Mn.



NGT



ANDHRA PRADESH POLLUTION CONTROL BOARD
D.No.33-26-14D/2, Near Sunrise Hospital, Pushpa Hotel Centre,
Chalamalavari Street, Kasturibaipet, Vijayawada – 520 010
Phone. No.0866-2463200, Website : <https://pcb.ap.gov.in>

**RED CATEGORY
CONSENT TO OPERATE & AUTHORIZATION ORDER**

Consent Order No : APPCB/VSP/72/CFO/HO/1957-

30/11/2022

CONSENT is hereby granted to Operation under section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 and under section 21 of Air (Prevention & Control of Pollution) Act 1981 and amendments thereof and Authorisation under Rule 6 of the Hazardous & Other Wastes (Management and Transboundary, Movement) Rules, 2016 and the rules and orders made there under (hereinafter referred to as 'the Acts', 'the Rules') to:

**M/s. Hindustan Petroleum Corporation Ltd.,
(Visakh Refinery), Malkapuram,
(After Expansion)
Visakhapatnam. - 530 011
Email: gbhagavan@hpcl.in; atan@hpcl.in**

(Hereinafter referred to as 'the Applicant') authorizing to operate the industrial plant to discharge the effluents from the outlets and the quantity of emissions per hour from the chimneys as detailed below:

i. Outlets for discharge of effluents:

Outlet No.	Outlet Description	Max Daily Discharge in KLD	Point of Disposal
Refinery			
1. (IETP)E TP 1 2 & 4 *	Process & Washings Cooling (Fresh) Treatment system: The industry shall treat the effluents from OWS streams and CTBD (fresh) streams in Integrated Effluent treatment plant (IETP) (1000 m ³ /hr) and RO plant (feed to 1005 m ³ /hr). The IETP also contains Contaminated Rain Water System (CRWS) of 390 m ³ /hr capacity (including existing 190 m ³ /hr capacity). This section removes free oil present in the effluent followed by filtration section. CRWS effluent shall be pumped to	19248 2400	After treatment the treated water recycled into the process. RO rejects about 269 m ³ /hr will be recycled to Re-Circulating Sea water make-up or disposed into Meghadrigedda surplus overflow channel, which joins Sea along sea water cooling tower blow down effluents.

	new ETP at controlled rate for treatment. IETP contains Spent Caustic treatment facility of 7 m3/hr capacity. Treated caustic from this section will be further sent to ETP for treatment		
2.	Industrial Cooling (Sea Water) (re-circulated)	407472	Shall discharge into Meghadrigedda surplus course finally joining to Sea after treatment duly meeting the Board discharge standards.
	Industrial Cooling (Sea Water) (Once through)	36000	
3.	Domestic Effluents	792	After treatment in STP, the treated waste water shall be used onland for irrigation, within the industry premises duly meeting the Board discharge standards.

* ETP 1, 2 & 4 will be non operational after commissioning of IETP & RO plant.

ii) Emissions from chimneys:

S. No	Description of Chimney	Quantity of Emissions in Nm3/hr. at peak flow
HPCL – Visakh Refinery		
1.	Stack attached to CDU – II Crude Oil Heater, 11 F1	79,812
2.	Stack attached to CDU – II Reduced Crude Oil Heater, 12 F1	25,716
3.	Stack attached to FCCU – II Feed Heater, 14 F1	20,514
4.	Stack attached to CDU – I Crude Oil Heater, 2 F1*	33,009
5.	Stack attached to CDU – I Crude Oil Heater, 2 F4*	24,470
6.	Stack attached to CDU – I Reduced Crude Oil Heater, 2F2*	16,146
7.	Stack attached to PP-I Utility Boiler (WIL-8) *	53,068
8.	Stack attached to FCCU-II CO Boiler, 14-F-3	93,631
9.	Stack attached to CPP Heat Recovery Steam Generator – I (HRSG-I)*	1,73,416
10.	Stack attached to CPP Heat Recovery Steam Generator – II (HRSG-II)*	1,73,416
11.	Stack attached to CDU – III Crude Oil Heater, 42F1	1,14,200
12.	Stack attached to CDU – III Reduced Crude Oil Heater, 42F2	20,608
13.	Stack attached to VBU Feed Heater, 46F1*	31,500
14.	Stack attached to FCCU-I Feed Heater, 4F51	21,487
15.	Stack attached to CO Boiler for FCCU – I, 4-F-52	84,647

16.	Stack attached to CPP Heat Recovery Steam Generator – III (HRSG-III)	3,20,388
17.	Stack attached to CPP Heat Recovery Steam Generator – IV (HRSG-IV)	3,20,388
18.	Stack attached to DHDS Reformer, 61F11*	61,001
19.	Stack attached to DHDS Pre-Desulphurization Heater, 61F1*	1,566
20.	Stack attached to DHDS Heater, 60 F1	18,781
21.	Stack attached to DHDS- SRU Train I & II incinerator, 65F001	18,200
22.	Stack attached to NHT (charge heater + splitter re-boiler) 72-F1/F2	31,428
23.	Stack attached to Continuous catalytic reforming unit (CCR) – 74 F1/F2/F3/F4	80,385
24.	Stack attached to FCCNHT HDS reactor Feed heater(75F1)	7,050
25.	Stack attached to SRU Train III incinerator, 79F302	11,300
26.	Stack attached to IBH boilers (2 X 75 TPH)	44,123
27.	Stack attached to CPP HRSG Heat Recovery Steam Generator – V - (HRSG-V) 1 X 60 T/hr	2,77,704
28.	Stack attached to CPP HRSG Heat Recovery Steam Generator – VI - (HRSG-VI) 1 X 60 T/hr	2,77,704
29.	Stack attached to Combined feed heater & Product fractionators reboiler – 90F01 & 90F02-	71,074
30.	Stack attached to HGU Reformer Naphtha firing – 91F20	1,39,671
31.	Stack attached to HGU Naphtha super heater FG firing – 91F01	1,596
32.	Stack attached to SRU Incinerator FG firing – 92F02	32,938
33.	Stack attached to Flue Gas Desulpharization unit (FGD) – II	1,40,737
34.	Stack attached to Flue Gas Desulpharization unit (FGD) – I	110,266
35.	Stack attached to FCC NHT 2nd HDS feed heater (75F51N)	5,715
36.	Stack attached to CDU IV	2,36,780
	Stack attached to VDU IV	
37.	Stack no. 1 attached to HCU	1,05,910
	Stack no. 2 attached to HCU	

38.	Stack attached to HGU Train 1	3,14,962
39.	Stack attached to HGU Train 2	3,14,962
40.	Stack attached to SRU/ TGTU Train 1	55,412
41.	Stack attached to SRU/ TGTU Train 2	55,412
42.	Stack attached to New GTG + HRS G 1	7,98,120

* These stacks will be non operational after commissioning of total VRMP project.

The following new stacks are connected to Residue Up-gradation Facility (RUF) unit which is under construction stage and these stacks will be come into operation from Dec-2023.

Sl.No	Source of Pollution	Flow rate in Nm ³ /hr.
1.	LC MAX Reactor Feed Oil Furnace	41508
2.	DAO Feed Oil Furnace & Hydrogen Furnace	42248
3.	VGO HDT Feed Furnace & Fractionator Feed Furnace	101564
4.	LC max Vacuum Tower Feed Furnace	29696
5.	Hot Oil Furnace	65620

The industry shall start the operations of RUF unit after obtaining prior permission of the Board only.

iii) HAZARDOUS WASTE AUTHORISATION (FORM – II) [See Rule 6 (2)]:

M/s. Hindustan Petroleum Corporation Limited, Visakh Refinery, Malkapuram, Visakhapatnam District is hereby granted an authorization to operate a facility for collection, reception, storage, treatment, transport and disposal of Hazardous Wastes namely:

REFINERY

• HAZARDOUS WASTES WITH DISPOSAL OPTION:

S.No	Name of HW	Category	Quantity	Mode of Treatment & Disposal/Recycling/Reuse/etc.
1.	Spent Catalyst	4.2 of Schedule - I	9704 tons/ 4 years	shall be routed through M/s. APEMC so as to send to authorized re-processors / recyclers (as recyclable waste) & TSDF.
2	Spent carbon / charcoal	4.4 of Schedule - I	5600 Tons for 4 years	Shall be routed through M/s. APEMC so as to send to preprocessors / cement
3	Spent clay	4.4 of Schedule - I	400 Tons for 4 years	Industry for co-processing / Recycler / TSDF
4	Spent Resin	35.2 of Schedule - I	600 MT for 4 years	Shall be routed through M/s. APEMC so as to send to authorized re-processors / recyclers (as recyclable waste waste)& TSDF.
5	Contaminated cotton rags or other cleaning	33.2 of Schedule - I	10 MT / year	Shall be routed through M/s. APEMC so as to dispose to TSDF.

	material			
6	RUF Spent catalyst slurry	4.2 of Schedule - 1	6327 TPA	Shall be disposed to authorized preprocessors/ recyclers/TSDF

• **HAZARDOUS WASTES WITH RECYCLING OPTION:**

S.No	Name of HW	Category	Quantity	Mode of Treatment & Disposal/Recycling/Reuse/etc.
	High oily sludge	4.1 of Schedule - 1	3000 Tons / crude tank	Shall be sent for Mechanical treatment to recover oil / shall be routed through M/s.APEMC so as to dispose to authorized reprocessors or recyclers (as recyclable waste)
	Low oily sludge (Bio-remedial sludge)	4.1 of Schedule - 1	667 TPA	Shall be sent for bioremediation / shall be routed through M/s.APEMC so as to dispose to authorized reprocessors or recyclers (as recyclable waste)
	Containers & Container liners of HW & Hazardous chemicals	33.1 of Schedule - 1	1500 Nos/Month	Shall be routed through M/s. APEMC so as to dispose to the outside agencies, after detoxification. (as recyclable waste)

The CFO order APPCB/VSP/VSP/72/CFO/HO/2021 dt:09.03.2021 valid upto 31.12.2025 stands cancelled after commissioning of total VRMP project. This consent order is valid for manufacturing the following products along with quantities indicated only:

S. No.	Name of the Product	Quantity (for 15 MMTPA crude)
1.	Propylene (Chemical Grade)	98,000 TPA
2.	LPG	5,50,000 TPA
3.	Naphtha	10,45,000 TPA
4.	Gasoline (Euro - VI)	16,82,000 TPA
5.	Aviation Turbine Fuel (ATF)	1,32,000 TPA
6.	Superior Kerosene oil (SKO)	6,93,000 TPA
7.	Diesel (EURO VI)	89,62,000 TPA
8.	Bitumen	2,20,000 TPA
9.	Sulphur	2,95,000 TPA
10.	Refinery Fuel (fuel gas + fuel oil + Naptha for GTGs)	8,34,000 TPA
11.	LDO	31,000 TPA
12.	SHC/RUF Pitch	2,86,000 TPA
	Total	1,50,00,000 (approx)
13.	Captive power plant	196 MW

This order is subject to the provisions of 'the Acts' and the Rules' and orders made thereunder and further subject to the terms and conditions incorporated in the schedule A, B & C

enclosed to this order.

This combined order of consent to operate & Hazardous Waste Authorization shall be valid for a period ending with the 31st day of December, 2025.

**VIJAY KUMAR GSRKR IAS, MEMBER SECY(GSRKRVK), O/o MEMBER
SECRETARY-APPCB**

To
M/s. Hindustan Petroleum Corporation Ltd.,
Visakh Refinery, Malkapuram,
Visakhapatnam - 530 011.

Copy to:

1. The JCEE, Zonal Office, **Visakhapatnam** for information and necessary action.
2. The EE, Regional Office, **Visakhapatnam** for information and necessary action.

SCHEDULE-A

1. Any up-set condition in any industrial plant / activity of the industry, which result in, increased effluent / emission discharge and/ or violation of standards stipulated in this order shall be informed to this Board, under intimation to the Collector and District Magistrate and take immediate action to bring down the discharge / emission below the limits.
2. The industry should carryout analysis of waste water discharges or emissions through chimneys for the parameters mentioned in this order on quarterly basis and submit to the Board.
3. All the rules & regulations notified by Ministry of Law and Justice, Government of India regarding Public Liability Insurance Act, 1991 should be followed as applicable.
4. The industry should put up two sign boards (6x4 ft. each) at publicly visible places at the main gate indicating the products, effluent discharge standards, air emission standards, hazardous waste quantities and validity of CFO and exhibit the CFO order at a prominent place in the factory premises.
5. Notwithstanding anything contained in this consent order, the Board hereby reserves the right and powers to review / revoke any and/or all the conditions imposed herein above and to make such variations as deemed fit for the purpose of the Acts by the Board.
6. The industry shall ensure that there shall not be any change in the process technology, source & composition of raw materials and scope of working without prior approval from the Board.
7. The applicant shall submit Environment statement in Form V before 30th September every year as per Rule No.14 of E(P) Rules, 1986 & amendments thereof.
8. The applicant should make applications through Online for renewal of Consent (under Water and Air Acts) and Authorization under HWM Rules at least 120 days before the date of expiry of this order, along with prescribed fee under Water and Air Acts and detailed compliance of CFO conditions for obtaining Consent & HW Authorization of the Board.
9. The industry should immediately submit the revised application for consent to this Board in the event of any change in the raw material used, processes employed, quantity of trade effluents & quantity of emissions. Any change in the management shall be informed to the Board. The person authorized should not let out the premises / lend / sell / transfer their industrial premises without obtaining prior permission of the State Pollution Control Board.

10. Any person aggrieved by an order made by the State Board under Section 25, Section 26, Section 27 of Water Act, 1974 or Section 21 of Air Act, 1981 may within thirty days from the date on which the order is communicated to him, prefer an appeal as per Andhra Pradesh Water Rules, 1976 and Air Rules 1982, to Appellate authority constituted under Section 28 of the Water(Prevention and Control of Pollution) Act, 1974 and Section 31 of the Air(Prevention and Control of Pollution) Act, 1981.
11. The industry shall be liable to pay Environmental Compensation / Other Environmental Taxes, if any environmental damage caused to the surroundings, as fixed by the Collector & District Magistrate or any other competent authority as per the Rules in vogue.
12. The industry may explore the possibility of tapping the solar energy for their energy requirements.
13. The industry should educate the workers and nearby public of possible accidents and remedial measures.

SCHEDULE-B

The industry shall comply the following:

1. The industry shall submit Bank Guarantee of Rs. 25 lakhs within 10 days with the following conditions:
 - i. The industry shall obtain fire NOC for expansion project and shall commission the expansion operations only after obtaining final fire NOC.
 - ii. The industry shall develop balance green belt in an area of 52 acres out of 112.5 acres as stipulated in CTE order dated 06.07.2016, by July 2023.
 - iii. The industry shall comply with Hon'ble NGT order in OA No 73.
 - iv. The industry shall comply with the conditions and loads stipulated in EC and CTE orders.
2. The industry shall install digital flow meters at inlet and outlet of IETP and data connected to the APPCB website to verify the operational hours and quantity treated.
3. The industry shall install digital flow meter at RO rejects tank and maintain records for quantity of treated effluents discharged into Meghadrigedda.

Water Pollution:

4. The effluent discharged shall not contain constituents in excess of the tolerance limits mentioned below. Further, the following parameters shall be complied for Process & Wash effluents at the Outlets mentioned above i.e., before mixing with Cooling waste water discharge:

Outlet	Parameter	Limiting Standards
1	pH	6.50 – 8.50
	Oil & Grease	5 mg/l
	Chromium Hexavalent	0.10 mg/l
	Pb	0.10 mg/l
	Suspended Solids	20 mg/l
	Phenols	0.35 mg/l
	Cyanides as CN	0.20 mg/l
	Chemical Oxygen Demand	125 mg/l
	Biochemical Oxygen Demand	15 mg/l
	Sulphides (as S)	0.5 mg/l
	Ammonia as N	15.0 mg/l
	P	3.0 mg/l
	Cr (Total)	2.0 mg/l

	Hg	0.01mg/l
	Zn	5.0 mg/l
	Ni	1.0 mg/l
	Cu	1.0 mg/l
	Benzene	0.1 mg/l
	TKN	40.0 mg/l
	V	0.2 mg/l
	Benza (a) Pyrene	0.2 mg/l

Cooling Water

Outlet	Parameter	Limiting Standards
2	pH	6.50 – 8.50
	Oil & Grease	1.0 mg/l
	Chromium Hexavalent	0.10 mg/l
	Cr (Total)	2.0 mg/l

Domestic

Outlet	Parameter	Limiting Standards
3	pH	6.50 – 8.50
	Oil & Grease	10 mg/l
	Biochemical Oxygen Demand	30 mg/l
	Total Suspended Solids	<100 mg/l
	Fecal Coliform (FC) (Most Probable Number per 100 milliliter, MPN/100ml)	<1000 MPN/100 ml

5. The source of water is GVMC supply, water from Tatipudi, Mindi and Raiwada reservoir, Sea. The industry shall take steps to reduce water consumption to the extent possible and consumption shall NOT exceed the quantities mentioned below:

S. No.	Purpose	Quantity in KLD
1.	Process & Washings, Boiler Feed	26088
2.	Industrial Cooling (Mae-up)/Humidification/water spraying	9852
3.	Industrial Cooling(Se water) (Re-circulated)	475008
4.	Industrial Cooling(Se water) (Once through)	36000
5.	Domestic	972
	Total :	555192

Separate meters with necessary pipe-line shall be maintained for assessing the quantity of water used for each of the purposes mentioned above.

Air Pollution:

6. The emissions shall not contain constituents in excess of the prescribed limits mentioned below:

Chimney No.	Parameter	Emission Standards mg/Nm ³
1 to 23, 25 to 30, 32 (30 stacks)	Particulate Matter	100

33 to 34 & 36 to 47	Particulate Matter	50
24, 31 & 35	Particulate matter	10

7. The industry shall comply with Standards for Oil Refineries notified by MOEF vide GSR No. 186(E), dt.18.03.2008.
8. The industry shall comply with ambient air quality standards of PM₁₀ (Particulate Matter size less than 10mm) - 100 mg/ m³; PM_{2.5} (Particulate Matter size less than 2.5 mm) - 60 mg/ m³; SO₂ - 80 mg/ m³; NO_x - 80 mg/m³, Ammonia - 400 mg/m³, and CO - 4.0 mg/m³, Benzene - 5.0 mg/m³, Benzo (a) Pyrene - 1.0 ng/m³ outside the factory premises at the periphery of the industry. -
Standards for other parameters as mentioned in the National Ambient Air Quality Standards CPCB Notification No.B-29016/20/90/PCI-I, dated 18.11.2009.
Noise Levels: Day time (6 AM to 10 PM) - 75 dB (A)
Night time (10 PM to 6 AM) - 70 dB (A)
9. The industry shall operate 3 CAAQM stations for monitoring Benzene, Carbon Monoxide, Ammonia, Nitrogen Dioxide, Ozone, PM₁₀, PM_{2.5} and Sulphur Dioxide with recording facility and connected to APPCB website.
10. The industry shall comply with emission limits for DG sets of capacity upto 800 KW as per the Notification G.S.R.520 (E), dated 01.07.2003 and G.S.R.448(E), dated 12.07.2004 under the Environment (Protection) Act Rules. In case of DG sets of capacity more than 800 KW shall comply with emission limits as per the Notification G.S.R.489 (E), dated 09.07.2002 at serial no.96, under the Environment (Protection) Act, 1986.

GENERAL:

11. The industry shall comply the conditions stipulated in the permission issued by PESO.
12. The industry shall include Oil & Grease parameter in the online continuous effluent monitoring system.
13. The industry shall maintain flow meters preferably Electro Magnetic flow meters with totalisers for water and effluent quantity measurements for different streams of effluents and different categories of water usage stipulated in this order.
14. The industry shall comply with CPCB directions dated 05.02.2014 / 02.03.2015 and guidelines issued regarding online monitoring systems issued from time to time. The online monitoring system shall be calibrated periodically as per equipment suppliers manual / CPCB guidelines before starting the production.
15. Dyke walls shall be maintained around storage tanks. Spillages / oil water mixture if any, shall be contained in the dykes and treated in the existing ETP and the oil shall be taken to storage tank. The treated wastewater conforming to onland for irrigation standards only shall be used for gardening purpose within the premises.
16. The industry shall inform the breakdowns, shutdowns and non operations of pollution control systems to APPCB duly taking alternate measures.
17. Odour control systems shall be improved at the Mercox plants and ETP areas. The industry shall not cause any odour nuisance problem.
18. The off-gases of Bitumen Blowing Unit shall be treated before emitting into the atmosphere.
19. The flare stack shall be improved to flare off all hydrocarbons by ensuring complete combustion without any black smoke.
20. The stripped off VOCs / Ammonia / Mercaptanes from the ETP system shall not be allowed to escape into the atmosphere.
21. In the plant area, values of VOC (non-methane hydrocarbons) shall be monitored as

per EPA notification

22. In case of bad weather conditions and inversions, the industry shall run the process units with low Sulphur crude oil only.
23. The industry shall take measures to improve the combustion efficiencies of furnaces to atleast 95% so as to control the generation of un-burnt hydrocarbons and particulates.
24. The industry shall maintain the drainage system properly. Storm water shall be collected and be treated before disposing into the drains.
25. The oil generation shall be prevented at the sources (process units) so that excessive oil does not reach the ETPs above the designed capacities.
26. No further Expansion is allowed without obtaining EC and CFE.
27. The pollution loads shall not exceed the following:
 - a. Effluent loads: existing
 - i. Oil and grease - 12.26 TPD
 - ii. Sulphides - 1.66 TPD
 - iii. Phenol - 0.67 TPD
 - iv. TSS - 1.25 TPD
 - v. BOD - 4.6 TPD
 - vi. COD - 17.2 TPD
 - b. Air Pollution:
 - i. SO₂ emissions after expansion - 11.5 TPD
 - ii. SPM existing - 1.11 TPD
 - iii. Hydro carbon emission existing - 2.5 TPD
 - iv. NO_x emissions after expansion - 11.15 TPD
28. The industry shall ensure that the pollution loads are not increased at any point of time and maintain online analyzers for SO₂, NO_x, CO and PM for stack emissions.
29. The stack and online AAQ monitoring analysers shall be regularly calibrated so as to record the actual values of air pollutants.
30. The industry shall comply with Noise Pollution (Regulation & Control) Rules 2000.
31. The industry shall provide Sulphur recovery unit with tail gas treatment facility with 99.9% efficiency in order to maintain the overall emission load for SO₂ emissions less than 11.5 TPD even after expansion.
32. Sulphur recovery efficiency shall be calculated on monthly basis, using quantity of Sulphur in the feed to SRU and quantity of Sulphur recovered.
33. The industry shall construct sheds for storage of hazardous waste.
34. The industry shall comply with Task Force directions issued by the Board from time to time.
35. The industry shall maintain the following records and the same shall be made available to the inspecting officers of the Board:
 - a. Daily production details (ER-1 Central Excise Returns).
 - b. Quantity of Effluents generated, treated, recycled/reused.
 - c. Log Books for pollution control systems.
 - d. Sulphur content in raw material.
 - e. Characteristics of effluents, emissions and ambient air.
 - f. Hazardous/non hazardous solid waste generated and disposed.
 - g. Inspection book.
 - h. Manifest copies hazardous waste.
36. The industry shall ensure that reduced Sulphur compounds and other odorous compound emissions are within odour detection threshold.
37. The industry shall carry out the Leak Detection and Repair Program (LDAR) at the

- specific regular intervals to identify the emission of VOCs, Volatile Hazardous Air pollutants from any leaking equipment, process equipment, etc preferably every month and the records shall be submitted to the APPCB officials during inspection.
- 38.VOCs shall be monitored at vulnerable locations periodically inside the plant. The sporadic odorous emissions shall also be placed on record and necessary measures to stop reoccurrences shall be taken.
 - 39.Gas detection systems shall be in place to detect process leakages.
 - 40.Sulphur recovery units shall have continuous systems for monitoring of SO₂. Manual monitoring for all the emission parameters shall be carried out once in a month. Data on Sulphur Dioxide emissions (mg/Nm³) shall be reported regularly.
 - 41.The industry shall extend the PLI policy which includes Environmental Relief Fund (ERF) and submit copy to RO, Visakhapatnam on yearly base.
 - 42.The industry shall update the information in OCEMS - Industry Information Data Entry Software for Compliance Reporting Protocol in PART-II (Sections F & G) Every Quarter on 1st January, 1st April, 1st July and 1st October through this software system.
 - 43.The industry shall comply with OSD guidelines and their amendment from time to time.
 - 44.The industry shall install digital display boards at publicly visible places at the main gate indicating the products manufactured Vs permitted quantities, Treated effluent concentrations Vs discharge standards, Stack emission & AAQ concentrations Vs standards, hazardous waste generation, disposed, stock Vs permitted quantities and validity of CTO; and exhibit the CTO order at a prominent place in the factory premises, as per Hon'ble Supreme Court order
 - 45.The industry shall submit Half yearly compliance reports to all the stipulated conditions in Environmental Clearance (EC), Consent to Establishment (CTE) and Consent to Operation (CTO) through website i.e., <https://pcb.ap.gov.in> by 1st of January and 1st July of every year. The first half yearly compliance reports shall be furnished by the industry and second half yearly compliance reports shall be the audited through MoEF&CC recognized and National Accreditation Board for Laboratory Testing (NABL) accredited third party.
 - 46.Any other directions / circulars / notices issued by CPCB, MoEF&CC and APPCB shall be followed from time to time.
 - 47.The conditions are stipulated without prejudice to the rights and contentions of this Board in any Hon'ble Court of Law.

Special conditions:

- 48.The industry shall prepare a safety report and carry out an independent safety audit report of the respective industrial activities including chemical storages / isolated storages by an expert not associated with such industrial activity as required under Rule 10 of MSIHC Rules, 1989 and get it approved by the Factories Dept., and submit the compliance along with copy of the safety report, safety audit report and safety certificate at concerned Regional Office, APPCB.
- 49.The industry shall identify major accident hazard chemicals & list out the hazardous chemicals endangered to human health & environment, and the details shall be furnished to the Factories Department and the Regional Office, APPCB time to time duly certifying the same by the industry. Further, the industry shall extend training to the working personnel while handling hazardous chemicals for the prevention of accidents and necessary antidotes to ensure safety, as per the MSIHC Rules, 1989.
- 50.The industry shall carryout calibration of safety equipment and leak detection systems at regular intervals and shall certify the same with the Factories Department. That

- certified copy shall be submitted to the APPCB, Regional Office. The industry shall install fluorescent Wind Vane at the highest point in the industry premises.
51. The industry shall inventory the hazardous wastes and its quantities stored within the industry premises as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (HOWM Rules, 2016) and shall furnish the details to Regional Office, APPCB on a monthly basis duly certifying the same by the industry.
 52. The industry shall submit Risk analysis and risk assessment covering worst scenario clearly describing impact within the industry premises and outside the industry premises and emergency response system.
 53. The industry shall inventorize the storage quantities of hazardous chemicals (raw materials), products, as per the hazard nature of reactivity / toxicity / flammability / explosive stored/handling in the premises as defined in the Management of Storage, Import of Hazardous Chemicals (MSIHC) Rules, 1989 and the details shall be furnished to the Factories Department and to the Regional Office, APPCB on monthly basis duly certifying the same.
 54. The industry shall submit the copy of the safety audit report and On-Site / Off Site Emergency Plans as applicable after being certified by the Factories Department to the APPCB, Regional Office from time to time, if the storage quantity of hazardous chemicals is equal to or, in excess of the threshold quantities specified in schedule 2 & 3 of MSIHC Rules, 1989.
 55. The industry shall provide VOC meters with data logger near the production blocks and near the chemical storage tanks.
 56. The industries and isolated storages that are storing hazardous chemicals less than the threshold quantities mentioned under MSIHC Rules, 1989 shall submit safety certificate to the concerned Regional Office, APPCB

SCHEDULE – C

[See rule 6(2)]

**[CONDITIONS OF AUTHORISATION FOR OCCUPIER OR OPERATOR
HANDLING HAZARDOUS WASTES]**

1. The authorised person, shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under.
2. The authorisation shall be produced for inspection at the request of an officer authorised by the State Pollution Control Board.
3. The person authorised shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this authorisation.
4. Any unauthorised change in personnel, equipment or working conditions as mentioned in the application by the person authorised shall constitute a breach of his authorisation.
5. The person authorised shall implement Emergency Response Procedure (ERP) for which this authorisation is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;
6. The person authorised shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty".
7. It is the duty of the authorised person to take prior permission of the State Pollution Control Board to close down the facility.
8. An application for the renewal of an authorisation shall be made as laid down under

these Rules.

9. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.

Specific Conditions:

10. Annual return shall be filed by June 30th for the period ensuring 31st March of the year.
11. The industry shall enter an agreement with the Cement industries for disposal of utilizable waste or shall dispose to Alternative Fuel Raw material facility (AFRF) OR to TSDF for co-incineration.
12. The industry shall comply with the provisions of HWM Rules, 2016 in terms of interstate transport of Hazardous Waste and manifest document prescribed Under Rule 18 and 19 of the HWM Rules, 2016.
13. The industry shall not store hazardous waste for more than 90 days as per the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.
14. The industry shall store Used / Waste Oil and Used Lead Acid Batteries in a secured way in their premises till its disposal to the manufacturers / dealers on buyback basis.
15. The industry shall maintain 7 copy manifest system for transportation of waste generated and a copy shall be submitted to concerned Regional Office of APPCB. The driver who transports Hazardous Waste should be well acquainted about the procedure to be followed in case of an emergency during transit. The transporter should carry a Transport Emergency (TREM) Card.
16. The industry shall maintain proper records for Hazardous and Other Wastes stated in Authorisation in Form-3 i.e., quantity of Incinerable waste, land disposal waste, recyclable waste etc., and file annual returns in Form-4 as per Rule 20 (2) of the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.
17. The industry shall comply with the provisions of HWM Rules, 2016 in terms of interstate transport of Hazardous Waste and manifest document prescribed Under Rule 18 and 19 of the HWM Rules, 2016.

VIJAY KUMAR GSRKR IAS, MEMBER SECY(GSRKRVK), O/o MEMBER SECRETARY-APPCB

To
**M/s. Hindustan Petroleum Corporation Ltd.,
(Visakh Refinery), Malkapuram,
Visakhapatnam - 530 011.**

Signed by Vijay Kumar
Gsrkr ias
Date: 30-11-2022 15:33:26
Reason: Approved

- ① Sampling
- ② CAAQIS
- ③ Sulphur storage area.
- ④ CENS

AST
TPI

Shaik Sardar (शेख सरदार)

From: Shaik Sardar (शेख सरदार)
Sent: 28 September 2023 14:54
To: 'rovspappcb@gmail.com'
Cc: Gudala Bhagavan (गुडाल भगवान्); Omkar Gopi Krishna P (ओंकार गोपी कृष्ण पी); Bhukya Rajesh Naik (भूकया राजेश नाइक); Bisetti Gopi (गोपी बिसेत्ति)
Subject: NGT recommendations compliance (attachments)
Attachments: Third Party Reports Jan-23 to June-23.zip; Steetplay photos.zip

Dear Sir,

Further to the trailing mail, third party reports and street play photos are attached separately in this mail due to file size limitation.

Regards,
Sardar Shaik,
HPCL-Visakh Refinery

From: Shaik Sardar (शेख सरदार)
Sent: 28 September 2023 12:34
To: 'rovspappcb@gmail.com' <rovspappcb@gmail.com>
Cc: Gudala Bhagavan (गुडाल भगवान्) <gbhagavan@hpcl.in>; Omkar Gopi Krishna P (ओंकार गोपी कृष्ण पी) <pogkrishn@hpcl.in>; Bhukya Rajesh Naik (भूकया राजेश नाइक) <brajeshnaik@hpcl.in>; Bisetti Gopi (गोपी बिसेत्ति) <Gopi.Bisetti@hpcl.in>
Subject: NGT recommendations compliance
Importance: High

Dear Sir,

As advised, please find below the required inputs regarding NGT matter

- Compliance status of NGT recommendations

Latest compliance status to NGT recommendations and CFO compliance (including third party monitoring reports) are attached.

- Status of Environmental Compensation:

HPCL-Visakh Refinery deposited Environmental Compensation of Rs.8.352 Crores with APPCB vide DD on 03.03.2023. Letter submitted earlier to APPCB in this regard is enclosed for reference.

- Status of Awareness Programs:

During June 2023, HPCL-Visakh Refinery conducted awareness programs on odour and environment protection through street plays at 3 locations in the vicinity of refinery covering residents of Sriharipuram and Malkapuram areas. Cloth bags were also distributed during these programs to reduce usage of polythene bags. Few photos are attached.

This is for your kind information and perusal please.

Regards,
Sardar Shaik,
HPCL-Visakh Refinery

Compliance to suggested remedial Measures by Joint committee to mitigate pollution.

S.No	Suggested remedial measures to mitigate pollution	Compliance by HPCL-Visakh Refinery
10	i. The unit should comply with the all the conditions mentioned in the CFO and hazardous waste authorization and also the directions issued by APPCB for effective and safe operation of the refinery so as to mitigate the pollution to possible extent.	CFO conditions are regularly complied with. Latest six-monthly CFO compliance submitted to APPCB is enclosed.
	ii. The unit should take necessary steps to reduce the PM10 & PM2.5 values in ambient air within the industry premises, the values in the CAAQMS in all the three locations shows the exceedances throughout the year 2020. The unit should spray water on the road and to plan the timings for the movement of vehicles inside the industry to control the fugitive emissions.	Various mitigation measures like water sprinkling on the roads at project sites, higher barricades around project sites, regulating the traffic near civil works of project activities, usage of RMC (Ready Mix Concrete) material etc. are taken up regularly to control dust emissions.
	iii. The five stacks monitored are meeting the prescribed standards, however, two stacks which were not monitored due to some issue in the stack monitoring platform has to be rectified.	Samples from 2 stacks couldnot be collected due to Eagle attack while climbing up the sample collection platform. Hence, Joint committee decided to collect samples from 2 other stacks and thus samples were collected from 5 stacks as per the plan. Subsequently, the Eagle attack issue was addressed and safe access to the sample collection platform of these 2 stacks was ensured.
	iv. Refinery has provided OCEMS in 32 stacks to	The total number of stacks in refinery are 35. OCEMS are

S.No	Suggested remedial measures to mitigate pollution	Compliance by HPCL-Visakh Refinery
	<p>monitor PM, SO₂, NO_x & CO and remaining 4 stacks has to be installed. The OCEMS data are connected to CPCB & APPCB servers. CEMS for measuring Hydrocarbons are yet to be installed. A few exceedances were observed during March, 2021. The industry should take periodic calibration and maintenance of analysers to avoid the exceedances in standards.</p>	<p>provided for 32 stacks. The remaining 3 stacks attached to PP-I utility boiler (WIL-8), CPP HRSG-I, CPP HRSG-II are not operational for past few years since these are no more required for operation of the Refinery and accordingly planned for dismantling. Hence, the continuous on-line stack monitoring facilities and their connectivity are not provided for these 3 stacks. Hydrocarbon analyzers are available for stacks in refinery.</p> <p>All stack analyzers are calibrated once in a month on regular basis to ensure the measured values are within the allowable range of the drift.</p>
	<p>v. The unit should rectify and repair the ETP-II components for effective treatment, the effluent spilled near the TPI area should be cleaned. The storm water drains near the ETP-II and final outlets have to be cleared for free flowing and to avoid stagnations. The small pump has to be installed in the tank constructed to collect the rain water near the guard pond to avoid manual transportation of the rain water to the ETP.</p>	<p>Housekeeping of the TPI area was completed. The storm water drains near the ETP-II are cleared regularly. The recommendation given by the JC for installation of pump in the tank is taken up for implementation and purchase order placed. ETC for implementation: February 2024.</p>
	<p>vi. The ETPs should be operated regularly and effectively for meeting the prescribed discharge standards. The unit should install covers either floating /fixed</p>	<p>ETPs are in service and treated process water is meeting the stipulated standards. MoEF recognized third party laboratory reports are enclosed.</p> <p>APIs and TPIs in ETPs are</p>

S.No	Suggested remedial measures to mitigate pollution	Compliance by HPCL-Visakh Refinery
	types in the oil-water separator and equalization tanks to trap the VOCs for eliminating the odours. The trapped off-gas has to be treated to remove at least 90% of VOCs.	provided with covers to minimize VOC emissions. VOC recovery system is implemented in the IETP (Integrated Effluent Treatment Plant) in the ongoing refinery expansion project. The existing ETPs will be non-operational post IETP commissioning.
	vii. The unit should recycle the treated water to the maximum extent to reduce the fresh water consumption instead of fully discharging into sea along with cooling water.	Stripped sour water from process units is being recycled to the maximum possible extent with the available systems for use as wash water. In addition, a new Integrated Effluent Treatment Plant (IETP) is implemented under current refinery expansion project (VRMP). Post implementation RO-DM plant in this IETP, the treated water will be recycled/reused fully.
	viii. At present the unit is monitoring the LDAR program annually through third party laboratory. According to the standards for equipment leaks and good practices, it is advised to conduct the quarterly monitoring of LDAR for pump seals, compressor seals, pressure relief devices & heat exchangers and annually monitor the process drains & components that are difficult to monitor.	Leak Detection and Repair (LDAR) survey is being carried out on continuous basis by MoEF recognized laboratory and the frequency of survey is in line with MoEF guidelines. Survey reports are being maintained and copy of latest LDAR survey report is enclosed.
	ix. The high oily sludge from the crude and products tanks stored in the sludge lagoons has producing VOCs, the unit has to take necessary steps to	VOC measured at sludge lagoon ponds by hand held instrument indicated 8 - 9 PPM. Few meters away from the sludge lagoon ponds, the VOC measurement done by same hand held

S.No	Suggested remedial measures to mitigate pollution	Compliance by HPCL-Visakh Refinery
	eliminate the VOCs odour in the area.	instrument indicated Nil VOC. These VOCs are confined at local area and are not carried to other areas of the refinery.
	x. The housekeeping at the sludge processing area has to be improved, the unit may take necessary action against the third party laboratory for causing spillages during sludge processing and advise to avoid spillages.	Housekeeping improved in sludge processing area and is carried out on regular basis. Actions are being taken to sustain the same.
	xi. The bio-remediation of the low oily sludge has to be carried out technically and avoid dumping of unwanted waste in the bins. Before using the treated sludge as manure, it is required to analyse to check that the oily sludge is completely degraded. The oil contents in terms of Total Petroleum Hydrocarbon (TPH) after bioremediation are less than 1%.	Low oily sludge is being bio-remediated with Oil Zapper bacteria which is patented by M/s OTBL (ONGC TERI Biotech Limited) to bring down the TPH content to less than 1%. The bioremediated low oily sludge is either used for direct landfill or manure. Necessary actions like installation of caution boards were taken to avoid dumping of unwanted waste in the bins.
	xii. To develop 33% of total area as a green belt along the industry premises to stop the odour issues as well as to eliminate the fugitive emissions. The unit may plant the odour eliminating plants suitable for refinery industry.	All the areas in refinery feasible for development of greenbelt are provided with plants suitable for attenuation of air pollution. Plantation of 6,70,000 saplings carried out in various locations of Visakhapatnam city covering about 700 acres. In addition to the above, 67 acres of green belt development is in progress under VRMP. ETC: December 2023.
	xiii. Refinery shall work out mass & material balance studies and maintain the	Accounting of the flared quantity is done regularly and it is a part of the refinery material balance.

S.No	Suggested remedial measures to mitigate pollution	Compliance by HPCL-Visakh Refinery
	<p>inventory of unrecoverable volatile organics venting through the flare stacks for burning Records to this effect shall be produced before the regulatory officials as and when required.</p>	
	<p>xiv. Suggested that the refinery shall procure, install and operate one Continuous Ambient Air Quality Monitoring station (CAAQMS) with PM 10, PM2.5, CO, O3, SO2, NO2, NH3, Benzene, H2S and Mercaptans parameters at an appropriate location in the residential areas of Malkapuram to assess the impact of refinery activities.</p>	<p>Taken up for implementation and purchase order placed for installing CAAMS in the surrounding residential area (Yarada Park housing colony). Civil jobs completed. ETC for receipt of CAAMS: October 2023.</p>

**Compliance to conditions of CFO (APPCB/VSP/VSP/72/CFO/HO/2021) dated
09.03.2021**

Schedule-A

Sl.	Condition	Remarks
1	Any upset condition in any industrial plant / activity of the industry, which result in, increased effluent / emission discharge and / or violation of standards stipulated in this order shall be informed to this Board, under intimation to the Collector and District Magistrate and take immediate action to bring down the discharge / emission below the limits	Noted.
2	The industry should carryout analysis of waste water discharges or emissions through chimneys for the parameters mentioned in this order on quarterly basis and submit to the Board.	Complied. Analysis of stack flue gases and treated effluent water quality is being carried out by MoEF - recognized third party laboratory on a monthly basis and being submitted to APPCB as per the requirement.
3	All the rules & regulation notified by Ministry of Law and Justice, Government of India regarding Public Liability Insurance Act, 1991 should be followed as applicable.	Noted.
4	The industry should put up two sign boards (6x4 ft. each) at publicly visible places at the main gate indicating the products, effluent discharge standards, air emission standards, hazardous waste quantities and validity of CFO and exhibit the CFO order at a prominent place in the factory premises.	Three display boards are available at the entrance of the refinery indicating the products, effluent discharge standards, air emission standards, hazardous waste quantities and validity of CFO. The above display boards are in addition to the LED display board installed for display of environmental parameters.
5	Notwithstanding anything contained in this consent order, the Board hereby reserves the right and powers to review / revoke any and/or all the conditions imposed herein above and to make such variations as deemed fit for the purpose of the Acts by the Board.	Noted.
6	The industry shall ensure that there shall not be any change in the process technology, source & composition of raw materials and scope of working without prior approval from the Board.	Noted.
7	The applicant shall submit Environment Statement in Form V before 30 th September every year as per Rule No. 14 of E(P) Rules, 1986 & amendments thereof.	Complied. The latest Environmental Statement for 2021-22 was submitted to APPCB vide letter dated 14.09.2022.
8	The applicant should make applications through online for renewal of Consent (under Water and Air Acts) and Authorization under H&OW (M&TM) Rules, 2016 at least 120 days before the date of expiry of this order, along with prescribed fee under Water and Air Acts and detailed compliance of CFO conditions for obtaining Consent & HW Authorization of the Board..	Noted and shall be complied.
9	The industry should immediately submit the revised application for consent to this Board in the event of any	Noted and shall be complied.

Sl.	Condition	Remarks
	change in the raw material used, processes employed, quantity of trade effluents & quantity of emissions. Any change in the management shall be informed to the Board. The person authorized should not let out the premises / lend / sell / transfer their industrial premises without obtaining prior permission of the State Pollution Control Board.	
10	Any person aggrieved by an order made by the State Board under Section 25, Section 26, Section 27 of Water Act, 1974 or Section 21 of Air Act, 1981 may within thirty days from the date on which the order is communicated to him, prefer an appeal as per Andhra Pradesh Water Rules, 1976 and Air Rules 1982, to Appellate authority constituted under Section 28 of the Water (Prevention and Control of Pollution) Act, 1974 and Section 31 of the Air (Prevention and Control of Pollution) Act, 1981.	Noted.
11	The industry shall be liable to pay Environmental Compensation / Other Environmental Taxes, if any environmental damage caused to the surroundings, as fixed by the Collector & District Magistrate or any other competent authority as per the Rules in vogue.	Noted
12	The industry may explore the possibility of tapping the solar energy for their energy requirements.	Installation of solar panels of 1.105 MW capacity is in progress as part of refinery expansion project.
13	The industry should educate the workers and nearby public of possible accidents and remedial measures	Being complied.

