BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL,

SOTHERN ZONE BENCH AT CHENNAI

ORIGINAL APPLICATION NO. 73 OF 2021

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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Dt: 17.06.2021

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

Report submitted to the Hon'ble National Green Tribunal, Southern Zone, Chennai on fire accident occurred in Crude Distillation Unit -3 of M/s. Hindustan Petroleum Corporation Ltd., (Visakh Refinery), Malkapuram, Visakhapatnam District on 25.05.2021 at 15:10 Hrs.

Preamble:

The Hon`ble NGT conducted hearing on 27.05.2021 in connection with OA No. 73 of 2021(SZ) and directed APPCB to furnish detailed report on the fire accident which was occurred at Crude Distillation Unit (CDU)-III in M/s. Hindustan Petroleum Corporation Limited (Visakh Refinery) on 25.05.2021 at about 15:10 Hrs. The copy of the Hon'ble NGT order dated 27.05.2021 in O.A. No. 73 of 2021 is enclosed at Annexure-1. The details of the industry and detailed report on the fire accident are submitted as below:

1. Details of the industry:

i.	Name and Address of the industry	M/s. Hindustan Petroleum Corporation Ltd., (Visakh Refinery), Malkapuram, Visakhapatnam District, Andhra Pradesh
ii.	Line of Activity	Oil Refinery (Mineral Oil or Petro Refineries) This industrial sector is one among the '17 categories of Highly Polluting Industries'. Listed at S.No. 4(a) of Schedule of EIA Notification, 2006.
iii.	Category of the industry	Red Category.
iv.	Date of commissioning of industry	**Refinery:** Visakh Refinery in May – 1957; Visakh Refinery Expansion Project–I in January – 1985; Additional Tankage Project in May – 1998; Visakh Refinery Expansion Project–II in August to December – 1999, Diesel Hydro De-Sulpurization in June – 2000; Visakh Refinery Clean Fuel Project – 2010; LPG & Propylene Mounded Storage System in April'2010; Flue Gas De-Sulpurization–I in July-2013; Flue Gas De-Sulpurization–II in December, 2013; Diesel Hydro Treatment Project in Feb-2015; Visakh Refinery Modernization Project in December-2019;
v.	Total area of the plant	Total Area: 890 acres (Leased from M/s.Visakhapatnam Port Trust)
vi.	Surroundings of the Industry:	**East:** M/s. Indian Oil Corporation Limited Terminal **West:** M/s.Coromandel Fertilizers Limited, M/s. Hindustan Zinc Limited, M/s. Alufluoride etc., **South:** 80 Ft. Road (Scindia to Gajuwaka road) followed by residential area of Sriharipuram & Malkapauram.

		North: M/s. Andhra Petro chemicals Limited. **Distance from Nearest Habitation:** Residential habitations on Southern side. **Distance from Nearest water body:** Meghadrigedda Surplus canal exists at a distance of about 1 Km which joins Bay of Bengal.
vii.	Extent of Green belt developed in Acres	45.0 acres and in addition, the industry has planted about 6.0 lakhs samplings in Greater Visakhapatnam Municipal Corporation limits.

2. Products & By Products:

This is a petroleum refinery of capacity of 10 Million Metric Tons Per Annum(MMTPA) of Crude oil. The industry was issued Consent for Operation and Hazardous Waste Authorization(CFO & HWA) by the Board vide order dt: 09.03.2021 with a validity upto 31.12.2025 for the following products:

S.No.	Products	Capacity (For 10 MMTPA crude)TPA
1.	Propylene	36,000
2.	LPG – domestic	6,43,000
3.	Naphtha	1,73,000
4.	Gasoline (Euro – VI)	16,55000
5.	Aviation Turbine Fuel(ATF)	1,20,000
6.	Superior Kerosene Oil(SKO)	5,21,330
7.	Diesel (Euro – VI)	37,86,670
8.	Furnace Oil(FO) @ 3.5% of Sulphur	16,62,000
9.	Furnace Oil(FO) @ 1.0% of Sulphur	2,37,670
10.	Bitumen	2,20,660
11.	Sulphur	56,370
12.	Refinery Fuel (fuel gas + fuel oil + Naptha for Gas Turbine Generators(GTGs))	7,41,670
	Total	**1,00,00,000**
	Captive power plant	121.20W

3. Details of fire accident occurred on 25.05.2021 and Environmental monitoring conducted by APPCB:

A fire accident was occurred in Crude Distillation Unit (CDU)-III of M/s.Hindustan Petroleum Corporation Limited (Visakh Refinery), Malkapuram, Visakhapatnam District on 25.05.2021 at about 15:10 Hrs. Immediately Emergency response and disaster management plan (ERDMP) of refinery was activated and fire fighting initiated. Fire call was given at 15.10 hrs and 6 Nos Fire tenders of M/s.HPCL(Visakh refinery) were pressed into firefighting operations. 8 nos Fire tenders with 48 member crew from AP State Disaster Response and Fire Service department, 4 nos Fire tenders with 26 member crew from Naval Dock Yard, 1 no Fire tender with 8 member crew from Vizag Port Trust and 1no Fire tender with 6 member crew from Hindustan Ship Yard came for necessary support and assistance in firefighting. These tenders were kept as stand by. The fire was completely extinguished and all clear was given at 16.15 hrs. The Joint Chief Inspector of Factories, Visakhapatnam has informed that the probable cause could be due to mechanical failure in the pipeline in Crude Distillation Unit-3 and the exact root cause will be established after thorough investigation by the Factories Department

who is prescribed authority and also informed that no injuries & causalities due to the accident.

After receiving the information from public about fire accident, officials of APPCB immediately rushed to the incident site by 15:40 Hrs along with scientific staff of Zonal Laboratory, Visakhapatnam and immediately started TVOC monitoring in ambient air about 10 m, 50 m & 100 m from the incident site and also carried out TVOC monitoring outside the industry premises. From the monitoring data it was observed that TVOC values recorded near to the incident area is ranging from 0.2 PPM to 7.4 PPM and outside the industry premises the maximum TVOC values recorded as 0.2 PPM. The Copies of the analysis reports are enclosed at Annexure-2. M/s. HPCL (Visakh Refinery) is operating 3 Continuous Ambient Air Quality stations at South gate, near HLPH and near Store yard. From the air quality data on 25.05.2021 (14.00 to 18.00 hrs) the following were observed:

a. At Southgate CAAQM station (South side to the Industry)
   - PM_{10} values increased from 202 $\mu g/m^3$ (14.00 hrs) to 319 $\mu g/m^3$ (17.00 hrs).
   - $PM_{2.5}$ values increased from 37 $\mu g/m^3$ (14.00 hrs) to 47.9 $\mu g/m^3$ (16.00 hrs).
   - NO_X values increased from 17 $\mu g/m^3$ (14.00 hrs) to 142 $\mu g/m^3$ (16.00 hrs) and reduced to 37 $\mu g/m^3$ (17.45 hrs)

b. At HLPH CAAQM station (Northeast side to the Industry)
   - PM_{10} values increased from 252 $\mu g/m^3$ (15.00 hrs) to 267 $\mu g/m^3$ (16.00 hrs).
   - $PM_{2.5}$ values increased from 26 $\mu g/m^3$ (14.00 hrs) to 30 $\mu g/m^3$ (16.00 hrs).
   - NO_X values increased from 15.8 $\mu g/m^3$ (14.45 hrs) to 59.7 $\mu g/m^3$ (15.45 hrs) and reduced to 34.3 $\mu g/m^3$ (17.45 hrs).

c. At Store yard CAAQM station (West side to the Industry)
   - PM_{10} values increased from 365 $\mu g/m^3$ (14.00 hrs) to 511 $\mu g/m^3$ (15.00 hrs) and reduced to 225 $\mu g/m^3$ (17.00 hrs).
   - PM2.5 values increased from 73 $\mu g/m^3$ (14.00 hrs) to 99 $\mu g/m^3$ (15.00 hrs) and reduced to 53 $\mu g/m^3$ (17.00 hrs).
   - NO_X values recorded 26.77 $\mu g/m^3$ (13.15 hrs) and increased to 35.49 $\mu g/m^3$ (17.30 hrs).

The copy of the monitoring reports are enclosed at Annexure-3.

Mobile lab of APPCB was also stationed in the down wind direction to record various parameters in the ambient air continuously. The copy of the monitoring reports are enclosed at Annexure-4.

Contaminated wastewater was generated due to fire fighting. Sea cooling water is used in the fire water network of HPCL-Visakh Refinery and the fire water used for fire-fighting operations collected in surface drains of CDU-3 is routed to Effluent Treatment Plant for treatment along with the other wastewaters. Water samples were collected during fire fighting operations from the drain were analysed and from the data it was observed that the TSS values are ranging from 820 mg/l to 1160 mg/l, COD values are

ranging from 156 mg/l to 184 mg/l, Oil & Grease values are ranging from 8 mg/l to 14 mg/l. The copy of the analysis report is enclosed at anneuxure-5.

The industry was directed to dispose the oily sludge generated in CDU-3 during fire incident to authorized agencies/ Treatment Storage Disposal Facility (TSDF) for safe disposal. The industry has 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 HPCL, about 25 Cr. worth of works have to be undertaken immediately to replace the damaged pipelines and machinery in CDU-III and about 78 MT of hydrocarbon was burnt in this fire incident.

