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

Original Application No. 73 of 2021

IN THE MATTERS OF:

Visakha PawanPrajaKarmikaSangham .. Applicant

Versus.

Union of India &Ors. ... Respondent(s)

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Place: Visakhapatnam.
Dated: 10.11.2021

A. P. POLLUTION CONTROL BOARD

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

Action taken report with regard to NGT order dated 17.09.2021 in O.A No. 73 of 2021 filed by Visakha Pawan Praja Karmika Sangham , Malkapuram, Visakhapatnam in the Hon'ble NGT, Sothern Zone bench at Chennai against M/s Hindustan Petroleum Corporation Limited(Visakh Refinery), Malkapuram, Visakhapatnam:

The APPCB, Regional Office, Visakhapatnam submitted status report to the Board Office on 06.04.2021 to review M/s.HPCL (Visakh Refinery) before External Advisory Committee (Task Force) and to issue directions for non-compliance of the Board's conditions/directions. The APPCB Board Office conducted legal hearing before the External Advisory (Task Force) Committee meeting on 22.07.2021 and reviewed the compliance status of the industry. The External Advisory Committee (Task Force) recommended to issue directions to the industry for Non-compliance of previous Board directions dated 19.03.2020. The APPCB issued specific directions to the industry vide order dated 12.08.2021 under Section 33(A) of Water (Prevention & Control) Amendment Act, 1988 and under Section 31(A) of Air(Prevention & Control) Amendment Act, 1987 in the interest of Public Health and Environment and also directed the industry to renew the Bank Guarantee of Rs. 64 Lakhs and to pay Environmental compensation as recommended by NGT committee. The copy of the directions order dated. 12.08.2021 is herewith submitted as Annexure-1. The Latest Compliance report submitted by the industry is herewith submitted as Annexure-II.

As per CFE expansion Order dated: 06.07.2016, the condition No. 16 of schedule – B, "*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***". In compliance to the green belt condition the industry has planted 6,50,000 saplings under "Green Visakha Programme" and achieved 100% target.

ENVIRONMENTAL ENGINEER

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

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

Phone:0866-2463200.
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Order No. 702/APPCB/UH-II/TF/VSP/2020- **Date: 12.08.2021.**

DIRECTIONS

Sub: **PCB - TF-HO** - M/s. Hindustan Petroleum Corporation Ltd., (Visakha Refinery & DHT Plant), Malkapuram, Visakhapatnam District – Non-Compliance of Board Directions - Inspection and monitoring of your industry by the Hon'ble NGT Committee in O.A.No. 73/2021- Legal hearing held on 22.07.2021 – **Directions – Issued** – Reg.

Ref:
1. Consent Order No: APPCB/VSP/VSP-72/CFO/2016, dt.18.12.2019 valid upto31.12.2020 and Auto renewal order dated 09.03.2021 valid upto 31.12.2025.
2. Direction Order No. 702/APPCB/UH-II/TF/VSP/2020, dt: 19.03.2020.
3. Inspections of Board Officials on 16.07.2020 & 30.11.2020 under randomizedinspections.
4. The order of the Hon'ble NGT, Sothern Zone bench at Chennai in OA.No. 73 of2021 filed against dt 25.02.2021
5. The inspection of the committee constituted by NGT on March 25th-27th 2021.
6. The fire accident occurred on 25.05.2021 at 15.10 hrs in Crude Distillation Unit
-3 of M/s. HPCL (Visakh Refinery & DHT Plant)
7. Hon'ble NGT Committee report in O.A.No. 73/2021, received through mail.
8. EAC meeting held on 22.07.2021.

* * *

WHEREAS you are operating the Petroleum Refinery in the name & style of M/s. Hindustan Petroleum Corporation Ltd., (Visakha Refinery) is located at Malkapuram, Visakhapatnam District.

WHEREAS the Board vide reference 1st cited, has issued CFO & HWA order to the industry vide order dated 18.12.2019 and auto renewal was issued vide order dated 09.03.2021 for the period up to 31.12.2025 for production of Diesel (Euro-VI), Gasoline, SKO, ATF, LPGetc., by using 10 MMTPA Crude.

WHEREAS the Board vide reference 2nd cited, issued directions to the industry vide order dated 19.03.2020 for non-compliance of Board directions.

WHEREAS the Board officials inspected the industry on 16.07.2020 & 30.11.2020 under randomized inspections and reported the following non-compliance -

a. The Board has stipulated Load based standards for the stack emissions. However there is no provision for measurement of emission flow rate / volume in the stacks and has to be displayed along with other parameters in the website so that the loads of various parameters is directly displayed in the website. The industry is required to provide flow measurement with online display of pollutant load for all the stacks in the APPCB website instead of the pollutant concentration as being displayed now.
b. The online monitoring system for the stack attached to BHT heater and the CAAQM station at south gate was verified for comparison of analog signal, range and the digital reading. observed variations between the display values and values calculated from analog data,Hence the instruments requires proper calibration and fine tuning. The above exercise is required to be taken up at regular intervals to verify the calibration of the online equipment.
c. Dense black emissions from the flare stack were observed indicating emission of unburnt hydro carbons. The designs of the flare stacks are required to be checked and modified.
d. The industry may be prescribed with specific standards in the consent order for the

parameters of H_2S, Hydro carbon (HC) and other products stored in the premises in the Ambient Air.

e. The industry is consented to draw of 500 MLD of sea water for cooling purpose. The actual present average drawl is around 230 MLD and most part of it is being discharged into open drains as against the CFO condition of discharge into sea. This needs to be examined critically as huge quantity of sea water discharged into fresh water inland drains is not desirable. The industry is required to discharge the once through cooling water and cooling tower blow down water into the sea through scientifically designed marine pipeline instead of discharging into open drains duly obtaining required statutory permissions like CRZ clearance, Environmental clearanceand etc.,
f. The industry informed that they have provided cooling towers to reduce the once through cooling water consumption. However the same quantity of 500 MLD is mentioned in the consent order against the actual average consumption of around 230 MLD. Similarly cooling blow down after treatment is mentioned in the consent is 218 MLD and there is no quantification of the cooling water discharged out. This may be examined for revision.
g. The industry is consented for usage of 732 KLD and discharge 630 KLD for domestic purpose. However the industry has provided 2 STPs (15 KLD + 25 KLD) for treatmentof domestic wastewater. This may be examined for revision in the consent order.
h. The industry is consented to discharge around 13 MLD of treated effluents and currently discharging around 5 MLD (average) of treated effluents along with salt water into open drains. The industry requires to explore the possibility of recycling at least part of the effluent discharges to conserve water resource.
i. As per design, the ETP-II outlet is required to be taken into inlet of ETP-IV. However a bypass is existing to discharge part of partially treated effluents through outlet to outside the premises. This bypass arrangement is required to be closed immediately.
j. The industry may be recommended to store used chemical drums in closed sheds.
k. There is further scope for development of Green Belt in the vacant areas.
l. The record keeping pertaining to generation, storage and disposal of High oily sludge and low oily sludge needs to be improved and properly documented. The Bio remediation process of oily sludge requires to be scientifically evaluated as there is considerable decomposition of oily matter in the Bio remediation process and the effects of end products liberated needs to be examined.
m. There is scope for improvement of Bio-remediation pond management as certain spillages on ground were observed.

WHEREAS the Visakha Pawan Praja Karmika Sangham, Malkapuram, Visakhapatnam vide reference 4th cited, has filed a case in the Hon'ble NGT, Sothern Zone bench at Chennai in OA.No. 73 of 2021 against M/s.Hindustan Petroleum Corporation Limited (HPCL), Malkapuram, Visakhapatnam on pollution problems.

WHEREAS the Hon'ble National Green Tribunal (NGT), Southern Zone, Chennai in the matter of O. A. No. 73 of 2021 has passed an order dated February 25, 2021 and the operative portion as follows:

> *... In order to ascertain the genuineness of the allegations made in the application andits impact and the remedial measures if any to be taken, we feel it appropriate to appointa Joint Committee comprising of (1) a Senior Officer from Ministry of Environment, Forests and Climate Change (MoEF & CC) Integrated, Regional Office, Chennai, (2) a Senior Scientist from Central Pollution Control Board (CPCB), Regional Office, Chennai , (3) a Senior Scientist having some experience in Petroleum Pollution from Andhra Pradesh State Pollution Control Board (APPCB) and (4) a Scientist having experience in Petro-Chemical activities from Indian Institute of Chemical Technology (IICT) under the Council of Scientific & Industrial Research (CSIR), Hyderabad to inspect the unit in question and submit a factual as well as action taken report, if thereis any violation found....."*

WHEREAS the above committee vide reference 5th cited, visited M/s. Hindustan Petroleum Corporation Limited (HPCL), Malkapuram, Visakhapatnam, Andhra Pradesh known as Visakha Refinery during March 25-27, 2021 and observed non-compliances of the Board directions.

WHEREAS vide reference 6th cited, a fire accident occurred on 25.05.2021 at 15.10 hrs in Crude Distillation Unit -3 of M/s. Hindustan Petroleum Corporation Ltd., (Visakh Refinery & DHT Plant), Malkapuram, Visakhapatnam District. The officials of RO, Visakhapatnam attended the fire accident along with scientific staff of Zonal Laboratory, Visakhapatnam immediately and observations are as follows:

a. The officials of RO, Visakhapatnam immediately started VOC monitoring in

ambientair in the surrounding areas. Mobile lab was also stationed in the down wind direction to record various parameters in the ambient air continuously and also collected water samples during fire fighting operations.

b. The representative of the industry Sri G. Bhagavan, DGM-Technical has informed that the probable cause could be due to mechanical failure in the pipeline. 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 HPCL - Visakh Refinery were pressed into firefighting operations. The fire was completely extinguished and all clear was given at 16.15 hrs.
c. 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.
d. During the incident, the fire was caught at a height of more than 25 m from the ground level in Crude Distillation Unit-3 hence the smoke is dispersed into atmosphere without spreading on the immediate surroundings.

WHEREAS vide reference 7th cited, legal hearing was conducted before the External Advisory Committee (Task Force) Meeting of A.P. Pollution Control Board on 22.07.2021. The representative of the industry, JCEE ZO VSP and EE RO VSP attended the meeting through VC. The EAC observed that the committee constituted by the Hon'ble NGT in connection with O.A No. 73/2021 has submitted report to the NGT. The observations of the committee are –

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 PM_{10}, $PM_{2.5}$ parameter is exceeding at all the five locations, at one point near the ETP – IV area the concentration value of SO_2 is exceeding the standards.
e. The effluent discharge standards for the ETP outlet of I & IV are not meeting, howeverdue 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 CFOand 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.
i. The sulphur content in the crude oil id found to be less than the sulphur content in theall products.

WHEREAS The ED (Incharge) & Technical head attended the meeting and submitted that they have not received the NGT committee report and not aware of recommendations of the committee. The representative of the industry has not explained the reason for excess sulphur content in the products than the sulphur in the crude oil. It was informed that the SO2 emissions are being monitored regularly and found to be within the limits. With regard to their discharge of the treated effluents in to the sea through marine outfall via Meghadrigadda over flow drain, the ZO, Visakhapatnam insisted the industry shall obtain CFE/CFO amendment duly obtaining the EC from MoEF. The representative of the industry requested time to complete the marine outfall work and also requested to continue the present system till the completion of marine outfall.

After detailed review, the committee has recommended to issue specific directions to the industry to comply. accordingly, the Board hereby issue the following directions under Sec.33 (A) of Water (Prevention and Control of Pollution) Amendment Act, 1988 and under Sec.31 (A)

of Air (Prevention & Control of Pollution) Amendment Act, 1987:

1. ***The industry is required to discharge the once through cooling water and cooling tower blow down water into the sea through scientifically designed marine pipeline instead of discharging into open drains duly obtaining required statutory permissions like CRZ clearance, Environmental clearance and other statutory clearances.***
2. ***The bypass at ETP-II shall be closed immediately and efficiency of all the ETPs shall be improved.***
3. ***The industry shall store used chemical drums in closed sheds with odour extraction cum suppression system.***
4. ***The industry shall complete the odour study as committed and shall furnish action plan for implementation of the study recommendations.***
5. ***The industry shall carry out the Leak Detection and Repair Program (LDAR) at the specified 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.***
6. ***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.***
7. ***The industry shall ensure that treated process water, Treated cooling tower blow down joining the Meghadrigadda shall comply with the prescribed discharge standards.***
8. ***The industry shall implement adequate measures to prevent contamination of run off and under any circumstances there shall not be any discharges of contaminated run off outside the premises.***
9. ***Refinery shall maintain the inventory of unrecoverable volatile organics flaring off.***
10. ***Monitoring of process emissions viz., SO2, NOx, HC (Methane & Non- methane), VOCs and Benzene from various units shall be done.***
11. ***The industry shall provide requisite facilities for continuous monitoring of HS, mercaptan, non-methane-HC and Benzene at all CAAQ monitoring stations.***
12. ***The industry should take periodic calibration and maintenance of analysers to avoid the exceedances in standards.***
13. ***The unit should rectify and repair the ETP –II components for effective treatment, the effluent spilled near the TPI area should be closed immediately.***
14. ***The storm water drains near the ETP-II and final outlets have to be cleared for free flowing and to avoid stagnations. A 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.***
15. ***All the ETPs should be operated regularly and effectively to comply with 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 followed by scrubbing to eliminate odour. The trapped off-gas has to be treatedto remove at least 90% of VOCs.***
16. ***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. Specific time bound action plan shall be submitted within a month along with implementation plan.***
17. ***The housekeeping at the sludge processing area has to be improved. The bio-remediation of the low oily sludge has to be carried out technically and avoid dumping of unwanted waste in the bins. The treated sludge shall be analysed for Total Petroleum Hydrocarbon (TPH) and the sludge with less than 1% of TPH only shall be used as manure.***
18. ***Refinery shall work out mass & material balance studies and maintain the inventory of unrecoverable volatile organics venting through the flare stacks for burning. Specific time bond action plan shall be furnished along with implementation schedule shall be reported within a month.***
19. ***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 with 3 months.***
20. ***The industry shall renew the bank guarantee of Rs.64 lakhs and furnish to EE RO, Visakhapatnam.***
21. ***Environmental Compensation as recommended by the NGT Committee shallbe paid.***

You are hereby directed to note that, should you violate any one of the directions mentioned above, your unit will be closed under Sec.33 (A) of Water (Prevention & Control of Pollution) Amendment Act, 1988 and Sec.31 (A) of Air (Prevention & Control of Pollution) Amendment Act, 1987 without any further notice, in the interest of Public Health and Environment.

This Order comes into effect from today i.e., 12.08.2021.

Sd/-

Vijay Kumar Gsrkr Ias
Secretary To Government

To
M/s. Hindustan Petroleum Corporation Ltd., (Visakh Refinery & DHT Plant), Malkapuram, Visakhapatnam District.

Copy to:

1. The Joint Chief Environmental Engineer, ZO, Visakhapatnam for information for information and necessary action.
2. The Joint Chief Environmental Engineer, Unit-4, Board office, APPCB directed to issue an amendment to CFO order regarding marine discharge based on the recommendations / guidelines of MoEF.
3. The Environmental Engineer, Regional Office, Visakhapatnam for information and necessary action.

// T.C.F.B.O. //

12/8/21

JOINT CHIEF ENVIRONMENTAL ENGINEER
UH-II

हिन्दुस्तान पेट्रोलियम कॉर्पोरेशन लिमिटेड

(भारत सरकार संस्थान) रजिस्टर्ड आफिस 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 बाक्स नं.15, विशाखपट्नम - 530 011 (आंध्रप्रदेश), फोन - 2895000, 2895100

VISAKH REFINERY, POST BOX NO.15, VISAKHAPATNAM-530 011 (A.P.), PHONES : 2895000, 2895100

The Environmental Engineer,
A.P. Pollution Control Board-Regional Office,
D.No.39-33-20/4/1, 3rd floor, Beside RTA office,
VUDA colony, Madhavadhara,
Visakhapatnam - 530018

Date: October 12, 2021
Ref: TSD/PS&E/APPCB/210/21

Dear Sir,

Sub: PCB - TF-HO - M/S. Hindustan Petroleum Corporation Ltd., (Visakh Refinery & DHT Plant), Malkapuram, Visakhapatnam District - Non Compliance of Board Directions - Inspection and monitoring of your industry by the Hon'ble NGT Committee in O.A.No. 73/2021 - Legal hearing held on 22.07.2021 - Directions - Issued - Reg.

With reference to the order No. 702/APPCB/UH-II/TF/VSP/2020- 295 dated 12.08.2021 on the above subject, please find below our inputs and the compliance status of directions issued by APPCB.

S.No	Task Force Directive	Compliance Status
1.	The industry is required to discharge the once through cooling water and cooling tower blow down water into the sea through scientifically designed marine pipeline instead of discharging into open drains duly obtaining required statutory permissions like CRZ clearance, Environmental clearance and other statutory clearances.	Marine Impact Assessment is being carried out. Necessary action will be initiated basis the study findings.
2.	The bypass at ETP-II shall be closed immediately and efficiency of all the ETPs shall be improved.	The bypass at ETP-II is generally kept closed. However, to ensure the same, lock arrangement is provided on the valve. The treated process water from ETPs is meeting the discharge standards. Reports of the effluent sample analysis carried out by MoEF recognized laboratory during recent three months (June'2021, July'2021 & Aug'2021) are enclosed in Annexure-I.

S.No	Task Force Directive	Compliance Status
3.	The industry shall store used chemical drums in closed sheds with odour extraction cum suppression system.	The used chemical drums are stored in closed sheds prior to detoxification.
4.	The industry shall complete the odour study as committed and shall furnish action plan for implementation of the study recommendations.	PO placed on M/s Glens Innovations Labs Pvt. Ltd for conducting Odour & VOC study at HPCL-Visakh Refinery. Study is in progress and will be completed by March'2022.
5.	The industry shall carry out the Leak Detection and Repair Program (LDAR) at the specified 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 on continuous basis by MoEF recognized laboratory and the frequency of survey is in line with MoEF guidelines. Survey reports are being maintained and are shared during inspection by APPCB.
6.	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.	VOCs within refinery premises at vulnerable locations are monitored periodically and controlled as part of LDAR survey. All gaseous vents from units are connected to flare header and hence, any sporadic emissions are routed to flare stack only and disposed safely.
7.	The industry shall ensure that treated process water, Treated cooling tower blow down joining the Meghadrigadda shall comply with the prescribed discharge standards.	Quality of the treated process water and treated cooling water blow down joining Meghadrigadda surplus channel is meeting the discharge standards. Reports of the samples analysis carried out by MoEF recognized laboratory during recent three months (June'2021, July'2021 & Aug'2021) are enclosed in Annexure-II.
8.	The industry shall implement adequate measures to prevent contamination of run off and under any circumstances there shall not be any discharges of contaminated run off outside the premises.	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 carry over.
9.	Refinery shall maintain the inventory of unrecoverable volatile organics flaring off.	Accounting of the flared quantity is done regularly, which is a part of refinery material balance.

S.No	Task Force Directive	Compliance Status
10.	Monitoring of process emissions viz., SO_2, NOx, HC (Methane & Non- methane), VOCs and Benzene from various units shall be done.	Monitoring of SO_2, NOx, CO, PM, HC, VOCs and Benzene is being done regularly in refinery premises. Online connectivity of stack emissions analyzers is established with CPCB and APPCB servers. Further, stack emission monitoring is being carried out by MoEF recognized laboratory on monthly basis. Reports of recent three months (June'2021, July'2021 & Aug'2021) are enclosed in Annexure-III. VOCs and Benzene within refinery premises are being monitored periodically and controlled as part of LDAR survey carried out by MoEF recognized third party.
11.	The industry shall provide requisite facilities for continuous monitoring of H_2S, mercaptan, non-methane-HC and Benzene at all CAAQ monitoring stations.	H_2S, Mercaptans, non-methane HC and Benzene analyzers are available at all the 3 CAAM stations.
12.	The industry should take periodic calibration and maintenance of analysers to avoid the exceedances in standards.	All the stack and ambient air quality analyzers are calibrated once in a month on regular basis. Copies of the latest calibration reports are enclosed as Annexure-IV.
13.	The unit should rectify and repair the ETP-II components for effective treatment, the effluent spilled near the TPI area should be closed immediately.	Housekeeping of the TPI area was completed.
14.	The storm water drains near the ETP-II and final outlets have to be cleared for free flowing and to avoid stagnations. A 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.	The storm water drains near the ETP-II are cleared regularly. The recommendation of pump installation in the tank is taken up for implementation.
15.	All the ETPs should be operated regularly and effectively to comply with 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 followed by scrubbing to eliminate odour. The trapped off-gas has to be treated to remove at least 90% of VOCs.	ETPs are in service and treated process water is meeting the stipulated standards. VOC recovery system is being implemented in Integrated Effluent Treatment Plant (IETP).

S.No	Task Force Directive	Compliance Status
16.	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. Specific time bound action plan shall be submitted within a month along with implementation plan.	Stripped sour water from process units is being recycled to the maximum possible extent with the available systems for use as wash water. A new Integrated Effluent Treatment Plant (IETP) is being implemented under current refinery expansion project (VRMP). Post implementation of this IETP, the treated water will be recycled fully. The recycle facility is expected to be commissioned by July'22.
17.	The housekeeping at the sludge processing area has to be improved. The bioremediation of the low oily sludge has to be carried out technically and avoid dumping of unwanted waste in the bins. The treated sludge shall be analysed for Total Petroleum Hydrocarbon (TPH) and the sludge with less than 1% of TPH only shall be used as manure.	Housekeeping at sludge processing area is carried out on regular basis and is a continuous activity. 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.
18.	Refinery shall work out mass & material balance studies and maintain the inventory of unrecoverable volatile organics venting through the flare stacks for burning. Specific time bound action plan shall be furnished along with implementation schedule shall be reported within a month.	Material balance of the refinery is carried out on monthly basis. Accounting of the flared quantity is done regularly, which is a part of refinery material balance. The same was made available earlier during the environmental inspections. Same will be submitted on monthly basis to APPCB.
19.	The refinery shall procure, install and operate one Continuous Ambient Air Quality Monitoring Station (CAAQMS) with PM 10, PM 2.5, CO, O_3, SO_2, NO_2, NH_3, Benzene, H_2S and Mercaptan parameters at an appropriate location in the residential areas of malkapuram within 3 months.	Visakh Refinery is regularly carrying out Ambient air quality monitoring outside its refinery premises (Malkapuram) through a MoEF recognized third party laboratory once in a month. Reports of recent three months (June'2021, July'2021 & Aug'2021) are enclosed in Annexure-V. Noted for compliance. Will be taken up for implementation in consultation with APPCB.
20.	The industry shall renew the bank guarantee of Rs.64 lakhs and furnish to EE RO Visakhapatnam.	Bank guarantee of Rs.64 lakhs was renewed for one more year with validity till 31.07.2022 and the same was submitted to APPCB.
21.	Environmental compensation as recommended by the NGT committee shall be paid.	--

We would like to assure HPCL-VR's commitment to environmental control & protection and all necessary systems are in place towards meeting all the stipulated environmental norms at all times.