Schedule-B

S.No.	Condition	Remarks
1	Online stack monitoring values of stacks are exceeding the Board standards. The industry shall comply with the Board standards for all the stacks, without fail.	<p>All the refinery emissions are monitored continuously for maintaining the parameters within the stipulated limits by ensuring required design & operational controls. A few exceedances occur due to occasional malfunctioning of analyzers which are attended on priority. Further, necessary clarifications are being provided immediately, in case of any exceedance reports from APPCB.</p> <p>All the stack analyzers are calibrated once in a month on regular basis. Calibration reports were verified by the Joint committee during inspection</p>
2	Not obtained NOC from fire department. As committed, the industry shall obtain NOC from fire department by 12.03.2021 and submit a copy at concerned Regional Office, APPCB.	<p>After receiving CFO, HPCL has submitted an online application for “Occupancy NOC” from AP State Disaster Response and fire services department on 26.03.2021.</p> <p>The concerned authorities visited the refinery on 03.04.2021 for issuing NOC for buildings as applicable and sought additional/new inputs. The inputs pertaining to new buildings under VRMP were also submitted on 07.10.2021. Subsequently, the authorities carried out inspection of the refinery premises and accorded approval on 09.12.2022 and issued fire NOC. Copy of the fire NOC was submitted to Visakhapatnam Regional Office, APPCB on 16.12.2022.</p>

S.No.	Condition	Remarks																																																																																										
1	<p>Water Pollution: The effluent discharged shall not contain constituents in excess of the tolerance limits mentioned below. Further, the following parameters shall be complied for Process & Wash effluents at the outlets of ETP-I, II & IV i.e., before mixing with cooling waste water discharge:</p> <table border="1"> <thead> <tr> <th>Outlet</th> <th>Parameter</th> <th>Limiting standard (mg/L)</th> </tr> </thead> <tbody> <tr> <td rowspan="20">1</td> <td>pH</td> <td>6.5 – 8.5</td> </tr> <tr> <td>Oil & Grease</td> <td>5</td> </tr> <tr> <td>Cr VI</td> <td>0.1</td> </tr> <tr> <td>Pb</td> <td>0.1</td> </tr> <tr> <td>Total Suspended Solids</td> <td>20</td> </tr> <tr> <td>Phenols</td> <td>0.35</td> </tr> <tr> <td>CN</td> <td>0.2</td> </tr> <tr> <td>COD</td> <td>125</td> </tr> <tr> <td>BOD</td> <td>15</td> </tr> <tr> <td>S</td> <td>0.5</td> </tr> <tr> <td>NH3-N</td> <td>15</td> </tr> <tr> <td>P</td> <td>3</td> </tr> <tr> <td>Cr (Total)</td> <td>2</td> </tr> <tr> <td>Hg</td> <td>0.01</td> </tr> <tr> <td>Zn</td> <td>5</td> </tr> <tr> <td>Ni</td> <td>1</td> </tr> <tr> <td>Cu</td> <td>1</td> </tr> <tr> <td>Benzene</td> <td>0.1</td> </tr> <tr> <td>TKN</td> <td>40</td> </tr> <tr> <td>V</td> <td>0.2</td> </tr> <tr> <td>Benza (a) Pyrene</td> <td>0.2</td> </tr> </tbody> </table>	Outlet	Parameter	Limiting standard (mg/L)	1	pH	6.5 – 8.5	Oil & Grease	5	Cr VI	0.1	Pb	0.1	Total Suspended Solids	20	Phenols	0.35	CN	0.2	COD	125	BOD	15	S	0.5	NH3-N	15	P	3	Cr (Total)	2	Hg	0.01	Zn	5	Ni	1	Cu	1	Benzene	0.1	TKN	40	V	0.2	Benza (a) Pyrene	0.2	<p>Complied. Average values for Jan 2023 to June 2023 are given below:</p> <table border="1"> <thead> <tr> <th>Parameter</th> <th>mg/L</th> </tr> </thead> <tbody> <tr><td>pH</td><td>7.7</td></tr> <tr><td>Oil & Grease</td><td>0.6</td></tr> <tr><td>Cr VI</td><td>BDL</td></tr> <tr><td>Pb</td><td><0.01</td></tr> <tr><td>Total Suspended Solids</td><td>7.7</td></tr> <tr><td>Phenols</td><td>0.03</td></tr> <tr><td>CN</td><td><0.02</td></tr> <tr><td>COD</td><td>38.6</td></tr> <tr><td>BOD</td><td>8.5</td></tr> <tr><td>S</td><td>0.16</td></tr> <tr><td>NH3-N</td><td><0.01</td></tr> <tr><td>P</td><td>0.27</td></tr> <tr><td>Cr (Total)</td><td><0.01</td></tr> <tr><td>Hg</td><td><0.01</td></tr> <tr><td>Zn</td><td><0.01</td></tr> <tr><td>Ni</td><td><0.01</td></tr> <tr><td>Cu</td><td><0.01</td></tr> <tr><td>Benzene</td><td><0.01</td></tr> <tr><td>TKN</td><td>1.74</td></tr> <tr><td>V</td><td><0.01</td></tr> <tr><td>Benza (a) Pyrene</td><td><0.01</td></tr> </tbody> </table> <p>* All units in mg/L except for pH * BDL: Below Detectable Limit * ND: Not Detected</p>	Parameter	mg/L	pH	7.7	Oil & Grease	0.6	Cr VI	BDL	Pb	<0.01	Total Suspended Solids	7.7	Phenols	0.03	CN	<0.02	COD	38.6	BOD	8.5	S	0.16	NH3-N	<0.01	P	0.27	Cr (Total)	<0.01	Hg	<0.01	Zn	<0.01	Ni	<0.01	Cu	<0.01	Benzene	<0.01	TKN	1.74	V	<0.01	Benza (a) Pyrene	<0.01
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4	The industry shall comply with Standards for Oil Refineries notified by MOEF vide GSR No. 186 (E), dt.18.03.2008	Complied																		
5	<p>The industry shall comply with ambient air quality standards of PM (Particulate Matter size less than 10 µm) – 100 µg/m³, PM (Particulate Matter size less than 2.5 µm) – 60 µg/m³, SO₂ – 80 µg/m³, NO_x -80 µg/m³, Ammonia – 400 µg/m³, CO – 4 mg/m³, Benzene – 5 µg/m³, Benzo (a) Pyrene – 1 ng/m³, outside the factory premises at the periphery of the industry.</p> <p>Standards for other parameters as mentioned in the National Ambient Air Quality Standards CPCB Notification No.B-29016/20/90/PCI-I, dated.18.11.2009.</p> <p>Noise levels :</p> <p>Day time (6 AM to 10 PM) – 75 dB(A)</p> <p>Night time (10 PM to 6 AM) – 70 dB(A)</p>	<p>Complied. Average values for the period Jan 2023 to June 2023 are given below:</p> <table border="1"> <thead> <tr> <th>Parameter</th> <th>µg/m³</th> </tr> </thead> <tbody> <tr> <td>PM -10</td> <td>85.2</td> </tr> <tr> <td>PM -2.5</td> <td>36.0</td> </tr> <tr> <td>SO₂</td> <td>19.7</td> </tr> <tr> <td>NO_x</td> <td>23.1</td> </tr> <tr> <td>Ammonia</td> <td>10.9</td> </tr> <tr> <td>Benzene</td> <td>0.4</td> </tr> <tr> <td>CO</td> <td>0.4 #</td> </tr> <tr> <td>BaP</td> <td>BDL*</td> </tr> </tbody> </table> <p># Units for CO is mg/m³ & for BaP is ng/m³ *BDL: Below Detectable Limit</p> <p>Noise levels day time : 64.6 dB(A)</p> <p>Noise levels night time: 56.4 dB(A)</p>	Parameter	µg/m ³	PM -10	85.2	PM -2.5	36.0	SO ₂	19.7	NO _x	23.1	Ammonia	10.9	Benzene	0.4	CO	0.4 #	BaP	BDL*
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6	The industry shall operate 3 CAAQM stations for monitoring Benzene, Carbon Monoxide, Ammonia, Nitrogen Dioxide, Ozone, PM ₁₀ , PM _{2.5} and Sulphur Dioxide with recording facility and connected to APPCB website.	Complied. All three CAAM Stations are connected to APPCB/CPCB websites.																		
7	The industry shall comply with emission limits for DG sets of capacity up to 800 KW as per the Notification G.S.R.520 (E), dated 01.07.2003 and G.S.R.448 (E), dated 12.07.2004 under the Environment (Protection) Act Rules. In case of DG sets of capacity more than 800 KW shall comply with emission limits as per the Notification G.S.R.489 (E), dated 09.07.2002 at serialno.96, under the Environment (Protection) Act, 1986.	Noted.																		
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8	The industry shall comply the conditions stipulated in the permission issued by PESO.	Complied.																		

S.No.	Condition	Remarks
9	The industry shall explore the possibility for recycling the waste water after treatment instead of discharging the waste water into Meghadrigedda surplus course during expansion.	Stripped sour water from process units is being recycled to the maximum possible extent with the available systems for use as wash water. The possibility for recycling the waste water after treatment was explored and the same is being implemented in Integrated Effluent Treatment Plant (IETP) as part of current expansion project (VRMP). Post Implementation of this IETP, the treated water will be recycled/reused fully.
10	The industry shall include Oil & Grease parameter in the online continuous effluent monitoring system.	Installation of online analyzers for monitoring Oil & Grease in the effluent is being implemented in the forthcoming IETP under expansion project.
11	The industry shall maintain flow meters preferably Electro Magnetic flow meters with totalizers for water and effluent quantity measurements for different streams of effluents and different categories of water usage stipulated in this order.	Flow meters are available for measurement of fresh water intake and discharge of treated effluents.
12	The industry shall comply with CPCB directions dated 05.02.2014 / 02.03.2015 and guidelines issued regarding online emission and effluent monitoring systems issued from time to time.	Online emission & effluent monitoring systems are available with connectivity to APPCB/CPCB.

S.No.	Condition	Remarks
13	Thick green belt shall be maintained all along the boundary of the industry with minimum area of 33%. Existing Green belt shall not be disturbed in the proposed expansion / construction activity.	<p>Plantation along the South boundary of the refinery has been carried out.</p> <p>Green belt is existing in an area of 45.0 acres. The industry being a brown field project, there is no adequate space available within the refinery for provision of additional green belt. Further, plantation of trees is not recommended inside the plant area due to safety considerations and development of green belt along the boundary is prohibited considering the associated security risk.</p> <p>HPCL-VR has taken up plantation of saplings in various locations of Visakhapatnam in 4 phases under Green Visakha program and completed the plantation of 6,50,000 saplings covering an area of approx..700 acres amounting to Rs 25 Crores.</p> <p>In addition to this, HPCL-VR has taken up plantation of saplings under Vanam-Manam program initiated by Andhra Pradesh State Government and completed the target plantation of 10000 saplings in Jan 2019.</p> <p>Above plantation measures, provide a green cover of about more than the present shortfall of greenbelt within the refinery. Further, Green belt is being developed in a vacant land in the vicinity of refinery under VRMP (modernisation project).</p>
14	Dyke walls shall be maintained around storage tanks. Spillage / oil water mixture if any, shall be contained in the dykes and treated in the existing ETP and the oil shall be taken to storage tank. The treated waste water conforming to onland for irrigation standards only shall be used for gardening purpose within the premises.	Complied. Dyke walls are provided for all the storage tanks and the collected water from the dyke is being routed to ETPs for treatment.
15	The industry shall inform the breakdown, shutdowns, and non-operations of pollution control systems to APPCB duly taking alternate measures.	Being complied.

S.No.	Condition	Remarks
16	Odour control systems shall be improved at the Merox plants and ETP areas. The industry shall not cause any odour nuisance problem.	Complied. In Merox unit, mercaptans are removed from product LPG by absorption in caustic (Sodium Hydroxide) solution. Mercaptans get converted to mercaptides upon absorption into caustic solution and thus no free mercaptans are present in the spent caustic. Moreover, spent caustic is handled in a closed system before being routed to ETP for treatment. Thus, there is no chance for emanation of any odorous compounds in Merox unit or in ETP.
17	The off-gases of Bitumen Blowing Unit shall be treated before emitting into the atmosphere.	Complied. Off gases are routed to furnace.
18.	The flare stack shall be improved to flare off all hydrocarbons by ensuring complete combustion without any black smoke.	Complied. Flare stacks are adequately designed.
19.	The stripped off VOCs / Ammonia / Mercaptans from the ETP system shall not be allowed to escape into the atmosphere.	APIs and TPIs in ETPs are provided with covers to minimize VOC emissions. VOC emissions are monitored periodically and controlled as part of LDAR survey. VOC recovery system in line with MoEF guidelines is being implemented in the IETP (Integrated Effluent Treatment Plant) which is envisaged in the ongoing refinery expansion project. The existing ETPs will be non-operational post IETP commissioning.
20	In the plant area, values of VOC (non-methane hydrocarbons) shall be monitored as per EPA notification.	Being complied.
21.	In case of bad weather conditions and inversions, the industry shall run the process units with low Sulphur crude oil only.	Refinery emissions are primarily governed by the fuels used rather than the types of crudes processed. Low Sulphur Fuel oil (LSHS), desulphurised Fuel Gas and Naphtha (of very low Sulphur content) are the fuels used in the refinery, the Sulphur contents of which remain in the same range irrespective of the type of crude processed. The quality of these fuels is continuously monitored and controlled so as to maintain the refinery emissions within the stipulated limits.
22.	The industry shall take measures to improve the combustion efficiencies of furnaces to at least 95% so as to control the generation of un-burnt hydrocarbons and particulates.	State-of-the-art technology is adopted for all furnace designs to achieve the maximum possible efficiencies. There will not be any unburnt hydrocarbon in flue gases.

S.No.	Condition	Remarks										
23	The industry shall maintain the drainage system properly. Storm water shall be collected and be treated before disposing into the drains.	Storm water is normally clean. However, in order to contain any oil presence in the storm water, API separator/oil catcher is provided to prevent any oil carryover. It is always ensured that water/effluent is treated before disposing into drains leading out of the premises.										
24	The oil generation shall be prevented at the sources (process units) so that excessive oil does not reach the ETPs above the designed capacities.	Complied. Closed Blow Down (CBD) systems are provided in all process units to route the drained oil directly for re-processing without routing to ETPs.										
25	No further expansion is allowed without obtaining EC and CFE.	Noted.										
26	The pollution loads shall not exceed the following: a) Effluent loads: i) The Oil & grease - 12.26 TPD ii) Sulphides - 1.66 TPD iii) Phenol - 0.67 TPD iv) TSS - 1.25 TPD. v) BOD - 4.6 TPD vi) COD - 17.2 TPD b) Air Pollution: i) SO ₂ emissions - 11.5 TPD ii) SPM - 1.11 TPD iii) Hydro carbon emission - 2.5 TPD iv) NO _x emissions - 6.5 TPD	Complied. Average effluent loads are well within the stipulated limits. Complied. Average emission loads for the period Jan 2023 to June 2023 are given below: <table border="1"> <thead> <tr> <th>Emissions</th> <th>TPD</th> </tr> </thead> <tbody> <tr> <td>SO₂</td> <td>7.87</td> </tr> <tr> <td>SPM</td> <td>0.77</td> </tr> <tr> <td>HC</td> <td>0.76</td> </tr> <tr> <td>NO_x</td> <td>2.81</td> </tr> </tbody> </table>	Emissions	TPD	SO ₂	7.87	SPM	0.77	HC	0.76	NO _x	2.81
Emissions	TPD											
SO ₂	7.87											
SPM	0.77											
HC	0.76											
NO _x	2.81											
27	The industry shall ensure that the pollution loads are not increased at any point of time.	Noted and complied.										
28	The stack and online AAQ monitoring analyzers shall be regularly calibrated so as to record the actual values of air pollutants.	Complied. All the Stack and AAQ analyzers are calibrated once in a month on regular basis.										
29	The industry should comply with Noise Pollution (Regulation & Control) Rules 2000.	Complied.										
30	The industry shall ensure that the efficiency of the Sulphur recovery in the Sulphur Recovery Units (SRU) should be at least 98.7% as per EPA standard for existing plants.	Complied. Sulphur recovery efficiency in SRUs is >99%.										
31	Sulphur recovery efficiency shall be calculated on monthly basis, using quantity of Sulphur in the feed to SRU and quantity of Sulphur recovered.	Sulphur recovery efficiency is being calculated regularly basis quantity of Sulphur in the feed to SRU and quantity of Sulphur produced in SRU. It is more than 99%.										
32	The industry shall construct sheds for storage of hazardous waste.	Complied.										
33	The industry shall comply with Task Force Directions issued by the Board from time to time.	Complied.										

S.No.	Condition	Remarks
34	<p>The industry shall maintain the following records and the same shall be made available to the inspecting officers of the Board:</p> <ul style="list-style-type: none"> a) Daily production details (ER-1 Central Excise Returns) b) Quantity of Effluents generated, treated, recycled/reused. c) Log Books for pollution control systems. d) Sulphur content in the raw material. e) Characteristics of effluents, emissions and ambient air. f) Hazardous / non-hazardous solid waste generated and disposed g) Inspection book h) Manifest copies hazardous waste 	Complied. Records are being maintained.
35	The industry shall ensure that reduced Sulphur compounds and other odorous compound emissions are within odour detection threshold.	Sulphur compounds & H ₂ S are handled in a closed system. Thus, chances for emanation of any odorous compounds from the refinery are very remote. The values of odorous compounds monitored by APPCB at different locations in HPCL-Visakh Refinery were below odour threshold levels.
36	The industry shall carry out the Leak Detection and Repair Program (LDAR) at the specific regular intervals to identify the emission of VOCs, Volatile Hazardous Air pollutants from any leaking equipment, process equipment, etc preferably every month and the records shall be submitted to the APPCB officials during inspection.	Leak Detection and Repair (LDAR) survey is being carried out regularly by MoEF recognized third party laboratory. Survey reports are being maintained and are shared during inspection by APPCB.
37	VOCs shall be monitored at vulnerable locations periodically inside the plant. The sporadic odorous emissions shall also be placed on record and necessary measures to stop reoccurrences shall be taken	<p>VOCs within the refinery premises at vulnerable locations are monitored periodically & controlled as part of LDAR survey. All the gaseous vents from the units are connected to flare header and hence, any sporadic emission will be routed to flare stack only.</p> <p>APIs and TPIs in ETPs are provided with covers to minimize VOC emissions. VOC emissions are monitored periodically and controlled as part of LDAR survey.</p> <p>VOC recovery system in line with MoEF guidelines is being implemented in the IETP (Integrated Effluent Treatment Plant) which is envisaged in the ongoing refinery expansion project. The existing ETPs will be non-operational post IETP commissioning.</p>

S.No.	Condition	Remarks
38	Gas detection systems shall be in place to detect process leakages	Elaborate and extensive gas detection systems (HC-632 nos. H ₂ S-217 nos & H ₂ -111 nos) are available in the refinery to detect any process leakages.
39	Sulphur recovery units shall have continuous systems for monitoring of SO ₂ . Manual monitoring for all the emission parameters shall be carried out once in a month. Data on Sulphur Dioxide emissions (mg/Nm ³) shall be reported regularly.	Being complied.
40	The industry shall obtain the PLI policy which includes Environmental Relief Fund (ERF) and submit copy to RO, Visakhapatnam on yearly base.	Corporation has a comprehensive valid PLI policy No. 0304008404, dated 25.04.2023. Visakh Refinery is also included in this policy.
41	The Industry shall update the information in OCEMS – Industry Information Data Entry Software for Compliance Reporting Protocol in PART-II (Sections F & G) Every Quarter on 1 st January, 1 st April, 1 st July and 1 st October through this software system.	Noted.
42	The industry shall submit half-yearly compliance report for the schedule A,B & C conditions stipulated in CFO & HWA order audited through NABL / MoEF accredited laboratories.	Noted and being complied.
43	The industry shall comply with OSD guidelines and their amendment from time to time.	Refinery is complying with all the relevant OISD guidelines and their amendments from time to time.
44	Any other directions / circulars / notices issued by CPCB, MoEF&CC and APPCB shall be followed from time to time.	Noted.
Special Conditions:		
45	The industry shall prepare a safety report and carry out an independent safety audit report of the respective industrial activities including chemical storages / isolated storages by an expert not associated with such industrial activity as required under Rule 10 of MSIHC Rules, 1989 and get it approved by the Factories Dept., and submit the compliance along with copy of the safety report, safety audit report and safety certificate at concerned Regional Office, APPCB.	Third Party External Safety Audit of Refinery is carried out annually as per the rule 10 of MSIHC rules and recommendations are complied with. The latest third-party external safety audit of refinery was carried out on March 06-09, 2023. The latest Refinery Safety Report was prepared in June 2021.

S.No.	Condition	Remarks
46	The industry shall identify major accident hazard chemicals & list out the hazardous chemicals endangered to human health & environment, and the details shall be furnished to the Factories Department and the Regional Office, APPCB time to time duly certifying the same by the industry. Further, the industry shall extend training to the working personnel while handling hazardous chemicals for the prevention of accidents and necessary antidotes to ensure safety, as per the MSIHC Rules, 1989.	Hazardous chemicals are identified as per MSIHC Rules 1989 and MSDS of these chemicals are maintained. Training on the safe handling of hazardous chemicals is imparted to refinery employees as part of Emergency preparedness training program. Training program on safe handling of hazardous chemicals is included in the safety induction training module imparted to contractor workers.
47	The industry shall carryout calibration of safety equipment and leak detection systems at regular intervals and shall certify the same with the Factories Department. That certified copy shall be submitted to the APPCB, Regional Office. The industry shall install fluorescent Wind Vane at the highest point in the industry premises.	Safety equipment and leak detection systems are checked and calibrated regularly as per schedule. Windsocks are installed at 62 elevated locations in refinery for indication of wind direction.
48	The industry shall inventory the hazardous wastes and its quantities stored within the industry premises as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (HOWM Rules, 2016) and shall furnish the details to Regional Office, APPCB on a monthly basis duly certifying the same by the industry.	Hazardous waste returns are being submitted in Form-IV every year. As advised, the details shall be furnished on monthly basis.
49	The industry shall submit Risk analysis and risk assessment covering worst scenario clearly describing impact within the industry premises and outside the industry premises and emergency response system.	QRA (Quantitative Risk Analysis) of refinery was submitted to APPCB. ERDMP (Emergency Response and Disaster Management Plan) of refinery, which is certified by PNGRB (Petroleum & Natural Gas Regulatory Board) approved third party is in place. Latest revision of ERDMP was done in March 2021.
50	The industry shall inventorize the storage quantities of hazardous chemicals (raw materials), products, as per the hazard nature of reactivity / toxicity / flammability / explosive stored / handling in the premises as defined in the Management of Storage, Import of Hazardous Chemicals (MSIHC) Rules, 1989 and the details shall be furnished to the Factories Department and to the Regional Office, APPCB on monthly basis duly certifying the same.	Hazardous chemicals (raw materials, products) are identified as per MSIHC Rules 1989 and MSDS of these chemicals are maintained. Details of hazardous chemicals (crude oil) identified as per MSIHC Rules 1989 are being submitted on monthly basis to APPCB.

S.No.	Condition	Remarks
51	The industry shall submit the copy of the safety audit report and On-Site / Off Site Emergency Plans as applicable after being certified by the Factories Department to the APPCB, Regional Office from time to time, if the storage quantity of hazardous chemicals is equal to or, in excess of the threshold quantities specified in schedule 2 & 3 of MSIHC Rules, 1989.	Third party external Safety audit of Refinery is carried out annually as per the rule 10 of MSIHC rules and recommendations are complied with. The latest third-party external safety audit of refinery was carried out on March 06-09, 2023. ERDMP (Emergency Response and Disaster Management Plan) of refinery, which is certified by PNGRB (Petroleum & Natural Gas Regulatory Board) approved third party, is in place. Latest revision of ERDMP was done in March 2021
52	VOC meters with real time data transmission facility through internet of things (IoT) shall be installed near the production blocks and near the chemical storage tanks and link to the servers of APPCB and CPCB, within 3 months.	All the gaseous vents from the units are connected to flare header. Currently such system is not existing in the Indian refineries. The feasibility will be discussed among the Industry members.
53	The industries and isolated storages that are storing hazardous chemicals less than the threshold quantities mentioned under MSIHC Rules, 1989 shall submit safety certificate to the concerned Regional Office, APPCB.	HPCL-VR has engaged M/s Bureau Veritas, a specialised agency, for updating Safety Report. The report includes the details of hazardous chemicals storage as per MSIHC Rules. The latest Refinery Safety Report was prepared in June 2021.

SCHEDULE – C
[See rule 6(2)]
[CONDITIONS OF AUTHORISATION FOR OCCUPER OR OPERATOR HANDLING
HAZARDOUS WASTES]

S.No.	Condition	Remarks
1	The authorized person shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under	Complied.
2	The authorization shall be produced for inspection at the request of an officer authorized by the State Pollution Control Board	Being complied.
3	The person authorized shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this authorization	Being complied.
4	Any unauthorized change in personnel, equipment or working conditions as mentioned in the application by the person authorized shall constitute a breach of his authorization.	Noted.
5	The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time.	Noted.
6	The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on “Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous waste and Penalty”.	Noted.
7	It is the duty of the authorized person to take prior permission of the State Pollution Control Board to close down the facility.	Shall be complied.
8	An application for the renewal of an authorization shall be made as laid down under these Rules.	Noted.
9	Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.	Noted.
Specific Conditions		
10	Annual return shall be filed by June 30 th of the period ensuring 31 st March of the year	Complied. The latest Hazardous waste returns for 2022-23 was submitted to APPCB vide letter dated 13.06.2022.
11	The industry shall enter an agreement with the Cement industries for disposal of incinerable waste or shall dispose to Alternative Fuel Raw material facility (AFRF) OR to TSDF for co-incineration.	Noted.
12	The industry shall comply with the provisions of HWM Rules, 2016 in terms of interstate transport of Hazardous Waste and manifest document prescribed Under Rule 18 and 19 of the HWM Rules, 2016.	Complied.
13	The industry shall not store hazardous waste for more than 90 days as per the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.	Disposal of hazardous waste is a continuous process.

14	The industry shall store Used / Waste Oil and Used Lead Acid Batteries in a secured way in their premises till its disposal to the manufactures / dealers on buyback basis.	Complied.
15	The industry shall transport the hazardous waste to cement industries only through vehicle fitted with GPS tracking system	Noted.
16	The industry shall maintain 7 copy manifest system for transportation of waste generated and a copy shall be submitted to concerned Regional Office of APPCB. The driver who transports Hazardous waste should be well acquainted about the procedure to be followed in case of an emergency during transit. The transporter should carry a Transport Emergency (TREM) Card.	Complied. Manifest copies are submitted to APPCB through online manifest portal for the wastes that are disposed. TREM card is issued to transporter during transportation of Hazardous Wastes.
17	The industry shall maintain proper records for Hazardous and Other wastes stated in Authorization in Form-3 i.e, quantity of incinerable waste, land disposable waste, recyclable waste etc., and file annual returns in Form-4 as per Rule 20 (2) of the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.	Complied.
18	The industry shall comply with the provisions of HWM Rules, 2016 in terms of interstate transport of Hazardous waste and manifest document prescribed Under Rules 18 and 19 of the HWM Rules, 2016.	Complied.
	The industry shall submit Half yearly compliance reports to all the stipulated conditions in Environmental Clearance (EC), Consent for Establishment (CFE) and Consent for Operation (CFO) through website i.e., https://pcb.ap.gov.in by 1 st of January and 1 st July of every year. The first half yearly compliance reports shall be furnished by the industry and second half yearly compliance reports shall be the audited through NABL accredited third party.	Shall be complied.



हिन्दुस्तान पेट्रोलियम कॉर्पोरेशन लिमिटेड
(भारत सरकार संस्थान) रजिस्टर्ड ऑफिस 17 जमशेदजी टाटा रोड, मुंबई - 400 020
HINDUSTAN PETROLEUM CORPORATION LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE) REGISTERED OFFICE: 17 JAMSHEDJI TATA ROAD, MUMBAI-400 020
CIN : L23201MH1952GOI008858



विशाख रिफाइनरी, पोस्ट बॉक्स नं. 15, विशाखपट्टनम - 530 011 (आंध्रप्रदेश), फोन - 2895000, 2895100
VISAKH REFINERY, POST BOX NO.15, VISAKHAPATNAM-530 011 (A.P.), PHONES : 2895000, 2895100

Date: March 03, 2023
Ref: TSD/PS&E/APPCB/34/23

To
Member Secretary,
A.P.Pollution Control Board,
D.No.33-26-14, D/2, Near Sunrise Hospital,
Pushpa Hotel Centre, Chalamalavari Street,
Kasturibaipet, Vijayawada - 520 010.

Sir,

Sub: APPCB - HO - Unit-II - Hon'ble NGT Order dt. 20.10.2022 in OA No 73 of 2021(SZ)
-Payment of Environmental Compensation to APPCB and to deposit a sum to CPCB -Reg.

This has reference to our earlier letter no TSD/PS&E/APPCB/108/22 dated 05.12.2022 in response to your letter dated 17.11.2022 on the above subject.

As informed earlier, HPCL- Visakh Refinery had appealed the NGT order dated 20.10.2022 before Hon'ble Supreme Court and copy of the directions issued by Hon'ble Supreme Court vide order dated 06.01.2023 are attached as Annexure-I.

In compliance with the above interim order of Hon'ble Supreme Court, HPCL-Visakh Refinery is hereby depositing the Environmental Compensation of Rs.8,35,20,000 (Eight crores thirty five lakhs twenty thousand rupees only) with APPCB vide the following DD drawn in favour of "Member Secretary, AP Pollution Control Board" payable at Vijayawada.

Drawee Bank (Code)	DD Number	DD Date	Amount, Rs.
SBI, Vijayawada (00948)	652353	03.03.2023	8,35,20,000

The enclosed original DD is sent through speed post to your office. Request APPCB to kindly acknowledge the receipt of the DD.

Yours truly,

G. Bhagavan
DGM-Technical

Cc: JCEE, APPCB, Zonal Office, Visakhapatnam
EE, APPCB RO, Visakhapatnam.

जारी करने वाले बैंक भारतीय स्टेट बैंक
Issuing Branch State Bank of India
ब्रांच कोड / CODE No. 00952
Tel No. 0891-2704995

मांगद्राफ्ट
DEMAND DRAFT

Key: VOFGLZ
Sr. No: 139778

0 3 0 3 2 0 2 3
D D M M Y Y Y Y

मांगे जानेपर MEMBER SECRETARY, A.P. POLLUTION CONTROL BOARD*****

या उनके आदेश पर
OR ORDER

ON DEMAND PAY

Eight Crore Thirty Five Lakh Twenty Thousand Only

रुपये RUPEES

83520000.00

अदा करें

₹

ICR 000538852353
Name of Applicant

Key: VOFGLZ Sr. No: 139778
BR PARKING A/C WITH INB-00952

AMOUNT BELOW 83520001(0/8)

मूल्य प्राप्त / VALUE RECEIVED

भारतीय स्टेट बैंक

STATE BANK OF INDIA
जवाहर नगर / DRAWEE BRANCH VIJAYAVADA
ब्रांच कोड / CODE No: 00948

K. Sandeep
D. Yashodhara

प्रतिष्ठान प्रबंधक
K. SANDEEP
Manager (A.P.)
SBI, Visakhapatnam Br. 0952

उपनिर्देशक
D. YASHODHARA
Deputy Manager (A/CY)
SBI, Visakhapatnam Br-0952

कंप्यूटर द्वारा मुद्रित होने पर ही वैध
VALID ONLY IF COMPUTER PRINTED

केवल 3 महीने के लिए वैध
VALID FOR 3 MONTHS ONLY

652353 0000020001: 000538* 16

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL SOUTHERN ZONE
BENCH AT CHENNAI**

ORIGINAL APPLICATION No 73 OF 2021

IN THE MATTER OF:

VISAKHA PAWAN PRAJA KARMIKA SANGAM, APPLICANT

Versus

Union of India

Rep by its Secretary,

Ministry of Environment,

Forest and Climate Change, **and 6 others** **Respondents**

COMPLIANCE REPORT FILED BY THE 5th RESPONDENT

APPCB

DATE- 28-10-2023



**M/s MADHURI DONTI REDDY
ADVOCATE**

**STANDING COUNSEL FOR GOVERNMENT OF ANDHRA PRADESH
A.P. POLLUTION CONTROL BOARD**

#26, S2, Royal Castle, 26, Gill Nagar Extension, Choolaimedu, Chennai – 600 094.
Mobile: 98407 98460 / 63831 21322, Email: reddymadhuri09@gmail.com

[Counsel for 5TH Respondent](#)

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL SOUTHERN ZONE BENCH AT
CHENNAI

Original Application No.73 of 2021

IN THE MATTER OF:

Visakha Pawan Praja Karmika Sangam,
A Registered Labour Association No. 799 of 2016,
Rep by its Secretary Mr. Ganga Raju Kola,
H. No. 60-33-49, Ambedkar Colony,
Maikapuram, Vishakhapatnam,
Andhra Pradesh- 53001.

.....APPLICANT

VERSUS

Union of India and
6 others

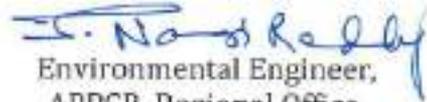
...RESPONDENTS

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2.	20.10.2022	Annexure - I Hon'ble NGT Order dt.20.10.2022	3-29
3.	05.01.2023	Annexure II Hon'ble Supreme Court Order dt. 05.01.2023	30-31
4.	03.03.2023	Annexure III Letter on Environmental Compensation paid by the industry.	32-34

It is certified that all the documents contained in the above annexure are true copies.

Date:31.10.2023


Environmental Engineer,
APPCB, Regional Office,
Visakhapatnam
Environmental Engineer
A.P. Pollution Control Board
Regional Office, Visakhapatnam

Report on the Hon'ble NGT, Chennai order dated 20.10.2022 in O.A.No. 73 of 2021 in the matter of Visakha Pawan Praja Karmika Sangham, Malkapuram, Visakhapatnam Vs M/s Hindustan Petroleum Corporation Limited (Visakh Refinery), Malkapuram, Visakhapatnam.

It is to submit that Visakha Pawan Praja Karmika Sangham, Malkapuram, Visakhapatnam has filed application OA No. 73 of 2021 (SZ) against M/s Hindustan Petroleum Corporation Limited (Visakh Refinery), Malkapuram, Visakhapatnam challenging the activities of HPCL Visakh Refinery in respect of Environment pollution before Hon'ble National Green Tribunal, Southern Bench, Chennai. The Hon'ble NGT appointed a Joint Committee on 25.02.2021. The said committee and APPCB have filed the reports to Hon'ble NGT, Chennai. The Hon'ble NGT, Chennai reviewed the reports of the Joint Committee from time to time and finally disposed the matter on 20.10.2022 **(Annexure-I)** with certain directions including the following:

Accordingly,

53.1 HPCL is directed to take all the required initiative and comply with the observations of the Joint Committee, IISC – Bangalore and enquiry report within a period of six months.

53.2 APPCB is to monitor the same and it is not debarred from taking any action against HPCL for any fresh violation under the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 and also initiate appropriate action against the erring officials as per the statutes.

53.3 HPCL is directed to deposit the Environmental Compensation assessed at Rs.8,35,20,000/- (Rupees Eight Crores Thirty-Five Lakhs and Twenty Thousand only) forthwith.

53.4 HPCL is directed to deposit a further sum of Rs.10,00,00,000/- (Rupees Ten Crores only) for their wilful negligence being a PSU which can be spent on restoration of environment and public health in the district of Vizag. Such deposit to be made within 2(Two) months from today to CPCB which will draw a plan to that effect.

53.5 The Joint Committee to ensure the regular monitoring in implementing the plan.

53.6 An independent Compliance Report may be filed by the Joint Committee after inspection as to the status of the compliance by the HPCL after 6 (Six) months i.e. by 15th May, 2023.

54. Accordingly, the Original Application is disposed of. List the matter in May, 2023 for reporting compliance.

Later, HPCL – Visakh Refinery filed Civil Appeal No. 9377/2022 challenging the Hon'ble NGT order in Hon'ble Supreme Court.

**The Hon'ble Supreme Court has directed the following vide order dated 05.01.2023.
(Annexure-II)**

"Admit.

The High Court, in the impugned order dated 20.10.2022, has directed in Paragraph Nos. 53.3 and 53.4 as under:

"53.3 HPCL is directed to deposit the Environmental Compensation assessed at Rs. 8,35,20,000/- (Rupees Eight Crores Thirty-Five Lakhs and Twenty Thousand only) forthwith.

53.4 HPCL is directed to deposit a further sum of Rs. 10,00,00,000/- (Rupees Ten Crores only) for their willful negligence being a PSU which can be spent on restoration of environment and public health in the district of Vizag. Such deposit to be made within 2 (Two) months from today to CPCB which will draw a plan to that effect."

Let the appellant comply with the directions mentioned at paragraph No. 53.3 of the order impugned within a period of eight weeks from today, without prejudice to the rights of the appellant in the pending appeal.

So far as paragraph No. 53.4 is concerned, there shall be a stay of the directions, until further orders.

In compliance to the above Hon'ble Supreme Court order, M/s. Hindustan Petroleum Corporation Ltd., (Visakh Refinery) had deposited Environmental Compensation of Rs.8,35,20,000/- vide DD No. 652353 dated 03.03.2023 to the AP Pollution Control Board.

(Annexure-III).

With regard to Paragraph No. 53.4, as the Hon'ble Supreme Court has given stay directions towards deposit of Rs.10 Crores to CPCB until further orders, accordingly, the industry has not deposited the amount to CPCB.

Later, M/s. Hindustan Petroleum Corporation Ltd., (Visakh Refinery) submitted compliance report on the suggested remedial measures to mitigate pollution [under point 32.10] as per Hon'ble NGT order dated 20.10.2022.

The joint committee carried out inspection of M/s. Hindustan Petroleum Corporation Ltd., (Visakh Refinery) on 26.09.2023 and 27.09.2023 for verifying the compliance as per Hon'ble NGT order dated 20.10.2022.

Submitted.


ENVIRONMENTAL ENGINEER,
APPCB, Regional Office,
Visakhapatnam.
Environmental Engineer
A.P. Pollution Control Board
Regional Office, Visakhapatnam

**BEFORE THE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI**

(Through Video Conference)

Original Application No.73 of 2021 (SZ)

IN THE MATTER OF

Visakha Pawan Praja Karmika Sangam,

A Registered Labour Association No. 799 of 2016,
Rep by its Secretary Mr. Ganga Raju Kola,
H. No. 60-33-49, Ambedkar Colony,
Maikapuram, Vishakhapatnam,
Andhra Pradesh- 53001.

...Applicant(s)

Versus

1. Union of India

Rep by its Secretary,
Ministry of Environment, Forest and Climate Change,
Indira Paryavaran Bhavan,
Jorbagh, New Delhi- 110003

2. Union of India

Rep by its Secretary,
Ministry of Petroleum and Natural Gas,
Sashtri Bhavan, New Delhi-1

3. Central Pollution Control

Rep by its Chairman,
Parivesh Bhavan,
East Arjun Vihar, New Delhi- 110032

4. State of Andhra Pradesh

Rep by its Chief Secretary,
Government Complex,
Velagapudi, Guntur District,
Andhra Pradesh- 522503

5. Andhra Pradesh Pollution Control Board

Rep by its Members Secretary,
D. No. 33-26-14/D2,
Near Sunrise Hospital, Pusha Hotel Center,
Chalamvari Street, Kasturibaipet,
Vijayawada, Andhra Pradesh- 520010.

6. District Collector and Magistrate

Main Road, Krishna Nagar,
Maharani Peta, Vishakhapatanam,
Andhra Pradesh- 530002.

7. M/s Hindustan Petroleum Corporation Limited.

Rep by its Chairman and Managing Director,
Malkapuram Post, Vishakhapatnam,
Andhra Pradesh- 530011.

...Respondent(s)

For Applicant(s): Mr. Sravan Kumar.
For Respondent(s): Mr. G.M. Syed Nurullah Sheriff for R1.
Mr. A.R. Sakthivel for R2.
Mrs. MadhuriDonti Reddy for R4 to R6.
M/s. King & Partridge for R7.

Judgment Reserved on: 26th August, 2022.

Judgment Pronounced on: 20th October, 2022.

CORAM:

HON'BLE Smt. JUSTICE PUSHPA SATHYANARAYANA, JUDICIAL MEMBER
HON'BLE Shri. SAIBAL DASGUPTA, EXPERT MEMBER

JUDGMENT

Delivered by Justice Smt. Pushpa Sathyanarayana, Judicial Member

1. The applicant is challenging the activities of Hindustan Petroleum Corporation Limited (for short 'HPCL') as they are violative of the Air (Prevention and Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Biodiversity Act and also the direction issued by the Andhra Pradesh Pollution Control Board and the conditions imposed by the MoEF&CC.
2. As the authorities, namely, MoEF&CC, the Andhra Pradesh Pollution Control Board and the CRZ have not taken any action against the 'HPCL' which is the 7th respondent, the above application is filed seeking a Committee to be appointed consisting of experts from the Pollution Control Board to conduct a site inspection and get factual findings and also assess air and water pollution etc., and direct the 7th respondent to implement the recommendations of the Indian Institute of Science, Bangalore with respect to the odour nuisance caused in Visakhapatnam.

3. The 7th respondent refinery was established in Visakhapatnam in the year 1957 and the capacity of the plant was increased from 0.65 MMTPA to 8.3MMTPA in the course of time. The industry has been causing smoke, odour nuisance and water pollution for several years. This has resulted in inconvenience and health hazards to the residents of the area. The local residents have made several complaints and given representation to the authorities on the pollution caused by the refinery. In response to those complaints, the Andhra Pradesh Pollution Control Board had also conducted several inspections in the unit and found large number of deficiencies and directed the unit to take precautions.
4. It is further alleged that the bad smell that emanates from the 'HPCL' plant creates nausea, breathlessness, lung, heart, eye and skin diseases to the residents, particularly to the women, children and elderly people. It is alleged that the water samples tested by the Public Health lab confirmed that the ground water was severely contaminated due to untreated water discharge from the industry. The Indian Institute of Science, Bangalore also had made certain recommendations regarding the odour pollution.
5. It is pointed out that the MoEF&CC compliance report found violation in the unit that the mandatory green belt of 33% in the unit was not developed. The conclusion of the monitoring report also stated that the capacity of the unit must be reduced to 70% of the original capacity. In the year 2017, the unit had proposed to extend its capacity from 8.5 MMTPA to 15 MMTPA. Several representations given to the authorities, requesting not to expand the capacity of the unit. Andhra Pradesh Pollution Control Board also conducted an inspection and issued directions on the violations noticed in the unit including directing the unit to submit a bank guarantee of Rs. 64 lakh.
6. It is now complained by the applicant that even the recommendations of the Indian Institute of Science, Bangalore was not implemented. Even during pendency of the application, a major accident occurred due to lack of requisite mandatory maintenance of the plant. On the directions of the Tribunal, a Joint Committee was constituted who had inspected and filed a report. It was recommended that the unit has to pay Rs.24,36,696/- (Rupees Twenty Four Lakhs Thirty Six Thousand Six Hundred and Ninety Six only) as environmental compensation. The

Joint Committee also confirmed the violations raised by the applicant like odour, lack of maintaining 33% of green belt etc. Therefore, the applicant had sought for the above directions in the application.

- 7. The 1st respondent, which is the Ministry of Environment, Forests and Climate Change** has filed its counter affidavit stating that apart from causing odour pollution, there are lot of violations committed in respect of the conditions imposed in the Environmental Clearance granted by them as well as the 'consent to operate' granted by the Pollution Control Board. The operation of the unit with the said violations resulted in serious environmental degradation. As the MoEF&CC is engaged only in policy formulation for abatement, control and prevention of pollution prescribing the environmental standards and they are implemented only through the Central Pollution Control Board and State Pollution Control Board, who are the enforcement authorities. The Pollution Control Boards or the Pollution Control Committees are empowered to take all such measures expedient for the purpose of protection and implementing the quality of the environment as well as prevention.
- 8. The 3rd respondent, who is the Central Pollution Control Board,** has filed its reply stating that the Environment Impact Assessment, Notification mandates the requirement of prior Environmental Clearance to the project listed in the schedule of the said notification. The Environmental Clearance is granted to the project proponent by the MoEF&CC under the said notification and they are also monitored periodically.
- 9.** It is alleged that for grant of Environmental Clearance for expansion to the 7th respondent, 'HPCL' the public hearing was not conducted when there were various complaints made by the applicant-Association and others regarding the functioning of the 7th respondent. Already Indian Institute of Science, Bangalore has submitted its report on odour nuisance and submitted a report to the State Pollution Control Board regarding the marine pollution. There are already the conditions and precautions for preservation and protection of the marine environment published by the Indian Coast Guard. The applicant had alleged that the 7th respondent is discharging the untreated water into the sea causing water pollution which has to be addressed only by the State Pollution Control Board.

- 10. The State Pollution Control Board, who is the 5th respondent,** had in its report stated that a report was called for from it regarding the accident that took place on 25.05.2021 in the 7th respondent unit. The total area of the unit is about 1880 acres which was leased from the Visakhapatnam. The 7th respondent, 'HPCL' is surrounded by various other industries on all the four sides and the green belt developed in the unit is about 45 acres and in an addition the industry has planted about 06 lakh saplings in Greater Visakhapatnam Municipal Corporation limits.
- 11.** The industry was issued with 'Consent for Operation' and hazardous waste authorization by the Board on 09.03.2021 which has got the capacity of 10 million metric ton per annum of crude oil. There was an accident on 25.05.2021 and Andhra Pradesh Pollution Control Board had inspected the site along with the scientific staff of the zonal lab, Vishakhapatnam and monitored the ambient air quality and submitted the monitoring report. It is also observed that contaminated waste water was generated due to fire fighting, sea cooling water is used in the fire water network and the fire water used for fire fighting operations collected in surface drains was routed to effluent treatment plant for treatment along with other waste waters. Water samples were collected during fire fighting operations from the drain where analysed and a report was given by the State Pollution Control Board. The industry was also directed to dispose of the oily sludge generated during fire incident to authorised agencies/treatment storage disposal facility for safe disposal.
- 12.** The 7th respondent had also informed that the oily sludge generated will be mechanically treated for oil recovery and the recovered oil pumped to slop tanks for processing along with crude oil. The residual low oily sludge will be bio-remediated within the industry. As per the information given by the 7th respondent to the Andhra Pradesh Pollution Control Board about Rs. 25 Crore worth of works have been undertaken immediately to replace the pipelines and machinery and about 78 metric ton of hydrocarbon was burnt in the fire accident
- 13. The 6th respondent, who is the District Collector and Magistrate,** also had constituted a Committee on the date of accident and a copy of proceedings was also issued. As per the proceedings, the Committee to enquire and submit a report to find out the cause of

outbreak of fire in the factory, whether sufficient measures have been taken by the management of the factory, whether any negligence or lapses are noticed in avoiding the mishap on the part of the management and whether any departmental failure is noticed were to be discreetly enquired and submitted.

14. The report submitted by the Enquiry Committee constituted by the District Collector and District Magistrate was also submitted to the Andhra Pradesh Pollution Control Board. The report also had identified the lapses and had given the recommendations to the unit to avoid such incidents in future.

15. The 7th respondent, who is the refinery unit, had filed its reply through its Dy. General Manager-Technical. The 7th respondent has specifically stated that it has got the name plate capacity of 8.33 Million Metric Tonnes and also a valid 'Consent for Operation' for 10 MMTPA. But the refinery is operating only in the range of 09 to 9.78 MMTPA. The refinery also had obtained all the necessary environmental consents to operate its refinery and complies with conditions imposed upon it by the environmental authorities. A very detailed reply is filed by the refinery unit setting out in detail the response for all the allegations made in the application.

16. The refinery unit/7th respondent also filed its objection to the Joint Committee report dated 03.12.2021 and reply to the allegations dated 03.10.2021 with respect to the Joint Committee report dated 23.02.2022. There is yet another objection to the report of the Joint committee dated 17.06.2021 filed by the refinery on 16.09.2021.

17. The Learned Counsel appearing for the refinery unit confined his argument only with the following issues, namely, (i) provision of 33% of the green belt, (ii) odour nuisance and (iii) the fire accident.

Odour Nuisance:

18. Pursuant to the complaints received from public of odour problems from several parts of Vizag City, Andhra Pradesh Pollution Control Board (APPCB) and District Administration of Vizag engaged IISC Bangalore to identify the root cause of odour nuisance. The major observation of the IISC is that the compounds responsible for odour

problem in Vizag City could be the cumulative effect of odorous organic and inorganic like unburnt hydrocarbons, BTX solvents, sulphides, amino compounds etc. from the industrial establishment, domestic sewage, municipal solid waste and vehicular exhausts and it is difficult to pinpoint any one industry. Thus the IISC had recommended the following measures for mitigating the pollution from the industries:

i. Even if industries follow good practices and maintain crisis within the limits, there are possibilities of episodic odour issues. In such cases, it is the responsibility of each and every industry in the region towards community to cooperate and participate in taking the order problem in Visakhapatnam area.

ii. APPCB being the model agency, should form an odour squad comprising members from APPCB, each stakeholder industry, prominent community members and experts in environmental field. The task of the squad should include:

- In case of any episode, the APPCB nominate to inform all members about the complaint and location.*
- The squad to visit the site and take ambient air samples in Tedler bags which should be stored under appropriate conditions and transported immediately (for GC-MC analysis) to recognized laboratory.*
- Upon receiving the complaints from the squad, each industry should check for abnormal emissions or operating conditions if any, in their industry and report to APPCB and take necessary actions.*

iii. APPCB should initiate a community medical study to correlate the mortality rate before and after the odour episode for compare the data during non-episodal to evaluate the hazard.

iv. Use of respiratory masks must be encouraged wherever odor is experienced.

v. Public education is an important concept in odor management. The odor squad should strive to impress upon people of Visakhapatnem that the common odor one might smell from the industries or any other sources will not have serious impact on average person's health if released in small amounts. It is important to maintain public decorum and take steps to mitigate the panic among the general public regarding proper education."

19. The Joint Committee had observed that the unit had not provided closed collection system to handle the odorous effluent streams. The oil-water separators and equalization tanks are not covered to trap the VOCs. Hence there was a strong odour of VOCs sensed in the ETP I & IV near bio-remediation ponds.

20. However, the 7th respondent had replied that the odour was localised and intermittent and it was not felt beyond ETP area. VOC recovery system is being implemented in the IETP as part of VRMP which is under mechanical completion stage. The existing ETPs will be non-operational post commissioning of IETP.