The Collector & District Magistrate, Visakhapatnam has constituted a committee on 25.05.2021 and the copy of proceedings issued by the Collector & District Magistrate, Visakhapatnam is herewith enclosed as anneuxure-6.

The committee visited the place of incident on 28.05.2021 and physically seen the burnt pipelines and adjoining areas which were badly damaged due to the engulfing of fire Based on the inspection of committee members, interaction with the HPCL officials and statements collected from the eye witness, the cause of the outbreak of the fire is preliminarily identified that the 6" SR pipeline carrying bituminous at a temperature of 355°C to 400°C and an operating pressure of 16 kg/cm^2 has developed a hole of about 2.5" to 3" may be due to corrosion or erosion. The technical reasons for the corrosion or erosion are to be ascertained after conducting a detailed study on MOC (Material of Construction) of the pipeline. The bituminous with such higher temperature has escaped from the hole developed in the pipeline and due to auto ignition temperature (280°C for bituminous), it has released lot of smoke and subsequent fire with loud cracking sound. As the projectile of the fire is vertical, the pipelines passing at an height of 30 mts from the ground level got ruptured at six places and contributed more hydrocarbons to the engulfed fire. The type of the fire can be envisaged as Jet Fire followed by Pool Fire.

The committee also observed that as per the air pollution monitoring reports from three CAAQM stations operating by M/s.HPCL shows higher values of $PM_{2.5}$ and PM_{10} during the fire incident which indicates the considerable extent of air pollution within the plant premises. Due to continuous fire of about 65 minutes, might have increased the ambient temperatures to some extent and incremental adverse impact on various meteorological parameters.

The copy of the detailed report submitted by the Committee to the District Collector is herewith enclosed at anneuxure-7.

The report is filed for kind consideration.

Date: 17.06.2021

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

Annexure-1

Item No.01:

BEFORE THE NATIONAL GREEN TRIBUNAL

SOUTHERN ZONE, CHENNAI

Original Application No. 73 of 2021 (SZ)

(Through Video Conference)

IN THE MATTER OF:

Visakha Pawan Praja Karmika

Sangam, Andhra Pradesh ...Applicant(s)

Verses

Union of India and Others. ....Respondent(s)

Date of hearing: 27.05.2021.

CORAM:

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

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

For Applicant(s): Sri. Sravan Kumar

For Respondent(s): Mr. G.M. Syed Nurullah Sheriff for R1
Smt. Maaduri Donti Reddy for R4 to R6
Mr. Kumaresan represented
M/s. King & Patridge for R7

ORDER

1. As per order dated 25.02.2021, this Tribunal had admitted the matter and appointed a joint committee to go into the question and submit a report and the case was originally posted to 12.04.2021 for appearance of

parties, completion of pleadings and consideration of reports. On 12.04.2021, at the request of the parties, the same has been adjourned.

2. When the matter came up for hearing today through Video Conference, Sri. Sravan Kumar represented the counsel for the applicant. Sri. G.M. Syed Nurullah Sheriff represented 1st respondent, Smt. Maduri Donti Reddy represented respondents 4 to 6 and Mr. Kumaresan represented M/s. King & Patridge for 7th respondent.

3. The 7th respondent had filed their reply statement along with the documents. The other respondents pray for some time.

4. The counsel appearing for the State of Andhra Pradesh and the Andhra Pradesh Pollution Control Board (APPCB) submitted that they got the report ready. But it will have to be signed by the concerned members and they will be able to file the same, if some time is granted.

5. Considering the circumstances, we feel that some more time can be granted to the committee as well as the other respondents to file their statements.

6. In the meantime the applicant is at liberty to file their rejoinder to the statement submitted by the 7th respondent.

7. The applicant had also sent an e-mail with the copy of the news report published in the News Minute in their Website dated 25.05.2021 regarding a fire incident that occurred in the 7th respondent unit on that day.

8. The learned counsel appearing for the applicant submitted that this has happened on account of non-compliance of the conditions imposed by the Andhra Pradesh Pollution Control Board (APPCB) as well as in the environmental clearance.

9. The learned counsel appearing for the Pollution Control Board submitted that they had conducted inspection and they may be permitted to file a detailed report regarding the same as well.

10. The 7th respondent as well as the Pollution Control Board are directed to file their independent reports regarding this issue apart from filing their reply and the report in the main matter and this also can be considered along with the main matter if there is any violation found. For fixing the quantum of compensation if any to be levied.

11. The committee as well as the Pollution Control Board are also directed to take this also into consideration while assessing the environmental compensation if any to be assessed if there is any violation found.

12. The committee, the party respondents and including the applicants are directed to file the report and complete the pleadings on or before 28.06.2021 by e-filing in the form of searchable PDF/OCR Support PDF and not in the form of Image PDF along with necessary hard copies to be produced as per rules.

13. The Registry is directed to communicate this order to the members of the committee as well as the official respondents and also to forward a copy of the e-mail received with the news item in respect of the incident happened on 25.05.2021 mentioned above immediately through e-mail, so as to enable them to comply with the direction

14. For completion of pleadings and for consideration of report, post on 28.06.2021

.....J.M.

(Justice K. Ramakrishnan)

.....E.M.

(Shri. Dr. K. Satya Gopal)

O. A. No. 73/2021, (SZ)
27.05.2021, Sr.

ZONAL LABORATORY, VISAKHAPATNAM

D.No. 33-39-20/1/4, Behind RTA Office,
Madhavadhara VUDA Colony,
Visakhapatnam – 530 018.
e-mail:zovsplab-ses2@appcb..gov.in
Ph: 0891-2719480/380/481 Fax: 2719480

M. RAVI, M.Sc
SENIOR ENVIRONMENTAL SCIENTIST

AMBIENT AIR QUALITY MONITORING REPORT

Sample location/Address : In and around M/s. Hindustan Petroleum Corporation Ltd., (Visakh Refinery), Malkapuram, Visakhapatnam.

Date of monitoring : 25.05.2021

Monitoring conducted by : Zonal Laboratory and Regional Office, APPCB, Visakhapatnam.

S.No	Location	Time (Hrs)	TVOC (ppm)
Within the Industry premises			
1	About 10m from the incident area (CDU-III)	15.40	7.4
2	About 50m from the incident area	15.45	4.0
3	About 100m from the incident area	15.50	1.1
4	Near Security gate	15.55	0.2
Outside the industry premises			
5	Sriharipuram	16.10	BDL
6	Near HPCL main gate	16.15	0.2
7	Malkapuram	16.20	BDL
8	Malkapuram road, Near Yarada bus stop (Southeast corner of HPCL)	16.25	BDL
9	Scindia junction	16.30	BDL
10	Naval main canteen	16.40	BDL
11	Sathavahana Bus stop	16.50	BDL
12	Coromandel Back gate	17.00	BDL
13	North west corner of HPCL (Near Coromandel 5th gate)	17.10	BDL

BDL: Below Detectable Limit (< 0.1ppm)

Remarks:

The TVOC monitoring was carried out using hand held PID GAS DETECTOR (make: ION Science, model: Phocheck Tiger). *The detection Range of the instrument is: 0.1 to 20,000 ppm.*

M. Ravi

SENIOR ENVIRONMENTAL SCIENTIST

Online Pollution Monitoring Portal

Site Name: Hindustan Petroleum Corporation Limited.
From Date: 2021/05/25 To Date: 2021/05/25
Report Name: Custom Report
Report Created by RO_Visakhapatnam on 2021-05-26 19:39:52