This is for your kind information please.

With best regards,

Yours truly,

G. Bhagavan
DGM - Technical

cc: The JCEE, APPCB-ZO, Visakhapatnam

SV ENVIRO LABS & CONSULTANTS

(Environmental Engineers & Consultants in Pollution Control)

Corporate Office & Laboratory : Enviro House, B-1, Block-B, IDA, Autonagar, Visakhapatnam-530012
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Ref: SVELC/HPCL-VR/21-08/001 Date: 10-09-2021

NAME AND ADDRESS	:	**Mr. G.Bhagavan, DGM – Technical,** **M/s. Hindustan Petroleum Corporation Ltd.,** Visakh Refinery, Post Box No.15, Visakhapatnam – 530 011.
SAMPLE PARTICULARS	:	**EFFLUENT**
SOURCE OF COLLECTION	:	ETP-I DMF Outlet
SAMPLE COLLECTED BY	:	SVELC
QUANTITY OF SAMPLE	:	3 lts
TYPE OF CONTAINER	:	2 PVC Containers and 1 Glass Container each 1ltr
DATE OF COLLECTION	:	31-08-2021

TEST REPORT

S. No.	Parameter	Unit	Result	Limits	Method followed
1.	pH	–	7.49	6.5 – 8.5	APHA, 4500-H+B
2.	Total Suspended Solids – TSS	mg/l	11	20	APHA, 2540-D
3.	Chemical Oxygen Demand – COD	mg/l	56.0	125	APHA, 5220-B
4.	Bio-Chemical Oxygen Demand – BOD (3 days incubation at 27°C)	mg/l	10.0	15	IS 3025, Part 44
5.	Oil & Grease	mg/l	3.0	5.0	APHA, 5520-D, 5-38
6.	Phenols as C_6H_5OH	mg/l	0.028	0.35	APHA, 5530-C
7.	Sulphides as S	mg/l	0.22	0.5	APHA, 4500S^2D
8.	Cyanide as CN	mg/l	<0.02	0.2	APHA, 4500-CN^- E
9.	Ammonia as N	mg/l	<0.01	15.0	IS 3025, Part 34
10.	Total Kjeldahl Nitrogen	mg/l	1.01	40	IS 3025, Part 34
11.	Phosphorus as P	mg/l	0.19	3.0	APHA, 4500 P- C
12.	Hexavalent Chromium as Cr^{+6}	mg/l	BDL	0.1	APHA, 3500 Cr - B
13.	Total Chromium as Cr	mg/l	<0.01	2.0	APHA, 3120-B
14.	Lead as Pb	mg/l	<0.01	0.1	APHA, 3120-B
15.	Mercury as Hg	mg/l	<0.01	0.01	APHA, 3120-B
16.	Zinc as Zn	mg/l	<0.01	5.0	APHA, 3120-B
17.	Nickel as N	mg/l	<0.01	1.0	APHA, 3120-B
18.	Copper as Cu	mg/l	<0.01	1.0	APHA, 3120-B
19.	Vanadium as V	mg/l	<0.01	<0.01	APHA, 3120-B
20.	Benzene	mg/l	<0.01	0.1	APHA, 6410-B
21.	Benzo pyrene	mg/l	<0.01	0.2	APHA, 6440-B

*BDL – Below Detectable Limit

Note: All the above parameters are tested as per APHA methods, 23rd Edition, 2017 and IS 3025 RA: 2014

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Ref: SVELC/HPCL-VR/21-08/002

Date: 10-09-2021

NAME AND ADDRESS : **Mr. G.Bhagavan, DGM – Technical,**
M/s. Hindustan Petroleum Corporation Ltd.,
Visakh Refinery, Post Box No.15,
Visakhapatnam – 530 011.

SAMPLE PARTICULARS : **EFFLUENT**

SOURCE OF COLLECTION : ETP-IV ACF Outlet

SAMPLE COLLECTED BY : SVELC

QUANTITY OF SAMPLE : 3 lts

TYPE OF CONTAINER : 2 PVC Containers and 1 Glass Container each 1ltr

DATE OF COLLECTION : 31-08-2021

TEST REPORT

S. No.	Parameter	Unit	Result	Limits	Method followed
1.	pH	--	7.60	6.5 – 8.5	APHA, 4500-H+B
2.	Total Suspended Solids – TSS	mg/l	6.0	20	APHA, 2540-D
3.	Chemical Oxygen Demand – COD	mg/l	42.0	125	APHA, 5220-B
4.	Bio-Chemical Oxygen Demand – BOD (3 days incubation at 27^{0}C)	mg/l	7.0	15	IS 3025, Part 44
5.	Oil & Grease	mg/l	2.0	5.0	APHA, 5520-D, 5-38
6.	Phenols as C_6H_5OH	mg/l	0.054	0.35	APHA, 5530-C
7.	Sulphides as S	mg/l	0.16	0.5	APHA, 4500S^2D
8.	Cyanide as CN	mg/l	<0.02	0.2	APHA, 4500-CN^-E
9.	Ammonia as N	mg/l	<0.01	15.0	IS 3025, Part 34
10.	Total Kjeldahl Nitrogen	mg/l	1.48	40	IS 3025, Part 34
11.	Phosphorus as P	mg/l	0.06	3.0	APHA, 4500 P- C
12.	Hexavalent Chromium as Cr^{+6}	mg/l	BDL	0.1	APHA, 3500 Cr - B
13.	Total Chromium as Cr	mg/l	<0.01	2.0	APHA, 3120-B
14.	Lead as Pb	mg/l	<0.01	0.1	APHA, 3120-B
15.	Mercury as Hg	mg/l	<0.01	0.01	APHA, 3120-B
16.	Zinc as Zn	mg/l	<0.01	5.0	APHA, 3120-B
17.	Nickel as N	mg/l	<0.01	1.0	APHA, 3120-B
18.	Copper as Cu	mg/l	<0.01	1.0	APHA, 3120-B
19.	Vanadium as V	mg/l	<0.01	0.2	APHA, 3120-B
20.	Benzene	mg/l	<0.01	0.1	APHA, 6410-B
21.	Benzo pyrene	mg/l	<0.01	0.2	APHA, 6440-B

*BDL – Below Detectable Limit

Note: All the above parameters are tested as per APHA methods, 23rd Edition, 2017 and IS 3025 RA: 2014

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Ref: SVELC/HPCL-VR/21-07/001 Date: 10-08-2021

NAME AND ADDRESS : **Mr. G.Bhagavan, DGM – Technical,**
M/s. Hindustan Petroleum Corporation Ltd.,
Visakh Refinery, Post Box No.15,
Visakhapatnam – 530 011.

SAMPLE PARTICULARS : **EFFLUENT**

SOURCE OF COLLECTION : ETP-I DMF Outlet

SAMPLE COLLECTED BY : SVELC

QUANTITY OF SAMPLE : 3 lts

TYPE OF CONTAINER : 2 PVC Containers and 1 Glass Container each 1ltr

DATE OF COLLECTION : 30-07-2021

TEST REPORT

S. No.	Parameter	Unit	Result	Limits	Method followed
1.	pH	--	7.47	6.5 – 8.5	APHA, 4500-H+B
2.	Total Suspended Solids – TSS	mg/l	3.0	20	APHA, 2540-D
3.	Chemical Oxygen Demand – COD	mg/l	10.6	125	APHA, 5220-B
4.	Bio-Chemical Oxygen Demand – BOD (3 days incubation at 27^0C)	mg/l	4.2	15	IS 3025, Part 44
5.	Oil & Grease	mg/l	<1.0	5.0	APHA, 5520-D, 5-38
6.	Phenols as C_6H_5OH	mg/l	0.022	0.35	APHA, 5530-C
7.	Sulphides as S	mg/l	<0.1	0.5	APHA, 4500S^2D
8.	Cyanide as CN	mg/l	<0.02	0.2	APHA, 4500-CN^-E
9.	Ammonia as N	mg/l	<0.01	15.0	IS 3025, Part 34
10.	Total Kjeldahl Nitrogen	mg/l	1.26	40	IS 3025, Part 34
11.	Phosphorus as P	mg/l	0.13	3.0	APHA, 4500 P- C
12.	Hexavalent Chromium as Cr^{+6}	mg/l	BDL	0.1	APHA, 3500 Cr - B
13.	Total Chromium as Cr	mg/l	<0.01	2.0	APHA, 3120-B
14.	Lead as Pb	mg/l	<0.01	0.1	APHA, 3120-B
15.	Mercury as Hg	mg/l	<0.01	0.01	APHA, 3120-B
16.	Zinc as Zn	mg/l	<0.01	5.0	APHA, 3120-B
17.	Nickel as N	mg/l	<0.01	1.0	APHA, 3120-B
18.	Copper as Cu	mg/l	<0.01	1.0	APHA, 3120-B
19.	Vanadium as V	mg/l	<0.01	<0.01	APHA, 3120-B
20.	Benzene	mg/l	<0.01	0.1	APHA, 6410-B
21.	Benzo pyrene	mg/l	<0.01	0.2	APHA, 6440-B

*BDL – Below Detectable Limit

Note: All the above parameters are tested as per APHA methods, 23rd Edition, 2017 and IS 3025 RA: 2014

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Ref: SVELC/HPCL-VR/21-07/002

Date: 10-08-2021

NAME AND ADDRESS : **Mr. G.Bhagavan, DGM – Technical,**
M/s. Hindustan Petroleum Corporation Ltd.,
Visakh Refinery, Post Box No.15,
Visakhapatnam – 530 011.

SAMPLE PARTICULARS : **EFFLUENT**

SOURCE OF COLLECTION : ETP-IV ACF Outlet

SAMPLE COLLECTED BY : SVELC

QUANTITY OF SAMPLE : 3 lts

TYPE OF CONTAINER : 2 PVC Containers and 1 Glass Container each 1ltr

DATE OF COLLECTION : 30-07-2021

TEST REPORT

S. No.	Parameter	Unit	Result	Limits	Method followed
1.	Ph	--	8.01	6.5 – 8.5	APHA, 4500-H+B
2.	Total Suspended Solids – TSS	mg/l	4.0	20	APHA, 2540-D
3.	Chemical Oxygen Demand – COD	mg/l	40.0	125	APHA, 5220-B
4.	Bio-Chemical Oxygen Demand – BOD (3 days incubation at 27^0C)	mg/l	12.0	15	IS 3025, Part 44
5.	Oil & Grease	mg/l	<1.0	5.0	APHA, 5520-D, 5-38
6.	Phenols as C_6H_5OH	mg/l	0.048	0.35	APHA, 5530-C
7.	Sulphides as S	mg/l	<0.1	0.5	APHA, 4500S^2D
8.	Cyanide as CN	mg/l	<0.02	0.2	APHA, 4500-CN^- E
9.	Ammonia as N	mg/l	<0.01	15.0	IS 3025, Part 34
10.	Total Kjeldahl Nitrogen	mg/l	1.82	40	IS 3025, Part 34
11.	Phosphorus as P	mg/l	0.11	3.0	APHA, 4500 P- C
12.	Hexavalent Chromium as Cr^{+6}	mg/l	BDL	0.1	APHA, 3500 Cr - B
13.	Total Chromium as Cr	mg/l	<0.01	2.0	APHA, 3120-B
14.	Lead as Pb	mg/l	<0.01	0.1	APHA, 3120-B
15.	Mercury as Hg	mg/l	<0.01	0.01	APHA, 3120-B
16.	Zinc as Zn	mg/l	<0.01	5.0	APHA, 3120-B
17.	Nickel as N	mg/l	<0.01	1.0	APHA, 3120-B
18.	Copper as Cu	mg/l	<0.01	1.0	APHA, 3120-B
19.	Vanadium as V	mg/l	<0.01	0.2	APHA, 3120-B
20.	Benzene	mg/l	<0.01	0.1	APHA, 6410-B
21.	Benzo pyrene	mg/l	<0.01	0.2	APHA, 6440-B

*BDL – Below Detectable Limit

Note: All the above parameters are tested as per APHA methods, 23rd Edition, 2017 and IS 3025 RA: 2014

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Ref: SVELC/HPCL-VR/21-06/001 Date: 10-07-2021

NAME AND ADDRESS : **Mr. G.Bhagavan, DGM – Technical,**
M/s. Hindustan Petroleum Corporation Ltd.,
Visakh Refinery, Post Box No.15,
Visakhapatnam – 530 011.

SAMPLE PARTICULARS : **EFFLUENT**

SOURCE OF COLLECTION : ETP-I DMF Outlet

SAMPLE COLLECTED BY : SVELC

QUANTITY OF SAMPLE : 3 lts

TYPE OF CONTAINER : 2 PVC Containers and 1 Glass Container each 1ltr

DATE OF COLLECTION : 30-06-2021

TEST REPORT

S. No.	Parameter	Unit	Result	Limits	Method followed
1.	pH	--	8.02	6.5 – 8.5	APHA, 4500-H+B
2.	Total Suspended Solids – TSS	mg/l	1.0	20	APHA, 2540-D
3.	Chemical Oxygen Demand – COD	mg/l	39.8	125	APHA, 5220-B
4.	Bio-Chemical Oxygen Demand – BOD (3 days incubation at 27^{0}C)	mg/l	13.2	15	IS 3025, Part 44
5.	Oil & Grease	mg/l	1.8	5.0	APHA, 5520-D, 5-38
6.	Phenols as C_6H_5OH	mg/l	0.036	0.35	APHA, 5530-C
7.	Sulphides as S	mg/l	0.07	0.5	APHA, 4500S^{2}D
8.	Cyanide as CN	mg/l	<0.02	0.2	APHA, 4500-CN$^-$ E
9.	Ammonia as N	mg/l	<0.01	15.0	IS 3025, Part 34
10.	Total Kjeldahl Nitrogen	mg/l	1.10	40	IS 3025, Part 34
11.	Phosphorus as P	mg/l	0.06	3.0	APHA, 4500 P- C
12.	Hexavalent Chromium as Cr^{+6}	mg/l	BDL	0.1	APHA, 3500 Cr - B
13.	Total Chromium as Cr	mg/l	<0.01	2.0	APHA, 3120-B
14.	Lead as Pb	mg/l	<0.01	0.1	APHA, 3120-B
15.	Mercury as Hg	mg/l	<0.01	0.01	APHA, 3120-B
16.	Zinc as Zn	mg/l	<0.01	5.0	APHA, 3120-B
17.	Nickel as N	mg/l	<0.01	1.0	APHA, 3120-B
18.	Copper as Cu	mg/l	<0.01	1.0	APHA, 3120-B
19.	Vanadium as V	mg/l	<0.01	<0.01	APHA, 3120-B
20.	Benzene	mg/l	<0.01	0.1	APHA, 6410-B
21.	Benzo pyrene	mg/l	<0.01	0.2	APHA, 6440-B

*BDL – Below Detectable Limit

Note: All the above parameters are tested as per APHA methods, 23rd Edition, 2017 and IS 3025 RA: 2014

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Ref: SVELC/HPCL-VR/21-06/002 Date: 10-07-2021

NAME AND ADDRESS : **Mr. G.Bhagavan, DGM – Technical,**
M/s. Hindustan Petroleum Corporation Ltd.,
Visakh Refinery, Post Box No.15,
Visakhapatnam – 530 011.

SAMPLE PARTICULARS : **EFFLUENT**

SOURCE OF COLLECTION : ETP-IV ACF Outlet

SAMPLE COLLECTED BY : SVELC

QUANTITY OF SAMPLE : 3 lts

TYPE OF CONTAINER : 2 PVC Containers and 1 Glass Container each 1ltr

DATE OF COLLECTION : 30-06-2021

TEST REPORT

S. No.	Parameter	Unit	Result	Limits	Method followed
1.	Ph	--	8.10	6.5 – 8.5	APHA, 4500-H+B
2.	Total Suspended Solids – TSS	mg/l	2.0	20	APHA, 2540-D
3.	Chemical Oxygen Demand – COD	mg/l	19.9	125	APHA, 5220-B
4.	Bio-Chemical Oxygen Demand – BOD (3 days incubation at 27^0C)	mg/l	6.56	15	IS 3025, Part 44
5.	Oil & Grease	mg/l	1.1	5.0	APHA, 5520-D, 5-38
6.	Phenols as C_6H_5OH	mg/l	0.061	0.35	APHA, 5530-C
7.	Sulphides as S	mg/l	<0.1	0.5	APHA, 4500S^2D
8.	Cyanide as CN	mg/l	<0.02	0.2	APHA, 4500-CN^-E
9.	Ammonia as N	mg/l	<0.01	15.0	IS 3025, Part 34
10.	Total Kjeldahl Nitrogen	mg/l	1.56	40	IS 3025, Part 34
11.	Phosphorus as P	mg/l	1.41	3.0	APHA, 4500 P- C
12.	Hexavalent Chromium as Cr^{+6}	mg/l	BDL	0.1	APHA, 3500 Cr - B
13.	Total Chromium as Cr	mg/l	<0.01	2.0	APHA, 3120-B
14.	Lead as Pb	mg/l	<0.01	0.1	APHA, 3120-B
15.	Mercury as Hg	mg/l	<0.01	0.01	APHA, 3120-B
16.	Zinc as Zn	mg/l	<0.01	5.0	APHA, 3120-B
17.	Nickel as N	mg/l	<0.01	1.0	APHA, 3120-B
18.	Copper as Cu	mg/l	<0.01	1.0	APHA, 3120-B
19.	Vanadium as V	mg/l	<0.01	0.2	APHA, 3120-B
20.	Benzene	mg/l	<0.01	0.1	APHA, 6410-B
21.	Benzo pyrene	mg/l	<0.01	0.2	APHA, 6440-B

*BDL – Below Detectable Limit

Note: All the above parameters are tested as per APHA methods, 23rd Edition, 2017 and IS 3025 RA: 2014

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Ref: SVELC/HPCL-VR/21-08/003 Date: 10-09-2021

NAME AND ADDRESS : **Mr. G.Bhagavan, DGM – Technical,**
M/s. Hindustan Petroleum Corporation Ltd.,
Visakh Refinery, Post Box No.15,
Visakhapatnam – 530 011.

SAMPLE PARTICULARS : **EFFLUENT**

SOURCE OF COLLECTION : MHF –I Outlet

SAMPLE COLLECTED BY : SVELC

QUANTITY OF SAMPLE : 3 lts

TYPE OF CONTAINER : 2 PVC Containers and 1 Glass Container each 1ltr

DATE OF COLLECTION : 31-08-2021

TEST REPORT

S. No.	Parameter	Unit	Result	Limits	Method followed
1.	Ph	--	7.22	6.5-8.5	APHA, 4500-H+B
2.	Oil & Grease	mg/l	<1.0	1.0	APHA, 5520-D, 5-38
3.	Hexavalent Chromium as Cr^{+6}	mg/l	BDL	0.1	APHA, 3500 Cr - B
4.	Total Chromium as Cr	mg/l	<0.01	2.0	APHA, 3120-B

*BDL – Below Detectable Limit

Note: All the above parameters are tested as per APHA methods, 23rd Edition, 2017 and IS 3025 RA: 2014

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Ref: SVELC/HPCL-VR/21-08/004 Date: 10-09-2021

NAME AND ADDRESS : **Mr. G.Bhagavan, DGM – Technical,**
M/s. Hindustan Petroleum Corporation Ltd.,
Visakh Refinery, Post Box No.15,
Visakhapatnam – 530 011.

SAMPLE PARTICULARS : **EFFLUENT**

SOURCE OF COLLECTION : MHF –II Outlet

SAMPLE COLLECTED BY : SVELC

QUANTITY OF SAMPLE : 3 lts

TYPE OF CONTAINER : 2 PVC Containers and 1 Glass Container each 1ltr

DATE OF COLLECTION : 31-08-2021

TEST REPORT

S. No.	Parameter	Unit	Result	Limits	Method followed
1.	pH	--	7.34	6.5-8.5	APHA, 4500-H+B
2.	Oil & Grease	mg/l	<1.0	1.0	APHA, 5520-D, 5-38
3.	Hexavalent Chromium as Cr^{+6}	mg/l	BDL	0.1	APHA, 3500 Cr - B
4.	Total Chromium as Cr	mg/l	<0.01	2.0	APHA, 3120-B

*BDL – Below Detectable Limit

Note: All the above parameters are tested as per APHA methods, 23rd Edition, 2017 and IS 3025 RA: 2014

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Ref: SVELC/HPCL-VR/21-07/003 Date: 10-08-2021

NAME AND ADDRESS : **Mr. G.Bhagavan, DGM – Technical,**
M/s. Hindustan Petroleum Corporation Ltd.,
Visakh Refinery, Post Box No.15,
Visakhapatnam – 530 011.

SAMPLE PARTICULARS : **EFFLUENT**

SOURCE OF COLLECTION : MHF –I Outlet

SAMPLE COLLECTED BY : SVELC

QUANTITY OF SAMPLE : 3 lts

TYPE OF CONTAINER : 2 PVC Containers and 1 Glass Container each 1ltr

DATE OF COLLECTION : 30-07-2021

TEST REPORT

S. No.	Parameter	Unit	Result	Limits	Method followed
1.	Ph	--	7.66	6.5-8.5	APHA, 4500-H+B
2.	Oil & Grease	mg/l	<1.0	1.0	APHA, 5520-D, 5-38
3.	Hexavalent Chromium as Cr^{+6}	mg/l	BDL	0.1	APHA, 3500 Cr - B
4.	Total Chromium as Cr	mg/l	<0.01	2.0	APHA, 3120-B

*BDL – Below Detectable Limit

Note: All the above parameters are tested as per APHA methods, 23rd Edition, 2017 and IS 3025 RA: 2014

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SV ENVIRO LABS & CONSULTANTS

SV ENVIRO LABS & CONSULTANTS

(Environmental Engineers & Consultants in Pollution Control)

Corporate Office & Laboratory : Enviro House, B-1, Block-B, IDA, Autonagar, Visakhapatnam-530012
www.svenvirolabs.com, Ph:0891-2755528, Cell: +91 9440338628
info@svenvirolabs.com, svenviro_labs@yahoo.co.in

Branch Office : 2-53, Mahipala Street, Yanam - 533464.