- 21.** In its reply, the 7th respondent has stated that a purchase order has been placed by the respondent on M/s. Glens Innovation Labs Private limited, Chennai for conducting odour study at the 7th respondent refinery which will be reviewed and vetted by IIT Madras and that the work will commence in April 2021. The status of the same is not furnished by the 7th respondent.
- 22.** A brief compliance report was also furnished by the refinery unit in which it is stated that despite following good practices and maintaining the emissions within the limits, there are possibilities of episodic odour issues. In such cases, it is the responsibility of the unit to cooperate and participate in tackling the odour problem. It is admitted by the 'HPCL' that checks were carried out inside the refinery and no abnormalities were observed and it was promptly communicated to the complainants and the authorities as applicable. It is also stated that an odour squad comprising members from Andhra Pradesh Pollution Control Board and stakeholders from the industry and prominent community members and experts in environmental area were constituted. The squad would visit the site and take air samples in Tedier bags which would be stored under appropriate conditions and transported to a recognised lab. The unit has stated that as and when complaints were received, the plants were checked for any abnormality and no abnormalities were found. As per the odour squad's recommendation the use of respiratory masks are encouraged.
- 23.** Though the smell from the industries may not have any serious impact on an average person health, the public also should be properly educated on the same as per the recommendation of the odour squad.
- 24.** Albeit, odour control is a major issue in any oil refinery as there is plenty of scope for unpleasant emissions which are inevitable. The 7th respondent refinery is a large scale refinery having the potential to generate odour that can be detected over large distances requiring a high performance odour control measures to minimize the odour impact. The odour impact besides being annoying also impacts the health. Stable petrochemical production may be associated with low but long-term exposure to industrial emissions. Nevertheless, accidents in the plants, such as the one happened in this case may temporarily cause high level of exposure in the population living near the plants.

25. The APPCB in its observation has not specified any well defined sources for the odour:-

"a. The unit is not complying with the majority of conditions stipulated in Environmental Clearances granted to Visakha Refinery.

b. The unit is not complying with the majority of consent & authorization conditions issued by APPCB on March 9, 2021; these are the same conditions given by APPCB at the time of consent & authorization renewal.

c. APPCB had issued 16 points directions for non-compliance on March 19, 2020; the unit is not complying for 6 points and partially complied for one point even after one year.

d. The committee had monitored stack emission at five stacks, manual ambient air quality monitoring at three locations and CAAQM using mobile van at two locations. The stack emissions are meeting the prescribed standards, the ambient air quality for PM10, PM2.5 parameter is exceeding at all the five locations, at one point near the ETP-IV area the concentration value of SO₂ is exceeding the standards.

e. The effluent discharge standards for the ETP outlet of I & IV are not meeting however due to mixing of one time cooling water with the treated effluent at the final discharge point, the prescribed discharge parameters are meeting the standards.

f. The committee calculated the prescribed pollution load for efficiency & emission in CFD and are meeting the prescribed standards.

g. The committee calculated environmental compensation for violation & non compliance of the directions issued by APPCB and levied Rs. 89,04,000 (Rupees eighty nine lakhs and four thousand only). M/s. HPCL, Visakha Refinery has to pay Rs. 89,04,000/- to APPCB.

h. The unit has to ensure self-monitoring, self-compliance and comply with statutory guidelines, safety measures, and directions issued by MOEF & CC, CPCS, APPCB, Directorate of Factories and other Regulatory Authorities.

i. The sulfur content in the crude oil is found to be less than the sulfur content in the all products."

26. From the above report of the APPCB, it can be inferred that most of the odours encountered during the observations were due to normal operations and diffuse emissions.

27. To ascertain the source of pollution, the Joint Committee along with the scientist of APPCB Zonal Laboratory carried out Ambient Air Quality Monitoring at 5 locations (Manual monitoring at 3 locations and Mobile van with CAAQMS at 2 locations) in and around the industrial premises.

"5.0 Monitoring of ambient air quality and stack emission in HPCL:

To ascertain the source of pollution, committee along with scientist of APPCB, Zonal Laboratory carried out ambient air quality monitoring at 5 locations (Manual monitoring at 3 locations & Mobile van with CAAQMS at 2 locations) in and around the industry premises.

Table 4: Details of ambient air quality monitoring locations

S. No.	Location	Latitude	Longitude	Date of monitoring	Parameters
I Manual Stations					
1	North-east side of the industry (near industry CAAQM stations at HLPH)	17.696921	83.251094	25.03.2021 and 26.03.2021	PM 10, PM 2.5, SO ₂ , NO ₂ & NH ₃ .
2	South-west to industry (Yarada park housing colony - S10 building)	17.688231	83.240756		
3	South-east side of the industry (near industry CAAQM station)	17.688419	83.250038		
II Mobile Continuous Ambient Air Quality Monitoring Station (CAAQMS)					
1	North-west corner of the industry near ETP - 4	17.700329	83.237126	25.03.2021 and 26.03.2021	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , NH ₃ , O ₃ , CO, Benzene and VOCs.
2	South-east side of the industry (near industry CAAQM station)	17.688419	83.250038		

The parameters monitored are PM₁₀, PM_{2.5}, SO₂, NO₂, NH₃, O₃, CO, Benzene and VOCs between 25.03.2021 and 27.03.2021. The monitoring results are depicted in table 5 below:

Table 5: Ambient air quality monitoring results

S. No.	Location	PM ₁₀	PM _{2.5}	SO ₂	NO _x	NH ₃	O ₃	CO	Benzene
I Manual Stations									
1	North-east side of the industry (near industry CAAQM stations at HLPH)	267	92	44	33	29	-	-	-
2	South-west to industry (Yarada park housing colony - S10 building)	115	69	19	17	27	-	-	-
3	South-east side of the industry (near industry CAAQM station)	248	83	48	36	30	-	-	-
II Mobile Continuous Ambient Air Quality Monitoring Station (CAAQMS)									
1	North-west corner of the industry near ETP - 4	320	89	84	39	40	57.7	1.4	2.7
2	South-east side of the industry (near industry CAAQM station)	298	94	52	42	35	66.2	1.7	3.3
24 Hour average standard		100	60	80	80	400	100 (8 hours)	4 (1 hour)	-
Annual average standard		60	40	50	40	100	180 (1)	2 (8)	5

						hour)	hours
All values are expressed in $\mu\text{g}/\text{m}^3$, except CO. CO values are expressed in mg/m^3 .							
Analysis result of other 49 VOCs is annexed (Annexure - 16).							

The results show that the values of PM_{10} & $\text{PM}_{2.5}$ values are exceeding the 24 hour average standards. The SO_2 value at the North-west corner of the Industry near ETP - 4 is exceeding the standard. The values of SO_2 & NO_x , though not exceeding the standard limits found far higher than the values obtained at the locations elsewhere in Visakhapatnam city. This indicates that there are leaks in the process systems through which, PM_{10} , $\text{PM}_{2.5}$, SO_2 , NO_x , etc. are find their way into the ambient air as fugitive emissions. Higher values of PM_{10} & $\text{PM}_{2.5}$ in the ambient air could also be attributed due to the expansion works going on within the premises of the refinery.

M/s. HPCL Refinery has installed three CAAQM stations within the periphery of the industry for continuously monitoring the ambient air quality on real-time basis. The data from these stations is transferred to APPCB & CPCB servers. Data pertaining to the monitoring for the period from January, 2020 to March, 2021 is enclosed (Annexure - 17). From the results it is observed that the value of PM_{10} and $\text{PM}_{2.5}$ are exceeding the standard. During February 15 to March 15, 2021 in the CAAQMS station at the southern side of the industry, there is a spike in the SO_2 value.

The Joint Committee requested Zonal Laboratory, APPCB, Visakhapatnam to carry out ambient air quality monitoring using mobile CAAQM Station for three days during May 3-6, 2021 and 06.05.2021 in the residential area of Malkapuram at Ajanta colony which lies south-east direction of M/s. HPCL Refinery to verify the impact of emissions from the refinery. The results obtained are tabulated as below:

Table 6: results of the ambient air quality monitored at Malkapuram in Ajanta colony

S. No	Date	PM_{10}	$\text{PM}_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Benzene
1	03.05.2021 to 04.05.2021	91	25	33	25	16	41.2	0.9	1.5
2	04.05.2021 to 05.05.2021	72	17	25	22	15	29.7	1.0	0.6
3	05.05.2021 to 06.05.2021	67	16	37	24	23	55.1	0.9	0.7
	24 Hour average standard	100	60	80	80	400	100 (8 hour s)	4 (1 hour)	-
	Annual average standard	60	40	50	40	100	180 (1 hour)	2 (8 hour s)	5
All values are expressed in $\mu\text{g}/\text{m}^3$, except CO. CO values are expressed in mg/m^3 .									
Analysis result of other 49 VOCs is enclosed (Annexure - 16).									

From the table above, it is observed that the all the parameters are well within the standards for all the three days.

28.Regarding emissions of stacks, the report of the committee is as follows:

"5.1 Monitoring of emission in stacks

Committee carried out monitoring of flue gas emissions from five important stacks for PM, SO₂ and NO_x during the period of inspection during March 25-27, 2021. Details of stacks monitored and the results are tabulated below:

Table 7: Analysis results of stacks monitored

S. No.	Stack identity	Date of monitoring	Parameter	Value (mg/N M3)	Standard
1	Stack attached to DHDS Reformer-61F11	25.03.2021	PM	39.0	100
			SO ₂	63.5	--
			NO _x	35.7	--
2	Stack attached to combined feed heater and product fractionators reboilers-90F01, 90F02	26.03.2021	PM	24.9	100
			SO ₂	184.7	--
			NO _x	204.9	--
3	Stack attached to Flue gas desulphurization unit FGD-II	26.03.2021	PM	36.0	50
			SO ₂	147.5	--
			NO _x	112.8	--
4	Stack attached to continuous catalytic reforming unit (CCR) 74F1, F2, F3, F4	26.03.2021	PM	22.0	100
			SO ₂	25.1	--
			NO _x	117.4	--
5	Stack attached SRU Train - III Incinerator 79F302	27.03.2021	PM	23.0	100
			SO ₂	32.5	--
			NO _x	35.7	--

Analysis reports enclosed (Annexure -18).

From the results, all the parameters are meeting the prescribed standard by APPCB for all the five stacks monitored.

The Visakha Refinery has installed Online Continuous Emission Monitoring Systems (OCEMS) to 32 stacks to monitor the flue gas emissions for Particulate Matter (PM), Sulfur dioxide (SO₂), Nitrogen dioxide (NO₂) and Carbon monoxide (CO) on real-time basis and connected to APPCB & CPCB server. Analysis data obtained from these stacks for the period from 01.01.2020 to 30.04.2021 has been collected and enclosed (Annexure - 18). There are few exceedances noticed during March, 2021

According to the CFO conditions issued by APPCB has prescribed stipulated standards for pollutant emission loads from the stacks for PM, SO₂, NO_x & hydrocarbons. The Joint Committee calculated pollutant emission load for compliance verification as tabulated below.

Table 8: Emission Load calculation statement for PM, SO₂ and NO_x as per the data obtained from the CEMS connected to stacks - From 01.01.2020 to 30.04.2021

S. No.	Stack ID		SPM (TPD)	NO _x (TPD)	SO ₂ (TPD)
	S. No. as per CFO order	As per CEMS	Actual as per CEMS	Actual as per CEMS	Actual as per CEMS

1	Stack 4	Stack 01_CDU_I_2F1	0.028	0.058	0.283
2	Stack 6	Stack02_CDU_I_2F2-	0.008	0.043	0.182
3	Stack 5	Stack03_CDU_I_2F4-	0.016	0.055	0.275
4	Stack 1	Stack04_CDU_II_11F1-	0.068	0.173	0.543
5	Stack 2	Stack05_CDU_II_12F1-	0.015	0.066	0.166
6	Stack 12	Stack06_CDU_III_42F1-	0.057	0.133	0.552
7	Stack 13	Stack07_CDU_III_42F2-	0.01	0.04	0.15
8	Stack 14	Stack08_VBU_46F1-	0.006	0.062	0.137
9	Stack 15	Stack09_FCCU_I_4F51-	0.015	0.02	0.116
10	Stack 16	Stack10_FCCU_I_4F52-	0.094	0.045	0.146
11	Stack 35	Stack11_FCCU_I_FGD1-	0.063	0.42	0.184
12	Stack 3	Stack12_FCCU_II_14F1-	0.012	0.023	0.139
13	Stack 9	Stack13_FCCU_II_14F3-	NA	0.029	0.093
14	Stack 34	Stack14_FCCU_II_FGD2-	0.111	0.31	0.098
15	Stack 8	Stack15_PP_I_WIL8-	NA	NA	NA
16	Stack 27	Stack16_PP_1_IBH-	0.01	0.203	0.273
17	Stack 21	Stack17_DHDS_60F1-	0.002	0.045	0.108
18	Stack 19	Stack_18_DHDS_REFORM ER-	NA	0.042	0.054
19	Stack 20	Stack19_DHDS_HGU_61F 1	NA	NA	NA
20	Stack 22	Stack20_DHDS_SRU_65F 001-	NA	0.02	0.042
21	Stack 26	Stack21_DHDS_SRU_79F 302-	NA	0.008	0.176
22	Stack 24	Stack22_CCR_74_F1toF4-	0.021	0.135	0.042
23	Stack 23	Stack23_NHT_72_F1F2-	0.003	0.017	0.02
24	Stack 25	Stack24_FCCNHT_75F1-	0.001	0.004	0.006
25	Stack 17	Stack25_CPP_HRSGIII-	0.083	0.978	0.047
26	Stack 18	Stack26_CPP_HRSGIV-	0.103	0.575	0.06
27	Stack 28	Stack27_CPP_HRSGV-	0.058	0.648	0.192
28	Stack 29	Stack28_CPP_HRSGVI-	0.064	0.74	0.176
29	Stack 30	Stack_29_DHT_FEED_90F 01_02-	0.054	0.092	0.138
30	Stack 32	Stack_30_DHT_HGU_NAP THA_HEATER_91F01-	0	0.002	0.001
31	Stack 31	Stack_31_DHT_HGU_91M 20-	0.063	0.079	0.071
32	Stack 33	Stack_32_DHT_SRU_92M 22-	0.004	0.018	0.051
Total (as calculated from the results obtained from CEMS connected to 32 stacks)			0.969	5.083	4.521
Total emission load (as stipulated to each stack in the CFO Order against the 32 stacks)			5.609	---	---
Total emission load (as stipulated to each stack in the CFO Order against all the 36 stacks)			6.72	---	---
Total emission load prescribed as per CFO Order			1.11	6.5	11.5
Stack monitoring data obtained from the Continuous Emission Monitoring Systems (CEMS) connected to 32 stacks for the period from 01.01.2020 to 30.04.2021. (Annexure - 19).					

From the above calculations, the parameters PM, SO₂ and NO₂ are meeting the prescribed standard for pollution emission loads."

29. As far as the waste water generation and treatment is concerned, there are three Effluent Treatment Plants in HPCL. Treatment effluent along with the ones-through cooling water is discharged into Megadrigedda surplus overflow channel through two numbers of Main Hay Filters, which finally joins the sea of Bay of Bengal.

30. During inspection, the Joint Committee collected treated effluents from three outlets of ETPs and the two final outlets discharged into Megadrigedda surplus overflow channel for compliance verification on 26.03.2021.

31. The Joint Committee had done the **domestic waste water** treatment analysis and observed that all the parameters are meeting the standards.

Groundwater Quality Monitoring:

"HPCL has installed six piezometer wells inside the unit premises to regularly monitor the groundwater quality. During the inspection, it was informed to the committee that four of the wells are dried up and the Joint Committee collected groundwater samples from two piezometer wells located within the industry premises.

Results shows that dissolved solids content in the groundwater within the premises of the refinery are very high exceeding the drinking water standard limits. This may either be attributed to the intrusion of sea water or be attributed to the seepage of sea water drawn by the refinery for cooling purpose."

Sulphur Balance Studies:

"The Joint Committee carried out sulphur balance studies for verification of compliance of stipulated standards. For the study, committee collected Sulphur related data of crude processed and petroleum products produced during the year 2020 (January to December).

Further, the refinery has used three types of fuels viz., fuel gas, low sulphur heavy stock (LSHS) fuel oil and CPP Naphtha for crude distillation, capital power generation, etc. purposes, which again is also having sulphur concentrations. The quantities of various fuels used and their sulphur content have also been verified by the Joint Committee while carrying out sulphur balance studies.

From the analysis sulphur balance studies, it appears that the refinery is not exceeding the sulphur dioxide emission load of 11.5 tons per day stipulated in the APPCB CFO order dated 18.12.2019.

In support of the claim of the refinery that is recovering sulphur from the crude and its products, it has provided the quantity of recovered sulphur for past five years from 2016-17 to 2020-21."

32. After the above analysis, the Joint Committee has observed as follows:-

"9.0 Observations of the committee:

i. Committee inspected HPCL known as Visakha Refinery during March 25-27, 2021. During inspection the unit was operational, however, FCCU-I, SRU train 1&2, Merox unit were not in operation. It was informed that FCCU-I is currently shutdown due to low catalyst circulation rate, and the unit is having four SRU Trains

and total design feed rate of these SRUs is higher than the generated feed gas. Generally, two SRU trains will be in operation. Thus SRU Train-3 and DHT SRU were in operation.

ii. The unit has three ETPs for treating the different streams of effluents generated. ETP -I is of the capacity 3,240 KLD, ETP - II (7,800 KLD) and ETP - IV of 4320KLD capacity. During inspection, ETP I & ETP-IV were fully operational, but, ETP -II was partially operational and was diverted to ETP -IV for further operation. It may be noted that the design capacity of ETP-IV is smaller compared to ETP-II, hence, complete treatment cannot be achieved. This is also reflected in the analysis results of ETP-IV outlet (Table 13). The chance of bypass is highly possible, however, during inspection no by-pass of effluents was observed.

iii. In the ETP-II area, the TPI was broken down and the thick black slurry like effluent was spilled all over and was filled in the drains. The drains near ETP-II section was filled with water and white sand like material.

iv. The storm water drains near the final outlets I & II was filled with water and when enquired, it was told that rain water. The small tank is constructed near the guard pond and it was observed that about four inches oily mark was visible. The water filled in this tank is transported to the rain water harvesting tanks through tankers.

v. The unit has not provided closed collection system to handle the odours effluent streams. The oil-water separators and equalizations tanks are not covered to trap the VOCs. Hence, during inspection a strong odour of VOCs was sensed by the committee members in the ETP I & IV, near bio-remediation ponds and at guard pond.

vi. The guard pond is filled with the treated effluent of ETP-I & II and ones through cooling water. It was observed that the oil was floating on the surface of the guard pond near the inlet of ETP treated water.

vii. The hazardous waste generated by the refinery as per the authorization is stored in a separate shed under lock & key. The different types of wastes are kept separately with demarked. The wastes are disposed accordingly mentioned in the authorization.

viii. Sludge generated from Crude/Product tanks is shifted to Sludge lagoons and is called as high oily sludge. Processing of this sludge to recover the oil is carried out through a temporary facility (Decanter, Centrifuge, RO Tank) installed by external agency. When 3000 to 5000 m³ of sludge is accumulated, tender is placed for processing of sludge. The third party by installing temporary facility such as Decanter, Centrifuge & RO Tank. The recovered oil generated is pumped to slop oil tanks for further reprocessing in CDUS. Low oily residual sludge generated out of sludge processing is taken to Bins for Bio Remediation process.

ix. During inspection, it was noticed spillages in the sludge processing area and scatter of sludge near the sludge lagoon ponds. The sludge lagoon ponds were not covered and the VOC measured by hand held instrument showed 8 - 9 PPM. In this area strong VOC was sensed by the committee members. The industry representative informed that it is only local and is not carried to other area of the refinery.

x. In the bio-remediation process of low oily sludge, 10 bins of 100m of each is constructed and filled with low oil sludge, the oil zapper bacteria at 5 kgs/m³ and nutrients of 250g/m³ is mixed along with the sludge. Periodic tilling has to be carried out. After two months the sludge has to be tested for the oil content and if required additional oil zapper bacteria and nutrients have to be added. After 10-12 months, the oil sludge will be completely degraded and can be used as manure.

xi. However, during inspection it was noticed that the 5 bins were empty and the remaining bins was filled with sludge, but on top of the sludge high oil sludge along with biofilms was dumped. The sludge was too dried and appears that it was not tilled and aerated for the growth of bacteria for the treatment.

xii. It was informed that the 1st batch was processed in bin no. 2, 5 & 6 and completed in March, 2020. The treated sludge was utilized for garden soil and road repair works in project Site.

xiii. It has been observed that project had display board at the main entrance gate. However, the critical parameters viz., stack emission, ambient air quality monitoring, water, noise, VOC, etc. data are not being displayed.

xiv. Thick black smoke emissions from the flare stacks were observed during inspection of the refinery. APPCB officials have also recorded in their reports during inspection of the refinery on 16.07.2020 and 30.11.2020, which indicate escape of incomplete and unburnt aromatic and aliphatic hydrocarbon emissions into the atmosphere.

xv. Refinery does not have the inventory of unrecoverable volatile organics venting through the flare stacks for burning.

xvi. It has been observed that, vide EC dated 03.02.2004 and 02.09.2009 project was under expansion from 7.5 to 10.0 MMTPA. As per EC dated 11.02.2016, project is under expansion from 8.33 MMTPA to 15.0 MMTPA. However, during inspection, no information has been provided for expansion of project from 7.5 to 8.33 MMTPA.

xvii. It has been observed that the PAs are submitting the six monthly compliance reports with respect to latest EC dated 11.02.2016 only. However, compliance status of earlier granted EC's and monitored data of air, water, noise, etc. are not being submitted.

xviii. Compliance of standards/norms in terms of fugitive emissions and VOC emissions monitoring at ETP area are not being implemented as per Oil Refinery Industry notified under the Environment (Protection) Rules, 1986 vide G.S.R. 186(E) dated 18th March, 2008.

xix. The project had not provided a mobile laboratory with adequate facility to monitor ambient air quality outside the refinery premises. The condition has been imposed in the EC dated 30.05.1995. However, till date mobile laboratory was not provided.

xx. As per CFO, there were 35 stacks were present in the project. However, continuous on line stack monitoring facilities were provided for 32 stacks only.

xxi. Monitoring of process emissions viz., SO₂, NO_x, HC (Methane & Non-methane), VOCs and Benzene from various units is not being done.

xxii. The monthly Sulphur balance sheet of the refinery along with six monthly compliancereports.

xxiii. Facilities for monitoring of HS, mercaptan, non-methane-HC and Benzene at all CAAQ monitoring stations is not being provided.

xxiv. The comprehensive water audit reports on annual basis are not being submitted to Ministry's Integrated Regional Office.

xxv. It has been observed that the PAs are in process of developing green belt in and around the plant premises. However, it has been observed that the plantation around the project area is not satisfactory.

xxvi. Uploading of environmental statement for each financial year ending 31st March in Form-V on company's website is not being done.

10.0 Suggested remedial measures to mitigate pollution.

The committee suggests the following measures:

i. The unit should comply with the all the conditions mentioned in the CFO and hazardous waste authorization and also the directions issued by APPCB for effective and safe operation of the refinery so as to mitigate the pollution to possible extent.

ii. The unit should take necessary steps to reduce the PM₁₀ & PM_{2.5} values in ambient air within the industry premises, the values in the CAAQMS in all the three locations shows the exceedances throughout the year 2020. The unit should spray water on the road and to plan the timings for the movement of vehicles inside the industry to control the fugitive emissions.

iii. The five stacks monitored are meeting the prescribed standards, however, two stacks which were not monitored due to some issue in the stack monitoring platform has to be rectified.

iv. Refinery has provided OCEMS in 32 stacks to monitor PM, SO₂, NO_x & CO and remaining 4 stacks has to be installed. The OCEMS data are connected to CPCB & APPCB servers. CEMS for

measuring Hydrocarbons are yet to be installed. A few exceedances were observed during March, 2021. The industry should take periodic calibration and maintenance of analysers to avoid the exceedances in standards.

v. The unit should rectify and repair the ETP -II components for effective treatment, the effluent spilled near the TPI area should be cleaned. The storm water drains near the ETP-II and final outlets have to be cleared for free flowing and to avoid stagnations. The small pump has to be installed in the tank constructed to collect the rain water near the guard pond to avoid manual transportation of the rain water to the ETP.

vi. The ETPs should be operated regularly and effectively for meeting the prescribed discharge standards. The unit should install covers either floating /fixed types in the oil water separator and equalization tanks to trap the VOCs for eliminating the odours. The trapped off-gas has to be treated to remove at least 90% of VOCs.

vii. The unit should recycle the treated water to the maximum extent to reduce the fresh water consumption instead of fully discharging into sea along with cooling water.

viii. At present the unit is monitoring the LDAR program annually through third party laboratory. According to the standards for equipment leaks and good practices it is advised to conduct the quarterly monitoring of LDAR for pump seals, compressor seals, pressure relief devices & heat exchangers and annually monitor the process drains & components that are difficult to monitor.

ix. The high oily sludge from the crude and products tanks stored in the sludge lagoons has producing VOCs, the unit has to take necessary steps to eliminate the VOCs odour in the area.

x. The housekeeping at the sludge processing area has to be improved, the unit may take necessary action against the third party laboratory for causing spillages during sludge processing and advise to avoid spillages.

xi. The bio-remediation of the low oily sludge has to be carried out technically and avoid dumping of unwanted waste in the bins. Before using the treated sludge as manure, it is required to analyse to check that the oily sludge is completely degraded. The oil contents in terms of Total Petroleum Hydrocarbon (TPH) after bioremediation are less than 1%.

xii. To develop 33 % of total area as a green belt along the industry premises to stop the odour issues as well as to eliminate the fugitive emissions. The unit may plant the odour eliminating plants suitable for refinery industry.

xiii. Refinery shall work out mass & material balance studies and maintain the inventory of unrecoverable volatile organics venting through the flare stacks for burning. Records to this effect shall be produced before the regulatory officials as and when required.

xiv. Suggested that the refinery shall procure, install and operate one Continuous Ambient Air Quality Monitoring station (CAAQMS) with PM 10, PM2.5, CO, O3, SO2, NO2, NH3, Benzene, H2S and Mercaptans parameters at an appropriate location in the residential areas of Malkapuram to assess the impact of refinery activities.

11.0 Concluding remarks:

a. The unit is not complying the majority of condition stipulated in Environmental Clearances granted to Visakha Refinery.

b. The unit is not complying with the majority of consent & authorisation conditions issued by APPCB on March 9, 2021; these are the same conditions given by APPCB at the time of consent & authorisation renewal.

c. APPCB had issued 16 points directions for non-compliance on March 19, 2020; the unit is not complying for 6 points and partially complied for one point even after one year.

d. The committee had monitored stack emissions at five stacks, manual ambient air quality monitoring at three locations and CAAQM using mobile van at two locations. The stack emissions are meeting the prescribed standards, the ambient air quality for PM10, PM2.5 parameter is exceeding at all the five locations, at one point near the ETP - IV area the concentration value of SO2 is exceeding the standards.

e. The effluent discharge standards for the ETP outlet of I & IV are not meeting, however due to mixing of one time cooling water with the treated effluent at the final discharge point, the prescribed discharge parameters are meeting the standards.

f. The committee calculated the prescribed pollution load for effluent & emission in CFO and are meeting the prescribed standards.

g. The committee calculated environmental compensation for violation & non-compliance of the directions issued by APPCB and levied Rs. 89,04,000/- (Rupees eighty nine lakhs and four thousand only). M/s. HPCL, Visakha Refinery has to pay Rs. 89,04,000/- to APPCB.

h. The unit have to ensure self-monitoring, self-compliance and comply with statutory guidelines, safety measures, and directions issued by MOEF & CC, CPCB, APPCB, Directorate of Factories and other Regulatory Authorities."

33. Therefore, the 7th respondent has decided to follow the specific directions recommended by the EAC (Expert Advisory Committee) to comply with the same.

Greenbelt:

34. Vegetation around the industry or the greenbelt is to mitigate the air pollution as the plants serve as a sink for pollutants and also reduce noise level. Greenbelt development is beneficial in several ways leading in conservation of bio-diversity, retention of soil moisture, recharge of groundwater, improving aesthetics of local environment and maintaining pleasant atmosphere of the region.

35. It would be relevant to advert to the order passed by the Hon'ble High Court of Andhra Pradesh in **W.P. No.259 of 2017** dated 23.09.2019 wherein a direction was given to the HPCL to comply with the CFO conditions including the recommendations of Andhra Pradesh Pollution Control Board (APPCB) of its report dated 25.04.2019 and further directing the Board to monitor the refinery and take appropriate action if necessary. In the said order, the Andhra Pradesh Pollution Control Board (APPCB) had recommended that besides the completion of plantation of 6,50,000 saplings, there was further scope for development of greenbelt in the vacant areas.

"The Board has stipulated Load based standards for the stack emissions. Whereas the Industry is measuring the emissions for concentrations. But the industry is generating load based data randomly duly taking volumetric flow data from third party monitored reports. The industry may be recommended to develop a methodology to correlate the concentration based result to convert to load based values to verify the compliance.

The industry may be recommended to improve housekeeping near ETP-IV.

The industry may be recommended to store used chemical drums in closed sheds.

There is further scope for development of Green Belt in the vacant areas.

There is scope for improvement of Bio-remediation pond management as certain spillages on ground were observed.

The industry may be recommended to comply with CFO conditions."

- 36.**Condition No. 16 of Schedule - B of the CFE Expansion Order dated 06.07.2016 speaks about the greenbelt:

"the total area of the industry after expansion is 860 acres. Green belt is existing in an area of 45.0 acres. The area of the green belt after expansion is 112.5 acres. The industry vide mail dt. 06.07.2016 informed that being a brown field project, there is no adequate space available within the refinery for provision of additional green belt. Further, plantation of trees is not recommended inside the plant area due to safety considerations and development of green belt along the boundary is prohibited considering the associated security risk. The industry under "Green Visakha Programme" about 4,50,000 saplings were planted till 2015. Additional plantation of 2,00,000 saplings is to be undertaken up and completed during 2016-17. The major areas of plantation are Autonagar, Vadlapudi, Parawada, Sheelanagar, Aganampudi, Denkada etc., and the total acreage of block plantation in these areas is approximately 700 acres."

- 37.**From the above it appears that the industry had complied with the greenbelt requirement.
- 38.**Development of greenbelt consisting of 3 tier along the periphery of the project with native species is most important guideline for any type of industry. Green vegetation cover is beneficial in many ways leading to conservation of bio-diversity. The greenbelt species should be selected based on the type/category of the industry and climate conditions. Setting trees around an industry may not serve the purpose of greenbelt without considering the above aspects.
- 39.**Therefore, the APPCB may consult the Andhra Pradesh Forest Department and NEERI in this regard for the delineation of the optimal width of a greenbelt in and around the industry based on pollution attenuation coefficient of selected place species. The 7th respondent may consider contributing to the greenery of the Vizag city.

Fire Accident:

40. It is not a secret that an oil refinery or petroleum product industry is a dangerous job. There is always something that could go wrong. One of the serious risks in these industries is the potential for fire and explosions. It is therefore important to conduct fire risk assessment. The management also put in place several rules and practices and train the employees how to recognize the hazards.

41. On 25.05.2021, there was a fire accident at Crude Distillation Unit III of the 7th respondent. A report was called for in this regard from Andhra Pradesh Pollution Control Board (APPCB) which was submitted along with the detailed report from the enquiry committee submitted to the Collector & District Magistrate. The cause of the outbreak was found to be the hole that developed on the 6" SR pipeline carrying Bitumen due to corrosion or erosion. The report further observed the following lapses of HPCL during inspection.

"1. Deviation in implementing preventive maintenance schedules as per the Standard Operating Procedures (SOP) within the time. During inspection, it was observed that industry was not conducted the Ultra sonic test for 6 inch pipeline in CDU-3 (fire incident was taken place) for which the due date for testing is August 2020.

2. Industry has conducted of hydro-test to the pipelines in August, 2012, and not conducted afterwards this test should be which will be conducted every 4 years which is serious lapse on account of HPCL.

3. Failure in identifying corrosion / erosion of the pipelines carrying hydrocarbons at higher temperatures

4. Preventive maintenance schedules are not implemented properly."

42. The report also furnished the recommendations suggested by the committee as follows:

"In view of the fire incident that occurred at HPCL-Visakha Refinery on 25.05.2021 at 3.10 PM the committee has suggested the following recommendations to avoid such incidents in future:

1. Industry shall conduct timely Hydro Testing of all pipelines for its efficacy and also shall start the Hydro testing of all pipelines of the other two crude distillation units existing in the same premises immediately by the management to avoid this type of fire incidents.

2. Industry shall ensure hydrant pressure of 7 kg / cm² at any point of time in the fire hydrant network

3. Industry shall ensure the operability of Diesel operated pump dedicated to fire hydrant network. A standby Diesel pump may be installed.

4. Industry shall conduct the audit of Foam availability in the plant premises regularly.

5. Industry shall strengthen the mutual aid agreement with the nearby industries

6. Industry shall conduct periodical mock drills and find out any lapses in the mitigation of defined scenario.
7. Industry shall mark the flow directions on the pipelines by indicating arrow marks for easy identification.
8. Industry shall conduct HARA study and implement the recommendations therein from time to time.
9. Industry shall clear accumulated trash and scrap regularly as the industry is under expansion.
10. A detailed metallurgical / micro-structural analysis of the failed pipeline elbow to be carried out to establish the nature of failure by external qualified agency.
11. The management shall follow the directions to be issued by Hon'ble NGT in OA No. 73/2021 which is filed case on the fire incident.
12. HPCL should purchase Hydraulic platform and made it available for any fire mishaps at heights, since most of the pipeline elevated structures are upto 30 meters and above
13. Escape signage boards should be displayed in the entire premises."

43. The report of the HPCL / 7th respondent on CDU-3 fire accident on 25.05.2021 is as follows:-

2.1.1 Ambient Air Quality:

There was no increase in the ground level concentrations of ambient air quality parameters recorded in the two of the three Continuous Ambient Air Monitoring (CAAM) stations during the fire incident. In the third CAAM station located at south gate, even though there was slight increase in NOx emissions for short duration (15:45 hrs to 16:45 hrs), the 24-hour average value was well within the stipulated limit of National Ambient Air Quality Standards (NAAQS).

Since the wind direction was predominantly towards south east during the incident, the average recorded values of the ambient air quality in CAAMS-1 (South Gate) which is located at south-east in the downwind direction during the incident are provided below:

CAAMS - 1 (South Gate)								
	Nox	So2	CO	PM 10	PM 2.5	Benzene	Ozone	NH3
	µg/m ³							
Average value observed during incident	66	8	1	240	40	0.4	9	0.1
24 hour Average value (8 AM to 8 AM)	27	8	0.8	177	39	0.8	13	0.1
Stipulated limit	80	80	2	100	60	5	100	400

As can be seen from the above table, all the ambient air quality parameters were within the stipulated limits, except PM10, which has been higher before, during & after the incident due to the ongoing construction activities in the area including the approved refinery modernization project. 15-minute average data recorded in the CAAMS-1 (South Gate) from 14:00 hrs to 17:00 hrs of 25.05.2021 is provided in Annexure-I, which shows that the ambient air quality parameters were within stipulated limits

2.1.2 Liquid Effluent

Sea cooling water is the medium used in the fire water network of HPCL-Visakh Refinery. The fire water was mainly used to extinguish fire during the incident besides dry chemical powder (DCP) and aqueous foam. The fire water used for fire-fighting gets

collected in surface drains of CDU-3 and is routed to API separators of ETP-I (as per design) where the traces of oil (if any) will get removed. This fire water (after oil removal) along with sea water cooling tower blow down is routed back to sea through the normal outlet channel of Refinery at MHF-1 (Main Hay Filter).

The fire water samples from CDU-3 surface drain and the final outlet after treatment in the API separators were collected for analysis. The samples were analyzed by MoEF recognized third party laboratory, M/s SV Enviro Labs & Consultants, and it was found vide reports dated 15.06.2021 that the parameters of final outlet were within the stipulated limits of sea cooling water discharge. Analysis reports are provided in Annexure-II.

3. CONCLUSIONS

From the above, following inference can be drawn:

a) The Refinery operations are carried out as per stipulated norms. There is no violation of Consent For Operation (CFO) granted by the environmental authorities. The emissions and discharges resulting from the fire incident in CDU-3 are within the prescribed parameters.

b) The fire incident has not impacted the environment or surrounding habitation and the ambient air quality was within stipulated limits."

44. In its objections to the Joint Committee report, the 7th respondent had stated that "the hydrotest and other testing activities are carried out during unit shutdown period stretching about one month. During the shutdown, each equipment will be dismantled, tested and refitted and thereafter Hydro testing will be conducted. For carrying out these activities, more than 1000 workers have to be assembled and they work round the clock for about one month. In view of the Nationwide lockdown due to COVID situation prevailing during the mentioned period, the above said activities could not be taken up as a planned activity. However, the UTG (Ultrasonic Thickness Gauging) of the pipelines was initiated in 2020 and the same was in progress till the onset of the COVID lockdowns. UTG of the balance pipelines and hydro test of all the pipelines were completed during the shutdown. In addition, various established alternate testing methods such as on stream inspections (OSI), Visual Inspection (VI) and in house Remaining Life Assessment (RLA) were carried out for all hydrocarbon (HC) circuits to ensure healthiness and longevity of the pipelines."

45. Regarding the environmental damage assessment for contribution of emission into atmosphere, the Joint Committee proposed to levy environmental damage compensation as per the European Union "Environmental Prices Handbook" EU 28 Version, wherein prices are expressed in Euros/kg pollutant emitted into the environment. The committee had used the document as a reference to calculate the

prices of the pollutants emitted into the environment, as the documents indicates 3 types of pricing viz., lower, central and upper, depending upon magnitude of emissions.

- 46.**As the quantities of pollutants emitted were in considerable quantity, but there was no significant damage to the surrounding environment injury or casualties reported, the committee had used central limit environmental prices assigned to SO_2 & CO_2 while calculating the damages. This was objected to by the 7th respondent contending that *"The Environmental Prices Handbook (EU-28 Version) which contains the standards applicable to the European Union and does not apply to India. Furthermore, as per Clause 3.2 of the Environmental Prices Handbook (EU-28 Version) it is stated that "the damage cost of environmental pollution can vary widely according to local circumstances and nature of environmental emission. Prices make no allowance for these differences". For these reasons, these environmental prices cannot simply be applied to specific cases of environmental pollution, for pollution in other countries or for pollution by non-average emission The Joint sources. Committee appears to have failed to consider the above. Without above, prejudice is further submitted that the Joint Committee Report applies central limit environmental prices even after finding that there was no significant damage to the surrounding environment, injury or casualties reported. Hence, this methodology of estimating the compensation is not applicable. Refinery SO_2 emission on the day of incident (25.05.2021) was 5.6 TPD. Even after considering the SO_2 emissions from hydrocarbon burnt during the fire incident (which was 2.3 MT as reported by the joint committee), overall SO_2 emission from the Refinery was 7.9 TPD, which is less than maximum prescribed limit of 11.5 TPD. Thus, the Refinery has not exceeded the prescribed SO_2 emission limit. The tons CO_2 of equivalent emissions per ton of crude ($\text{tCO}_2\text{e} / \text{MT}$) processed is in the range of 0.200 to 0.213 for HPCL - Visakh Refinery. The estimated increase in $\text{tCO}_2\text{e} / \text{MT}$ due to 211 MT of CO_2 as reported by the joint committee is 0.004 $\text{tCO}_2\text{e} / \text{MT}$, which is insignificant. Finally, the committee observed that there is no significant damage to the surrounding environment, the environmental compensation that is linked to the damage, should not have been ascertained. HPCL denies any liability to pay any compensation."*

47. The 7th respondent also disputed the liability of payment of compensation.

48. In this regard, it is useful to refer to the report of enquiry committee on the fire accident wherein the following lapses were identified by the committee:-

"9.0 IDENTIFICATION OF LAPSES

The following lapses of HPCL are observed during the inspection and document verification:

1. *Deviation in implementing preventive maintenance schedules as per the Standard Operating Procedures (SOP) within the time. During inspection, it was observed that industry was not conducted the Ultra sonic test for 6 inch pipeline in CDU-3 (fire incident was taken place) for which the due date for testing is August 2020.*

2. *Industry has conducted of hydro-test to the pipelines in August, 2012, and not conducted afterwards this test should be which will be conducted every 4 years which is serious lapse on account of HPCL.*

3. *Failure in identifying corrosion / erosion of the pipelines carrying hydrocarbons at high temperatures*

4. *Preventive maintenance schedules are not implemented properly."*

49. The above report clearly indicates that the 7th respondent had admittedly not conducted hydro test after 2012, though it should have been conducted every 4 years. It is only in 2020 as admitted the Covid-19 disabled them from conducting the hydro test. There is no clear answer given by the unit in this regard.

50. The conspectus of the above facts based on the reports of the Joint Committee constituted by the Tribunal and the enquiry committee headed by the District Magistrate on fire accident dated 25.05.2021, the HPCL/7th respondent has complied with most of the directions issued by the APPCB, IISC - Bangalore and the Joint Committee but not completely.

51. In fact, the recommendations of the IISC, Bangalore were not complied with at the time of inspection of Joint Committee. The committee also found that the directions issued by APPCB for non-compliance of Consent for Operation and Consent for Establishment conditions and also for odour nuisances. The APPCB had issued directions to the unit under Section 33 (A) of the Water (Prevention and Control of Pollution) Act, 1974 and Section 31 (A) of the Air (Prevention and Control of Pollution) Act, 1981 for non-compliances

from 14.12.2011 till 19.03.2020. **Therefore, the committee observed that there were repeated violations by the unit from 2011 onwards** and decided to consider the number of violations from 2011 and recommended levying environmental compensation at Rs.8,35,20,000/ (Rupees Eight Crores Thirty Five Lakhs and Twenty Thousand only). The conclusions and recommendations of the Joint Committee are as follows:-

"(i) The unit after expansion consists of 860 acres and 112.5 acres is used for greenbelt development within the premises. At present the unit has no space for developing green belt inside the refinery. However, the unit has developed green belt outside the premises and major areas of Visakhapatnam city viz. Autonagar, Vadlapudi, Parawade, Sheelanagar. Aganampudi, Denkada etc.

(ii) The recommendations made by IISC, Bengaluru pertaining to M/s HPCL, Visakhapatnam (7 respondents) have been complied.

(iii) The committee revisited the no. of days of violations by M/s. HPCL and takes the violations date as the date of directions issued by APPCB on 14/12/2011 till 23/06/2021 the day of committee inspected and observed the non-compliances. Hence, for the repeated violations committed by HPCL, Rupees Eight Crores Thirty Five Lakhs and Twenty Thousand of EC has been calculated and levied.

(iv) M/s. HPCL may be directed to deposit Rs.8,35,20,000/- with APPCB.

(v) M/s HPCL may be directed to comply with all conditions of Environmental Clearance, Consent For Establishment & Consent For Operate and submit the compliance report to APPCB.

(vi) APPCB may be directed to verify compliance submitted by M/s HPCL, and take necessary actions for non-compliances.

(vii) APPCB may be directed to constitute the odour squad as per the recommendations of IISC, Bengaluru to initiate action and resolve the odour episodes. The APPCB and industries shall jointly organize awareness programmes for public on odour and pollution matters."

52. There is merit in the recommendations of the Joint Committee that HPCL had failed to take effective steps despite the long period between 2011 and 2020. HPCL being a CPSE industry carrying out public utility services has to be a model unit of compliance with the environmental norms which was unfortunately not there in this case for more than a decade.

53. Accordingly,

53.1 HPCL is directed to take all the required initiative and comply with the observations of the Joint Committee, IISC – Bangalore and enquiry report within a period of six months.

53.2 APPCB is to monitor the same and it is not debarred from taking any action against HPCL for any fresh violation under the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 and also initiate appropriate action against the erring officials as per the statutes.

53.3 HPCL is directed to deposit the Environmental Compensation assessed at **Rs.8,35,20,000/- (Rupees Eight Crores Thirty Five Lakhs and Twenty Thousand only)** forthwith.

53.4 HPCL is directed to deposit a further sum of **Rs.10,00,00,000/- (Rupees Ten Crores only)** for their wilful negligence being a PSU which can be spent on restoration of environment and public health in the district of Vizag. Such deposit to be made **within 2 (Two) months** from today to CPCB which will draw a plan to that effect.

53.5 The Joint Committee to ensure the regular monitoring in implementing the plan.

53.6 An independent Compliance Report may be filed by the Joint Committee after inspection as to the status of the compliance by the HPCL after 6 (Six) months i.e. by **15th May, 2023**.

54. Accordingly, the Original Application is disposed of. List the matter in May, 2023 for reporting compliance.

Sd/-

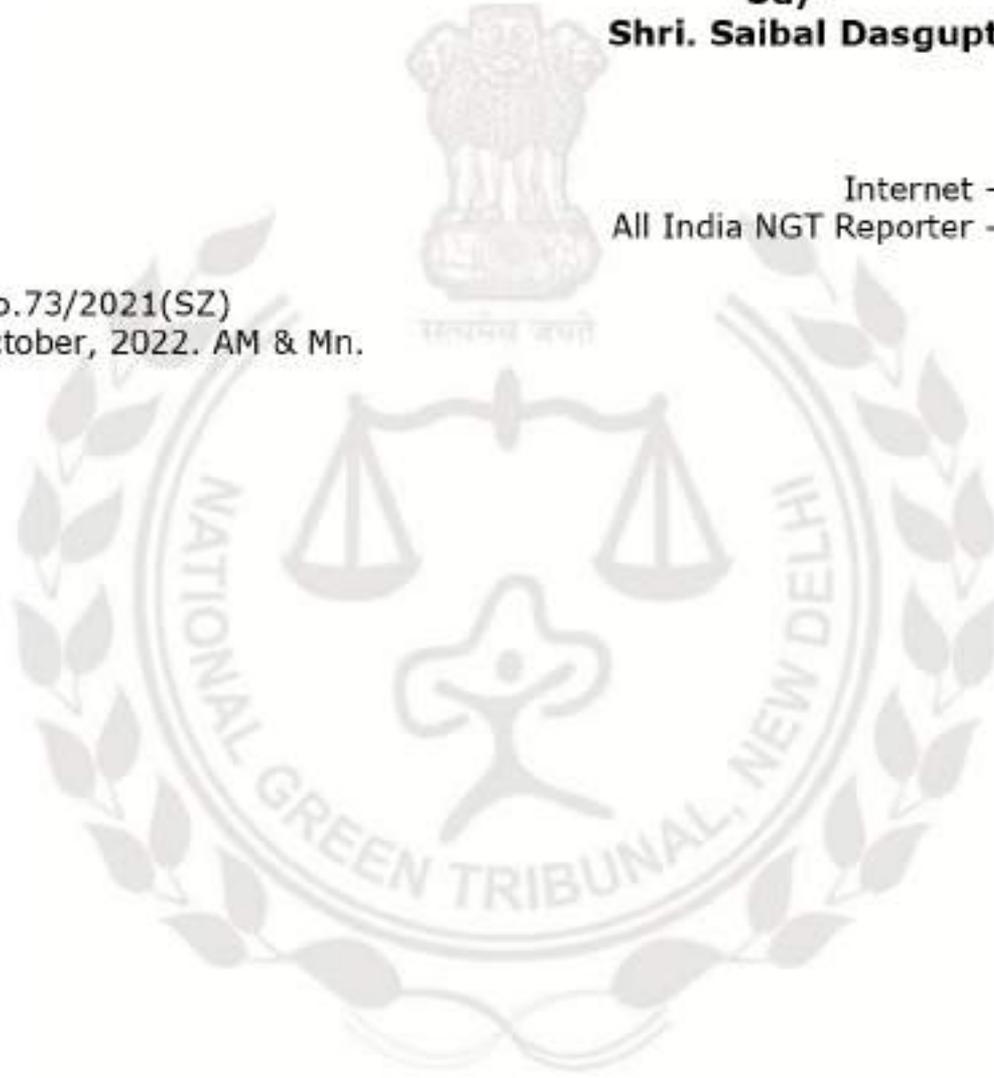
Smt. Justice Pushpa Sathyanarayana, J.M.