Sl No.	Time	CAAMS_1_SOUTH_GATE-NOx_U	CAAMS_1_SOUTH_GATE-SO2_U	CAAMS_1_SOUTH_GATE-CO_U	CAAMS_1_SOUTH_GATE-PM10_U	CAAMS_1_SOUTH_GATE-PM2.5_U	CAAMS_1_SOUTH_GATE-Benzene_U	CAAMS_1_SOUTH_GATE-O3_U	CAAMS_1_SOUTH_GATE-NH3_U
1	2021-05-25 14:00	17.18	6.29	0.63	202.28	37.41	0.75	19.21	0.07
2	2021-05-25 14:15	22.63	6.47	0.57	202.28	37.41	4.25	17.05	0.07
3	2021-05-25 14:30	29.5	6.51	0.58	202.27	37.42	0	15.35	0.07
4	2021-05-25 14:45	24.93	6.42	0.64	202.56	36.93	0	13.32	0.07
5	2021-05-25 15:00	25.03	6.61	0.62	204.97	32.73	0	12.57	0.07
6	2021-05-25 15:15	67.8	7.26	1.03	204.95	32.7	0	8.81	0.07
7	2021-05-25 15:30	74.86	7.73	1.2	204.96	32.71	0	6.34	0.08
8	2021-05-25 15:45	87.58	8.87	1.37	228.27	37.07	0	4.63	0.07
9	2021-05-25 16:00	142.03	10.22	1.5	286.55	47.93	0	3.76	0.08
10	2021-05-25 16:15	118.6	10.45	1.52	286.55	47.92	0	3.33	0.08
11	2021-05-25 16:30	98.69	9.71	1.45	286.54	47.92	0	3.32	0.08
12	2021-05-25 16:45	88.52	9.21	1.41	289.84	47.45	0	3.38	0.07
13	2021-05-25 17:00	66.02	8.84	1.3	319.57	43.06	0	3.45	0.07
14	2021-05-25 17:15	68.96	8.93	1.29	319.57	43.06	0.75	3.82	0.08
15	2021-05-25 17:30	54.2	8.89	1.28	319.57	43.06	4.44	3.98	0.08
16	2021-05-25 17:45	37.19	9.49	1.09	307.96	41.95	0	5.01	0.08
17	2021-05-25 18:00	NA	NA	NA	NA	NA	NA	NA	NA
18	Prescribed Standards	0 - 80	0 - 80	0 -	0 - 100	0 - 60	0 - 5	0 - 100	0 - 400
19	Maximum Value	142.03	10.45	1.52	319.57	47.93	4.44	19.21	0.08
20	Maximum Value At Time	2021-05-25 16:00	2021-05-25 16:15	2021-05-25 16:15	2021-05-25 17:00	2021-05-25 16:00	2021-05-25 17:30	2021-05-25 14:00	2021-05-25 15:30
21	Minimum Value	17.18	6.29	0.57	202.27	32.7	0	3.32	0.07
22	Minimum Value At Time	2021-05-25 14:00	2021-05-25 14:00	2021-05-25 14:15	2021-05-25 14:30	2021-05-25 15:15	2021-05-25 14:30	2021-05-25 16:30	2021-05-25 14:00
23	Geometric Mean	63.98	8.24	1.09	254.29	40.42	0.64	7.96	0.07
24	Median	66.91	8.86	1.24	257.41	39.68	0	4.82	0.07
25	Standard Deviation	37.01	1.47	0.36	50.87	5.6	1.47	5.61	0.01
26	Valid Data Points	16	16	16	16	16	16	16	16
27	Total Data Points	17	17	17	17	17	17	17	17
28	Data Availablity %	94.12	94.12	94.12	94.12	94.12	94.12	94.12	94.12

Online Pollution Monitoring Portal

Site Name: Hindustan Petroleum Corporation Limited.
From Date: 2021/05/25 To Date: 2021/05/25
Report Name: Custom Report
Report Created by RO_Visakhapatnam on 2021-05-26 19:39:52

Sl No.	Time	CAAMS_2_Store_Yard-PM2.5_U	CAAMS_2_Store_Yard-SO2_U	CAAMS_2_Store_Yard-NOx_U	CAAMS_2_Store_Yard-CO_U	CAAMS_2_Store_Yard-PM10_U	CAAMS_2_Store_Yard-NH3_U	CAAMS_2_Store_Yard-O3_U	CAAMS_2_Store_Yard-Benzene_U
1	2021-05-25 14:00	73	3.96	29.89	0.49	365	71.95	6.04	0.14
2	2021-05-25 14:15	73	3.71	29.28	0.63	365	69.47	5.48	0.17
3	2021-05-25 14:30	73	3.48	32.7	0.44	365	67.42	3.55	0.11
4	2021-05-25 14:45	74.44	3.33	31.74	0.47	365	68.12	2.57	0.12
5	2021-05-25 15:00	99	3.32	31.02	0.55	511	69.45	2.6	0.11
6	2021-05-25 15:15	99	3.4	26.77	0.61	511	NA	NA	0.12
7	2021-05-25 15:30	99	3.38	25.94	0.62	511	NA	NA	0.13
8	2021-05-25 15:45	96.24	3.5	24.77	0.62	511	74.02	3.87	0.14
9	2021-05-25 16:00	52	3.87	22.32	0.62	219	75.65	4.68	0.09
10	2021-05-25 16:15	52	3.59	23.77	0.72	219	75.38	4.29	0.15
11	2021-05-25 16:30	52	3.76	26	0.75	219	74.36	2.54	0.17
12	2021-05-25 16:45	52.06	3.85	29.22	0.97	219	76.56	2.17	0.21
13	2021-05-25 17:00	53	4	30.71	1.07	225	76.62	1.8	0.19
14	2021-05-25 17:15	53	4.57	31.23	1.1	225	74.55	1.24	0.2
15	2021-05-25 17:30	53	4.11	35.49	1.13	225	73.19	1.58	0.25
16	2021-05-25 17:45	53.75	4.42	35.94	1.05	225	74.17	1.11	0.26
17	2021-05-25 18:00	NA	NA	NA	NA	NA	NA	NA	NA
18	Prescribed Standards	0 - 60	0 - 80	0 - 80	0 -	0 - 100	0 - 400	0 - 100	0 - 5
19	Maximum Value	99	4.57	35.94	1.13	511	76.62	6.04	0.26
20	Maximum Value At Time	2021-05-25 15:00	2021-05-25 17:15	2021-05-25 17:45	2021-05-25 17:30	2021-05-25 15:00	2021-05-25 17:00	2021-05-25 14:00	2021-05-25 17:45
21	Minimum Value	52	3.32	22.32	0.44	219	67.42	1.11	0.09
22	Minimum Value At Time	2021-05-25 16:00	2021-05-25 15:00	2021-05-25 16:00	2021-05-25 14:30	2021-05-25 16:00	2021-05-25 14:30	2021-05-25 17:45	2021-05-25 16:00
23	Geometric Mean	69.22	3.77	29.17	0.74	330	72.92	3.11	0.16
24	Median	63.38	3.74	29.58	0.62	295	74.1	2.58	0.15
25	Standard Deviation	19.45	0.38	3.98	0.24	123.65	3.12	1.57	0.05
26	Valid Data Points	16	16	16	16	16	14	14	16
27	Total Data Points	17	17	17	17	17	17	17	17
28	Data Availablity %	94.12	94.12	94.12	94.12	94.12	82.35	82.35	94.12

Online Pollution Monitoring Portal

Site Name: Hindustan Petroleum Corporation Limited.
From Date: 2021/05/25 To Date: 2021/05/25
Report Name: Custom Report
Report Created by RO_Visakhapatnam on 2021-05-26 19:39:52

Sl No.	Time	CAAMS_3_HLPH-NH3_U	CAAMS_3_HLPH-O3_U	CAAMS_3_HLPH-Benzene_U	CAAMS_3_HLPH-CO_U	CAAMS_3_HLPH-NOx_U	CAAMS_3_HLPH-SO2_U	CAAMS_3_HLPH-PM2.5_U	CAAMS_3_HLPH-PM10_U
1	2021-05-25 14:00	2.94	8.35	0	0.37	36.17	60.32	42	273
2	2021-05-25 14:15	4.85	6.63	0	0.38	25.53	56.78	42	273
3	2021-05-25 14:30	5.83	5.91	0	0.33	18.98	60.94	42	273
4	2021-05-25 14:45	6.15	5.04	0	0.33	15.81	56.4	36	254.33
5	2021-05-25 15:00	5.85	4.19	0	0.38	16.66	56.09	26	252
6	2021-05-25 15:15	1.89	2.43	0	0.42	32.2	54.05	26	252
7	2021-05-25 15:30	0	1.2	0	0.38	51.81	53.04	26	252
8	2021-05-25 15:45	0	1.6	0	0.4	59.76	52.07	27.75	265.24
9	2021-05-25 16:00	0	1.69	0	0.4	59.01	50.07	30	267
10	2021-05-25 16:15	NA	NA	NA	NA	NA	NA	NA	NA
11	2021-05-25 16:30	NA	NA	NA	NA	NA	NA	NA	NA
12	2021-05-25 16:45	NA	NA	NA	NA	NA	NA	NA	NA
13	2021-05-25 17:00	0	2.5	0	0.46	48.92	59.3	22	251
14	2021-05-25 17:15	0.04	2.4	0	0.4	44.61	49.68	22	251
15	2021-05-25 17:30	1.53	3.75	0	0.45	35.96	61.19	22	251
16	2021-05-25 17:45	1.92	3.64	0	0.46	34.35	80.86	25.71	186.78
17	2021-05-25 18:00	NA	NA	NA	NA	NA	NA	NA	NA
18	Prescribed Standards	0 - 400	0 - 100	0 - 5	0 - 2	0 - 80	0 - 80	0 - 60	0 - 100
19	Maximum Value	6.15	8.35	0	0.46	59.76	80.86	42	273
20	Maximum Value At Time	2021-05-25 14:45	2021-05-25 14:00	2021-05-25 14:00	2021-05-25 17:00	2021-05-25 15:45	2021-05-25 17:45	2021-05-25 14:00	2021-05-25 14:00
21	Minimum Value	0	1.2	0	0.33	15.81	49.68	22	186.78
22	Minimum Value At Time	2021-05-25 15:30	2021-05-25 15:30	2021-05-25 14:00	2021-05-25 14:30	2021-05-25 14:45	2021-05-25 17:15	2021-05-25 17:00	2021-05-25 17:45
23	Geometric Mean	2.38	3.79	0	0.4	36.91	57.75	29.96	253.95
24	Median	1.89	3.64	0	0.4	35.96	56.4	26	252
25	Standard Deviation	2.48	2.17	0	0.04	15.2	7.97	7.81	22.24
26	Valid Data Points	13	13	13	13	13	13	13	13
27	Total Data Points	17	17	17	17	17	17	17	17
28	Data Availablity %	76.47	76.47	76.47	76.47	76.47	76.47	76.47	76.47