Recognized by Govt.of India-MoEF & CC, New Delhi, Accredited by : NABL & NABET

Ref: SVELC/HPCL-VR/21-07/004

Date: 10-08-2021

NAME AND ADDRESS : **Mr. G.Bhagavan, DGM – Technical,**
M/s. Hindustan Petroleum Corporation Ltd.,
Visakh Refinery, Post Box No.15,
Visakhapatnam – 530 011.

SAMPLE PARTICULARS : **EFFLUENT**

SOURCE OF COLLECTION : MHF –II Outlet

SAMPLE COLLECTED BY : SVELC

QUANTITY OF SAMPLE : 3 lts

TYPE OF CONTAINER : 2 PVC Containers and 1 Glass Container each 1ltr

DATE OF COLLECTION : 30-07-2021

TEST REPORT

S. No.	Parameter	Unit	Result	Limits	Method followed
1.	pH	--	7.70	6.5-8.5	APHA, 4500-H+B
2.	Oil & Grease	mg/l	<1.0	1.0	APHA, 5520-D, 5-38
3.	Hexavalent Chromium as Cr^{+6}	mg/l	BDL	0.1	APHA, 3500 Cr - B
4.	Total Chromium as Cr	mg/l	<0.01	2.0	APHA, 3120-B

*BDL – Below Detectable Limit

Note: All the above parameters are tested as per APHA methods, 23rd Edition, 2017 and IS 3025 RA: 2014

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Ref: SVELC/HPCL-VR/21-06/003 Date: 10-07-2021

NAME AND ADDRESS : **Mr. G.Bhagavan, DGM – Technical,**
M/s. Hindustan Petroleum Corporation Ltd.,
Visakh Refinery, Post Box No.15,
Visakhapatnam – 530 011.

SAMPLE PARTICULARS : **EFFLUENT**

SOURCE OF COLLECTION : MHF –I Outlet

SAMPLE COLLECTED BY : SVELC

QUANTITY OF SAMPLE : 3 lts

TYPE OF CONTAINER : 2 PVC Containers and 1 Glass Container each 1ltr

DATE OF COLLECTION : 30-06-2021

TEST REPORT

S. No.	Parameter	Unit	Result	Limits	Method followed
1.	Ph	--	8.02	6.5-8.5	APHA, 4500-H+B
2.	Total Suspended Solids – TSS	mg/l	-	-	APHA, 2540-D
3.	Chemical Oxygen Demand – COD	mg/l	-	-	APHA, 5220-B
4.	Bio-Chemical Oxygen Demand – BOD (3 days incubation at 27^0C)	mg/l	-	-	IS 3025, Part 44
5.	Oil & Grease	mg/l	<1.0	1.0	APHA, 5520-D, 5-38
6.	Phenols as C_6H_5OH	mg/l	-	-	APHA, 5530-C
7.	Sulphides as S	mg/l	-	-	APHA, 4500S^2D
8.	Cyanide as CN	mg/l	-	-	APHA, 4500-CN^- E
9.	Ammonia as N	mg/l	-	-	IS 3025, Part 34
10.	Total Kjeldahl Nitrogen	mg/l	-	-	IS 3025, Part 34
11.	Phosphorus as P	mg/l	-	-	APHA, 4500 P- C
12.	Hexavalent Chromium as Cr^{+6}	mg/l	BDL	0.1	APHA, 3500 Cr - B
13.	Total Chromium as Cr	mg/l	<0.01	2.0	APHA, 3120-B
14.	Lead as Pb	mg/l	-	-	APHA, 3120-B
15.	Mercury as Hg	mg/l	-	-	APHA, 3120-B
16.	Zinc as Zn	mg/l	-	-	APHA, 3120-B
17.	Nickel as N	mg/l	-	-	APHA, 3120-B
18.	Copper as Cu	mg/l	-	-	APHA, 3120-B
19.	Vanadium as V	mg/l	-	-	APHA, 3120-B
20.	Benzene	mg/l	-	-	APHA, 6410-B
21.	Benzo pyrene	mg/l	-	-	APHA, 6440-B

*BDL – Below Detectable Limit

Note: All the above parameters are tested as per APHA methods, 23rd Edition, 2017 and IS 3025 RA: 2014

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Ref: SVELC/HPCL-VR/21-06/004 Date: 10-07-2021

NAME AND ADDRESS : **Mr. G.Bhagavan, DGM – Technical,**
M/s. Hindustan Petroleum Corporation Ltd.,
Visakh Refinery, Post Box No.15,
Visakhapatnam – 530 011.

SAMPLE PARTICULARS : **EFFLUENT**

SOURCE OF COLLECTION : MHF –II Outlet

SAMPLE COLLECTED BY : SVELC

QUANTITY OF SAMPLE : 3 lts

TYPE OF CONTAINER : 2 PVC Containers and 1 Glass Container each 1ltr

DATE OF COLLECTION : 30-06-2021

TEST REPORT

S. No.	Parameter	Unit	Result	Limits	Method followed
1.	pH	--	8.08	6.5-8.5	APHA, 4500-H+B
2.	Total Suspended Solids – TSS	mg/l	-	-	APHA, 2540-D
3.	Chemical Oxygen Demand – COD	mg/l	-	-	APHA, 5220-B
4.	Bio-Chemical Oxygen Demand – BOD (3 days incubation at 27^0C)	mg/l	-	-	IS 3025, Part 44
5.	Oil & Grease	mg/l	1.9	1.0	APHA, 5520-D, 5-38
6.	Phenols as C_6H_5OH	mg/l	-	-	APHA, 5530-C
7.	Sulphides as S	mg/l	-	-	APHA, 4500S^2D
8.	Cyanide as CN	mg/l	-	-	APHA, 4500-CN^- E
9.	Ammonia as N	mg/l	-	-	IS 3025, Part 34
10.	Total Kjeldahl Nitrogen	mg/l	-	-	IS 3025, Part 34
11.	Phosphorus as P	mg/l	-	-	APHA, 4500 P- C
12.	Hexavalent Chromium as Cr^{+6}	mg/l	BDL	0.1	APHA, 3500 Cr - B
13.	Total Chromium as Cr	mg/l	<0.01	2.0	APHA, 3120-B
14.	Lead as Pb	mg/l	-	-	APHA, 3120-B
15.	Mercury as Hg	mg/l	-	-	APHA, 3120-B
16.	Zinc as Zn	mg/l	-	-	APHA, 3120-B
17.	Nickel as N	mg/l	-	-	APHA, 3120-B
18.	Copper as Cu	mg/l	-	-	APHA, 3120-B
19.	Vanadium as V	mg/l	-	-	APHA, 3120-B
20.	Benzene	mg/l	-	-	APHA, 6410-B
21.	Benzo pyrene	mg/l	-	-	APHA, 6440-B

*BDL – Below Detectable Limit

Note: All the above parameters are tested as per APHA methods, 23rd Edition, 2017 and IS 3025 RA: 2014

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(ISO 45001:2018, OHSAS 18001:2007)

Plot No.B15 & 16, Industrial Estate, Behind Pollution Control Board, Opp. Dena Bank, Sanath Nagar, Hyderabad – 500 018, Tele Fax : 040-23717213

E-mail:info@pragathilabs.com Website: www.pragathilabs.com

TEST REPORT

Industry Name	Hindustan Petroleum Corporation Limited		
Address	Visakh Refinery, Malkapuram, Visakhapatnam-530 011		
Phone No.	0891-2894825/4818	Kind attention to: Sri Gudala Bhagavan DGM – Technical	
Fax No.	0891-2759861		
Date of Reporting	09th July,2021	Nature of the Sample	Fuel Gases
Our Ref. No.	Pra/Env/HPCL (Stack 1-27) May-21	No. of Samples	22
P.O. No.	20000433-HB/PR200066-HP/LOA/AG	Method of Analysis	IS: 11255
Parameters	Temperature, Velocity, PM, SO_2, NO_x, HC, CO, H_2S, Ni & V		

STACK GAS EMISSION ANALYSIS

S. No.	Unit	Stack type	Date of Monitoring	Stack details					Stack emissions							
				Height	Dia.	Area	Temp.	Velocity	PM	SO_2	NO_x	CO	H_2S	HC	Ni	V
				m	m	m^2	°C	m/s	mg/Nm³							
1	CDU-I	2-F-1	16-06-2021	60	1.40	1.539	184	5.2	34.8	320	90	29	--	25	BDL	BDL
2	CDU-I	2-F-2	16-06-2021	60	1.00	0.785	232	4.6	33.7	270	81	26	--	24	BDL	BDL
3	CDU-I	2-F-4	16-06-2021	60	1.60	2.01	190	4.0	34.6	280	82	25	--	26	BDL	BDL
4	CDU-II	11-F-01	18-06-2021	60	2.55	5.104	204	5.3	35.2	262	95	27	--	27	BDL	BDL
5	CDU-II	12-F-01	18-06-2021	60	1.60	2.01	232	4.5	32.1	240	93	32	--	28	BDL	BDL
6	FCCU-I	4-F-51	10-06-2021	60	2.18	3.733	208	2.6	19.8	152	72	36	--	27	BDL	BDL
7	FCCU-II	14-F-01	08-06-2021	60	1.35	1.431	245	4.7	20.6	175	75	37	--	26	BDL	BDL
8	DHDS	60-F-01	09-06-2021	60	1.34	1.410	214	3.3	36.2	126	93	26	--	21	BDL	BDL
9	DHDS	61-F-11	09-06-2021	60	1.60	2.011	172	5.4	34.7	102	104	28	--	20	BDL	BDL
10	NHT	72- F-01/02	15-06-2021	60	1.50	1.767	165	2.9	3.2	41	75	24	--	23	BDL	BDL
11	CCR	74-F-1/2/3/4	15-06-2021	60	3.37	8.923	152	3.7	4.1	38	70	21	--	18	BDL	BDL
12	CPP	HRSG-III	22-06-2021	60	3.00	7.065	141	13.2	17.5	70	82	25	--	19	BDL	BDL
13	CPP	HRSG-IV	22-06-2021	60	3.00	7.065	137	13.1	17.2	62	86	26	--	16	BDL	BDL
14	CPP	HRSG-V	22-06-2021	60	3.00	7.065	156	13.3	18.4	66	94	24	--	17	BDL	BDL
15	CPP	HRSG-VI	22-06-2021	60	3.00	7.065	148	13.4	18.6	65	92	23	--	18	BDL	BDL
16	PP-1	IBH	29-06-2021	60	2.40	4.525	164	3.5	35.3	128	106	28	--	16	BDL	BDL
17	FCC	75-F-01	11-06-2021	60	1.01	0.801	292	2.9	3.0	40	92	27	--	21	--	--
18	FCC	75-F-51	11-06-2021	60	1.35	1.430	210	3.2	2.9	35	72	26	--	24	BDL	BDL
19	FCCU-I	FGD-I	10-06-2021	60	1.76	2.433	67	4.1	25.6	72	78	24	--	25	BDL	BDL
20	FCCU-II	FGD-II	08-06-2021	60	2.00	3.142	66	3.5	36.8	68	80	26	--	23	BDL	BDL
21	DHDSSRU	79-X-310	25-06-2021	60	1.01	0.801	224	3.6	24.3	71	65	21	8.2	19	--	--
22	DHT-SRU	92-M-22	24-06-2021	60	1.50	1.767	250	5.7	8.4	78	68	24	8.4	20	--	--

Stack emissions Revised Norm (mg/Nm³)

	Fuel Type	SO_2	NOx	PM	CO	Ni & V	H_2S
Furnaces & CPP	Gas	50	350	10	150		
	Liquid	1700	450	100	200	5	---
FCC Regenerators	---	1700	450	100	400	5	---
SRU'S (65-X-01 & 79-X-310)	---	---	350	---	150	---	15

Methodology for testing of pollutants

PM	Methods for measurement of emissions from stationary sources	IS: 11255	(Part I)	1985
SO_2	Methods for measurement of emissions from stationary sources	IS: 11255	(Part II)	1985
NOx	Methods for measurement of air pollution	IS: 11255	(Part VII)	2005
HC&CO	GC Method	-	-	-

P. Pradeep Reddy

Analyst Signatory
(P. Pradeep Reddy)

Authorized Signatory
(M. Ravi Kiran)

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(ISO 9001:2015, OHSAS 18001:2007)

Plot No.B15 & 16, Industrial Estate, Behind Pollution Control Board, Opp. Dena Bank, Sanath Nagar, Hyderabad – 500 018, Tele Fax : 040-23717213

E-mail:info@pragathilabs.com Website: www.pragathilabs.com

TEST REPORT

Industry Name	Hindustan Petroleum Corporation Limited		
Address	Visakh Refinery, Malkapuram, Visakhapatnam-530 011		
Phone No.	0891-2894825/4818	Kind attention to: Sri Gudala Bhagavan DGM – Technical	
Fax No.	0891-2759861		
Date of Reporting	03rd August, 2021	Nature of the Sample	Fuel Gases
Our Ref. No.	Pra/Env/HPCL (Stack 1-27) May-21	No. of Samples	21
P.O. No.	20000433-HB/PR200066-HP/LOA/AG	Method of Analysis	IS: 11255
Parameters	Temperature, Velocity, PM, SO_2, NO_x, HC, CO, H_2S, Ni & V		

STACK GAS EMISSION ANALYSIS

S. No.	Unit	Stack type	Date of Monitoring	Stack details					Stack emissions							
				Height	Dia.	Area	Temp.	Velocity	PM	SO_2	NO_x	CO	H_2S	HC	Ni	V
				m	m	m^2	°C	m/s	mg/Nm^3							
1	CDU-I	2-F-1	06-07-2021	60	1.40	1.539	192	5.3	32.2	305	82	26	--	23	BDL	BDL
2	CDU-I	2-F-2	06-07-2021	60	1.00	0.785	245	4.8	31.4	265	75	28	--	22	BDL	BDL
3	CDU-I	2-F-4	06-07-2021	60	1.60	2.01	180	4.2	32.1	260	77	29	--	23	BDL	BDL
4	CDU-II	11-F-01	12-07-2021	60	2.55	5.104	212	5.1	33.6	245	90	24	--	24	BDL	BDL
5	CDU-II	12-F-01	12-07-2021	60	1.60	2.01	240	4.7	30.5	230	86	30	--	26	BDL	BDL
6	FCCU-I	4-F-51	23-07-2021	60	2.18	3.733	215	2.5	20.4	165	67	32	--	25	BDL	BDL
7	FCCU-II	14-F-01	08-07-2021	60	1.35	1.431	260	4.8	21.3	160	70	33	--	24	BDL	BDL
8	DHDS	60-F-01	01-07-2021	60	1.34	1.410	225	3.5	34.7	115	87	28	--	23	BDL	BDL
9	DHDS	61-F-11	01-07-2021	60	1.60	2.011	150	5.2	32.2	95	98	31	--	22	BDL	BDL
10	NHT	72- F-01/02	15-07-2021	60	1.50	1.767	172	2.8	3.3	46	70	27	--	21	BDL	BDL
11	CCR	74-F-1/2/3/4	15-07-2021	60	3.37	8.923	158	3.5	3.6	32	64	24	--	19	BDL	BDL
12	CPP	HRSG-III	22-07-2021	60	3.00	7.065	147	13.3	18.8	60	78	27	--	18	BDL	BDL
13	CPP	HRSG-V	22-07-2021	60	3.00	7.065	164	13.5	19.1	60	90	26	--	17	BDL	BDL
14	CPP	HRSG-VI	22-07-2021	60	3.00	7.065	155	13.1	19.3	58	87	25	--	15	BDL	BDL
15	PP-1	IBH	28-07-2021	60	2.40	4.525	174	3.7	37.7	115	102	30	--	16	BDL	BDL
16	FCC-NHT	75-F-01	14-07-2021	60	1.01	0.801	280	2.8	4.2	46	84	29	--	15	BDL	BDL
17	FCC-NHT	75-F-51	14-07-2021	60	1.35	1.430	220	3.4	3.3	39	65	28		20	--	--
18	FCCU-I	FGD-I	23-07-2021	60	1.76	2.433	67	4.3	26.2	65	70	27	--	21		
19	FCCU-II	FGD-II	08-07-2021	60	2.00	3.142	66	3.6	35.4	62	72	28	--	22	BDL	BDL
20	DHDSSRU	65-X-001	19-07-2021	60	1.21	1.150	204	2.6	20.5	95	85	18	8.0	21	BDL	BDL
21	DHDSSRU	79-X-310	19-07-2021	60	1.01	0.801	215	3.8	26.8	65	60	23	8.2	15	--	--

Stack emissions Revised Norm (mg/Nm^3)

	Fuel Type	SO_2	NOx	PM	CO	Ni & V	H_2S
Furnaces & CPP	Gas	50	350	10	150		
	Liquid	1700	450	100	200	5	---
FCC Regenerators	---	1700	450	100	400	5	---
SRU'S (65-X-01 & 79-X-310)	---	---	350	---	150	---	15

Methodology for testing of pollutants				
PM	Methods for measurement of emissions from stationary sources	IS: 11255	(Part I)	1985
SO_2	Methods for measurement of emissions from stationary sources	IS: 11255	(Part II)	1985
NOx	Methods for measurement of air pollution	IS: 11255	(Part VII)	2005
HC&CO	GC Method	-	-	-

T. Maruthi

Analyst Signatory
(T.Maruthi)

Authorized Signatory
(M. Ravi Kiran)

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E-mail:info@pragathilabs.com Website: www.pragathilabs.com

TEST REPORT

Industry Name	Hindustan Petroleum Corporation Limited		
Address	Visakh Refinery, Malkapuram, Visakhapatnam-530 011		
Phone No.	0891-2894825/4818	Kind attention to: Sri Gudala Bhagavan DGM – Technical	
Fax No.	0891-2759861		
Date of Reporting	03rd September,, 2021	Nature of the Sample	Fuel Gases
Our Ref. No.	Pra/Env/HPCL (Stack 1-23) August, 2021	No. of Samples	23
P.O. No.	20000433-HB/PR200066-HP/LOA/AG	Method of Analysis	IS: 11255
Parameters	Temperature, Velocity, PM, SO_2, NO_x, HC, CO, H_2S, Ni & V		

STACK GAS EMISSION ANALYSIS

S. No.	Unit	Stack type	Date of Monitoring	Stack details					Stack emissions							
				Height	Dia.	Area	Temp	Velocity	PM	SO_2	NO_x	CO	H_2S	HC	Ni	V
				m	m	m^2	°C	m/s	mg/Nm³							
1	CDU-I	2-F-1	03-08-2021	60	1.40	1.539	185	5.4	31.8	290	76	22	--	21	BDL	BDL
2	CDU-I	2-F-2	03-08-2021	60	1.00	0.785	232	4.6	33.6	270	70	24	--	19	BDL	BDL
3	CDU-I	2-F-4	03-08-2021	60	1.60	2.01	172	4.4	34.5	252	72	23	--	20	BDL	BDL
4	CDU-II	11-F-01	12-08-2021	60	2.55	5.104	204	5.3	35.2	260	82	21	--	22	BDL	BDL
5	CDU-II	12-F-01	12-08-2021	60	1.60	2.01	225	4.8	32.8	215	78	27	--	23	BDL	BDL
6	FCCU-I	4-F-51	24-08-2021	60	2.18	3.733	206	2.4	21.7	180	62	30	--	24	BDL	BDL
7	DHT	90-F-01/2	31-08-2021	60	3.05	7.309	148	3.7	23.6	365	75	26	--	19	BDL	BDL
8	DHT- HGU	91-F-20	31-08-2021	60	2.15	3.63	110	5.4	9.2	70	76	17	--	14	BDL	BDL
9	DHDS	60-F-01	26-08-2021	60	1.34	1.410	234	3.6	36.4	108	81	26	--	21	BDL	BDL
10	DHDS	61-F-11	26-08-2021	60	1.60	2.011	162	5.2	30.5	90	86	28	--	20	BDL	BDL
11	NHT	72- F-01/02	04-08-2021	60	1.50	1.767	184	3.1	3.7	40	62	25	--	18	BDL	BDL
12	CCR	74-F-1/2/3/4	04-08-2021	60	3.37	8.923	165	3.0	4.0	30	57	22	--	17	BDL	BDL
13	CPP	HRSG-III	05-08-2021	60	3.00	7.065	154	13.1	18.2	54	69	24	--	16	BDL	BDL
14	CPP	HRSG-V	05-08-2021	60	3.00	7.065	158	13.4	19.6	52	82	23	--	18	BDL	BDL
15	CPP	HRSG-VI	05-08-2021	60	3.00	7.065	163	13.2	18.7	55	83	22	--	19	BDL	BDL
16	PP-1	IBH	24-08-2021	60	2.40	4.525	165	3.5	35.5	104	95	34	--	17	BDL	BDL
17	DHT- HGU	91-F-01	31-08-2021	60	1.30	1.327	262	0.4	9.2	36	72	29	--	13	--	--
18	FCC NHT	75-F-01	11-08-2021	60	1.01	0.801	268	2.7	3.9	41	78	32	--	23	--	--
19	FCC NHT	75-F-51	11-08-2021	60	1.35	1.430	208	1.3	3.8	33	70	31		24		
20	FCCU-I	FGD-I	24-08-2021	60	1.76	2.433	66	12.4	28.6	60	76	30	--	20	BDL	BDL
21	DHDSSRU	65-X-001	25-08-2021	60	1.21	1.150	212	2.8	19.1	86	69	22	8.2	16	--	--
22	DHDSSRU	79-X-310	25-08-2021	60	1.01	0.801	228	3.6	25.4	58	65	25	8.4	18	--	--
23	DHT-SRU	92-M-22	18-08-2021	60	1.50	1.767	252	5.1	8.6	116	62	20	8.5	14	--	--

Stack emissions Revised Norm (mg/Nm³)

	Fuel Type	SO_2	NOx	PM	CO	Ni & V	H_2S
Furnaces & CPP	Gas	50	350	10	150		
	Liquid	1700	450	100	200	5	---
FCC Regenerators	---	1700	450	100	400	5	---
SRU'S (65-X-01 & 79-X-310)	---	---	350	---	150	---	15

Methodology for testing of pollutants

PM	Methods for measurement of emissions from stationary sources	IS: 11255	(Part I)	1985
SO_2	Methods for measurement of emissions from stationary sources	IS: 11255	(Part II)	1985
NOx	Methods for measurement of air pollution	IS: 11255	(Part VII)	2005
HC&CO	GC Method	-	-	-

T Maruthi

Analyst Signatory
(T.Maruthi)

Authorized Signatory
(M. Ravi Kiran)

COPY

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Stack Analyzer Calibration Report

Cal. Date	24/08/21	Next Cal. Date	24/09/21	Unit	CDU I (2F4)
Parameter	SO2	Tag. No.	02AX1403	Range	0-2000 mg/m³
Make	TFS	Model	43I HL	Sl. No.	1204451599
Cal. Gas Concentration (Zero): SO2 0.0 mg/m³			Validity of Zero Cal Gas:	IN-AI	
Cal. Gas Concentration (Span): SO2 1651 mg/m³			Validity of Span Cal Gas:	02/01/22	
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Two Point		