Sd/-

Shri. Saibal Dasgupta, E.M.

Internet – Yes/No
All India NGT Reporter – Yes/No

O.A. No.73/2021(SZ)
20th October, 2022. AM & Mn.



NGT

ITEM NO.16

COURT NO.5

SECTION XVII

S U P R E M E C O U R T O F I N D I A
R E C O R D O F P R O C E E D I N G S

Civil Appeal No(s). 9377/2022

M/S HINDUSTAN PETROLEUM CORPORATION LIMITED

Appellant(s)

VERSUS

VISAKHA PAWAN PRAJA KARMIKA SANGAM & ORS.

Respondent(s)

(IA No.203722/2022-EXEMPTION FROM FILING C/C OF THE IMPUGNED JUDGMENT and IA No.203720/2022-STAY APPLICATION)

Date : 05-01-2023 This appeal was called on for hearing today.

CORAM : HON'BLE MR. JUSTICE AJAY RASTOGI
HON'BLE MS. JUSTICE BELA M. TRIVEDI

For Appellant(s) Mr. K. V. Viswanathan, Sr. Adv.
Mr. Sanjay Kapur, AOR
Ms. Megha Karnwal, Adv.
Mr. Surya Prakash, Adv.
Mr. Arjun Bhatia, Adv.
Ms. Akshata Joshi, Adv.
Ms. Aastha Gumber, Adv.

For Respondent(s)

UPON hearing the counsel the court made the following
O R D E R

Admit.

The High Court, in the impugned order dated 20.10.2022, has directed in Paragraph Nos. 53.3 and 53.4 as under :-

"53.3 HPCL is directed to deposit the Environmental Compensation assessed at Rs. 8,35,20,000/- (Rupees Eight Crores Thirty Five Lakhs and Twenty Thousand only) forthwith.



53.4 HPCL is directed to deposit a further sum of Rs. 10,00,00,000/- (Rupees Ten Crores only) for their wilful negligence being a PSU which can be spent on restoration of environment and public health in the district of Vizag. Such deposit to be made within 2 (Two) months from today to CPCB which will draw a plan to that effect."

Let the appellant comply with the directions mentioned at Paragraph No. 53.3 of the order impugned within a period of eight weeks from today, without prejudice to the rights of the appellant in the pending appeal.

So far as Paragraph No. 53.4 is concerned, there shall be a stay of the directions, until further orders.

(JAYANT KUMAR ARORA)
ASTT. REGISTRAR-cum-PS

(VIRENDER SINGH)
BRANCH OFFICER



हिन्दुस्तान पेट्रोलियम कॉर्पोरेशन लिमिटेड
(भारत सरकार संस्थान) रजिस्टर्ड ऑफिस 17 जवाहरलाल नेहरू रोड, मुंबई - 400 029
HINDUSTAN PETROLEUM CORPORATION LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE) REGISTERED OFFICE: 17 JAWAHARLAL NEHRU ROAD, MUMBAI-400 029
CIN : L23201MH1952G01000050

Annexure-III



विशाख रिफाइनरी, पोस्ट बॉक्स नं. 15, विशाखपट्टनम - 530 011 (जॉर्जटाउन), फोन - 2895000, 2895100
VISAKH REFINERY, POST BOX NO.15, VISAKHAPATNAM-530 011 (A.P.), PHONES : 2895000, 2895100

To
Member Secretary,
A.P. Pollution Control Board,
D.No.33-26-14, D/2, Near Sunrise Hospital,
Pushpa Hotel Centre, Chalamalavari Street,
Kasturibaipet, Vijayawada - 520 010.

Date: March 03, 2023
Ref: TSD/PS&E/APPCB/34/23

Sir,

Sub: APPCB - HO - Unit-II - Hon'ble NGT Order dt. 20.10.2022 in OA No 73 of 2021(SZ)
-Payment of Environmental Compensation to APPCB and to deposit a sum to CPCB -Reg.

This has reference to our earlier letter no TSD/PS&E/APPCB/108/22 dated 05.12.2022 in response to your letter dated 17.11.2022 on the above subject.

As informed earlier, HPCL- Visakh Refinery had appealed the NGT order dated 20.10.2022 before Hon'ble Supreme Court and copy of the directions issued by Hon'ble Supreme Court vide order dated 06.01.2023 are attached as Annexure-I.

In compliance with the above interim order of Hon'ble Supreme Court, HPCL-Visakh Refinery is hereby depositing the Environmental Compensation of Rs.8,35,20,000 (Eight crores thirty five lakhs twenty thousand rupees only) with APPCB vide the following DD drawn in favour of "Member Secretary, AP Pollution Control Board" payable at Vijayawada.

Drawee Bank (Code)	DD Number	DD Date	Amount, Rs.
SBI, Vijayawada (00948)	652353	03.03.2023	8,35,20,000

The original DD is handed over to APPCB-RO, Visakhapatnam, today.

This is for your kind information please.

Yours truly,

G. Bhagavan
DGM-Technical

Cc: JCEE, APPCB, Zonal Office, Visakhapatnam
EE, APPCB RO, Visakhapatnam.

M. udhy kumar
Ph: 9618008515



हिन्दुस्तान पेट्रोलियम कॉर्पोरेशन लिमिटेड
(भारत सरकार वॉल्वन) रजिस्टर्ड ऑफिस 17 नम्योपरी टाटा रोड, मुंबई - 400 020
HINDUSTAN PETROLEUM CORPORATION LIMITED



(A GOVERNMENT OF INDIA ENTERPRISE) REGISTERED OFFICE: 17 ANSHU N TATA ROAD, MUMBAI-400 020
CIN : L23201MH1992G01000868

विशख रिफाइनरी, पोस्ट बॉक्स नं. 15, विशखपट्टनम - 530 011 (आंध्रप्रदेश), फोन - 2895000, 2895100
VISAKH REFINERY, POST BOX NO.15, VISAKHAPATNAM-530 011 (A.P.), PHONES : 2895000, 2895100

To
Member Secretary,
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Pushpa Hotel Centre, Chalumalavari Street,
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Date: March 03, 2023
Ref: TSD/PS&E/APPCCB/34/23

Sir,

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Yours truly,

G. Bhagavan
DGM-Technical

Cc: JCEE, APPCB, Zonal Office, Visakhapatnam
✓EE, APPCB RO, Visakhapatnam.

State Emblem of India
 Institute for
 Reg. No. 0001-2716-9105

DEMAND DRAFT

Key: VOFSGZ
 D/ No: 180778

0	3	0	1	3	2	0	2	3
D	D	M	M	Y	Y	Y	Y	Y

श्री. राज्य मंत्री, प.प. पोल्लूटिओन कंट्रोल बोर्ड
 ON DEMAND PAY
 Eight Crore Thirty Five Lakh Twenty Thousands Only

OR ORDER

FOR DEPOSITED TO
 Name of Applicant
 Key: VOFSGZ
 BR. PAYING AC. WITH IIB-00552

ACCOUNT BELOW SAID TO (0/0)

9	8	7	6	5	4	3	2	1
---	---	---	---	---	---	---	---	---

संशोधन विभाग
 राज्य मंत्री, प.प. पोल्लूटिओन कंट्रोल बोर्ड

श्री. राज्य मंत्री, प.प. पोल्लूटिओन कंट्रोल बोर्ड
 STATE BANK OF INDIA
 BRANCH: BANGALORE

श्री. राज्य मंत्री, प.प. पोल्लूटिओन कंट्रोल बोर्ड
 K. S. Srinivasan
 D. Y. Srinivasan

IFSC 525531 0000020004 0005381 15

ITEM NO.16

COURT NO.5

SECTION XVII

**S U P R E M E C O U R T O F I N D I A
R E C O R D O F P R O C E E D I N G S**

Civil Appeal No(s). 9377/2022

M/S HINDUSTAN PETROLEUM CORPORATION LIMITED

Appellant(s)

VERSUS

VISAKHA PAWAN PRAJA KARMIKA SANGAM & ORS.

Respondent(s)

(IA No.203722/2022-EXEMPTION FROM FILING C/C OF THE IMPUGNED JUDGMENT and IA No.203720/2022-STAY APPLICATION)

Date : 05-01-2023 This appeal was called on for hearing today.

**CORAM : HON'BLE MR. JUSTICE AJAY RASTOGI
HON'BLE MS. JUSTICE BELA M. TRIVEDI**

For Appellant(s) Mr. K. V. Viswanathan, Sr. Adv.
Mr. Sanjay Kapur, AOR
Ms. Megha Karnwal, Adv.
Mr. Surya Prakash, Adv.
Mr. Arjun Bhatia, Adv.
Ms. Akshata Joshi, Adv.
Ms. Aastha Gumber, Adv.

For Respondent(s)

**UPON hearing the counsel the Court made the following
O R D E R**

Admit.

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ASTT. REGISTRAR-cum-PS

(VIRENDER SINGH)
BRANCH OFFICER



हिन्दुस्तान पेट्रोलियम कॉर्पोरेशन लिमिटेड
(भारत सरकार संस्थान) रजिस्टर्ड ऑफिस 17 जमशेदजी टाटा रोड, मुंबई - 400 020
HINDUSTAN PETROLEUM CORPORATION LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE) REGISTERED OFFICE 17 JAMSHEDJI TATA ROAD, MUMBAI-400 020
CIN : L23201MH1952GO1008858



विशाख रिफाइनरी, पोस्ट बॉक्स नं. 15, विशाखापट्टनम - 530 011 (आंध्रप्रदेश), फोन - 2895000, 2895100
VISAKH REFINERY, POST BOX NO. 15, VISAKHAPATNAM-530 011 (A.P.), PHONES : 2895000, 2895100

Date: March 03, 2023

Ref: TSD/PS&E/APPCB/34/23

To

Member Secretary,
A.P. Pollution Control Board,
D.No.33-26-14, D/2, Near Sunrise Hospital,
Pushpa Hotel Centre, Chalamalavari Street,
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Sir,

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SBI, Vijayawada (00948)	652353	03.03.2023	8,35,20,000

The original DD is handed over to APPCB-RO, Visakhapatnam, today.

This is for your kind information please.

Received DD
for Rs 8,35,20,000/-
bearing DD No. 652353
dated 3/3/2023



Yours truly,

G. Bhagavan
G. Bhagavan
DGM-Technical

Cc: JCEE, APPCB, Zonal Office, Visakhapatnam
EE, APPCB RO, Visakhapatnam.

अरी एम्ने वारी भावभागीय स्टेट बैंक
 Issuing Branch: State Bank of India
 ब्रांच कोड / CODE No. 00952
 टेली नंबर / Tel. No. 0891-2704995

मांगद्वारपत्र
DEMAND DRAFT

Key: VOFGLZ
 Sr. No. 139778

0	3	0	3	2	0	2	3
D	D	M	M	Y	Y	Y	Y

भागे आनेपर MEMBER SECRETARY, A.P. POLLUTION CONTROL BOARD*****

ON DEMAND PAY

Eight Crore Thirty Five Lakh Twenty Thousand Only

रुपये RUPEES

या उपरोक्त अंश पर 9

OR ORDER 8

83520000.00

अदा करें ₹

AMOUNT BELOW 83520001(0/8)

रुपये प्राप्त / VALUE RECEIVED

IOI 000538652353
 Name of Applicant

Key VOFGLZ Sr. No. 139778
 BR PARKING A/C WITH INB-00952

भारतीय स्टेट बैंक

STATE BANK OF INDIA
 अदाकारी शाखा / DRAWEE BRANCH, VIJAYAVADA
 ब्रांच कोड / CODE No. 00948

(Signature)
 K. SANDEEP D. YASHODHARA
 सहायक प्रबन्धक / Deputy Manager

Manager / Deputy Manager (ADY)
 SBI, Visakhapatnam Br. 0952
 SBI, Visakhapatnam Br. 0952

कम्प्यूटर द्वारा मुद्रित होने पर ही वैध
 VALID ONLY IF COMPUTER PRINTED

वैधता 1 मास के लिए है
 VALID FOR 1 MONTHS ONLY

⑈ 6 5 2 3 5 3 ⑈ 0 0 0 0 0 2 0 0 0 1 ⑈ 0 0 0 5 3 8 ⑈ 1 6



ANDHRA PRADESH POLLUTION CONTROL BOARD
ZONAL OFFICE :: VISAKHAPATNAM
39-33-20/4/1, Madhavadhara VUDA Colony,
Visakhapatnam - 530018. Ph : 0891 – 2719380/481



M. RAVI, M.Sc
SENIOR ENVIRONMENTAL SCIENTIST

e-mail: zovsplab-ses2@appcb.gov.in

ANALYSIS REPORT

**FORM – X
REPORT BY THE BOARD ANALYST
(See Rule 26)**

Report No. VSP202309670 to 675

Date: 05.10.2023

I hereby certify that I, Sri M. Ravi, State Board Analyst, Zonal Laboratory duly appointed under sub-section (3) of section 53 of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) received from the Joint Chief Environmental Scientist (FAC), Central Laboratory, Vijayawada on the day of 28.09.2023, the following samples for analysis

- 670: Treated effluent collected at the outlet of Guard Pond of ETP-4
- 671: Once-through cooling water sample collected at the outlet of skimming pond
- 672: Sample of combined outlet of treated effluent of ETP-4 & once-through cooling water blow down collected at MHF-2
- 673: Water sample collected from the storm water drain originating from the ETP-2 before joining the combined outlet of treated effluent of ETP-4 & once-through cooling water after MHF-2
- 674: Effluent sample collected from the aeration tank of ETP-2
- 675: Sample of combined outlet of treated effluent of ETP-1 & cooling water blow down collected at MHF-1

of M/s Hindustan Petroleum Corporation Limited, Visakh Refinery, Post Box No.15, Malkapuram, Visakhapatnam collected on 27.09.2023. The samples were in a condition fit for analysis reported below:

I further certify that I have analyzed the above mentioned samples from 28.09.2023 to 05.10.2023 and declare the result of the analysis to be as follows.



M. RAVI, M.Sc
SENIOR ENVIRONMENTAL SCIENTIST

e-mail: zovsplab-ses2@appcb.gov.in

S. No.	Parameter	Sample codes & Analysis Results						Test Method
		670	671	672	673	674	675	
1.	pH	6.72	6.86	6.95	7.73	--	7.16	APHA (24 th Edition, 2023) 4500- H+ B: Page No.473 to 478.
2.	Total Suspended Solids	18	10	12	28	--	12	APHA (24 th Edition,2023) 2540- D: Page No. 146 & 147
3	Total Organic Carbon	21.8	7.9	9.8	12.8	--	11.8	APHA (24 th Edition,2023) 5310-B Page No. 552
4	Chemical Oxygen Demand	56	20	24	32	--	32	APHA (24 th Edition, 2023) 5220- B: Page No.544 & 545.
5.	Biochemical Oxygen Demand	18	6	8	10	--	9	IS 3025 (Part 44): 1993 (Reaffirmed 2014)
6	Oil & Grease	6.2	0.8	4.5	7.4	8.2	1.6	APHA (24 th Edition, 2023) 5520 - B: Page No.572 to 574.
7	Hexavalent Chromium (as Cr ⁶⁺)	0.01	BDL	BDL	BDL	--	BDL	APHA (24 th Edition,2023) 3500- Cr Page No. 256
8	Sulphide (as S ²⁻)	5.6	1.7	3.3	3.6	--	3.8	APHA (24 th Edition, 2023) 4500-S ²⁻ Page No.514.
9	Ammonical Nitrogen (as NH ₃ -N)	19.78	1.05	7.24	26.13	--	1.96	APHA (24 th Edition, 2023) 4500-NH3- F: Page No. 429 to 430.
10	Phenols (as C ₆ H ₅ OH)	0.12	0.03	0.06	0.08	--	0.04	APHA (24 th Edition,2023) 5530:Page No. 582
11.	Ortho Phosphate (as PO ₄ ³⁻)	1.49	0.70	0.51	0.38	--	0.47	APHA (24 th Edition,2023) 4500- P D: Page No. 485 & 486
12	Cyanide (as CN)	0.03	BDL	0.01	0.02	--	BDL	APHA (24 th Edition,2023) 4500- CN Page No.370

- Note: 1. All results are expressed in mg/lit. except pH,
2. BDL: Below Detectable Limit
3. Results are related to sample tested

The condition of the seals, fastening and container on receipt was intact.

Signed this:05.10.2023

Address:

Sri M. Ravi,
Senior Environmental Scientist,
Zonal Laboratory, APPCB, Visakhapatnam.


SIGNATURE OF THE STATE BOARD ANALYST

Hindustan Petroleum Corporation Limited, Visakhapatnam									
Ambient air quality monitoring									
01.01.2022 to 30.12.2022									
Obtained from realtime ambient air quality monitoring stations									
S. No.	Date	CAAQMS - 1 - South gate							
		NO2 (ug/m3)	SO2 (ug/m3)	CO (mg/m3)	PM10 (ug/m3)	PM2.5 (ug/m3)	Benzene (ug/m3)	O3 (ug/m3)	NH3 (ug/m3)
1	2022-01-01	87.15	17.32	0.58	113.67	54.93	0.18	22.68	8
2	2022-01-02	95.78	22.54	0.67	131.94	65.3	0.21	17.44	7.79
3	2022-01-03	122.01	22.58	0.72	155.57	72.92	0.24	18.33	7.99
4	2022-01-04	141.95	24.68	0.74	136.73	60.11	0.25	17.99	8.25
5	2022-01-05	141.71	22.72	0.87	147.24	65.7	0.3	17.88	8.48
6	2022-01-06	111.29	13.7	1.02	139.25	63.95	0.35	11.61	7.6
7	2022-01-07	84.55	3.52	0.99	141.17	66.67	0.26	10.83	9.21
8	2022-01-08	74.16	2.49	1.06	170.4	83.83	0.29	17.94	8.94
9	2022-01-09	56	2.32	1.05	143.05	73.76	0.3	25.49	7.81
10	2022-01-10	76.62	2.48	0.92	102.08	44.16	0.25	16.16	8.61
11	2022-01-11	84.44	1.3	0.83	91.39	35.28	0.2	6.84	8.55
12	2022-01-12	79.15	1.22	0.73	78.65	25.46	0.13	7.23	8.28
13	2022-01-13	64.65	1.39	0.69	75.37	29.82	0.14	8.19	8.35
14	2022-01-14	42.93	0.17	0.68	56.22	27.9	0.14	9.47	8.51
15	2022-01-15	26.99	0.03	0.66	59.76	32.01	0.13	9.42	7.45
16	2022-01-16	11.98	0.03	0.55	72.34	37.1	0.11	14.92	6.72
17	2022-01-17	47.48	0.03	0.69	115.34	56.31	0.12	12.79	6.75
18	2022-01-18	81.06	0.03	0.82	140.49	67.28	0.16	9.53	7.07
19	2022-01-19	85.4	0.03	0.82	144.06	69.71	0.2	10.48	7.54
20	2022-01-20	69.01	0.03	0.85	145.26	69.06	0.25	7.64	7.3
21	2022-01-21	60.75	31.16	0.87	145.66	61.21	0.24	5.27	7.46
22	2022-01-22	73.8	88.25	0.81	131.7	48.94	0.33	5.49	8.35
23	2022-01-23	44.37	95.58	0.92	136.35	53.62	0.47	5.49	8.01
24	2022-01-24	31.56	96.46	0.69	98.79	40.98	0.14	5.48	7.93
25	2022-01-25	31.4	60.11	0.72	107.68	44.77	0.14	10.31	7.64
26	2022-01-26	29.58	38.03	0.59	85.51	28.55	0.06	9.02	7.07
27	2022-01-27	34.82	35.55	0.7	185.16	57.39	0.13	11.76	6.83
28	2022-01-28	60.31	28.48	0.76	205.46	64.15	0.14	17.2	6.95
29	2022-01-29	75.05	30.28	0.72	147.68	48.48	0.21	24.22	7.3
30	2022-01-30	43.55	47.81	0.83	136.34	56.64	0.2	25.49	7.07
31	2022-01-31	48.46	49.84	0.92	141.23	58.39	0.28	15.37	7.36
32	2022-02-01	68.46	47.34	1.03	138.43	47.83	0.59	9.07	7.46
33	2022-02-02	40.38	35.08	0.77	93.75	33.34	0.3	8.46	8.2
34	2022-02-03	27.47	37.48	0.65	78.02	24.25	0.33	20.37	7.4
35	2022-02-04	47.12	38.66	0.84	96.92	28.29	0.34	11.56	8.36
36	2022-02-05	64.01	27.71	0.71	112.2	30.87	0.14	15.87	8.01
37	2022-02-06	43.52	23.41	0.68	124.78	38.98	0.26	18.44	6.74
38	2022-02-07	73.68	18.55	0.77	117.1	38.68	0.24	28.77	6.34
39	2022-02-08	128.37	11.73	0.83	131.89	44.58	0.16	30.41	7.81
40	2022-02-09	154.83	9.05	0.85	118.34	38.32	0.13	34.25	8.86
41	2022-02-10	141.2	59.02	0.84	123.02	47.28	0.22	28.09	8.35
42	2022-02-11	91.92	176.77	0.75	106.97	35.44	0.21	30.67	7.79
43	2022-02-12	80.87	93.83	0.77	107.4	49.47	0.12	38.08	7.31
44	2022-02-13	54.02	18.91	0.69	122.59	53.43	0.06	51.17	7.21
45	2022-02-14	78.86	21.99	0.76	115.47	43.43	0.1	48.01	6.85
46	2022-02-15	153.41	27.62	0.86	135.06	55.99	0.17	41.29	6.99
47	2022-02-16	161.07	45.14	0.92	139.29	60.44	0.14	36.15	6.94
48	2022-02-17	145.37	41.4	0.87	135.62	62.01	0.14	35.67	8.1
49	2022-02-18	85.32	35.15	0.9	137.03	66.71	0.13	37.3	9.23
50	2022-02-19	22.45	30.04	0.89	139.52	67.57	0.16	34.04	8.1
51	2022-02-20	20.05	19.48	0.96	182.34	67.99	0.18	33.64	7.14
52	2022-02-21	21.03	7.3	0.73	115.6	43.1	0.28	28.15	6.27
53	2022-02-22	21.82	10.2	0.79	96.67	37.86	0.14	29.02	8.02

54	2022-02-23	22.07	6.2	0.71	93.88	39.55	0.09	26.14	15.62
55	2022-02-24	16.82	0.68	0.6	63.74	22.65	0.21	27.49	8.38
56	2022-02-25	29.06	7.63	0.74	89.72	33.28	0.37	25.37	8.94
57	2022-02-26	32.76	10.48	0.68	93.25	34.37	0.28	29.74	7.82
58	2022-02-27	30.18	4.18	0.68	75.64	25.66	0.3	27.65	7.24
59	2022-02-28	55.99	4.27	1.07	120.07	38.63	0.44	30.58	10.05
60	2022-03-01	42.93	2	0.97	94.74	31.3	0.36	31.94	8.84
61	2022-03-02	37.51	1.15	0.78	69.4	21.15	0.14	26.77	8.98
62	2022-03-03	37.73	9.5	0.83	86.2	30.73	0.09	29.97	7.72
63	2022-03-04	33.73	0.06	0.8	97.47	37.22	0.13	29.49	5.93
64	2022-03-05	38.54	0.06	0.85	105.52	37.06	0.14	27.75	9.38
65	2022-03-06	30.64	0.06	0.8	100.48	31.05	0.18	28.64	6.85
66	2022-03-07	31.97	0.06	0.93	104.02	36.62	0.19	30.07	10.13
67	2022-03-08	32.92	5.78	0.96	115.5	43.62	0.52	20.19	7.44
68	2022-03-09	30	0.08	0.95	124.3	46.64	0.29	12.76	6.31
69	2022-03-10	43.46	0.07	1.14	151	58.59	0.31	11.25	6.72
70	2022-03-11	37.65	0.05	1.03	138.29	54.08	0.29	16.33	4.95
71	2022-03-12	44.78	0.05	1.84	171	58.32	0.43	14.29	7.63
72	2022-03-13	39.38	0.05	1.53	164.2	58.12	0.46	15.28	5.37
73	2022-03-14	50.6	0.05	1.33	185.76	67.71	0.53	18.42	5.88
74	2022-03-15	37.43	0.05	1.09	173.48	62.46	0.53	16.21	4.78
75	2022-03-16	33.76	0.05	1.11	179.51	52.35	0.83	14.64	5.98
76	2022-03-17	23.39	0.05	1.09	125.93	38.59	0.29	11.62	4.04
77	2022-03-18	20.91	0.05	0.82	79.21	28.99	0.17	9.51	4.21
78	2022-03-19	21.93	0.05	0.84	83.48	28.14	0.28	8.27	5.62
79	2022-03-20	20.2	0.04	1.14	75.69	27.71	0.38	5.16	9.66
80	2022-03-21	21.37	6.96	1.08	109.35	36.67	0.41	6.73	13.33
81	2022-03-22	17.75	3	0.96	115.89	39.33	0.34	9.94	13.28
82	2022-03-23	17.3	1.39	0.92	111.56	42.04	0.18	10.57	10.35
83	2022-03-24	21.48	1.07	0.98	115.6	38.22	0.29	6.36	9
84	2022-03-25	20.7	4	0.96	123.79	32.71	0.18	5.52	6.98
85	2022-03-26	22.6	3.91	1.11	140.67	35.12	0.19	4.55	8.34
86	2022-03-27	19.63	1.44	1.09	110.25	28.36	0.06	4.7	7.39
87	2022-03-28	25.67	1.82	0.92	101.46	24.22	0.14	3.33	7.55
88	2022-03-29	18.39	0.48	0.83	74.3	17.86	0.01	3.98	6.55
89	2022-03-30	16.88	0.95	0.85	75.44	17.36	0.11	5.52	6.73
90	2022-03-31	20.11	0.75	0.86	80.91	19.74	0.25	5.26	8.92
91	2022-04-01	17.56	2.22	0.8	66.61	12.61	0.09	4.87	4.9
92	2022-04-02	16.01	2.93	0.79	67.45	13.15	0.06	5.08	3.23
93	2022-04-03	19.95	3.16	0.85	83.47	15.09	0.15	4.27	3.2
94	2022-04-04	20.25	1.96	0.72	49.17	9.56	0.54	3.53	4.53
95	2022-04-05	17.16	0.29	0.74	57.62	10.25	0.15	4.39	3.68
96	2022-04-06	21.13	0.23	0.81	78.97	15.99	0.72	4.76	4.39
97	2022-04-07	21.72	2.9	0.77	72.29	18.26	0.69	7.4	3.39
98	2022-04-08	23.66	2.1	0.74	73.46	14.95	0.3	4.24	4.74
99	2022-04-09	18.61	2.36	0.7	48.68	7.64	0.23	4.74	3.67
100	2022-04-10	19.71	2.16	0.76	51.37	9.13	0.69	5.02	3.04
101	2022-04-11	21.5	3.16	0.8	65.13	8.46	1.01	4.65	2.99
102	2022-04-12	21.47	2.35	0.68	59.88	8.07	0.35	4.23	3.47
103	2022-04-13	23.72	2.04	0.75	61.32	9	0.37	3.84	3.49
104	2022-04-14	26.22	3.19	0.78	75.58	11.54	0.29	4.35	3.84
105	2022-04-15	22.28	1.65	0.73	67.9	10.19	0.19	5.15	3.72
106	2022-04-16	20.44	1.11	0.78	71.07	13.77	0.34	4.92	3.51
107	2022-04-17	19.91	0.38	0.76	62.08	11.22	0.62	5.8	3.65
108	2022-04-18	27.6	0.14	0.97	89.98	16.74	0.84	6.28	4.19
109	2022-04-19	19.3	0.17	0.86	84.21	18.86	0.21	8.34	3.5
110	2022-04-20	14.04	0.1	0.4	30.22	6.67	0.06	5.68	2.58
111	2022-04-21	0.03	0.78	0	0.02	0	0.35	2.9	2.89
112	2022-04-22	20.04	1.43	0	18.26	2.53	0.11	5.01	7.62
113	2022-04-23	28.2	5.56	0	76.42	10.89	0.35	3.09	9.76

114	2022-04-24	26.13	2.75	0	96.16	17.74	0.55	5.88	8.22
115	2022-04-25	27.98	2.36	0.73	175.21	18.96	0.39	3.88	7.21
116	2022-04-26	27.13	4.44	0.98	103.62	18.02	0.37	4.14	10.48
117	2022-04-27	26.54	6.07	1.04	91.9	16.63	0.38	4.52	8.45
118	2022-04-28	18.42	4.5	0.71	48.07	8.67	0.08	2.71	6.95
119	2022-04-29	30	10.23	1.11	105.96	17.57	0.41	3.64	8.68
120	2022-04-30	18.61	5.59	0.93	83.03	17.56	0.15	6.86	7.4
121	2022-05-01	17.29	4.13	0.9	74.36	16.34	0.14	6.87	8.01
122	2022-05-02	17.45	3.48	0.77	73.73	15.91	0.09	7.81	11
123	2022-05-03	19.04	3.23	0.81	53.39	16.15	0.14	10.26	9.52
124	2022-05-04	32.5	4.47	1.33	56	25.65	0.49	4.39	10.35
125	2022-05-05	27.84	3.88	0.94	111.58	18.91	0.19	5.47	7.77
126	2022-05-06	32.1	3.94	1.02	101.34	26.3	0.38	6.84	7.61
127	2022-05-07	38.86	5.11	1.11	131.42	34.15	0.54	6.07	7.55
128	2022-05-08	25.01	4.21	0.63	79.18	22.58	0.09	9.84	7.83
129	2022-05-09	24.22	12.61	0.48	64.09	5.99	0.16	12.25	9.02
130	2022-05-10	18.35	2.22	0.5	33.08	8.17	0.01	18.68	6.75
131	2022-05-11	19.15	1.74	0.71	55.46	16.12	0.03	16.02	5.85
132	2022-05-12	17.82	1.88	0.66	57.45	16.67	0.02	3.82	4.3
133	2022-05-13	16.62	2.65	0.67	73.45	18.28	0.09	2.94	5.46
134	2022-05-14	18.64	2.7	0.8	63.51	15.03	0.11	2.05	6.14
135	2022-05-15	15.1	2.33	0.84	88.92	25.35	0.09	2.62	8.47
136	2022-05-16	15.03	2.37	0.64	50.89	14.48	0.02	1.57	6.32
137	2022-05-17	15.47	2.7	0.67	46.41	6.17	0.06	0.53	5.58
138	2022-05-18	17.47	2.75	0.73	58.24	9.85	0.18	0.75	5.28
139	2022-05-19	21.55	3.31	0.87	61.05	9.87	0.21	0.33	6.53
140	2022-05-20	17.27	3.41	0.8	68.76	13.52	0.13	2.63	5.06
141	2022-05-21	19.68	4.04	0.97	94.06	20.14	0.16	5.19	5.37
142	2022-05-22	21.54	4.29	0.86	108.04	28.37	0.11	7.1	5.8
143	2022-05-23	35.67	5.03	1.31	175.85	46.77	0.62	6.71	8.3
144	2022-05-24	15.37	3.14	0.7	80.5	18.21	0.09	6.91	7.17
145	2022-05-25	24.82	5.21	0.98	88.29	21.46	0.67	5.29	7.13
146	2022-05-26	24.65	3.16	0.99	110.92	29.72	0.34	3.68	9.85
147	2022-05-27	31.05	4.53	1.13	110.4	35.65	0.39	2.64	14.68
148	2022-05-28	30.92	4.92	1.49	183.42	51.38	0.47	5.01	11.29
149	2022-05-29	18.51	3.68	1.33	128.37	31.55	0.1	5.3	4.84
150	2022-05-30	23.77	4.9	1.5	187.57	45.11	0.4	3.54	8.04
151	2022-05-31	27.22	3.63	1.88	225.6	38.78	0.49	4.87	5.37
152	2022-06-01	25.98	2.23	1.39	144.93	35.66	0.26	5.45	4.73
153	2022-06-02	23.69	2.73	1.86	139.08	32.83	0.55	2.98	5.65
154	2022-06-03	21.56	2.9	2.01	130.45	31.52	0.31	5.48	4.77
155	2022-06-04	17.97	2.88	1.41	98.86	27.81	0.11	4.46	3.29
156	2022-06-05	17.12	2.32	1.39	95.94	19.75	0.23	2.43	3.66
157	2022-06-06	11.11	2.53	1.27	78.91	17.34	0.23	2.77	2.82
158	2022-06-07	15.26	2.2	1.63	114.32	31.98	0.04	6.26	10.64
159	2022-06-08	23.25	2.72	1.73	125.08	31.23	0.25	6.11	9.81
160	2022-06-09	21.66	3.1	2.19	138.54	33.71	0.09	7.73	8.83
161	2022-06-10	20.55	3.7	1.05	100.71	25.71	0.27	3.55	8.58
162	2022-06-11	26.21	3.04	0.96	91.91	23.95	0.28	4.17	8.85
163	2022-06-12	21.12	2.71	0.92	69.08	18.57	0.17	4.2	7.6
164	2022-06-13	24.68	3.15	1	73.02	18.52	0.31	2.92	9.51
165	2022-06-14	24.23	4.29	0.97	115.75	36.39	0.57	4.57	9.43
166	2022-06-15	21.85	3.44	1	83.57	21.04	0.18	5.47	6.64
167	2022-06-16	19.45	3	0.91	46.51	12.39	0.15	2.64	5.44
168	2022-06-17	18.14	3.42	0.78	44.52	9.59	0.14	0.57	5.3
169	2022-06-18	23.35	4.21	0.77	49.71	8.91	0.13	0.56	7.97
170	2022-06-19	17.59	3.85	0.78	50.6	9.33	0.1	1.52	6.02
171	2022-06-20	36.08	4.81	0.87	70.9	20.66	0.26	2.65	7.52
172	2022-06-21	34.95	6.33	1.17	57.41	16.56	0.37	0.52	8.32
173	2022-06-22	26.23	5.12	1.04	64.54	17.33	0.1	2.5	5.31

174	2022-06-23	33.89	4.6	0.96	67.48	15.9	0.22	2.57	5.79
175	2022-06-24	19.55	4.83	0.76	63.05	17.68	0.06	2.71	4.02
176	2022-06-25	19.62	5.5	0.84	65.79	16.74	0.1	2.09	4.19
177	2022-06-26	16.12	5.79	0.81	57.54	14.05	0.12	2.83	3.74
178	2022-06-27	23.16	5.68	0.81	67.2	13.22	0.35	2.26	3.4
179	2022-06-28	19.88	6.14	0.82	113.67	14.94	0.09	2.07	3.35
180	2022-06-29	20.87	5.67	0.87	88.01	19.62	0.14	3.67	5.03
181	2022-06-30	20.53	5.23	0.99	75.96	16.97	0.17	4.65	8.52
182	2022-07-01	24.52	5.51	0.93	65.71	14.03	0.2	4.29	9.08
183	2022-07-02	27.86	7.1	1.01	89.38	25.16	0.27	2.22	10.54
184	2022-07-03	23.62	8.3	1.16	107.22	26.97	0.91	2.21	8.81
185	2022-07-04	30.49	7.04	0.63	45.68	8.82	0.05	1.5	5.3
186	2022-07-05	18.69	6.68	0.75	52.01	11.48	0.03	1.74	4.06
187	2022-07-06	20.41	5.7	0.77	40.56	6.95	0.03	1.82	4.12
188	2022-07-07	36.37	9	1.39	67.06	16.73	0.61	2.77	6.73
189	2022-07-08	37.51	2.33	1.41	40.49	8.5	0.68	2.02	7.86
190	2022-07-09	34.1	2.46	1.05	30.98	4.04	0.65	1.58	6.02
191	2022-07-10	25.72	2.03	0.9	35.24	6.97	0.62	2.5	5.52
192	2022-07-11	26.22	2.1	0.94	28.85	6.07	0.45	1.34	4.47
193	2022-07-12	32.06	1.41	0.82	23.32	3.68	0	1.52	5.6
194	2022-07-13	28.07	2.72	0.74	36.13	7.08	0.08	2.08	3.72
195	2022-07-14	19.3	3.71	0.78	38.37	6.38	0	3.17	3.7
196	2022-07-15	32.83	2.86	1.35	50.43	9.18	0.28	4.01	5.32
197	2022-07-16	23.97	2.63	1.36	72.28	18.23	0.05	4.07	5.76
198	2022-07-17	10.76	2.46	1.41	45.5	9	0.01	5.48	2.7
199	2022-07-18	15.49	2.19	1.13	82.76	6.92	0.03	5.47	2.95
200	2022-07-19	18.79	2.02	1.69	87.25	15.43	0.29	6.03	5.72
201	2022-07-20	15.56	2.25	1.61	96.28	21.08	0.15	7.94	3.98
202	2022-07-21	17.19	2.64	2.3	98.65	26.67	0.07	6.48	4.27
203	2022-07-22	12.98	3.59	1.41	68.12	17.24	0.08	7.97	5.57
204	2022-07-23	8.7	4	1.36	62.84	11.75	0.05	3.95	3.74
205	2022-07-24	8.67	3.83	1.33	58.42	16.28	0.07	4.58	4.77
206	2022-07-25	19.7	4.66	1.58	80.16	18.74	0.21	3.68	5.44
207	2022-07-26	28.27	4.62	1.92	78.59	17.43	0.26	2.86	2.19
208	2022-07-27	16.11	4.02	1.2	57.22	12.37	0.07	3.62	2.43
209	2022-07-28	12.57	4.53	1.45	78.58	18.57	0.15	3.04	2.81
210	2022-07-29	31.47	3.67	1.5	166.88	14.15	0.18	3.01	5.71
211	2022-07-30	17.64	3.65	1.77	99.09	18.84	0.34	2.79	4.69
212	2022-07-31	17.3	3.64	1.48	97.07	9.04	0.11	2.7	4.09
213	2022-08-01	11.33	3.96	1.85	72.4	14.18	0.25	3.47	5.35
214	2022-08-02	10.67	4.79	1.55	72.8	18.89	0.16	3.81	5.63
215	2022-08-03	9.27	5.38	1.17	57.07	16.81	0.09	3.92	4.32
216	2022-08-04	9.64	5.87	1.16	56.39	12.94	0.08	3.06	4.02
217	2022-08-05	7.62	6.69	1.24	56.13	10.95	0.14	3.33	3.41
218	2022-08-06	9.57	7.09	1.64	57.98	13.4	0.22	3.98	3.42
219	2022-08-07	5.03	7.17	1.15	32.87	9.18	0.1	3.71	2.81
220	2022-08-08	5.74	7.28	0.9	34.93	12.14	0	3.4	2.59
221	2022-08-09	16.64	8.72	0.62	36.53	7.88	0.31	5.28	2.03
222	2022-08-10	20.1	2.18	0.61	55.65	12.37	0	4.76	1.6
223	2022-08-11	19.42	1.55	0.45	56.53	10.78	0	5.47	1.96
224	2022-08-12	18.17	1.62	0.59	58.9	11.95	0.11	4.77	2.01
225	2022-08-13	16.31	1.88	0.52	56.79	12.37	0.05	4.07	1.87
226	2022-08-14	12.29	1.95	0.57	43.37	9.86	0	4.53	1.8
227	2022-08-15	13.52	1.33	0.73	55.3	8.95	0.01	5.85	1.78
228	2022-08-16	15.82	0.92	0.82	68.29	11.97	0.06	4.96	1.83
229	2022-08-17	14.15	1.3	0.97	83	21.27	0.06	5.92	1.96
230	2022-08-18	15.88	1.99	0.83	80.95	23.98	0.12	5.52	1.71
231	2022-08-19	22.18	3.1	0.97	63.41	15.43	0.27	2.6	1.5
232	2022-08-20	15.89	2.51	0.8	70.01	17.26	0.13	3.77	1.42
233	2022-08-21	13.84	1.8	1.1	84.64	17.34	0.05	6.33	3.24

234	2022-08-22	15.04	2.31	1.1	100.16	20.38	0.3	6.12	5.53
235	2022-08-23	17.25	2.23	0.78	78.12	19.04	0.18	4.44	4.1
236	2022-08-24	19.45	2.59	0.91	58.42	14.07	0.15	3.29	3.96
237	2022-08-25	17.33	2.19	0.83	71.04	19.38	0.13	6.54	4.56
238	2022-08-26	14.26	2.83	0.77	75.46	22.2	1.18	7.01	3.43
239	2022-08-27	15.59	3.29	1.08	99.1	33.06	0.27	4.69	4.64
240	2022-08-28	15.32	2.94	0.95	71.68	22.67	0.15	5.21	3.04
241	2022-08-29	14.29	2.11	0.81	68.98	20.53	0.08	4.71	3.64
242	2022-08-30	15.36	2.02	0.74	42.84	12.48	0.05	3.33	5.15
243	2022-08-31	17.83	4.03	0.95	52.85	11.37	0.1	2.7	9.62
244	2022-09-01	22.11	4.59	0.9	36.02	6.21	0.11	2.77	10.83
245	2022-09-02	19.08	4.37	0.69	26.97	4.26	0.03	3.36	8.23
246	2022-09-03	17.11	7.23	0.88	139.35	10.29	0.19	3.33	5.11
247	2022-09-04	15.85	6.99	0.91	63.3	14.08	0.16	3.82	4
248	2022-09-05	13.28	6.18	0.86	65.23	14.25	0.17	4.93	3.53
249	2022-09-06	14.33	6.74	0.75	51.95	11.22	0.1	3.56	3.1
250	2022-09-07	14.29	6.83	0.83	52.29	16.17	0.12	4.63	3
251	2022-09-08	17.69	9.26	0.78	25.89	5.55	0.24	4.46	2.92
252	2022-09-09	53.6	3.3	0.71	24.51	1.86	0.06	2.57	2.64
253	2022-09-10	51.07	4.14	0.71	30.34	8.7	0.17	2.1	4.26
254	2022-09-11	30.89	3.58	0.62	35.75	9.59	0	4.53	2.99
255	2022-09-12	39.28	4.06	0.74	59.86	13.19	0.05	3.89	2.26
256	2022-09-13	35.18	3.22	0.92	58.04	9.46	0.1	4.47	2.29
257	2022-09-14	46.52	3.22	1.24	63.91	14.65	0.13	2.86	3.19
258	2022-09-15	34.58	2.97	0.82	67.99	19.53	0.01	4.44	3.5
259	2022-09-16	35.42	3.4	1	80.51	16.44	0.06	5.22	3.71
260	2022-09-17	34.24	2.38	1.06	72.86	13.79	0.05	5.94	4.45
261	2022-09-18	38.68	2.56	0.81	51.48	14.69	0.13	3.37	3.95
262	2022-09-19	48.3	2.57	1.06	44.37	12.89	0.15	3	6.4
263	2022-09-20	35.65	3.03	0.91	48.99	11.6	0.11	4.12	4.32
264	2022-09-21	32.31	2.5	0.87	76.63	23.17	0.04	6.54	3.88
265	2022-09-22	44.74	2.57	1.01	81.28	24.5	0.1	5.21	3.17
266	2022-09-23	44.72	2.94	0.93	75.54	18.54	0.2	5.12	4.62
267	2022-09-24	50.12	4.01	0.95	85.87	25.88	0.23	5.42	5.41
268	2022-09-25	41.88	3.77	0.89	64.46	20.16	0.09	4.66	5.75
269	2022-09-26	40.54	3.53	0.82	64.68	18.51	0.06	4.01	6.51
270	2022-09-27	44	3.84	0.91	68.64	19.48	0.06	6.18	7.43
271	2022-09-28	44.07	3.2	0.95	74.13	22.21	0.09	3.94	6.79
272	2022-09-29	42.9	3.36	0.92	62.93	19.53	0.1	3.34	5.78
273	2022-09-30	46.38	4.37	0.74	83.3	10.54	0.06	3.32	7.43
274	2022-10-01	64.01	7.72	1.29	72.63	18.69	0.2	2.26	9.18
275	2022-10-02	42.94	5.94	1.07	61.09	19.91	0.15	3.87	10.65
276	2022-10-03	64.96	6.4	1.68	79.86	39.24	0.23	2.88	10.81
277	2022-10-04	74.52	5.4	1.54	74.63	29.42	0.56	2.24	17.91
278	2022-10-05	38.31	2.4	0.74	26.3	6.39	0.05	4.4	20.27
279	2022-10-06	44.73	2.25	0.92	27.81	5.28	0.07	4.92	16.92
280	2022-10-07	44.01	13.54	1.07	26.05	5.2	0.24	5.24	15.74
281	2022-10-08	38.23	0.67	1.04	25.39	4.76	0.14	2.23	16.34
282	2022-10-09	30.2	0.51	0.92	17.92	2.88	0.08	2.53	13.16
283	2022-10-10	42.29	1.16	1.46	40.81	12.92	2.73	2.25	11.51
284	2022-10-11	36.12	1.42	1.18	38.14	7.71	4.25	2.4	10.32
285	2022-10-12	30.55	18.15	1.05	51.75	9.19	2.52	3.44	8.64
286	2022-10-13	61.45	54.57	1.14	144.16	18.96	0.08	4.42	8.88
287	2022-10-14	49.75	59.47	0.89	45.1	9.32	0.05	3.83	16.03
288	2022-10-15	40.69	59.62	1.01	38.79	5.72	0.08	3.67	19.95
289	2022-10-16	28.79	56.68	0.83	34.63	3.23	0.07	4.08	15.2
290	2022-10-17	23.82	59.4	1.02	91.55	21.59	0.1	4.89	13.31
291	2022-10-18	13.23	57.91	0.94	107.22	34.89	0.08	7.84	10.78
292	2022-10-19	11.35	55.67	0.8	118.87	40.02	0.06	11.38	9.86
293	2022-10-20	11.88	55.36	0.77	108.33	41.52	0.07	13.84	8.63

294	2022-10-21	16.1	60.63	0.77	107.59	39	0.06	14.5	8.25
295	2022-10-22	22.26	66.77	0.97	169.16	41.95	0.21	12.54	8.1
296	2022-10-23	22.65	71.29	1.02	121.63	44.8	0.28	9.97	7.96
297	2022-10-24	15.65	77.6	1.03	190.21	47.17	0.15	7.96	7.8
298	2022-10-25	16.62	77.73	1.09	142.03	59.05	0.1	8.63	8.14
299	2022-10-26	16.91	76.69	1.07	122.29	44.46	0.1	9.26	7.19
300	2022-10-27	15.17	77.81	0.97	116.18	41.73	0.08	9.44	7.76
301	2022-10-28	15.34	75.41	0.97	128.18	47.15	0.08	9.44	7.48
302	2022-10-29	18.05	74.21	0.96	136.57	53.53	0.13	9.36	7.81
303	2022-10-30	16.41	70.31	1.01	137.78	56.12	0.1	11.2	7.66
304	2022-10-31	16.26	65.66	0.92	132.56	49.96	0.08	13.12	7.76
305	2022-11-01	18.99	66.09	0.99	121.24	39.33	0.1	9.77	7.76
306	2022-11-02	32.23	65.23	1.13	122.83	41.16	0.11	12.18	7.5
307	2022-11-03	39.08	62.19	1.2	106.19	36.77	0.08	9.53	7.56
308	2022-11-04	32.87	70.48	1.31	120.18	49.25	0.11	10.23	8.99
309	2022-11-05	31.89	28.6	1.38	142.76	48.86	0.11	10.74	10.22
310	2022-11-06	28.01	8.98	1.34	142.7	54.6	0.11	11.66	9.41
311	2022-11-07	36.94	17.4	1.32	166.45	65.52	0.25	10.92	7.54
312	2022-11-08	25.46	12.91	0.99	165.95	62.02	0.1	8.61	5.18
313	2022-11-09	22.62	12	0.83	147.91	51.96	0.08	10.86	6.46
314	2022-11-10	20.78	9.18	0.77	148.58	53.32	0.13	15.74	5.33
315	2022-11-11	23.16	11.02	0.67	113.66	40.02	0.05	17.66	6.13
316	2022-11-12	18.6	18.66	0.72	123.42	43.88	0.08	20.41	6.79
317	2022-11-13	18.55	20.6	0.88	135.27	54.94	0.1	15.03	6.18
318	2022-11-14	23.14	20.28	1.03	161.01	67.6	0.13	12.14	5.96
319	2022-11-15	20.81	19.29	1.02	200.64	64.72	0.15	9.11	11.19
320	2022-11-16	21.42	18.17	0.94	177.81	67.34	0.15	12.31	13.56
321	2022-11-17	18.17	15.97	0.82	174.92	62.75	0.13	15.3	13.41
322	2022-11-18	18.7	13.09	0.71	188.65	52.38	0.12	16.13	15.82
323	2022-11-19	18.52	11.16	0.67	161.22	47.66	0.12	16.64	14.18
324	2022-11-20	18.51	11.55	0.62	141.27	45.91	0.1	13.1	14.41
325	2022-11-21	18.74	9.22	0.69	123.5	37.84	0.12	13.08	4.72
326	2022-11-22	15.74	7.88	0.71	126.51	45.66	0.12	14.67	3.49
327	2022-11-23	18.48	8.57	0.85	101.07	39.18	0.11	8.51	12.96
328	2022-11-24	22.67	10.73	0.94	78.51	24.97	0.13	4.99	19.98
329	2022-11-25	30.04	10.68	1.35	136.12	53.66	0.19	4.81	19.79
330	2022-11-26	23.13	10.75	1.23	195.93	81.46	0.18	8.56	17.42
331	2022-11-27	17.69	8.85	1	180.61	74.74	0.16	9.29	16.35
332	2022-11-28	24.84	7.18	1.05	178.89	72.96	0.18	7.43	15.69
333	2022-11-29	22.73	49.88	1.08	184.27	76.04	0.2	9.42	15.86
334	2022-11-30	18.82	107.26	0.93	167.86	69.1	0.18	12.54	18.04
335	2022-12-01	19.69	92.71	0.89	146.81	57.31	0.14	10.78	19.99
336	2022-12-02	17.55	97	0.91	146.74	57	0.15	11.98	18.05
337	2022-12-03	17.18	154.42	1	163.96	68.53	0.24	13.05	22.46
338	2022-12-04	12.89	99.16	0.82	189.63	89.6	0.1	12.97	18.82
339	2022-12-05	14.1	75.93	0.82	231.14	110.67	0.11	13.85	19.9
340	2022-12-06	15.5	79.13	0.91	254.36	121.56	0.14	13.54	17.17
341	2022-12-07	16.57	91.73	0.69	208.71	83.78	0.08	16.12	12.33
342	2022-12-08	11.6	82.92	0.49	181.33	68.94	0.01	22.55	11.57
343	2022-12-09	13.23	45.36	0.58	161.58	67.9	0.01	16.91	13.41
344	2022-12-10	12.31	93.78	0.64	107.93	58.59	0	11.55	17.44
345	2022-12-11	8.91	120.78	0.61	108.54	54.43	0	11.47	17.51
346	2022-12-12	14.87	147.92	0.75	106.46	46.01	0	8.29	20.93
347	2022-12-13	20.83	98.1	0.74	178.97	46.74	0.11	9.18	24.93
348	2022-12-14	22.06	83.21	0.75	161.11	65.76	0.23	8.53	24.09
349	2022-12-15	25.21	28.69	0.71	179.88	64.65	0.2	8.28	26.22
350	2022-12-16	12.81	34.67	0.63	175.52	71.52	0.15	9.66	27.47
351	2022-12-17	10.1	54.51	0.53	166.88	66.07	0.13	10.26	27.54
352	2022-12-18	7.79	56.11	0.45	173.22	61.82	0.13	17.19	23.43
353	2022-12-19	14.21	54.94	0.56	179.94	69.37	0.46	12.69	21.87

354	2022-12-20	14.46	62.14	0.57	183.33	77.64	0.11	11.52	21.49
355	2022-12-21	14.05	60.99	0.62	203.84	89.48	0.06	10.73	25.18
356	2022-12-22	14.01	59.75	0.61	227.38	99.77	0.13	11.72	20.64
357	2022-12-23	17.53	53.9	0.62	268.38	112.62	0.2	15.34	19.45
358	2022-12-24	24.08	66.97	0.7	214.42	85.01	0.2	8	21.76
359	2022-12-25	12.59	67.02	0.41	109.64	41.17	0.1	8.55	18.66
360	2022-12-26	11.58	68.31	0.34	93.02	32.22	0.07	7.43	16.88
361	2022-12-27	14.45	66.84	0.41	75.77	20.46	0.09	5.98	18.71
362	2022-12-28	19.91	58.75	0.62	118.57	25.78	0.17	5.47	21.7
363	2022-12-29	15.4	59.94	0.48	81.69	23.92	0.09	5.83	20.32
364	2022-12-30	10.13	53.92	0.56	151.45	69.86	0.15	9.39	18.98
365	2022-12-31	10.16	18.74	0.54	140.24	59.15	0.09	6.99	20.58
366	Annual average	30.9	18.29	0.92	99.77	31.9	0.22	9.24	8.18
367	24 hour average Standard	80	80	2 (8 hour average)	100	60		100 (8 hour average)	400
368	Annual average Standard	40	50		60	40	5		100
369	Maximum Value	161.07	176.77	2.3	268.38	121.56	4.25	51.17	27.54
370	Maximum Value At Time	2022-02-16	2022-02-11	2022-07-21	2022-12-23	2022-12-06	2022-10-11	2022-02-13	2022-12-17
371	Minimum Value	0.03	0.03	0	0.02	0	0	0.33	1.42
372	Minimum Value At Time	2022-04-21	2022-01-15	2022-04-21	2022-04-21	2022-04-21	2022-07-12	2022-05-19	2022-08-20
373	Valid Data Points	365	365	365	365	365	365	365	365
374	Total Data Points	365	365	365	365	365	365	365	365
375	Data Availability %	100	100	100	100	100	100	100	100
Remarks: The value of PM10 is exceeding the annual average standard limit.									