A.P. POLLUTION CONTROL BOARD, ZONAL LABORATORY, VISAKHAPATNAM

CONTINUOUS AMBIENT AIR QUALITY MONITORING STATION-MOBILE VAN

Location : Ajanta colony, near Coramandel main gate (South west side to M/s HPCL)

Period of monitoring: 25.05.2021 to 26.05.2021

Time (hrs)	CO mg/m³	O3 µg/m³	NO µg/m³	NO2 µg/m³	NOx µg/m³	NH3 µg/m³	SO2 µg/m³	PM 2.5 µg/m³	PM 10 µg/m³	AT °C	RH %	WS m/s	WD deg	BP mmHg
18:00	0.6	92.9	3.9	10.5	14.5	8.8	20.2	24	101	34.9	34	0.4	226	751
19:00	0.6	103.5	4.7	9.8	14.5	13.7	32.2	34	121	34.9	35	0.6	220	751
20:00	0.6	105.4	5.5	12.2	17.8	39.6	34.1	37	139	34.7	38	0.6	161	751
21:00	0.6	103.9	6.3	13.3	19.6	29.5	28.6	45	171	34.6	43	1.9	199	751
22:00	0.8	95.3	7.5	16.2	23.7	35.8	26.5	56	177	33.6	49	0.8	186	751
23:00	0.8	98.4	6.6	16.5	23.2	28.8	21.0	44	134	33.0	53	0.5	156	751
0:00	0.7	101.1	5.5	22.7	28.3	24.6	25.4	39	114	32.7	52	0.5	118	751
1:00	0.6	108.4	8.0	28.6	36.6	32.3	26.2	34	119	33.2	46	0.8	198	750
2:00	0.6	107.8	5.5	14.1	19.6	34.7	27.0	39	132	33.8	40	1.0	202	750
3:00	0.6	107.2	8.1	26.7	34.8	35.4	29.1	38	128	33.5	41	1.4	214	750
4:00	0.6	105.6	10.1	30.3	40.4	32.1	28.0	34	127	33.3	40	1.4	192	750
5:00	0.7	102.3	8.7	24.6	33.4	24.2	29.6	28	116	32.6	41	1.3	196	750
6:00	0.8	105.1	8.5	24.6	33.1	31.9	29.1	34	122	32.6	41	0.9	190	751
7:00	1.3	101.1	7.1	30.3	37.4	7.4	16.8	54	155	32.7	43	1.0	180	751
8:00	1.4	120.1	4.2	13.7	17.9	8.6	14.7	51	167	34.5	41	1.5	194	751
9:00	0.9	160.7	3.0	12.6	15.5	15.7	14.9	34	143	37.2	34	1.7	236	750
10:00	0.7	155.8	4.6	32.5	37.1	37.5	12.3	27	130	39.3	29	1.6	234	750
11:00	0.9	159.2	5.3	39.5	44.8	30.5	8.4	29	114	40.2	28	1.6	228	749
12:00	0.7	158.4	3.8	30.1	33.9	32.1	6.3	27	107	41.3	25	1.5	232	748
13:00	0.4	153.1	3.0	14.5	17.4	31.9	13.1	21	114	42.6	23	1.3	234	747
14:00	0.5	146.8	3.3	14.9	18.2	33.7	20.7	17	117	43.1	22	1.1	230	746
15:00	0.4	145.0	4.7	19.0	23.7	35.8	18.6	15	88	42.9	22	0.8	221	746
16:00	0.5	147.0	7.5	22.7	30.3	39.5	20.4	16	75	42.5	22	1.1	220	746
17:00	0.5	139.2	6.6	19.0	25.6	37.4	19.4	14	70	42.1	25	0.9	216	746
Average	**0.7**	**121.8**	**5.9**	**20.8**	**26.7**	**28.4**	**21.8**	**33**	**124**	**36**	**36**	**1**	**203**	**750**
Minimum	0.4	92.9	3.0	9.8	14.5	7.4	6.3	14.0	70.0	32.6	21.6	0.4	118.0	746.0
Maximum	1.4	160.7	10.1	39.5	44.8	39.6	34.1	56.0	177.0	43.1	53.0	1.9	236.0	751.0
Capture	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NAAQ Stadard(24 hours aerage)	2*	100*	--	80	--	400	80	60	100	--	--	--	--	--

*CO and Ozone standard is for 8 hours average

M.Rao

SENIOR ENVIRONMENTAL SCIENTIST

A.P. POLLUTION CONTROL BOARD, ZONAL LABORATORY, VISAKHAPATNAM

CONTINUOUS AMBIENT AIR QUALITY MONITORING STATION-MOBILE VAN

Location : Ajanta colony, near Coramandel main gate (South west side to M/s HPCL)

Period of monitoring: 25.05.2021 to 26.05.2021

Time (hrs)	Methylmercaptan (ppb)	Ethylmercaptan (ppb)	Dimethylsulfide (ppb)	Carbon disulfide (ppb)	Diethylsulfide (ppb)	Dimethyldisulfide (ppb)	Diethyldisulfide (ppb)	2-methylpentane (ppb)	3-methylpentane (ppb)	2,4-dimethylpentane (ppb)	benzene (µg/m³)	cyclohexane (ppb)	2-methylhexane (ppb)	2,3-dimethylpentane (ppb)	3-methylhexane (ppb)	n-heptane (ppb)
18:00	0.0	0.0	0.4	0.1	0.3	0.5	0.4	3.4	0.0	0.0	0.3	0.0	0.0	0.1	0.0	0.0
19:00	0.1	0.0	0.4	0.0	0.3	0.5	0.4	0.3	0.0	0.1	0.6	0.1	0.0	0.1	0.0	0.4
20:00	0.2	0.0	0.4	0.0	0.3	0.5	0.4	0.8	0.1	0.2	1.1	1.5	0.0	0.4	0.0	0.4
21:00	0.2	0.0	0.4	0.0	0.3	0.5	0.4	0.8	0.1	0.2	0.9	1.8	0.0	0.4	0.0	0.0
22:00	0.2	0.0	0.4	0.0	0.3	0.5	0.4	0.9	0.0	0.0	1.5	0.8	0.0	0.0	0.0	0.1
23:00	0.1	0.0	0.4	0.0	0.3	0.5	0.4	0.8	0.0	0.1	1.6	0.8	0.0	0.0	0.0	0.0
0:00	0.0	0.0	0.4	0.0	0.3	0.6	0.4	0.9	0.2	0.3	0.2	0.3	0.0	0.4	0.6	0.1
1:00	0.0	0.0	0.4	0.0	0.3	0.5	0.4	0.7	0.1	0.0	0.1	0.5	0.0	0.2	0.9	0.1
2:00	0.0	0.0	0.4	0.0	0.3	0.5	0.4	0.7	0.1	0.3	0.1	0.2	0.5	0.9	0.4	0.1
3:00	0.0	0.0	0.4	0.0	0.3	0.5	0.4	0.6	0.1	0.6	0.2	0.3	0.3	0.9	0.6	0.2
4:00	0.0	0.0	0.4	0.0	0.3	0.5	0.4	0.7	0.1	1.0	0.2	0.0	1.0	1.9	0.0	0.3
5:00	0.0	0.1	0.4	0.0	0.3	0.5	0.4	0.7	0.1	1.0	0.2	0.0	1.0	3.5	0.0	0.4
6:00	0.1	0.1	0.4	0.0	0.3	0.5	0.4	0.6	0.2	0.7	0.1	0.0	0.9	1.9	0.0	0.5
7:00	0.0	0.1	0.4	0.0	0.3	0.5	0.4	0.3	0.1	0.3	0.2	0.6	0.3	0.9	0.1	0.2
8:00	0.0	0.0	0.4	0.0	0.3	0.5	0.4	0.5	0.0	0.0	1.6	0.6	0.0	0.0	0.0	0.0
9:00	0.0	0.0	0.4	0.0	0.3	0.5	0.4	0.8	0.1	0.1	2.0	0.5	0.1	0.2	0.0	0.2
10:00	0.0	0.0	0.4	0.0	0.3	0.5	0.4	1.0	0.1	0.1	1.2	0.2	0.1	0.2	0.1	0.1
11:00	0.0	0.0	0.4	0.0	0.3	0.5	0.4	0.7	0.1	0.3	1.0	0.1	1.1	0.1	0.1	0.2
12:00	0.0	0.0	0.4	0.0	0.3	0.5	0.4	0.9	0.2	0.4	0.4	1.7	0.1	0.3	0.2	0.5
13:00	0.0	0.0	0.4	0.0	0.3	0.5	0.4	1.3	0.2	0.5	0.4	0.0	2.2	0.1	0.0	0.4
14:00	0.0	0.0	0.4	0.0	0.3	0.5	0.4	0.8	0.2	0.5	0.5	0.0	1.0	0.1	0.4	0.3
15:00	0.1	0.0	0.4	0.0	0.3	0.5	0.4	0.6	0.1	0.3	0.5	0.0	1.2	0.0	0.0	0.3
16:00	0.0	0.0	0.4	0.0	0.3	0.5	0.4	0.6	0.2	0.3	0.4	0.0	1.2	1.5	0.0	0.3
17:00	0.0	0.0	0.4	0.0	0.3	0.5	0.4	0.3	0.1	0.3	0.4	0.0	1.0	0.8	0.0	0.3
Average	**0.1**	**0.0**	**0.4**	**0.0**	**0.3**	**0.5**	**0.4**	**0.8**	**0.1**	**0.3**	**0.7**	**0.4**	**0.5**	**0.6**	**0.1**	**0.2**
Minimum	0.0	0.0	0.4	0.0	0.3	0.5	0.4	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Maximum	0.2	0.1	0.4	0.1	0.3	0.6	0.4	3.4	0.2	1.0	2.0	1.8	2.2	3.5	0.9	0.5