Following Checks were carried out (√ **Tick appropriate BOX**)

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Aspirator suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	Standard Value	Measured Reading	Calibrated Reading	Drift	Allowable Drift Limit
SO2	0.00 mg/m³	0.00 mg/m³	0.00 mg/m³	0 %	±8%
Span Calibration	**Standard Value**	**Measured Reading**	**Calibrated Reading**	**Drift**	**Allowable Drift Limit**
SO2	1651 mg/m³	1652 mg/m³	1651 mg/m³	0.05 %	±2%

Analyzer Values

Before Calibration	After Calibration
DCS: 426 mg/m³	DCS: 425 mg/m³
Local : 426 mg/m³	Local : 425 mg/m³

Observations if any :	

Calibration Carried by
THERMOFISHER

Checked by (Operations)
HPCL-VR

Checked by Eng. (Maint-Inst)
HPCL-VR

Reviewed by
Manager (Maint-Inst)-HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Stack Analyzer Calibration Report

Cal. Date	24/08/21	Next Cal. Date	24/09/21	Unit	CDU I (2F4)
Parameter	CO	Tag. No.	02AX1405	Range	0-300 mg/m³
Make	TFS	Model	48I	Sl. No.	CM13510030
Cal. Gas Concentration (Zero): CO 0.0 mg/m³			Validity of Zero Cal Gas: N/A		
Cal. Gas Concentration (Span): CO 247 mg/m³			Validity of Span Cal Gas: 02/01/22		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Two Point		

Following Checks were carried out (√ **Tick appropriate BOX)**

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Aspirator suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	Standard Value	Measured Reading	Calibrated Reading	Drift	Allowable Drift Limit
CO	0.00 mg/m³	0.00 mg/m³	0.00 mg/m³	0 %	±8%
Span Calibration	**Standard Value**	**Measured Reading**	**Calibrated Reading**	**Drift**	**Allowable Drift Limit**
CO	247 mg/m³	249 mg/m³	247 mg/m³	0.66 %	±2%

Analyzer Values

Before Calibration	After Calibration
DCS: 8 mg/m³	DCS: 6 mg/m³
Local : 8 mg/m³	Local : 6 mg/m³

Observations if any :	

Calibration Carried by
THERMOFISHER

Checked by (Operations)
HPCL-VR

Checked by Eng. (Maint-Inst)
HPCL-VR

Reviewed by
Manager (Maint-Inst)-HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Stack Analyzer Calibration Report

Cal. Date	24/08/21	Next Cal. Date	24/09/21	Unit	CDU I (2F4)
Parameter	HC	Tag. No.	02AX1406	Range	0-1000 ppm
Make	TFS	Model	51I HT	Sl. No.	1204451607
Cal. Gas Concentration (Zero): CH4 0.0 ppm			Validity of Zero Cal Gas:	N.A	
Cal. Gas Concentration (Span): CH4 1000 ppm			Validity of Span Cal Gas: 02 / 01 / 22		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Two Point		

Following Checks were carried out (√ **Tick appropriate BOX**)

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Aspirator suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	Standard Value	Measured Reading	Calibrated Reading	Drift	Allowable Drift Limit
CH4	0.00 ppm	1.01 ppm	0.00 ppm	0.1 %	±8%
Span Calibration	**Standard Value**	**Measured Reading**	**Calibrated Reading**	**Drift**	**Allowable Drift Limit**
CH4	1000 ppm	1002 ppm	1000 ppm	0.2 %	±2%

Analyzer Values

Before Calibration	After Calibration
DCS: 2 ppm	DCS: 2 ppm
Local : 2 ppm	Local : 2 ppm

Observations if any :	

Calibration Carried by
THERMOFISHER

Checked by (Operations)
HPCL-VR

Checked by Eng. (Maint-Inst)
HPCL-VR

Reviewed by
Manager (Maint-Inst)-HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Stack Analyzer Calibration Report

Cal. Date	24/08/21	Next Cal. Date	24/09/21	Unit	CDU I (2F4)
Parameter	NOx	Tag. No.	02AX1404	Range	0-700 mg/m³
Make	TFS	Model	42I HL	Sl. No.	1204451598
Cal. Gas Concentration (Zero): NOx 0.0 mg/m³			Validity of Zero Cal Gas: N.A		
Cal. Gas Concentration (Span): NOx 543 mg/m³			Validity of Span Cal Gas: 02/01/22		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Two Point		

Following Checks were carried out (√ **Tick appropriate BOX)**

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Aspirator suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	Standard Value	Measured Reading	Calibrated Reading	Drift	Allowable Drift Limit
NOx	0.00 mg/m³	0.00 mg/m³	0.00 mg/m³	0 %	±8%
Span Calibration	**Standard Value**	**Measured Reading**	**Calibrated Reading**	**Drift**	**Allowable Drift Limit**
NOx	543 mg/m³	544 mg/m³	543 mg/m³	0.14 %	±2%

Analyzer Values

Before Calibration	After Calibration
DCS: 140 mg/m³	DCS: 139 mg/m³
Local : 140 mg/m³	Local : 139 mg/m³

Observations if any :	

Calibration Carried by
THERMOFISHER

Checked by (Operations)
HPCL-VR

Checked by Eng. (Maint-Inst)
HPCL-VR

Reviewed by
Manager (Maint-Inst)-HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Stack Analyzer Calibration Report

Cal. Date	24 / 08 / 21	Next Cal. Date	24 / 09 / 21	Unit	CDU II (11F1)
Parameter	SO2	Tag. No.	11AI003	Range	0-2000 mg/m³
Make	TFS	Model	43I HL	Sl. No.	1109147787
Cal. Gas Concentration (Zero): SO2 0.0 mg/m³			Validity of Zero Cal Gas: / NA /		
Cal. Gas Concentration (Span): SO2 1651 mg/m³			Validity of Span Cal Gas: 02 / 01 / 22		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Two Point		

Following Checks were carried out (√ **Tick appropriate BOX)**

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Aspirator suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	Standard Value	Measured Reading	Calibrated Reading	Drift	Allowable Drift Limit
SO2	0.00 mg/m³	0.00 mg/m³	0.00 mg/m³	0 %	±8%
Span Calibration	**Standard Value**	**Measured Reading**	**Calibrated Reading**	**Drift**	**Allowable Drift Limit**
SO2	1651 mg/m³	1652 mg/m³	1651 mg/m³	0.05 %	±2%

Analyzer Values

Before Calibration	After Calibration
DCS: 220 mg/m³	DCS: 219 mg/m³
Local : 220 mg/m³	Local : 219 mg/m³

Observations if any :	

Calibration Carried by
THERMOFISHER

Checked by (Operations)
HPCL-VR

Checked by Eng. (Maint-Inst)
HPCL-VR

Reviewed by
Manager (Maint-Inst)-HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Stack Analyzer Calibration Report

Cal. Date	24 / 08 / 21	Next Cal. Date	24 / 09 / 21	Unit	CDU II (11F1)
Parameter	NOx	Tag. No.	11AI004	Range	0-700 mg/m³
Make	TFS	Model	42I HL	Sl. No.	1204451597
Cal. Gas Concentration (Zero): NOx 0.0 mg/m³			Validity of Zero Cal Gas: / NA/		
Cal. Gas Concentration (Span): NOx 543 mg/m³			Validity of Span Cal Gas: 02 / 01 / 22		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Two Point		

Following Checks were carried out (√ Tick appropriate BOX)

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Aspirator suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	Standard Value	Measured Reading	Calibrated Reading	Drift	Allowable Drift Limit
NOx	0.00 mg/m³	0.00 mg/m³	0.00 mg/m³	0 %	±8%
Span Calibration	**Standard Value**	**Measured Reading**	**Calibrated Reading**	**Drift**	**Allowable Drift Limit**
NOx	543 mg/m³	545 mg/m³	543 mg/m³	0.28 %	±2%

Analyzer Values

Before Calibration	After Calibration
DCS: 89 mg/m³	DCS: 87 mg/m³
Local : 89 mg/m³	Local : 87 mg/m³

Observations if any :	

SK Shivaji

Calibration Carried by
THERMOFISHER

Checked by (Operations)
HPCL-VR

Checked by Eng. (Maint-Inst)
HPCL-VR

Reviewed by Manager

Manager (Maint-Inst)-HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Stack Analyzer Calibration Report

Cal. Date	24 / 08 / 21	Next Cal. Date	24 / 09 / 21	Unit	CDU II (11F1)
Parameter	CO	Tag. No.	11AI002	Range	0-300 mg/m³
Make	TFS	Model	48I	Sl. No.	1204451603
Cal. Gas Concentration (Zero): CO 0.0 mg/m³			Validity of Zero Cal Gas: / NA/		
Cal. Gas Concentration (Span): CO 247 mg/m³			Validity of Span Cal Gas: 02 / 01 / 22		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Two Point		

Following Checks were carried out (√ **Tick appropriate BOX)**

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Aspirator suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	Standard Value	Measured Reading	Calibrated Reading	Drift	Allowable Drift Limit
CO	0.00 mg/m³	0.00 mg/m³	0.00 mg/m³	0 %	±8%
Span Calibration	**Standard Value**	**Measured Reading**	**Calibrated Reading**	**Drift**	**Allowable Drift Limit**
CO	247 mg/m³	249 mg/m³	247 mg/m³	0.66 %	±2%

Analyzer Values

Before Calibration	After Calibration
DCS: 6 mg/m³	DCS: 7 mg/m³
Local : 6 mg/m³	Local : 7 mg/m³

Observations if any :	

Calibration Carried by
THERMOFISHER

Checked by (Operations)
HPCL-VR

Checked by Eng. (Maint-Inst)
HPCL-VR

Reviewed by
Manager (Maint-Inst)-HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Stack Analyzer Calibration Report

Cal. Date	24/08/21	Next Cal. Date	24/09/21	Unit	CDU II (11F1)
Parameter	HC	Tag. No.	11AI005	Range	0-1000 ppm
Make	TFS	Model	51I HT	Sl. No.	1126447754
Cal. Gas Concentration (Zero): CH4 0.0 ppm			Validity of Zero Cal Gas: /NA/		
Cal. Gas Concentration (Span): CH4 1000 ppm			Validity of Span Cal Gas: / /		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Two Point		

Following Checks were carried out (√ **Tick appropriate BOX**)

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Aspirator suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	Standard Value	Measured Reading	Calibrated Reading	Drift	Allowable Drift Limit
CH4	0.00 ppm	1.03 ppm	0.00 ppm	0.1 %	±8%
Span Calibration	**Standard Value**	**Measured Reading**	**Calibrated Reading**	**Drift**	**Allowable Drift Limit**
CH4	1000 ppm	1001 ppm	1000 ppm	0.1 %	±2%

Analyzer Values

Before Calibration	After Calibration
DCS: 3 ppm	DCS: 2 ppm
Local : 3 ppm	Local : 2 ppm

Observations if any :	

Calibration Carried by THERMOFISHER	Checked by (Operations) HPCL-VR	Checked by Eng. (Maint-Inst) HPCL-VR

Reviewed by _____
Manager (Maint-Inst)-HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Stack Analyzer Calibration Report

Cal. Date	26/8/21	Next Cal. Date	26/9/21	Unit	HRSG 5
Parameter	CO	Tag. No.	08AI54622	Range	0-300 mg/nm³
Make	ESA	Model	MIR9000	Sl. No.	3182
Cal. Gas Concentration (Zero): CO 0.0 mg/nm³			Validity of Zero Cal Gas: 5/5/2022		
Cal. Gas Concentration (Span): CO 240 mg/nm³			Validity of Span Cal Gas: 26/2/2022		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Two Point		

Following Checks were carried out (√ **Tick appropriate BOX)**

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Aspirator suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	Standard Value	Measured Reading	Calibrated Reading	Drift	Allowable Drift Limit
CO	0 mg/nm³	1.1 mg/nm³	0 mg/nm³	0.3 %	±8%
Span Calibration	**Standard Value**	**Measured Reading**	**Calibrated Reading**	**Drift**	**Allowable Drift Limit**
CO	240 mg/nm³	242.1 mg/nm³	240 mg/nm³	0.7 %	±2%

Analyzer Values

Before Calibration	After Calibration
DCS: 13.1 mg/nm³	DCS: 12.9 mg/nm³
Local : 13.1 mg/nm³	Local : 12.9 mg/nm³

Observations if any :	

V. Pavan Kumar
Calibration Carried by

Checked by (Operations)
HPCL-VR

Checked by Eng. (Maint-Inst)
HPCL-VR

Reviewed by
Manager (Main-Inst)-HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Stack Analyzer Calibration Report

Cal. Date	26 / 8 / 21	Next Cal. Date	26/9 / 21	Unit	HRSG 5
Parameter	NOx	Tag. No.	08AI54620	Range	0-700 mg/nm³
Make	ESA	Model	MIR9000	Sl. No.	3182
Cal. Gas Concentration (Zero): NOx 0.0 mg/nm³			Validity of Zero Cal Gas: 5 / 5 / 2022		
Cal. Gas Concentration (Span): NOx 560 mg/nm³			Validity of Span Cal Gas: 26 / 2 / 2022		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Two Point		

Following Checks were carried out (√ **Tick appropriate BOX)**

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Aspirator suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	Standard Value	Measured Reading	Calibrated Reading	Drift	Allowable Drift Limit
NOx	0 mg/nm³	1.05 mg/nm³	0 mg/nm³	0.15 %	±8%
Span Calibration	**Standard Value**	**Measured Reading**	**Calibrated Reading**	**Drift**	**Allowable Drift Limit**
NOx	560 mg/nm³	567 mg/nm³	560 mg/nm³	1 %	±2%

Analyzer Values

Before Calibration	After Calibration
DCS: 194.1 mg/nm³	DCS: 193.2 mg/nm³
Local : 194.1 mg/nm³	Local : 193.2 mg/nm³

Observations if any :	

V. Pavan Kumar
Calibration Carried by

Checked by (Operations)
HPCL-VR

Checked by Eng. (Maint-Inst)
HPCL-VR

Reviewed by
Manager (Main-Inst)-HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Stack Analyzer Calibration Report

Cal. Date	26/8/21	Next Cal. Date	26/9/21	Unit	HRSG 5
Parameter	SO2	Tag. No.	08AI54619	Range	0-2200 mg/nm³
Make	ESA	Model	MIR9000	Sl. No.	3182
Cal. Gas Concentration (Zero): SO2 0.0 mg/nm³			Validity of Zero Cal Gas: 5/5/2022		
Cal. Gas Concentration (Span): SO2 2000 mg/nm³			Validity of Span Cal Gas: 5/5/2022		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Two Point		

Following Checks were carried out (√ **Tick appropriate BOX)**

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Aspirator suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	Standard Value	Measured Reading	Calibrated Reading	Drift	Allowable Drift Limit
SO2	0 mg/nm³	0.9 mg/nm³	0 mg/nm³	0.04 %	±8%
Span Calibration	**Standard Value**	**Measured Reading**	**Calibrated Reading**	**Drift**	**Allowable Drift Limit**
SO2	2000 mg/nm³	2015 mg/nm³	2000 mg/nm³	0.68 %	±2%

Analyzer Values

Before Calibration	After Calibration
DCS: 16.4 mg/nm³	DCS: 15.1 mg/nm³
Local : 16.4 mg/nm³	Local : 15.1 mg/nm³

Observations if any :	

V. Pavan Kumar

Calibration Carried by

Checked by (Operations) HPCL-VR

Checked by Eng. (Maint-Inst) HPCL-VR

Reviewed by _____

Manager (Main-Inst)-HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Stack Analyzer Calibration Report

Cal. Date	26/8/21	Next Cal. Date	26/9/21	Unit	HRSG 5/6
Parameter	HC	Tag. No.	08AI54621/64621	Range	0-800 ppm
Make	ESA	Model	HC51M	Sl. No.	959
Cal. Gas Concentration (Zero): C3H8 0.0 ppm			Validity of Zero Cal Gas: 5/5/2022		
Cal. Gas Concentration (Span): C3H8 358 ppm			Validity of Span Cal Gas: 27/11/2021		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Two Point		

Following Checks were carried out (√ Tick appropriate BOX)

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Aspirator suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	Standard Value	Measured Reading	Calibrated Reading	Drift	Allowable Drift Limit
C3H8	0 ppm	1 ppm	0 ppm	0.125%	±8%
Span Calibration	**Standard Value**	**Measured Reading**	**Calibrated Reading**	**Drift**	**Allowable Drift Limit**
C3H8	358 ppm	353 ppm	358 ppm	0.62%	±2%

Analyzer Values

Before Calibration	After Calibration
DCS: 2.8 ppm	DCS: 3.1 ppm
Local : 2.8 ppm	Local : 3.1 ppm

Observations if any :	

V. Pavan Kumar
Calibration Carried by

Checked by (Operations)
HPCL-VR

Checked by Eng. (Maint-Inst)
HPCL-VR

Reviewed by
Manager (Main-Inst)-HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	7 / 8 / 2021	Next Cal. Date	7 / 9 / 2021	Unit	South CAAMS
Ana Parameter	SO2	Tag. No.	120-AI-101	Range	0 – 250 µg/m³
Make	Teledyne	Model	T100	Sl. No.	4284

Cal. Gas Concentration (Zero) : SO2 = 0 ppb	Cylinder Validity: - / NA / -
Cal.Gas Concentration(Span):SO2 = 225 ppb Cal.Gas Concentration(Valid):SO2 = 112 ppb	Cylinder Validity: 31 / 8 / 2021
Calibration Type: Auto ( ) / Manual (√)	Calibration Method: Dilution

Following Checks were carried out (√ **Tick appropriate BOX)**

1. Sample line checking	Yes	√	No	
2. Purging carried out	Yes	√	No	
3. Sample suction pump checks	Yes	√	No	
4. Others if any	Yes		No	√

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
SO2 Zero	0 ppb	0.12 ppb	0 ppb	0.12 ppb
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
SO2 Balance N2	225 ppb	226.1 ppb	225 ppb	1.1 ppb
Validation	**Dilution Value**		**Measured Reading**	
SO2 Balance N2	112 ppb		113.5 ppb	

Analyzer Values

Before Calibration	After Calibration
Portal : 0.9 µg/m³	**Portal :** 1.2 µg/m³
Local : 0.9 µg/m³	**Local :** 1.2 µg/m³

Observations if any :	- NA -

Calibration Carried by
EMERSON

Checked by Engg. (Maint-Inst)
HPCL-VR

Reviewed by

Manager (Main-Inst)
HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	7 / 8 / 2021	Next Cal. Date	7/ 9 / 2021	Unit	South CAAMS
Ana Parameter	NOX	Tag. No.	120-AI-102	Range	0 – 500 µg/m³
Make	Teledyne	Model	T200	Sl. No.	4791

Cal. Gas Concentration (Zero) : NOX = 0 ppb	Cylinder Validity: - / NA / -
Cal.Gas Concentration(Span):NOX= 400 ppb Cal.Gas Concentration(Valid):NOX= 200 ppb	Cylinder Validity: 18 / 02 / 22
Calibration Type: Auto ( ) / Manual (√)	Calibration Method: Dilution

Following Checks were carried out (√ **Tick appropriate BOX)**

1. Sample line checking	Yes	√	No	
2. Purging carried out	Yes	√	No	
3. Sample suction pump checks	Yes	√	No	
4. Others if any	Yes		No	√

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
NOX Zero	0.0 ppb	0.39 ppb	0 ppb	0.39 ppb
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
NOX Balance N2	400 ppb	401.3 ppb	400 ppb	1.3 ppb
Validation	**Dilution Value**		**Measured Reading**	
NOX Balance N2	200 ppb		200.9 ppb	

Analyzer Values

Before Calibration	After Calibration
Portal : 18.2 µg/m³	**Portal :** 21.6 µg/m³
Local : 18.2 µg/m³	**Local :** 21.6 µg/m³

Observations if any :	- NA -

Calibration Carried by
EMERSON

Checked by Engg. (Maint-Inst)
HPCL-VR

Reviewed by

Manager (Main-Inst)
HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	7 / 8 / 2021	Next Cal. Date	7 / 9 / 2021	Unit	South CAAMS
Ana Parameter	CO	Tag. No.	120-AI-103	Range	0 – 10 mg/m³
Make	Teledyne	Model	T300	Sl. No.	4025

Cal. Gas Concentration (Zero) : CO = 0 ppm	Cylinder Validity: -/ NA/ -
Cal.Gas Concentration(Span):CO = 8 ppm Cal.Gas Concentration(Valid):CO = 4 ppm	Cylinder Validity: 18 / 02 / 22
Calibration Type: Auto ( ) / Manual (√)	Calibration Method: Dilution

Following Checks were carried out (√ **Tick appropriate BOX)**

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Sample suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
CO Zero	0 ppm	0.06 ppm	0 ppm	0.06 ppm
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
CO Balance N2	8 ppm	8.02 ppm	8 ppm	0.2 ppm
Validation	**Dilution Value**		**Measured Reading**	
CO Balance N2	4 ppm		4.121 ppm	

Analyzer Values

Before Calibration		After Calibration	
Portal : 0.56	mg/m³	**Portal :** 0.59	mg/m³
Local : 0.56	mg/m³	**Local :** 0.59	mg/m³

Observations if any :	- NA -

Calibration Carried by
EMERSON

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HPCL-VR

Reviewed by

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HPCL-VR

VISAKH REFINERY
MAINTENANCE DEPARTMENT
Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	7 / 8 / 2021	Next Cal. Date	7/ 9 / 2021	Unit	South CAAMS
Ana Parameter	Ozone	Tag. No.	120-AI-119	Range	0 – 500 µg/m³
Make	Environ. SA	Model	O342E	Sl. No.	665

Cal. Gas Concentration (Zero) : O3 = 0 ppb	Cylinder Validity: -/ NA/ -
Cal. Gas Concentration (Span):O3 = 160 ppb	Cylinder Validity: -/ NA/ -
Calibration Type: Auto ( ) / Manual (√)	Calibration Method: Inbuilt Ozonator

Following Checks were carried out (√ **Tick appropriate BOX)**

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Sample suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
Ozone Zero	0 ppb	-0.21 ppb	0 ppb	-0.21 ppb
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
Inbuilt Ozonator	160 ppb	160.2 ppb	160 ppb	0.2 ppb

Analyzer Values

Before Calibration	After Calibration
Portal : 7.98 µg/m³	**Portal :** 8.02 µg/m³
Local : 7.98 µg/m³	**Local :** 8.02 µg/m³

Observations if any :	- NA -

Calibration Carried by
EMERSON

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HPCL-VR

VISAKH REFINERY
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Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	7 / 8 / 2021	Next Cal. Date	7 / 9 / 2021	Unit	South CAAMS
Ana Parameter	NH3	Tag. No.	20-AI-118	Range	0 – 500 µg/m³
Make	Environ. SA	Model	AC32E	Sl. No.	121

Cal. Gas Concentration (Zero) :NH3 = 0 ppb	Cylinder Validity: – / NA / –
Cal.Gas Concentration(Span):NH3 = 400 ppb Cal.Gas Concentration(Valid):NH3 = 200 ppb	Cylinder Validity: 18 / 2 / 22
Calibration Type: Auto ( ) / Manual (√)	Calibration Method: Dilution

Following Checks were carried out (√ **Tick appropriate BOX)**

1. Sample line checking	Yes	✓	No	
2. Purging carried out	Yes	✓	No	
3. Sample suction pump checks	Yes	✓	No	
4. Others if any	Yes		No	✓

Zero Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
NH3 Zero	0 ppb	1.2 ppb	0 ppb	1.2 ppb
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
NH3 Balance N2	400 ppb	401.4 ppb	400 ppb	1.4 ppb
Validation	**Dilution Value**		**Measured Reading**	
NH3 Balance N2	200 ppb		199 ppb	

Analyzer Values

Before Calibration	**After Calibration**
Portal : 3.46 µg/m³	**Portal :** 3.39 µg/m³
Local : 3.46 µg/m³	**Local :** 3.39 µg/m³

Observations if any :	– NA –

Calibration Carried by
EMERSON

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VISAKH REFINERY
MAINTENANCE DEPARTMENT
Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	8 / 8 / 2021	Next Cal. Date	9 / 9 / 2021	Unit	South CAAMS
Ana Parameter	H2S	Tag. No.	120-AI-120	Range	0 – 5 µg/m³
Make	Chromatotech	Model	M52022	Sl. No.	#40640413
Cal. Gas Concentration (Zero) : H2S = 0 ppb			Cylinder Validity: — / NA / —		
Cal. Gas Concentration (Span):H2S = 229 ppb			Cylinder Validity: 07 / 10 / 2021		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: DMS Tube		

Following Checks were carried out (√ **Tick appropriate BOX)**

1. Sample line checking	Yes		No	
2. Purging carried out	Yes		No	
3. Sample suction pump checks	Yes		No	
4. Others if any	Yes		No	

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
H2S Zero	0 µg/m³	0 µg/m³	0 µg/m³	µg/m³
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
DMS Tube	229 µg/m³	231.265 µg/m³	229 µg/m³	µg/m³

Analyzer Values

Before Calibration		After Calibration	
Portal :	0.129 µg/m³	**Portal :**	0.129 µg/m³
Local :	0.130 µg/m³	**Local :**	0.130 µg/m³

Observations if any :	

Calibration Carried by
EMERSON

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VISAKH REFINERY
MAINTENANCE DEPARTMENT
Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	19 / 8 / 2021	Next Cal. Date	19/ 9 / 2021	Unit	SY CAAMS
Ana Parameter	SO2	Tag. No.	120-AI-201	Range	0 – 250 µg/m³
Make	Environ SA	Model	AF22E	Sl. No.	1227

Cal. Gas Concentration (Zero) : SO2 = 0 ppb	Cylinder Validity: – / NA / –
Cal.Gas Concentration(Span):SO2 = 225 ppb Cal.Gas Concentration(Valid):SO2 = 112 ppb	Cylinder Validity: 31/ 8 /2021
Calibration Type: Auto ( ) / Manual (√)	Calibration Method: Dilution

Following Checks were carried out (√ **Tick appropriate BOX)**

5. Sample line checking	Yes	√	No	
6. Purging carried out	Yes	√	No	
7. Sample suction pump checks	Yes	√	No	
8. Others if any	Yes		No	√

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
SO2 Zero	0 ppb	0.1 ppb	0 ppb	0.1 ppb
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
SO2 Balance N2	225 ppb	225.3 ppb	225 ppb	0.3 ppb
Validation	**Dilution Value**		**Measured Reading**	
SO2 Balance N2	112 ppb		113.6 ppb	

Analyzer Values

Before Calibration		After Calibration	
Portal : 6.49	µg/m³	**Portal :** 7.09	µg/m³
Local : 6.45	µg/m³	**Local :** 7.09	µg/m³

Observations if any :	– NA –

Calibration Carried by
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VISAKH REFINERY
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Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	19 / 8 / 2021	Next Cal. Date	19 / 9 / 2021	Unit	SY CAAMS
Ana Parameter	NOX	Tag. No.	120-AI-202	Range	0 – 500 µg/m³
Make	Environ SA	Model	AC32E	Sl. No.	1275
Cal. Gas Concentration (Zero) : NOX = 0 ppb			Cylinder Validity: - / NA / -		
Cal.Gas Concentration(Span):NOX= 400 ppb Cal.Gas Concentration(Valid):NOX= 200 ppb			Cylinder Validity: 18 / 2 / 2022		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Dilution		

Following Checks were carried out (√ **Tick appropriate BOX)**

5. Sample line checking	Yes	√	No	
6. Purging carried out	Yes	√	No	
7. Sample suction pump checks	Yes	√	No	
8. Others if any	Yes		No	√

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
NOX Zero	0 ppb	0.06 ppb	0 ppb	0.06 ppb
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
NOX Balance N2	400 ppb	403.1 ppb	400 ppb	3.1 ppb
Validation	**Dilution Value**		**Measured Reading**	
NOX Balance N2	200 ppb		198.9 ppb	

Analyzer Values

Before Calibration		After Calibration	
Portal : 11.9	µg/m³	**Portal :** 12.4	µg/m³
Local : 11.9	µg/m³	**Local :** 12.4	µg/m³

Observations if any :	- NA -

Calibration Carried by
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VISAKH REFINERY
MAINTENANCE DEPARTMENT
Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	19 / 8 / 2021	Next Cal. Date	19 / 9 / 2021	Unit	SY CAAMS
Ana Parameter	CO	Tag. No.	120-AI-203	Range	0 – 10 mg/m^3
Make	Environ SA	Model	CO12E	Sl. No.	968

Cal. Gas Concentration (Zero) : CO = 0 ppm	Cylinder Validity: – / NA / –
Cal.Gas Concentration(Span):CO = 8 ppm Cal.Gas Concentration(Valid):CO = 4 ppm	Cylinder Validity: 18/ 2 / 22
Calibration Type: Auto ( ) / Manual (√)	Calibration Method: Dilution

Following Checks were carried out (√ **Tick appropriate BOX**)

5. Sample line checking	Yes	✓	No	
6. Purging carried out	Yes	✓	No	
7. Sample suction pump checks	Yes	✓	No	
8. Others if any	Yes		No	✓

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
CO Zero	0 ppm	0.11 ppm	0 ppm	0.1 / ppm
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
CO Balance N2	8 ppm	8.04 ppm	8 ppm	0.04 ppm
Validation	**Dilution Value**		**Measured Reading**	
CO Balance N2	4 ppm		3.98 ppm	

Analyzer Values

Before Calibration		After Calibration	
Portal : 0.51	mg/m^3	**Portal :** 0.55	mg/m^3
Local : 0.51	mg/m^3	**Local :** 0.55	mg/m^3

Observations if any :	– NA –

Calibration Carried by
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Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	19 / 8 / 2021	Next Cal. Date	19/ 9 / 2021	Unit	SY CAAMS
Ana Parameter	Ozone	Tag. No.	120-AI-211	Range	0 – 500 µg/m³
Make	Teledyne	Model	T400	Sl. No.	4864
Cal. Gas Concentration (Zero) : O3 = 0 ppb			Cylinder Validity: -/ NA / -		
Cal. Gas Concentration (Span):O3 = 400 ppb			Cylinder Validity: - / NA / -		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Inbuilt Ozonator		

Following Checks were carried out (√ **Tick appropriate BOX)**

5. Sample line checking	Yes	✓	No	
6. Purging carried out	Yes	✓	No	
7. Sample suction pump checks	Yes	✓	No	
8. Others if any	Yes		No	✓

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
Ozone Zero	0 ppb	0.15 ppb	0 ppb	0.15 ppb
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
Inbuilt Ozonator	400 ppb	401.5 ppb	400 ppb	1.5 ppb

Analyzer Values

Before Calibration		After Calibration	
Portal : 9.6	µg/m³	**Portal :** 10.2	µg/m³
Local : 9.6	µg/m³	**Local :** 10.2	µg/m³

Observations if any :	— NA —

Calibration Carried by
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Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	19 / 8 / 2021	Next Cal. Date	19 / 9 / 2021	Unit	SY CAAMS
Ana Parameter	NH3	Tag. No.	120-AI-210	Range	0 – 500 µg/m³
Make	Teledyne	Model	T201	Sl. No.	664
Cal. Gas Concentration (Zero) :NH3 = 0 ppb			Cylinder Validity: - / NA / -		
Cal.Gas Concentration(Span):NH3 = 400 ppb Cal.Gas Concentration(Valid):NH3 = 200 ppb			Cylinder Validity: 18 / 2 / 22		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Dilution		

Following Checks were carried out (√ **Tick appropriate BOX**)

5. Sample line checking	Yes	✓	No	
6. Purging carried out	Yes	✓	No	
7. Sample suction pump checks	Yes	✓	No	
8. Others if any	Yes		No	✓

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
NH3 Zero	0 ppb	0.61 ppb	0 ppb	0.61 ppb
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
NH3 Balance N2	400 ppb	398.6 ppb	400 ppb	1.4 ppb
Validation	**Dilution Value**		**Measured Reading**	
NH3 Balance N2	200 ppb		190.4 ppb	

Analyzer Values

Before Calibration		After Calibration	
Portal : 28.9 µg/m³		**Portal :** 31.2 µg/m³	
Local : 28.9 µg/m³		**Local :** 31.2 µg/m³	

Observations if any :	- NA -

Calibration Carried by
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VISAKH REFINERY
MAINTENANCE DEPARTMENT
Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	21 / 8 / 2021	Next Cal. Date	19/ 9 / 2021	Unit	SY CAAMS
Ana Parameter	Benzene	Tag. No.	120-AI-209	Range	0 – 5 µg/m³
Make	Chromatotech	Model	A73022	Sl. No.	#20510313
Cal. Gas Concentration (Zero) : Ben = 0 µg/m³			Cylinder Validity: – / NA/ –		
Cal. Gas Concentration (Span):Ben = 50 µg/m³			Cylinder Validity: 7 / 10 / 2022		
Calibration Type: Auto ( ) / Manual (√)			Calibration Method: Permeation Tube		

Following Checks were carried out (√ **Tick appropriate BOX)**

5. Sample line checking	Yes		No	
6. Purging carried out	Yes		No	
7. Sample suction pump checks	Yes		No	
8. Others if any	Yes		No	

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
Nitrogen	0 µg/m³	0 µg/m³	0 µg/m³	0 µg/m³
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
Permeation Tube	50 µg/m³	50 µg/m³	50 µg/m³	0 µg/m³

Analyzer Values

Before Calibration	After Calibration
Portal : 0·038 µg/m³	**Portal :** 0·02 µg/m³
Local : 0·038 µg/m³	**Local :** 0·02 µg/m³

Observations if any :	– NIL –

Calibration Carried by
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VISAKH REFINERY
MAINTENANCE DEPARTMENT
Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	23/ 8 / 2021	Next Cal. Date	23/ 9 / 2021	Unit	HLPH CAAMS
Ana Parameter	SO2	Tag. No.	120-AI-301	Range	0 – 250 µg/m³
Make	Environ SA	Model	AF22E	Sl. No.	1226

Cal. Gas Concentration (Zero) : SO2 = 0 ppb	Cylinder Validity: - / NA / -
Cal.Gas Concentration(Span):SO2 = 225 ppb Cal.Gas Concentration(Valid):SO2 = 112 ppb	Cylinder Validity: 31 / 08/ 2024
Calibration Type: Auto ( ) / Manual (√)	Calibration Method: Dilution

Following Checks were carried out (√ **Tick appropriate BOX)**

9. Sample line checking	Yes	✓	No	
10. Purging carried out	Yes	✓	No	
11. Sample suction pump checks	Yes	✓	No	
12. Others if any	Yes		No	✓

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
SO2 Zero	0.00 ppb	0.09 ppb	0 ppb	0.09 ppb
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
SO2 Balance N2	225 ppb	224.9 ppb	225 ppb	0.1 ppb
Validation	**Dilution Value**		**Measured Reading**	
SO2 Balance N2	112 ppb		115 ppb	

Analyzer Values

Before Calibration		After Calibration	
Portal : 80.3	µg/m³	**Portal :** 81.9	µg/m³
Local : 80.3	µg/m³	**Local :** 81.9	µg/m³

Observations if any :	- NA -

Calibration Carried by
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VISAKH REFINERY
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Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	23/ 8 / 2021	Next Cal. Date	23 / 9 / 2021	Unit	HLPH CAAMS
Ana Parameter	NOX	Tag. No.	120-AI-302	Range	0 – 500 µg/m³
Make	Environ SA	Model	AC32E	Sl. No.	1095

Cal. Gas Concentration (Zero):NOX = 0 ppb	Cylinder Validity: – / NA / –
Cal.Gas Concentration(Span):NOX=400 ppb Cal.Gas Concentration(Valid):NOX= 200 ppb	Cylinder Validity: 13 / 02 / 2022
Calibration Type: Auto ( ) / Manual (√)	Calibration Method: Dilution

Following Checks were carried out (√ **Tick appropriate BOX)**

9. Sample line checking	Yes	✓	No	
10. Purging carried out	Yes	✓	No	
11. Sample suction pump checks	Yes	✓	No	
12. Others if any	Yes		No	✓

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
NOX Zero	0 ppb	0.79 ppb	0 ppb	0.79 ppb
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
NOX Balance N2	400 ppb	402.2 ppb	400 ppb	2.2 ppb
Validation	**Dilution Value**		**Measured Reading**	
NOX Balance N2	200 ppb		196.8 ppb	

Analyzer Values

Before Calibration		After Calibration	
Portal : 31.6	µg/m³	**Portal :** 32.9	µg/m³
Local : 31.6	µg/m³	**Local :** 32.9	µg/m³

Observations if any :	– NA –

Calibration Carried by
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Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	23/ 8 / 2021	Next Cal. Date	23/ 9 / 2021	Unit	HLPH CAAMS
Ana Parameter	CO	Tag. No.	120-AI-303	Range	0 – 10 mg/m³
Make	Environ SA	Model	CO12E	Sl. No.	967

Cal. Gas Concentration (Zero) :CO = 0 ppm	Cylinder Validity: - / NA / -
Cal. Gas Concentration (Span):CO = 8 ppm Cal. Gas Concentration (Valid):CO = 4 ppm	Cylinder Validity: 18 / 02 / 2022
Calibration Type: Auto ( ) / Manual (√)	Calibration Method: Dilution

Following Checks were carried out (√ **Tick appropriate BOX)**

9. Sample line checking	Yes	√	No	
10. Purging carried out	Yes	√	No	
11. Sample suction pump checks	Yes	√	No	
12. Others if any	Yes		No	√

Zero Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
CO Zero	0 ppm	-0.11 ppm	0 ppm	-0.11 ppm
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
CO Balance N2	8 ppm	8.06 ppm	8 ppm	0.06ppm
Validation	**Dilution Value**		**Measured Reading**	
CO Balance N2	4 ppm		4.15 ppm	

Analyzer Values

Before Calibration	**After Calibration**
Portal : 0.86 mg/m³	**Portal :** 0.69 mg/m³
Local : 0.86 mg/m³	**Local :** 0.69 mg/m³

Observations if any :	- NA -

Calibration Carried by
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Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	23/ 8 / 2021	Next Cal. Date	23/ 9 / 2021	Unit	HLPH CAAMS
Ana Parameter	Ozone	Tag. No.	120-AI-311	Range	0 – 500 µg/m³
Make	Environ SA	Model	O342E	Sl. No.	923

Cal. Gas Concentration (Zero) :O3 = 0 ppb	Cylinder Validity: - / NA / -
Cal. Gas Concentration (Span):O3 = 160 ppb	Cylinder Validity: - / NA / -
Calibration Type: Auto ( ) / Manual (√)	Calibration Method: Inbuilt Ozonator

Following Checks were carried out (√ **Tick appropriate BOX)**

9. Sample line checking	Yes	√	No	
10. Purging carried out	Yes	√	No	
11. Sample suction pump checks	Yes	√	No	
12. Others if any	Yes		No	√

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
Ozone Zero	0 ppb	0.12 ppb	0 ppb	0.12 ppb
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
inbuilt Ozonator	160 ppb	160.3 ppb	160 ppb	0.3 ppb

Analyzer Values

Before Calibration		After Calibration	
Portal : 18.6	µg/m³	**Portal :** 19.1	µg/m³
Local : 18.6	µg/m³	**Local :** 19.1	µg/m³

Observations if any :	- NA -

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Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	23/ 8 / 2021	Next Cal. Date	23/ 9 / 2021	Unit	HLPH CAAMS
Ana Parameter	NH3	Tag. No.	120-AI-310	Range	0 – 500 µg/m³
Make	Environ SA	Model	AC32E	Sl. No.	1095

Cal. Gas Concentration (Zero) :NH3 = 0 ppb	Cylinder Validity: – / NA / –
Cal.Gas Concentration(Span):NH3 = 400 ppb Cal.Gas Concentration(Valid):NH3 = 200 ppb	Cylinder Validity: 13 / 02 / 2022
Calibration Type: Auto ( ) / Manual (√)	Calibration Method: Dilution

Following Checks were carried out (√ **Tick appropriate BOX)**

9. Sample line checking	Yes	√	No	
10. Purging carried out	Yes	√	No	
11. Sample suction pump checks	Yes	√	No	
12. Others if any	Yes		No	√

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
NH3 Zero	0 ppb	0.39 ppb	0 ppb	0.39 ppb
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
NH3 Balance N2	400 ppb	402.2 ppb	400 ppb	2.2 ppb
Validation	**Dilution Value**		**Measured Reading**	
NH3 Balance N2	200 ppb		196.8 ppb	

Analyzer Values

Before Calibration		After Calibration	
Portal : 3.4 µg/m³		**Portal :** 3.46 µg/m³	
Local : 3.4 µg/m³		**Local :** 3.46 µg/m³	

Observations if any :	– NA –

Calibration Carried by
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VISAKH REFINERY
MAINTENANCE DEPARTMENT
Continuous Ambient Air Quality Analyzer Calibration Report

Cal. Date	02/09/2021	Next Cal. Date	02/10/2021	Unit	HLPH CAAMS
Ana Parameter	Benzene	Tag. No.	120-AI-309	Range	0 – 5 µg/m³
Make	Chromatotech	Model	A73022	Sl. No.	#20530313

Cal. Gas Concentration (Zero) :Ben = 0 µg/m³	Cylinder Validity: - / - / -
Cal. Gas Concentration (Span):Ben = µg/m³	Cylinder Validity: 10 / 08 / 2022
Calibration Type: Auto ( ) / Manual (√)	Calibration Method: Permeation Tube

Following Checks were carried out (√ **Tick appropriate BOX)**

9. Sample line checking	Yes	✓	No	
10. Purging carried out	Yes	✓	No	
11. Sample suction pump checks	Yes	✓	No	
12. Others if any	Yes		No	✓

Zero Calibration	Dilution Value	Measured Reading	Calibrated Reading	Drift
Benzene Zero	0 µg/m³	0 µg/m³	0 µg/m³	µg/m³
Span Calibration	**Dilution Value**	**Measured Reading**	**Calibrated Reading**	**Drift**
Permeation Tube	47 µg/m³	47.3 µg/m³	47 µg/m³	µg/m³

Analyzer Values

Before Calibration		After Calibration	
Portal :	0.15 µg/m³	**Portal :**	0.18 µg/m³
Local :	0.15 µg/m³	**Local :**	0.18 µg/m³

Observations if any :	

Calibration Carried by
EMERSON

Checked by Engg. (Maint-Inst)
HPCL-VR

Reviewed by
Manager (Main-Inst)
HPCL-VR

PRAGATHI LABS & CONSULTANTS PVT.LTD.

(LAB RECOGNISED BY MINISTRY OF ENVIRONMENT & FORESTS,GOVT.OF INDIA)

(ISO 45001:2018, OHSAS 18001:2007)

Plot No.B15 & 16, Industrial Estate, Behind Pollution Control Board, Opp. Dena Bank, Sanath Nagar, Hyderabad – 500 018, Tele Fax : 040-23717213

E-mail:info@pragathilabs.com Website: www.pragathilabs.com

TEST REPORT

Industry Name	Hindustan Petroleum Corporation Limited		
Address	Visakh Refinery, Malkapuram, Visakhapatnam-530 011		
Phone No.	0891-2894825/4818	Kind attention to: Sri Gudala Bhagavan DGM –Technical	
Fax No.	0891-2759861		
Date of sampling	25th June ,2021	Nature of the Sample	Ambient Air
Date of Reporting	09th July,2021	No. of Samples	1
Our Ref. No.	Pra/Env/HPCL/05 (AAQ-01)	Method of Analysis	IS: 5182 & AWMA
P.O. No.	20000433-HB/PR200066-HP/LOA/AG		
Parameters	PM_{10},$PM_{2.5}$,SO_2, NO_2, O_3,Pb, CO, NH_3,Benzene,Benzo(a)pyrene, Arsenic& Nickel		

Discipline: Chemical Testing:

Group: Atmospheric Pollution

AMBIENT AIR QUALITY

No.	Pollutant	Methods of Measurement & Analysis	NAAQS	Malkapuram
1	PM_{10} (µg/m³)	Gravimetric, IS: 5182 (Part 23)	100 - 24 hrs	56
2	$PM_{2.5}$ (µg/m³)	Gravimetric, SOP- AIR 004	60 - 24 hrs	22
3	SO_2 (µg/m³)	Improved West &Gaeke, IS: 5182 (Part 02)	80 - 24 hrs	12
4	NO_2 (µg/m³)	Modified Jacob &Hochheiser (NaArsenite), IS: 5182 (Part 06)	80 - 24 hrs	16
5	O_3(µg/m³)	Chemical method, IS: 5182 (Part 09)	100 - 8hrs	10.0
6	Pb (µg/m³)	AAS Method after Sampling on EPM 2000 or equipment Filter Pa-, IS: 5182 (Part 22)	1.0–24 hrs	BDL
7	CO (mg/m³)	Gas Chromatography based on Continuous analyzer, IS: 5182 (Part 10)	2.0- 1 hr	0.35
8	NH_3 (µg/m³)	Indophenol blue Method, Method: 401 AWMA	400 - 24 hrs	11.0
9	C_6H_6 (µg/m³)	Gas Chromatography based on continuous analyzer, IS: 5182 (Part 11)	5.0-Annum	0.24
10	B(a)P (ng/m³)	GC analysis, CPCB	1.0-Annum	BDL
11	As (ng/m³)	AAS Method after Sampling on EPM 2000 or equipment Filter Pa-, Method: 822, AWMA	6.0-Annum	BDL
12	Ni (ng/m³)	AASMethod after Sampling on EPM 2000 or equipment Filter Pa-, Method: 822, AWMA	20 -Annum	BDL

Note: BDL- Below Detectable Limit.

P. Pradeep Reddy

Analyst Signatory
(P. Pradeep Reddy)

Authorized Signatory
(M. Ravi Kiran)

COPY

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E-mail:info@pragathilabs.com Website: www.pragathilabs.com

TEST REPORT

Industry Name	Hindustan Petroleum Corporation Limited		
Address	Visakh Refinery, Malkapuram, Visakhapatnam-530 011		
Phone No.	0891-2894825/4818	Kind attention to: Sri Gudala Bhagavan DGM –Technical	
Fax No.	0891-2759861		
Date of sampling	10th July, 2021	Nature of the Sample	Ambient Air
Date of Reporting	03rd August, 2021	No. of Samples	1
Our Ref. No.	Pra/Env/HPCL/05 (AAQ-01)	Method of Analysis	IS: 5182 & AWMA
P.O. No.	20000433-HB/PR200066-HP/LOA/AG		
Parameters	PM_{10},$PM_{2.5}$,SO_2, NO_2, O_3,Pb, CO, NH_3,Benzene,Benzo(a)pyrene, Arsenic& Nickel		

Discipline: Chemical Testing:

Group: Atmospheric Pollution

AMBIENT AIR QUALITY

No.	Pollutant	Methods of Measurement & Analysis	NAAQS	Malkapuram
1	PM_{10} (µg/m³)	Gravimetric, IS: 5182 (Part 23)	100 - 24 hrs	51
2	$PM_{2.5}$ (µg/m³)	Gravimetric, SOP- AIR 004	60 - 24 hrs	20
3	SO_2 (µg/m³)	Improved West &Gaeke, IS: 5182 (Part 02)	80 - 24 hrs	11
4	NO_2 (µg/m³)	Modified Jacob &Hochheiser (NaArsenite), IS: 5182 (Part 06)	80 - 24 hrs	15
5	O_3(µg/m³)	Chemical method, IS: 5182 (Part 09)	100 - 8hrs	09.0
6	Pb (µg/m³)	AAS Method after Sampling on EPM 2000 or equipment Filter Pa-, IS: 5182 (Part 22)	1.0–24 hrs	BDL
7	CO (mg/m³)	Gas Chromatography based on Continuous analyzer, IS: 5182 (Part 10)	2.0- 1 hr	0.30
8	NH_3 (µg/m³)	Indophenol blue Method, Method: 401 AWMA	400 - 24 hrs	10.0
9	C_6H_6 (µg/m³)	Gas Chromatography based on continuous analyzer, IS: 5182 (Part 11)	5.0-Annum	0.30
10	B(a)P (ng/m³)	GC analysis, CPCB	1.0-Annum	BDL
11	As (ng/m³)	AAS Method after Sampling on EPM 2000 or equipment Filter Pa-, Method: 822, AWMA	6.0-Annum	BDL
12	Ni (ng/m³)	AASMethod after Sampling on EPM 2000 or equipment Filter Pa-, Method: 822, AWMA	20 -Annum	BDL

Note: BDL- Below Detectable Limit.

T. Maruthi

Analyst Signatory
(T.Maruthi)

Authorized Signatory
(M. Ravi Kiran)

COPY

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(LAB RECOGNISED BY MINISTRY OF ENVIRONMENT & FORESTS,GOVT.OF INDIA)

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E-mail:info@pragathilabs.com Website: www.pragathilabs.com

TEST REPORT

Industry Name	**Hindustan Petroleum Corporation Limited**		
Address	**Visakh Refinery, Malkapuram, Visakhapatnam-530 011**		
Phone No.	0891-2894825/4818	**Kind attention to: Sri Gudala Bhagavan DGM –Technical**	
Fax No.	0891-2759861		
Date of sampling	14th August, 2021	**Nature of the Sample**	Ambient Air
Date of Reporting	03rd September, 2021	**No. of Samples**	1
Our Ref. No.	Pra/Env/HPCL/08 (AAQ-01)	**Method of Analysis**	IS: 5182 & AWMA
P.O. No.	20000433-HB/PR200066-HP/LOA/AG		
Parameters	PM_{10},$PM_{2.5}$,SO_2, NO_2, O_3,Pb, CO, NH_3,Benzene,Benzo(a)pyrene, Arsenic& Nickel		

Discipline: Chemical Testing:

Group: Atmospheric Pollution

AMBIENT AIR QUALITY

No.	Pollutant	Methods of Measurement & Analysis	NAAQS	Malkapuram
1	PM_{10} (µg/m³)	Gravimetric, IS: 5182 (Part 23)	100 - 24 hrs	48
2	$PM_{2.5}$ (µg/m³)	Gravimetric, SOP- AIR 004	60 - 24 hrs	19
3	SO_2 (µg/m³)	Improved West &Gaeke, IS: 5182 (Part 02)	80 - 24 hrs	12
4	NO_2 (µg/m³)	Modified Jacob &Hochheiser (NaArsenite), IS: 5182 (Part 06)	80 - 24 hrs	16
5	O_3(µg/m³)	Chemical method, IS: 5182 (Part 09)	100 - 8hrs	8.0
6	Pb (µg/m³)	AAS Method after Sampling on EPM 2000 or equipment Filter Pa-, IS: 5182 (Part 22)	1.0–24 hrs	BDL
7	CO (mg/m³)	Gas Chromatography based on Continuous analyzer, IS: 5182 (Part 10)	2.0- 1 hr	0.26
8	NH_3 (µg/m³)	Indophenol blue Method, Method: 401 AWMA	400 - 24 hrs	9.0
9	C_6H_6 (µg/m³)	Gas Chromatography based on continuous analyzer, IS: 5182 (Part 11)	5.0-Annum	0.22
10	B(a)P (ng/m³)	GC analysis, CPCB	1.0-Annum	BDL
11	As (ng/m³)	AAS Method after Sampling on EPM 2000 or equipment Filter Pa-, Method: 822, AWMA	6.0-Annum	BDL
12	Ni (ng/m³)	AASMethod after Sampling on EPM 2000 or equipment Filter Pa-, Method: 822, AWMA	20 -Annum	BDL

Note: BDL- Below Detectable Limit.

T. Maruthi

Analyst Signatory
(T.Maruthi)

Authorized Signatory
(M. Ravi Kiran)

COPY

Item No.01:

60

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 ... Applicant(s)

Vs.

Union of India & Ors. ...Respondent(s)

Date of hearing: 17.09.2021

CORAM:

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

HON'BLE MR. SAIBAL DASGUPTA, EXPERT MEMBER

For Applicant(s): Mr. Sravan Kumar

For Respondent(s): Mr. Surya Prabhu for Mr. G.M. Syed Nurullah Sheriff for R1.
Mr. Basu for Ms. Madhuri Donti Reddy for R4 to R6
Mr. Kumaresan for M/s King & Partridge 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 that purpose. On 12.04.2021, it was adjourned for completion of pleadings and also for filing of report to 27.05.2021. On 27.05.2021 also it was adjourned for completion of pleadings and consideration of report, since the report has not been filed.

2. Further this Tribunal had directed the Committee to consider the allegations made in the newspaper report published in News Minutes dated 25.05.2021 regarding a fire incident occurred in the 7th respondent unit. Pollution Control Board was directed to inspect and submit their independent report. The case was posted to 28.06.2021 for that purpose. Thereafter, the matter has been adjourned from time to time and lastly it was adjourned to today as per notification dated 15.09.2021.

3. The Joint Committee has filed a report dated 19.07.2021 e-filed on 26.07.2021 and received on the same date which reads as follows:

REPORT OF THE JOINT COMMITTEE ON THE FIRE ACCIDENT OCCURRED IN CDU – III OF M/s. HINDUSTAN PETROLEUM CORPORATION LTD., VISAKH REFINERY, MALKAPURAM, VISAKHAPATNAM, ANDHRA PRADESH 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 MAY 27, 2021.

1. Preamble:

The Hon'ble NGT in its order dated 27.05.2021 in the case of OA 73 of 2021 (SZ) directed to the Committee as below:

.....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."....

The copy of the NGT order dated 27.05.2021 is enclosed as *Annexure - 1.*

2. Fire Accident at M/s HPCL, Visakh Refinery, Visakhapatnam, Andhra Pradesh:

A fire accident occurred at M/s HPCL, Visakh Refinery in Crude Distillation Unit – III(CDU – III) on May 25, 2021at 15:10 hrs.

2.1 Causes for fire accident:

The following are the causes for the fire accident at CDU –III:

i. The mechanical failure of one of the pipeline elbows on the pump discharge line caused leak in the 6" Carbon Steel (CS) pipeline carrying vacuum residue which contains fuel oil/ bitumen at a temperature of about 350^0 C & pressure of 16 kg/cm^2. A hole about 2.5" - 3" was formed (may be due to corrosion) and drained the fluid with high pressure, which resulted in the auto ignition of the hydrocarbon fluid (auto ignition temperature of the vacuum residue fluid is 280^0C) caused fire at deck 1(first floor) of the CDU-III.

ii. The fire further extended to deck2 and air fin coolers (deck 3) of the CDU-III. The flames at deck 3 resulted in the rupture of atmospheric column overhead pipeline carrying Naphtha and leading to fire from this location.

3. Measure taken by M/s. HPCL, District collector and APPCB after the fire accident:

3.1 Immediate measure taken by M/s. HPCL(Visakh Refinery):

When the unit noticed black smoke and fire at 15.06 hrs. from the ground floor (deck 1) of the CDU –III, the emergency shutdown of the CDU was taken at 15.07 hrs and all the motor pumps were stopped. The emergency siren was raised at 15.07hrs, the Emergency Response & Disaster Management Plan (ERDMP) of the Refinery was activated immediately and the fire & safety crew reached the area and carried out fire fighting activities using foam tender and dry chemical powder tender. The fire was extinguished at 16:10 hrs, cooling operations were continued in the surrounding area and all clear siren was given at 16:15 hrs. No injury or causalities were reported.

M/s. HPCL Visakh Refinery has submitted the investigation report, dated 03.06.2021 to the Director Refineries on the fire accident occurred in the CDU – III of the refinery on 25.05.2021, wherein reported the cause of the fire accident as,

3.1.1 The probable cause is mechanical failure of the 6" hydrocarbon (Vacuum residue) pipe line elbow. This has resulted in release of hydrocarbon (Vacuum residue) at $350^{O}C$.

3.1.2 The ignition source is the high temperature (above the auto ignition temperature) of the leaked vacuum residue itself.

Copy of the report enclosed (Annexure – 2).

3.2 Immediate measure taken by District Collector, Visakhapatnam, Andhra Pradesh:

On hearing the news of fire accident at HPCL, the officials from the distractive administration reached the unit around 15:25 hrs as per the instruction of District Collector. The RDO, Joint Chief Inspector of Factories, District Fire Officer, officials from the industries department and APPCB reached the site and given necessary instruction to combat the fire for the Emergency response team of HPCL.

The Collector and District Magistrate, Visakhapatnam Dt.25/05/2021 constituted a Committee with the following Members to enquire into the incident of fire at M/s HPCL, Visakh Refinery with a direction to inspect the incident place and to submit the report.

1	Revenue Divisional Officer, Visakhapatnam	Head of the Committee
2	General Manager, District Industries Centre, Visakhapatnam	Member
3	Joint Chief Inspector of Factories, Visakhapatnam	Member
4	District Fire Officer, Visakhapatnam	Member
5	Environmental Engineer, APPCB, Visakhapatnam	Member
6	HOD of Chemical Engineering, IIPE	Member
7	Associate Dean of Students Affairs & Assistant Professor, Chemical Engineering, IIPE	Member
8	Assistant Professor, Chemical Engineering, IIPE	Member
9	Professor, Chemical Engineering department, Andhra University	Member
10	Professor, Chemical Engineering department, Andhra University	Member

The committee constituted by the DC visited M/s HPCL on 28.05.2021 and the detailed report was submitted to the District Collector.

3.3 Immediate action taken by APPCB, Visakhapatnam, Andhra Pradesh:

APPCB immediately rushed to the incident site by 15:40 hrs along with scientific staff of Zonal Laboratory, Visakhapatnam and immediately started monitoring the ambient air in the surrounding areas through Mobile lab in the down wind direction. The Total Volatile Organic Carbons (TVOCs) were monitored in ambient air at various points from the fire accidents and also outside the unit premises. Samples of wastewater generated during fire-fighting operations and accumulated in the drain at CDU-III were collected. The values of TVOC recorded during fire accident were ranging from 0.2 PPM to 7.4 PPM and outside the premises, the maximum TVOC of 0.2 PPM was recorded. Analysis report enclosed as Annexure – 3.

Data of the 3 CAAQM Stations being operated by M/s. HPCL within the premises pertaining to the date of fire accident (25.05.2021) was also collected.The results are given below:

3.3.1 At Southgate CAAQM Station (South side to the Industry):

- PM10 values increased from 202 µg/m3 (14.00 hrs) to 319 µg/m3 (17.00 hrs) during the accident period. Minimum value of 93 and maximum value of 319 µg/m3 was observed during the day of accident on 25.05.2021.

- PM2.5 values increased from 37 µg/m3 (14.00 hrs) to 47.9 µg/m3 (16.00 hrs) during the accident period. Minimum value of 22 and maximum value of 52 µg/m3 was observed during the day of accident on 25.05.2021.

- NOx values increased from 17 µg/m3 (14.00 hrs) to 142 µg/m3 (16.00 hrs) during the accident period. Minimum value of 05 and maximum value of 132 µg/m3 was observed during the day of accident on 25.05.2021.

- No significant change in the SO2 concentrations were observed during the fire accident period. Minimum value of 05 and maximum value of 132 µg/m3 was observed during the day of accident on 25.05.2021.

- Average value of Air Quality Index (AQI) during the day of accident (25.05.2021) at this location found to be 143, i.e. moderate category.Value of PM10 is exceeding the standard limit prescribed for 24 hour average.

3.3.2 At store yard CAAQM Station (West side to the Industry)

- PM10 value increased from 365 µg/m3 (14.00 hrs) to 511 µg/m3 (15.00) during the accident period. Minimum value of 120 and maximum value of 608 µg/m3 was observed during the day of accident on 25.05.2021.

- PM2.5 values increased from 73 µg/m3 (14.00 hrs) to 99 µg/m3 (15.00 hrs) during the accident period. Minimum value of 37 and maximum value of 99 µg/m3 was observed during the day of accident on 25.05.2021.

- NOx values recorded 26.77 µg/m3 (13.15 hrs) and increased to 35.49 µg/m3 (17.30 hrs) during the accident period. Minimum value of 0.6 and maximum value of 11.84 µg/m3 was observed during the day of accident on 25.05.2021.

- No significant change in the SO2 concentrations were observed during the fire accident period. Minimum value of 11.76 and maximum value of 37.74 µg/m3 was observed during the day of accident on 25.05.2021.

- Average value of Air Quality Index (AQI) during the day of accident (25.05.2021) at this location found to be 204, i.e. poor category.Value of PM10 is exceeding the standard limit prescribed for 24 hour average.

3.3.3 At HLPH CAAQM Station (Northeast side to the Industry)

- PM10 value increased from 252 µg/m^3 (15.00 hrs) to 267 µg/m^3 (16.00) during the accident period. Minimum value of 130 and maximum value of 411 µg/m3 was observed during the day of accident on 25.05.2021.

- PM2.5 values increased from 26 µg/m3 (14.00 hrs) to 30 µg/m3 (16.00 hrs) during the accident period. Minimum value of 21 and maximum value of 153 µg/m3 was observed during the day of accident on 25.05.2021.

- NOx values increased from 15.8 µg/m3 (14.45 hrs) to 59.7 µg/m3 (15.45 hrs) during the accident period. Minimum value of 15.81 and maximum value of 110 µg/m3 was observed during the day of accident on 25.05.2021.

- As far as the SO2 concentrations are concerned, minimum value of 30.34 and maximum value of 510 µg/m3 was observed during the day of accident on 25.05.2021.

- Average value of Air Quality Index (AQI) during the day of accident (25.05.2021) at this location found to be 186, i.e. moderate category.Values of PM10, PM2.5 and SO2 are exceeding the standard limits prescribed for 24 hour average.

Ambient air quality data obtained from these CAAQM stations enclosed as Annexure – 4.

APPCB has deployed Mobile CAAQM Station Lab and monitored the ambient air quality in the neighboring residential area, Ajanta colony, Malkapuram for a period of 24 hours on 25.05.2021 and 26.05.2021 to assess the impact of fire accident occurred at M/s. HPCL and the values found to be:

- PM10 values: Minimum 70 µg/m3; maximum 177 µg/m3; average 124 µg/m3.
- PM2.5 values: Minimum 14 µg/m3; maximum 56 µg/m3; average 33 µg/m3.
- NOx values: Minimum 14.5 µg/m3; maximum 44.8 µg/m3; average 26.7 µg/m3.
- SO2 values: Minimum 6.3 µg/m3; maximum 34.1 µg/m3; average 21.8 µg/m3.
- AQI value: 116, i.e. moderate category.

Ambient air quality data obtained from the Mobile CAAQM station is enclosed as Annexure – 5.

The characteristics of wastewater generated during fire fighting operation found to be, TSS values ranging from 820 to 1160 mg/lit; COD values from 156 to 184 mg/lit and oil & grease from 8 to 14 mg/lit. Analysis report enclosed as Annexure – 6.

4. Site inspection and observations madeby the Joint Committee appointed by Hon'ble NGT:

The committee inspected the fire accident site at M/s HPCL on June 23, 2021 and observed the following:

a. The committee inspected the CDU-III area and physically verified the burnt pipelines and the impact area, deck 1, 2 & 3 floors, which were damaged due to the fire.

b. It was informed by the unit representative that about 78 MTs of hydrocarbons was burnt in the fire accident, out of which 35 tons of bitumen/furnace oil and 43 tons of Naphtha.

c. The cause for the fire was informed due to the hole in the 6" CS pipeline carrying the bitumen/furnace oil which may be due to the corrosion/erosion which led to mechanical failure. However, it was informed that the technical reasons for the sudden burst of the pipeline carrying bitumen/furnace oil is to be ascertained.

d. The refinery has to carryout hydro-testing of the pipelines once in 4 years as per the protocol and carried out the said test in the year, 2012 & 2016. The next testing has to be carried out during the year, 2020. However, it was not conducted and informed that due to COVID-19 situation it got delayed. Self certified copy of the hydro-test report of M/s. HPCL (Visakh Refinery) is enclosed as Annexure – 7.

e. During inspection, the debris from the fire accident was cleared and the preparation work for repair/ renovation was in progress.

f. The high oil sludge of 5 KL from the CDU-III was collected in drums and stored in the sludge lagoons for the recovery of oil. The sludge lagoons was inspected and observed that the drums used for collection was dumped along with the sludge.

g. The sea water of about 6000 KL was used for fire-fighting and informed that the wastewater collected in the drains of CDU-III was diverted to ETP-1 for treatment and discharged along with the cooling water.

h. To combat the fire, Dry Chemical Powder of 2000 kg and foam tender of 5200 litres along with 6000 KL sea water were used.

i. The detailed report from the Petroleum and Explosives Safety Organization (PESO), to ascertain the cause for fire accident is awaited.

5. Environmental damage assessment for contribution of emission into atmosphere:

During the fire accident on 25.05.2021 at CDU-III of M/s. HPCL, Visakhapatnam, an amount of 78 tons of hydrocarbons (35 tons Bitumen / Furnace oil and 43 tons of Naphtha) was burnt and emissions were let out into open atmosphere. The 78 tons of burnt hydrocarbons also contain an amount of 1.2 tons of sulphur (@3.4% Sulphur in Bitumen / furnace oil and 0.024% sulphur in Naphtha). Hence, an amount of 76.8 tons of *hydrocarbons and 1.2 tons of sulphur got burnt during the fire accident at M/s. HPCL on 25.05.2021 resulting in the emission of 211 tons of carbon dioxide and 2.38 tons of sulphur dioxide into the surroundings.

$$\text{*Hydrocarbons} + 2O_2 \longrightarrow CO_2 + 2H_2O + \text{Heat}$$

$$S + O_2 \longrightarrow SO_2$$

*While calculating the quantity of emission of CO_2, the burnt hydrocarbon during fire accident is considered as Methane (CH_4 the simplest hydrocarbon in the homologous series of alkanes) and 100% combustion.

Accordingly, the Joint Committee proposed to levy Environmental damage compensation on M/s. Hindustan Petroleum Corporation Ltd., (Visakh Refinery), Visakhapatnam as per theEuropean Union "Environmental Prices Handbook" EU28 version published in October 2018 wherein prices are expressed in Euros per kilogram pollutant emitted into the environment. The committee has used the document as a reference to calculate the prices of the pollutants emitted into environment. The document indicates three types of pricing, lower, central and upper depending uponmagnitude of emissions. The quantities of pollutants emitted were in considerable quantity, but, there was no significant damage to the surrounding environment, injury or casualties reported. Hence, the committee has used central limit environmental prices assigned to SO_2 & CO_2 whilecalculating the compensation for damage as detailed below. The environmental price of $SO_2$is 11.5€$_{2015}$/Kg emission and for CO_2 is 0.057 €$_{2015}$/Kg emission, for CO_2 which is a greenhouse gas also includes VAT and increase in 3.5% per annum.

		Calculation for SO_2 emission		**Calculation for CO_2 emission**
Environmental Compensation for emissions contributed	=	2,380 Kgs of SO_2X Environmental price of SO_2	+	2,11,000 Kgs of CO_2 X Environmental price of CO_2 with VAT of 3.5% per annum
	=	2,380 Kgs of SO_2 X 11.5 €/Kg	+	2,11,000 Kgs X (0.057 €/Kg X 0.21)
	=	27,370 € 1€ = Rs. 89.028 (As on 25.05. 2021)	+	2,525.67 € 1€ = Rs. 89.028 (As on 25.05.2021)
	=	Rs. 24,36,696/-	+	Rs. 2,24,855/-
	Total of Rs. 26,61,551/- (rupees twenty six lakhs sixty one thousand five hundred and fifty one only)			

6. Recommendations of the Committee:

i. The unit shall strictly follow the standard laid down protocols / Standard Operating Procedures (SOP) for Hydro testing of pipelines and immediately take precautionary

measures to avoid this type of fire accidents in future. The unit shall immediately take up hydro testing of the remaining two CDUs and confirm its efficiency.

ii. The unit shall treat the high oily sludge waste of 5KL generated and collected during the fire accident occurred at CDU-III and the status report shall be submitted to APPCB.

iii. The unit shall pay the compensation of Rs. 26,61,551/-(rupees twenty six lakhs sixty one thousand five hundred and fifty one only)towards damage of environment during the fire accident and the same shall be paid to APPCB.

iv. To regularly conduct mock-drills to the employees in controlled environment on actions to be taken during failures, gas leakage etc.

v. The committee humbly submits that the industries have to ensure self-compliance and the industry and its personnel are solely responsible for this negligent act which resulted in the accident. The industries have to adhere self-monitoring and self-compliance to avoid accidents or any other untoward incidents.

Report dated July 19, 2021.

Dr. Suresh Babu Pasupuleti
Scientist-C
Ministry of Environment, Forest & Climate Change, Vijayawada

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

Dr. B. V. Prasad
Senior Environmental Scientist
Andhra Pradesh Pollution Control Board
Vijayawada

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

****

4. The Andhra Pradesh Pollution Control Board filed a report dated 17.06.2021, e-filed and received today in respect of fire incident occurred on 25.05.2021 in the 7th respondent unit along with certain report submitted by the District Collector which reads as follows:

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 µg/m³ (14.00 hrs) to 319 µg/m³ (17.00 hrs).
   - $PM_{2.5}$ values increased from 37 µg/m³ (14.00 hrs) to 47.9 µg/m³ (16.00 hrs).
   - NO_X values increased from 17 µg/m³ (14.00 hrs) to 142 µg/m³ (16.00 hrs) and reduced to 37 µg/m³ (17.45 hrs)

b. At HLPH CAAQM station (Northeast side to the Industry)
   - PM_{10} values increased from 252 µg/m³ (15.00 hrs) to 267 µg/m³ (16.00 hrs).
   - $PM_{2.5}$ values increased from 26 µg/m³ (14.00 hrs) to 30 µg/m³ (16.00 hrs).
   - NO_X values increased from 15.8 µg/m³ (14.45 hrs) to 59.7 µg/m³ (15.45 hrs) and reduced to 34.3 µg/m³ (17.45 hrs).

c. At Store yard CAAQM station (West side to the Industry)
   - PM_{10} values increased from 365 µg/m³ (14.00 hrs) to 511 µg/m³ (15.00 hrs) and reduced to 225 µg/m³ (17.00 hrs).
   - PM2.5 values increased from 73 µg/m³ (14.00 hrs) to 99 µg/m³ (15.00 hrs) and reduced to 53 µg/m³ (17.00 hrs).
   - NO_X values recorded 26.77 µg/m³ (13.15 hrs) and increased to 35.49 µg/m³ (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

5. The Joint Committee further filed a report dated 26.05.2021, e-filed and received today with annexure which reads as follows:

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 FEBRUARY 25, 2021

1.0 Preamble:

The Hon'ble National Green Tribunal (NGT), Southern Zone, Chennai in the matter of O. A. No. 73 of 2021 has passed an order dated February 25, 2021 and the operative portion of the order is reproduced as under and the copy of the Hon'ble NGT order is annexed as **Annexure - 1**:

"11... In order to ascertain the genuineness of the allegations made in the application and its impact and the remedial measures if any to be taken, we feel it appropriate to appoint a Joint Committee comprising of (1) a Senior Officer from Ministry of Environment, Forests and Climate Change (MoEF & CC) Integrated, Regional Office, Chennai, (2) a Senior Scientist from Central Pollution Control Board (CPCB), Regional Office, Chennai . (3) a Senior Scientist having some experience in Petroleum Pollution from Andhra Pradesh State Pollution Control Board (APPCB) and (4) a Scientist having experience in Petro-Chemical activities from Indian Institute of Chemical Technology (IICT) under the Council of Scientific & Industrial Research (CSIR), Hyderabad to inspect the unit in question and submit a factual as well as action taken report, if there is any violation found....."

2.0 Constitution of the Joint Committee:

In compliance with the order dated February 25, 2021; as a nodal agency, Andhra Pradesh Pollution Control Board (APPCB), based on the nominations received from the concerned organizations, constituted a Joint Committee on March 20, 2021 comprising the following members:

i. Dr. Suresh Babu Pasupuleti, Scientist-C, Ministry of Environment, Forest and Climate Change, Integrated Regional Office (IRO), Vijayawada.
ii. Smt. Poornima B M, Scientist D, Central Pollution Control Board, Regional Directorate – Chennai.
iii. Dr. B.V. Prasad, Senior Environmental Scientist, APPCB, Vijayawada.
iv. Dr. N. Lingaiah, Sr. Principal Scientist, Catalysis & Fine Chemicals Division, CSIR-IICT, Hyderabad.

The Joint Committee had its first meeting on March 22, 2021 through video conference (VC) and discussed Terms of Reference (ToR) to proceed further over the case. The committee finalized the dates for the site visit during March 25-27, 2021.

2.1 Terms of Reference (ToR) of the Joint Committee:

As per the Hon'ble NGT order dated February 25, 2021; the committee is entrusted to visit and inspect the site in question and following ToR:

a. To inspect the unit in question and submit a factual as well as action taken report, if there is any violation found.
b. To ascertain whether there is any violations of environmental clearance, consent conditions and safety measures provided are sufficient to meet the pollution that is likely to be caused on account of the operating of the unit.
c. To verify the compliance to the recommendations made by the Indian Institute of Science in 2016 which was directed to be implemented by the Andhra Pradesh State Pollution Control Board (APPCB) during 2016.
d. To assess environmental compensation if any violation found causing environmental degradation.
e. To provide the remedial measures for the purpose of mitigating the situation and improve the condition of air quality in that area.
f. To ascertain the source of pollution and the remedial measures to mitigate the same.

2.2 Site visit by the Joint Committee:

The committee as decided in its first meeting visited the unit M/s. Hindustan Petroleum Corporation Limited (HPCL), Malkapuram, Visakhapatnam, Andhra Pradesh known as Visakha Refinery during March 25-27, 2021. Sh. A. Tirupathi Naidu, GM (I/C), Sri Bhagavan, Deputy General Manager, Sh. Shaik Sardar, Senior Manager Environment and other Technical & Environment Department officials representing the refinery were present during the time of inspection. The committee inspected the unit and verified the compliance status of Environmental Clearance (EC), Consent conditions of both Air & Water, Conditions of Hazardous waste authorization and the directions issued by APPCB. The committee monitored the source emissions & ambient air quality in and around the refinery and collected samples from the Effluent Treatment Plants (ETP) and Sewage Treatment Plant (STP).

3.0 About M/s. Hindustan Petroleum Corporation Limited (HPCL), Malkapuram, Visakhapatnam, AP:

3.1 General Information: M/s Hindustan Petroleum Corporation Limited was commissioned in the year 1957 with an installed capacity of 0.65 Million Metric Tons per Annum (MMTPA) by Caltex Oil Refining (India) Ltd. In the year, 1976 Govt. of India taken over the refinery and subsequently merged with HPCL in 1978. HPCL increased the production capacity phase wise from 0.65 MMTPA to 8.3 MMTPA by installing various types of process units to manufacture various products. The total area of the industry is 723 acres, and is located at $17^0$14'41.51" N; $83^0$14'54.42" E at an elevation of 5.5m. The unit has 1194 permanent employees and 3500 contract workers.

The unit is surrounded by

North: M/s. Andhra Petro Chemicals Limited.

South: 80 Ft. Road (Scindia to Gajuwaka), Sriharipuram, Malkapauram

East: M/s. IOCL Terminal

West: M/s. Coromandel Fertilizer Ltd., M/s. HZL, M/s. Alufluoride etc.

3.2 Statutory Requirements:

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The Environmental Clearances (EC), Consents for Establishment (CFE) and Consents for Operation (CFO) obtained from the Ministry of Environment, Forests & Climate Change, Govt. of India and Andhra Pradesh Pollution Control Board (APPCB) are as follows:

S. No.	EC / CFE / CFO	Capacity (MMTPA)	Order No., dated
1	MoEF & CC EC	4.5 to 7.5	J-11011/22/94-A II (I), dated 30.05.1995 (Annexure – 2)
2		Installation of Diesel Hydro-desulphurization	J-11011/88/96-IA-II(I), dated 10.04.1997 (Annexure – 3)
3		7.5 to 10.0	Lr. No. J-11013/55/2003-1A II (I), 03.02.2004 (Annexure – 4)
4		Mounded storage for Propylene/LPG	J-11011/66/2007-IA II (I), dated 07.03.2008 (Annexure – 5)
5		Expansion from 7.5 to 10.0 MMTPA	J-11011/408/2009-IA-II(I), dated 02.09.2009 (Annexure – 6)
6		8.33 to 15.0	F-No. J-11011/63/2013-IA II (I), 11.02.2016 (Annexure – 7)
7	APPCB CFE	10.0 to 15.0	Order No. 72/APPCB/CFE/RO-VSP/HO/2006, dated 06.07.2016 (Annexure – 8)
8	APPCB CFO & Hazardous waste authorization	10.0 & 121.20 MW captive power plant	Order No. APPCB/VSP/VSP/72/CFO/HO/2016, 24.03.2016 (Annexure – 9)
9		10.0 & 121.20 MW captive power plant	Order No. APPCB/VSP/VSP/72/CFO/HO/2019, 18.12.2019 (Annexure – 10)
10		10.0 & 121.20 MW captive power plant	Order No. APPCB/VSP/VSP/72/CFO/HO/2021, 09.03.2021 (Annexure – 11)
MMTPA: Million Metric Tons Per Annum.			

After obtaining the EC dated 10.02.2016 from MoEF & CC for expansion upto 15 MMTPA, M/s. HPCL applied consent for establishment (CFE) to APPCB for Expansion on June 11, 2016 & June 21, 2016. APPCB issued CFE on July 6, 2016 valid up to seven years from the date of issue of CFE. During the committee inspection, the construction works for expansion project are under progress.

3.3 Process Description:

The series of processes by which products are manufactured from crude oil is collectively known as refining. Crude oil is a mixture of different hydrocarbon compounds and a source of various products like LPG, Naphtha, Gasoline, ATF/SKO, Diesel, Fuel Oil/LSHS and other petroleum speciality products. HPCL sources crude oil containing both high & low sulphur from indigenous

sources viz., Ravva, Mumbai High etc., and imported crude from Middle –East, African countries etc. Crude oil from the tankers is received at the Off-Shore Tanker Terminal (OSTT) and transported to the Visakha Refinery through 9.2 Km underground pipeline. The crude oil is stored in the 12 large tanks.

HPCL has three Crude Distillation Units namely CDU-I, II & III, the secondary units of two Fluid Catalytic Cracking Units, one Vis Breaking Unit (VBU), and one Bitumen Blowing unit (BBU). Product Quality Treating Units like Diesel Hydro Desulphurization unit (DHDS), Hydrogen Generation unit (GHU), Sulphur Recovery unit (SRU), Merox Units (LPG, CRN, ATF), LPG Amine Treating unit & Propylene Recovery Unit (PRU), Fluid Catalytic Cracking Unit (FCCU), Naphtha Hydro Treating Unit (NHTU- (Prime G+) Continuous Catalytic Reforming Unit(CCRU) and Naphtha Isomerizing Unit (NIU).

Crude oil is first subjected to physical separation into various components in crude distillation unit (CDU) by employing a process called fractional distillation. In CDU, the crude is preheated in a battery of heat exchangers utilizing the heat of the various streams from the distillation columns and finally heated in a furnace to a temperature required for effective separation. It is fed to a distillation column wherein it is separated to various streams, viz., Un-stabilized Naphtha, Heavy Naphtha, Kerosene, Straight Run Diesel and Reduced Crude Oil. Un-stabilized Naphtha is further separated in another distillation column called Stabilizer into Liquefied Petroleum Gas (LPG) and Straight Run Naphtha.

The Reduced Crude Oil is subjected to further separation under vacuum conditions in another distillation column. There, it gets separated to Vacuum Diesel, Vacuum Gas Oil and Short Residue. The Short Residue from this column goes for production of either Bitumen or Fuel Oil. The Vacuum Gas Oil from crude distillation unit is further processed in a Fluidized Catalytic Cracking Unit (FCCU) wherein it is converted to value added streams in the presence of a circulating catalyst. The streams that are so generated are Liquefied Petroleum Gas (LPG), Cracked Run Naphtha, Cycle Oils and residue. Clarified oil from FCCUs is also routed to Fuel oil pool for FO production.

LPG from CDUs and FCCUs is treated in Amine Treatment Unit / Merox Unit for removal of Hydrogen Sulphide and Mercaptans. Propylene (> 95% Purity) is recovered from Cracked LPG in Propylene Recovery Unit (PRU).

The Straight Run Naphtha & Cracked Run Naphtha are routed to MS block (NHT/CCR/NIU/FCCNHT) for Desulphurizing / Reforming / Isomerization, thus producing Motor Spirit (Petrol) meeting required statutory specifications. Excess Naphtha if any that could not be converted to Motor Spirit is sold as Naphtha Product.

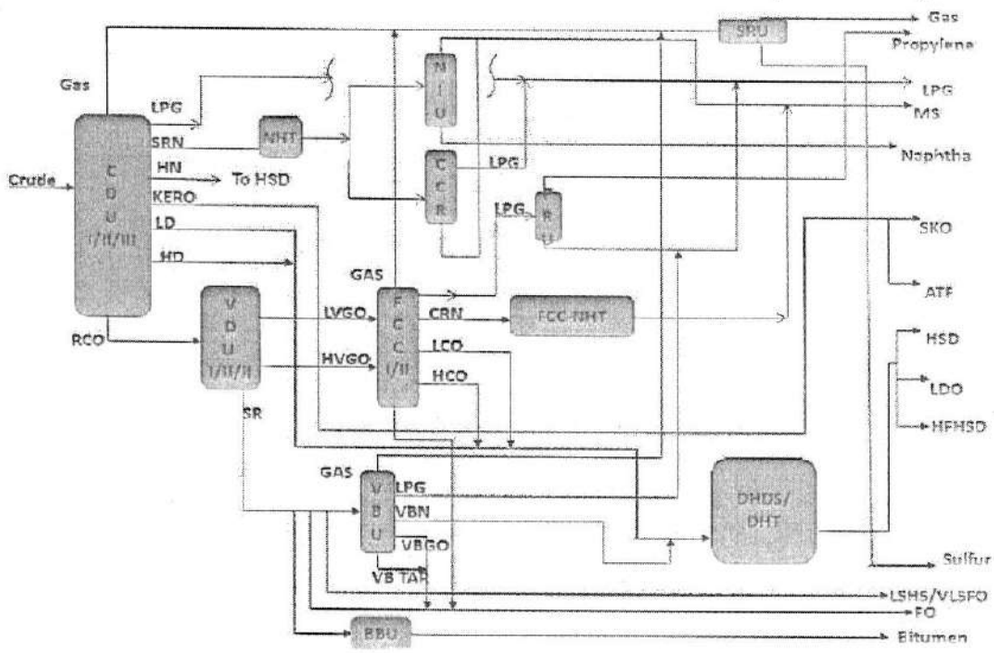

Figure 1: M/s. HPCL process flow diagram

Kerosene from CDUs and Diesel streams viz., Straight Run Diesel, Vacuum Diesel & Cycle Oils are routed to Diesel Hydro Desulphurisation (DHDS) / Diesel Hydrotreater (DHT) units for removal of Sulphur thus producing Diesel meeting required statutory specifications.

In the sulphur removal process of Motor Spirit / Diesel, the sulphur compounds present in the streams are removed by reaction with Hydrogen in presence of Catalyst in Reactor at high temperature and pressure to form Hydrogen Sulphide. Hydrogen required in the process is generated in Hydrogen Plant by cracking Naphtha in presence of steam in a Reformer. Hydrogen Sulphide rich gases generated during Desulphurization processes is treated in Sulphur Recovery Units for recovery of the Sulphur.

Short residue from the CDUs is routed to:

- Low Sulphur Heavy Stock (LSHS) / Very Low Sulphur Fuel Oil (VLSFO) (during low sulphur crude processing)
- Bitumen Blowing Unit: For manufacturing Bitumen (During bituminous crude processing)
- Fuel Oil (high sulphur crude processing)

3.3.1 Status of crude oil processed & products produced during the year 2020 (January to December, 2020):

The refinery has processed 90,71,100 MT of crude oil during the year 2020 (January – December) and produced the following consented petroleum products:

Table 1: Products produced during the year 2020

S. No.	Product	Permitted quantity as per CFO Order dated 09.03.2021 in TPA	Products Produced during 2020 (Jan. to Dec.) in TPA
1	Propylene	36,000	46,000
2	LPG	6,43,000	4,18,000
3	Naphtha	1,73,000	3,68,700
4	Motor spirit	16,55,000	16,72,900
5	ATF	1,20,000	59,100
6	SKO	5,21,330	1,42,200
7	Diesel	37,86,670	39,31,500
8	FO 3.5 % S	16,62,000	9,36,100
9	FO 1.0% S	2,37,670	1,68,500
10	Bitumen	2,20,660	5,15,400
11	Sulphur	56,370	34,800
12	Refinery Fuel	7,41,670	7,27,300
13	Intermediate Stream Build up	--	50,500
	Total:	**1,00,00,000**	**90,71,100**
Crude processed during the year, 2020 (January to December)			**90,71,100**

From the above table, it is observed that the quantities of crude oil processed and the sum of various products produced during the year 2020 is same. This shows that the entire crude oil is converted into useful petroleum products without any loss or leaving any hydrocarbon fraction into the atmosphere, which is practically impossible in any refinery. There will always be good amount of non-recoverable volatile aromatic and aliphatic hydrocarbons emanated during crude processing, which will be vented through flare stacks and subjected to continuous burning throughout the year. The crude will also be having measurable concentrations of water soluble salts, which are removed through water treatment before subjected to distillation.

4.0 Compliance status of Environmental Clearance conditions

The detailed compliance status of conditions stipulated in the environmental clearance letter no. J-11011/22/94-A II (I) dated 30.05.1995, J-11011/88/96- IA II (I) dated 10.04. 1997, J-11013/55/2003-IA II (I) dated 03.02.2004, J-11011/66/2007-IA II (I) dated 07.03.2008, J-11011/408/2009-IA II (I) dated 02.09.2009 and J-11011/63/2013-IA II (I) dated 11.02.2016 along with non-compliances observed are enclosed (Annexure - 12).

4.1 Compliance status of consent conditions issued by APPCB

APPCB renewed combined consent for operation on March 9, 2021 under Water Act, 1974 and Air Act, 1981 and Authorisation under Hazardous & Other Wastes Rules, 2016 up to December 31, 2025. In compliance to Hon'ble NGT order dated February 25, 2021; the committee verified the compliance of the consent conditions. The compliance status of CFO conditions is enclosed (Annexure – 13).

4.2 Compliance status of the recommendations made by the Indian Institute of Science, Bengaluru:

APPCB and District Administration received many public complaints of odour problems from several parts of the Visakhapatnam city during October-November, 2011. APPCB and District Administration of Visakhapatnam engaged Indian Institute of Science (IISc), Bengaluru in the year 2012 to carry out the study for identifying the root cause for odour nuisance in Visakhapatnam city. IISc, Bengaluru carried out the study and submitted the report along with the recommendations in the year 2016. The major observation of the IISc is that the compounds responsible for the odour problem in Visakhapatnam City, particularly Malkapuram, Gajuvaka, Gopalapuram, etc., residential areas could be the cumulative effect of odorous organic and inorganic like, unburnt hydrocarbons, BTX solvents, Sulphides (Hydrogen Sulphide, Mercaptans, Mono & Di methyl sulphides), Amino compounds, etc. from the industrial establishment, domestic sewage, municipal solid waste and vehicular exhausts, and hence, it is difficult to pin point any individual industry.

The important task in mitigating the pollution from the industries is to maintain stack emissions within the stipulated limits. As far as the HPCL Refinery is concerned, the scrubbers of FGDS in FCCU-I & II shall be maintained at its best operating condition.

The recommendations made by the IISC, Bengaluru are:

i. Even if industries follow good practices and maintain emission 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 odour problem in Visakhapatnam area.
ii. APPCB being the nodal 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 nominee to inform all members about the compliant 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 whenever odour is experienced.
v. Public education is an important concept in odour management. The odour squad should strive to impress upon people of Visakhapatnam that the common odour 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 through proper education.

4.3 Compliance status of the directions issued by APPCB dated March 19, 2020:

Based on the recommendations made by IISC, Bengaluru report in 2016; APPCB did not issue any directions to HPCL as there were no specific directions to HPCL. APPCB inspected the industry on February 25, 2020 and based on the observations, legal hearing was conducted before the External Advisory Committee (Task Force) on March 4, 2020. The representative of the industry attended the legal hearing and submitted their views. The committee after detailed discussions issued the directions on March 19, 2020. The copy of the directions issued by APPCB on March 19, 2020 is attached as ***Annexure - 14***. During inspection, the committee verified the compliance status of the directions and is enclosed (Annexure - 15).

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, SO2, NO2 & NH3.
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	PM10, PM2.5, SO2, NO2, NH3, O3, 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 PM_{10}, $PM_{2.5}$, 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

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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 hour)	2 (8 hours)	5
All values are expressed in $\mu g/m^3$, 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} & $PM_{2.5}$ 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 & NOx, 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}, $PM_{2.5}$, SO_2, NOx, etc. are find their way into the ambient air as fugitive emissions. Higher values of PM_{10} & $PM_{2.5}$ 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 $PM_{2.5}$ 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}	$PM_{2.5}$	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 hours)	4 (1 hour)	-
Annual average standard		60	40	50	40	100	180 (1 hour)	2 (8 hours)	5
All values are expressed in $\mu g/m^3$, 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.

5.1 Monitoring of emission in stacks

Committee carried out monitoring of flue gas emissions from five important stacks for PM, SO_2 and NOx 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/NM 3)	Standard
1	Stack attached to DHDS Reformer-61F11	25.03.2021	PM	39.0	100
			SO_2	63.5	--
			NOx	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	--
			NOx	204.9	--
3	Stack attached to Flue gas desulphurization unit FGD-II	26.03.2021	PM	36.0	50
			SO_2	147.5	--
			NOx	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	--
			NOx	117.4	--
5	Stack attached SRU Train – III Incinerator 79F302	27.03.2021	PM	23.0	100
			SO_2	32.5	--
			NOx	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, NOx & hydrocarbons. The Joint Committee calculated pollutant emission load for compliance verification as tabulated below.

Table 8: Emission Load calculation statement for PM, SO2 and NOx 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)	NOx (TPD)	SO2 (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_I_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_REFORMER-	NA	0.042	0.054
19	Stack 20	Stack19_DHDS_HGU_61F1	NA	NA	NA
20	Stack 22	Stack20_DHDS_SRU_65F001-	NA	0.02	0.042
21	Stack 26	Stack21_DHDS_SRU_79F302-	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_90F01_02-	0.054	0.092	0.138
30	Stack 32	Stack_30_DHT_HGU_NAPTHA_HEATER_91F01-	0	0.002	0.001
31	Stack 31	Stack_31_DHT_HGU_91M20-	0.063	0.079	0.071
32	Stack 33	Stack_32_DHT_SRU_92M22-	0.004	0.018	0.051
Total (as calculated from the results obtained from			**0.969**	**5.083**	4.521

CEMS connected to 32 stacks)			
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, SO_2 and NO_2 are meeting the prescribed standard for pollution emission loads.

5.2 Water consumption and wastewater generation & treatment details

Domestic and process & washings requirements of the refinery are met from the Greater Visakhapatnam Municipal Corporation supply. Cooling water requirements are met from the water drawn from sea. The refinery has provided the data of water consumption & wastewater generation during the year 2020 (January to December) and treatment facilities available to the Joint Committee during inspection. Details are tabulated below:

Table 9: Water consumption details

S. No.	Purpose	Permitted quantity as per the CFO order dated 18.12.2019 (KLD)	Actual consumption (KLD)
1	Process & washings	10,176	9,250
2	Boiler feed	1,680	7,718
3	Industrial cooling (make up) / humidification / water spraying	5,03,305	2,13,035
4	Industrial water	6,900	---
5	Domestic	732	732
Total:		**5,22,793**	**2,30,735**
Remarks: Water consumption for boiler feed was exceeded the permitted quantity.			

a. Waste water generation and treatment:

Wastewater is generated mostly during desalting of crude oil (striped Water), spent caustic solutions, floor washings, crude & product tank washings, boiler blow downs, etc.

Table 10: Wastewater generation

S. No.	Outlet description	Max. daily discharge as per CFO order dated 18.12.2019 (KLD)	Point of disposal	Actual quantity of wastewater discharge during the year 2020 (KLD)
1	Process & Washings	11,820	Shall be discharged into Meghadrigedda surplus course joining Bay of Bengal sea after	5,272

			treatment in ETPs – I, II & IV.	
2	Cooling blow down	2,18,286	Shall be discharged into Meghadrigedda surplus course joining Bay of Bengal sea after treatment	2,18,286
3	Domestic effluents	636	Shall be used for onland for irrigation within the industry premises after treatment in STP.	636
Total:		**2,30,742**	—	**2,24,194**

There are three effluent treatment plants in HPCL. The status of operation and its operating capacities are as below:

Table 11: ETP status details

Name of ETP	Designed Capacity, (KL/hr)	Inlet Sources to ETP	Status of Operation	Treatment units
ETP-I	135 KL/Hour (3,240 KLD)	CDUs, FCC-I, QC & Product tank	In Operation.	API, TPIs for free oil removal, dissolved air floatation, flocculation tank, equalisation tank, aeration tank & duel media filters (carbon & sand).
ETP-II	325 KL/Hour (7,800 KLD)	Desalter, Oily water & spent caustic effluents	Partially operation and routed to ETP-IV for further treatment.	API, TPIs for free oil removal, neutralisation tank, ammonia stripper, dissolved air floatation tank, equalization tank, two-stage biological treatment, duel media & activated carbon filters.
ETP-IV	180 KL/Hour (4,320 KLD)	Effluents from MS block	In Operation.	API, TPIs, flash mixing tanks, flocculation tank, dissolved air floatation tank, sequential batch reactor for removal of organics, duel media filters, activated carbon filters followed by disinfection through bromination.

Treated 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 Bay of Bengal.

During inspection, Joint Committee collected treated effluents from three outlets of Effluent Treatment Plants and the two final outlets discharged into Megadrigedda surplus overflow

channel for compliance verification on March 26, 2021 The samples collected were analyzed in the Zonal Laboratory, APPCB, Visakhapatnam. Details of samples collected and analysis results are tabulated below:

Table 12: **Analysis results of Final outlet**

S. No.	Parameters	MHF-II outlet (E-332)	MHF-I outlet (E-333)	CFO Order stipulated standards
1	pH	7.16	7.28	6.50 – 8.50
2	Oil & grease	< 1.0	< 1.0	1.0
3	Hexavalent chromium (as Cr)	0.01	BDL	0.10
All values are expressed in mg/L except pH.				

Table 13: Analysis results of ETPs outlet

S. No.	Parameter	ETP – I – DMF outlet (E-334)	ETP – IV ACF outlet (E-335)	CFO Order stipulated standards
1	pH	7.64	8.33	6.5-8.5
2	Total Suspended Solids at 105^0 C	23	57	20
3	Chemical Oxygen Demand	44	96	125
4	Biochemical Oxygen Demand	10.5	23.0	15
5	Oil & Grease	<1	2.0	5.0
6	Sulphides (as S^{2-})	1.6	2.4	0.5
7	Ammonical Nitrogen (as NH_3-N)	3.9	26.3	15.0
8	Phenols (as C_6H_5OH)	BDL	0.02	0.35
9	Phosphates (as P)	0.08	0.07	3.0
10	Hexavalent Chromium (as Cr^{6+})	BDL	BDL	0.10
11	Total Chromium (as Cr)	0.0007	0.0010	2.0
12	Lead (as Pb)	0.0002	<0.0001	0.10
13	Zinc (as Zn)	0.0090	0.0080	5.0
14	Nickel (Ni)	0.0083	0.0024	1.0
15	Copper (as Cu)	0.0025	0.0007	1.0
16	Cyanide (as CN^-)	BDL	BDL	0.2
All values are expressed in mg/l except pH.				
Analysis reports enclosed (Annexure – 20).				

From the analysis results, it is observed that the values of Total Suspended Solids, Biochemical Oxygen Demand and Ammonical Nitrogen are exceeding the stipulated standards for the sample collected from ETP – IV (ACF outlet) and TSS value in ETP I outlet.

APPCB in the CFO Order, stipulated standards have been prescribed for pollution loads of various effluents parameters to comply with while discharging the treated effluents outside the premises. Accordingly, the Joint Committee made pollution load calculations as tabulated below for compliance verification. As per the calculation, the pollution load of all the parameters are meeting the stipulated standard prescribed by APPCB.

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Table 14: Pollution load calculation for effluent

S. No.	Pollutant	ETP / STP	Value (mg/lit)	Quantity of treated effluent (KLD)	Pollutant load (TPD)
1	TSS	ETP – I – DMF outlet	23	5,272	0.42
		ETP – IV ACF outlet	57		
		STP outlet	14	636	0.009
	Total				**0.429**
	Standard as per CFO order				1.25
2	COD	ETP – I – DMF outlet	44	5,272	0.74
		ETP – IV ACF outlet	96		
		STP outlet	72	636	0.046
	Total				**0.786**
	Standard as per CFO order				17.2
3	BOD	ETP – I – DMF outlet	10.5	5,272	0.18
		ETP – IV ACF outlet	23		
		STP outlet	18	636	0.011
	Total				**0.191**
	Standard as per CFO order				4.6
4	Phenol	ETP – I – DMF outlet	BDL	5,272	0.00011
		ETP – IV ACF outlet	0.02		
		STP outlet	---	636	---
	Total				**0.00011**
	Standard as per CFO order				0.67
5	Sulphide	ETP – I – DMF outlet	1.6	5,272	0.021
		ETP – IV ACF outlet	2.4		
		STP outlet	---	636	---
	Total				**0.021**
	Standard as per CFO order				1.66
6	Oil & Grease	ETP – I – DMF outlet	0.9	2,23,558 (Treated effluent: 5,272 + Cooling blow down: 2,18,286)	0.20
		ETP – IV ACF outlet			
		MHF-II outlet			
		MHF-I outlet			
	Total				**0.20**
	Standard as per CFO order				12.26

b. Domestic wastewater treatment details

HPCL has two STPs of 40 KLD capacity (25 & 15 KLD) to treat the sewage generated from the administration block. The wastewater is generated from rest rooms, kitchen and dining area. About 25-30 KLD of sewage is generated and is treated in the STP with Wetland Technology treatment system and the treated water is utilized for on land gardening. During inspection, the STP was monitored and collected samples from the outlet of STP and the results are depicted in the table below:

Table 15: Analysis results of treated domestic effluent

S. No.	Parameter	STP outlet Mg/L except pH	Standard prescribed by APPCB as in CFO
1	pH	8.40	6.5-8.5
2	Total Suspended Solids at 105^0 C	14	100 mg/l
3	Total Dissolved Solids at 105^0 C	**820**	----
4	Chemical Oxygen Demand	72	----
5	Biochemical Oxygen Demand	18	30 mg/l

From the analysis results, it is observed that all the parameters are meeting the standards.

6. Ground water quality monitoring:

HPCL has installed six piezometer wells inside the unit premises to regularly monitor the ground water quality. During the inspection, it was informed to the committee that four of the wells are dried up and the Joint Committee collected ground water samples from two piezometer wells located within the industry premises. The analysis results of the ground water are detailed below:

Table 16: Analysis results of bore well water samples collected within the premises of the refinery

S. No.	Parameter	Borewell near substation 8A	Borewell near tank 10A	Drinking Water Specifications: IS:10500:2012
				Requirement (Acceptable Limit)
1	pH	7.81	8.03	6.5-8.5
2	Conductivity (as µS/cm)	**10190**	**4400**	**----**
3	Total Dissolved Solids at 105^0 C	7184	**2772**	500
4	Total Organic Carbon (as TOC)	36.8	8.8	----
5	Chlorides (as Cl)	**3229**	**1101**	250
6	Total Alkalinity (as $CaCO_3$)	**424**	**380**	200
7	Total Hardness (as $CaCO_3$)	**1104**	**592**	200
8	Calcium (as Ca)	**107.2**	**128.0**	75
9	Magnesium (as Mg)	**203.1**	**66.0**	30
10	Sodium (as Na)	**1938**	**652**	----
11	Potassium (as K)	32	30	----
12	Nitrites Nitrogen (as NO_2-N)	0.82	0.05	----
13	Ammonical Nitrogen (as NH_3-N)	BDL	BDL	----
14	Phosphates (as P)	0.07	1.82	----
15	Sulphates (as SO_4)	76.3	142.3	200
16	Fluorides (as F)	1.62	1.10	1.0
Heavy Metals				

17	Lead (as Pb)	0.0004	0.0016	0.01
18	Iron (as Fe)	0.6514	0.5752	0.3
19	Copper (as Cu)	0.0018	0.0056	0.05
20	Zinc (as Zn)	0.0071	0.0173	5
21	Nickel (as Ni)	0.0006	0.0013	0.02
22	Cadmium (as Cd)	<0.0001	<0.0001	0.003
23	Chromium (as Cr)	0.0010	0.0009	0.05
24	Arsenic (as As)	0.0006	0.0002	0.01
25	Manganese (as Mn)	0.0300	0.0865	0.1
All values are expressed in mg/l except pH.				
Analysis report enclosed (Annexure – 21).				

Results shows that dissolved solids content in the ground water 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.

7.0 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).

Table 17: Quantity of crude obtained from various sources and the concentrations of Benzene and Sulphur contents as per the information provided by M/s. HPCL Refinery

S. No.	Type of crude	Crude quantity (TMT)	No. of parcels	Benzene content (wt%)	Sulfur content (%)
1	MH	416.4	8	1.8	0.124
2	Bonny light	1395.7	6	0.1	0.138
3	WTI	1059.3	4	0.1	0.169
4	Quaiboe	467.6	3	0.1	0.115
5	ERHA	127.7	1	0.3	0.169
6	AZERI	92.5	1	0.1	0.158
7	Kuwait	62.1	1	0.1	2.808
8	Arab Lt	206.2	8	0.1	1.997
9	Arab Ex Lt	698.5	7	0.2	1.007
10	Arab Hy	510.8	8	0.05	2.978
11	Murban	390.5	5	0.2	0.769
12	Basrah Hvy	39.9	1	0.1	4.2
12	Basrah Lt	1416.3	14	0.1	3.005
13	Das	1902.4	16	0.2	1.186
14	Ravva	285.0	5	0.1	0.052
Total		**9070.9**	**88**	**0.243**	**1.258**
Accordingly, an amount of about 22,042 metric tons of Benzene and 1,14,112 metric tons of sulfur will be having the 90,70,900 metric tons (9070.9 TMT) of crude obtained by the refinery during the year, 2020.					

Table 18: Quantity of petroleum products generated and their Sulphur content

S. No.	Product	Production	Sulphur %	Sulphur quantity

		in Tons	in product	in Tons (Actual)
1	Propylene	46,000	0.004	1.84
2	LPG	4,18,000	0.013	54.34
3	Naphtha	3,68,700	0.024	88.48
4	Motor spirit	16,72,900	0.001	16.729
5	ATF	59,100	0.036	21.276
6	SKO	1,42,200	0.019	27.018
7	Diesel	39,31,500	0.580	22802.7
8	FO 3.5 % S	9,36,100	3.5	32763.5
9	FO 1.0% S	1,68,500	1	1685
10	Bitumen	5,15,400	5.70	29377.8
11	Sulfur	34,800	--	34800
12	Refinery Fuel	7,27,300	0.22	1600.06
13	Intermediate Stream Build up	50,500		
Total:		**90,71,100**	**--**	**1,23,238.743**

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 sulfur content have also been verified by the Joint Committee while carrying out sulfur balance studies as detailed below:

Table 19: Fuels, Sulphur concentrations and total Sulphur load of the fuels used during 2020:

S. No.	Month	Fuel quantity (Metric Tons)	Sulphur concentration	Total Sulphur (metric tons)
I	**Fuel gas**			
1	January	18341	82 PPM	1.50396
2	February	19105	75 PPM	1.432875
3	March	20476	69 PPM	1.412844
4	April	19341	70 PPM	1.35387
5	May	18252	63 PPM	1.149876
6	June	18618	75 PPM	1.39635
7	July	17931	66 PPM	1.183446
8	August	16456	54 PPM	0.888624
9	September	19001	53 PPM	1.007053
10	October	19264	27 PPM	0.520128
11	November	19228	21 PPM	0.403788
12	December	17667	17 PPM	0.300339
Total:		**223681**	**---**	**12.553153**
II	**LSHS (fuel oil)**			
1	January	8162	0.65 (wt%)	53.053
2	February	6252	0.51 (wt%)	31.8852
3	March	4856	0.6 (wt%)	29.136
4	April	4921	0.53 (wt%)	26.0813
5	May	7483	0.59 (wt%)	44.1497
6	June	8118	0.58 (wt%)	47.0844
7	July	7718	0.59 (wt%)	45.5362

8	August	5973	0.66 (wt%)	39. 4218
9	September	6250	0.61 (wt%)	38.125
10	October	6810	0.61 (wt%)	41.541
11	November	8595	0.52 (wt%)	44.694
12	December	8338	0.59 (wt%)	49.1942
Total:		**83477**	---	**489.9018**
III	**CPP Naphtha**			
1	January	17628	0.020 (wt%)	3.5256
2	February	17135	0.028 (wt%)	4.7978
3	March	18031	0.030 (wt%)	5.4093
4	April	17279	0.020 (wt%)	3.4558
5	May	17827	0.016 (wt%)	2.85232
6	June	16256	0.021(wt%)	3.41376
7	July	17721	0.019 (wt%)	3.36699
8	August	16032	0.021 (wt%)	3.36672
9	September	16651	0.022 (wt%)	3.66322
10	October	17733	0.019 (wt%)	3.36927
11	November	17389	0.016 (wt%)	2.78224
12	December	14884	0.014 (wt%)	2.08376
Total:		**204567**	---	**42.08678**
Total sulfur content in the fuels used (I+II+III) during the year 2020:				**544.542**
Total sulfur dioxide content that has emitted by the 544.542 tons of sulfur during the year, 2020:				1,089.08
Sulfur dioxide content emitted per day during the year, 2020 :				**2.98**
Standard emission load of sulfur dioxide as stipulated in the APPCB CFO order dated 18.12.2019.				**11.5**

From the above 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 as detailed below.

Table 20: Recovered Sulphur from the crude & its products

S. No.	Financial year (April-March)	Crude processed (TMT)	Sulphur recovered (TMT)	Sulphur shipment (TMT)	Sulphur inventory at the year-end (TMT)
1	2016-17	9,303.9	45.16	47.39	0.12
2	2017-18	9,635.0	43.50	42.89	0.73
3	2018-19	9,773.1	50.80	51.18	0.35
4	2019-20	9,115.0	37.48	36.93	0.90
5	2020-21	9,050.5	34.07	34.82	0.15

8.0 Assessment of Environmental Compensation for non-compliance:

APPCB issued directions for non-compliances to HPCL on March 19, 2020; during inspection committee verified the compliance status and observed that some of the directions have not been complied. It is also observed that the refinery has not complied the EC conditions and CFO conditions. Hence, the Committee recommends to levy environmental compensation on the refinery as detailed below:

EC=PI x N x R x S x LF

Where,

EC = Environmental Compensation in INR

PI = Pollution Index of industrial sector (red-80)

N = Number of days of violation took place (date of direction issued to date of compliance verification.)

R = A factor in Rupees for EC (Rs. 100/- may be assumed)

S = Factor for scale of operation (large-1.5)

LF = Location factor (present in Visakhapatnam where population is more than 10 lakh=2)

i. Pollution Index of industrial sector (PI): Andhra Pradesh Pollution Control Board has categorized this industry into red category of industries and accordingly the Combined consent & Authorisation have been granted. For red category of industries, average pollution index is 80.

ii. Number of days of violation (N): The number of days for which violation took place is considered as the period between the day of violation observed and day of compliance verified by the CPCB/ APPCB. From the available records, APPCB issued directions to HPCL on March 19, 2020 and committee verified the compliance on March 25, 2021. Based on the criteria, 371 days (from 19.03.2020 to 25.03.2021 including both the days) is considered for calculation of period of violation for estimating EC.

iii. Scale of operation (S): The industry is considered as large as per the capital investment by the industry. Thus, scale of operation (S) for EC estimation is considered as 1.5.

iv. Location factor (LF): The industry is located in Malkapuram and the total population within municipal boundary and up to 10 km distance from the municipal boundary of the city is 10 million and above. Thus location factor (LF) is considered as 2 for EC estimation.

v. Factor in Rupees (R) (Rs): As per the environmental compensation estimation guidelines, factor of rupees may be minimum of Rs 100/- and maximum of Rs 500/-. The Committee decided to take rupee factor as Rs. 100/- for estimating environmental compensation as there was no environmental damage caused by these non-compliances.

S.N	Period of non-compliance	PI	S	LF	R (Rs)	N (days)	Environmental compensation (Rs)
1	19.03.2020 to 25.03.2021	80	1.5	2	100/-	371	89,04,000/-
	Total EC for violating					**371**	**89,04,000/-**
Rupees eighty nine lakhs and four thousand only.							

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 $100m^3$ of each is constructed and filled with low oil sludge, the oil zapper bacteria at 5 kgs/m^3 and nutrients of $250g/m^3$ 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, NOx, 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 compliance reports.

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 authorisation 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 PM_{10} & $PM_{2.5}$ 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, NOx & 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 practises 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 PM_{10}, $PM_{2.5}$

parameter is exceeding at all the five locations, at one point near the ETP – IV area the concentration value of SO_2 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.

Report dated May 26, 2021

Dr. Suresh Babu Pasupuleti
Scientist-C
Ministry of Environment, Forest & Climate Change, Vijayawada

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Scientist D
Central Pollution Control Board
Regional Directorate, Chennai

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Senior Environmental Scientist
Andhra Pradesh Pollution Control Board
Vijayawada

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

6. Earlier they have assessed an environment compensation of Rs. 26,61,551/- (26 lakhs sixty one thousand five hundred fifty one) in respect of pollution caused due to the fire incident happened on

25.05.2021. They have further assessed an environment compensation of Rs. 89,04,000/- (Eighty Nine lakhs four thousand) for the violation and non-compliance of the directions.

7. The Learned Counsel for the applicant as well as 7th respondent submitted that they want to file objections to the Committee reports as according to the applicant, the amount of compensation imposed is not proper and they have not mentioned anything about further action taken report on the basis of the continuous violation as well.

8. The Pollution Control Board as well MoEF&CC are directed to file their independent action taken report on the basis of the observations made by the Joint Committee regarding the alleged violations and also non-compliance of the conditions of developing green belt and other conditions issued in the environment clearance granted and permission granted.

9. They have not mentioned what is the extent of green belt developed and also whether there is any possibility of developing green belt in that area and if it could not be developed within the complex, what is the further remedial measures to be taken for improving the green belt within the permissions to mitigate air as well as odour pollution.

10. The Committee has also not mentioned as to whether the guidelines provided by the Indian Institute of Science in 2016 have been complied with by the 7th respondent or not. Further, it

is seen from the report that the violations are in existence since long time and even earlier certain deficiencies have been found and notice have been issued by the Pollution Control Board in that regard. So, the number of days of violation taken appears to be not correct. They will have to take the cumulative act of violations for the purpose of ascertaining the number of days violated for the purpose of calculating the compensation, which has been reiterated by the Principal Bench as well as this Tribunal in several cases of this nature.

11. So, under such circumstances, we direct the Committee to re-visit those aspects and submit a further report incorporating their suggestions and recommendations on the basis of the observations made by this Tribunal.

12. The MoEF&CC as well as Andhra Pradesh Pollution Control Board are directed to file further action taken report on the basis of the violations noted by them, which they are expected to take as a regulator under the respective statutes and notification. They are also directed to file further action taken report to this Tribunal before the next hearing date.

13. The Committee as well as MoEF&CC and Pollution Control Board are directed to file their further reports to this Tribunal on or before 12.11.2021 by e-filing in the form of Searchable PDF/OCR Supportable PDF and not in the form of Image PDF along with necessary

hardcopies to be produced as per Rules.

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14. The parties are at liberty to file their objections, if any, to the Committee reports within 3 weeks and submit a copy of the same to the members of the Committee, so that they can go through the same and submit their views on the same while submitting further report as directed by this Tribunal.

15. In the meantime, the parties are also directed to complete the pleadings.

16. The Registry is directed to communicate this order to the members of the Committee as well as official respondent, Andhra Pradesh Pollution Control Board for their information and compliance of the directions issued by this Tribunal.

17. For completion of pleadings, objection, if any, to the reports and consideration of further reports, post on 12.11.2021.

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

.....E.M.
(Shri. Saibal Dasgupta)

O.A. No.73/2021,
17th September, 2021. AM.