Hindustan Petroleum Corporation Limited, Visakhapatnam

Ambient air quality monitoring

01.01.2022 to 30.12.2022

Obtained from realtime ambient air quality monitoring stations

S. No.	Date	CAAQMS - 2 - Store yard							
		PM2.5 (ug/m3)	SO2 (ug/m3)	NO2 (ug/m3)	CO (mg/m3)	PM10 (ug/m3)	NH3 (ug/m3)	O3 (ug/m3)	Benzene (ug/m3)
1	2022-01-01	68.28	2.3	41.65	0.57	89.04	28.41	46.54	0.05
2	2022-01-02	105.14	2.25	39.88	0.56	121.81	28.88	46.53	1.95
3	2022-01-03	91.82	2.67	44.85	0.65	125.53	29.9	48.58	2.6
4	2022-01-04	80.17	3.5	43.54	0.59	111.25	30.97	9.46	0.04
5	2022-01-05	92.97	11.52	43.62	0.87	131.28	30.85	15.46	0.03
6	2022-01-06	83.43	10.41	39.02	0.96	114.77	31.03	6.56	0.03
7	2022-01-07	68.51	10.37	30.44	0.88	104.26	30.89	7.55	0.03
8	2022-01-08	102.88	10.96	32.27	0.94	136.89	30.97	8.81	0.05
9	2022-01-09	89.92	13.64	28.96	1.06	114.65	31.15	8.47	0.02
10	2022-01-10	63.41	11.95	34.82	0.93	88.1	30.69	6.12	0.02
11	2022-01-11	49.45	11.74	32.86	0.81	66.26	30.8	6.91	0.02
12	2022-01-12	38.82	9.45	32.61	0.7	56.92	30.57	7.75	0.02
13	2022-01-13	45	10.86	38.57	0.64	64.94	30.4	6.41	0.02
14	2022-01-14	39.96	7.06	42.97	0.62	34.77	30.06	6.8	0.02
15	2022-01-15	41.57	8.87	33.85	0.63	42.15	30.49	8.79	0.02
16	2022-01-16	50.44	12.68	32.54	0.6	48.53	30.12	11.65	0.03
17	2022-01-17	68.75	11.91	30.07	0.67	89.57	30.18	14.62	0.03
18	2022-01-18	85.77	8.87	44.94	0.83	93.15	29.88	11.26	0.03
19	2022-01-19	92.03	13.12	43.83	0.84	99.45	30.17	14.14	0.02
20	2022-01-20	89.98	4.95	48.98	1.18	105.83	29.29	16.89	0.03
21	2022-01-21	71.93	4.48	33.63	0.69	89.85	30.12	17.17	0.03
22	2022-01-22	70.29	3.1	39.03	0.9	96.53	30.65	17.52	0.03
23	2022-01-23	64.67	4.75	43.52	1.06	93.5	30.13	18.94	0.03
24	2022-01-24	59.37	5.37	37.56	0.48	77.51	29.91	20.24	0.02
25	2022-01-25	76.72	13.96	40.95	0.64	90.8	30.32	22.92	0.41
26	2022-01-26	54.61	9.57	31.31	0.64	73.79	30.2	23.36	0.09
27	2022-01-27	97.64	13.12	44.3	0.81	148.88	29.62	24.7	0.48
28	2022-01-28	92.61	8.73	36.15	0.84	145.8	30.29	29.71	1.05
29	2022-01-29	69.47	11.77	37.29	0.84	108.24	30.57	31.93	0.82
30	2022-01-30	76.67	10.77	37.19	0.94	112.02	30.85	35.35	0.36
31	2022-01-31	83.35	5.47	37.63	1.09	119.3	30.3	38.52	0.02
32	2022-02-01	68.55	3.67	41.86	1.15	113.42	29.91	37.96	0.03
33	2022-02-02	47.82	4.44	29.92	0.78	80.6	29.87	38.85	0.03
34	2022-02-03	40.47	4.03	33.11	0.77	67.91	30.11	39.67	0.02
35	2022-02-04	42.97	5.61	34.94	0.75	74.81	29.7	41.37	0.02
36	2022-02-05	47.74	12.39	34.08	0.65	74.33	28.89	45.93	0.02
37	2022-02-06	57.68	11.83	32.53	0.55	82.65	28.42	46.99	0.69
38	2022-02-07	60.3	12.97	30.26	0.59	82.85	28.24	50.18	0.19
39	2022-02-08	65.58	12.57	40.52	0.66	93.65	27.38	53.65	0.02
40	2022-02-09	61.93	12.09	51.99	0.7	77.6	27.09	21.42	0.05
41	2022-02-10	63.48	7.21	46.08	0.64	79.96	28.8	6.06	0.03
42	2022-02-11	56.33	13.98	71.46	0.48	70.12	27.35	5.06	0.75
43	2022-02-12	65.7	20.76	36.67	0.39	61.33	27.9	7.99	0.87
44	2022-02-13	70.04	7.1	38	0.57	67.43	27.67	12.52	0.41
45	2022-02-14	67.27	20.75	39.57	0.48	73.71	29.12	12.51	0.59
46	2022-02-15	70.27	18.67	37.36	0.56	76.97	29.95	12.7	0.51
47	2022-02-16	82.92	10.44	44.82	0.72	88.64	29.22	9.92	0.17
48	2022-02-17	87.68	9.61	48.51	0.55	89.38	28.47	6.02	0.25
49	2022-02-18	88.88	8.9	45.47	0.58	87.19	28.36	22.45	0.24
50	2022-02-19	94.63	5.94	35.73	0.62	86.33	29.58	9.88	1.18
51	2022-02-20	81.06	4.95	24.53	0.5	87.12	30.09	12.67	0.06
52	2022-02-21	67.21	2.95	33.18	0.49	91	30.94	10.3	0.05
53	2022-02-22	53.75	9.03	29.97	0.41	59.56	31.3	9.63	0.05

54	2022-02-23	68.38	24.35	53.95	0.5	82.73	30.86	5.9	0.06
55	2022-02-24	37.37	42.4	25.71	0.37	45.94	22.2	14.8	0.05
56	2022-02-25	51.35	39.18	62.93	0.51	70.92	19.31	14.44	0.05
57	2022-02-26	57.21	18.2	72.91	0.49	76.17	19.1	15.01	2.81
58	2022-02-27	52.29	24.46	53.18	0.51	67.94	19.28	13.24	0.43
59	2022-02-28	58.89	4.63	92.52	0.91	109.51	16.09	13.3	0.08
60	2022-03-01	57.2	19.21	79.52	0.81	101.57	13.75	18.14	0.05
61	2022-03-02	44.41	10.54	53.07	0.66	61.39	13.29	12.91	0.06
62	2022-03-03	51.58	16.31	42.79	0.45	72.67	15.43	14.25	0.03
63	2022-03-04	56.26	16.75	40.38	0.49	78.22	17.08	15.92	0.02
64	2022-03-05	58.34	17.36	39.06	0.57	83.65	16.42	15.66	0.01
65	2022-03-06	46.43	12.56	31.7	0.53	69.99	17.37	18.04	0.01
66	2022-03-07	51.87	18.33	36.32	0.62	60.99	15.8	18.42	0.01
67	2022-03-08	63.9	25.94	51.85	0.55	74.31	15.35	20.12	0.02
68	2022-03-09	60.93	18.52	46.68	0.65	80.86	22.99	24.63	0.05
69	2022-03-10	79.14	10.5	84.25	0.64	100.23	22.63	10.66	0.05
70	2022-03-11	75.65	10.58	76.97	0.64	100.81	22.42	14.16	0.04
71	2022-03-12	72.08	4.94	73.71	0.9	98.83	24.65	12.4	0.04
72	2022-03-13	73.51	15.85	67.86	0.79	97.08	25.7	13.96	0.05
73	2022-03-14	79.34	16.27	68.43	0.79	105.17	25	17.08	0.05
74	2022-03-15	86.93	16.32	71.94	0.98	127.45	25.5	15.85	0.06
75	2022-03-16	71.92	9.46	47.65	0.69	107.37	27	15.65	0.06
76	2022-03-17	54.59	4.09	33.73	0.57	72.5	27.77	11.33	0.05
77	2022-03-18	40.18	8.2	27.4	0.46	43.46	27.42	10.97	0.06
78	2022-03-19	46.08	2.54	39.15	0.69	58.36	27.23	10.21	0.05
79	2022-03-20	37.26	3.86	27.73	0.78	51.94	29.11	9.6	0.04
80	2022-03-21	53.45	1.48	27.41	0.86	64.22	28.74	10.35	0.05
81	2022-03-22	58.13	2.02	27.13	0.69	69.81	29	12.21	0.05
82	2022-03-23	62.05	3.92	19.88	0.62	63.85	29.39	14.4	0.04
83	2022-03-24	53.97	2.18	25.38	0.72	64.06	30.11	14.24	0.04
84	2022-03-25	49.59	2.08	26.71	0.49	60.31	29.53	15.54	0.05
85	2022-03-26	47.19	5.23	26.79	0.61	100.44	29.17	16.1	0.06
86	2022-03-27	40.6	4.03	31.61	0.46	62	30.5	16.31	0.06
87	2022-03-28	33.54	4.57	25.38	0.42	45.04	30.35	16.17	0.06
88	2022-03-29	28.59	3.92	21.98	0.21	33.13	30.79	17.12	0.06
89	2022-03-30	27.8	8.9	17.68	0.31	31.07	30.63	19.42	0.06
90	2022-03-31	27.72	13.76	20.34	0.32	37.78	29.97	21.33	0.06
91	2022-04-01	20.4	14.39	18.57	0.2	32.5	27.79	22.36	0.06
92	2022-04-02	17.76	14.14	15.86	0.19	27.47	31.15	22.23	0.06
93	2022-04-03	21.28	5.53	20.32	0.3	43.81	30.65	22.25	0.06
94	2022-04-04	20.4	13.89	25.66	0.55	37.84	30.71	21.59	0.06
95	2022-04-05	21.47	13.32	26.17	0.46	42.17	30.81	22.07	0.06
96	2022-04-06	27.11	15.48	23.17	0.38	45.74	30.94	22.89	0.06
97	2022-04-07	29.95	15.35	21.4	0.33	49.33	30.85	23.11	0.06
98	2022-04-08	27.08	12.73	25.9	0.55	54.08	30.34	22.82	0.06
99	2022-04-09	18.77	16.13	25.71	0.57	38.57	30.01	23.93	0.06
100	2022-04-10	18.96	12.28	21.73	0.82	33.94	31.35	7.08	0.06
101	2022-04-11	19.34	13.19	20.9	0.77	40.52	30.96	7.06	0.06
102	2022-04-12	15.69	12.63	22.51	0.6	34.3	31.13	6.79	0.06
103	2022-04-13	15.59	13.08	21.87	0.71	33.34	31.33	6.7	0.06
104	2022-04-14	18.64	13.01	27.16	0.58	40.9	31.28	7.34	0.06
105	2022-04-15	23.04	13.54	23.58	0.41	36.02	31.74	7.62	0.06
106	2022-04-16	20.64	13.24	21.66	0.47	39.36	30.53	7.63	0.06
107	2022-04-17	21.61	12.89	22.64	0.58	34.64	31.62	8.16	0.06
108	2022-04-18	33.21	13.46	28.72	0.72	68.34	31.28	8.32	0.06
109	2022-04-19	35.39	8.23	18.85	0.24	107.83	30.07	8.44	0.06
110	2022-04-20	20.97	1.01	8.09	0.31	38.3	30.71	7.52	0.06
111	2022-04-21	23.39	2.44	17.44	0.61	42.21	30.37	7.6	0.06
112	2022-04-22	21.52	2.22	20.48	0.23	53.5	28.11	7.43	0.04
113	2022-04-23	22.79	7.26	26.12	0.67	55.71	25.44	6.67	0.02

114	2022-04-24	30.43	3.45	28.09	0.6	70.63	26.23	8.19	0.03
115	2022-04-25	28.97	5.37	22.69	0.71	61.71	25.53	7.37	0.02
116	2022-04-26	31.01	3.89	28.49	0.67	72.31	27.09	15.89	0.04
117	2022-04-27	27.89	3.93	22.93	0.77	85.06	27.68	10.63	0.06
118	2022-04-28	21.08	5.49	20.64	0.48	33.59	28.1	11.08	0.06
119	2022-04-29	28.42	7.01	22.61	0.82	68.2	22.29	20.4	0.06
120	2022-04-30	32.75	4.53	19.24	0.61	51.96	22.18	7.2	0.06
121	2022-05-01	33.32	3.9	20.48	0.78	55.47	24.67	9.17	0.06
122	2022-05-02	32.69	6.21	16.58	0.57	47.86	24.63	10.4	0.06
123	2022-05-03	36.04	2.26	26.9	0.68	59.31	25.89	10.6	0.06
124	2022-05-04	38.35	7.41	28.74	1.07	59.64	26.83	9.38	0.06
125	2022-05-05	38.28	3.41	29.96	1.06	82.75	25.83	8.85	0.06
126	2022-05-06	59.49	9.95	41.39	0.8	95.14	25.88	9.35	0.06
127	2022-05-07	52.94	3.88	38.87	0.73	103.98	25.84	9.8	0.05
128	2022-05-08	47.01	7.05	35.46	0.5	82.48	25.91	10.16	0.08
129	2022-05-09	20.33	6.08	28.54	0.37	43.08	24.89	9.95	0.07
130	2022-05-10	21.12	10.52	26.44	0.44	18.9	25.64	8.18	0.07
131	2022-05-11	37.58	5.67	26.8	0.54	37.68	25.48	7.76	0.06
132	2022-05-12	34.23	0.58	18.32	0.55	43.87	23.09	6.41	0.06
133	2022-05-13	36.27	0.88	17.77	0.41	47.05	16.99	6.46	0.06
134	2022-05-14	29.1	2.04	19.61	0.55	40.41	26.15	5.54	0.06
135	2022-05-15	38.21	0.56	14.94	0.73	50.84	28.12	6.96	0.06
136	2022-05-16	29.67	2.54	17.93	0.53	48	19.74	5.16	0.05
137	2022-05-17	19.45	3.41	15.98	0.47	36.18	14.7	4.56	0.02
138	2022-05-18	25.54	1.54	16.12	0.68	40.01	11.72	4.7	0.02
139	2022-05-19	21.47	6.49	19.47	1.03	44.17	11.64	4.26	0.02
140	2022-05-20	27.7	4.95	17.02	0.78	47.5	13.41	6.37	0.02
141	2022-05-21	34.13	6.44	21.52	0.78	57.93	19.7	9.58	0.03
142	2022-05-22	44.89	7.69	31	0.56	74.25	27.68	8.45	0.68
143	2022-05-23	59.48	11.76	29.52	1.21	112.53	26.69	10.36	0.14
144	2022-05-24	33.5	8.06	18.82	0.59	56.41	26.93	10.41	0.17
145	2022-05-25	37.86	9.74	22.42	0.66	49.21	26.15	15.62	0.16
146	2022-05-26	45.28	3.85	22.76	0.77	69.37	25.05	13.5	0.05
147	2022-05-27	55.59	6.37	32.01	1.09	79.53	28.48	8.66	0.05
148	2022-05-28	72.93	4.27	32.88	1.33	129.85	26.89	5.97	0.05
149	2022-05-29	46.51	3.26	21.19	0.43	75.49	27.37	2.35	0.05
150	2022-05-30	62.61	5.94	23.76	1.45	102.86	27.54	7.63	0.05
151	2022-05-31	52.52	7.48	21.73	1.53	91.91	27.46	6.07	0.05
152	2022-06-01	52.37	9.45	21.67	0.83	79.25	27.43	7.65	0.05
153	2022-06-02	46.5	6.69	24.81	1.06	77.33	27.05	4.48	0.05
154	2022-06-03	52.45	6.41	21.6	1.06	90.67	27.13	9.48	0.05
155	2022-06-04	46.57	6.13	19.8	0.58	70.36	28.46	7.26	0.05
156	2022-06-05	38.21	6.27	16.9	1.35	68.1	28.02	4.96	0.05
157	2022-06-06	36.66	8.13	13.55	0.81	53.38	27.08	5.4	0.05
158	2022-06-07	NA	4.36	NA	NA	NA	NA	NA	NA
159	2022-06-08	NA	5.63	NA	NA	NA	NA	NA	NA
160	2022-06-09	NA	7.87	0	1.08	NA	NA	NA	NA
161	2022-06-10	66.74	16.41	NA	0.69	7.47	31.6	18.14	NA
162	2022-06-11	59.46	3.87	NA	0.89	220.75	31.52	18.55	NA
163	2022-06-12	31.64	2.61	NA	0.2	61.33	31.29	19.66	NA
164	2022-06-13	31.24	5.93	NA	0.39	69.34	30.99	19.54	NA
165	2022-06-14	48.5	6.71	NA	0.87	101.17	30.89	23.07	NA
166	2022-06-15	36.79	8.71	NA	0.67	62.71	31.3	25.1	NA
167	2022-06-16	25.52	5.97	NA	0.39	35.78	31.12	21.91	NA
168	2022-06-17	48.39	10.81	NA	0.64	33.89	29.56	19.85	NA
169	2022-06-18	16.57	8.37	NA	0.48	29.44	27.43	19.64	5
170	2022-06-19	18.99	6.07	NA	0.42	31.85	25.44	21.48	5
171	2022-06-20	33.74	11.07	5.23	0.45	52.32	26.73	23.04	3.26
172	2022-06-21	31.73	6.1	14.47	0.9	49.18	27.71	20.41	0.03
173	2022-06-22	21.75	9.12	7.69	0.53	36.67	28.9	24.24	0.03

174	2022-06-23	27.45	8.72	72.72	0.45	49.94	30.03	26.38	0.03
175	2022-06-24	29.79	6.37	9.83	0.22	54.79	30.25	30.26	0.03
176	2022-06-25	26.55	5.45	5.13	0.18	36.8	31.06	35.32	0.03
177	2022-06-26	22.23	9.79	5.1	0.2	34.3	30.46	40.75	0.03
178	2022-06-27	26.71	9.83	31.41	0.12	76.53	29.65	37.2	0.03
179	2022-06-28	27.65	6.89	17.51	0.12	49.03	28.95	3.55	0.04
180	2022-06-29	28.13	10.27	7.69	0.28	51.85	25.73	6.24	0.04
181	2022-06-30	28.09	14.06	10.46	0.27	52.92	21.9	6.45	0.05
182	2022-07-01	34.25	9.02	9.94	0.28	76.47	20.51	5.97	0.05
183	2022-07-02	37.97	13.7	9.84	0.33	72.39	22.2	3.02	0.04
184	2022-07-03	37.53	8.74	9.85	0.45	71.1	22.54	3.88	0.06
185	2022-07-04	18.46	6.83	25.63	0.2	41.36	21.03	3.66	0.1
186	2022-07-05	20.07	15.73	4.25	0.22	34.25	21.9	6.13	0.06
187	2022-07-06	19.86	91.02	8.14	0.29	29.64	22.06	5.35	0.05
188	2022-07-07	25.23	9.77	7.23	0.16	40.11	21.61	8.13	0.03
189	2022-07-08	21.54	7.47	33.87	0.24	47.61	20.83	7.64	0.03
190	2022-07-09	14.77	4.95	21.48	0.16	31.91	27.34	11.15	0.03
191	2022-07-10	9.72	8.46	23.06	0.08	25.46	31.83	11.02	0.03
192	2022-07-11	15.16	7.65	29.83	0.05	25	31.59	10.3	0.03
193	2022-07-12	18.91	5.73	16.1	0.08	20.34	31.73	10.99	0.03
194	2022-07-13	19.98	9.58	35.85	0.08	30.57	31.42	11.52	0.03
195	2022-07-14	44.91	10.8	9.12	0.11	34.03	31.52	11.77	0.03
196	2022-07-15	24.27	46.14	18.1	0.11	60.16	31.36	11.33	0.03
197	2022-07-16	32.09	203.91	23.28	0.14	59.24	31.68	10.8	0.03
198	2022-07-17	18.35	102.07	20.17	0.22	25.45	32.02	12.01	0.03
199	2022-07-18	17.64	93.31	22.01	0.18	23.19	31.64	12.58	0.03
200	2022-07-19	22.2	5.89	19.31	0.35	47.01	31.75	14.35	0.03
201	2022-07-20	31.99	6.51	17.76	0.35	57.6	31.7	16.38	0.03
202	2022-07-21	37.45	20.02	10.57	0.21	58.13	31.52	15.21	0.03
203	2022-07-22	38.15	29.96	15.49	0.14	72.74	31.65	12.47	0.07
204	2022-07-23	25.53	28.12	11.61	0.23	40.34	31.51	13.21	0.03
205	2022-07-24	26.96	35.12	4.46	0.23	35.79	31.83	13.24	0.03
206	2022-07-25	36.87	39.16	5.63	0.26	64.91	31.6	13.54	0.03
207	2022-07-26	32.25	46.21	11.34	0.37	57.22	31.33	12.98	0.03
208	2022-07-27	26.98	50.97	14.62	0.19	40.11	31.75	14.02	0.08
209	2022-07-28	33.1	58.61	25.4	0.24	57.37	31.42	15.25	0.04
210	2022-07-29	29.3	44.79	21.91	0.22	60.88	31.83	10.46	0.03
211	2022-07-30	29.75	29.49	20.7	0.35	62.9	31.36	10.6	0.03
212	2022-07-31	19.64	30.86	16.97	0.26	37.37	31.32	10.1	0.1
213	2022-08-01	25.82	19.61	21.92	0.18	57.87	31.28	11.33	0.03
214	2022-08-02	34.41	38.91	22.55	0.18	59.63	31.38	10.82	0.03
215	2022-08-03	27.12	41.25	18.58	0.2	40.47	31.43	10.83	0.03
216	2022-08-04	25.29	44.66	20.09	0.15	40.01	31.33	10.25	0.03
217	2022-08-05	31.39	37.42	21.3	0.2	65.31	31.6	10.32	0.03
218	2022-08-06	35.18	28.15	22.13	0.25	54.13	31.8	11.38	0.03
219	2022-08-07	21.9	50.82	17.36	0.18	29.99	31.59	10.63	0.03
220	2022-08-08	18.72	49.54	19.35	0.07	17.49	31.63	10.43	0.03
221	2022-08-09	17.39	36.55	26.52	0.19	25.09	31.55	12.25	0.03
222	2022-08-10	19.9	27.19	21.1	0.16	33.4	32	9.36	0.12
223	2022-08-11	20.51	30.06	19.49	0.12	40.36	31.82	8.47	0.03
224	2022-08-12	22.78	30.4	18.44	0.14	46.58	31.68	8.26	0.03
225	2022-08-13	21.64	31.54	19.91	0.03	39.26	31.95	6.84	0.03
226	2022-08-14	15.34	32.15	15.94	0.25	22.17	31.75	7.33	0.03
227	2022-08-15	18.25	33.35	15.02	0.17	24.93	32.1	10	0.03
228	2022-08-16	20.76	34.61	14.56	0.25	34.22	31.88	9.32	1.07
229	2022-08-17	28.83	35.11	15.1	0.24	42.78	31.98	10.14	2.27
230	2022-08-18	33.13	36.43	22.83	0.29	62.88	31.81	8.99	0.03
231	2022-08-19	30.85	30.3	31.32	0.28	78.18	31.79	6.05	0.05
232	2022-08-20	31.34	19	23.24	0.14	63.36	31.86	5.82	0.03
233	2022-08-21	21.11	21.3	15.73	0.21	42.14	31.76	NA	0.03

234	2022-08-22	26.43	28.31	18.83	0.41	59.48	31.8	14.54	0.05
235	2022-08-23	34.85	32.79	26.69	0.22	77.49	31.93	10.45	0.05
236	2022-08-24	37.24	83.25	32.87	0.28	60.66	31.84	8.81	0.03
237	2022-08-25	39.91	83.77	27.8	0.28	58.56	31.99	10.89	0.03
238	2022-08-26	42.67	14.66	19.82	0.19	58.62	31.73	12.4	0.05
239	2022-08-27	53.68	0.92	32.09	0.39	86.47	31.64	9.52	0.03
240	2022-08-28	36.99	1.7	27.76	0.35	58.05	31.65	10.27	0.03
241	2022-08-29	39.35	20.95	25.43	0.3	49.61	31.49	9.33	0.05
242	2022-08-30	25.23	14.13	24.82	0.22	30.57	31.7	8.62	0.03
243	2022-08-31	27.54	1.2	23.74	0.33	37.81	31.69	8.32	0.05
244	2022-09-01	18.34	0.87	20.84	0.14	27.23	31.62	8.76	0.03
245	2022-09-02	16.44	0.15	27.18	0.15	26.39	31.33	9.01	0.96
246	2022-09-03	31.69	0.61	28.18	0.19	40.29	31.6	8.57	2.48
247	2022-09-04	28.72	0.31	30.98	0.25	46.99	31.48	8.86	0.05
248	2022-09-05	31.73	1.39	24.29	0.26	43.41	31.52	10.26	0.03
249	2022-09-06	29.48	2.74	23.96	0.22	49.57	31.19	9.58	0.03
250	2022-09-07	32.11	2.87	27.19	0.27	40.13	31.6	9.35	0.03
251	2022-09-08	11.38	0.9	23.98	0.31	12.03	31.71	10.65	0.03
252	2022-09-09	15.29	4.78	25.6	0.21	15.88	31.27	1.91	0.03
253	2022-09-10	18.15	235.14	21.66	0.31	23.47	31.61	2.15	0.06
254	2022-09-11	16.76	11.94	16.67	0.21	15.13	31.82	4.34	0.03
255	2022-09-12	43.51	18.22	20.13	0.28	27.96	31.53	3.87	0.03
256	2022-09-13	20.04	4.76	17.68	0.23	26.47	31.94	4.28	0.03
257	2022-09-14	27.38	4.98	22.06	0.32	32.77	31.52	2.67	0.02
258	2022-09-15	29.26	5.16	18.7	0.28	36.15	31.43	4.5	0.08
259	2022-09-16	22.76	5.98	18.35	0.34	33.68	31.48	5.77	0.05
260	2022-09-17	30.81	2.89	17.07	0.26	34.47	31.23	7	0.08
261	2022-09-18	41.2	6.34	21.58	0.21	47.58	31.32	3.49	0.03
262	2022-09-19	29.81	11.17	23.82	0.39	29.23	31.62	2.97	0.22
263	2022-09-20	28.74	5.65	24.29	0.32	32.63	31.52	3.57	0.13
264	2022-09-21	41	5.54	19.55	0.31	44.58	31.82	6.82	0.13
265	2022-09-22	42.52	9.6	24.68	0.32	45.54	31.81	5.72	0.06
266	2022-09-23	46.66	10.38	35.21	0.23	53.3	31.52	5.56	0.03
267	2022-09-24	46.57	5.15	35.73	0.32	54	31.48	5.03	0.08
268	2022-09-25	40.39	17.52	32.2	0.33	43.29	31.66	4.58	0.13
269	2022-09-26	45.43	18.04	32.56	0.3	44.21	31.86	4.12	0.03
270	2022-09-27	39.28	15.35	31.71	0.4	44.17	31.81	5.26	0.06
271	2022-09-28	50.22	15.23	36.98	0.36	56.78	31.72	4.73	0.03
272	2022-09-29	39.15	7.43	30.89	0.35	43.77	31.74	4.36	0.03
273	2022-09-30	19.52	14.92	30.27	0.29	25.92	31.37	4.67	0.03
274	2022-10-01	48.42	18.35	41.44	0.38	56.19	31.4	4.21	0.08
275	2022-10-02	39.66	12.33	26.57	0.39	41.7	31.85	5.45	0.03
276	2022-10-03	54.97	15.89	31.51	0.42	54.12	31.7	5.07	0.05
277	2022-10-04	44.39	13.35	28.05	0.24	47.14	31.52	4.97	0.03
278	2022-10-05	22.16	16.43	21.96	0.24	50.49	31.65	6.14	0.3
279	2022-10-06	23.51	15.56	23.44	0.26	36.95	31.53	7.29	0.08
280	2022-10-07	18.71	10.78	23.2	0.41	21.18	31.81	6.99	0.13
281	2022-10-08	22.97	11.44	25.15	0.19	21	31.53	6.65	0.17
282	2022-10-09	13.46	11.25	20.91	0.14	12.33	31.72	7.17	0.03
283	2022-10-10	24.68	11.83	33.84	0.5	33.88	31.53	7.09	0.03
284	2022-10-11	20.99	11.85	30.56	0.41	27.6	31.47	2.7	0.16
285	2022-10-12	23.6	7.14	22.86	0.29	37.3	31.65	3.06	0.02
286	2022-10-13	33.48	2.31	24.16	0.37	53.83	31.43	2.96	0.03
287	2022-10-14	19.64	14.95	24.76	0.27	29.8	31.61	2.65	0.03
288	2022-10-15	18.24	11.62	29.88	0.14	21.31	31.6	2.44	0.1
289	2022-10-16	21.17	4.26	30.5	0.17	23.48	31.73	2.51	0.05
290	2022-10-17	34.2	4.1	28.4	0.28	64.67	31.94	3.35	0.05
291	2022-10-18	53.48	4.49	27.66	0.27	77.96	31.61	4.69	0.05
292	2022-10-19	61.66	9.24	29.45	0.23	86.04	31.68	4.33	0.05
293	2022-10-20	58.08	4.67	27.36	0.33	82.67	31.81	4.83	0.08

294	2022-10-21	55.87	8.66	20.01	0.34	74.64	31.98	8.64	0.02
295	2022-10-22	49.19	9.6	20.83	0.26	77.15	31.83	8.91	0.05
296	2022-10-23	56.17	9.13	27.01	0.29	100.44	31.84	8.46	1.38
297	2022-10-24	79.19	10.38	26.81	0.41	200.94	31.32	7.96	5
298	2022-10-25	108.19	13.38	32.5	0.42	497.16	31.46	8	2.69
299	2022-10-26	64.29	12.22	38.37	0.49	124.72	31.72	7.29	0.1
300	2022-10-27	59.4	12.08	30.62	0.45	113.56	31.67	8.31	0.05
301	2022-10-28	66	12.36	30.11	0.44	131.34	31.77	8.98	0.15
302	2022-10-29	70.47	13.01	26	0.34	130.51	31.77	11.02	0.03
303	2022-10-30	73.94	11.43	27.92	0.39	162.02	31.83	11.78	0.03
304	2022-10-31	67.9	12	27.03	0.36	125.41	31.51	13.53	0.13
305	2022-11-01	62.33	11.18	29.13	0.27	148.26	31.75	12.66	0.07
306	2022-11-02	55.82	11.3	29.12	0.32	110.44	31.76	14.17	0.05
307	2022-11-03	51.73	10.61	30.93	0.38	108.94	31.7	12.11	0.05
308	2022-11-04	47.93	10.72	29.97	0.43	124.55	31.6	13.24	0.03
309	2022-11-05	51.25	11.38	35.78	0.53	133.74	31.62	13.69	0.03
310	2022-11-06	86.49	12.88	31.91	0.45	138.2	31.59	15.39	0.03
311	2022-11-07	91.85	12.13	33.51	0.46	246.29	31.56	13.78	0.03
312	2022-11-08	85.39	14.6	36.2	0.47	151.7	32.07	14.36	0.13
313	2022-11-09	68.85	11.65	28.31	0.36	127.72	31.69	7.78	0.02
314	2022-11-10	77.84	11.8	27.42	0.35	135.16	31.56	11.72	0.05
315	2022-11-11	57.29	12.69	21.8	0.31	92.53	31.72	14.91	0.03
316	2022-11-12	64.29	11.94	23.19	0.33	108.68	31.89	13.47	0.03
317	2022-11-13	79.88	12.27	30.73	0.48	131.5	32	13.22	0.04
318	2022-11-14	88.16	13.68	32.25	0.6	156.29	31.69	13.2	0.19
319	2022-11-15	93.98	21.41	31.61	0.48	158.9	31.62	14.07	0.6
320	2022-11-16	86.48	19.84	27.9	0.44	183.17	31.46	16.29	0.15
321	2022-11-17	81.61	15.65	30.35	0.42	185.15	31.64	15.89	0.1
322	2022-11-18	65.83	13.44	26.76	0.37	150.19	31.66	17.23	0.44
323	2022-11-19	63.23	13.3	24.6	0.35	144.22	31.97	19.7	0.13
324	2022-11-20	61.52	12.45	26.5	0.34	139.02	31.48	18.09	0.03
325	2022-11-21	49.64	12.23	22.42	0.36	87.58	31.81	17.96	0.03
326	2022-11-22	58.72	10.85	20.69	0.41	93.51	31.78	17.31	0.13
327	2022-11-23	54.69	10.7	21.94	0.3	90.62	31.85	14.89	0.04
328	2022-11-24	47.74	11.53	22.72	0.33	86.4	31.46	14.1	0.03
329	2022-11-25	86.14	11.13	29.19	0.41	127.77	31.26	15.6	0.03
330	2022-11-26	108.26	13.37	30.13	0.53	187.02	31.65	19.69	0.12
331	2022-11-27	102.56	14.11	26.18	0.46	182.98	31.72	20.14	0.02
332	2022-11-28	95.94	13.23	28.12	0.42	161.53	31.74	20.23	0.02
333	2022-11-29	99.65	14	33.03	0.49	174.73	31.73	22.71	0.23
334	2022-11-30	95.51	12.27	28.38	0.48	151.76	31.56	23.56	0.33
335	2022-12-01	71.3	11.3	28.4	0.41	121.4	31.86	25.7	0.45
336	2022-12-02	80.13	11.2	26.91	0.38	125.21	31.59	25.92	0.35
337	2022-12-03	95.19	11.21	26.78	0.43	144.65	31.53	26.15	0.49
338	2022-12-04	117.47	11.18	24.77	0.51	167.62	31.66	29.65	0.6
339	2022-12-05	137.41	14.18	36.73	0.59	198.45	31.82	29.28	0.03
340	2022-12-06	149.5	14.5	37.73	0.56	223.98	31.73	16.3	0.14
341	2022-12-07	105.51	15.66	38.36	0.57	177.22	31.66	15.97	1.43
342	2022-12-08	83.66	16.17	37.43	0.41	134.56	31.61	23.96	2.02
343	2022-12-09	77.91	15.6	45.11	0.48	115.81	31.58	14.76	0.09
344	2022-12-10	69.28	15.01	49.15	0.42	85.85	31.62	9.69	0.03
345	2022-12-11	67.84	13.89	47.89	0.4	90.84	31.55	9.74	0.09
346	2022-12-12	64.6	13.92	34.83	0.4	87.35	31.84	11.93	0
347	2022-12-13	62.62	14.42	38.9	0.56	100.71	32.04	14.02	0
348	2022-12-14	85.75	15.28	40.63	0.61	144.55	31.64	15.68	0
349	2022-12-15	90.73	14.87	53.84	0.58	184.8	31.99	15.89	0
350	2022-12-16	97.01	16.92	44.52	0.55	162.93	31.88	18.69	0
351	2022-12-17	90.26	13.92	43.38	0.47	151.51	31.54	19.32	0.09
352	2022-12-18	90.89	13.84	35.31	0.44	162.74	31.59	23.89	0.1
353	2022-12-19	97.26	16.27	41.26	0.49	161.1	31.55	23.8	0.14

354	2022-12-20	96.26	15.25	42.9	0.47	157.29	31.51	26.17	2.15
355	2022-12-21	107.05	15.02	44.82	0.6	179.93	31.92	28.01	2.08
356	2022-12-22	125.6	16.16	42.82	0.44	190.72	31.71	31.55	0.78
357	2022-12-23	128.57	15.57	34.57	0.56	201.51	31.41	37.93	0.71
358	2022-12-24	96.24	13.99	39.39	0.41	162.6	31.75	10.64	1.94
359	2022-12-25	53.41	14.01	38.74	0.29	96.16	31.55	6.45	1.52
360	2022-12-26	51.75	16.57	35.47	0.38	103.26	31.7	9.77	1.1
361	2022-12-27	39.92	13.98	31.45	0.43	86.1	31.7	15.05	0
362	2022-12-28	40.78	15.03	38.73	0.58	120.42	31.26	16.8	0.3
363	2022-12-29	43.34	13.62	33.8	0.21	86.51	31.3	18.22	0.77
364	2022-12-30	98.35	16.67	36.73	0.58	156.6	31.97	19.91	1.18
365	2022-12-31	87.43	13.28	30.94	0.65	154.1	31.6	20.75	1.25
366	Annual average	48.61	14.61	29.19	0.48	77.06	29.27	13.48	0.23
367	24 hour average Standard	60	80	80	2 (8 hour average)	100	400	100 (8 hour average)	
368	Annual average Standard	40	50	40		60	100		5
369	Maximum Value	149.5	235.14	92.52	1.53	497.16	32.1	53.65	5
370	Maximum Value At Time	2022-12-06	2022-09-10	2022-02-28	2022-05-31	2022-10-25	2022-08-15	2022-02-08	2022-06-18
371	Minimum Value	9.72	0.15	0	0.03	7.47	11.64	1.91	0
372	Minimum Value At Time	2022-07-10	2022-09-02	2022-06-09	2022-08-13	2022-06-10	2022-05-19	2022-09-09	2022-12-12
373	Valid Data Points	362	365	353	363	362	362	361	354
374	Total Data Points	365	365	365	365	365	365	365	365
375	Data Availability %	99.18	100	96.71	99.45	99.18	99.18	98.9	96.99
Remarks: The values of PM10 & PM 2.5 are exceeding the annual average standard limits.									