A.P. POLLUTION CONTROL BOARD, ZONAL LABORATORY, VISAKHAPATNAM

CONTINUOUS AMBIENT AIR QUALITY MONITORING STATION-MOBILE VAN

Location : Ajanta colony, near Coramandel main gate (South west side to M/s HPCL)

Period of monitoring: 25.05.2021 to 26.05.2021

Time (hrs)	2,3,4-trimethylpenta (ppb)	methylcyclohexane (ppb)	toluene (µg/m³)	2-methylheptane (ppb)	3-methylheptane (ppb)	n-octane (ppb)	ethylbenzene (ppb)	m,p-xylene (ppb)	styrene (ppb)	o-xylene (ppb)	n-nonane (ppb)	n-propylbenzene (ppb)	1,3,5-trimbenzene (ppb)	1,2,4-trimbenzene (ppb)	n-decane (ppb)	1,2,3-trimbenzene (ppb)
18:00	0.1	0.0	2.1	0.0	0.6	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.2	0.1	0.9	0.3
19:00	0.0	0.0	7.0	0.0	0.0	0.0	0.2	0.3	0.2	0.0	0.0	0.1	0.6	0.2	1.9	0.3
20:00	0.0	0.1	26.8	0.0	0.0	0.0	0.2	0.5	0.2	0.0	0.0	0.0	1.4	0.2	3.9	0.0
21:00	0.0	0.1	34.8	0.0	0.0	0.0	0.1	0.4	0.2	0.0	0.0	0.0	1.7	0.2	4.0	0.0
22:00	0.0	0.0	21.8	0.0	0.0	0.0	0.1	0.3	0.2	0.0	0.0	0.0	1.9	0.2	4.2	0.1
23:00	0.0	0.4	23.5	0.0	0.0	0.0	0.1	0.3	0.2	0.0	0.0	0.0	1.7	0.2	3.8	0.0
0:00	0.0	5.3	0.0	7.7	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.7	0.1	1.7	4.6
1:00	0.0	0.0	0.0	4.9	4.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.3	8.0
2:00	0.0	0.0	0.0	0.0	8.0	0.2	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.3	7.4
3:00	0.0	0.0	0.0	0.0	12.0	0.2	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.8	0.4	8.6
4:00	0.0	0.0	0.0	0.0	20.1	0.2	0.0	0.1	0.0	0.2	0.0	0.0	0.1	1.6	0.5	10.3
5:00	0.0	0.0	0.0	0.0	17.5	0.2	0.0	0.1	0.0	0.2	0.0	0.0	0.1	1.6	0.5	10.5
6:00	0.0	0.0	0.0	0.0	12.7	0.3	0.0	0.1	0.0	0.2	0.0	0.0	0.1	1.7	0.6	10.8
7:00	0.0	0.0	6.0	0.0	5.9	0.1	0.1	0.3	0.1	0.2	0.5	0.0	0.9	1.0	2.5	5.0
8:00	0.1	0.0	13.3	0.0	0.0	0.0	0.2	0.7	0.1	0.0	0.0	0.0	1.5	0.3	3.3	0.0
9:00	0.1	0.1	13.2	0.0	0.0	0.1	0.2	0.9	0.1	0.2	0.1	0.0	1.9	0.4	3.6	0.0
10:00	0.1	0.1	8.6	0.0	0.0	0.0	0.1	0.5	0.1	0.1	0.0	0.0	2.3	0.3	4.2	0.0
11:00	0.1	0.1	6.1	11.9	0.1	0.1	0.1	0.5	0.1	0.4	0.0	0.1	3.2	0.4	5.6	0.1
12:00	0.0	0.0	0.1	24.0	0.0	0.0	0.3	0.7	0.2	0.4	0.1	0.0	3.0	0.4	5.5	0.1
13:00	0.0	0.0	0.1	13.2	0.0	0.0	0.1	0.5	0.2	0.3	0.1	0.0	3.1	0.4	5.8	0.1
14:00	0.0	0.0	0.0	10.9	0.0	0.0	0.0	0.1	0.0	0.3	0.0	0.0	3.3	0.3	6.2	0.2
15:00	0.0	0.0	0.0	9.5	0.0	0.0	0.0	0.1	0.0	0.3	0.0	0.0	3.5	0.3	6.3	0.2
16:00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	2.0	0.5	5.9	0.2
17:00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	2.3	0.5	5.5	0.4
Average	**0.0**	**0.3**	**6.8**	**3.4**	**3.4**	**0.1**	**0.1**	**0.3**	**0.1**	**0.2**	**0.0**	**0.0**	**1.5**	**0.5**	**3.2**	**2.8**
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Maximum	0.1	5.3	34.8	24.0	20.1	0.3	0.3	0.9	0.2	0.4	0.5	0.1	3.5	1.7	6.3	10.8

A.P. POLLUTION CONTROL BOARD, ZONAL LABORATORY, VISAKHAPATNAM

CONTINUOUS AMBIENT AIR QUALITY MONITORING STATION-MOBILE VAN

Location : Ajanta colony, near Coramandel main gate (South west side to M/s HPCL)

Period of monitoring: 25.05.2021 to 26.05.2021

Time (hrs)	Ethane-FID (ppb)	Propane-FID (ppb)	iso-Butane-FID (ppb)	n-Butane-FID (ppb)	trans-2-butene (ppb)	1-butene (ppb)	cis-2-butene (ppb)	cyclopentane-FID (ppb)	iso-Pentane-FID (ppb)	n-Pentane-FID (ppb)	trans-2-pentene (ppb)	1-pentene (ppb)	cis-2-pentene (ppb)	2,2-dimethylbutane (ppb)	2,3-dimethylbutane (ppb)	isoprene (ppb)	methylcyclopentane (ppb)	1-Hexene (ppb)
18:00	8.8	94.9	0.5	5.7	0.0	0.2	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.1	0.6	0.0	0.0	0.0
19:00	6.9	16.2	5.6	4.4	0.0	0.8	0.0	2.5	2.0	0.0	0.2	0.1	0.0	0.0	21.4	0.0	0.0	1.2
20:00	5.7	2.6	5.3	0.5	0.5	0.6	0.0	0.0	1.3	0.0	0.2	0.1	0.0	0.2	31.9	0.3	0.0	0.1
21:00	5.5	5.0	5.2	0.7	0.9	0.1	0.0	0.0	0.9	0.0	0.1	0.1	0.0	0.2	30.2	0.4	0.0	0.0
22:00	2.6	6.8	2.1	0.4	0.7	0.0	0.0	0.0	0.5	0.0	0.1	0.0	0.0	0.3	49.2	0.1	0.0	0.1
23:00	2.8	6.6	2.1	0.4	0.6	0.0	0.0	0.0	0.5	0.0	0.1	0.0	0.0	0.5	49.2	0.0	0.0	0.1
0:00	2.5	6.7	1.8	0.4	0.6	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.1	0.2	14.8	0.2	0.3	0.3
1:00	2.3	5.0	0.9	0.2	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.4	2.5	0.9	0.0	0.1	0.4
2:00	2.2	5.3	0.2	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.5	0.2	0.3	14.2	0.0	0.5	3.4
3:00	2.1	1.1	0.0	0.0	0.0	0.2	0.8	0.0	0.2	0.0	0.1	0.4	1.8	0.0	0.1	0.0	0.6	0.9
4:00	3.3	1.0	0.0	0.0	0.0	0.2	0.5	0.0	0.3	0.0	0.1	0.1	1.7	0.0	0.8	0.0	0.1	14.3
5:00	1.8	1.0	0.0	0.0	0.0	0.2	0.6	0.0	0.2	0.0	0.1	0.8	0.9	0.0	0.0	0.0	0.1	0.2
6:00	2.5	3.4	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.9	0.2	0.1	0.0	0.0	1.3	0.1
7:00	2.9	5.2	0.2	0.0	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.5	0.5	0.5	12.3	0.0	0.1	0.2
8:00	4.2	5.6	0.2	0.0	0.2	0.0	0.0	1.5	0.0	0.0	0.1	0.0	0.2	2.8	0.7	0.0	0.1	0.8
9:00	4.4	4.2	0.2	0.0	0.0	0.2	0.0	2.3	0.0	0.0	0.1	0.0	0.3	0.1	1.5	0.0	0.3	0.8
10:00	2.7	4.6	0.2	0.0	0.2	0.0	0.1	1.0	0.0	0.1	0.1	0.0	0.2	4.7	1.7	0.0	0.3	1.2
11:00	2.5	3.9	0.2	0.0	0.2	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.5	11.3	2.0	0.0	0.1	0.4
12:00	2.7	2.1	0.3	0.0	0.2	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.5	14.2	2.0	0.0	0.2	0.5
13:00	2.1	4.2	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	17.8	0.4	0.1	0.2	1.0
14:00	2.2	3.8	0.2	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.2	21.4	1.4	0.0	0.3	0.0
15:00	3.9	2.6	0.2	0.0	0.1	0.0	0.0	1.2	0.0	0.0	0.1	0.0	0.2	20.0	0.3	0.0	0.4	0.1
16:00	2.6	2.5	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.9	0.2	0.1	0.0	0.0	1.3	0.1
17:00	2.5	3.5	0.2	0.0	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.5	0.5	0.5	0.0	0.0	0.1	0.2
Average	**3.4**	**8.2**	**1.1**	**0.5**	**0.2**	**0.1**	**0.1**	**0.4**	**0.3**	**0.1**	**0.1**	**0.2**	**0.4**	**4.1**	**9.8**	**0.1**	**0.3**	**1.1**
Minimum	1.8	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	8.8	94.9	5.6	5.7	0.9	0.8	0.8	2.5	2.0	0.3	0.2	0.9	1.8	21.4	49.2	0.4	1.3	14.3