Hindustan Petroleum Corporation Limited, Visakhapatnam

Ambient air quality monitoring

01.01.2022 to 30.12.2022

Obtained from realtime ambient air quality monitoring stations

S. No.	Date	CAAQMS - 3 - LPH							
		NH3 (ug/m3)	O3 (ug/m3)	Benzene (ug/m3)	CO (mg/m3)	NO2 (ug/m3)	SO2 (ug/m3)	PM2.5 (ug/m3)	PM10 (ug/m3)
1	2022-01-01	17.03	22.27	0.27	0.53	46.64	15.37	31.79	82.51
2	2022-01-02	16.04	21.29	0.39	0.64	45.03	17.19	45.55	93.41
3	2022-01-03	11.58	20.81	0.36	0.6	60.38	13.38	47.09	117.3
4	2022-01-04	17.87	23.88	0.76	0.63	61.37	19.3	32.78	109.73
5	2022-01-05	21.85	24.4	0.57	0.67	46.44	12.54	41.64	115.78
6	2022-01-06	22.47	23.71	0.59	0.71	48.5	16.35	39.7	105.02
7	2022-01-07	20.96	24.15	0.39	0.69	42.75	10.49	37.6	101.39
8	2022-01-08	21.01	26.2	0.45	0.81	42.26	14.37	49.8	127.15
9	2022-01-09	19.17	25.29	0.49	0.72	33.79	14.68	48.54	119.93
10	2022-01-10	20.15	21.07	0.47	0.72	43.2	2.45	27.67	82.44
11	2022-01-11	19.18	20.34	0.31	0.42	40.75	8.13	17.95	60.41
12	2022-01-12	19.68	21.08	0.28	0.36	38.88	4.33	12.84	55.9
13	2022-01-13	19.16	20.43	0.34	0.49	35.65	6.3	15.46	59.25
14	2022-01-14	18.72	19.47	0.65	0.45	26.38	4.97	11.55	35.12
15	2022-01-15	17.59	19.67	0.65	0.46	19.91	3.91	12.23	43.12
16	2022-01-16	16.35	22.76	0.65	0.51	17.71	6.11	17.21	55.39
17	2022-01-17	21.67	23.43	0.36	0.6	32.62	6.76	28.44	83.69
18	2022-01-18	28.57	22.89	0.02	0.69	35.53	5.28	35.52	97.14
19	2022-01-19	28.12	23.5	0.26	0.65	48.22	15.64	52.98	124.02
20	2022-01-20	25.73	22.49	0.54	0.7	43.77	28.23	47.4	135.23
21	2022-01-21	28.41	21.88	0.52	0.81	71.01	149.91	64.71	164.41
22	2022-01-22	20.68	22.31	0.64	0.53	44.66	49.36	39.58	117.52
23	2022-01-23	20.91	19.52	0.65	0.84	50.13	88.2	48.51	139.55
24	2022-01-24	17.72	19.31	0.5	0.2	35.12	36.76	19	87.51
25	2022-01-25	16.88	19.89	0.17	0.64	32.83	11.55	21.95	76.49
26	2022-01-26	13.94	21.11	0.21	0.47	18.55	8.9	18.64	71.66
27	2022-01-27	17.27	22.88	0.39	0.6	34.75	21.34	41.04	151.7
28	2022-01-28	20.95	25.46	0.22	0.54	40.83	6.1	45.9	167.03
29	2022-01-29	23.99	24.86	0.36	0.52	47.8	10.84	33.95	129.9
30	2022-01-30	22.27	26.93	0.74	0.59	41.68	34.5	37.87	132.74
31	2022-01-31	21.21	26.41	0.68	0.64	43.8	48.37	38.47	145.53
32	2022-02-01	26.97	24.61	0.72	1.19	65.65	99.56	44.17	171.77
33	2022-02-02	20.83	23.41	0.5	0.49	46.52	66.75	26.77	101.38
34	2022-02-03	19.38	22.02	0.56	0.44	42.4	25.84	24.15	98.53
35	2022-02-04	22.32	21.6	0.55	0.69	56.7	56.27	27.35	113.83
36	2022-02-05	18.27	23.06	0.53	0.39	37.65	35.2	25.06	96.23
37	2022-02-06	18.5	24.28	0.74	0.42	34.73	15.41	27	100.58
38	2022-02-07	19.2	24.73	1.01	0.45	39.99	20.46	32.08	116.61
39	2022-02-08	12.18	23.69	0.77	0.54	58.33	11.28	29.59	107.86
40	2022-02-09	1.26	22.48	0.59	0.52	93.06	6.5	26.87	105.86
41	2022-02-10	2.3	22.06	0.61	0.51	80.91	9.82	29.36	112.28
42	2022-02-11	2.38	20.24	0.43	0.56	88.12	5.07	23.61	97.55
43	2022-02-12	4.35	21.17	0.57	0.49	59.26	6.25	22.99	84.54
44	2022-02-13	6.05	25.52	0.29	0.53	56.66	5.84	24.85	91.96
45	2022-02-14	2.36	24.47	0.61	0.52	84.23	12.28	26.14	102.31
46	2022-02-15	4.9	25.02	0.48	0.52	75.86	8.94	28.96	110.38
47	2022-02-16	4.91	25.28	0.57	0.47	82.39	15.57	34.28	122.02
48	2022-02-17	4.53	22.56	0.43	0.56	87.18	6.91	33.99	124.84
49	2022-02-18	6.4	21.8	0.45	0.66	82.28	2.4	32.88	119.06
50	2022-02-19	8.51	21.25	0.4	0.6	68.1	6.44	35.01	121.34
51	2022-02-20	17.58	22.12	0.5	0.68	75.72	47.27	42.07	160.85
52	2022-02-21	20.86	22.71	0.49	0.51	16.28	9.21	29.93	118.71
53	2022-02-22	14.16	20.12	0.32	0.47	8.3	4.81	22.03	82.34

54	2022-02-23	12.03	18.59	0.25	0.44	8.4	0.69	20.48	81.17
55	2022-02-24	12.09	18.54	0	0.12	8.52	1.57	17.24	74.48
56	2022-02-25	15.15	18.58	0	0.46	11.43	2.1	22.38	94.2
57	2022-02-26	16.77	18.83	0	0.48	13.8	2.03	23.82	89.56
58	2022-02-27	14.76	18.6	0	0.31	11.29	0.88	16.6	67.4
59	2022-02-28	26.85	20.51	0	0.61	24.21	3.17	35.29	131.08
60	2022-03-01	22.6	19.48	0.52	0.61	17.49	3.01	29.33	109.84
61	2022-03-02	18.36	18.56	0.9	0.36	14.03	0.85	17.17	79.26
62	2022-03-03	15.48	18.11	0.86	0.36	11.81	1.78	20.49	88.83
63	2022-03-04	16.77	18.45	1.05	0.43	13.12	1.39	32.61	122.38
64	2022-03-05	16.02	19.41	0.94	0.45	13.57	2.27	38.26	149.57
65	2022-03-06	0.02	23.96	0.85	0.45	0.02	7.82	33.58	123.88
66	2022-03-07	0.02	23.39	0.75	0.45	0.02	7.22	27.38	100.28
67	2022-03-08	17.98	23.33	0.43	0.43	36.12	52.83	29.45	114.21
68	2022-03-09	17.56	22.15	0.28	0.61	44.85	48.02	31.76	116.29
69	2022-03-10	17.71	21.76	0.35	0.74	61.07	65.68	42.46	147.15
70	2022-03-11	18.1	22.66	0.38	0.72	63.12	51.88	40.37	140.13
71	2022-03-12	19.21	23.74	0.51	1.09	65.38	84.53	48.09	179.02
72	2022-03-13	21.53	23.56	0.34	0.88	57.49	70.35	44.08	148.59
73	2022-03-14	22.88	25.86	0.4	0.85	68.71	125.67	48.56	167.34
74	2022-03-15	15.68	27.23	0.43	0.92	50.15	105.45	54.19	185.62
75	2022-03-16	20.68	38.38	0.42	0.9	26.2	157.94	51.68	192.67
76	2022-03-17	184.59	32.84	0.42	0.68	247.93	102.04	35.21	129.55
77	2022-03-18	105.23	32.56	0.42	0.37	138.44	47.66	21.75	76.49
78	2022-03-19	35.19	26.02	0.45	0.51	61.05	31.45	22.33	85.15
79	2022-03-20	28.65	23.96	0.41	0.81	77.6	91.37	27.82	106.32
80	2022-03-21	25.58	25.23	0.41	0.76	66.62	64.61	32.07	115.27
81	2022-03-22	20.22	26.71	0.41	0.63	52.13	57.62	37.49	123.95
82	2022-03-23	0.02	27.01	0.42	0.6	0.01	26.65	31.06	104.49
83	2022-03-24	0.67	24.07	0.57	0.78	1.24	108.06	37.03	131.89
84	2022-03-25	1.01	23.83	0.52	0.78	2.21	112.23	36.71	140.12
85	2022-03-26	1	23.66	0.38	0.62	2.01	172.97	41.77	155.69
86	2022-03-27	0.99	23.63	0.43	0.64	1.72	165.51	36.83	119.39
87	2022-03-28	1.01	23.43	0.42	0.59	2.01	173.1	29.4	103.37
88	2022-03-29	0.98	23.56	0.33	0.45	1.66	168.63	25.53	92.61
89	2022-03-30	0.99	24.06	0.35	0.29	2	119.3	22.08	86.56
90	2022-03-31	1	24.95	0.43	0.36	1.95	18.28	18.24	80.24
91	2022-04-01	1.01	24.43	0.43	0.32	2.08	18.91	16.03	80.27
92	2022-04-02	1.03	24.06	0.42	0.25	2.37	34.29	17.24	73.98
93	2022-04-03	1	23.49	0.44	0.47	1.93	54.21	23.07	90.08
94	2022-04-04	1.02	23.19	0.52	0.74	2.23	70.74	21.12	84.75
95	2022-04-05	1	23.43	0.39	0.44	1.99	41.06	14.65	74.3
96	2022-04-06	1.01	23.53	0.41	0.42	2.11	37.43	23.74	95.61
97	2022-04-07	0.99	23.93	0.44	0.61	1.91	33.41	25.1	91.94
98	2022-04-08	1.02	25.4	0.36	0.61	2.32	28.08	20.11	87.39
99	2022-04-09	1	23.32	0.31	0.54	2.01	32.27	14.94	66.33
100	2022-04-10	1.01	23.32	0.42	0.7	2.12	44.4	18.94	77.38
101	2022-04-11	0.97	23.19	0.55	0.59	1.66	39.64	19.92	89.36
102	2022-04-12	11.57	23.31	0.36	0.48	44.43	46.69	18.09	84.34
103	2022-04-13	27.95	23.44	0.46	0.55	74.52	37.48	17.8	82.12
104	2022-04-14	30.63	23.16	0.35	0.59	53.43	39.34	19.01	90.02
105	2022-04-15	32.32	23.17	0.48	0.54	56.41	39.42	19.52	87.77
106	2022-04-16	30.09	23.09	0.53	0.69	46.76	32.45	22.69	94.36
107	2022-04-17	28.59	23.41	0.63	0.62	42.97	33.27	16.46	72.3
108	2022-04-18	18.51	29.83	0.53	0.71	35.19	39.21	27.08	104.92
109	2022-04-19	62.25	24.36	0.45	0.69	23.57	36.99	27.44	104.24
110	2022-04-20	82.86	23.71	0.62	0.42	15.86	29.43	20.83	82.67
111	2022-04-21	57.78	23.23	0.57	0.66	7.8	30.02	21.24	92.61
112	2022-04-22	33.24	23.86	0.66	0.46	10.05	35.05	16.26	72.79
113	2022-04-23	36.42	23.39	0.71	0.62	14.48	52.87	25.35	105.62
114	2022-04-24	36.49	23.82	0.73	0.67	11.02	70.75	29.9	112.22

115	2022-04-25	29.85	23.47	0.85	0.86	21.58	52.85	30.12	122.41
116	2022-04-26	21.93	23.03	0.82	0.65	21.38	50.15	28.93	122.25
117	2022-04-27	17.29	14.97	0.62	1.34	22.31	65.56	28.88	125.49
118	2022-04-28	11.34	10.29	0.89	0.64	9.81	46.66	27.86	121.73
119	2022-04-29	9.33	2.82	0.71	0.72	16.44	56.36	28.44	119
120	2022-04-30	14.14	4.25	0.76	0.55	12.5	46.36	24.44	101.4
121	2022-05-01	11.88	3.5	1.09	0.53	18.63	39.79	22.35	85.96
122	2022-05-02	14.51	4.27	1.21	0.47	19.28	26.34	21.26	86.6
123	2022-05-03	14.07	4.22	0.74	0.45	24.67	8.05	15.43	61.36
124	2022-05-04	15.07	3.44	1.03	0.81	30.01	19.93	23.21	86.12
125	2022-05-05	17.41	5.97	1.11	0.37	29.71	26.06	20.52	77.61
126	2022-05-06	11.71	4.46	1.09	0.68	13.93	14.81	26.18	95.69
127	2022-05-07	5.23	3.97	1.01	0.53	12.2	14.95	32.19	125.11
128	2022-05-08	3.81	3.99	0.78	0.33	4.13	7.43	21.52	80.53
129	2022-05-09	7.4	4.61	0.85	0.23	9.78	7.08	13.32	84.02
130	2022-05-10	11.81	4.57	0.85	0.31	20.99	24.01	5.27	28.39
131	2022-05-11	12.15	2.23	0.77	0.04	9.03	3.06	11.01	29.01
132	2022-05-12	14.17	4.5	0.8	0.26	9.51	4.96	12.02	32.16
133	2022-05-13	15.23	3.79	1.18	0.31	11.39	4.01	16.55	59.92
134	2022-05-14	16.16	2.68	1.43	0.31	14.72	5.13	17.1	63.27
135	2022-05-15	17.26	2.49	1.82	0.49	17.29	11.8	24.61	83.66
136	2022-05-16	17.8	4.32	2	0.34	17.2	11.73	14.03	61.8
137	2022-05-17	17.2	3.15	1.34	0.37	19.51	13.94	12.9	60.11
138	2022-05-18	16.45	3.47	1.63	0.44	23.7	9.05	13.22	65.29
139	2022-05-19	16.63	3.73	1.67	0.64	23.02	18.16	16.65	74.16
140	2022-05-20	16.47	11.71	1.45	0.61	28.79	33.94	24.84	96.67
141	2022-05-21	14.92	10.56	1.06	0.78	29.9	27.2	28.36	110.84
142	2022-05-22	12.27	13	1.28	0.4	22.33	18.69	30.04	110.77
143	2022-05-23	13.49	11.95	0.97	0.83	30.61	21.96	46.68	161.3
144	2022-05-24	11.47	11.04	1.18	0.36	16.14	8.17	21	85.5
145	2022-05-25	12.71	7.15	1.1	0.59	25.45	16.77	19.28	83.05
146	2022-05-26	15.14	4.15	1.25	0.53	33.35	26.62	29.23	100.1
147	2022-05-27	20.2	7.63	1.19	0.68	28.33	26.37	31.06	105.46
148	2022-05-28	15.68	7.37	1.71	0.97	31.81	35.98	50.89	171.43
149	2022-05-29	13.92	8.08	1.62	0.74	23.22	24.64	32.53	115.45
150	2022-05-30	15.05	9.95	1.64	1.2	29.14	27.74	44.72	146.43
151	2022-05-31	14.57	7.72	1.78	1.31	26.09	27.31	43.05	146.8
152	2022-06-01	14.63	8.03	1.87	0.97	24.36	28.93	41.74	151.39
153	2022-06-02	15.19	5.13	2.13	1.37	28.48	18.25	37.52	133.39
154	2022-06-03	14.07	7.83	2.11	0.96	21.77	14.23	33.56	123.29
155	2022-06-04	12.83	12.62	2.4	0.39	17.66	11.82	26.31	90.69
156	2022-06-05	12.2	6.49	2.25	0.64	14.7	4.59	21.95	83.02
157	2022-06-06	12.02	7.11	2.21	0.52	19.45	12.25	20.08	62.68
158	2022-06-07	13.68	8.12	2.61	0.86	32.23	19.13	29.35	89.66
159	2022-06-08	12.61	6.91	3.25	0.85	22.46	20.41	31.49	110.79
160	2022-06-09	12.71	7.15	3.24	1.28	19.46	19.58	30.9	111.17
161	2022-06-10	12.56	4.92	3.35	0.43	21.61	20.25	22.87	86.13
162	2022-06-11	12.35	5.38	3.47	0.45	19.3	12.85	21.75	86.16
163	2022-06-12	13.58	5.29	3.37	0.35	25.01	19.83	19.69	76.17
164	2022-06-13	14.7	6.93	3.73	0.61	27.44	18.17	20.13	81.6
165	2022-06-14	13.73	8.53	3.38	0.58	23.58	19.55	31.58	125.31
166	2022-06-15	11.75	9.76	2.75	0.53	18.02	7.48	19.67	84.42
167	2022-06-16	12.44	5.98	2.63	0.38	25.25	8.87	12.11	51.27
168	2022-06-17	11.43	3.65	2.5	0.48	19.57	15.03	10.56	45.93
169	2022-06-18	13.96	2.71	2.64	0.34	28.52	20.62	12.73	53.9
170	2022-06-19	12.79	3.09	2.3	0.48	21.49	23.33	14.3	58.31
171	2022-06-20	13.58	3.56	2.62	0.59	24.73	21.7	19.4	72.69
172	2022-06-21	13.24	4.1	2.79	0.68	24.1	21.16	16.94	60.52
173	2022-06-22	13.55	4.01	3.11	0.72	24.72	21.2	18.58	66.72
174	2022-06-23	14.55	3.77	3.23	0.54	29.25	24.43	16.4	63.83
175	2022-06-24	13.42	3.21	3.3	0.91	28.37	28.54	22.43	74.44

176	2022-06-25	16.22	2.68	1.54	1.02	42.54	31.44	22.93	74.55
177	2022-06-26	12.34	3.92	0.08	0.78	22.69	15.53	15.77	56.11
178	2022-06-27	13.18	2.68	0.18	0.76	26.25	16.71	19.31	78.33
179	2022-06-28	13.96	3.14	0.09	0.62	29.74	36.21	26.65	85.6
180	2022-06-29	14.4	2.91	0.1	0.69	30.08	38.77	29.63	102.79
181	2022-06-30	12.81	3.39	0.03	0.71	23.17	36.26	26.81	91.11
182	2022-07-01	11.82	3.76	0.29	0.44	19.74	21.6	15.14	59.95
183	2022-07-02	11.34	3.04	0.29	0.41	17.93	12.42	21.67	81.27
184	2022-07-03	12.34	2.49	0	0.63	22.59	14.19	24.84	91.08
185	2022-07-04	16.11	2.64	0	0.35	41.2	73.56	26.23	81.77
186	2022-07-05	14.89	2.81	0.09	0.52	36.82	75.48	29.48	87.96
187	2022-07-06	13.73	3.18	0.16	0.42	33.12	66.17	21.23	64.77
188	2022-07-07	13.62	2.68	0.03	0.6	30.86	67.39	34.26	91.84
189	2022-07-08	12.58	3.64	0.04	0.46	27.1	36.2	16.69	57
190	2022-07-09	15.58	3.11	0.03	0.35	42.47	39.15	16.13	55.39
191	2022-07-10	15.18	2.56	0.04	0.45	41.02	37.88	12.11	43.79
192	2022-07-11	15.77	4.15	0.01	0.33	45	59.07	15.35	51.01
193	2022-07-12	12.98	4.02	0	0.49	32.16	61.69	12.95	44.66
194	2022-07-13	11.71	4.03	0	0.47	26.49	51.13	15.18	52.12
195	2022-07-14	13.06	18.69	0.03	0.38	34.79	64.6	14.86	51.18
196	2022-07-15	16.07	31.39	0	0.39	41.17	55.66	24.01	78.18
197	2022-07-16	13.11	29.58	0	0.6	30.41	50.68	29.47	91.65
198	2022-07-17	10.35	22.6	0	0.59	20.62	40.92	22.27	55.93
199	2022-07-18	10.57	22.48	0	0.73	20.53	33.88	13.76	47.84
200	2022-07-19	11.58	23.52	0.01	0.9	24.19	52.77	29.86	108.62
201	2022-07-20	11.34	24.45	0.05	0.88	17.53	35.61	25	98.19
202	2022-07-21	10.49	18.08	0.06	0.58	29.28	43.23	26.03	90.47
203	2022-07-22	9.45	6.86	0.02	0.43	36.53	36.43	18.54	74.98
204	2022-07-23	9.55	5.03	0.03	0.42	42.51	25.36	14.66	68.33
205	2022-07-24	9.36	14.16	0.02	0.42	26.38	30.05	13.06	48.49
206	2022-07-25	6.73	26.08	0.02	0.4	16.05	13.15	15.64	68.66
207	2022-07-26	18.31	4.33	0.02	0.44	24.22	9.29	14.87	65.69
208	2022-07-27	14.91	5.11	0.04	0.22	15.08	7.32	10.9	47.26
209	2022-07-28	8.19	4.5	0	0.28	9.91	8.27	13.36	63.62
210	2022-07-29	6.25	4.49	0	0.34	8.12	9.35	18.16	77.21
211	2022-07-30	5.82	4.39	0.04	0.5	7.73	11.06	21.12	95.12
212	2022-07-31	5.1	4.6	1.39	0.28	4.4	20.47	8.31	38.92
213	2022-08-01	5.53	4.34	2.17	0.24	7.78	16.08	13.67	65.86
214	2022-08-02	5.7	4.8	0.01	0.16	6.18	11.49	14.25	62.57
215	2022-08-03	5.49	4.6	0.01	0.25	5.51	17.15	12.74	53.84
216	2022-08-04	4.78	4.29	0.01	0.17	5.07	6.8	8.55	42.17
217	2022-08-05	5.15	4.82	0.01	0.33	5.48	20.95	13.01	62.54
218	2022-08-06	5.32	5.14	0.01	0.27	7.26	18.53	12.79	65.15
219	2022-08-07	4.87	5.05	0	0.21	6.42	33.73	8.55	36.82
220	2022-08-08	4.53	5.65	0	0.17	7.5	29.32	9.09	36.85
221	2022-08-09	4.63	5.84	0	0.11	7.9	30.42	10.35	36.81
222	2022-08-10	5.58	6.65	0	0.3	7.01	35.33	13.02	43.3
223	2022-08-11	4.84	6.13	0.02	0.08	8.38	32.84	13.3	52.47
224	2022-08-12	8.88	11.41	0.01	0.13	10.92	40.02	14.86	60.6
225	2022-08-13	13.92	7.63	0.01	0.27	16.14	45.51	16.99	62.13
226	2022-08-14	10.51	3.38	0	0.22	11.8	37.09	10.08	39.08
227	2022-08-15	8.64	3.38	0	0.37	8.93	16.05	8.34	36.27
228	2022-08-16	9.64	8.15	0.13	0.43	10.41	33.92	11.28	57.04
229	2022-08-17	8.38	5.66	0	0.49	11.56	32.19	22.49	77.01
230	2022-08-18	8.73	7.05	0	0.3	12.14	29.33	25.49	89.8
231	2022-08-19	10.21	6.91	0	0.41	11.54	21.81	18.72	67.18
232	2022-08-20	8.95	8.89	0	0.37	11.42	33.72	22.4	68.24
233	2022-08-21	7.99	8.89	0	0.68	10.2	22.99	17.07	66.64
234	2022-08-22	8.35	8.89	0	0.69	11.12	16.37	19.42	79.31
235	2022-08-23	10.29	11.82	0	0.42	12.83	33.46	20.77	75.16
236	2022-08-24	10.95	3.23	0.25	0.27	9.7	9.03	10.68	47.7

237	2022-08-25	9.82	7.4	0.2	0.28	8.48	11.36	17.83	74.98
238	2022-08-26	9.04	5.52	0.23	0.41	9.76	10.58	21.85	74.2
239	2022-08-27	9.61	3.61	0.19	0.47	9.83	7.46	24.28	87.15
240	2022-08-28	9.85	4.65	0.14	0.32	7.45	4.98	18.58	72.65
241	2022-08-29	7.5	4.55	0.07	0.4	6.67	3.5	14.9	53.26
242	2022-08-30	7.31	2.64	0.06	0.26	6.08	4.13	9.27	34.44
243	2022-08-31	8.57	2.35	0.11	0.28	6.31	10.77	11.15	48.11
244	2022-09-01	8.01	2.42	0.18	0.22	5.06	14.45	5.81	31.76
245	2022-09-02	7.49	19.28	0.05	0.24	4.93	14.04	3.65	26.94
246	2022-09-03	10.06	0.51	0.29	0.33	8.11	8.86	14.94	70.35
247	2022-09-04	9.14	3.26	0.67	0.43	9.82	15.47	16.49	70.82
248	2022-09-05	9.36	0.56	0.41	0.54	10.1	11.18	14.29	64.12
249	2022-09-06	8.65	1.01	0.7	0.19	9.82	19.94	14.61	68.53
250	2022-09-07	7.74	5.65	1.22	0.32	8.18	9.9	14.76	58.23
251	2022-09-08	7.94	1.86	0.43	0.27	6.72	3.47	4.16	20.36
252	2022-09-09	7.46	7.4	0.47	0.3	5.57	0.95	1.69	20.01
253	2022-09-10	10.15	0.15	1.93	0.34	7.3	33.68	7.73	29.75
254	2022-09-11	12.07	6.12	0.15	0.23	11.81	92.94	13.05	45.25
255	2022-09-12	14.55	7.4	0.13	0.31	13.31	88.22	16.71	63.59
256	2022-09-13	19.37	11.32	0.16	0.37	15.5	17.43	18.08	56.29
257	2022-09-14	16.64	12.99	0.63	0.51	13.95	26.91	16	64.27
258	2022-09-15	15.06	10.17	0.13	0.33	16.83	38.2	20.93	74.26
259	2022-09-16	16.69	6.31	0.14	0.62	18.23	28.57	22.58	88.3
260	2022-09-17	16.06	6.66	0.11	0.53	18.58	25.18	18.41	74.45
261	2022-09-18	11.72	7.81	0.46	0.32	13.25	23.81	17.62	62.45
262	2022-09-19	10.77	7.75	0.16	0.46	11.23	16.59	12.8	39.86
263	2022-09-20	16.16	9.07	0.21	0.5	15.64	36.93	19.56	60.93
264	2022-09-21	11.35	7.18	0.14	0.42	16.55	39.16	24.29	87.28
265	2022-09-22	10.18	7.23	0.1	0.47	16.13	79.77	24.63	83.93
266	2022-09-23	8	7.87	0.15	0.39	10.86	23.5	17.48	68.74
267	2022-09-24	7.47	9.83	0.14	0.36	11.12	25.32	16.68	70.54
268	2022-09-25	6.92	9.4	0.12	0.34	7.86	29.91	17.1	63.81
269	2022-09-26	6.85	8.2	0.11	0.29	7.18	18.59	14.94	56.74
270	2022-09-27	6.88	9.25	0.08	0.31	7.62	21.1	14.31	56.32
271	2022-09-28	6.95	8.57	0.08	0.38	7.27	16.98	15.21	71.42
272	2022-09-29	6.56	9.21	0.07	0.28	7.24	16.6	12.4	49.87
273	2022-09-30	9.49	6.6	0.09	0.36	8.31	12.73	7.39	42.48
274	2022-10-01	9.24	7.23	0.14	0.17	8.35	17.78	8.69	40.13
275	2022-10-02	4.58	9.87	0.14	0.3	5.19	23.25	19	61.16
276	2022-10-03	6.15	7.45	0.15	0.61	7.29	21.04	23.48	74.46
277	2022-10-04	8.56	7.02	0.16	0.4	8.45	10.58	13.99	47.69
278	2022-10-05	7.74	8.6	0.06	0.23	7.53	10.34	5.31	19.01
279	2022-10-06	5.65	8.18	0.08	0.26	5.7	8.21	6.37	30.73
280	2022-10-07	5.72	7.28	0.06	0.25	5.63	9.19	2.47	15.38
281	2022-10-08	6.46	10.03	0.14	0.3	7.1	28.24	4.86	19.28
282	2022-10-09	6.91	6.82	0.04	0.07	8.2	8.95	1.04	10.76
283	2022-10-10	7.44	6.96	0.2	0.44	8.93	10.57	6.66	23.48
284	2022-10-11	10.7	18.75	0.13	0.34	11.36	9.75	6.64	28.3
285	2022-10-12	9.41	16.77	0.13	0.3	9.78	9.52	10.07	41.71
286	2022-10-13	7.23	10	0.13	0.22	8.57	13.4	16.78	59.94
287	2022-10-14	7.05	10.14	0.08	0.29	8.32	11.05	5.7	26.31
288	2022-10-15	7.81	12.29	0.09	0.33	8.62	20.52	3.86	15.09
289	2022-10-16	8.23	11.93	0.06	0.23	8.33	8.96	2.51	14.93
290	2022-10-17	8.38	11.7	0.1	0.36	8.82	5.63	11.87	43.95
291	2022-10-18	7.16	13.08	0.14	0.43	8.42	8.94	22.93	71.19
292	2022-10-19	7.02	14.16	0.11	0.35	8.42	11.02	23.55	80.72
293	2022-10-20	8.17	12.84	0.08	0.45	9.78	20.41	23.99	81.54
294	2022-10-21	9.96	36.62	0.08	0.43	12.85	18.5	24.84	89.63
295	2022-10-22	10.06	41.52	0.11	0.41	13.15	14.49	27.61	104.52
296	2022-10-23	10.13	45.6	0.26	0.4	12.55	17.01	22.49	81
297	2022-10-24	10.38	54.78	0.34	0.49	13.44	29.4	49.39	113.62

298	2022-10-25	10.4	61.1	0.17	0.42	13.04	17.41	43.36	133.62
299	2022-10-26	10.59	47.37	0.16	0.55	14.11	13.44	31.08	102.26
300	2022-10-27	10.48	12.56	0.13	0.46	13.5	12.29	26.7	91.41
301	2022-10-28	10.2	11.32	0.1	0.52	12.64	13.02	28.51	93.64
302	2022-10-29	10.87	32.56	0.14	0.49	13.31	7.91	30.92	106.95
303	2022-10-30	13.52	57.09	0.13	0.48	14.57	7.8	31.74	104.06
304	2022-10-31	17.04	74.23	0.13	0.75	14.97	8.91	31.82	111
305	2022-11-01	17.42	86.33	0.13	0.72	14.2	11.27	23	94.61
306	2022-11-02	16.26	108.16	0.13	0.66	13.35	7.19	25.07	90.8
307	2022-11-03	19.22	58.93	0.1	0.56	19.94	10.72	20.06	74.95
308	2022-11-04	13.24	17.08	0.1	0.66	11.48	9.48	26.32	84.4
309	2022-11-05	14.28	13.6	0.12	0.46	12.55	10.03	32.26	115.17
310	2022-11-06	13.88	11.94	0.14	0.65	12.13	9.97	39.14	126.31
311	2022-11-07	13.26	13.33	0.18	0.6	12.47	7.22	41.16	132.91
312	2022-11-08	12.67	6.19	0.12	0.59	12.67	11.68	39.44	137.43
313	2022-11-09	11.18	7.62	0.09	0.55	9.46	38.89	29.71	111.49
314	2022-11-10	9.83	9.02	0.12	0.52	10.88	32	33.17	129.58
315	2022-11-11	10.84	8.62	0.06	0.51	12.5	8.11	24.64	108.41
316	2022-11-12	12.67	11.38	0.07	0.44	11.54	12.68	26.45	91.27
317	2022-11-13	12.98	9.66	0.1	0.5	13.34	9.58	30.46	101.77
318	2022-11-14	12.67	9.53	0.12	0.6	14.07	8.23	34.26	113.39
319	2022-11-15	12.43	7.23	0.19	0.64	14.96	12.45	40.78	135.43
320	2022-11-16	12.21	7.67	0.28	0.65	15.85	15.25	48.59	165.99
321	2022-11-17	11.45	12.57	0.28	0.68	15.11	12.82	44.84	138.01
322	2022-11-18	10.89	9.72	0.21	0.58	13.62	8.76	35.17	136.25
323	2022-11-19	10.78	12.63	0.1	0.49	14.12	12.59	29.78	118.5
324	2022-11-20	10.15	9.62	0.06	0.46	12.3	14.74	24.24	89.1
325	2022-11-21	10.9	7.52	0.08	0.53	15.56	6.56	22.95	84.54
326	2022-11-22	11.23	9.22	0.09	0.58	15.6	13.58	24.7	84.09
327	2022-11-23	10.91	7.48	0.11	0.54	12.47	10.01	21.21	77.54
328	2022-11-24	11.1	12.44	0.12	0.51	12.21	13.33	13.58	60.92
329	2022-11-25	11.23	8	0.19	0.77	13.56	11.01	31.02	93.02
330	2022-11-26	11.35	12.52	0.25	0.68	15.05	9.11	44.73	144.96
331	2022-11-27	10.44	13.25	0.21	0.64	12.73	12.66	43.07	143.12
332	2022-11-28	11.6	9.54	0.27	0.63	15.73	28.4	46.87	157.71
333	2022-11-29	11.99	12.02	0.29	0.73	15.32	23.49	44.26	159.31
334	2022-11-30	11.94	11.72	0.17	0.71	14.69	12.44	39.59	136.89
335	2022-12-01	11.69	11.75	0.15	0.61	13.38	10.87	28.3	105.11
336	2022-12-02	11.33	13.63	0.14	0.48	12.2	13.69	27.98	101.47
337	2022-12-03	11.43	14.33	0.17	0.6	13.1	10.5	35.93	127.4
338	2022-12-04	10.82	16.36	0.17	0.68	11.31	10.01	47.24	143.86
339	2022-12-05	10.71	15.3	0.17	0.74	12.66	10.17	56.47	181.83
340	2022-12-06	10.84	14.34	0.24	0.85	18.84	28.07	59.88	188.3
341	2022-12-07	11.91	11.27	0.13	0.71	18.56	18.12	48.31	169.62
342	2022-12-08	12.1	15.21	0.09	0.67	18.83	14.98	39.7	148.22
343	2022-12-09	13.21	10.92	0.12	0.74	21.22	12.5	34.95	126.43
344	2022-12-10	12.89	8.25	0.12	0.69	13.57	16.17	26.45	84.1
345	2022-12-11	12.76	7.63	0.12	0.68	12.73	14.75	25.09	84.84
346	2022-12-12	17.47	10.16	0.18	0.71	13.29	14.22	20.83	70.59
347	2022-12-13	176.54	6.6	0.18	0.56	14.41	11.45	22.58	87.25
348	2022-12-14	25.39	2.72	0.26	0.7	16.84	16.94	36.24	127.69
349	2022-12-15	27.48	1.96	0.29	0.76	19.13	12.34	45.75	178.23
350	2022-12-16	21.02	6.75	0.21	0.7	17.56	16.32	45.1	163.5
351	2022-12-17	17.75	10.12	0.16	0.65	16.6	11.08	37.79	136.2
352	2022-12-18	15.66	15.39	0.11	0.59	15.3	8.29	38.14	145.09
353	2022-12-19	14.39	12.02	0.16	0.63	17.89	11.11	43.65	157.51
354	2022-12-20	13.7	12.67	0.22	0.64	17.31	11.41	47.58	164.85
355	2022-12-21	16.45	12.4	0.34	0.82	17.91	17.08	54.81	179.23
356	2022-12-22	20.68	15.05	0.2	0.85	18.96	24.8	50.81	174.61
357	2022-12-23	20	18.14	0.38	0.76	20.4	12.9	59.06	195.16
358	2022-12-24	19.45	11.52	0.65	0.67	20.16	13.34	41.9	145.54

359	2022-12-25	18.16	10.85	0.65	0.44	15.74	13.87	18.07	77.13
360	2022-12-26	18.02	9.35	0.65	0.39	16.91	10.91	23.73	80.72
361	2022-12-27	18.19	8.79	0.3	0.54	15.97	9.17	15.74	71.16
362	2022-12-28	18.27	8.14	0.31	0.65	21.2	15.46	26.68	115.98
363	2022-12-29	15.33	9.07	0.11	0.4	16.43	17.65	19.85	66.95
364	2022-12-30	11.9	13.21	0.16	0.6	14.12	14.35	39.49	125.71
365	2022-12-31	11.22	11.72	0.14	0.52	14.66	12.56	37.83	133.65
366	Annual average	14.53	14.64	0.54	0.53	23.29	26.83	25.2	91.11
367	24 hour average Standard	400	100 (8 hour average)		2 (8 hour average)	80	80	60	100
368	Annual average Standard	100		5		40	50	40	60
369	Maximum Value	184.59	108.16	3.73	1.37	247.93	173.1	64.71	195.16
370	Maximum Value At Time	2022-03-17	2022-11-02	2022-06-13	2022-06-02	2022-03-17	2022-03-28	2022-01-21	2022-12-23
371	Minimum Value	0.02	0.15	0	0.04	0.01	0.69	1.04	10.76
372	Minimum Value At Time	2022-03-06	2022-09-10	2022-02-24	2022-05-11	2022-03-23	2022-02-23	2022-10-09	2022-10-09
373	Valid Data Points	365	365	365	365	365	365	365	365
374	Total Data Points	365	365	365	365	365	365	365	365
375	Data Availability %	100	100	100	100	100	100	100	100
Remarks: The value of PM10 is exceeding the annual average standard limit.									

Hindustan Petroleum Corporation Limited, Visakhapatnam

Ambient air quality monitoring

01.01.2023 to 30.12.2023

Obtained from realtime ambient air quality monitoring stations

S. No.	Date	CAAQMS - 1 - South gate							
		NO2 (ug/m3)	SO2 (ug/m3)	CO (mg/m3)	PM10 (ug/m3)	PM2.5 (ug/m3)	Benzene (ug/m3)	O3 (ug/m3)	NH3 (ug/m3)
1	2023-01-01	7.08	25.31	0.43	101.28	42.96	0.05	7.63	19.82
2	2023-01-02	15.47	43.08	0.51	102.33	35.6	0.07	6.39	19.02
3	2023-01-03	15.37	30.71	0.48	119.35	45.35	0.09	8.36	17.93
4	2023-01-04	11.2	21.33	0.44	133.82	64.31	0.11	10.66	21.09
5	2023-01-05	16.27	32.37	0.58	190.67	91.71	0.41	18.7	30.03
6	2023-01-06	21.95	22.78	0.82	236.48	105.72	0.24	10.48	22.93
7	2023-01-07	26.73	26.54	0.77	221.72	98.18	0.22	10.21	22.95
8	2023-01-08	27.03	20.9	0.52	140.33	54.77	0.16	10.14	20.92
9	2023-01-09	30.33	54.71	0.58	137.85	51.26	0.14	9.38	20.89
10	2023-01-10	32.21	58.3	0.73	169.32	59.25	0.12	12.98	21.85
11	2023-01-11	31.01	71.13	0.87	170.23	70.92	0.14	9.41	23.31
12	2023-01-12	25.62	55.59	0.74	176.03	68.69	0.19	8.89	17.89
13	2023-01-13	24.11	59.08	0.64	136.86	53.44	0.2	9.18	14.85
14	2023-01-14	29.06	60.22	0.91	183.15	140.76	0.22	7.77	17.21
15	2023-01-15	19.34	53.2	0.58	107.69	81.75	0.18	9.25	14.64
16	2023-01-16	16.04	45.56	0.41	100.75	37.23	0.12	9.27	12.77
17	2023-01-17	18.32	41.76	0.49	136.24	52.79	0.1	9.72	12.57
18	2023-01-18	18.61	41.29	0.43	130.54	54.4	0.07	59.57	12.43
19	2023-01-19	21.67	38.29	0.49	141.48	57.95	0.06	86.62	12.2
20	2023-01-20	22.75	39.44	0.54	158.06	64.39	0.09	28.41	20.55
21	2023-01-21	18.67	45.85	0.58	172.67	78.62	0.08	31.49	27.74
22	2023-01-22	19.41	51.11	0.63	194.82	91.69	0.08	44.84	21.78
23	2023-01-23	20.66	52.31	0.55	158.46	71.26	0.07	28.58	22.09
24	2023-01-24	27.6	58.5	0.61	176.45	73.07	0.15	14.02	23.15
25	2023-01-25	34.41	50.83	0.77	207.78	89.31	0.27	18.32	20.72
26	2023-01-26	25.28	49.37	0.61	174.09	79.63	0.11	18.29	18.16
27	2023-01-27	37.01	47.18	0.7	176.9	70.26	0.09	12.86	18
28	2023-01-28	28.66	37.15	0.61	174.14	74.76	0.07	21.78	17.23
29	2023-01-29	20.5	23.57	0.49	186.46	78.57	0.04	29.61	16.93
30	2023-01-30	18.21	19.87	0.42	153.46	59.33	0.02	25.89	16.61
31	2023-01-31	19.44	24.83	0.5	164.17	65.79	0.05	30.15	15.92
32	2023-02-01	22.44	22.77	0.5	163.12	60.48	0.09	31.13	17.08
33	2023-02-02	22.16	22.46	0.55	174.68	63.43	0.09	26.93	16.32
34	2023-02-03	22.09	22.1	0.54	159.48	60.52	0.1	28.72	15.39
35	2023-02-04	22.57	25.71	0.52	151.13	57.92	0.1	20.07	15.23
36	2023-02-05	22.2	24.77	0.53	152.31	63.42	0.11	24.89	14.67
37	2023-02-06	46.25	39.1	0.71	173.35	73.99	0.47	12.3	23.49
38	2023-02-07	27.06	18.82	0.58	151.93	50.22	0.25	13.86	28.93
39	2023-02-08	25.29	15.93	0.46	128.26	46.6	0.15	12.62	11.73
40	2023-02-09	25.33	12.21	0.42	128.3	69.03	0.11	11.78	13.99
41	2023-02-10	25.39	8.49	0.32	147.92	68.57	0.09	12.16	9.73
42	2023-02-11	26.83	5.94	0.47	123.07	54.96	0.16	13.04	9.84
43	2023-02-12	21.11	2.38	0.64	154.96	71.84	0.23	11.75	9.05
44	2023-02-13	21	10	0.51	159.19	59.76	0.07	21.52	6.11
45	2023-02-14	22.67	15.19	0.78	228.97	171.4	0.11	22.41	7.36
46	2023-02-15	21.74	15.61	0.89	204.81	461.48	0.24	22.13	8.59
47	2023-02-16	18.42	11.58	0.75	189.34	261.09	0.11	15.96	7.81
48	2023-02-17	15.05	15.5	0.75	145.94	45.87	0.12	14.35	7.39
49	2023-02-18	11.34	20.63	0.59	111.67	10.1	0.05	14.95	6.42
50	2023-02-19	10.99	21.64	0.59	91.21	9.11	0.12	10.37	6.21
51	2023-02-20	14.56	19.8	0.7	104.16	NA	0.07	10.91	6.63
52	2023-02-21	11.24	15.82	0.53	93.33	NA	0.06	15.69	5.52
53	2023-02-22	12.25	14.02	0.68	131.68	NA	0.11	15.89	5.82

54	2023-02-23	13.16	11.29	0.73	150.63	51.15	0.15	13.67	5.54
55	2023-02-24	12.71	10.59	0.74	134.35	42.21	0.12	10.68	6.82
56	2023-02-25	17	4.84	0.75	157.23	38.32	0.13	12.32	10.09
57	2023-02-26	16.45	2.82	0.79	125.13	39.09	0.15	13.65	9.57
58	2023-02-27	16.29	10.86	0.7	112.97	35.95	0.05	17.68	11.91
59	2023-02-28	24.3	17.3	0.97	153.41	45.15	0.12	13.97	14.33
60	2023-03-01	28.02	13.08	1.06	182.83	57.33	0.3	21.56	15.11
61	2023-03-02	20.96	8.61	0.88	151.39	49.45	0.12	21.25	13.27
62	2023-03-03	23.76	6.74	0.93	169.64	56.32	0.15	22.8	13.35
63	2023-03-04	20.19	4.7	0.86	161.45	49.97	0.14	19.18	11.78
64	2023-03-05	22.27	4.18	0.89	157.67	43.36	0.2	13.82	11.12
65	2023-03-06	42.46	13.45	1.37	235.58	55.3	0.77	19.23	26.21
66	2023-03-07	37.89	18.5	0.97	185.65	51.45	0.25	16.12	15.99
67	2023-03-08	32.41	25.7	0.78	132.44	37.61	0.16	18.87	13.12
68	2023-03-09	30.07	26.52	0.74	135.03	41.57	0.14	18.17	12.55
69	2023-03-10	29.88	26.67	0.67	126.88	36.43	0.08	21.33	11.68
70	2023-03-11	28.85	24.87	0.68	129.38	41.96	0.1	25.48	11.15
71	2023-03-12	28.7	25.46	0.73	121.82	44.69	0.12	21.93	10.88
72	2023-03-13	33.08	27.52	0.84	155.63	53.35	0.24	20.43	11.45
73	2023-03-14	29.62	28.22	1.22	192.8	65.46	0.36	19.8	11.33
74	2023-03-15	27.6	27.45	0.88	142.75	51.26	0.24	16.62	11.47
75	2023-03-16	25.9	28.57	0.69	104.34	27.75	0.12	8.36	10.34
76	2023-03-17	30.86	29.66	0.76	96.52	26.15	0.1	6.75	11.2
77	2023-03-18	29.87	28.87	0.75	91.28	25.43	0.09	8.93	11.25
78	2023-03-19	25.4	27.86	0.54	38.26	4.51	0	11.02	10.57
79	2023-03-20	26.09	28.24	0.58	51.94	6.57	0.03	10.31	11.16
80	2023-03-21	29.17	26.55	0.6	58.46	9.8	0.08	7.16	11.61
81	2023-03-22	26.66	25.42	0.59	64.67	11.21	0.06	7.01	10.34
82	2023-03-23	26.5	26.22	0.6	73.13	12.51	0.06	6.83	10.63
83	2023-03-24	29.9	24.94	0.6	77.97	9.89	0.17	5.32	11.32
84	2023-03-25	28.51	23.11	0.55	83.52	15.05	0.08	6	13.18
85	2023-03-26	31.14	23.48	0.84	101.64	17.03	0.18	5.39	15.62
86	2023-03-27	25.06	22.25	0.47	86.21	20.68	0.08	6.85	15.52
87	2023-03-28	26.32	21.43	0.58	102.3	19.82	0.12	6.41	16.88
88	2023-03-29	24.21	42.78	0.5	86.06	15.07	0.04	6.46	16
89	2023-03-30	26.19	41.94	0.55	95.85	18.55	0.12	5.97	16.81
90	2023-03-31	23.01	16.87	0.37	64.6	7.65	0.05	7.18	13.5
91	2023-04-01	23.76	19.49	0.43	66.59	6.07	0.12	6.38	10.14
92	2023-04-02	23.25	22.96	0.42	60.28	6.35	0.02	7.48	9.92
93	2023-04-03	24.28	22.73	0.52	71.66	8.13	0.06	7.23	9.66
94	2023-04-04	24.21	16.21	0.66	85.98	13.12	0.08	7.08	9.33
95	2023-04-05	24.89	13.02	0.57	85.96	12.92	0.12	6.77	9.05
96	2023-04-06	31.93	20.8	0.74	86.13	15.22	0.47	7.98	20.02
97	2023-04-07	12.63	19.5	0.58	89.08	16.73	0.05	10.1	9.27
98	2023-04-08	13.43	18.33	0.73	104.01	22.69	0.1	11.3	10.19
99	2023-04-09	13.15	16.14	1.03	133.26	27.99	0.17	13.46	11.66
100	2023-04-10	13.52	14.77	1.27	165.23	33.39	0.15	16.5	12.23
101	2023-04-11	16.29	16.05	1.06	212.53	44.74	0.17	16.12	13.39
102	2023-04-12	14.77	14.33	1.03	180.85	41.14	0.11	17.94	12.44
103	2023-04-13	16.04	11.49	1.13	226.99	51.87	0.22	13.79	11.43
104	2023-04-14	13.17	8.69	0.99	190.55	43.2	0.18	15.18	9.84
105	2023-04-15	14.06	8.34	1.26	230.47	57.63	0.19	19.76	10.15
106	2023-04-16	13.35	8.21	1.46	183.41	57.92	0.13	23.26	9.96
107	2023-04-17	12.86	5.54	1.03	183.17	50.01	0.12	17.31	9.72
108	2023-04-18	12.01	6.48	1.13	157	52.29	0.11	16.84	8.67
109	2023-04-19	13.64	11.97	1.33	43.38	51.46	0.1	13.44	9.5
110	2023-04-20	11.08	13.1	0.91	29.95	46.09	0.03	14.43	8.18
111	2023-04-21	10.26	11.05	0.73	111.42	42.42	0.04	18.38	7.47
112	2023-04-22	11.85	9.8	0.52	156.87	36.62	0.05	11.4	7.21
113	2023-04-23	11.3	7.62	0.42	74.91	14.9	0.03	19.14	5.98

114	2023-04-24	9.38	7.28	0.32	79.5	18.68	0.09	12.14	5.84
115	2023-04-25	9.22	9.11	0.1	70.52	12.86	0.01	7.62	6.08
116	2023-04-26	8.72	9.04	0.38	103.85	22.36	0.04	10.79	6.16
117	2023-04-27	8.96	9.49	0.51	120.27	31.47	0.04	8.81	6.81
118	2023-04-28	8.16	8.73	0.53	124.48	34.24	0.05	7.5	6.28
119	2023-04-29	8.88	8.94	0.58	117.95	24.45	0.05	6.68	6.58
120	2023-04-30	8.37	8.12	0.54	90.38	16.69	0.05	7.48	5.76
121	2023-05-01	9.24	8.26	0.46	63.4	12.54	0.03	7.1	6.1
122	2023-05-02	7.96	7.05	0.41	64.47	10.48	0.02	8.64	5.82
123	2023-05-03	11.89	6.49	0.58	55.27	9.19	0.03	5.32	5.85
124	2023-05-04	9.46	6.17	0.44	50.91	5.83	0.01	7.13	5.55
125	2023-05-05	9.65	6.47	0.52	74.64	6.08	0.04	5.73	5.64
126	2023-05-06	8.29	5.93	0.44	72.73	5.58	0.02	8.01	5.83
127	2023-05-07	8.51	6.19	0.82	90.16	11.61	0.07	8.23	6.66
128	2023-05-08	19.46	15.08	0.69	111.32	21.43	0.23	9.94	10.67
129	2023-05-09	12.76	6.79	0.55	113.31	26.15	0.11	12.53	6.49
130	2023-05-10	12.8	6.37	0.59	88.87	23.28	0.01	11.94	6.27
131	2023-05-11	13.82	4.99	0.45	74.16	12.83	0.01	9.01	6.54
132	2023-05-12	14.81	3.97	0.46	78.03	13.64	0.01	8.94	6.78
133	2023-05-13	14.32	6.42	0.65	113.44	0.03	0.06	9.97	6.61
134	2023-05-14	13.85	12.78	1.08	152.82	1.22	0.17	14.14	7
135	2023-05-15	19.08	12.27	1.39	201.99	18.47	0.3	11.92	9.16
136	2023-05-16	19.41	11.18	0.93	115.78	25.86	0.15	19.59	9.82
137	2023-05-17	14.64	8.77	0.5	110.61	20.3	0.01	16.2	7.89
138	2023-05-18	16.46	8.67	0.61	131.88	29.02	0.06	10.48	7.41
139	2023-05-19	16.81	8.62	0.52	117.95	27.94	0.03	10.23	7.02
140	2023-05-20	20.54	9.45	0.8	166.03	37.55	0.1	8.38	6.99
141	2023-05-21	17.32	8.73	0.55	121.93	26.36	0.04	11.28	5.87
142	2023-05-22	17.32	8.32	0.56	121.78	30.55	0.06	11.4	6.09
143	2023-05-23	18.07	8.66	0.66	182.5	29.98	0.05	13.06	5.86
144	2023-05-24	17.33	8.03	0.63	129.25	35.39	0.05	12.53	5.72
145	2023-05-25	17.54	8.79	0.66	123.83	33.68	0.06	13.84	6.36
146	2023-05-26	17.66	9.51	0.65	104.88	27.19	0.06	13.47	5.54
147	2023-05-27	20.16	10.32	1.07	184.5	47.97	0.2	12.31	6.44
148	2023-05-28	17.96	9.88	0.65	134.6	41.84	0.06	13.28	5.14
149	2023-05-29	17.29	8.43	0.61	138.81	34.6	0.03	10.41	9.49
150	2023-05-30	19.88	8.15	0.48	136.71	29.94	0.06	9.68	11.22
151	2023-05-31	19.38	8.43	0.93	161.03	42.61	0.05	14.1	8.56
152	2023-06-01	18.87	8.19	0.9	150.79	46.82	0.06	14.08	8.59
153	2023-06-02	22.56	9.02	1.09	193.82	55.49	0.09	13.06	9.73
154	2023-06-03	21.94	9.11	0.74	164.71	43.3	0.08	12.99	9.15
155	2023-06-04	18.15	9.09	0.55	127.84	35.73	0.03	15.05	7.9
156	2023-06-05	18.9	8.71	0.66	136.44	36.84	0.06	16.85	7.36
157	2023-06-06	28.54	15.38	1.03	183.6	43.4	2.73	14.45	15
158	2023-06-07	30.28	8.9	1	252.26	47.83	1.96	11.67	7.31
159	2023-06-08	33.67	9.01	0.93	191.15	48.01	0.15	11.05	7.73
160	2023-06-09	21.92	7.46	0.91	181.24	36.32	0.1	16.32	6.97
161	2023-06-10	20.45	7.69	0.71	141.34	31.62	0.08	12.84	19.44
162	2023-06-11	21.1	8.06	1.02	169.24	39.1	0.08	13.49	9.63
163	2023-06-12	19.48	7.17	0.57	121.1	27.57	0.01	11.96	7.31
164	2023-06-13	19.45	7.33	0.68	142.6	36.78	0.03	15.09	42.21
165	2023-06-14	17.88	7.13	0.51	135.3	33.27	0.1	13.23	15.5
166	2023-06-15	22.47	8.02	0.84	188.84	38.57	0.15	10.54	8.81
167	2023-06-16	26.78	8.09	0.98	196.17	41.33	0.13	16.13	39.46
168	2023-06-17	22.12	7.15	0.69	141.88	32.57	0.02	12.95	30.75
169	2023-06-18	20.21	6.72	0.69	146.15	36.89	0.02	16.87	29.9
170	2023-06-19	24.5	6.81	0.77	108.44	28.3	0.01	10.32	29.04
171	2023-06-20	22.16	7.06	0.85	144.27	40.57	0.07	11.08	24.74
172	2023-06-21	19.66	6.46	0.6	110.93	24.8	0.06	6.94	30.24
173	2023-06-22	17.9	5.93	0.71	120.38	25.15	0.02	7.8	31.59

174	2023-06-23	18.84	5.88	0.76	112.29	28.11	0	7.79	34.74
175	2023-06-24	18.43	5.75	0.56	119.23	21.7	0	7	28.4
176	2023-06-25	16.14	5.75	0.41	71.18	17.25	0	9.44	26.66
177	2023-06-26	16.83	5.72	0.48	63.78	14.03	0	6.99	23.98
178	2023-06-27	18.1	6.39	1.04	134.86	23.17	0	8.37	26.75
179	2023-06-28	19.54	7.13	0.95	133.85	26.24	0	10.11	22.03
180	2023-06-29	21.03	7.52	1.01	127.69	21.76	0	9.42	18.87
181	2023-06-30	20.94	7.97	1.03	144.68	29.25	2.67	7.76	16.67
182	2023-07-01	19.51	7.92	0.96	135.31	27.15	2.34	7.36	17.46
183	2023-07-02	17.08	8	0.67	104.71	25.99	0	10.83	14.48
184	2023-07-03	18.64	8.42	0.84	123.69	29.38	0	11.26	12.48
185	2023-07-04	17.56	8.28	0.65	98.52	25.28	0	9.11	11.57
186	2023-07-05	19.94	8.4	0.78	84.24	22.13	2.58	5.24	10.48
187	2023-07-06	16.19	7.92	0.69	77.19	20.46	5	6.34	9.66
188	2023-07-07	19.78	12.61	0.53	92.99	18.53	NA	10.53	19.74
189	2023-07-08	19.34	7.32	0.66	125.24	25.97	NA	10.24	11.42
190	2023-07-09	20.13	7.66	0.62	111.79	28.73	NA	10.26	10.94
191	2023-07-10	21.22	7.77	0.62	120.39	27.66	NA	11.55	10.87
192	2023-07-11	19.79	7.39	0.47	102.06	25.83	0	15.97	10.45
193	2023-07-12	20.3	7.14	0.42	67.46	18.67	0	12.31	13.09
194	2023-07-13	19.07	7.34	0.41	80.96	19.36	0	8.68	9.47
195	2023-07-14	18.36	7.47	0.5	106.3	22.24	NA	10.13	8.5
196	2023-07-15	21.32	7.78	0.82	117.36	24.9	NA	9.66	9.81
197	2023-07-16	17.3	7.76	0.4	62.32	13.26	NA	9.24	8.38
198	2023-07-17	16.82	7.72	0.37	67.66	17.42	NA	8.55	6.74
199	2023-07-18	17.81	8.11	0.33	53.64	16	NA	8.02	7.27
200	2023-07-19	18.33	8.69	0.38	89.36	9.17	NA	8.51	8.99
201	2023-07-20	17.2	8.49	0.38	57.87	12.68	NA	8.45	7.95
202	2023-07-21	17.13	8.52	0.55	79.36	15.72	NA	8.91	10.03
203	2023-07-22	17.43	8.63	0.52	69.94	18.7	NA	8.57	9.69
204	2023-07-23	17.06	8.55	0.63	69.84	19.37	NA	9.07	8.96
205	2023-07-24	20.4	9.24	0.53	61.82	15.79	NA	7.97	9.27
206	2023-07-25	23.89	9.38	0.63	52.15	13.99	NA	8.1	12.03
207	2023-07-26	18.69	8.97	0.56	43.04	12.19	NA	7.92	11.6
208	2023-07-27	14.31	8.19	0.4	47.43	10.21	NA	10.08	11.85
209	2023-07-28	16.59	8.42	0.28	49.44	10.54	NA	9.5	9.04
210	2023-07-29	15.7	8.81	0.37	70.03	19.26	NA	9.4	6.82
211	2023-07-30	15.25	9.14	0.4	81.11	24.84	NA	9.08	5.97
212	2023-07-31	18.23	9.51	0.45	78.3	23.28	NA	8.16	6.01
213	2023-08-01	14.76	9.61	0.34	73	21.91	NA	8.89	4.64
214	2023-08-02	14.83	9.61	0.31	78.9	21.3	NA	9.43	6.48
215	2023-08-03	16.01	9.39	0.35	81.72	18.09	NA	9.39	7.74
216	2023-08-04	15.74	9.61	0.64	112.63	23.89	NA	10.21	8.82
217	2023-08-05	17.1	10.39	0.76	141.45	32.25	NA	10.61	10.05
218	2023-08-06	14.54	10.5	0.71	139.59	28.4	NA	12.26	8.07
219	2023-08-07	16.17	22.14	0.49	200.52	23.95	NA	11.35	9.44
220	2023-08-08	16.85	10.81	0.76	187.18	40.23	0	8.84	10.76
221	2023-08-09	18.18	11.35	0.84	190.33	37.41	0	8.23	9.33
222	2023-08-10	17.42	11.31	0.63	142.4	32.32	0	6.28	12.56
223	2023-08-11	21.6	11.6	0.9	155.85	49.03	3.65	6.47	14
224	2023-08-12	17.15	11.77	0.89	159.48	57.58	1.36	7.6	10.21
225	2023-08-13	17.9	12.07	0.6	148.01	34.58	1.53	7.49	8.1
226	2023-08-14	19.46	12.22	0.85	165.66	44.95	1.31	7.19	8.57
227	2023-08-15	19.04	12.68	0.75	148.29	38.06	1.61	7	9.07
228	2023-08-16	15.83	12.75	0.56	115.03	29.94	0.7	8.5	8.33
229	2023-08-17	16.8	13.24	0.58	97.31	27.71	1.07	5.63	10.3
230	2023-08-18	15.03	13.54	0.59	88.34	27.6	0.61	5.95	11.31
231	2023-08-19	14.78	13.44	0.59	103.68	25.71	0.3	7.17	10.42
232	2023-08-20	14.35	13.39	0.78	124	26.65	0.38	7.84	9.45
233	2023-08-21	16.47	13.77	0.62	130.43	27.31	0.75	7.94	8.59

234	2023-08-22	17.18	14.19	0.79	135.81	30.53	0.91	7.32	9.6
235	2023-08-23	16.12	14.43	0.69	120.04	28.13	0.33	9.16	9.58
236	2023-08-24	16.33	14.72	0.72	103.06	24.45	1.18	8.62	8.07
237	2023-08-25	18.72	15.26	0.71	113.05	27.49	0.95	7.32	8.78
238	2023-08-26	20.98	15.56	0.94	78.82	19.84	1.13	4.21	11.56
239	2023-08-27	15.12	15.48	0.75	92.53	26.16	0.74	5.59	9.86
240	2023-08-28	17.04	16.22	0.97	163.02	39.43	1.76	5.96	9.78
241	2023-08-29	15.9	16.09	0.62	202.61	41.65	0.9	8.7	7.79
242	2023-08-30	17.02	16.63	0.65	237.15	53.3	0.82	9.82	8.26
243	2023-08-31	16.89	17.28	0.86	222.15	53.42	1.04	9.38	8.2
244	2023-09-01	15.88	18.1	0.73	189.85	53.21	0.98	7.23	9.23
245	2023-09-02	17.45	18.91	0.78	143.18	38.38	1.21	6.04	10.82
246	2023-09-03	15.25	19.43	0.76	116.8	32.43	1.16	7.2	11.14
247	2023-09-04	17.03	19.94	0.77	104.85	31.76	0.71	6.87	12.09
248	2023-09-05	15.76	20.07	0.62	95.02	28.7	0.51	7.09	11.06
249	2023-09-06	19.97	15.35	0.69	99.8	35.09	0.67	7.75	11.25
250	2023-09-07	12.66	9.11	0.53	94.26	28.71	0.35	6.67	9.89
251	2023-09-08	12.78	9.28	0.68	100.37	21.2	0.49	7.44	9.99
252	2023-09-09	12.25	9.56	0.58	80.35	18.51	0.67	6.53	10.16
253	2023-09-10	11.68	9.69	0.5	70.69	17.84	0.5	5.91	9.69
254	2023-09-11	19.88	10.84	0.66	68.7	16.56	0.82	4.42	12.36
255	2023-09-12	15.3	10.87	0.57	94.85	20.52	1.03	4.82	11.37
256	2023-09-13	13.09	10.65	0.44	84.05	22.26	0.64	4.81	10.8
257	2023-09-14	11.23	10.86	0.34	71.98	18.49	0.38	6.27	9.62
258	2023-09-15	12.95	11.15	0.52	123.96	25.84	0.81	8.12	10.66
259	2023-09-16	13.34	11.5	0.46	100.93	21.36	0.96	7.28	10.06
260	2023-09-17	13.27	12.06	0.59	112.48	23.9	0.94	6.02	10.33
261	2023-09-18	13.33	12.3	0.46	95.52	28.13	0.73	7.93	9.99
262	2023-09-19	15.47	12.52	0.78	167.87	33.81	0.97	5.31	10.97
263	2023-09-20	21.46	12.95	0.83	126.36	42.47	1.08	4.9	13.24
264	2023-09-21	15.49	12.67	0.58	103.61	25.39	0.63	6.19	10.77
265	2023-09-22	13.43	12.57	0.51	102.69	28.76	0.56	6.31	10.7
266	2023-09-23	13.7	12.48	0.48	94.56	23.22	0.79	5.79	10.01
267	2023-09-24	12.75	12.6	0.55	87.82	24.39	0.71	5.26	9.53
268	2023-09-25	13.71	13.13	0.53	112.82	27.56	0.85	5.62	10.16
269	2023-09-26	13.39	13.39	0.53	90.86	23.84	0.78	6.56	9.47
270	2023-09-27	12.77	14.23	0.53	95.01	27.91	0.64	6.26	9.32
271	2023-09-28	12.71	14.36	0.48	96.33	29.23	0.54	8.48	10.37
272	2023-09-29	13.1	14.26	0.49	96.66	24.72	0.64	7.42	10.22
273	2023-09-30	12.24	14.47	0.54	106.15	30.12	0.58	6.74	9.32
274	2023-10-01	11.9	14.7	0.44	97.52	26.2	0.37	7.73	8.47
275	2023-10-02	11.44	14.85	0.48	96.9	27.2	0.21	7.82	7.78
276	2023-10-03	11.9	15.37	0.56	128.57	44.56	0.5	7.58	9.2
277	2023-10-04	13.25	32.57	0.87	151.69	44.73	1.25	7.11	10.76
278	2023-10-05	13.91	28.3	0.71	208.7	47.81	1.57	9.28	10.84
279	2023-10-06	13.13	8.48	0.67	174.97	48.76	0.89	10.9	10.39
280	2023-10-07	13.49	7.75	0.75	184.37	56.47	0.62	11.54	12.19
281	2023-10-08	15.78	6.4	0.88	183.91	56.57	1.08	9.01	11.9
282	2023-10-09	15.22	7.4	0.79	152.79	46.58	0.76	8.49	10.97
283	2023-10-10	16.26	6.37	0.81	252.72	56.57	0.65	9.96	10.98
284	2023-10-11	17.26	8.85	0.86	138.7	64.81	0.84	8.98	12.35
285	2023-10-12	16.44	9.91	0.79	26.65	65	0.61	9.93	11.24
286	2023-10-13	18.46	33.38	0.78	23.47	62.24	0.62	9.82	11.24
287	2023-10-14	16.24	54.23	0.68	140.31	51.61	68.27	10.46	10.1
288	2023-10-15	16.88	54.9	0.78	157.89	55.46	0.81	10.17	10.57

289	2023-10-16	17.26	48.97	0.79	168.11	53.92	1.67	11.45	10.05
290	2023-10-17	18.39	42.15	0.93	199.83	105.91	3.14	11.9	10.03
291	2023-10-18	16.22	48.34	0.83	202.25	70.62	2.66	11.41	9.61
292	2023-10-19	14.05	47.22	0.65	187.87	73.36	1.73	13.07	10.31
293	2023-10-20	15.87	47.43	0.6	170.92	61.61	1.62	14.5	13.43
294	2023-10-21	16.46	76.41	0.63	153.33	44.12	1.55	17.51	16.49
295	2023-10-22	19.09	90.31	0.72	156.45	53.62	2.62	12.26	15.84
296	2023-10-23	24.14	72.05	1.53	144.42	41.67	26.92	7.43	17.13
297	2023-10-24	16.76	58.23	0.87	139.44	46.59	3.31	8.89	16.78
298	2023-10-25	16.61	55.11	0.97	147.47	78.76	2.44	8.56	15.25
299	2023-10-26	17.89	38.76	1.06	151.36	54.54	2.34	7.25	17.12
300	2023-10-27	15.5	52.77	0.91	153.91	57.86	1.97	8.54	17.03
301	2023-10-28	13.85	58.26	0.88	197.6	84.79	1.74	10.72	15.62
302	2023-10-29	14.42	62.75	0.87	208.21	76.78	1.61	11.66	16.91
303	2023-10-30	14.48	57.27	0.78	158.25	57.85	2.36	11.81	17.12
304	2023-10-31	14.14	62.21	0.76	165.12	57.66	2.38	13.38	17.57
305	2023-11-01	14.83	70.15	0.69	148.16	47.46	1.45	12.6	15.51
306	2023-11-02	14.81	136.95	0.59	85.01	22.96	1.04	9.33	14.36
307	2023-11-03	15.54	NA	0.62	46.01	7.05	0.75	8.48	13.32
308	2023-11-04	19.71	NA	0.71	78.91	11.15	1.38	6.1	14.18
309	2023-11-05	18.9	NA	0.7	69.19	12.65	1.31	6.43	13.97
310	2023-11-06	15.43	NA	0.66	76.02	22.81	1.07	8.08	13.04
311	2023-11-07	16.29	NA	0.84	127.4	49.19	1.82	9.44	7.33
312	2023-11-08	15.78	NA	0.98	176.82	65.58	2.04	8.66	10.54
313	2023-11-09	17.61	NA	1.01	189.9	66.11	2.26	9.39	16.34
314	2023-11-10	18.34	NA	1.06	221.2	74.94	2.18	9.32	17.42
315	2023-11-11	17.71	NA	1.12	222.99	81.86	2.4	9.87	18.93
316	2023-11-12	17.13	NA	1.12	320.69	165.36	2.14	9.34	18.81
317	2023-11-13	16	32.28	1.16	288.95	137.85	1.63	15.03	25.9
318	2023-11-14	15.62	40.54	0.95	216.85	81.84	0.84	16.46	12.23
319	2023-11-15	16.77	41.79	0.86	186.56	62.74	2.84	15.57	10.32
320	2023-11-16	18.39	51.9	0.95	117.17	40.46	2.81	11.76	10.2
321	2023-11-17	15.89	60.11	0.82	121.71	42.33	1.84	9.45	9.5
322	2023-11-18	15.87	63.05	0.77	97.59	31.83	1.42	8.18	8.65
323	2023-11-19	14.8	48.49	0.64	91.35	29.96	1.24	11.67	8.55
324	2023-11-20	14.89	23.75	0.6	94.39	26.74	1.16	12.34	7.88
325	2023-11-21	20.24	36.86	0.81	83.94	24.83	1.62	5.67	7.41
326	2023-11-22	19.1	44.18	0.87	150.5	39.46	1.51	8.82	7.58
327	2023-11-23	18.6	42.08	0.92	153.42	64.84	3.01	13.63	8.1
328	2023-11-24	17.24	65.54	0.84	154.64	68.09	1.97	17.45	7.62
329	2023-11-25	18.29	74.58	0.91	189.17	76.04	268.77	15.53	7.69
330	2023-11-26	17.22	67.45	0.89	182.42	77	500	15.61	7.52
331	2023-11-27	17.17	86.73	0.93	164.22	69.46	200.98	12.83	7.1
332	2023-11-28	17.41	79.52	0.88	149.09	57.08	0.75	11.33	7.34
333	2023-11-29	17.82	60.23	0.88	154.51	61.42	0.77	11.14	7.42
334	2023-11-30	16.76	65.82	0.87	179.38	70.94	0.83	13.17	7.2
335	Average	18.59	21.02	0.69	130.53	41.39	4.05	11.81	12.17
336	24 hour average Standard	80	80	2 (8 hour average)	100	60	100 (8 hour average)	400	
337	Annual average Standard	40	50		60	40			
338	Maximum Value	46.25	136.95	1.53	320.69	461.48	500	86.62	42.21
339	Maximum Value At Time	2023-02-06	2023-11-02	2023-10-23	2023-11-12	2023-02-15	2023-11-26	2023-01-19	2023-06-13
340	Minimum Value	7.08	2.38	0.1	23.47	0.03	0	4.21	4.64
341	Minimum Value At Time	2023-01-01	2023-02-12	2023-04-25	2023-10-13	2023-05-13	2023-03-19	2023-08-26	2023-08-01
342	Valid Data Points	334	324	334	334	331	305	334	334
343	Total Data Points	334	334	334	334	334	334	334	334
344	Data Availability %	100	97.01	100	100	99.1	91.32	100	100

Remarks: The values of PM10 & PM 2.5 are exceeding the annual average standard limits.

Hindustan Petroleum Corporation Limited, Visakhapatnam

Ambient air quality monitoring

01.01.2023 to 30.12.2023

Obtained from realtime ambient air quality monitoring stations

S. No.	Date	CAAQMS - 2 - Store yard							
		PM2.5 (ug/m3)	SO2 (ug/m3)	NO2 (ug/m3)	CO (mg/m3)	PM10 (ug/m3)	NH3 (ug/m3)	O3 (ug/m3)	Benzene (ug/m3)
1	2023-01-01	61.49	16.29	25.21	0.42	89.85	31.4	21.94	0.85
2	2023-01-02	55.38	15.95	29.95	0.47	89.96	31.33	28.23	0.53
3	2023-01-03	62.75	17.85	36.08	0.46	110.14	30.92	14.39	0.26
4	2023-01-04	87.26	14.67	38.38	0.41	133.41	31.62	11.45	0.17
5	2023-01-05	109.84	15.79	31.13	0.58	172.42	31.69	14.74	1.03
6	2023-01-06	132.59	17.41	33.13	0.73	215.57	31.58	25.14	0.89
7	2023-01-07	121.6	14.62	21	0.68	199.67	31.78	25.34	1.11
8	2023-01-08	81.11	16.04	24.03	0.43	162.65	31.32	25.69	0.55
9	2023-01-09	77.41	16.84	24.14	0.47	141.7	31.85	25.88	0.27
10	2023-01-10	87.21	18.37	29.89	0.48	167.65	31.41	30.09	0.17
11	2023-01-11	NA	NA	NA	NA	NA	NA	NA	NA
12	2023-01-12	76.04	21.52	20.4	0.64	152.54	32.08	30.43	0.17
13	2023-01-13	85.5	36.57	22.24	0.68	166.97	31.95	29.71	0.03
14	2023-01-14	113.29	21.78	25.97	0.83	180.35	31.68	30.09	0
15	2023-01-15	73.94	16.66	22.29	0.65	132.16	31.38	29.4	0
16	2023-01-16	66.07	13.56	16.65	0.54	128.18	31.31	30.61	0
17	2023-01-17	76.68	30.51	17.97	0.63	144.73	31.74	32.44	0
18	2023-01-18	77.36	23.78	20.71	0.51	175.36	31.69	22.09	0.03
19	2023-01-19	82.72	30.23	20.61	0.52	184.7	31.71	14.59	0
20	2023-01-20	89.36	23.49	21.42	0.59	186.92	31.83	15.8	0.02
21	2023-01-21	101.39	23.13	18.81	0.45	172.98	31.63	18.42	0.1
22	2023-01-22	114.26	19.93	24.78	0.64	198.64	31.62	22.43	0.12
23	2023-01-23	90.22	28.04	22.27	0.38	148.5	31.54	21.58	0.14
24	2023-01-24	94.24	27.57	24.19	0.52	159.71	31.54	20.04	0.15
25	2023-01-25	116.09	21.81	28.03	0.66	168.71	31.51	21.42	0.15
26	2023-01-26	105.59	25.32	24.84	0.55	144.14	31.57	22.81	0.21
27	2023-01-27	117.52	29.48	32.49	0.62	177.08	31.59	14.96	0.26
28	2023-01-28	93.23	19.04	21.73	0.4	130.29	31.98	27.59	0.36
29	2023-01-29	100.68	26.67	20.89	0.46	133.96	31.57	19.97	0.32
30	2023-01-30	76.52	26.15	20.25	0.39	108.07	31.67	25.64	0.44
31	2023-01-31	90.1	25.95	24.35	0.44	125.02	31.63	30.23	0.51
32	2023-02-01	80.82	32.22	26.57	0.47	125.89	31.55	30.4	0.26
33	2023-02-02	91.8	32.33	25.3	0.57	135.76	31.79	29.02	0.07
34	2023-02-03	79.1	29.64	21.71	0.46	123.68	31.47	28.32	0.03
35	2023-02-04	89.7	30.92	25.42	0.52	146.66	32.13	21.58	0.02
36	2023-02-05	98.33	29.69	24.21	0.45	141.66	31.9	23.3	0.02
37	2023-02-06	108.5	28.87	24.76	0.65	171.15	31.83	15.55	0.05
38	2023-02-07	79.08	20.64	28.08	0.72	151.39	33.37	13.3	0.04
39	2023-02-08	70.24	26.26	21.19	0.57	134.83	31.74	5.56	0.03
40	2023-02-09	69	27.91	22.29	0.51	131.2	37.51	5.4	0.04
41	2023-02-10	60.14	24.15	21.88	0.53	111.44	40.66	6.53	0.05
42	2023-02-11	62.74	26.58	22.89	0.64	121.44	31.05	6.9	0
43	2023-02-12	76.73	26.82	20.26	0.82	138.68	29.66	5.64	0.02
44	2023-02-13	72.24	25.45	19.7	0.32	137.82	30.22	7.73	0
45	2023-02-14	83.26	22.03	26.16	0.56	162.72	37.18	10.17	0
46	2023-02-15	96.18	26.19	33.95	0.47	168.75	42	9.8	0
47	2023-02-16	76.01	23.96	30.65	0.5	142.13	43.33	6.64	0.01
48	2023-02-17	67.76	26.47	26.52	0.39	126.2	45.17	7.06	0.05
49	2023-02-18	61.3	45.59	26.91	0.34	109.66	31.31	6.41	0.06
50	2023-02-19	51.76	26.46	24.09	0.35	88.99	30.16	4.6	0.03
51	2023-02-20	46.55	38.6	27.09	0.41	101.42	30.6	5.18	0.04
52	2023-02-21	55.14	32.71	24.8	0.37	112.31	30.22	7.5	0.1

53	2023-02-22	65.61	29.03	24.56	0.45	122.32	30.25	6.54	0.05
54	2023-02-23	71.59	23.68	26.53	0.55	151.92	30.36	5.05	0.06
55	2023-02-24	77.42	23.2	27.58	0.6	144.7	30.19	4.34	0.01
56	2023-02-25	74.11	25.26	31.66	0.49	140.45	30.32	4.99	0.01
57	2023-02-26	71.95	30.34	30.44	0.46	121.91	30.28	4.94	0
58	2023-02-27	68.24	34.87	32.8	0.36	112.26	30.77	5.58	0.01
59	2023-02-28	86.8	30.74	39.02	0.62	165.09	32.23	5.48	0
60	2023-03-01	95.63	25.53	36.15	0.67	154.25	32.1	7.47	0.01
61	2023-03-02	87.12	19.71	32.84	0.63	178.53	32.14	8.44	0.01
62	2023-03-03	99.22	23.85	45.94	0.57	171.06	32.96	8.58	0.01
63	2023-03-04	89.63	21.36	32.01	0.52	166.71	33.05	8.69	0.02
64	2023-03-05	81.44	22.4	35.53	0.58	210.94	33.78	8.22	0.01
65	2023-03-06	94.26	19.51	46.86	0.78	189.84	33.94	8.22	0.02
66	2023-03-07	82.61	22.95	45.35	0.71	165.98	33.68	9.27	0.06
67	2023-03-08	69.42	22.19	49.53	0.68	126.88	36.89	10.83	0.03
68	2023-03-09	66.66	22.44	34.72	0.63	120.32	40.93	6.91	0.6
69	2023-03-10	63.07	22.94	31.02	0.44	148.81	39.96	8.86	0.02
70	2023-03-11	75.06	24.27	30.83	0.46	117.76	39.46	11.12	0.05
71	2023-03-12	72.73	24.7	29.83	0.57	106.57	40.41	8.46	0.07
72	2023-03-13	87.66	21.27	30.63	0.67	140.08	38.82	9.91	0.03
73	2023-03-14	98.1	22.12	31.14	0.77	157.49	29.57	11.38	0.03
74	2023-03-15	92.65	22.32	42.8	0.71	165.07	29.61	7.69	0.05
75	2023-03-16	60.48	22.56	28.57	0.54	123.11	29	3.96	0.13
76	2023-03-17	57.12	22.79	32.65	0.49	126.44	29.58	3.82	0.25
77	2023-03-18	51.85	21.81	26.12	0.49	118.56	31.04	4.84	0.2
78	2023-03-19	21.8	22.94	25.81	0.37	56.96	28.88	5.49	1.76
79	2023-03-20	27.18	22.04	29.95	0.36	57.66	29.41	5.52	2.25
80	2023-03-21	29.17	22.28	29.71	0.47	61.49	30.85	4.41	1.68
81	2023-03-22	29.02	23.24	28.63	0.35	61.23	31.67	3.58	0.27
82	2023-03-23	34.69	27.96	28.83	0.36	71.75	31.25	3.51	0.37
83	2023-03-24	28.81	22.86	33.45	0.42	87.2	32.45	3.29	0.14
84	2023-03-25	37.42	23.46	30.38	0.4	89.47	32.25	3.21	0.35
85	2023-03-26	31.55	24.73	32.39	0.47	83.4	32.03	3.16	0.34
86	2023-03-27	37.85	25.37	25.11	0.35	84.24	32.67	3.28	0.88
87	2023-03-28	43.86	24.24	28.2	0.43	101.96	31.48	3.19	2.16
88	2023-03-29	36.5	22.4	23.2	0.43	75.05	31.68	3.11	0.18
89	2023-03-30	31.12	23.17	21.12	0.42	68.11	32.69	6.01	1.71
90	2023-03-31	27.69	21.41	19.92	0.25	64.68	32.62	4.93	0.15
91	2023-04-01	21.74	22.13	17.15	0.22	52.43	32.16	7.54	0.07
92	2023-04-02	27.85	25.75	20.85	0.2	96.4	31.84	7.7	0.11
93	2023-04-03	28.8	19.45	22.8	0.3	73.64	32.86	7.72	0.13
94	2023-04-04	27.33	22.74	17.17	0.47	61.87	33.23	8.21	0.11
95	2023-04-05	26.96	24.41	19.72	0.49	70.01	32.75	7.89	0.09
96	2023-04-06	33.43	23.25	21.1	0.47	77.73	33.33	7.69	0.07
97	2023-04-07	33.9	20.92	27.65	0.43	102.39	30.97	9.54	0.76
98	2023-04-08	53.56	25.26	27.73	0.59	108.06	30.11	9.56	3.09
99	2023-04-09	55.91	25.55	25.59	0.83	140.12	30.25	10.8	3.41
100	2023-04-10	77.06	23.09	30.52	0.63	180.23	30.23	12.16	2.55
101	2023-04-11	95.08	25.13	35.4	0.7	286.9	29.93	11.73	0.14
102	2023-04-12	76.48	25.18	27.83	0.5	173.08	27.6	13.7	0.02
103	2023-04-13	83.93	24.93	29.07	0.63	193.48	24.62	12.46	0.01
104	2023-04-14	76.73	24.59	27.58	0.72	224.33	24.85	13.13	0.01
105	2023-04-15	94.24	24.85	28.53	0.77	241.67	24.44	16.32	0.02
106	2023-04-16	87.97	25.83	26.25	0.6	164.57	23.87	18.6	0.02
107	2023-04-17	80.88	24.46	26.06	0.61	182.12	24.25	16.26	0.05
108	2023-04-18	88.03	24.21	28.33	0.76	268.68	26.55	16.42	0.03
109	2023-04-19	91.77	23.07	24.06	0.81	222.76	29.28	14.19	0.04
110	2023-04-20	71.88	23.99	21.4	0.48	155.87	29.99	14.2	0.04
111	2023-04-21	71.52	24.83	27.91	0.43	86.09	30.05	12.82	0.03

112	2023-04-22	69.52	24.13	25.49	0.29	62.68	30.07	10.66	0.04
113	2023-04-23	44.12	25.25	28.34	0.16	17.59	30.24	12.04	0.06
114	2023-04-24	47.96	24.41	19.98	0.15	39.14	30.15	10.74	0.03
115	2023-04-25	40.33	24.79	20.77	0.38	15.83	29.85	8.18	0.03
116	2023-04-26	39.91	23.97	22.83	0.51	1.7	30.25	9.69	0.05
117	2023-04-27	73.68	24.55	29	0.49	27.69	30.17	10	0.05
118	2023-04-28	73.52	24.79	28.88	0.35	75.13	29.82	8.59	0.07
119	2023-04-29	55.99	23.03	27.95	0.33	77.94	29.72	8	0.15
120	2023-04-30	48.57	22.75	28.86	0.47	88.19	29.84	7.96	0.19
121	2023-05-01	45.7	22.91	27.46	0.3	90.61	29.73	7.36	0.39
122	2023-05-02	61.29	22.83	24.93	0.26	66.57	28.26	8.51	0.21
123	2023-05-03	37.15	22.82	25.95	0.33	56.7	25.79	7.45	0.06
124	2023-05-04	31.76	22.73	23.28	0.29	49.98	27.32	8.08	0.1
125	2023-05-05	33.79	22.81	27.09	0.38	73.54	26.33	8.04	0.13
126	2023-05-06	33.99	22.7	28.77	0.29	83.7	22.2	9.06	0.08
127	2023-05-07	35.18	22.69	24.23	0.61	85.3	22.48	8.94	0.06
128	2023-05-08	56.89	22.04	26.42	0.63	144.28	20.83	9.16	0.07
129	2023-05-09	57.3	23.55	21.8	0.4	132.88	25.23	12.87	0.18
130	2023-05-10	49.83	20.22	16.7	0.22	82.97	29.04	10.07	0.13
131	2023-05-11	45.08	21.23	25.23	0.14	81.45	28.93	9	0.06
132	2023-05-12	46.01	20.92	14.9	0.14	88.58	28.97	8.71	0.1
133	2023-05-13	55.52	20.84	6.41	0.49	116.03	29.35	10.29	0.85
134	2023-05-14	86.26	20.75	5.53	0.61	155.56	29.39	12.51	0.08
135	2023-05-15	83.49	20.9	12.54	0.95	188.65	28.58	12.75	0.1
136	2023-05-16	89.71	20.6	14.18	0.65	194.22	28.28	13.37	0.21
137	2023-05-17	73.33	19.67	15.74	0.33	103.81	28.65	13.38	0.19
138	2023-05-18	42.48	17.69	15.14	0.26	80.97	28.56	12.71	0.18
139	2023-05-19	41.78	17.84	17.17	0.28	121.34	29.18	11.65	0.11
140	2023-05-20	55.12	17.56	18.98	0.59	106.09	29.87	10.21	0.14
141	2023-05-21	41.53	18.19	18.37	0.34	79.18	29.74	11	0.14
142	2023-05-22	53.49	18.12	18.84	0.18	129.53	29.77	12.17	0.09
143	2023-05-23	51.02	18.05	22.37	0.44	103.01	28.59	12.17	0.05
144	2023-05-24	45.65	17.42	17.95	0.2	106.04	30.15	12.4	0.02
145	2023-05-25	62.13	17.99	23.23	0.27	124.76	29.04	13.11	0.26
146	2023-05-26	47.34	17.49	21.77	0.49	88.67	28.53	11.48	0.08
147	2023-05-27	72.64	17.94	22.37	0.66	176.17	28.53	12.4	0.07
148	2023-05-28	66.02	17.34	20.45	0.45	154.41	29.16	11.99	0.05
149	2023-05-29	54.33	17.14	18.32	0.4	109.13	29.24	11.69	0.1
150	2023-05-30	56.24	17.6	23.54	0.21	135.02	29.72	10.87	0.08
151	2023-05-31	62.7	17.72	24.15	0.48	136.98	29.78	14.35	0.14
152	2023-06-01	67.16	17.13	21.14	0.57	132.4	29.69	13.79	0.17
153	2023-06-02	87	18.18	25.52	0.8	176.91	29.32	13	0.13
154	2023-06-03	67.06	17.98	23.35	0.61	155.82	29.99	12.58	0.11
155	2023-06-04	57.41	17.47	20.79	0.33	131.5	30.19	14.65	0.11
156	2023-06-05	59.93	17.73	23.25	0.51	137.38	30	15.91	0.08
157	2023-06-06	72.24	17.95	24.51	0.68	187.73	29.7	13.26	0.06
158	2023-06-07	84.54	19.43	33.64	0.66	256.35	30.32	17.13	0.06
159	2023-06-08	83.11	7	32.47	0.77	216.77	29.57	13.5	0.01
160	2023-06-09	58.59	4.35	17.61	0.73	160.51	29.01	17.85	0.01
161	2023-06-10	62.13	5.97	19.21	0.46	212.41	30.52	12.94	0.04
162	2023-06-11	63.74	7.27	21.13	0.91	167.6	30.58	14.25	0.06
163	2023-06-12	49.31	6.06	13.8	0.36	127.67	30.36	12.25	0.04
164	2023-06-13	58.55	6.59	14.26	0.18	130.87	30.04	15.45	0.05
165	2023-06-14	67.76	4.74	10.11	0.33	129.94	29.92	14.26	0.05
166	2023-06-15	71.08	26.54	13.02	0.61	169.06	29.96	11.12	0.03
167	2023-06-16	84.39	7.43	14.49	0.42	271.36	29.89	15.21	0.02
168	2023-06-17	77.64	6.97	19.33	0.27	210.21	29.63	13.48	0.02
169	2023-06-18	80.58	6.74	14.1	0.33	197.62	29.79	16.66	0.03
170	2023-06-19	114.62	14.08	18.04	0.27	93.98	29.66	11.5	0.05

171	2023-06-20	78.68	5.07	16.52	0.31	131.9	29.49	12.77	0.03
172	2023-06-21	59.66	7.51	19.4	0.47	125.43	29.66	11.09	0.03
173	2023-06-22	52.75	19.3	14.04	0.12	83.23	29.93	12.49	0.03
174	2023-06-23	52.29	4.11	16.55	0.23	74.36	30	9.72	0.03
175	2023-06-24	51.77	6.67	15.92	0.19	88.27	30.03	8.39	0.01
176	2023-06-25	38.07	5.71	8.61	0.18	43.3	30.05	9.15	0.01
177	2023-06-26	35.36	5.37	10.84	0.18	63.77	30.05	8.45	0.03
178	2023-06-27	43.57	5.09	7.47	0.5	70.93	30.12	10.01	0.05
179	2023-06-28	58.17	7.31	8.99	1.94	98.69	30.08	10.66	0.08
180	2023-06-29	43.01	4.49	4.68	0.16	66.71	30.12	10.93	0.08
181	2023-06-30	52.9	7.51	11.51	0.66	89.33	30.08	9.77	1.98
182	2023-07-01	56.69	6.94	13.4	1.27	99.19	28.03	10.67	2.56
183	2023-07-02	62.58	7.55	15.45	1.07	77.53	26.82	10.75	0.04
184	2023-07-03	64.11	8.42	18.62	1.19	111.37	25.48	11.4	0.45
185	2023-07-04	61.24	10.79	10.42	1.15	144.46	28.43	11.18	0.06
186	2023-07-05	46.87	10.1	11.84	1.15	91.46	30.05	8.07	0
187	2023-07-06	39.82	5.03	6.07	1.09	56.36	29.98	8.93	0
188	2023-07-07	38.35	5.76	2.26	1.06	63.27	29.87	10.54	0
189	2023-07-08	39.29	5.72	4.27	1.14	79.13	30.14	10.03	0
190	2023-07-09	50.29	6.87	15.07	1.14	92.35	30.07	9.38	0
191	2023-07-10	60.62	9.07	16.55	1.04	136.22	30.14	11.92	0
192	2023-07-11	54.32	25	11.5	1.19	101.69	30.09	10.28	0
193	2023-07-12	42.29	44.82	2.16	1.23	72.99	29.96	7.97	0.21
194	2023-07-13	NA	17.11	3.23	0.89	NA	29.63	7.93	0.44
195	2023-07-14	59.06	12.83	2.56	1.11	89.9	30.04	9.44	0.59
196	2023-07-15	47.78	12.98	2.64	1.16	59.04	30.15	9.08	0.38
197	2023-07-16	42.71	15.15	2.68	1.05	70.34	30.12	7.92	0.31
198	2023-07-17	43.65	12.23	2.42	0.89	53.11	30.13	7.62	0.37
199	2023-07-18	34.2	13.52	2.25	0.42	27.56	30.01	7.16	0.31
200	2023-07-19	34.88	12.38	2.14	0.21	27.45	29.97	8.04	0.22
201	2023-07-20	32.52	12.63	2	0.17	36.47	30.13	8.29	0.22
202	2023-07-21	34.12	12.37	2.11	0.14	52.37	29.94	8.46	0.24
203	2023-07-22	44.08	12.72	2.04	NA	44.1	30.11	7.66	0.5
204	2023-07-23	38.9	12.66	2.14	NA	41.89	30.16	8.18	0.5
205	2023-07-24	40.79	12.33	2.32	NA	40.7	30.14	7.57	0.31
206	2023-07-25	37.97	12.57	2.27	NA	33.41	30.11	7.22	0.64
207	2023-07-26	33.66	11.8	13.02	NA	24.84	29.92	7.52	0.21
208	2023-07-27	30.46	11.52	18.95	NA	25.91	28.63	9.22	0.1
209	2023-07-28	31.72	11.52	21.65	NA	33.56	26.43	8.28	0.15
210	2023-07-29	48.78	11.99	19.76	NA	57.79	23.8	7.83	0.23
211	2023-07-30	64.86	11.84	25.84	NA	86.74	25.76	7.34	0.29
212	2023-07-31	51.48	12.2	19.31	NA	57.91	26.56	7.22	0.59
213	2023-08-01	45.19	11.4	15.64	NA	71.47	28.37	7.52	30.28
214	2023-08-02	41.9	12.29	14.42	NA	40.22	28.99	7.83	0.25
215	2023-08-03	58.08	12.56	18.86	NA	53.68	26.45	8.02	0.18
216	2023-08-04	40.84	14.77	14.49	NA	49.07	23.91	9.63	108.57
217	2023-08-05	47.89	13.02	14.64	NA	59.34	23.79	10.22	213.85
218	2023-08-06	48	12.06	14.5	NA	52.55	26.76	11.55	0.22
219	2023-08-07	56.39	12.67	13.35	NA	80.06	26.23	8.65	0.22
220	2023-08-08	63.15	11.52	14.86	NA	84.38	23.85	9.95	18.01
221	2023-08-09	68.32	11.34	14.93	NA	96.99	24.94	10.3	0.71
222	2023-08-10	64.01	9.4	30.1	NA	84.12	30.08	11.66	0.58
223	2023-08-11	71.63	7.07	50.65	NA	109.24	30.03	10.81	0.98
224	2023-08-12	54.61	7.35	41.97	NA	81.65	30.18	11.41	0.38
225	2023-08-13	52.02	7.25	46.13	NA	78.57	30.1	10.47	0.36
226	2023-08-14	59.64	37.59	50.22	NA	86.23	30.12	10.64	0.91
227	2023-08-15	55.32	19.6	47.82	NA	79.75	30.19	10.44	0.44
228	2023-08-16	44.88	10.58	44.08	NA	74	30.15	11.44	0.29
229	2023-08-17	41.28	13.18	38.74	0.25	65.63	30.13	9.06	0.36

230	2023-08-18	44.27	10.48	35.45	0.36	52.65	30.17	9.17	0.85
231	2023-08-19	36.73	7.99	28.01	0.35	44.77	30.16	10.63	0.45
232	2023-08-20	35.26	16.78	29.13	0.31	53.91	30.06	10.92	0.29
233	2023-08-21	39.93	10.23	39.16	0.42	63.69	30.14	11.12	0.54
234	2023-08-22	46.48	12.26	41.1	0.39	69.63	30.09	10.41	0.5
235	2023-08-23	41.67	10.51	29.16	0.24	53.46	30.06	11.19	0.26
236	2023-08-24	42.5	13.34	32.61	0.34	58.5	30.15	10.68	1.55
237	2023-08-25	43.52	13.29	28.65	0.54	60.83	30.13	10.93	0.49
238	2023-08-26	36.95	13.41	54.33	0.52	57.3	30.08	8.17	0.55
239	2023-08-27	40.39	11.66	40.9	0.34	53.45	30.14	9.16	0.38
240	2023-08-28	67.13	11.24	45.78	0.75	94.94	30.16	9.54	0.94
241	2023-08-29	75.3	13.74	47.89	0.34	123.72	30.16	10.67	1.42
242	2023-08-30	90.97	13.33	53.5	0.49	152.16	30.15	11.27	0.73
243	2023-08-31	83.69	15.07	51.5	0.42	134.72	30.11	10.94	1.09
244	2023-09-01	84.95	9.18	49.94	0.41	120.74	30.2	10.54	0.57
245	2023-09-02	59.37	13.33	56.53	0.33	89.69	30.13	10.14	0.49
246	2023-09-03	60.17	11.79	56.26	0.67	91.76	30.15	10.63	1.16
247	2023-09-04	65.66	12.13	33.27	0.37	63.21	30.19	10.25	0.96
248	2023-09-05	62.11	11.16	14.03	0.26	67.09	30.12	9.78	0.32
249	2023-09-06	61.78	14.49	14.8	0.35	76.47	30.14	9.6	0.4
250	2023-09-07	42.57	10.95	14.26	0.26	81.69	30.17	9.99	0.45
251	2023-09-08	37.47	10.53	13.83	0.28	49.88	30.16	11.53	0.28
252	2023-09-09	38.14	13.98	14.32	0.32	44.34	30.12	10.54	0.33
253	2023-09-10	45.01	14.28	15.42	0.36	51.89	30.15	10.32	0.43
254	2023-09-11	56.81	12.39	16.45	0.35	71.21	30.18	9.2	0.52
255	2023-09-12	63.2	11.32	17.54	0.4	81.21	30.19	7.47	0.8
256	2023-09-13	53.42	8.9	15	0.17	62.87	30.13	1.69	0.33
257	2023-09-14	35.39	7.94	14.94	0.14	47.44	30.15	2.19	0.16
258	2023-09-15	60.64	7.55	16.26	0.41	57.55	30.19	4.75	0.18
259	2023-09-16	53.56	10.18	16.44	0.42	63.13	30.2	3.58	0.62
260	2023-09-17	61.15	8.09	16.8	0.46	81.89	30.13	2.59	0.38
261	2023-09-18	60.36	8.82	16.9	0.42	258.09	30.16	4	0.73
262	2023-09-19	61.2	8.46	17.37	0.46	439.38	30.22	4.19	0.65
263	2023-09-20	69.39	9.4	24.23	0.54	151.06	30.01	6.73	1.3
264	2023-09-21	51.61	9	45.07	0.39	125.24	29.27	7.62	0.48
265	2023-09-22	44.13	8.19	48.2	0.41	83.99	27.94	8.07	0.23
266	2023-09-23	39.27	10.67	34.97	0.53	77.04	26.71	8.02	0.35
267	2023-09-24	38.52	10.76	43.42	0.25	73.6	24.52	6.72	0.31
268	2023-09-25	49.93	5.99	51.11	0.56	98.78	27.19	7.2	0.56
269	2023-09-26	45.82	6.21	39.02	0.36	79.9	29.5	8.56	0.82
270	2023-09-27	54.63	6.65	53.32	0.48	96.51	29.03	7.53	0.68
271	2023-09-28	49.9	9.42	60.11	0.32	91.92	28.12	8.97	0.54
272	2023-09-29	47.1	8.58	65.15	0.37	108.63	27.3	8.4	0.45
273	2023-09-30	52.54	8.31	68.73	0.38	128.47	21.76	7.88	0.31
274	2023-10-01	40.43	7.82	54.81	0.25	79.99	17.88	9.52	0.21
275	2023-10-02	26.16	8.71	52.57	0.29	64.09	18.19	10.37	0.12
276	2023-10-03	48.83	8.71	51.86	0.4	113.76	26.51	8.32	0.25
277	2023-10-04	71.93	9.42	66.95	0.86	172.37	28.97	8.49	0.93
278	2023-10-05	86.74	8.59	72.95	0.7	239.64	29.39	10.56	0.87
279	2023-10-06	76.1	8.94	51.69	0.59	185.4	28.89	11.91	0.71
280	2023-10-07	80.65	8.79	58.01	0.61	174.27	28.39	11.02	0.71
281	2023-10-08	74.27	8.9	43.71	0.52	157.73	28.26	10.6	0.39
282	2023-10-09	71.06	9.68	35.69	0.48	186.24	29.03	10.2	0.87
283	2023-10-10	74.58	9.28	25.38	0.28	141.73	30.02	9.79	0.75
284	2023-10-11	95.2	9.24	16.56	0.47	166.65	30.1	10.17	0.6
285	2023-10-12	94.42	9.82	33.95	0.46	168.13	30	11.27	0.5
286	2023-10-13	96.63	9.45	55.45	0.3	169.8	29.76	9.19	0.78
287	2023-10-14	80.91	8.94	49.82	0.33	141.62	29.02	8.87	0.85
288	2023-10-15	85.22	8.65	45.68	0.35	141.49	28.87	9.46	0.64