K.M. Rao

SENIOR ENVIRONMENTAL SCIENTIST

ANDHRA PRADESH POLLUTION CONTROL BOARD
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M.RAVI, M.Sc.,
SENIOR ENVIRONMENTAL SCIENTIST

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ANALYSIS REPORT

Sample No. : **2021 – 05 – E – 131, 131A, 131B & 131C**

Sample location/Address : M/s Hindustan Petroleum Corporation Ltd., (Visakh Refinery), Malkapuram, Visakhapatnam.

Sample Source : E-131 : Fire Fighting Water
E-131A : Fire Fighting Water
E-131B : Fire Fighting Water
E-131C : Fire Fighting Water

Sample collected on : 25.05.2021

Sample received on : 26.05.2021

Sample collected by : EE, AEE-1 & Analyst (OS), Regional Office, Visakhapatnam

Purpose of monitoring : Fire Accident occured at CDU-III

Sl. No.	Parameters	E-131	E-131A	E-131B	E-131C
1.	pH	7.19	7.02	7.54	7.32
2.	Total Suspended Solids	1162	880	840	820
3.	Total Dissolved Solids	50616	48100	49160	50220
4.	Total Organic Carbon (TOC)	73.8	65.6	68.8	62.4
5.	Chemical Oxygen Demand	184.0	164.0	172.0	156.0
6.	Oil & Grease	12	14	10	8

Note: - All values are expressed in mg/l except pH

M.Ravi

SENIOR ENVIRONMENTAL SCIENTIST

Annexure-6

MOST URGENT
Rc.No.1692/2021 D3, Dt:25.05.2021

Collector's Office,Visakhapatnam.

PROCEEDINGS OF THE COLLECTOR & DISTRICT MAGISTRATE, VISAKHAPATNAM
PRESENT: V. VINAY CHAND, I.A.S.,

@@@

Sub: **FIRE ACCIDENT**- Visakhapatnam District - Fire accident occurred in Hindustan Petroleum Corporation Limited, Distillation unit block No.3 of Malkapuram village at about at 3.15 PM ON 25.05.2021 – Constitution of **Committee to enquire and to submit detailed report– Orders** – Issued.

Read: 1) Report of the Revenue Divisional Officer, Visakhapatnam vide Rc.No.1/2021/D Dtd.25.05.2021 along with report of Tahsildar, Mulagada Mandal vide Rc.No.69/2021/SA Dtd.25.05.2021
2) Oral Instructions of District Collector, Visakhapatnamdt.25-05-2021.

@@@

ORDER:

Whereas, the Revenue Divisional Officer, Visakhapatnam in the 1st read above has reported that a fire accident took place in Hindustan Petroleum Corporation Limited, Distillation Unit block No.3 of Malkapuram village at about at 3.15 PM on 25.05.2021. After noticing the fire, all extinguishers and fire hydrants have been activated by the HPCL authorities and fire controlled within one hour due to the efforts of Fire, Revenue and Police departments.

On considering the above preliminary report, the following team is hereby constituted for causing a discrete probe into the mishap and to report (a) the cause of outbreak of fire in the factory (b) Whether sufficient required measures have been taken by the Management of the factory (c) Whether any negligence or lapses are noticed in avoiding the mishap on part of the Management (d) Whether any departmental failure is noticed and (e) Other issues related to the mishap if any.

S No	Name of the Officer	Designation	Committee
1	Sri Penchala Kishore	Revenue Divisional Officer and Sub-Divisional Magistrate, Visakhapatnam	Head of the Committee
2	Sri A Ramalingeswara Raju	GM, DIC	Member
3	Sri J. Shiva Shankar Reddy	Joint Chief Inspector of Factories, Visakhapatnam	Member
4	Sri B.V.S. Ram Prakash	District Fire Officer, Visakhapatnam	Member
5	Sri M. Pramod Kumar	Environmental Engineer, APPCB, Visakhapatnam	Member
6	Dr P Venkat Reddy	HoD of Chemical Engineering, IIPE	Member
7	Dr Pratibha Biswal	Associate Dean of Students Affairs and Assistant Professor Chemical Engineering, IIPE	Member
8	Prof. Chittibabu	Professor, Chemical Engineering Department, Andhra University	Member
9	Prof. P. Jagannadha Rao	Professor, Chemical Engineering. Department, Andhra University	Member
10	Dr Raka Mondal,	Assistant Professor, Chemical Engineering, IIPE	Member

The above committee shall enquire into the matter in detail and submit a detailed report within (07) days.

FOR COLLECTOR
VISAKHAPATNAM

To
The above District Officers
Copy to the Joint Collector, Asara & Welfare, Visakhapatnam.
Copy to the Tahsildar, Mulagada
Copy to the RDO, Viskahapatnam
Copy to the CC to Collector, Visakhapatnam

Annexure-7

REPORT OF ENQUIRY COMMITTEE ON HPCL-VISAKH REFINERY FIRE ACCIDENT OCCURRED ON 25-MAY-2021 AT ABOUT 15:10 HRS.

Submitted to

The Collector & District Magistrate
Visakhapatnam

1.0 PREAMBLE

A major fire accident was occurred in Hindustan Petroleum Corporation Limited (HPCL) Refinery in Visakhapatnam at Crude Distillation Unit (CDU)-III on 25-May-2021 at about 15:10 Hrs. On hearing the emergency siren blown by HPCL Management, huge numbers of workers were rushed to Main Gate of the Refinery and many people from adjoining areas have reached the Refinery. The entire situation became panic and the news was spread widely through the Media.

Followed by this incident, the Collector & District Magistrate, Visakhapatnam has constituted a team for conducting a discrete probe into the mishap and to report on the following terms of reference.

a) the cause of outbreak of fire in the factory
b) whether sufficient required measures have been taken by the Management of the factory
c) whether any negligence or lapses are noticed in avoiding the mishap on part of the Management
d) whether any departmental failure is noticed
e) any other issue related to the mishap, if any

The committee is headed by The Revenue Divisional Officer, Visakhapatnam and co-ordinated by The General Manager, District Industries Centre, Visakhapatnam.

The list of Committee members are given hereunder:

S.No	Name of the Member	Designation	Committee
1.	Sri Penchala Kishore	Revenue Divisional Officer, Visakhapatnam	Head of the Committee
2.	Sri A. Ramalingeswara Raju	General Manager, District Industries Center, Visakhapatnam	Member
3.	Sri J. Sivasankara Reddy	Joint Chief Inspector of Factories, Visakhapatnam	Member
4.	Sri B.V.S. Ram Prakash,	District Fire Officer, Visakhapatnam	Member
5.	Sri M. Pramod Kumar	Environmental Engineer, APPCB, Visakhapatnam	Member
6.	Dr. P. Venkat Reddy	HoD of Chemical Engineering, IIPE	Member

S.No	Name of the Member	Designation	Committee
7.	Dr. Pratibha Biswal	Associate Dean of Students Affairs and Assistant Professor, Chemical Engineering, IIPE	Member
8.	Dr. Raka Mondal	Assistant Professor, Chemical Engineering, IIPE	Member
9.	Prof. Chitti Babu	Professor, Chemical Engineering Department, Andhra University	Member
10.	Prof. P. Jagannadha Rao	Professor, Chemical Engineering Department, Andhra University.	Member

The team of the members visited the place of incident on 28-May-2021 after a preliminary interaction with the officials of HPCL in Conference Hall at 15:00 Hrs.

The team has collected the view point of the Management on the incident and noted down some salient technical features for further technical conclusion. Mr. Ramanathan Ramakrishnan, Chief General Manager (Operations), HPCL has presented the sequence of events of fire along with some technical points related to the occurrence of fire. The team has physically seen the burnt pipelines and adjoining areas which were badly damaged due to the engulfing of fire. The photographs of the site visit are given hereunder.

Fig.1 : Meeting of the Team with HPCL Officials

Fig.2 : Visit of incident site by Team Members

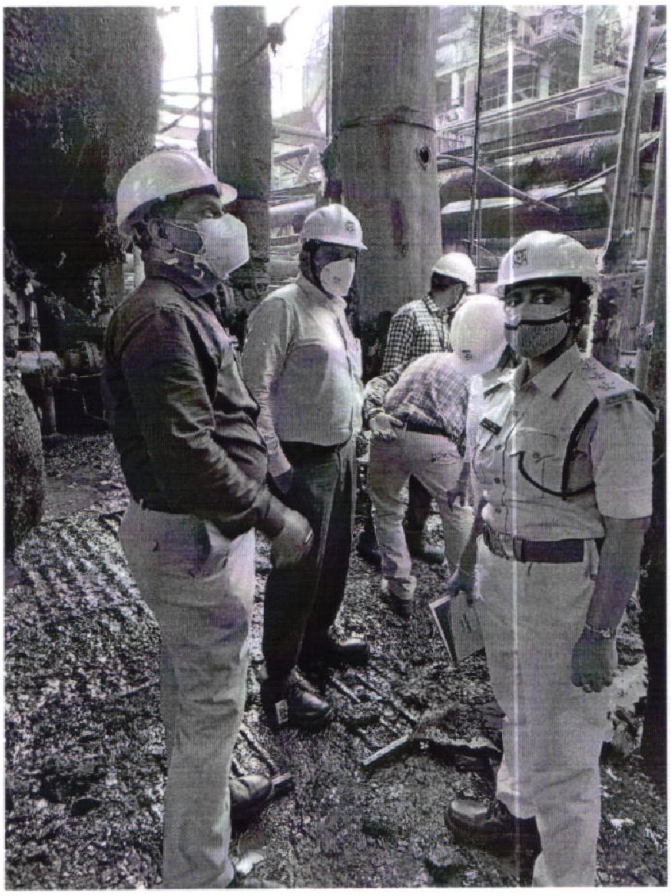

Fig.3 : Damaged area in CDU-III

The RDO has conducted a personal interaction with the employees witnessed the incident on the day of fire and the statements were noted which are placed in this report.

The team has taken due care in finding of the initial cause of the incident but some of the technical studies need to be conducted to ascertain the exact root cause of the mechanical failure of the pipeline carrying Bitumen for which a dedicated technical team from Mumbai is expected to visit the Refinery and conduct technical studies as per the statement of HPCL officials.

This report contains some recommendations for taking avoid repeat measures by HPCL officials. The team has found some deviations of statutory obligations by HPCL which are placed in this report.

The identification of lapses, some environmental consequences of the incident are depicted in this report along with necessary recommendations for implementation by HPCL.

2.0 IMMEDIATE ACTIONS TAKEN BY THE GOVT. OFFICIALS

Soon after the news spread out that there was a huge fire in HPCL Refinery, the official of District Administration i.e., Joint Collector (ASRA & Welfare) reached to HPCL premises at about 15:25 Hrs. as per the instructions of the Collector & District Magistrate. Consequently, the Revenue Divisional Officer, Jt. Chief Inspector of Factories, District Fire Officer, officials from the Industries Department & A.P.Pollution Control Board reached the premises and passed on necessary instructions to the fire combat team of HPCL. On hearing the news, Sri Muttamsetty Srinivasa Rao, Hon'ble Minister of Tourism & Development, Govt. of Andhra Pradesh has visited the factory and interacted with the higher officials of the HPCL. There are several habitations in the vicinity of HPCL. After noticing the fir accident, large group of people gathered on roads to access the impact of the accident. The District administration has conveyed the public around HPCL that the fire incident was limited to Crude Distillation Unit (CDU)-III only and there is no necessary for evacuation.

Due to the immediate action of the District officials as well as the fire team of HPCL, the duration of fire is drastically reduced to about 65 minutes which is, in fact, shows the efficacy of the collective effort. No casualties and injuries are reported out of this incident.

3.0 SEQUENCE OF EVENTS

The sequence of fire combat process on 25-May-2021 is as follows as per the inputs taken by HPCL officials.

Time	Sequence of Events
15:10 Hrs	Emergency message received on fire phone & RT Set
15:11 Hrs	Level-2 Emergency Siren blown
15:11 Hrs	Emergency turnout by F&S crew along with fire tenders (Equipment Tender, Foam Tenders VFT-72 & VFT-68)
15:13 Hrs	Fire Tenders reached the site
15:14 Hrs	Started opening fixed fire monitors and initiated firefighting operation
15:15 Hrs	Water spray system of CDU-III units operated – pump bay, Overhead accumulated drum (42-V-13) and LPG drum (42-V-14)
15:17 Hrs	Water spray system of 5 Nos. hydrocarbon tanks at south of CDU-3 operated
15:20 Hrs	DCP Tender reached site
15:22 Hrs	Fire at first and second floor of technical structure got extinguished using DCP tender
15:45 Hrs	One more Foam tender (VFT-71) reached site
15.50 Hrs	Foam tender from Naval Dockyard reports to the emergency location
15.51 Hrs	Jt. Chief Inspector of Factories reached the incident location and advised the emergency handling operations
15.55 Hrs	Foam tender from AP Fire services reported to the emergency location at South side of the CDU-III unit
16.00 Hrs	Foam tender from Vizag Port Trust reported to emergency location at East side of the CDU-III
16:15 Hrs	Fire was extinguished completely
16:15-16:24 Hrs	Search operation in CDU-III carried out and no casualty was found
16.24 Hrs	Hon'ble Minister of Tourism & Development, Govt. of Andhra Pradesh reached the location for review of the site condition
16:25 Hrs	All Clear Siren given
16:25-17:00 Hrs	Cooling operation carried out in the unit

4.0 DOCUMENTS SUBMITTED BY HPCL

During the interactive session, the team has asked HPCL officials the required documents for verification purpose. The list of documents are annexed after last page of this report for ready reference. The documents show that the periodical conduct of hydro test of the pipelines is due on August '2020. The management of HPCL has given the reason that the test was not conducted due to non-availability of the competent authority due to the prevailing COVID situation. The team considered it as a major deviation of statutory obligations laid on HPCL.

5.0 BRIEF INTRODUCTION OF HPCL

HPCL-Visakha Refinery was commissioned in the year 1956 as Caltex Oil Refining India Ltd. (CORIL). This was the first oil refinery on the East Coast of India and the first major industry in Visakhapatnam, Andhra Pradesh. CORIL was taken over by the Govt. of India and merged with Hindustan Petroleum in 1978.

Starting with a modest installed capacity of 0.65 MMTPA, the refinery has been expanded in phases to the current nameplate capacity of 8.3 MMTPA. Visakha Refinery is a Fuels based refinery generating major products of mass consumption like Petrol, Diesel and Kerosene. The refinery has a flexibility to process a wide range of crude oils procured across the globe and ranging from non-bituminous to bituminous and lube bearing crude oils.

Visakha Refinery Modernization Project (VRMP) envisages substantial expansion of the existing capacity of the refinery from 8.33 MMTPA to 15 MMTPA, which represents an increase in capacity by more than 25% (approx. 80%). It is also proposed to carry out revamp of existing MS and HSD product up-gradation facilities.

M/s. Hindustan Petroleum Corporation Limited, Visakha Refinery is an existing 2m(i) factory with R.No.2014 the manufacturing process in the factory is manufacturing of Petroleum Refinery with licence limits of 264132.44 HP electrical power and to employee maximum of 17000 workers. This factory comes under Major Accident Hazard (MAH) factory as per the inventories available in the factory as mentioned in the MSIHC rule 1989.

This factory has three Crude Distillation Units (CDU'S) in operation. The following are the capacities of Crude Distillation Units.

1	Crude Distillation Unit-I	1.8 MMTPA
2	Crude Distillation Unit-II	3.1 MMTPA
3	Crude Distillation Unit-III	3.4 MMTPA
	TOTAL	**8.3 MMTPA**

The present fire incident took place in Crude Distillation Unit-III

6.0 BRIEF DESCRIPTION OF CDU-III

Crude Distillation Unit-III is designed to produce Liquefied Petroleum Gas (LPG), Straight Run Naphtha (SRN), Heavy Naphtha (HN), Superior Kerosene Oil (SKO), Light Diesel (LD), Heavy Diesel (HD) and Reduced Crude Oil (RCO). The unit is also designed for special products like Aviation Turbine Fuel (ATF), Machine Turpentine Oil (MTO), Jute Batch Oil (JBO-I) & JBO-II. The CDU-III also comprises the Naphtha Stabilizer section and the Straight Run Naphtha (SRH) Caustic and Water Wash sections. The Vacuum Distillation Unit (VDU) is designed to process Reduced Crude Oil (RCO) from CDU and to produce Vacuum Diesel, Light Vacuum Gas Oil (LVGO), Heavy Vacuum Gas Oil (HVGO) and Vacuum Residue (VR).

The process flowchart of the CDU-III is presented in the Figure-4. The crude feed from offsite crude storage tank is fed to desalter after preheating in first stage PHT-I to around 129-136°C. In normal desalting process water will be mixed with crude in the upstream of mixing valve of the Desalter. On mixing, fresh water comes in contact with brine droplets and various water soluble impurities in oil. The water and oil mixture is then pumped into the Desalter vessel where the mixture is metered out at a low velocity into an electric field. The electric field causes the oil and water to separate. The Desalted Crude from Desalter (42-V-10) is pumped by Crude Booster Pumps (42- P-02 A/B) to PHT-II & III.

The existing incident was occurred at 6" SR pipeline which carries Bitumen at 340°C and 16 kg/cm^2 pressure. The pipeline is insulated one. The hydro test of the pipeline was conducted during the month of April '2016 since than it is overdue for hydro test.

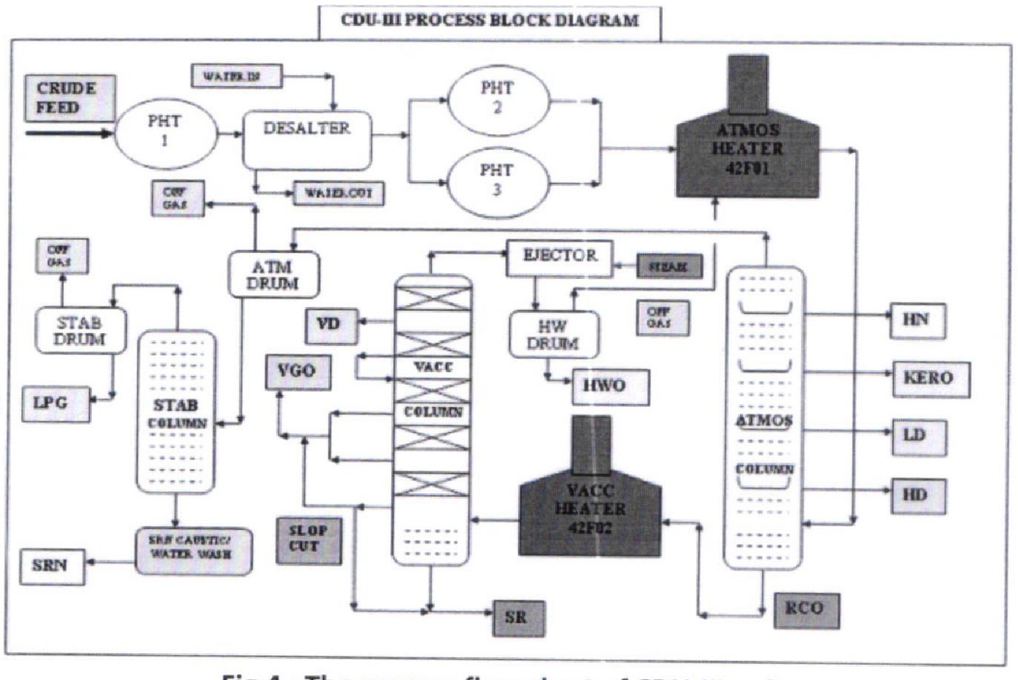

Fig.4 : The process flow chart of CDU-III unit

7.0 CAUSE OF OUTBREAK OF FIRE

Based on the inspection of team members interaction with the HPCL officials and statements collected from the eye witness, the cause of the outbreak of the fire is preliminarily identified that the 6" SR pipeline carrying Bitumin at a temperature of 355°C to 400°C and an operating pressure of 14 kg/Cm^2 has developed a hole of about 2.5" to 3" may be due to corrosion or erosion. The technical reasons for the corrosion or erosion are to be ascertained after conducting a detailed study on MOC (Material of Construction) of the pipeline. The Bitumin with such higher temperature has escaped from the hole developed in the pipeline and due to auto ignition temperature (280°C for bitumin), it has released lot of smoke and subsequent fire with loud cracking sound. As the projectile of the fire is vertical, the pipelines passing at an height of 30 mts from the ground level got ruptured at six places and contributed more hydrocarbons to the engulfed fire. The type of the fire can be envisaged as Jet Fire followed by Pool Fire. The pipelines burnt due to fire are shown as Figure Nos. 5 & 6.

7.1 INITIATION AND PROPAGATION OF FIRE (AS PER THE EYE WITNESS OF THE OPERATORS)

The Crude Petroleum is brought from the different places. The factory distills the crude in the three distillation units; On 25-May-2021, the Superintendents of production Sri B. Madhu and Sri Magatapalli. Prasad came to the duty at 08:00 AM. Along with them the four technicians also reported at the same time, whose names are S. Chandra Mouli, K. Ramesh, R. Nidesh and Y. Eswar Kumar. The four technicians attended the repair and maintenance works under the supervision of Sri B. Madhu, Superintendent Production and Sri. M. Prasad. The superintendent production worked on the DCS (Distributed Control Centre) operations from 13:30 Hrs. Sri B. Madhu was shifted to DCS operations and Sri M. Prasad attended for the supervision of technician works. At around 15:10 Hrs, the four technicians and Sri. M. Prasad who were working in CDU-III heard loud sound from the 4.05m to 5.0m level area pipeline, i.e., Vacresidue pipeline (SR line) and observed fire and smoke from Unit Central Pipe Track. Immediately, Sri M. Prasad passed on the message to the control room and they informed the incident to the safety & fire department. Then this department attempted to operate fire water hydrant points; while the crude oil supply was shut down (as per the standard operating procedure isolated unit battery limited valves). Immediately, the safety & fire department along with the fire tenders came to the spot and fire extinguishing operations were commenced. The fire tenders came from the State Disaster and Fire Services Department and also from other neighboring industries. Those were kept stand by for any potential emergency. The leftover crude in the pipelines was allowed to burn. The whole fire was extinguished by 16:05 Hrs. and all clear sirens were blown about 16:15 Hrs. After confirming that there were no injuries or casualties, the plant was kept in cooling operations up to 17:00 Hrs. It was again confirmed that in this fire incident there were no casualties and no injuries to the workers.

After the fire incident, it is found that the pipelines are ruptured in six places as mentioned here under

1. Vacuum residue pipe line (S.R. line) at a height of 4.0m from the ground;
2. Kerosene Line in 2nd floor;
3. Naphtha line in 2nd floor;
4. Diesel line in pipe line track in between 1st and 2nd floor;
5. Heavy Diesel line;
6. Atmospheric Column vapor line in fifth floor i.e., at a height of 30m from the ground.

As per the witness statements first fire occurred in Vacuum residue pipeline (SR line) at a height of 4.0 meters from the ground with a small sound followed by the heavy smoke and fire; accordingly, the fire caught on to the other pipelines as stated above. The fire from 4.0 meters level spread to the 2nd floor and raised up to 30m height atmospheric column in 5th floor. The fire at 30 meters height further increased 20m along with heavy smoke to its top level, which is about 50m from the ground.

8.0 CONSEQUENCES OF THE INCIDENT

About 78 MT of hydrocarbon was burnt in this fire incident. As per the information given by HPCL, about 24.25 Crores works have to be undertaken immediately to replace the damaged pipelines and machinery in CDU-III. The air pollution monitoring reports from three monitoring stations submitted by HPCL shows higher values of $PM_{2.5}$ and PM_{10} during the fire incident which indicates the considerable extent of air pollution within the plant premises. Due to continuous fire of about 65 minutes, the ambient temperatures might be increased to some extent and incremental adverse impact on various meteorological parameters.

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 conduced 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.

10.0 RECOMMENDATIONS

In view of the fire incident was occurred at HPCL -Visakha Refinery on 25.05.2021 at 3.10PM 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 the this type of fire incidents.
2. Industry shall ensure hydrant pressure of 7 kg/cm^2 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 time to time.
9. Industry shall clear accumulated trash and scrap regularly as the industry is under r expansion.
10. A detailed metallurgically /microstructural 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'able 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.

Annexure -I

The following are the attachments to the committee Report,

- ✓ Inspection History of 20" Atmospheric column overhead line and 06" short residue line.
- ✓ Inputs to JCIF.
- ✓ Chronology of events,
- ✓ Form No. 18-A
- ✓ Form 8 certificates and summary (TA-2016)
- ✓ Crude Distillation Unit – III (CDU – III) fire incident – Loss calculation,
- ✓ DCS Chart of atmospheric overhead pressure and temperature, SR flow and temperature
- ✓ Auto Ignition TEMPERATURES
- ✓ Testing Certificate,
- ✓ Photographs (02 No's),
- ✓ Statements,
- ✓ Crude Distillation Unit – III Process flow diagram,
- ✓ Mock Drills 02 No's (12-09-2020 & 12-02-2021).
- ✓ Offsite Mock Drill report dated 12-02-2021.

SIGNATURES OF ENQUIRY COMMITTEE MEMBERS

Sri Penchala Kishore
Revenue Divisional Officer, Visakhapatnam
Head of the Committee

Sri A. Ramalingeswara Raju
General Manager, DIC, Visakhapatnam
Member

Sri J. Shiva Shankar Reddy
Jt. Chief Inspector of Factories, Visakhapatnam
Member

Sri B.V.S.Ram Prakash
District Fire Officer, Visakhapatnam
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