289	2023-10-16	81.85	9.53	61.93	0.37	72.64	29.52	9.49	82.37
290	2023-10-17	102.11	9.45	54.08	0.52	21.79	30.16	9.91	1.6
291	2023-10-18	65.05	9.4	18.05	0.36	95.44	30.21	10.13	1.29
292	2023-10-19	25.04	9.87	5.61	0.38	175.9	30.13	18.12	2
293	2023-10-20	48.31	8.8	13.73	0.31	179.04	30.16	28.75	2.61
294	2023-10-21	65.59	9.94	14.69	0.25	128.03	30.11	34.64	2.61
295	2023-10-22	65.14	9.31	14.69	0.12	112.79	30.12	41.28	1.46
296	2023-10-23	68.68	9.54	14.77	0.36	151.95	30.06	37.54	1.1
297	2023-10-24	87.13	9	14.62	0.42	114.4	30.21	42.47	0.75
298	2023-10-25	98.32	9.9	14.7	0.36	145.32	30.13	33.48	0.56
299	2023-10-26	88.7	8.94	14.64	0.3	130.16	30.23	24.55	0.54
300	2023-10-27	97.78	9.41	14.55	0.31	157.1	30.14	20.59	1.41
301	2023-10-28	113	9.68	12.89	0.25	181.09	30.2	17.96	1.5
302	2023-10-29	105.09	9.51	11.58	0.35	149.81	30.16	13.16	2.05
303	2023-10-30	81.84	10.14	10.93	0.32	133.78	30.08	16.87	1.48
304	2023-10-31	88.18	9.11	4.77	0.35	166.9	30.09	15.45	1.64
305	2023-11-01	75.82	8.85	23.11	0.16	123.09	30.18	12.43	2.03
306	2023-11-02	33.24	9.4	24.57	0.19	54.48	30.18	9.88	2.07
307	2023-11-03	30.75	9.54	36.48	0.15	46.41	30.11	10.54	1.23
308	2023-11-04	36.87	10.42	31.54	0.13	54.74	30.16	11.81	0.78
309	2023-11-05	42.18	4.43	19.89	0.44	71.26	30.17	14.3	1
310	2023-11-06	42.65	5.03	19.95	0.43	55.76	30.13	14.16	2.12
311	2023-11-07	71.14	4.81	20.08	0.53	90.04	30.2	20.46	2.33
312	2023-11-08	92.13	5.43	20.44	0.52	134.72	30.2	32.23	0.96
313	2023-11-09	92.05	9.02	20.13	0.58	152.86	30.18	34.77	0.94
314	2023-11-10	102.62	7.64	20.11	0.64	167.05	30.08	36.4	0.76
315	2023-11-11	119.58	6.73	19.56	0.72	200.4	30.08	34.02	0.72
316	2023-11-12	161.62	6.14	20.25	0.75	229.13	30.12	32.62	1
317	2023-11-13	148.66	6.57	23.24	0.84	216.23	30.18	34.35	1.19
318	2023-11-14	111.52	6.39	21.78	0.68	177.94	30.21	39.37	2.91
319	2023-11-15	86.65	6.95	17.56	0.46	128.08	30.14	25.51	1.47
320	2023-11-16	56.87	7.04	23.59	0.5	86.39	30.14	27.35	1.06
321	2023-11-17	62.33	8.17	18.79	0.53	88.1	30.16	36.03	1.18
322	2023-11-18	65.8	7.74	18.67	0.31	95.33	30.01	32.49	0.7
323	2023-11-19	57.02	7.02	19.83	0.33	68.78	30.15	30.18	1.12
324	2023-11-20	48.86	8.43	18.81	0.45	62.06	30.08	29.14	1.12
325	2023-11-21	53.89	6.93	19.08	0.51	54.46	29.84	25.77	0.69
326	2023-11-22	70.44	8.56	18.71	0.56	94.54	29.86	24.26	0.69
327	2023-11-23	92.56	10.42	21.35	0.61	119.62	30.06	24.7	2.08
328	2023-11-24	101.88	9.37	19.16	0.63	128.46	29.44	24.22	1.54
329	2023-11-25	115.8	7.75	19.45	0.66	175.28	28.98	24.47	246.94
330	2023-11-26	126.01	7.93	20.08	1.08	179.62	30.24	28.46	500
331	2023-11-27	102.76	7.79	20.31	0.68	149.74	30.16	20.94	246.84
332	2023-11-28	92.43	7.89	20.13	0.56	127.99	29.84	20.65	1.82
333	2023-11-29	105.4	6.71	17.87	0.59	154.49	30.12	18.21	1.73
334	2023-11-30	98.43	7.18	18.74	0.57	170.17	30.08	19.57	2.2
335	Average	64.92	16.25	24.96	0.5	116.3	30.1	13.03	4.81
336	24 hour average	60	80	80	2 (8 hour average)	100	400	100 (8 hour average)	5
337	Annual average Standard	40	50	40		60	100		
338	Maximum Value	161.62	45.59	72.95	1.94	439.38	45.17	42.47	500
339	Maximum Value At Time	2023-11-12	2023-02-18	2023-10-05	2023-06-28	2023-09-19	2023-02-17	2023-10-24	2023-11-26
340	Minimum Value	21.74	4.11	2	0.12	1.7	17.88	1.69	0
341	Minimum Value At Time	2023-04-01	2023-06-23	2023-07-20	2023-06-22	2023-04-26	2023-10-01	2023-09-13	2023-01-14
342	Valid Data Points	332	333	333	307	332	333	333	333
343	Total Data Points	334	334	334	334	334	334	334	334
344	Data Availability %	99.4	99.7	99.7	91.92	99.4	99.7	99.7	99.7

Remarks: The values of PM10 & PM 2.5 are exceeding the annual average standard limits.

Hindustan Petroleum Corporation Limited, Visakhapatnam

Ambient air quality monitoring

01.01.2023 to 30.12.2023

Obtained from realtime ambient air quality monitoring stations

S. No.	Date	CAAQMS - 3 - HLPH							
		NH3 (ug/m3)	O3 (ug/m3)	Benzene (ug/m3)	CO (mg/m3)	NO2 (ug/m3)	SO2 (ug/m3)	PM2.5 (ug/m3)	PM10 (ug/m3)
1	2023-01-01	11.08	13.09	0.13	0.51	11.89	13.47	23.19	80.2
2	2023-01-02	10.59	10.99	0.08	0.43	14.13	14.46	20.3	73.81
3	2023-01-03	10.65	12.6	0.11	0.52	14.76	14.38	23.25	93.89
4	2023-01-04	10.76	13.02	0.15	0.62	16.13	13.41	33.45	107.43
5	2023-01-05	10.14	19.77	0.15	0.76	14.33	12.86	48.71	149.74
6	2023-01-06	10.51	15.32	0.22	0.91	19.93	12.76	62.15	196.34
7	2023-01-07	16.53	18.49	0.22	0.87	21.17	27.32	54.73	171.86
8	2023-01-08	8.64	13.47	0.16	0.48	15.71	13.39	30.42	115.63
9	2023-01-09	8.59	10.91	0.13	0.65	18.59	16.16	37.7	144.93
10	2023-01-10	15.4	12.73	0.17	0.71	23.4	8.93	38.26	149.38
11	2023-01-11	22.36	12.9	0.26	0.91	25.96	21.63	49.39	176.85
12	2023-01-12	22.82	14.93	0.34	0.78	23.25	16.22	45.29	160.15
13	2023-01-13	27.31	13.01	0.31	0.7	20.8	16.09	33.76	121.23
14	2023-01-14	28.43	11.26	0.35	1	22.26	20.78	45.92	141.98
15	2023-01-15	24.89	15	0.28	0.64	16.94	19.41	25.11	87.66
16	2023-01-16	22.86	14.59	0.25	0.5	18.21	23.34	25.31	91.04
17	2023-01-17	23.18	11.02	0.26	0.64	20.15	19.73	36.07	119.28
18	2023-01-18	24.92	10.06	0.27	0.53	20.64	22.28	37.32	125.81
19	2023-01-19	25.79	10.81	0.18	0.6	21.2	16.95	40.57	133.23
20	2023-01-20	23.96	13.66	0.2	0.57	16.89	16.57	37.55	127.7
21	2023-01-21	23.64	14.25	0.05	0.69	17.55	10.36	41.44	132.54
22	2023-01-22	22.83	17.38	0.09	0.75	17.27	14.12	48.69	150.92
23	2023-01-23	23.06	13.09	0.13	0.67	18.57	11.58	40.36	134.53
24	2023-01-24	24.51	11.56	0.19	0.67	21.63	16.51	50.44	169.9
25	2023-01-25	25.72	12.06	0.25	0.73	24.22	14.47	65.6	210.21
26	2023-01-26	25.5	14.54	0.17	0.65	20.15	12.48	48.64	152.58
27	2023-01-27	24.67	9.88	0.21	0.75	30.25	13.05	53.09	193.09
28	2023-01-28	24.5	14.11	0.26	0.71	23.98	13.73	59.83	198.75
29	2023-01-29	23.61	15.82	0.5	0.55	15.76	15.39	43.15	141.68
30	2023-01-30	22.63	15.36	1.05	0.56	15.92	11.63	32.83	124.68
31	2023-01-31	21.57	21.47	0.07	0.57	16.61	14.2	35.38	130.39
32	2023-02-01	23.06	22.87	0	0.57	16.71	13.35	34.01	128.65
33	2023-02-02	23.35	16.45	0.04	0.64	20.6	13.3	42.54	158.41
34	2023-02-03	21.95	20.26	0.01	0.67	18.42	12.98	33.95	130
35	2023-02-04	22.87	13.83	0.02	0.66	27.42	13.01	41.46	142
36	2023-02-05	22.99	16.46	0.03	0.61	22.54	17.26	47.97	163.78
37	2023-02-06	23.87	6.9	0.03	0.8	24.35	14.25	57.53	178.56
38	2023-02-07	22.82	13.91	0.01	0.76	23.83	13.32	34.81	135.86
39	2023-02-08	23.69	13.55	0.01	0.66	24.01	28.29	30.78	115.69
40	2023-02-09	20.91	12.57	0.01	0.63	26.74	17.81	31.49	115.57
41	2023-02-10	20.91	13.74	0.02	0.59	24.58	18.73	26.41	107.8
42	2023-02-11	22.13	12.75	0	0.7	33.82	21.99	29.44	113.84
43	2023-02-12	22.69	11	0.01	0.98	40.34	23	41.4	140.01
44	2023-02-13	50.34	17.18	0.01	0.52	21.42	18.84	38.87	149.28
45	2023-02-14	45.36	18.71	0.03	0.7	23.14	17.6	55.15	198.48
46	2023-02-15	34.73	17.06	0.12	0.65	28.14	18.02	54.78	185.25
47	2023-02-16	31.52	13.55	0.15	0.54	25.33	17.91	43.83	154.62
48	2023-02-17	30.71	13.16	0.12	0.49	21.11	19.71	33.5	129.78
49	2023-02-18	29.39	13.88	0.06	0.37	16.93	17.69	26.41	104.14
50	2023-02-19	31.87	12.89	0.12	0.46	16.21	18.48	22.44	92.08
51	2023-02-20	24.84	11.08	0.16	0.52	17.79	18.59	21.99	94.35
52	2023-02-21	15.29	11.78	0.15	0.44	19.11	17.98	25.06	96.31
53	2023-02-22	15.61	12.42	0.18	0.6	23.22	17.28	31.89	121.12

54	2023-02-23	9.88	8.54	0.24	0.73	27.99	18.52	41.84	151.94
55	2023-02-24	18.8	7.59	0.21	0.62	25.42	17.51	38.67	142.24
56	2023-02-25	23.63	12.32	0.14	0.45	21.32	19.47	34.83	127.96
57	2023-02-26	23.98	8.73	0.3	0.68	18.51	18.97	30.19	117.39
58	2023-02-27	25.7	11.3	0.33	0.55	20.64	22.22	33.78	125.05
59	2023-02-28	19.5	13.14	0.15	0.6	21.1	12.85	37.02	147.06
60	2023-03-01	15.21	15.93	0.06	0.82	23.76	16.17	56.72	203.56
61	2023-03-02	16.81	12.99	0.19	0.77	23.78	18.32	52.34	197.75
62	2023-03-03	23.65	16.29	0.04	0.73	23.61	18.88	49.13	182.53
63	2023-03-04	18.12	17.47	0.05	0.68	21	17.05	49.26	179.91
64	2023-03-05	16.74	9.44	0.12	0.7	22.15	17.7	42.78	166.91
65	2023-03-06	19.36	12.15	0.07	1.13	25.55	17.48	52.95	203.5
66	2023-03-07	26.18	15.47	0.03	0.98	29.33	33.12	46.32	167.21
67	2023-03-08	9.86	14.8	0.02	0.73	28.25	18.42	37.87	139.47
68	2023-03-09	14	11.16	0.02	0.66	28.96	18.06	36.47	132.47
69	2023-03-10	32.12	22.95	0.02	0.51	29.74	17.63	31.37	128.23
70	2023-03-11	39.65	22.16	0.01	0.51	22.73	16.8	33.5	125.46
71	2023-03-12	38.18	20.47	0.16	0.6	29.53	18.01	36.84	119.03
72	2023-03-13	44.73	19.3	0.23	0.76	36.94	18.99	45.87	165.89
73	2023-03-14	42.14	18.04	0.2	1.04	32.96	17.87	56.75	189.96
74	2023-03-15	40.48	14.44	0.1	0.92	31.41	18.91	41.8	141.03
75	2023-03-16	29.23	7.58	0.18	0.6	25.99	19.08	28.2	105.97
76	2023-03-17	36.55	5.46	0.18	0.68	31.98	20.01	21.17	84.33
77	2023-03-18	33.98	8.15	0.15	0.64	25.15	19.3	19.38	79.61
78	2023-03-19	27.37	10.48	0.16	0.43	19.2	19.04	1.84	25.4
79	2023-03-20	39.33	8.89	0.12	0.34	19.79	18.7	6.04	40.95
80	2023-03-21	27.43	5.54	0.14	0.33	18.36	18.63	9.22	54.5
81	2023-03-22	21.61	7.77	0.16	0.46	20.65	17.26	8.61	45.24
82	2023-03-23	31.45	6.27	0.21	0.52	19.29	17.24	9.16	54.14
83	2023-03-24	34.48	5.67	0.25	0.53	29.36	18.15	15.93	74.52
84	2023-03-25	38.51	4.63	0.2	0.45	25.82	17.63	15.07	74.49
85	2023-03-26	29.81	6.74	0.24	0.71	30.94	17.07	17.16	92.21
86	2023-03-27	32.45	3.32	0.16	1.98	25.89	18.65	23.86	94.9
87	2023-03-28	30.49	4.67	0.2	0.69	25.26	19.03	19.51	96.38
88	2023-03-29	31.23	5.51	0.13	0.68	24	19.76	18.41	83.09
89	2023-03-30	23.25	4.76	0.15	0.71	27.74	18.82	21.67	97.56
90	2023-03-31	18.02	6.06	0.06	0.46	29.95	19.62	17.04	78.68
91	2023-04-01	17.86	5.6	0	0.46	25.57	18.62	12.68	76.73
92	2023-04-02	13.83	9.33	0.01	0.48	33.29	19.38	15.08	70.56
93	2023-04-03	30.42	8.93	0.02	0.54	38.8	20.08	22.32	91.18
94	2023-04-04	8.13	6.21	0.1	0.65	40.93	19.54	23.62	101.41
95	2023-04-05	6.4	7.4	0.18	0.66	45.49	19.56	18.7	89.95
96	2023-04-06	9.32	5.42	0.14	0.62	42.07	18.44	20.18	87.6
97	2023-04-07	17.65	6.56	0.14	0.5	25.17	16.36	14.91	79.31
98	2023-04-08	16.39	9.71	0.26	0.77	39.83	29.3	23.87	110.67
99	2023-04-09	34.14	8.42	0.32	0.99	50.48	21.44	28.76	123.12
100	2023-04-10	37.8	10.74	0.32	1	50.43	23.23	40.91	160.76
101	2023-04-11	32.14	11.9	0.35	0.9	54.12	23.39	47.45	196.7
102	2023-04-12	26.99	15.22	0.22	0.78	29.41	21.85	40.85	152.57
103	2023-04-13	24.87	16.01	0.37	0.95	39.7	23.47	48.04	189.1
104	2023-04-14	21.59	12.92	0.31	0.92	37.96	25.05	43.24	167.27
105	2023-04-15	21.6	20.15	0.34	1.16	37.99	21.84	54.89	209.01
106	2023-04-16	24.03	22.43	0.26	1.15	30.27	21.19	44.45	159.13
107	2023-04-17	20.94	18.75	0.27	0.93	35.21	21.52	43.97	169.01
108	2023-04-18	18.09	12.56	0.23	0.92	47.32	22.66	49.47	199.12
109	2023-04-19	18.85	10.95	0.19	1.24	48.54	23.62	45.24	110.63
110	2023-04-20	18.62	13.36	0.17	0.8	49.48	24.16	39.92	99.82
111	2023-04-21	19.57	16.5	0.15	0.68	31.87	19.1	32.51	86.81
112	2023-04-22	18.73	14.42	0.18	0.51	37.17	21.1	26.13	70.12
113	2023-04-23	19.85	13.08	0.09	0.41	18.27	16.7	10.86	43.5

114	2023-04-24	19.83	11.9	0.1	0.5	13.18	18.74	11.46	38.91
115	2023-04-25	20.43	10.15	0.07	0.52	13.48	18.99	11.51	39.62
116	2023-04-26	20.52	11.54	0.16	0.6	18.67	17.14	17.93	57.26
117	2023-04-27	19.58	11.86	0.18	0.66	22.81	18.93	24.48	74.47
118	2023-04-28	23.13	8.4	0.13	0.4	20.78	20.48	24.74	70.25
119	2023-04-29	22.81	11.87	0.16	0.44	23.73	18.67	23.79	70.31
120	2023-04-30	21.68	8.5	0.17	0.55	23.21	19.82	19.25	59.25
121	2023-05-01	17.81	10.14	0.08	0.37	15.56	16.48	7.87	31.41
122	2023-05-02	14.46	8.39	0.16	0.38	17.36	19.77	12.97	43.72
123	2023-05-03	13.61	6.8	0.13	0.4	20.95	17.47	7.11	32.92
124	2023-05-04	15.01	7.68	0.08	0.26	14.81	19.32	3.54	20.01
125	2023-05-05	15.01	6.49	0.21	0.47	19.29	19.14	10.55	40.42
126	2023-05-06	13.4	5.98	0.19	0.55	21.47	21.19	10.13	38.98
127	2023-05-07	10.9	8.46	0.16	0.72	28.14	22.38	16.65	53.58
128	2023-05-08	12.01	10.83	0.27	0.78	29.17	20.08	25.61	73.27
129	2023-05-09	16.06	12.44	0.15	0.47	27.74	19.1	28.16	78.93
130	2023-05-10	19.88	15.29	0.07	0.55	24.44	22.63	19.17	60.6
131	2023-05-11	17.28	8.6	0.08	0.34	15.38	17.99	12.3	38.63
132	2023-05-12	16.26	7.51	0.07	0.4	14.59	17.1	9.05	45.1
133	2023-05-13	16.98	7.96	0.31	0.57	29.19	19.36	31.59	70.98
134	2023-05-14	22.77	16.33	0.26	1.14	18.44	17.85	36.66	92.55
135	2023-05-15	29.45	13.62	0.51	1.42	27.17	12.91	48.31	117.95
136	2023-05-16	37.63	18.74	0.36	0.72	21.11	15.42	38.69	94.43
137	2023-05-17	51.48	20.49	0.02	0.32	12.07	20.28	18.34	56.84
138	2023-05-18	91.08	13.07	0.06	0.99	24.69	20.69	21.84	74.79
139	2023-05-19	52.68	11.55	0.1	0.83	27.14	17.83	20.59	68.25
140	2023-05-20	51.88	8.47	0.2	1.4	26.1	17.19	26.94	75.3
141	2023-05-21	196.6	13.43	0.06	0.75	35.08	10.38	24.65	73.47
142	2023-05-22	62.6	9.81	0.15	1.01	38.96	31.06	26.12	77.28
143	2023-05-23	19.07	12.65	0.18	0.9	32.37	16.47	21.87	72.69
144	2023-05-24	12.82	13.07	0.15	0.87	32.37	24.26	25.19	77.81
145	2023-05-25	11.85	14.83	0.16	0.58	39.05	25.24	30.75	86.89
146	2023-05-26	15.98	14.35	0.14	0.71	29.2	20.48	20.5	62.59
147	2023-05-27	19.01	14.57	0.31	1.49	31.16	22.3	36.74	98.37
148	2023-05-28	20.39	15.7	0.14	0.83	20.83	20.33	23.88	72.71
149	2023-05-29	29.97	14.37	0.19	0.87	25.31	21.77	27.48	79.13
150	2023-05-30	18.12	13.51	0.26	0.57	31.52	29.24	25.78	79.77
151	2023-05-31	19.33	15.72	0.22	1.4	33.57	22.18	31.69	95.69
152	2023-06-01	14.13	15.66	0.19	1.11	34.49	24.51	33.15	96.83
153	2023-06-02	16.06	15.4	0.28	1.46	31.33	19.09	39.4	108.65
154	2023-06-03	18.85	16.66	0.24	1.05	28.3	18.2	30.49	91.08
155	2023-06-04	19.4	15.96	0.16	0.69	24.77	19.18	22.11	70.52
156	2023-06-05	21.45	16.78	0.21	0.98	27.04	23.35	27.2	77.23
157	2023-06-06	20.37	16.39	0.38	1.16	30.58	19.07	34.75	101.34
158	2023-06-07	14.31	14.71	0.25	0.91	41.35	18.1	42.12	127.83
159	2023-06-08	22.61	15.44	0.41	0.92	41.13	21.76	35.57	106.27
160	2023-06-09	24.34	15.59	0.13	1.24	30.78	10.54	32.91	110.12
161	2023-06-10	10.1	8.75	0.2	0.58	47.42	10.95	30.75	96.71
162	2023-06-11	11.36	17.9	0.27	1.08	38.66	10.04	31.55	94.71
163	2023-06-12	12.37	13.56	0.13	0.58	33.91	10.68	22.93	77.12
164	2023-06-13	11.67	16.62	0.08	0.76	28	8	25.66	79.93
165	2023-06-14	4.27	15.55	0.12	0.47	26.31	10.02	32.93	77.96
166	2023-06-15	8.8	10.61	0.29	0.77	26.35	11.24	33.82	94.04
167	2023-06-16	37.13	15.08	0.26	0.82	44.1	10.7	35.94	107.82
168	2023-06-17	42.62	8.85	0.26	0.42	49.18	11.69	28.3	87.53
169	2023-06-18	43.56	12.22	0.08	0.5	46.02	10.99	30.23	90.59
170	2023-06-19	37.69	12.22	0.03	0.42	33.66	7.57	16.85	56.87
171	2023-06-20	30.3	9.06	0	0.51	30.57	10.47	24.66	72.36
172	2023-06-21	64.52	7.65	0	0.39	23.18	9.83	17.77	59.65
173	2023-06-22	68.42	9.45	0	0.61	25.8	10.58	20.8	66.43

174	2023-06-23	68.87	2.93	0	0.69	25.03	10.96	24.13	76.78
175	2023-06-24	138.08	1.65	0	0.32	17.32	12.02	17.44	61.49
176	2023-06-25	145.23	3.1	0	0.3	14.85	11.52	13.66	51.17
177	2023-06-26	143.61	4.59	0	0.32	23.02	12.77	16.82	62.69
178	2023-06-27	34.55	3.32	0.2	0.68	17.08	11.1	20.74	64.37
179	2023-06-28	36.4	11.13	0.6	0.68	17.23	11.5	23.25	70
180	2023-06-29	17.96	10	0.65	0.7	21.29	10.93	19.68	70.75
181	2023-06-30	35.18	8.65	0.65	0.75	18.95	10.22	24.82	75.89
182	2023-07-01	13.38	7.49	0.29	0.65	14.66	10.42	26.02	76.68
183	2023-07-02	6.33	5.57	0	0.42	9.81	10.65	27.87	82.65
184	2023-07-03	6.25	6.7	0	0.56	9.21	9.35	19.73	63.57
185	2023-07-04	10.03	6.75	0.15	0.42	11.56	10.56	17.47	63.9
186	2023-07-05	5.14	4.14	0	0.92	16.58	9.23	16.06	53.89
187	2023-07-06	5.4	5.82	NA	1.33	17.86	9.87	17.01	64.72
188	2023-07-07	3.89	5.72	NA	0.55	20.99	10.82	15.48	56.92
189	2023-07-08	4.28	4.82	NA	0.58	22.29	11	23.23	75.07
190	2023-07-09	7.08	5.03	NA	0.43	18.87	10.16	17.75	70.94
191	2023-07-10	17.1	9.44	NA	0.47	17.98	12.25	23.96	87.8
192	2023-07-11	44.12	10.6	0	0.35	9.12	11.84	18.56	69.2
193	2023-07-12	39.15	9.29	0.52	0.36	8.39	9.74	12.38	44.84
194	2023-07-13	39.54	6.7	1.23	0.74	9.72	11.99	17.38	78.4
195	2023-07-14	37.45	6.24	1.09	0.44	15.21	12.12	21.1	64.64
196	2023-07-15	36.28	7.98	1.15	0.7	12	10.91	17.54	57.93
197	2023-07-16	33.77	2.91	1.37	0.34	10.6	11.89	13.59	49.77
198	2023-07-17	31.85	5.49	1.32	0.28	9.44	13.7	27.69	68.42
199	2023-07-18	29.08	5.54	1.35	0.33	8.89	11.97	11.17	37.18
200	2023-07-19	28.39	7.55	0.89	0.43	8.23	12.43	18.48	41.71
201	2023-07-20	27.8	5.98	1.17	0.46	7.37	12.58	21.14	52.18
202	2023-07-21	31.41	6.56	1.74	0.79	7.11	13.48	29.08	63.37
203	2023-07-22	30.73	8.87	1.97	0.59	14.79	12.37	20.74	51.25
204	2023-07-23	28.07	6.1	1.87	0.6	19.77	11.91	23.37	50.15
205	2023-07-24	26.57	5.63	2.19	0.22	15.56	11.52	16.78	40.33
206	2023-07-25	26.67	6.67	1.83	0.29	13.21	10.61	6.14	25.06
207	2023-07-26	22.74	6.26	1.84	0.42	19.24	10.77	14.48	39.32
208	2023-07-27	25.05	12.69	1.2	0.5	14.58	11.46	6.49	30.72
209	2023-07-28	32.19	6.86	1.31	0.21	21.95	13.32	11.02	51.33
210	2023-07-29	54.66	5.04	1.75	0.25	22.98	11.06	17.73	57.62
211	2023-07-30	47.05	7.16	1.87	0.21	18.56	11.8	21.96	58.21
212	2023-07-31	35.95	5.7	1.32	0.29	22.13	10.22	20.86	61.39
213	2023-08-01	29.19	2.41	1.21	0.23	26.14	12.9	23.41	63.57
214	2023-08-02	31.22	4.22	2.19	0.61	22.48	13.13	20.21	52.34
215	2023-08-03	31.79	3.15	1	0.75	22.1	15.35	20.6	52.3
216	2023-08-04	33.95	6.08	1.08	1.28	21.09	14	26.11	66.7
217	2023-08-05	32.36	6.79	1.46	1.48	20.04	11.55	28.92	68.48
218	2023-08-06	31.2	6.68	1.17	1.94	19.45	10.95	26.02	64.95
219	2023-08-07	28.97	6.28	1.18	0.55	24.02	16.74	28.06	67.44
220	2023-08-08	29.15	10.53	1.62	1.84	30.43	11.19	45.91	132.69
221	2023-08-09	55.12	8.87	1.1	0.49	26.68	10.63	46.41	117.09
222	2023-08-10	34.71	5.59	1.63	0.4	21.68	9.47	36.81	85.12
223	2023-08-11	28.21	5.93	2.61	0.57	20.64	11.78	43.03	114.2
224	2023-08-12	21.06	12.89	1.33	0.6	22.5	8.81	43.54	92.22
225	2023-08-13	21.02	8.4	1.75	0.37	20.57	8.93	32	81.56
226	2023-08-14	19.2	8.63	2.3	0.57	17.24	9.03	32.33	89.95
227	2023-08-15	13.61	7.08	1.71	0.46	21.68	9.82	33.87	88.64
228	2023-08-16	13.91	8.65	1.12	0.41	20.23	9.95	27.2	82.45
229	2023-08-17	13.8	5.4	1.35	0.37	24.52	12.05	28.88	88.19
230	2023-08-18	14.46	7.22	1.19	1.52	18.81	8.99	23.4	61.25
231	2023-08-19	12.16	7.43	0.84	1.37	16.96	9.82	20.55	75.06
232	2023-08-20	8.8	5.7	0.62	1.13	17.26	9.79	21.46	60.49
233	2023-08-21	11.65	8.33	1.86	0.45	17.85	11.86	19.01	63.77

234	2023-08-22	11.78	10.41	1.38	0.67	18.73	9.03	28.65	121.98
235	2023-08-23	12.32	12.28	0.96	0.46	21.61	9.91	27.43	108.74
236	2023-08-24	14.52	9.17	1.8	0.42	18.77	9.53	24.42	83.98
237	2023-08-25	11.97	8.24	1.24	0.43	21.77	9.35	23.38	85.32
238	2023-08-26	8.19	5.05	1.43	0.62	19.9	8.77	17.65	76.78
239	2023-08-27	6.85	7.29	1.01	0.45	21.59	9.72	21.44	61.25
240	2023-08-28	9.15	7.26	1.7	0.7	19.02	9.32	38.03	107.75
241	2023-08-29	11.34	11.64	1.69	0.46	14.2	8.83	49.19	138.19
242	2023-08-30	11.52	10.7	1.64	0.43	14.21	9.2	56.08	187.2
243	2023-08-31	13.16	9.65	1.33	0.56	15.82	9.38	52.58	142.91
244	2023-09-01	15.48	9.92	1.35	0.5	18.84	9.24	48.59	125.78
245	2023-09-02	13.16	7.89	1.61	0.53	21.93	9.76	35.64	103.64
246	2023-09-03	12.6	10.77	1.51	0.56	17.22	9.47	27.55	80.13
247	2023-09-04	11.2	12.44	0.99	0.45	12.54	8.79	18.89	57.96
248	2023-09-05	11.42	13.29	1.07	0.37	10.97	10.82	15.24	50.81
249	2023-09-06	10.69	11.65	1.36	0.45	12.62	8.49	19.57	58.8
250	2023-09-07	9.27	10.8	1.53	1.02	22.92	9.51	30.04	89.15
251	2023-09-08	5.06	12.44	0.84	0.69	20.41	9.61	21.64	65.43
252	2023-09-09	5.39	12.3	1.36	0.69	24.72	13.64	17.32	52.82
253	2023-09-10	6.95	10.5	1.39	0.74	27.79	11.16	16.53	50.67
254	2023-09-11	49.69	6.72	2.02	0.36	21.08	13.85	22.3	63.98
255	2023-09-12	28.31	6.59	1.94	0.45	19.39	11.96	22.4	67.04
256	2023-09-13	14.96	7.5	1.17	0.41	19.77	10.6	24.23	66.45
257	2023-09-14	11.55	7.62	1.08	0.39	27.06	11.27	16.31	53.3
258	2023-09-15	15.66	8.39	1.24	0.88	24.92	13.13	24.57	78.53
259	2023-09-16	13.72	6.75	1.47	0.68	27.81	13.36	23.38	71.58
260	2023-09-17	12.01	8.12	1.68	0.52	20.23	12.82	25.97	78.85
261	2023-09-18	11.91	11.14	1.29	0.42	14.77	11.45	21.65	67.62
262	2023-09-19	12.13	7.06	1.54	1.16	23.72	9.66	34.63	95.45
263	2023-09-20	10.16	5.89	1.34	0.6	27.68	9.16	28.29	84.29
264	2023-09-21	9.95	6.74	1.51	0.55	25.03	12.53	25.22	76.37
265	2023-09-22	12.34	6.52	1.08	0.7	22.94	12.86	20.92	64.13
266	2023-09-23	13.27	6.54	1.62	1.11	21.89	12.94	20.81	62.52
267	2023-09-24	10.7	6.2	1.14	0.93	22.29	13.4	21.68	62.42
268	2023-09-25	12.11	6.5	1.77	0.93	21.12	11.77	19.63	66.6
269	2023-09-26	10.37	9.12	1.7	0.47	17.68	10.37	20.34	60.37
270	2023-09-27	12.92	7.48	1.02	0.42	18.36	10.52	13.22	50.67
271	2023-09-28	12.86	9.28	1.25	0.37	17.12	10.86	16.51	55.94
272	2023-09-29	11.7	6.22	1.37	0.36	21.58	11.15	16.41	58.8
273	2023-09-30	10.73	4.54	1.84	0.51	32.82	13.06	26.65	85.46
274	2023-10-01	12.86	8.46	1.43	0.38	25.97	11.42	18.49	61.24
275	2023-10-02	12.03	9.76	1.19	0.53	25.66	11.57	18.42	54.42
276	2023-10-03	13.27	6.3	2.96	1.38	31.61	13.23	36.38	92.75
277	2023-10-04	12.72	8.97	3.6	1	26.88	13.94	35.25	99.32
278	2023-10-05	11.6	10.83	2.77	0.75	26.51	12.48	49.21	147.39
279	2023-10-06	10.73	14.88	2.42	0.72	32.72	12.62	43.05	121.13
280	2023-10-07	13.5	12.86	1.83	0.63	26.96	11.47	41.68	118.17
281	2023-10-08	17.33	9.36	1.78	0.93	34.16	13.91	43.39	114.25
282	2023-10-09	16	10.19	1.37	0.69	29.56	12.98	35.77	99.95
283	2023-10-10	16.23	13.34	1.28	0.56	19.7	11.43	35.48	98.68
284	2023-10-11	15.65	12.99	1.41	0.62	20.39	9.69	50.27	131.96
285	2023-10-12	15.34	13.49	1.14	0.58	19.78	11.03	43.31	120.37
286	2023-10-13	16.88	11.24	1.22	0.54	19.14	10.99	39.93	112.73
287	2023-10-14	19.33	8.58	1.66	0.4	17.66	11.69	35.67	98.61
288	2023-10-15	22.14	11.62	1.37	0.54	18.93	11.15	34.7	98.94

289	2023-10-16	21.17	11.98	1.25	0.46	19.72	11.23	33.43	104.29
290	2023-10-17	19.2	15.47	1.76	0.65	22.44	10.49	52.19	134.03
291	2023-10-18	18.34	13.7	1.81	0.55	19.79	12.18	48.07	128.07
292	2023-10-19	16.52	13.42	1.33	0.56	18.22	11.25	45.96	121.16
293	2023-10-20	16.1	16.43	0.86	0.46	16.62	11.32	33.31	99.62
294	2023-10-21	13.85	17.83	0.42	0.33	24.2	9.49	31.09	97.78
295	2023-10-22	11.96	12.48	0.42	0.33	24.07	11.34	28.42	87.9
296	2023-10-23	13.12	12.47	0.93	0.34	16.89	12.06	22.63	74.2
297	2023-10-24	13.73	18.57	1.02	0.45	17.83	11.47	25.18	70.91
298	2023-10-25	13.4	13.59	1.21	0.53	17.75	11.42	26.66	73.57
299	2023-10-26	12.66	10.02	1.23	0.59	16.77	11.48	24.94	68.48
300	2023-10-27	11.89	11.92	1.05	0.44	18.63	10.14	30.33	83.86
301	2023-10-28	12.29	17.27	1.78	0.48	16.08	11.43	43.87	112.07
302	2023-10-29	13.93	15.36	1.27	0.56	16.53	10.63	36.07	95.27
303	2023-10-30	12.51	12.59	1.29	0.43	20.96	11.56	36.32	103.93
304	2023-10-31	12.45	14.87	0.94	0.44	17.96	11.14	29.1	90.15
305	2023-11-01	17.55	14.83	0.79	0.38	17.23	11.24	23.07	75.12
306	2023-11-02	28.49	12.19	0.37	0.3	16.03	11.06	4.95	39.16
307	2023-11-03	32.71	9.29	0.38	0.22	12.95	10.87	0.53	19.54
308	2023-11-04	27.93	9.83	0.71	0.26	13.39	10.73	1.11	18.25
309	2023-11-05	26.79	7.29	1.28	0.36	14.02	10.81	3.78	27.69
310	2023-11-06	29.82	10.92	0.78	0.31	14.8	10.47	5.61	33.97
311	2023-11-07	28.29	14.64	0.97	0.48	14.96	9.87	21	62.66
312	2023-11-08	20.53	15.04	1.87	0.57	16.48	10.1	34.19	97.55
313	2023-11-09	16.95	12.14	1.91	0.56	18.67	10.1	39.21	106.81
314	2023-11-10	14.97	11.06	1.73	0.59	24.29	10.35	47.31	126.5
315	2023-11-11	15.76	10.73	2.08	0.65	24.62	11.06	54.23	143.21
316	2023-11-12	16.23	12.17	1.9	0.68	22.57	10.72	84.06	194.75
317	2023-11-13	19.09	18.99	1.23	0.81	16.15	10.7	67.92	165.83
318	2023-11-14	17.21	22.03	1.04	0.63	17.81	9.39	46.52	120.42
319	2023-11-15	15.71	18.28	0.6	0.42	19.49	10.1	36.85	112.29
320	2023-11-16	16.48	14.4	0.59	0.32	15.09	10.73	21.3	73.2
321	2023-11-17	16.35	15.27	0.72	0.34	12.28	10.55	18.25	62.66
322	2023-11-18	16.05	10.26	0.62	0.37	12.52	10.12	13.08	52.92
323	2023-11-19	15.78	14.03	0.37	0.34	10.74	10.17	12.16	51.13
324	2023-11-20	15.01	15.18	0.35	0.23	16.46	9.9	15.4	67.03
325	2023-11-21	12.11	8.16	0.44	0.36	16.87	9.54	7.32	36.88
326	2023-11-22	13.04	14.14	0.89	0.5	15.36	12.17	18.28	59.85
327	2023-11-23	13.74	21.39	0.71	0.47	12.04	12.01	34.57	41.13
328	2023-11-24	14.8	25.25	5.85	0.5	14.47	12.53	35.76	45.76
329	2023-11-25	14.08	23.72	267.94	0.57	16.43	10.77	42.59	48
330	2023-11-26	13.71	24.77	500	0.58	17.53	10.01	42.33	48.55
331	2023-11-27	17.03	13.73	207.39	0.53	17.24	11.21	36.55	48.33
332	2023-11-28	16.77	14.77	0.93	0.52	14.94	10.24	30.04	41.25
333	2023-11-29	17.2	13.68	1.64	0.6	14.24	10.16	32.87	42.97
334	2023-11-30	11.77	16.17	0.98	0.51	12.48	9.75	35.45	44.73
335	Average	23.32	11.24	3.65	0.64	22.91	14.68	29.38	94.08
336	24 hour average Standard	400	100 (8 hour average)	5	2 (8 hour average)	80	80	60	100
337	Annual average Standard	100				40	50	40	60
338	Maximum Value	196.6	25.25	500	1.98	54.12	33.12	84.06	210.21
339	Maximum Value At Time	2023-05-21	2023-11-24	2023-11-26	2023-03-27	2023-04-11	2023-03-07	2023-11-12	2023-01-25
340	Minimum Value	3.89	1.65	0	0.21	7.11	7.57	0.53	18.25
341	Minimum Value At Time	2023-07-07	2023-06-24	2023-02-01	2023-07-28	2023-07-21	2023-06-19	2023-11-03	2023-11-04
342	Valid Data Points	334	334	329	334	334	334	334	334
343	Total Data Points	334	334	334	334	334	334	334	334
344	Data Availability %	100	100	98.5	100	100	100	100	100

Remarks: The values of PM10 & PM 2.5 are exceeding the annual average standard limits.

Photographs

1) Effluent collection tank of ETP – 4:



2) Effluent collection tank of ETP – 4:



3) View of ETP – 4:



4) Clarifier of the ETP – 4:



5) Mineral oil float in the clarifier of ETP – 4:



6) Clarifier of the ETP – 4:



7) Aeration tank of ETP – 4 with mineral oil:



8) Effluent storage tank with near brim-full oily effluents – ETP – 4:



9) Mineral oily scum in the aeration tank of ETP – 4:



10) Final clarifier of the ETP – 4 with mineral oil float:



11) Oily effluents in the storm water drain originating from ETP – 4 leading outside of the industry through oil-catcher tank:



12) Oily effluents in the storm water drain originating from ETP – 4 leading outside of the industry through oil-catcher tank:



13) Oily effluents in the storm water drain originating from ETP – 4 leading to outside of the industry after oil-catcher tank:



14) Oily effluents in the storm water drain originating from ETP – 4 leading to outside of the industry through oil-catcher tank:



15) Oil-catcher tank provided to the storm water drain originating from ETP – 4 to skim-out the oily effluents:



16) HAY filter provided to the storm water drain originating from ETP – 4:



17) Tanker provided to skim-out the oily effluents from the oil-catcher tank provided to the storm water drain originating from ETP – 4:



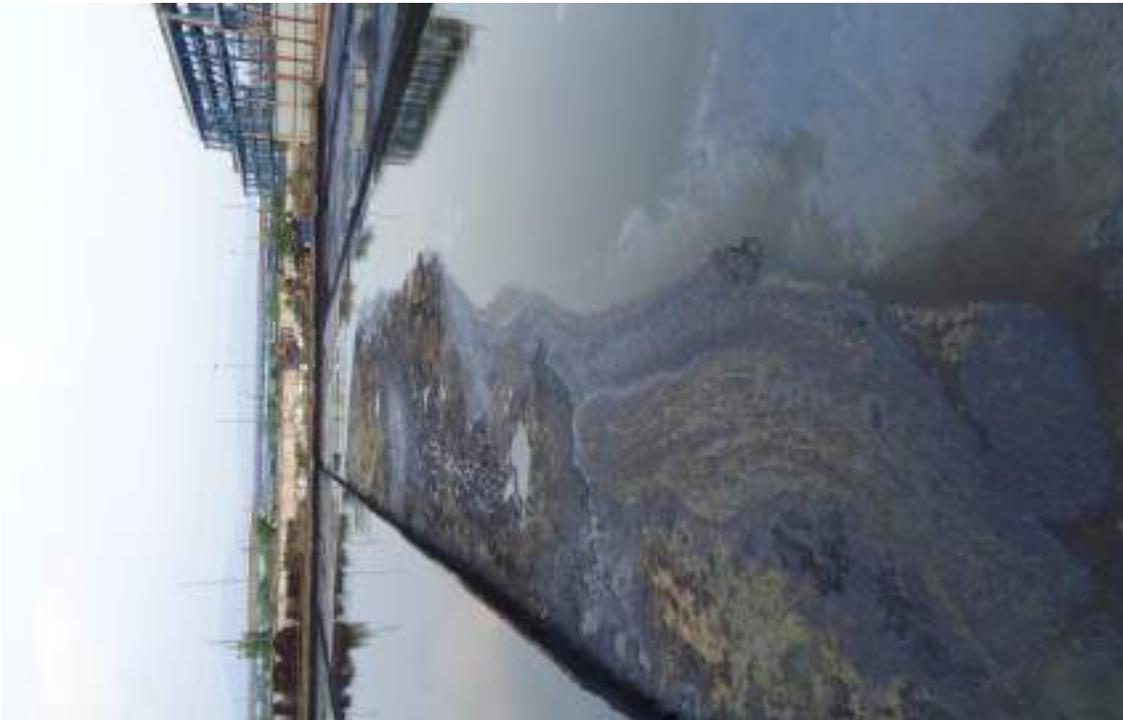
18) Oily effluents in the storm water drain originating from ETP – 4 after the industry premises:



19) Outlet of spent once-through cooling water joining the skimming ponds:



20) Mineral oil scum in one of the skimming ponds connected to once-through cooling water outlet:



21) Mineral oil scum in one of the skimming ponds connected to spent once-through cooling water outlet:



22) Mineral oil scum in one of the skimming ponds connected to spent once-through cooling water outlet:



23) High Oily Sludge storage facility:



24) High Oily Sludge storage facility:



25) Spillages at high oily sludge storage facility:



26) Storage facility with brim full high oily sludge and spillages:



27) Bitumen drums melting facility:



28) Bitumen drums melting facility:



29) Bitumen drums stored near drums melting facility:



30) Oily effluents in the storm water drain near high oily sludge storage facility and bitumen melting facility:



31) Collection of treated effluent sample at the outlet of guard pond of ETP – 4 during Joint Committee inspection:



32) Oil traces at the outlet of guard pond of ETP – 4:



33) Collection of water sample at the outlet of skimming pond of once-through cooling water during Joint Committee inspection:



34) Collection sample of combined outlet of ETP – 4 & once-through cooling water blow-down at MHF – 2 (final outlet of the industry) during Joint Committee inspection:



35) Traces of oil in the combined outlet of ETP – 4 & once-through cooling water blow-down at MHF – 2:

