इंडियन ऑयल कॉर्पोरेशन लिमिटेड
एओडि - डिगबोई रिफाइनरी
पो.ओ. डिगबोई, पिन-786171, असम

Indian Oil Corporation Limited
AOD - Digboi Refinery
P. O. Digboi, PIN: 786171, Assam
Tel. : 03751-262000
Fax : 03751-269015
E-mail : aoddigboi@indianoil.in
Website : www.iocl.com

असम ऑयल डिवीजन
Assam Oil Division

Ref: HSE: 01 -714/25 **Dated: 23.07.2025**

To,

The Regional Officer,
Integrated Regional Office, Guwahati,
Ministry of Environment, Forest and Climate Change,
4thFloor, Housefed Building, G.S. Road, Rukminigaon,
Guwahati – 781022

Sub: Submission of the Half-Yearly Compliance Report for the period (1st Oct'24 to 31st March'25) on Environmental Stipulations pertaining to various units of Digboi Refinery.

Dear Sir,

Please find enclosed herewith the six-monthly compliance status of Digboi Refinery on the Environmental Clearance Stipulations of the Environmental Clearance letters referred to above for the period **(October 2024 - March 2025)**.

Thanking you,

Yours sincerely,
For Indian Oil Corporation (AOD)

23/07/25

D. K. Barua
General Manager (TS)

Copy To:

1. The Member Secretary, Pollution Control Board, Assam, Guwahati-21.
2. The Environmental Engineer, North Eastern Zonal Office, CPCB, Shillong-14
3. The Regional Executive Engineer, PCBA Dibrugarh-786001

HALF YEARLY COMPLIANCE REPORT OF ENVIRONMENTAL CLEARANCE DIGBOI REFINERY

(1St October 2024 – 31st March 2025)

INDEX

REPORTS ATTACHED

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ENVIRONMENTAL CLEARANCE (J-11011/12/87-1A, dated – 19-10-1987) FOR DIGBOI REFINERY MODERNISATION PROJECT

SL. NO	STIPULATIONS	COMPLIANCE STATUS AS ON 31.03.2025
1.0	The concentration levels of all the parameters of the effluent (gaseous & liquids) discharged must comply with MINAS and in the light of MINAS, the Assam oil, Digboi must review the entire effluent generation, routing, treatment and disposal system.	The concentration levels of all the parameters of effluent after treatment at ETP meets the MINAS specification. As per revised CPCB guideline, Digboi Refinery meets the stipulations for all 21 parameters of effluent. Six monthly compliance Report on Quantum Limit (Kg/1000 MT Crude processed) is attached in **Annexure-3.** Online effluent monitoring & connectivity to CPCB server was commissioned on 28th December 2015. WebSite: Online Emission and Effluent Monitoring System (cpcb.gov.in)
2. 0	Monitoring with respect to physical, chemical and biological parameters must be carried out for effluent discharged as well as for the samples of river waters where effluents are discharged.	These tests are carried out regularly and reports submitted to the Pollution Control Board, Assam. Monitoring of receiving water bodies is also carried out every month. Six monthly 21 MINAS parameter ETP effluent Reports (Polishing Pond outlet) by External Agency Nitya laboratories 43, sector -A1 Ext. Bhalla Enclave, channi Himmat, Jammu-180015, J&K (UT), India is enclosed as **Annexure-1** Six monthly nearby river water sample by AOD QC Laboratories is enclosed as **Annexure-2.**
3.0	The sludge drains must be properly covered to avoid land and water pollution during incessant rains.	All OWS systems at DRMP are completely covered.
4.0	The sludge dumping area should be made impervious so that ground water is not affected due to leaching and seepage of associated water containing pollutants.	One HDPE lining concrete oily sludge storage tank of 400m^3 capacity was constructed in 2014 to prevent leaching and seepage of oil to ground water. Another storage pit bottom is made up of concrete to avoid leaching.
5.0	The ambient air around Refinery	Four nos. of Ambient Air quality monitoring stations have

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	should be monitored at least at four monitoring stations for SPM, SOx, NOx, Hydrocarbons and H_2S.	been installed around Digboi Refinery-(I) Bazar Gate (II) Wax Sector Cooling Tower (III) New Tank Farm (IV) Effluent treatment Plant. One no. of Continuous Ambient Air Quality Monitoring Station installed and commissioned in September 2012 at Welfare center which is connected with CPCB and PCBA server. Ambient air quality monitoring is carried out monthly by external agency. Six-month Ambient Air Quality Monitoring Report by External Agency Nitya laboratories 43, sector -A1 Ext. Bhalla Enclave, channi Himmat, Jammu-180015, J&K (UT), India is attached as **Annexure-5**
6.0	The stack emission from processes, power generating units and Boilers must be regularly monitored and proper type of stack monitoring/instruments must be procured and installed.	Monitoring of stack emissions is carried out with the help of a portable monitoring kit. Fixed on-line analyzers are also installed in AVU, DCU, CPP HRSG's, CRU, SDU, HDT, HGU and MSQU and monitoring through RTDBMS. Online connectivity established with CPCB Server and PCBA for Furnaces having heat capacity of more than 10mkcl/hr (HGU & HRSG's Stacks). Apart from own monitoring, external agencies Nitya laboratories 43, sector -A1 Ext. Bhalla Enclave, channi Himmat, Jammu-180015, J&K (UT), India is also employed to conduct stack emission analysis on regular basis. 6 Months (Quarterly Report) Stack emission Reports by External Agency Nitya laboratories 43, sector -A1 Ext. Bhalla Enclave, channi Himmat, Jammu-180015, J&K (UT), India are enclosed as **Annexure-4.**
7.0	Fugitive emissions arising during handling and storage of low boiling petroleum fractions and from effluent treatment plant, leakage through valves and flanges must also be monitored regularly.	Regular monitoring of Hydrocarbons is done with GMI Gas surveyor and as well as with VOC detectors in plant & offsite areas by an external CPCB approved agency. Leak detection and repair (LDAR) report for the Q 3 and Q4 of FY 2024-25 is attached as **Annexure-6.**
8.0	Land filling, if any, must be done with fill material only from within battery limits of the Refinery.	It is being followed accordingly.
9.0	The Assam Oil Division must take up development of green belt as proposed.	Digboi Refinery is surrounded by the Upper Dehing Reserve Forest on the south and southwest side, which acts as a natural Green Belt. The green belt is developed with regular tree plantation around Refinery premises and township area. Since 2002, Digboi Refinery has planted around **319980** trees till March '24 in and around Digboi Refinery achieving a green belt coverage of 52.86% of the total IOCL area.

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ENVIRONMENTAL CLEARANCE (J-13011/3/1987-1A dated - 18-06-1987) FOR CAPTIVE POWER PLANT

SL. NO	STIPULATIONS	COMPLIANCE STATUS AS ON 31.03.2025
1.0	Only sweet natural gas will be used as feed stock.	Digboi Refinery uses only sweet Natural Gas.
2.0	Under the envisaged modernization programme for the refinery, Sulphur recovery units to be provided to reduce emission of SO_2. Efforts should also be made to reduce the emissions of NOx. The existing sulphuric acid plant should be scrapped.	Digboi Refinery processes only indigenous sweet Assam crude with Sulphur content less than 0.25 wt%. A Sulphur Recovery Unit (SRU) has been installed and commissioned in 2004 as a part of Hydrotreater Project. Since the refinery is using natural gas, the formation of NOx is very low and always remains within the prescribed limit. Further, low NOx burners are also fitted in all the new units viz. Solvent De-waxing Unit, Hydro-treater Unit, Delayed Coking Unit and MSQ Unit.
3.0	The liquid effluent emanating from the captive power plant and the existing refinery should be treated as per the standards prescribed by the State Pollution Control Board.	Liquid effluent generated from the power plant is negligible, which is also routed to ETP for further treatment.
4.0	The height of the stack should not be less than 50 meters.	**Complied.**
5.0	Green belt around the power plant should be raised.	Digboi Refinery is surrounded by the Upper Dehing Reserve Forest on the south and southwest side, which acts as a natural Green Belt. The green belt is developed with regular tree plantation around Refinery premises and township area. Since 2002, Digboi Refinery has been planted around 319980 trees till March '2025 in and around Digboi Refinery achieving a green belt coverage of 52.86% of the total IOCL area.
6.0	Adequate precautionary measures for preventing and controlling fire and explosion hazards should be taken up, especially in the gas storage area.	Natural gas used in the plants is transported through pipeline ex M/s OIL India Ltd. There is no storage of natural gas in the Refinery. Fire fighting facilities are provided at CPP, all process plants and tank farm area for controlling fire and explosion hazards.

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ENVIRONMENTAL CLEARANCE (J-11011/8/89-1A dated 26-07-1989) FOR CATALYTIC REFORMER UNIT

<table>
<tr><th>SL. NO</th><th>STIPULATIONS</th><th>COMPLIANCE STATUS AS ON 31.03.2025</th></tr>
<tr><td>1.0</td><td>The project authority must strictly adhere to the stipulations made by State govt. and the State Pollution Control Board.</td><td>The stipulations made by the State Govt. and the State Pollution Control Board are strictly followed regarding effluent and emission norms.
The existing CTO has been renewed till 31st March 2028.
Digboi Refinery meets all parameters of effluent as per revised CPCB guideline.</td></tr>
<tr><td>2.0</td><td>The project authority will not increase the throughput capacity of the refinery from the existing level.</td><td>Crude processing capacity of Digboi Refinery was based on neat Assam crude. The actual crude throughput is based on Govt MoU maintaining all the environmental parameters within the stipulated norm.</td></tr>
<tr><td>3.0</td><td>The project authority must submit a rapid EIA report within a month and a comprehensive EIA report within 15 months to the Ministry for review.</td><td>Complied.</td></tr>
<tr><td>4.0</td><td>Gaseous emissions of SO2, Hydrocarbons and oxides of Nitrogen should not exceed the prescribed standard stipulated by Central/State Pollution Control Board. At no time should the emission level be beyond the stipulated standard. In the event of failure of any pollution control system adopted by the unit, the respective unit should be put out of operation immediately and should not be restarted until the control systems are rectified to achieve the desired efficiency.</td><td>Complied.

The reported gaseous emission of SOx and NOx by External Agency Nitya laboratories 43, sector -A1 Ext. Bhalla Enclave, channi Himmat, Jammu-180015, J&K (UT), India are: -
<table>
<tr><th></th><th>CRU-HDT(SOx) mg/Nm3</th><th>CRU-HDT(NOx) mg/Nm3</th><th>CRU-OBSG(SOx) mg/Nm3</th><th>CRU-OBSG(NOx) mg/Nm3</th></tr>
<tr><td>Nov'24</td><td>6.00</td><td>28.00</td><td>9.00</td><td>57.00</td></tr>
<tr><td>Feb'25</td><td>8.00</td><td>24.00</td><td>6.00</td><td>41.0</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>5.0</td><td>The project authority must explore the possibility of maximum recycling of effluent either as process water or for aforestation.</td><td>Treated effluent from ETP is recycled to refinery as make up for Fire water tank, Coke Cutting water at delayed coking unit, Wax Sector Cooling Tower, cleaning and gardening purposes.
During October'24 – March'25, 100 % of treated effluent was reused.</td></tr>
<tr><td>6.0</td><td>The entire quantity of liquid effluent coming out of the complex should strictly confirm to MINAS both in terms of quantity and quality before discharge in to the drainage system. The process plant effluent should be discharged through pipeline/closed channel.</td><td>Effluent is meeting MINAS specifications both in quality and quantity before being discharged.
Six monthly compliance Report on Quantum Limit (Kg/1000 MT Crude processed) is attached in Annexure-3.</td></tr>
</table>

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7.0	The project authorities must set up minimum of four air quality monitoring stations at different location of the plant and in the nearby areas. The air quality will be monitored as per standard procedure. The monitoring of gaseous emissions should also include oxides of nitrogen and hydrocarbons. All the stacks of the plant must be provided with continuous automatic air quality monitoring equipment and stacks emission levels must be recorded. Reports should be submitted to Pollution Control Board once in three months and to this Ministry once in six months.	4 (Four) numbers of Ambient Air quality monitoring stations have been installed around Digboi Refinery-(i)Bazar Gate (ii)Wax Sector Cooling Tower (iii)New Tank Farm (iv) Effluent treatment Plant. Ambient air quality monitoring is being carried out on a monthly basis. 1(One) number of Continuous Ambient Air Quality Monitoring Station installed and commissioned in September 2012 at Welfare centre. Online CAAQMS parameters are being monitored regularly through https://aicpl.glensserver.com/#/login Six-month Ambient Air quality Monitoring Report by External Agency Nitya laboratories 43, sector -A1 Ext. Bhalla Enclave, channi Himmat, Jammu-180015, J&K (UT), India attached as **Annexure-5** Fixed on-line analyzers are also installed in AVU, DCU, CPP HRSG's, CRU, SDU, HDT, HGU and MSQU and being monitored regularly through RTDBMS. Online connectivity established with CPCB Server and PCBA server for Furnaces having heat capacity of more than 10mkcl/hr (HGU & HRSG's Stacks). Apart from own monitoring, external agencies are also employed to conduct stack emission analysis on a regular basis. Online stack monitoring regularly done through Website http://www.envsaindia.com/cpcb/login.php
8.0	The liquid effluent quality must be ensured on a daily basis. At least five water quality monitoring stations must be set up in consultation with the State Pollution Control Board. This should include the monitoring of oil content in the river. If the effluent quality exceeds the standard prescribed at any time, the corresponding units of the plant which are contributing to the excessive pollutant load shall be immediately stopped from operation till the quality of effluent discharged from the units are brought down to the required level.	Water quality monitoring stations were set up:- one near ETP, three at Digboi Nullah and one at oily sludge area. Liquid effluent quality from ETP outlet is monitored regularly daily. 1. 8(eight) parameters daily basis by QC (AOD) 2. 21(twenty-one) parameters monthly tested by SPCB approved outside agency. 3. In addition to the above four parameters, BOD, COD, TSS & pH being monitored through online analyzers connected with CPCB Server, 4. Sample from Digboi River and Dihing River are being collected and analyzed by QC (AOD) on monthly basis.
9.0	The project authority must monitor aquatic life (like fish, tortoise etc.) and report should be submitted to the Ministry once in six months.	Digboi Refinery has carried out study on **"Biomonitoring of aquatic life in lotic and lentic water bodies in and around Digboi Refinery"** by M/S A.B.N Scientific Services, Guwahati on October'24-March '25. The report has been enclosed as **Annexure-11**.

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10.	The project must start construction only after the approval of the Chief Controller of Explosives and a copy of the consent letter should be made available to this Ministry.	**Complied.** Present PESO License **P/HQ/AS/15/880** is valid till 31.12.2026.
11.	The project authority must provide oil separators in the nullah and the effluents should be discharged through covered drains.	At present an oil separator is being provided and the effluents are discharged through covered drain.
12.	No change of stack should be made without the prior approval of the State Pollution Control Board. Alternate pollution control system and/or proper design (steam injection system) of the stacks should be made to minimize hydrocarbon emission due to failure in the flare system in the plant.	**Complied.**
13.	The project authority must submit the Disaster Management Plan incorporating worst accident scenario and its probable consequence duly approved by the nodal agency of the State Govt. within 3 months.	Disaster Management Plan duly certified by PNGRB empanelled party. Copy of plan submitted to CIF Guwahati & DC, Tinsukia. Offsite drills are carried out regularly, once a year, along with District Administration, Mutual Aid Partners & NGOs. Onsite Disaster Mock drills are carried out once in a quarter with different scenarios. Emergency response & Disaster Management Plan (ERDMP) of Digboi refinery as per guidelines of PNGRB has been drawn up and certified by **M/S SafeNet Industrial solutions PLL.** Last Offsite Disaster drill was carried out on 13.12.2024 at 12:30 hrs. on scenario of ""Fire in Refinery open drain and escape of Oil to Nullah outside Refinery, caused by leakage of oil from slop oil line at pipe rack located north of AVU/DCU".". Last Odd hours onsite Disaster drill was carried out on 12/03/2025 at 23:00 Hrs. on scenario of "Thundering at Crude tank (T-001) roof leading to full surface fire"." Last L2 level onsite Disaster drill was carried out on 03/06/2025 at 16:09 Hrs. "Profuse Naphtha leakage from the upstream flange gasket of isolation valve of Tank 599 receiving/discharge common 4" line resulting in pool fire in the tank 599 dyke area"
14.	The Project authority must ensure that the effluent plant fully operational within the next 3 months.	ETP has been fully operational since its inception in 1989.
15.	The project authority must set up laboratory facilities in the existing premises for testing and analyzing gaseous emissions and water quality.	Digboi Refinery has set up its own state of art Quality Control Laboratories inside the Refinery premises with NABL Accreditation **ISO/IEC 17025:2017**

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16.	The project authority must provide necessary infrastructural facilities to the construction workers during construction.	**Complied.** Provided as per requirement.
17.	The project must submit a revised green belt design for the plant and township to this Ministry within three months for approval. The green belt should have minimum tree density of 1000 trees per acres.	Digboi Refinery is surrounded by the Upper Dehing Reserve Forest on the south and southwest side, which acts as a natural Green Belt. The green belt is developed with regular tree plantation around Refinery premises and township area. Since 2002, Digboi Refinery has planted around **319980** trees till March'2024 in and around Digboi Refinery achieving a green belt coverage of 52.86% of the total IOCL area.
18.	Additional area under the control of project which is not being used for the plant utilities should be afforested and fund for this should be suitably provided.	It is followed as part of IOCL's green belt development.
19.	A separate environmental management cell with suitably qualified people to carry out various functions related to environmental management should be set up under the control of a senior technical person who will directly report to the head of the organization.	Digboi Refinery has a full-fledged Health, Safety and Environment (HSE) unit functioning under Chief General Manager with direct reporting to Head of Organization.HSE Department team consists of General Manager, Chief Manager and Assistant Managers. The HSE team regularly monitors and reviews the effectiveness of the EMP implementation.
20.	Adequate fund provision (capital and recurring expenditure) so provided for environmental control measures should not be diverted to any other purpose. The implementation schedule for environmental measure must be strictly adhered to.	The HSE department is supported with budgetary Allocation. The allocation for the last three years are as follows: ➢ 2020-21: Rs 7.74 Cr. ➢ 2021-22: Rs 7.78 Cr. ➢ 2022-23: Rs 8.83 Cr. ➢ 2023-24: Rs 3.51 Cr ➢ 2024-25: Rs. 2.59 Cr.

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ENVIRONMENTAL CLEARANCE (J-11011/41/97-1A.II(I) dated -05-3-1998)
FOR SOLVENT DEWAXING UNIT

SL. NO	STIPULATIONS	COMPLIANCE STATUS AS ON 31.03.2025
1.0	The project authority should submit a Risk Analysis Report within a period of six months and submit the same to the Ministry.	Risk analysis has been carried out by M/s KLG-TNO in 1999 covering all the new units and report submitted to Ministry. A fresh round of Quantitative Risk Analysis (QRA) was carried out by M/s Alfa Project Services Pvt. Ltd, Vadodara in 2005. All the recommendations have already been implemented. Quantitative Risk Analysis study for all the units, including MSQU, was carried out in March 2012 & in Aug' 2013 post installation of Wax Palletization Unit. Further Quantitative Risk Analysis (QRA) study for all the units of DR was carried out in 2019 by M/s Techniche Engineering Private Limited, Pune and final report received in February 2020. The QRA study report was submitted to the office of IRO-Guwahati, MoEF & CC during Dec'2022 EC Compliance inspection Monitoring. The latest QRA study with all existing DR units and including facilities for capacity augmentation of Digboi refinery to 1 MMTPA was carried out by M/s Techniche Engineering Private Limited, Pune in the month of June'25.

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ENVIRONMENTAL CLEARANCE (J-11013/71/99-1A(II) dated - 13-05-1999)
FOR HYDROTREATER UNIT

SL. NO	STIPULATIONS	COMPLIANCE STATUS AS ON 31.03.2025
1.0	The project authority should submit a Risk Analysis Report within a period of six months and submit the same to the Ministry.	Risk analysis has been carried out by M/s KLG-TNO in 1999 covering all the new units and report submitted to Ministry. A fresh round of Quantitative Risk Analysis (QRA) was carried out by M/s Alfa Project Services Pvt. Ltd, Vadodara in 2005. All the recommendations have already been implemented. Quantitative Risk Analysis study for all the units, including MSQU, was carried out in March, 2012 & in Aug' 2013 post installation of Wax Pelletisation Unit. Further Quantitative Risk Analysis (QRA) study for all the units of DR was carried out in 2019 by M/s Techniche Engineering Private Limited, Pune and final report received in February 2020. The QRA study report was submitted to the office of IRO-Guwahati, MoEF & CC during Dec'2022 EC Compliance inspection Monitoring. The latest QRA study with all existing DR units and including facilities for capacity augmentation of Digboi refinery to 1 MMTPA was carried out by M/s Techniche Engineering Private Limited, Pune in the month of June'25.

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ENVIRONMENTAL CLEARANCE (J-11011/482/2007-IA II (I), DATED – 18-03-2008) FOR M S QUALITY IMPROVEMENT PROJECT AT DIGBOI REFINERY.

A	Specific Conditions	
SL. NO	STIPULATIONS	COMPLIANCE STATUS AS ON 31.03.2025
1	The company shall comply with new standards/norms that are being proposed by the CPCB for petrochemical plants and refineries.	Digboi Refinery strictly complies with all the norms and parameters of effluent and gaseous emission as per revised CPCB guideline.
2	The process emissions (SO_2, NOx, HC, VOCs and Benzene) from various units shall conform to the standards prescribed by the Assam State Pollution Control Board from time to time. At no time, the emission levels shall go beyond the stipulated standards. In the event of failure of pollution control system(s) adopted by the unit the unit shall be immediately put out of operation and shall not be restarted until the desired efficiency has been achieved.	The various process Emissions are within the prescribed limits and meets the norms as prescribed by MoEF & CC and Assam State Pollution Control Board as mentioned in the CTO. The various Emission reports from Refinery are submitted to Assam State Pollution Control Board and MoEF & CC on a regular basis.
3	Ambient air quality monitoring stations. [SPM, SO_2, NOx and NMHC, Benzene] shall be set up in the Refinery complex in consultation with SPCB based on occurrence of maximum ground level concentration and down-wind direction of wind. The monitoring network must be decided based on modeling exercise to represent short term GLCs Continuous on-line stack monitoring equipment should be installed for measurement of SO_2 and NOx.	5(Five) no's of Ambient Air Quality monitoring stations are already in operation in the Refinery premises as per direction of Pollution Control Board, Assam. Out of five stations, one Continuous Ambient Air Quality Monitoring Station is connected with CPCB server. Furnaces having a heat capacity of more than 10MMkcal/hr. (HGU & HRSG's Stacks) are continuously connected with CPCB Server and PCBA server. Online stack monitoring analyzers are already installed for monitoring stack emissions. Apart from own monitoring, external agencies are also employed to conduct stack emission analysis on regular basis as per CPCB guideline.

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4	Quarterly monitoring of fugitive emissions shall be carried out as per the guidelines of CPCB by fugitive emission detectors and reports shall be submitted to the Ministry's regional office at Shillong. For control of fugitive emission all unsaturated hydrocarbon will be routed to the flare system and the flare system shall be designed for smoke less burning.	Quarterly monitoring of fugitive emission (VOC) is being carried out regularly by external agency. The report is submitted regularly to the office of MoEF & CC with six monthly compliance reports. For control of fugitive emissions, dual seals have been installed in all light oil pumps with provision of venting to Flare system. Leak detection and repair (LDAR) report for the Q 3 and Q 4 of FY 2024-25 is attached as **Annexure-6.**
5	Fugitive emissions of HC from product storage tank yards etc must be regularly monitored. Sensors for detecting HC leakage shall also be provided at strategic locations. The company shall use low sulphur fuel to minimize S02 emission.	Fugitive emissions of HC from product storage tank yards etc. are being monitored quarterly by an external agency. HC detectors are already provided at strategic locations at plants and tank farm areas. HC detectors are maintained by the vendors on a quarterly basis. HC detectors also provided at MS Quality up gradation unit. Digboi Refinery uses sweet natural gas with average sulphur content of ~ 2.5 ppm.
6	The company shall strictly follow all the recommendation mentioned In the charter on corporate responsibility for environmental protection (CREP).	The latest compliance status of CREP is enclosed as **Annexure -7.** Also, Digboi Refinery has carried out various CSR activities in and around Digboi with a total CSR budget of Rs 50.20 Cr during last three fiscal years. The major activities include empowering underprivileged young girls by enrolling 60 students each year in Nursing course (BSc & GNM), empowering 45 students from economically underprivileged section with Medical & Engineering coaching, skill development of local women, provision of Drinking water facility in schools, water supply to non IOCL consumers in and around Digboi etc.
7	The Company shall take necessary measures to prevent fire hazards, containing oil spills and soil remediation as needed. At place of ground flaring. The overhead flaring stack with knockout drums shall be installed to minimize gaseous emissions during flaring.	At Digboi Refinery, flaring is done at the height of 108 meters through flare stack. Knockout drums are provided in the flare system Further, modern fire fighting system and hydrant network system has been provided, and it meets OISD – 116 standards. Fire fighting facility at MSQ project is as per OISD-116. Remote HVLR System has been commissioned in October 2013. Installation of Rim Seal Fire Protection System of Fire Water network commissioned for Tank nos. 001, 607, 560 & 452.
8.	To prevent fire and explosion at oil & gas facility, potential ignition should be kept to a minimum and adequate separation distance between potential ignition sources and flammable materials shall be in place.	Separation distance between potential ignition sources and flammable materials are maintained as per OISD – STD-118.

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9.	Occupational Health surveillance of worker shall be done on a regular basis and records maintained as per the Factory Act.	Occupational Health surveillance for employees is being carried out as per Factory Act and records maintained at Occupational Health Centre of AOD hospital.
10.	Green belt shall be developed to mitigate the effect of fugitive emission all around the plant in a minimum 30 % plant area in consultation with DFO and as per CPCB guidelines.	Digboi Refinery is surrounded by the Upper Dehing Reserve Forest on the south and southwest side, which acts as a natural Green Belt. The green belt is developed with regular tree plantation around Refinery premises and township area. Since 2002, Digboi Refinery has planted around 319980 trees till March'2025 in and around Digboi Refinery achieving a green belt coverage of 52.86% of the total IOCL area.
B.	**General Conditions**	
1	The project authorities must strictly adhere to the stipulations made by the concerned State Pollution Control Board (SPCB) and the State Government and any other statuary body.	The stipulations made by the State Govt. and the State Pollution Control Board are strictly followed regarding effluent and emission norms. The existing CTO has been renewed till 31st March 2028. Digboi Refinery meets all parameters of effluent as per revised CPCB guideline.
2	No further expansion or modification in the project shall be carried without prior approval of the Ministry of Environment and Forests. In case of deviations or alterations in the project proposal from those submitted to the Ministry for clearance, a fresh reference shall be made to the Ministry.	**Complied.**
3	At no time, the emissions should go beyond the prescribed standards. In the event of failure of any pollution control system, the respective well site should be immediately put out of operation and should not be restarted until the desired efficiency has been achieved. Provision of adequate height of stack attached to DG sets & flare is to be done.	Stack emission quality data of Sox and NOx are regularly monitored. Apart from own monitoring, external agencies are also employed to conduct stack emission analysis on a regular basis as per CPCB guideline.
4	Wastewater shall be properly collected and treated to conform to the standards prescribed under EP Act & Rules and mentioned in the Consents provided by the relevant SPCB.	Digboi Refinery had installed Effluent Treatment Plant (ETP) in the year 1989, for the treatment of process wastewater generated from various units of the refinery. Digboi Refinery meets all MINAS parameters related to effluent discharge as per revised CPCB guideline and CTO.

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5	The overall noise levels in and around the premises shall be limited within the prescribed standards (75 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels should conform to the standards prescribed under EPA Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).	Acoustic hoods are available all over the refinery and silencers exist in all sensitive parts of the plant where noise is a major concern. Moreover, all vehicle/trucks speed is limited to 20 km/hr inside the refinery, which is also less than 75 DB. Quarterly Noise survey is also being carried out by Occupational Health Centre of AOD hospital.
6	The project authorities must strictly comply with the provisions made in Manufacture, Storage and Import of Hazardous Chemicals Rules 1989 as amended in 2000 for handling of hazardous chemicals etc. Necessary approvals from Chief Controller of Explosives must be obtained before commission of the expansion project, if required, Requisite On-site and Off-site Disaster Management Plans will be prepared and implemented.	Digboi Refinery strictly follows the provisions made in the Manufacture, Storage and Import of Hazardous Chemicals Rules 1989 as amended in 2000 and later for handling of hazardous chemicals. Present PESO License **P/HQ/AS/15/880** is valid till 31.12.2026. Disaster Management Plan duly certified by PNGRB empanelled party. Copy of plan submitted to CIF Guwahati & DC, Tinsukia. Offsite drills are carried out regularly, once a year, along with District Administration, Mutual Aid Partners & NGOs. Onsite Disaster Mock drills are carried out once in a quarter with different scenarios. Emergency response & Disaster Management Plan (ERDMP) of Digboi refinery as per guidelines of PNGRB has been drawn up and certified by **M/S SafeNet Industrial Solution PLL.**
7	Disposal of hazardous wastes shall be as per the Hazardous Wastes. (Management and Handling) Rules, 2003 Authorization from the State Pollution Control Board must be obtained for collections / treatment /storage/disposal of hazardous wastes.	Digboi Refinery has been granted Hazardous Waste Authorization **WB/T-311/21-22/115/101** and is valid till 31-Mar-2027. Digboi Refinery annually files Hazardous Wastes Return to PCBA. Last Annual Hazardous Wastes Return for FY 2024-25 has been duly submitted to Pollution Control Board, Assam on 27.06.2025.

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8	The project authorities will provide adequate funds as nonrecurring and recurring expenditure to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds so provided should not be diverted for any other purposes.	The HSE department is supported with budgetary Allocation. The allocation for the last three years are as follows: ➢ 2020-21: Rs 7.74 Cr. ➢ 2021-22: Rs 7.78 Cr. ➢ 2022-23: Rs 8.83 Cr. ➢ 2023-24: Rs. 3.51 Cr. ➢ 2024-25: Rs. 2.59 Cr.
9	The company shall develop rainwater harvesting structures to harvest the runoff water for recharge of ground water.	Storage Cum Percolation Pond (SCP) was commissioned in 2018 utilizing run-off water of 9 interlinked natural catchment areas around Digboi, first of its type in eastern Asia. The usage of rainwater has proven to be very cost effective and environmentally friendly to increase the water table in the Digboi area. During FY 2024-25, 47.6 % of industrial water requirements were met through harvested rainwater as Cooling Tower Make up, feed to DM plant, Service water and fire water make up. During October '2024 to April' 2025, usage of harvested rainwater was 23.22 % of total refinery industrial water requirement.
10	The stipulated conditions will be monitored by the concerned Regional Office of this Ministry /Central Pollution Control Board/State Pollution Control Board. A six-monthly compliance report and the monitored data should be submitted to them regularly. It will also be displayed on the Website of the Company	Six-monthly EC compliance reports are duly submitted to IRO Guwahati. Last Report Submitted on 18 October 2024. Previous EC compliance reports of Digboi Refinery are uploaded on Indian Oil website. Link to the website is below. https://iocl.com/statutory-notices
11	The Project Proponent should inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the State Pollution Control Board/ Committee and may also be seen at Website of the Ministry of Environment and Forests at http://www.envfor.nic.in This should be advertised within seven days from the date of issue of the clearance letter at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the concerned Regional office of this Ministry	The advertisement in local newspapers was published.

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12	A separate environment management cell with fully fledged laboratory facilities to carry out various management and monitoring functions shall be set up under the control of a Senior Executive.	Digboi Refinery has a full-fledged Health, Safety and Environment (HSE) unit functioning under Chief General Manager with direct reporting to Head of Organization.HSE Department team consists of General Manager, Chief Manager, Two Senior Managers and one Officer. The HSE team regularly monitors and reviews the effectiveness of the EMP implementation.
13	The project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of the project.	All the formalities for closure of project have been completed and project capitalized on 28.12.2010

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ENVIRONMENTAL CLEARANCE (J-11011/482/2007-IA II (I) dated 01-01-2024) FOR Capacity Augmentation of Digboi Refinery to 1 MMTPA

A	Specific Conditions	
SL. NO	STIPULATIONS	COMPLIANCE STATUS AS ON 31.03.2025
1	Environmental clearance is subject to obtaining prior clearance from the wildlife angle, including clearance from the Standing Committee of the National Board for Wildlife, as applicable, as per the Ministry's OM dated 8th August, 2019. Grant of environmental clearance does not necessarily imply that Wildlife Clearance shall be granted to the project and that their proposal for Wildlife Clearance will be considered by the respective authorities on its merit and decision taken. PP shall also strictly follow the conditions mentioned in existing NBWL clearance.	NBWL Minutes was issued on 26.06.25 recommending the project with 4 conditions. Letter from PCCF to DR issued on 11.07.2025 with decision taken and conditions to be complied. Refinery submitted the compliance report to PCCF (Wildlife) & CWW, Assam on 16.07.2025 **(Enclosed as Annexure -8)**
2	The project proponent shall prepare a site-specific conservation plan and wildlife management plan in case of the presence of Schedule-1 species in the study area, as applicable to the project, and submit it to Chief Wildlife Warden for approval. The recommendations shall be implemented in consultation with the State Forest/Wildlife Department in a time bound manner.	Site specific conservation plan and wildlife management plan have been prepared and submitted to DFO, Digboi on 14.03.2023 for onward forwarding to Chief Wildlife Warden. DFO forwarded the same to PCCF vide letter dated 10.05.2023. **(Enclosed as Annexure -9)**
3	The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.	Actions being initiated for strictly complying EIA/EMP and risk mitigation measures during designing & construction phase of Digboi Refinery Capacity Augmentation project to 1 MMTPA.
4	The effluent generation post expansion of the refinery shall not exceed 2352 m3/day which will be treated through Effluent Treatment Plant which shall be re-used inside refinery.	The effluent generation post expansion of the refinery has been considered within 2352 m3/day during engineering and shall be complied with post commissioning of the project. Treated effluent from ETP shall be recycled to refinery

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		as make up for Fire water tank, Coke Cutting water at delayed coking unit, Wax Sector Cooling Tower, cleaning and gardening purposes.
5	The National Emission Standards for Petroleum Oil Refinery issued by the Ministry vide G.S.R. 186(E) dated 18th March, 2008 and G.S.R.595(E) dated 21st August, 2009 as amended from time to time, shall be followed.	Shall be complied
6	Volatile organic compounds (VOCs)/Fugitive emissions shall be controlled at 99.997% with effective chillers/modern technology. For emission control and management, use of FG/NG in heater as fuel, adequate stack height, use of Low NOX burners in heater & boiler, continuous stack monitoring, Sulphur recovery plant, etc. shall be installed/ensured.	Project has been conceived for implementation with state-of-the-art technology with equipment to ensure negligible VOC emission to comply EC norm. Currently Digboi refinery doesn't use any liquid fuel and Natural Gas & Fuel Gas (FG) is being used. No Liquid fuel burning has been considered under DR 1.0 project. Use of Low Nox burner, adequate stack height etc. has been considered in the engineering design. Currently, quarterly monitoring of fugitive emission (VOC) is being carried out regularly by CPB/MoEFCC approved external agency and shall also be continued post DR 1.0 project commissioning.
7	As proposed, the total SOx emission form post project shall not exceed 16.61 kg/hr (i.e. 0.398 TPD).	SOx emission from Stack shall be maintained within stipulated limit.
8.	All the commitments made to the public during public hearing/public consultation meeting held on 04.03.2023 shall be satisfactorily implemented and adequate budget provision shall be made accordingly.	DR has allocated Rs. 5.0 Crores towards Extended EMP (CER) which shall be spent as submitted in CER plan by involving local villages and administration. All the activities under CER shall be completed before the commissioning of the plant.

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9.	Total freshwater requirement after proposed expansion shall not exceed 13032 KLPD which will be met from the existing pumping station at Nazirating. Necessary permission in this regard shall be obtained from the concerned regulatory authority.	No Objection Certificate to withdraw 14400 KLPD is obtained vide letter no. EE/WRD/DBR/2022-23/D-3/Pt IV/790 dated 15/03/2023 from Dibrugarh Water Resource Division. Total freshwater requirements shall be ensured within 13032 KLPD.
10.	The additional effluent generation shall not exceed 8 m3/hr from the proposed expansion i.e. the refinery (including DM Plant regeneration wastewater, process units, Cooling towers blowdown), which will be treated in the existing Effluent Treatment Plant (ETP). The existing ETP capacity is 375 m3/hr with present load of 90 m3/hr from refinery.	The present ETP load is around 90 m3/hr. & post DR 1.0 additional load is considered within 8 m3/hr.
11	Process effluent/any wastewater shall not be allowed to mix with storm water. Storm water drain shall be passed through guard pond.	Process and storm drains are separate systems and not allowed to mix. All process effluent is routed to ETP. Strom water channel is provided with hay filter and Oil boom to catch any accidental oil spillage prior to routing to Digboi Nallah.
12	Hazardous chemicals shall be stored in tanks, tank farms, drums, carboys etc. Flame arresters shall be provided on tank farm, and solvent transfer to be done through pumps.	All hazardous chemicals shall be stored in tanks & drums. All solvent & chemical transfer shall be done through pumps, and manual transfer shall be avoided. Flare arrestor in tank farm shall be provided as per safe engineering practice.
13	Process organic residue and spent carbon, if any, shall be sent to cement industries. ETP sludge, process inorganic & evaporation salt shall be disposed off to the TSDF.	Process organic residues (ETP Bio sludge) are allowed to dry and weather in sludge drying beds at ETP. Bio-sludge is then transferred to secured land fill for bioremediation. After completion, the same is disposed of in the low lying non crop area . No evaporation salt is generated from ETP.

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14	The company shall undertake waste minimization measures as below: Metering and control of quantities of active ingredients to minimize waste. Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. Use of automated filling to minimize spillage. Use of Close Feed system into batch reactors. Venting equipment through vapour recovery system. Use of high pressure hoses for equipment clearing to reduce wastewater generation.	Slop oil generated if any is reprocessed as per prevailing practice. The process handles close loop systems without any provision for manual filling. Venting of equipment's through FG header/Flare has been considered. Use of high-pressure hoses for equipment cleaning (e.g exchanger) shall be ensured.
15	The green belt of 5-10 m width shall be developed in the total project area, mainly along the plant periphery, in downward wind direction, and along road sides etc. The project proponent shall ensure 33% greenbelt area vis-à-vis the project area through afforestation in the degraded area. The Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department	Green belt developed with regular tree plantation around Refinery premises and township area. Currently, Digboi refinery has 52.8 % greenbelt covers of the total refinery area and already achieved min. 33% greenbelt areas as per guidelines prescribed by MoEFCC. Digboi Refinery planted total 1,44,881 trees during FY 24-25 (till 31st March') through Miyawaki Methodology besides 1,75,099 trees from 2002-2024.
16	PP proposed to allocate Rs. 5.0 Crores towards Extended EMP (CER) which shall be spent as submitted in CER plan. Further, all the proposed activities under CER shall be completed before the commissioning of the plant in consultation with District Administration.	Digboi Refinery has allocated 5.0 Crore towards extended EMP as per the proposed activities mentioned in the EIA report. Accordingly, preliminary activities have been started, and all the CER recommendations shall be completed before the commissioning of the plant.
17	For the DG sets, emission limits and the stack height shall be in conformity with the extant regulations and the CPCB guidelines. Acoustic enclosure shall be provided to DG set for controlling the noise pollution.	Shall be complied

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18	The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.	A comprehensive Fire protection system shall be installed and activated prior to commissioning of new facilities under DR 1.0 project. The same shall also be vetted through external audit like OISD & PESO.
19	Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises. In case of the treated effluent to be utilized for irrigation/gardening, real time monitoring system shall be installed at the ETP outlet.	Online connectivity established with CPCB Server and PCBA for Furnaces having heat capacity of more than 10mkcal/hr (HGU & HRSG's Stacks) ETP is already installed with real time analyzers (pH, COD, BOD, TSS) and connected to CPCB and PCBA server. Further online Oil & Grease analyser shall be installed by Mar'2026 at ETP effluent line. Installation of web camera with night vision capability in the channel/drain carrying effluent within the premises has been installed to monitor at 6 locations.
20	PP shall allocate at least Rs. 0.5 Crore/annum for Occupational Health Safety. Occupational health surveillance of the workers shall be done on a regular basis and records maintained as per the Factories Act.	PME and WPME are being carried out as per Factories Act with. Budged provision of 0.5 Crore/Annum for Occupational Health Safety shall be ensured.
21	Process safety and risk assessment studies shall be further carried out using advanced models, and the mitigating measures shall be undertaken/implemented accordingly.	RRA study of DR 1.0 project has been carried out using PHAST by M/s EIL. All the RRA recommendations shall be considered and ensured implementation during DR 1.0 Project implementation along with HAZOP recommendations. The latest QRA study with all

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		existing DR units and including facilities for capacity augmentation of Digboi refinery to 1 MMTPA was carried out by M/s Techniche Engineering Private Limited, Pune in the month of June'25.
22	The PP should improve the efficiency of ETP Plant and the water discharge should be as per prescribed CPCB Norms. They should also install 24x7 hours monitoring system (of the discharge) and the same should be connected to the server of SCPB/CPCB.	ETP is already installed with real time analyzers (pH, COD, BOD, TSS) and connected to CPCB and PCBA server. Further online Oil & Grease analyser shall be installed before commissioning by March'26 at ETP effluent line. The effluent quality meets all the MINAS standard.
23	PP shall sensitize and create awareness among the people working within the project area as well as its surrounding area on the ban of Single Use Plastic in order to ensure the compliance of Notification published by MOEFCC on 12th August, 2021. A report along with photographs on the measures taken shall also be included in the six-monthly compliance report being submitted to concerned authority.	Under Mission LIFE campaign, awareness regarding ban of Single Use Plastic is already being carried out through distribution of leaflets, display of banners and posters and conducting Nukkad natak etc. World Environment Day 2025 was also observed at DR with various awareness programs and campaigns like waste segregation, carrying jute bags to market to avoid use of plastic bags etc.
B.	**General Conditions**	
1	No further expansion or modifications in the plant, other than mentioned in the EIA Notification, 2006 and its amendments, shall be carried out without prior approval of the Ministry of Environment, Forest and Climate Change/SEIAA, as applicable. In case of deviations or alterations in the project proposal from those submitted to this Ministry for clearance, a fresh reference shall be made to the Ministry/SEIAA, as applicable, to assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any.	**Shall be complied**
2	The energy source for lighting purpose shall be preferably LED based, or advanced having preference in energy conservation and environment betterment.	LED based lighting is only used for lighting purpose

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3	The overall noise levels in and around the plant area shall be kept well within the standards by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform to the standards prescribed under the Environment (Protection) Act, 1986 Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).	Acoustic hoods are available all over the refinery and silencers exist in all sensitive parts of the plant where noise is a major concern. Moreover, all vehicle/trucks speed is limited to 20 km/hr inside the refinery. The ambient noise levels conform to the standards prescribed under the Environment (Protection) Act, 1986 Rules, 1989 viz. 75 dBA (daytime and 70 dBA (nighttime). A quarterly Noise survey is carried out by the Occupational Health Centre of Digboi Refinery hospital.
4	The company shall undertake all relevant measures for improving the socio-economic conditions of the surrounding area. CER activities shall be undertaken by involving local villages and administration and shall be implemented. The company shall undertake eco-developmental measures including community welfare measures in the project area for the overall improvement of the environment.	DR has allocated Rs. 5.0 Crores towards Extended EMP (CER) which shall be spent as submitted in CER plan by involving local villages and administration. Actions have been already initiated and planned for compliance prior to commissioning of DR 1.0 project facilities.
5	The company shall earmark sufficient funds towards capital cost and recurring cost per annum to implement the conditions stipulated by the Ministry of Environment, Forest and Climate Change as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds so earmarked for environment management/ pollution control measures shall not be diverted for any other purpose.	Shall be complied & ensured.
6	A copy of the clearance letter shall be sent by the project proponent to concerned Panchayat, Zilla Parishad/Municipal Corporation, Urban local Body and the local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal.	Complied (No such suggestion / representations received from any bodies)
7	The project proponent shall also submit six monthly reports on the status of compliance of the stipulated Environmental Clearance conditions including results of monitored data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF&CC, the respective Zonal Office of CPCB and SPCB. A copy of Environmental Clearance and six monthly compliance status report shall be posted on the website of the company.	Shall be complied with current practice.

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8	The environmental statement for each financial year ending 31st March in Form-V as is mandated shall be submitted to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the respective Regional Offices of MoEF&CC by e-mail.	Shall be complied with current practice.
9	The project proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the SPCB/Committee and may also be seen at Website of the Ministry and at https://parivesh.nic.in/. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same shall be forwarded to the concerned Regional Office of the Ministry.	Complied **Attached As Annexure 10**
10	The project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of the project.	Shall be ensured & complied
11	This Environmental clearance is granted subject to final outcome of Hon'ble Supreme Court of India, Hon'ble High Court, Hon'ble NGT and any other Court of Law, if any, as may be applicable to this project.	Shall be ensured & complied

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
AOD, Digboi, Dist. Tinsukia, Assam, INDIA

Test Report No. : 202410010110
Test Report Date: 11/10/2024

Annexure -1

Sample Particulars

Nature of the Sample	:	**Treated Effluent**
Sample Quantity & Packaging	:	1 L HDPE Can+150 ml Sterile Container
Sample Received at Lab	:	05/10/2024
Test Started On	:	05/10/2024
Test Completed On	:	10/10/2024
Method of Sampling	:	SOP/B/D-3
Date of Sampling	:	01/10/2024
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Location	:	ETP Polishing Pond-Outlet

Test Report

Sr. No.	Parameter	Unit	Result	Permissible Limit	Protocol
1	pH	...	7.72	6.0-8.5	IS:3025 (P-11)
2	Total Suspended Solids (TSS)	mg/L	18	20	IS:3025 (P-17)
3	Oil & Grease (O&G)	mg/L	ND	5	IS:3025 (P-39)
4	Bio-Chemical Oxygen Demand (3 days at 27°C) (BOD)	mg/L	14	15	IS:3025 (P-44)
5	COD	mg/L	80	125	IS:3025 (P-58)
6	Ammonical Nitrogen	mg/L	0.60	15	IS:3025 (P-34)
7	Total Kjeldhal Nitrogen	mg/L	1.12	40	IS:3025 (P-34)
8	Lead as Pb	mg/L	ND	0.1	APHA 23rd Ed.
9	Chromium Hexavalent as Cr^{+6}	mg/L	ND	0.1	APHA 23rd Ed.
10	Chromium as Cr	mg/L	ND	2.0	APHA 23rd Ed.
11	Copper as Cu	mg/L	ND	1.0	APHA 23rd Ed.
12	Zinc as Zn	mg/L	0.24	5.0	APHA 23rd Ed.
13	Sulphide as S^{2-}	mg/L	ND	0.5	IS:3025 (P-29)
14	Mercury as Hg	mg/L	ND	0.01	APHA 23rd Ed.
15	Phenolic Compounds(C_6H_5OH)	mg/L	ND	0.35	IS:3025 (P-43)
16	Nickel as Ni	mg/L	ND	1.0	APHA 23rd Ed.

Remark:
ND-Not Detected

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(AUTHORISED SIGNATORY)
(RAVINDER MITTAL)

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info@nityalab.com www.nityalab.com

Test Report

issued To **M/s Indian Oil Corporation Limited**
Bongaigaon Refinery
Distt. Chirang-783 380, Assam, India

Test Report No. : 202410010110
Test Report Date: 11/10/2024

Sample Particulars

Nature of the Sample	:	**Treated Effluent**
Sample Quantity & Packaging	:	1 L HDPE Can+150 ml Sterile Container
Sample Received at Lab	:	05/10/2024
Test Started On	:	05/10/2024
Test Completed On	:	10/10/2024
Method of Sampling	:	SOP/B/D-3
Date of Sampling	:	01/10/2024
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Location	:	ETP Polishing Pond-Outlet

Test Report

Sr. No.	Parameter	Unit	Result	Permissible Limit	Protocol
1	Cyanide as CN	mg/L	ND	0.2	IS:3025 (P-27)
2	Total Phosphorous as P	mg/L	0.74	3.0	IS:3025 (P-31)
3	Vanadium as V	mg/L	ND	0.2	IS:3025 (P-56)
4	Benzene	mg/L	ND	0.1	USEPA-8270C
5	Benzo (a) pyrene	mg/L	ND	0.2	USEPA-8270C

Remark:
ND-Not Detected

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(AUTHORISED SIGNATORY)
(RAVINDER MITTAL)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
AOD, Digboi, Dist. Tinsukia, Assam, INDIA

ULR No. : TC148142400000104F
Test Report Date: 16/11/2024

Sample Particulars

Nature of the Sample	:	**Treated Effluent**
Sample Quantity & Packaging	:	1 L HDPE Can+150 ml Sterile Container
Sample Received at Lab	:	09/11/2024
Test Started On	:	09/11/2024
Test Completed On	:	15/11/2024
Method of Sampling	:	SOP/B/D-3
Date of Sampling	:	04/11/2024
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Location	:	ETP Polishing Pond-Outlet

Test Report

Sr. No.	Parameter	Unit	Result	Permissible Limit	Protocol
1	pH	...	7.57	6.0-8.5	IS:3025 (P-11)
2	Total Suspended Solids (TSS)	mg/L	18	20	IS:3025 (P-17)
3	Oil & Grease (O&G)	mg/L	ND	5	IS:3025 (P-39)
4	Bio-Chemical Oxygen Demand (3 days at 27°C) (BOD)	mg/L	13	15	IS:3025 (P-44)
5	COD	mg/L	72	125	IS:3025 (P-58)
6	Ammonical Nitrogen	mg/L	ND	15	IS:3025 (P-34)
7	Total Kjeldhal Nitrogen	mg/L	ND	40	IS:3025 (P-34)
8	Lead as Pb	mg/L	ND	0.1	APHA 23rd Ed.
9	Chromium Hexavalent as Cr^{+6}	mg/L	ND	0.1	APHA 23rd Ed.
10	Chromium as Cr	mg/L	ND	2.0	APHA 23rd Ed.
11	Copper as Cu	mg/L	ND	1.0	APHA 23rd Ed.
12	Zinc as Zn	mg/L	ND	5.0	APHA 23rd Ed.
13	Sulphide as S^{2-}	mg/L	ND	0.5	IS:3025 (P-29)
14	Mercury as Hg	mg/L	ND	0.01	APHA 23rd Ed.
15	Phenolic Compounds(C_6H_5OH)	mg/L	ND	0.35	IS:3025 (P-43)
16	Nickel as Ni	mg/L	ND	1.0	APHA 23rd Ed.

Remark:
ND-Not Detected

TC-14814

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
Bongaigaon Refinery
Distt. Chirang-783 380, Assam, India

Test Report No. : 202411040114
Test Report Date: 16/11/2024

Sample Particulars

Nature of the Sample	:	**Treated Effluent**
Sample Quantity & Packaging	:	1 L HDPE Can+150 ml Sterile Container
Sample Received at Lab	:	09/11/2024
Test Started On	:	09/11/2024
Test Completed On	:	15/11/2024
Method of Sampling	:	SOP/B/D-3
Date of Sampling	:	04/11/2024
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Location	:	ETP Polishing Pond-Outlet

Test Report

Sr. No.	Parameter	Unit	Result	Permissible Limit	Protocol
1	Cyanide as CN	mg/L	ND	0.2	IS:3025 (P-27)
2	Total Phosphorous as P	mg/L	0.84	3.0	IS:3025 (P-31)
3	Vanadium as V	mg/L	ND	0.2	IS:3025 (P-56)
4	Benzene	mg/L	ND	0.1	USEPA-8270C
5	Benzo (a) pyrene	mg/L	ND	0.2	USEPA-8270C

Remark:
ND-Not Detected

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(RAVINDER MITTAL)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
AOD, Digboi, Dist. Tinsukia, Assam, INDIA

ULR No. : TC148142400000704F
Test Report Date: 16/12/2024

Sample Particulars

Nature of the Sample	:	**Treated Effluent**
Sample Quantity & Packaging	:	1 L HDPE Can+150 ml Sterile Container
Sample Received at Lab	:	09/12/2024
Test Started On	:	09/12/2024
Test Completed On	:	15/12/2024
Method of Sampling	:	SOP/B/D-3
Date of Sampling	:	04/12/2024
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Location	:	ETP Polishing Pond-Outlet

Test Report

Sr. No.	Parameter	Unit	Result	Permissible Limit	Protocol
1	pH	...	7.59	6.0-8.5	IS:3025 (P-11)
2	Total Suspended Solids (TSS)	mg/L	12	20	IS:3025 (P-17)
3	Oil & Grease (O&G)	mg/L	2	5	IS:3025 (P-39)
4	Bio-Chemical Oxygen Demand (3 days at 27°C) (BOD)	mg/L	13	15	IS:3025 (P-44)
5	COD	mg/L	74	125	IS:3025 (P-58)
6	Ammonical Nitrogen	mg/L	0.66	15	IS:3025 (P-34)
7	Total Kjeldhal Nitrogen	mg/L	1.00	40	IS:3025 (P-34)
8	Lead as Pb	mg/L	ND [DL-0.01]	2	APHA 23rd Ed.
9	Chromium Hexavalent as Cr^{+6}	mg/L	ND [DL-0.1]	0.1	APHA 23rd Ed.
10	Chromium as Cr	mg/L	ND [DL-0.05]	2.0	APHA 23rd Ed.
11	Copper as Cu	mg/L	0.10	1.0	APHA 23rd Ed.
12	Zinc as Zn	mg/L	ND [DL-0.05]	5.0	APHA 23rd Ed.
13	Sulphide as S^{2-}	mg/L	ND [DL-0.05]	2.0	IS:3025 (P-29)
14	Mercury as Hg	mg/L	ND [DL-0.05]	0.01	APHA 23rd Ed.
15	Phenolic Compounds(C_6H_5OH)	mg/L	ND [DL-1]	0.35	IS:3025 (P-43)
16	Nickel as Ni	mg/L	ND [DL-0.1]	1.0	APHA 23rd Ed.

Remark:
ND-Not Detected

TC-14814

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
AOD, Digboi, Dist. Tinsukia, Assam, INDIA

Test Report No. : 202412040110
Test Report Date: 16/12/2024

Sample Particulars

Nature of the Sample	:	**Treated Effluent**
Sample Quantity & Packaging	:	1 L HDPE Can+150 ml Sterile Container
Sample Received at Lab	:	09/12/2024
Test Started On	:	09/12/2024
Test Completed On	:	15/12/2024
Method of Sampling	:	SOP/B/D-3
Date of Sampling	:	04/12/2024
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Location	:	ETP Polishing Pond-Outlet

Test Report

Sr. No.	Parameter	Unit	Result	Permissible Limit	Protocol
1	Cyanide as CN	mg/L	ND [DL-0.01]	0.2	IS:3025 (P-27)
2	Total Phosphorous as P	mg/L	0.49	3	IS:3025 (P-31)
3	Vanadium as V	mg/L	ND [DL-0.01]	0.1	IS:3025 (P-56)
4	Benzene	mg/L	ND [DL-0.0001]	0.1	USEPA-8270C
5	Benzo (a) pyrene	mg/L	ND [DL-0.0001]	0.2	USEPA-8270C

Remark:
ND-Not Detected

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
AOD, Digboi, Dist. Tinsukia, Assam, INDIA

ULR No. : TC148142500000055F
Test Report Date: 15/01/2025

Sample Particulars

Nature of the Sample	:	**Treated Effluent**
Sample Quantity & Packaging	:	1 L HDPE Can+150 ml Sterile Container
Sample Received at Lab	:	08/01/2025
Test Started On	:	08/01/2025
Test Completed On	:	14/01/2025
Method of Sampling	:	SOP/B/D-3
Date of Sampling	:	04/01/2025
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Location	:	ETP Polishing Pond-Outlet

Test Report

Sr. No.	Parameter	Unit	Result	Permissible Limit	Protocol
1	pH	...	7.45	6.0-8.5	IS:3025 (P-11)
2	Total Suspended Solids (TSS)	mg/L	15	20	IS:3025 (P-17)
3	Oil & Grease (O&G)	mg/L	2	5	IS:3025 (P-39)
4	Bio-Chemical Oxygen Demand (3 days at 27°C) (BOD)	mg/L	12	15	IS:3025 (P-44)
5	COD	mg/L	60	125	IS:3025 (P-58)
6	Ammonical Nitrogen	mg/L	0.28	15	IS:3025 (P-34)
7	Total Kjeldhal Nitrogen	mg/L	0.84	40	IS:3025 (P-34)
8	Lead as Pb	mg/L	ND [DL-0.01]	2	APHA 23rd Ed.
9	Chromium Hexavalent as Cr^{+6}	mg/L	ND [DL-0.1]	0.1	APHA 23rd Ed.
10	Chromium as Cr	mg/L	ND [DL-0.05]	2.0	APHA 23rd Ed.
11	Copper as Cu	mg/L	0.05	1.0	APHA 23rd Ed.
12	Zinc as Zn	mg/L	0.22	5.0	APHA 23rd Ed.
13	Sulphide as S^{2-}	mg/L	ND [DL-0.05]	2.0	IS:3025 (P-29)
14	Mercury as Hg	mg/L	ND [DL-0.05]	0.01	APHA 23rd Ed.
15	Phenolic Compounds(C_6H_5OH)	mg/L	ND [DL-1]	0.35	IS:3025 (P-43)
16	Nickel as Ni	mg/L	ND [DL-0.1]	1.0	APHA 23rd Ed.

Remark:
ND-Not Detected

TC-14814

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
Bongaigaon Refinery
Distt. Chirang-783 380, Assam, India

Test Report No. : 202501040110
Test Report Date: 15/01/2025

Sample Particulars

Nature of the Sample	:	**Treated Effluent**
Sample Quantity & Packaging	:	1 L HDPE Can+150 ml Sterile Container
Sample Received at Lab	:	08/01/2025
Test Started On	:	08/01/2025
Test Completed On	:	14/01/2025
Method of Sampling	:	SOP/B/D-3
Date of Sampling	:	04/01/2025
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Location	:	ETP Polishing Pond-Outlet

Test Report

Sr. No.	Parameter	Unit	Result	Permissible Limit	Protocol
1	Cyanide as CN	mg/L	ND [DL-0.01]	0.2	IS:3025 (P-27)
2	Total Phosphorous as P	mg/L	0.34	3	IS:3025 (P-31)
3	Vanadium as V	mg/L	ND [DL-0.01]	0.1	IS:3025 (P-56)
4	Benzene	mg/L	ND [DL-0.0001]	0.1	USEPA-8270C
5	Benzo (a) pyrene	mg/L	ND [DL-0.0001]	0.2	USEPA-8270C

Remark:
ND-Not Detected

(AUTHORISED SIGNATORY)

(RAVINDER MITTAL)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
AOD, Digboi, Dist. Tinsukia, Assam, INDIA

ULR No. : TC148142500000562F
Test Report Date: 13/02/2025

Sample Particulars

Nature of the Sample	:	**Treated Effluent**
Sample Quantity & Packaging	:	1 L HDPE Can+150 ml Sterile Container
Sample Received at Lab	:	06/02/2025
Test Started On	:	06/02/2025
Test Completed On	:	12/02/2025
Method of Sampling	:	SOP/B/D-3
Date of Sampling	:	03/02/2025
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Location	:	ETP Polishing Pond-Outlet

Test Report

Sr. No.	Parameter	Unit	Result	Permissible Limit	Protocol
1	pH	...	7.62	6.0-8.5	IS:3025 (P-11)
2	Total Suspended Solids (TSS)	mg/L	6	20	IS:3025 (P-17)
3	Oil & Grease (O&G)	mg/L	4	5	IS:3025 (P-39)
4	Bio-Chemical Oxygen Demand (3 days at 27°C) (BOD)	mg/L	12	15	IS:3025 (P-44)
5	COD	mg/L	76	125	IS:3025 (P-58)
6	Ammonical Nitrogen	mg/L	0.64	15	IS:3025 (P-34)
7	Total Kjeldhal Nitrogen	mg/L	1.06	40	IS:3025 (P-34)
8	Lead as Pb	mg/L	ND [DL-0.01]	2	APHA 23rd Ed.
9	Chromium Hexavalent as Cr^{+6}	mg/L	ND [DL-0.1]	0.1	APHA 23rd Ed.
10	Chromium as Cr	mg/L	ND [DL-0.05]	2.0	APHA 23rd Ed.
11	Copper as Cu	mg/L	0.05	1.0	APHA 23rd Ed.
12	Zinc as Zn	mg/L	ND [DL-0.05]	5.0	APHA 23rd Ed.
13	Sulphide as S^{2-}	mg/L	ND [DL-0.05]	2.0	IS:3025 (P-29)
14	Mercury as Hg	mg/L	ND [DL-0.05]	0.01	APHA 23rd Ed.
15	Phenolic Compounds(C_6H_5OH)	mg/L	ND [DL-1]	0.35	IS:3025 (P-43)
16	Nickel as Ni	mg/L	ND [DL-0.1]	1.0	APHA 23rd Ed.

Remark:
ND-Not Detected

TC-14814

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
AOD, Digboi, Dist. Tinsukia, Assam, INDIA

Test Report No. : 202502030110
Test Report Date: 13/02/2025

Sample Particulars

Nature of the Sample	:	**Treated Effluent**
Sample Quantity & Packaging	:	1 L HDPE Can+150 ml Sterile Container
Sample Received at Lab	:	06/02/2025
Test Started On	:	06/02/2025
Test Completed On	:	12/02/2025
Method of Sampling	:	SOP/B/D-3
Date of Sampling	:	03/02/2025
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Location	:	ETP Polishing Pond-Outlet

Test Report

Sr. No.	Parameter	Unit	Result	Permissible Limit	Protocol
1	Cyanide as CN	mg/L	ND [DL-0.01]	0.2	IS:3025 (P-27)
2	Total Phosphorous as P	mg/L	0.49	3	IS:3025 (P-31)
3	Vanadium as V	mg/L	ND [DL-0.01]	0.1	IS:3025 (P-56)
4	Benzene	mg/L	ND [DL-0.0001]	0.1	USEPA-8270C
5	Benzo (a) pyrene	mg/L	ND [DL-0.0001]	0.2	USEPA-8270C

Remark:
ND-Not Detected

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
AOD, Digboi, Dist. Tinsukia, Assam, INDIA

ULR No. : TC148142500001286F
Test Report Date: 14/03/2025

Sample Particulars

Nature of the Sample	:	**Treated Effluent**
Sample Quantity & Packaging	:	1 L HDPE Can+150 ml Sterile Container
Sample Received at Lab	:	07/03/2025
Test Started On	:	07/03/2025
Test Completed On	:	13/03/2025
Method of Sampling	:	SOP/B/D-3
Date of Sampling	:	03/03/2025
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Location	:	ETP Polishing Pond-Outlet

Test Report

Sr. No.	Parameter	Unit	Result	Permissible Limit	Protocol
1	pH	...	7.68	6.0-8.5	IS:3025 (P-11)
2	Total Suspended Solids (TSS)	mg/L	16	20	IS:3025 (P-17)
3	Oil & Grease (O&G)	mg/L	ND	5	IS:3025 (P-39)
4	Bio-Chemical Oxygen Demand (3 days at 27°C) (BOD)	mg/L	13	15	IS:3025 (P-44)
5	COD	mg/L	70	125	IS:3025 (P-58)
6	Ammonical Nitrogen	mg/L	0.60	15	IS:3025 (P-34)
7	Total Kjeldhal Nitrogen	mg/L	1.00	40	IS:3025 (P-34)
8	Lead as Pb	mg/L	ND [DL-0.01]	2	APHA 23rd Ed.
9	Chromium Hexavalent as Cr^{+6}	mg/L	ND [DL-0.1]	0.1	APHA 23rd Ed.
10	Chromium as Cr	mg/L	ND [DL-0.05]	2.0	APHA 23rd Ed.
11	Copper as Cu	mg/L	0.12	1.0	APHA 23rd Ed.
12	Zinc as Zn	mg/L	ND [DL-0.05]	5.0	APHA 23rd Ed.
13	Sulphide as S^{2-}	mg/L	ND [DL-0.05]	2.0	IS:3025 (P-29)
14	Mercury as Hg	mg/L	ND [DL-0.05]	0.01	APHA 23rd Ed.
15	Phenolic Compounds(C_6H_5OH)	mg/L	ND [DL-1]	0.35	IS:3025 (P-43)
16	Nickel as Ni	mg/L	ND [DL-0.1]	1.0	APHA 23rd Ed.

Remark:
ND-Not Detected

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
AOD, Digboi, Dist. Tinsukia, Assam, INDIA

Test Report No. : 202503030110
Test Report Date: 14/03/2025

Sample Particulars

Nature of the Sample	:	**Treated Effluent**
Sample Quantity & Packaging	:	1 L HDPE Can+150 ml Sterile Container
Sample Received at Lab	:	07/03/2025
Test Started On	:	07/03/2025
Test Completed On	:	13/03/2025
Method of Sampling	:	SOP/B/D-3
Date of Sampling	:	03/03/2025
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Location	:	ETP Polishing Pond-Outlet

Test Report

Sr. No.	Parameter	Unit	Result	Permissible Limit	Protocol
1	Cyanide as CN	mg/L	ND [DL-0.01]	0.2	IS:3025 (P-27)
2	Total Phosphorous as P	mg/L	0.62	3	IS:3025 (P-31)
3	Vanadium as V	mg/L	ND [DL-0.01]	0.1	IS:3025 (P-56)
4	Benzene	mg/L	ND [DL-0.0001]	0.1	USEPA-8270C
5	Benzo (a) pyrene	mg/L	ND [DL-0.0001]	0.2	USEPA-8270C

Remark:
ND-Not Detected

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Annexure-1

Effluent Parameters Test Report								
From October 2024 to April,2025 (IOCL -Digboi Refinery Lab)								
Parameters	Limits	October	November	December	January	February	March	Average
pH	6.0 - 8.5	**6.60**	**6.40**	**6.50**	**6.40**	**6.60**	**6.80**	6.550
Oil & Grease	5.0	**3.90**	**3.70**	**3.70**	**3.10**	**4.02**	**3.70**	3.687
BOD	15.0	**9.45**	**9.56**	**10.15**	**9.00**	**9.87**	**9.00**	9.505
COD	125.0	**66.18**	**63.94**	**68.70**	**60.00**	**67.60**	**64.00**	65.070
TSS	20.0	**15.36**	**14.75**	**15.73**	**13.00**	**15.07**	**14.00**	14.652
Phenols	0.35	**0.26**	**0.23**	**0.24**	**0.21**	**0.26**	**0.20**	0.233
Sulphides	0.5	**0.11**	**0.10**	**0.11**	**0.08**	**0.13**	**0.09**	0.102
CN	0.20	**0.010**	**0.012**	**0.012**	**0.012**	**0.01**	**0.01**	0.012
From October 2024 to April 2025 (Source-External Agency)								
Parameters	**Limits**	October	November	December	January	February	March	**Average**
pH	6.0 - 8.5	7.72	7.57	7.59	7.45	7.62	7.68	7.582
Oil & Grease	5.0	ND	ND	2.00	2.00	4.00	ND	2.667
BOD	15.0	14.00	13.00	13.00	12.00	12.00	13.00	12.600
COD	125.0	80.00	72.00	74.00	60.00	76.00	70.00	70.400
TSS	20.0	18.00	18.00	12.00	15.00	6.00	16.00	13.400
Phenols	0.35	ND	ND	ND	ND	ND	ND	#DIV/0!
Sulphides	0.5	ND	ND	ND	ND	ND	ND	#DIV/0!
CN	0.20	ND	ND	ND	ND	ND	ND	#DIV/0!
Ammonia as N	15.0	0.60	ND	0.66	0.28	0.64	0.60	0.545
TKN	40.0	12.00	ND	1.00	0.84	1.06	1.00	0.975
P	3.0	0.74	0.84	0.49	0.34	0.49	0.62	0.556
Cr (Hexavalent)	0.1	ND	ND	ND	ND	ND	ND	#DIV/0!
Cr (Total)	2.0	ND	ND	ND	ND	ND	ND	#DIV/0!
Pb	0.1	ND	ND	ND	ND	ND	ND	#DIV/0!
Hg	0.01	ND	ND	ND	ND	ND	ND	#DIV/0!
Zn	5.0	0.24	ND	ND	0.22	ND	ND	0.220
Ni	1.0	ND	ND	ND	0.05	0.05	0.12	0.073
Cu	1.0	ND	ND	ND	ND	ND	ND	#DIV/0!
V	0.2	ND	ND	ND	ND	ND	ND	#DIV/0!
Benzene	0.1	ND	ND	ND	ND	ND	ND	#DIV/0!
Benzo (a) - Pyrene	0.2	ND	ND	ND	ND	ND	ND	#DIV/0!

ND- Not Detectable

Checked by:- त्रिदिब सैकिया/ TRIDIB SAIKIA
मुख्य प्रबंधक (एच, एस व ई)
Chief Manager (HS,&E)
आई.ओ.सी.एल.(एओडी), डिगबोई
I.O.C. LTD (AOD)
01.07.25

Prepared by:
01.07.25
मुजीब अहमद/Mujeeb Ahmad
वरिष्ठ प्रबंधक (एच एस ई)
Senior Manager (HSE)
आई.ओ.सी.एल. (एओडी), डिगबोई

गुणवत्ता नियंत्रण विभाग (QUALITY CONTROL DEPARTMENT)

इंडियन ऑयल कॉर्पोरेशन लिमिटेड(INDIAN OIL CORPORATION LIMITED)

(असम ऑयल डिवीजन (ASSAM OIL DIVISION)

डिगबोई रिफाइनरी, असम(DIGBOI REFINERY, ASSAM)

Test Report of Dihing and Digboi Rivers Water Sample

Source: Dihing and Digboi Rivers

रिपोर्ट संख्या/ Report No.:DR/QC/Oct-2024 | **Dated 24.10.2024**

Dated of sample Collection :-17.10.2024

PARAMETER		pH	Oil & Grease	Phenol	Sulphide	COD	BOD (3 Days) @ 27°C
Test Method		IS 3025 (Part 11)	APHA-5520-B	APHA-5530-D	IS 3025 (Part 29)	APHA-5220-B	IS-3025 PART-44
Unit			mg/l	mg/l	mg/l	mg/l	mg/l
Requirements as per MINAS noems (Minimum National Standards)		6.0-8.5	Max 5.0 mg/l	Max 0.35 mg/l	Max 0.5 mg/l	Max 125 mg/l	Max 15.0 mg/l
S.No	Sample Details	Test Results					
1	Digboi River Water in Kenduguri Area	6.5	3.2	0.18	BDL	56.0	8.0
2	Digboi River Water (15 km away from Digboi Refinery on Digboi	6.8	3.0	0.12	BDL	52.0	8.0
3	Digboi River Water (26 km away from Digboi Refinery on Digboi	6.8	2.0	0.10	BDL	45.0	6.0
4	Dihing River water before confluence with Digboi river	7.3	0.6	0.01	BDL	22.0	2.0
5	Dihing River water after confluence with Digboi river	7.1	1.0	0.06	BDL	36.0	4.0

***BDL = Below Detection Limit

Test Report Released By :-
Dr. Gopal Maurya (QCM)
Inter Com No:-3593

गुणवत्ता नियंत्रण विभाग (QUALITY CONTROL DEPARTMENT)

इंडियन ऑयल कॉर्पोरेशन लिमिटेड(INDIAN OIL CORPORATION LIMITED)

(असम ऑयल डिवीजन (ASSAM OIL DIVISION)

डिगबोई रिफाइनरी, असम(DIGBOI REFINERY, ASSAM)

Test Report of Dihing and Digboi Rivers Water Sample

Source: Dihing and Digboi Rivers

रिपोर्ट संख्या/ Report No.:DR/QC/Nov-2024 | **Dated 29.11.2024**

Dated of sample Collection :-07.11.2024

PARAMETER		pH	Oil & Grease	Phenol	Sulphide	COD	BOD (3 Days) @ 27°C
Test Method		IS 3025 (Part 11)	APHA-5520-B	APHA-5530-D	IS 3025 (Part 29)	APHA-5220-B	IS-3025 PART-44
Unit			mg/l	mg/l	mg/l	mg/l	mg/l
Requirements as per MINAS noems (Minimum National Standards)		6.0-8.5	Max 5.0 mg/l	Max 0.35 mg/l	Max 0.5 mg/l	Max 125 mg/l	Max 15.0 mg/l
S.No	Sample Details	Test Results					
1	Digboi River Water in Kenduguri Area	6.4	3.6	0.19	BDL	60.0	8.0
2	Digboi River Water (15 km away from Digboi Refinery on Digboi	6.6	3.0	0.13	BDL	54.0	7.0
3	Digboi River Water (26 km away from Digboi Refinery on Digboi	6.7	2.2	0.11	BDL	48.0	5.0
4	Dihing River water before confluence with Digboi river	7.4	0.8	0.02	BDL	22.0	4.0
5	Dihing River water after confluence with Digboi river	7.3	1.4	0.05	BDL	38.0	5.0

***BDL = Below Detection Limit

Test Report Released By :-
Dr. Gopal Maurya (QCM)
Inter Com No:-3593

गुणवत्ता नियंत्रण विभाग (QUALITY CONTROL DEPARTMENT)

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(असम ऑयल डिवीजन (ASSAM OIL DIVISION)

डिगबोई रिफाइनरी, असम(DIGBOI REFINERY, ASSAM)

Test Report of Dihing and Digboi Rivers Water Sample

Source: Dihing and Digboi Rivers

रिपोर्ट संख्या/ Report No.:DR/QC/Dec-2024 | **Dated 31.12.2024**

Dated of sample Collection :-26.12.2024

PARAMETER		pH	Oil & Grease	Phenol	Sulphide	COD	BOD (3 Days) @ 27°C
Test Method		IS 3025 (Part 11)	APHA-5520-B	APHA-5530-D	IS 3025 (Part 29)	APHA-5220-B	IS-3025 PART-44
Unit			mg/l	mg/l	mg/l	mg/l	mg/l
Requirements as per MINAS noems (Minimum National Standards)		6.0-8.5	Max 5.0 mg/l	Max 0.35 mg/l	Max 0.5 mg/l	Max 125 mg/l	Max 15.0 mg/l
S.No	Sample Details	Test Results					
1	Digboi River Water in Kenduguri Area	7.1	3.2	0.15	BDL	55.0	9.0
2	Digboi River Water (15 km away from Digboi Refinery on Digboi	7.2	2.8	0.07	BDL	50.0	7.0
3	Digboi River Water (26 km away from Digboi Refinery on Digboi	6.9	1.9	BDL	BDL	46.0	5.0
4	Dihing River water before confluence with Digboi river	6.8	1.2	BDL	BDL	27.0	4.0
5	Dihing River water after confluence with Digboi river	7.2	1.6	BDL	BDL	39.0	9.0

***BDL = Below Detection Limit

Test Report Released By :-
Dr. Gopal Maurya (QCM)
Inter Com No:-3593

गुणवत्ता नियंत्रण विभाग (QUALITY CONTROL DEPARTMENT)

इंडियन ऑयल कॉर्पोरेशन लिमिटेड(INDIAN OIL CORPORATION LIMITED)

(असम ऑयल डिवीजन (ASSAM OIL DIVISION)

डिगबोई रिफाइनरी, असम(DIGBOI REFINERY, ASSAM)

Test Report of Dihing and Digboi Rivers Water Sample

Source: Dihing and Digboi Rivers

रिपोर्ट संख्या/ Report No.:DR/QC/Dec-2024 | **Dated 31.01.2025**

Dated of sample Collection :-27.01.2025

PARAMETER		pH	Oil & Grease	Phenol	Sulphide	COD	BOD (3 Days) @ 27°C
Test Method		IS 3025 (Part 11)	APHA-5520-B	APHA-5530-D	IS 3025 (Part 29)	APHA-5220-B	IS-3025 PART-44
Unit			mg/l	mg/l	mg/l	mg/l	mg/l
Requirements as per MINAS noems (Minimum National Standards)		6.0-8.5	Max 5.0 mg/l	Max 0.35 mg/l	Max 0.5 mg/l	Max 125 mg/l	Max 15.0 mg/l
S.No	Sample Details	Test Results					
1	Digboi River Water in Kenduguri Area	6.5	3.1	0.18	BDL	57.0	8.0
2	Digboi River Water (15 km away from Digboi Refinery on Digboi	6.7	3.0	0.07	BDL	56.0	8.0
3	Digboi River Water (26 km away from Digboi Refinery on Digboi	6.8	2.5	BDL	BDL	44.0	7.0
4	Dihing River water before confluence with Digboi river	7.2	0.7	BDL	BDL	24.0	3.0
5	Dihing River water after confluence with Digboi river	7.1	1.0	BDL	BDL	28.0	4.0

***BDL = Below Detection Limit

Test Report Released By :-
Dr. Gopal Maurya (QCM)
Inter Com No:-3593

गुणवत्ता नियंत्रण विभाग (QUALITY CONTROL DEPARTMENT)

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(असम ऑयल डिवीजन (ASSAM OIL DIVISION)

डिगबोई रिफाइनरी, असम(DIGBOI REFINERY, ASSAM)

Test Report of Dihing and Digboi Rivers Water Sample

Source: Dihing and Digboi Rivers

रिपोर्ट संख्या/ Report No.:DR/QC/Feb-2025 | **Dated 27.02.2025**

Dated of sample Collection :-15.02.2025

PARAMETER		pH	Oil & Grease	Phenol	Sulphide	COD	BOD (3 Days) @ 27°C
Test Method		IS 3025 (Part 11)	APHA-5520-B	APHA-5530-D	IS 3025 (Part 29)	APHA-5220-B	IS-3025 PART-44
Unit			mg/l	mg/l	mg/l	mg/l	mg/l
Requirements as per MINAS noems (Minimum National Standards)		6.0-8.5	Max 5.0 mg/l	Max 0.35 mg/l	Max 0.5 mg/l	Max 125 mg/l	Max 15.0 mg/l
S.No	Sample Details	Test Results					
1	Digboi River Water in Kenduguri Area	6.8	3.0	0.15	BDL	58.0	8.0
2	Digboi River Water (15 km away from Digboi Refinery on Digboi	7.2	2.0	0.12	BDL	41.0	7.0
3	Digboi River Water (26 km away from Digboi Refinery on Digboi	7.0	1.2	0.0	BDL	32.0	5.0
4	Dihing River water before confluence with Digboi river	7.3	0.7	BDL	BDL	20.0	4.0
5	Dihing River water after confluence with Digboi river	7.5	0.9	BDL	BDL	33.0	5.0

***BDL = Below Detection Limit

Test Report Released By :-
Dr. Gopal Maurya (QCM)
Inter Com No:-3593

गुणवत्ता नियंत्रण विभाग (QUALITY CONTROL DEPARTMENT)

इंडियन ऑयल कॉर्पोरेशन लिमिटेड(INDIAN OIL CORPORATION LIMITED)

(असम ऑयल डिवीजन (ASSAM OIL DIVISION)

डिगबोई रिफाइनरी, असम(DIGBOI REFINERY, ASSAM)

Test Report of Dihing and Digboi Rivers Water Sample

Source: Dihing and Digboi Rivers

रिपोर्ट संख्या/ Report No.:DR/QC/March-2025 | **Dated 31.03.2025**

Dated of sample Collection :-08.03.2025

PARAMETER		pH	Oil & Grease	Phenol	Sulphide	COD	BOD (3 Days) @ 27°C
Test Method		IS 3025 (Part 11)	APHA-5520-B	APHA-5530-D	IS 3025 (Part 29)	APHA-5220-B	IS-3025 PART-44
Unit			mg/l	mg/l	mg/l	mg/l	mg/l
Requirements as per MINAS noems (Minimum National Standards)		6.0-8.5	Max 5.0 mg/l	Max 0.35 mg/l	Max 0.5 mg/l	Max 125 mg/l	Max 15.0 mg/l
S.No	Sample Details	Test Results					
1	Digboi River Water in Kenduguri Area	6.4	3.5	0.20	BDL	62.0	9.0
2	Digboi River Water (15 km away from Digboi Refinery on Digboi	7.2	2.8	0.16	BDL	52.0	8.0
3	Digboi River Water (26 km away from Digboi Refinery on Digboi	7.2	1.6	0.02	BDL	38.0	6.0
4	Dihing River water before confluence with Digboi river	7.5	0.6	0.01	BDL	22.0	3.0
5	Dihing River water after confluence with Digboi river	7.3	1.0	0.04	BDL	30.0	5.0

***BDL = Below Detection Limit

Test Report Released By :-
Dr. Gopal Maurya (QCM)
Inter Com No:-3593

ANNEXURE-3

COMPLIANCE OF EFFLUENT STANDARDS (In Kg/TMT of Crude)

	(October'24 - March '25) Source-External agency							
PARAMETER	LIMIT	October	November	December	January	February	March	Average
pH	--	-	-	-	-	-	-	-
Oil & Grease	2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.000
BOD	6.0	0.00	0.00	0.00	0.00	0.00	0.00	0.000
COD	50	0.00	0.00	0.00	0.00	0.00	0.00	0.000
TSS	8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Phenols	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Sulphides	0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.000
CN	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Ammonia as N	6.0	0.00	0.00	0.00	0.00	0.00	0.00	0.000
TKN	16	0.00	0.00	0.00	0.00	0.00	0.00	0.000
P	1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Cr (Hexavalent)	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Cr (Total)	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Pb	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Hg	0.004	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Zn	2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Ni	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Cu	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.000
V	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Benzene	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Benzo (a) -Pyrene	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.000

NB:- ND ; Not Done & BDL; Bellow Detection Level

Remarks **No effluent Discharged outside ETP**

Checked by: 01.04.25

त्रिदिब सैकिया/ TRIDIB SAIKIA
मुख्य प्रबंधक (एच, एस व ई)
Chief Manager (HS,&E)
आई.ओ.सी.एल.(एओडी), डिगबोई
I.O.C. LTD. (AOD), DIGBOI

Prepared by: 01.04.25

मुजीब अहमद/Mujeeb Ahmad
वरिष्ठ प्रबंधक (एच एस ई)
Senior Manager (HSE)
आई.ओ.सी.एल. (एओडी), डिगबोई
I.O.C. LTD. (AOD), DIGBOI

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400000517F
Test Repo.. Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	26/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	DCU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	58
Diameter of the Stack(m)	:	1.68
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	125
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	11.22
Quantity of Gas Flow, Nm^3/hr	:	67069.7
Barometric Pressure, mmHg	:	752

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	6.8	10	IS:11255(P-1)

TC-14814

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info@nityalab.com www.nityalab.com

Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202412260140
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	26/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	DCU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	58
Diameter of the Stack(m)	:	1.68
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	125
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	11.22
Quantity of Gas Flow, Nm^3/hr	:	67069.7
Barometric Pressure, mmHg	:	752

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	85	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	28	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	5.2	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	4.1	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	16.9	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400000507F
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	26/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	MSQU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.10
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	204
Ambient Air Temperature °C	:	14
Flue Gas Velocity (m/s)	:	15.52
Quantity of Gas Flow, Nm^3/hr	:	33180.1
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	8.2	10	IS:11255(P-1)

TC-14814

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202412260141
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	26/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	MSQU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.10
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	204
Ambient Air Temperature °C	:	14
Flue Gas Velocity (m/s)	:	15.52
Quantity of Gas Flow, Nm^3/hr	:	33180.1
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	243	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	673	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	6	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	14.2	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	9.4	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400000566F
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	29/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	HGU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.00
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	154
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	13.63
Quantity of Gas Flow, Nm^3/hr	:	26912.7
Barometric Pressure, mmHg	:	753

Analysis Repc t

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	6.4	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202412260142
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	29/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	HGU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.00
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	154
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	13.63
Quantity of Gas Flow, Nm^3/hr	:	26912.7
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	48	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	32	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	15	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	4.2	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	19.4	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

(AUTHORISED SIGNATORY)
(RAVINDER MITTAL)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400000520F
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	28/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	CPP (HRSG-4)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	60
Diameter of the Stack(m)	:	3.0
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	132
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	14.07
Quantity of Gas Flow, Nm^3/hr	:	263597.3
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	7.2	10	IS:11255(P-1)

TC-14814

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202412260143
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	28/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	CPP (HRSG-4)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	60
Diameter of the Stack(m)	:	3.0
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	132
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	14.07
Quantity of Gas Flow, Nm^3/hr	:	263597.3
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	114	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	24	-	USEPA OTM-39
3	Oxides of Sulphur (as SOx), mg/Nm^3	6	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	8.2	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	18.3	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400000519F
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	28/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	CPP (HRSG-2)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	50
Diameter of the Stack(m)	:	2.0
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	129
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	14.97
Quantity of Gas Flow, Nm^3/hr	:	125567.1
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	7.6	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202412260144
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	28/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	CPP (HRSG-2)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	50
Diameter of the Stack(m)	:	2.0
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	129
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	14.97
Quantity of Gas Flow, Nm^3/hr	:	125567.1
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	48	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	32	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	6	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	3.1	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	19.7	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400000506F
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	26/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	CRU (HDT)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.1
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	187
Ambient Air Temperature °C	:	14
Flue Gas Velocity (m/s)	:	14.96
Quantity of Gas Flow, Nm^3/hr	:	33165.5
Barometric Pressure, mmHg	:	752

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	7.2	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202412260145
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	26/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	CRU (HDT)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.1
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	187
Ambient Air Temperature °C	:	14
Flue Gas Velocity (m/s)	:	14.96
Quantity of Gas Flow, Nm^3/hr	:	33165.5
Barometric Pressure, mmHg	:	752

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	28	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	38	-	USEPA OTM-39
3	Oxides of Sulphur (as SOx), mg/Nm^3	6	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	7.2	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	17.5	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400000563F
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	29/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	OBSU (CRU)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	45
Diameter of the Stack(m)	:	1.8
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	167
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	15.30
Quantity of Gas Flow, Nm^3/hr	:	89733.6
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	6.8	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202412260146
Tes. Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	29/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	OBSU (CRU)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	45
Diameter of the Stack(m)	:	1.8
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	167
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	15.30
Quantity of Gas Flow, Nm^3/hr	:	89733.6
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	57	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	25	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	9	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	18.7	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	13.2	-	SOP No.: NL/ SOP / FGA /11

Remark: ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400000565F
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	29/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	HDTU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.0
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	231
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	17.69
Quantity of Gas Flow, Nm^3/hr	:	29586.4
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	7.6	10	IS:11255(P-1)

TC-14814

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202412260147
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	29/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	HDTU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.0
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	231
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	17.69
Quantity of Gas Flow, Nm^3/hr	:	29586.4
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	64	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	21	-	USEPA OTM-39
3	Oxides of Sulphur (as SOx), mg/Nm^3	6	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	21.4	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	19.6	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400000518F
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	27/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check th Pollution Load
Sampling Location	:	SDU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	46
Diameter of the Stack(m)	:	1.38
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	156
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	13.64
Quantity of Gas Flow, Nm^3/hr	:	51031.7
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	7.8	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202412260148
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	27/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	SDU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	46
Diameter of the Stack(m)	:	1.38
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	156
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	13.64
Quantity of Gas Flow, Nm^3/hr	:	51031.7
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	52	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	34	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	26	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	14.2	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	19.8	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400000564F
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	29/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	AVU (CDU/VDU)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	46.5
Diameter of the Stack(m)	:	1.59
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	121
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	13.42
Quantity of Gas Flow, Nm^3/hr	:	72556.1
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	7.2	10	IS:11255(P-1)

TC-14814

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202412260149
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	29/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	AVU (CDU/VDU)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	46.5
Diameter of the Stack(m)	:	1.59
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	121
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	13.42
Quantity of Gas Flow, Nm^3/hr	:	72556.1
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	16	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	34	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	5	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	15.4	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	18.1	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400000567F
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	29/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	OBSU (CRU)- FLV 005-1
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	45
Diameter of the Stack(m)	:	1.8
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	154
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	14.34
Quantity of Gas Flow, Nm^3/hr	:	86715.1
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	6.8	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202412260147
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	29/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	OBSU (CRU)- FLV 005-1
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	45
Diameter of the Stack(m)	:	1.8
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	154
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	14.34
Quantity of Gas Flow, Nm^3/hr	:	86715.1
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	43	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	21	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	6	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	14.5	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	17.6	-	SOP No.: NL/ SOP / FGA /11

Remark: ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400000568F
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	29/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	OBSU (CRU)- FLV 005-2
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	45
Diameter of the Stack(m)	:	1.8
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	146
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	13.38
Quantity of Gas Flow, Nm^3/hr	:	82441.3
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	7.1	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202412260148
Test Report Date: 10/12/2024

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	29/11/2024
Sample Received at Lab	:	03/12/2024
Test Started On	:	03/12/2024
Test Completed On	:	09/12/2024
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	OBSU (CRU)- FLV 005-2
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	45
Diameter of the Stack(m)	:	1.8
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	146
Ambient Air Temperature °C	:	11
Flue Gas Velocity (m/s)	:	13.38
Quantity of Gas Flow, Nm^3/hr	:	82441.3
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	46	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	26	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	8	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	14.1	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	18.3	-	SOP No.: NL/ SOP / FGA /11

Remark: ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400001061F
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	21/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	DCU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	58
Diameter of the Stack(m)	:	1.68
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	119
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	11.66
Quantity of Gas Flow, Nm^3/hr	:	70754.1
Barometric Pressure, mmHg	:	752

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	7.2	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202502190140
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	21/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	DCU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	58
Diameter of the Stack(m)	:	1.68
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	119
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	11.66
Quantity of Gas Flow, Nm^3/hr	:	70754.1
Barometric Pressure, mmHg	:	752

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	92	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	21	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	4.8	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	4.7	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	17.2	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400001002F
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	20/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	MSQU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.10
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	201
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	13.34
Quantity of Gas Flow, Nm^3/hr	:	28699.1
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	7.8	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202502190141
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	20/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	MSQU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.10
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	201
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	13.34
Quantity of Gas Flow, Nm^3/hr	:	28699.1
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	214	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	720	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	8	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	13.5	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	10.2	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400001001F
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	19/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	HGU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.00
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	161
Ambient Air Temperature °C	:	9
Flue Gas Velocity (m/s)	:	13.82
Quantity of Gas Flow, Nm^3/hr	:	26836.4
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	6.1	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202502190142
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	19/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	HGU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.00
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	161
Ambient Air Temperature °C	:	9
Flue Gas Velocity (m/s)	:	13.82
Quantity of Gas Flow, Nm^3/hr	:	26836.4
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	52	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	37	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	12	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	4.8	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	18.4	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400001062F
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	21/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	CPP (HRSG-4)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	60
Diameter of the Stack(m)	:	3.0
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	120
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	12.84
Quantity of Gas Flow, Nm^3/hr	:	247769.0
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	8.2	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202502190143
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	21/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	CPP (HRSG-4)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	60
Diameter of the Stack(m)	:	3.0
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	120
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	12.84
Quantity of Gas Flow, Nm^3/hr	:	247769.0
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	110	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	26	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_X), mg/Nm^3	4	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	7.6	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	19.2	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400001063F
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	21/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	CPP (HRSG-2)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	50
Diameter of the Stack(m)	:	2.0
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	116
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	13.29
Quantity of Gas Flow, Nm^3/hr	:	115185.7
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	6.7	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202502190144
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	21/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	CPP (HRSG-2)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	50
Diameter of the Stack(m)	:	2.0
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	116
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	13.29
Quantity of Gas Flow, Nm^3/hr	:	115185.7
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	42	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	38	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	8	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	3.6	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	17.8	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400001003F
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	20/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	CRU (HDT)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.1
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	167
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	13.28
Quantity of Gas Flow, Nm^3/hr	:	30781.4
Barometric Pressure, mmHg	:	752

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	8.2	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202502190145
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	20/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	CRU (HDT)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.1
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	167
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	13.28
Quantity of Gas Flow, Nm^3/hr	:	30781.4
Barometric Pressure, mmHg	:	752

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	24	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	42	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	8	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	7.8	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	16.4	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400001004F
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	20/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	HDTU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.0
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	203
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	16.44
Quantity of Gas Flow, Nm^3/hr	:	29106.6
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	6.5	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202502190147
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	20/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	HDTU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	40
Diameter of the Stack(m)	:	1.0
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	203
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	16.44
Quantity of Gas Flow, Nm^3/hr	:	29106.6
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	58	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	15	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	4	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	18.6	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	17.8	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400001030F
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	20/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	SDU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	46
Diameter of the Stack(m)	:	1.38
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	167
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	13.53
Quantity of Gas Flow, Nm^3/hr	:	49375.5
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	8.9	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202502190148
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	20/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	SDU
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	46
Diameter of the Stack(m)	:	1.38
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	167
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	13.53
Quantity of Gas Flow, Nm^3/hr	:	49375.5
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	45	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	28	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	23	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	12.5	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	16.7	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142400001064F
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	21/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	AVU (CDU/VDU)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	46.5
Diameter of the Stack(m)	:	1.59
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	112
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	11.71
Quantity of Gas Flow, Nm^3/hr	:	64816.1
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	7.4	10	IS:11255(P-1)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202502190149
Test Report Date: 01/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	21/02/2025
Sample Received at Lab	:	25/02/2025
Test Started On	:	25/02/2025
Test Completed On	:	28/02/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	AVU (CDU/VDU)
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	46.5
Diameter of the Stack(m)	:	1.59
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	112
Ambient Air Temperature °C	:	10
Flue Gas Velocity (m/s)	:	11.71
Quantity of Gas Flow, Nm^3/hr	:	64816.1
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	18	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	28	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	8	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	13.2	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	17.2	-	SOP No.: NL/ SOP / FGA /11

Remark:
ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142500001144F
Test Report Date: 07/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	25/02/2025
Sample Received at Lab	:	28/02/2025
Test Started On	:	28/02/2025
Test Completed On	:	06/03/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	OBSG (CRU)- FLV 005-1
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	45
Diameter of the Stack(m)	:	1.8
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	159
Ambient Air Temperature °C	:	18
Flue Gas Velocity (m/s)	:	13.91
Quantity of Gas Flow, Nm^3/hr	:	83125.3
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	7.2	10	IS:11255(P-1)

TC-14814

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202502250140
Test Report Date: 07/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	25/02/2025
Sample Received at Lab	:	28/02/2025
Test Started On	:	28/02/2025
Test Completed On	:	06/03/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	OBSG (CRU)- FLV 005-1
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	45
Diameter of the Stack(m)	:	1.8
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	159
Ambient Air Temperature °C	:	18
Flue Gas Velocity (m/s)	:	13.91
Quantity of Gas Flow, Nm^3/hr	:	83125.3
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	47	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	26	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	8	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	15.8	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	19.1	-	SOP No.: NL/ SOP / FGA /11

Remark: ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No. : TC148142500001145F
Test Report Date: 07/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	25/02/2025
Sample Received at Lab	:	28/02/2025
Test Started On	:	28/02/2025
Test Completed On	:	06/03/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	OBSG (CRU)- FLV 005-2
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	45
Diameter of the Stack(m)	:	1.8
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	151
Ambient Air Temperature °C	:	16
Flue Gas Velocity (m/s)	:	14.21
Quantity of Gas Flow, Nm^3/hr	:	86506
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Particulate Matter, (as PM), mg/Nm^3	6.4	10	IS:11255(P-1)

TC-14814

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No. : 202502250141
Test Report Date: 07/03/2025

Sample Particulars:

Nature of the Sample	:	**Stack Gas Emission**
Date of Sampling	:	25/02/2025
Sample Received at Lab	:	28/02/2025
Test Started On	:	28/02/2025
Test Completed On	:	06/03/2025
Purpose of Monitoring	:	To Check the Pollution Load
Sampling Location	:	OBSG (CRU)- FLV 005-2
Method of Sampling	:	IS: 11255 (P-7)
Normal Operating Schedule	:	As per requirement
Type of Stack /Duct	:	Mild Steel
Stack height from Ground Level (m)	:	45
Diameter of the Stack(m)	:	1.8
Sampling Duration (min)	:	40

Observations:

Flue Gas Temperature °C	:	151
Ambient Air Temperature °C	:	16
Flue Gas Velocity (m/s)	:	14.21
Quantity of Gas Flow, Nm^3/hr	:	86506
Barometric Pressure, mmHg	:	753

Analysis Report

Sr. No.	Parameter	Test Results	Permissible Limits	Test Method
1	Oxide of Nitrogen (as NO_x), mg/Nm^3	41	350	USEPA OTM-39
2	Carbon Monoxide (as CO), mg/Nm^3	29	-	USEPA OTM-39
3	Oxides of Sulphur (as SO_x), mg/Nm^3	6	50	SOP No.: NL/ SOP / FGA /01
4	Hydrogen Sulphide (as H_2S), mg/Nm^3	ND (DL-4)	150	SOP No.: NL/ SOP / FGA /10
5	Carbon Dioxide (as CO_2), %	12.5	-	SOP No.: NL/ SOP / FGA /11
6	Oxygen (as O_2), %	16.4	-	SOP No.: NL/ SOP / FGA /11

Remark: ND-Not Detected, DL-Detection Limit

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No.: 202410030110,202410070110, 202410100110, 202410140110 202410170110, 202410210110, 202410240110, 202410280110
Test Report Date: 09/10/2024

Sample Particulars

Nature of the Sample	:	**Ambient Air Quality Monitoring**
Sampling Location	:	Wax Sector Cooling Tower
Purpose of Monitoring	:	To Check the Pollution Load
Method of Sampling	:	IS 5182 (Part 14)
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Duration (Hrs.)	:	24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m^3	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m^3	Benzene (C6H6[5]) ug/m3
03/10/2024	38.20	54.30	17.50	23.40	24.50	ND	0.83	14.60	ND	ND	ND	ND
07/10/2024	35.40	55.60	16.20	22.50	21.20	ND	0.64	12.20	ND	ND	ND	ND
10/10/2024	36.70	57.20	18.80	24.10	23.30	ND	1.02	13.90	ND	ND	ND	ND
14/10/2024	39.20	56.40	17.40	21.50	23.10	ND	1.10	12.60	ND	ND	ND	ND
17/10/2024	36.00	55.90	16.50	24.50	22.40	ND	1.14	13.60	ND	ND	ND	ND
21/10/2024	34.50	53.20	18.70	22.30	24.10	ND	0.90	12.40	ND	ND	ND	ND
24/10/2024	34.10	57.20	16.00	21.80	20.10	ND	1.12	16.60	ND	ND	ND	ND
28/10/2024	32.20	54.80	15.80	21.00	22.10	ND	1.06	15.20	ND	ND	ND	ND
Minimum	**32.20**	**53.20**	**15.80**	**21.00**	**20.10**	-	**0.64**	**12.20**	-	-	-	-
Maximum	**39.20**	**57.20**	**18.80**	**24.50**	**24.50**	-	**1.14**	**16.60**	-	-	-	-
Average	**35.79**	**55.58**	**17.11**	**22.64**	**22.60**	-	**0.98**	**13.89**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:
*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

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Test Report

Issued To M/s Indian Oil Corporation Limited
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No.: 202410030111,202410070111, 202410100111, 202410140111 202410170111, 202410210111, 202410240111, 202410280111
Test Report Date: 09/10/2024

Sample Particulars

Nature of the Sample : **Ambient Air Quality Monitoring**
Sampling Location : Bazaar Gate
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 14)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m^3	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m^3	Benzene (C6H6[5]) ug/m3
03/10/2024	34.20	61.20	18.50	23.40	23.40	ND	1.16	20.60	ND	ND	ND	ND
07/10/2024	31.10	62.40	19.70	24.80	24.70	ND	0.54	21.40	ND	ND	ND	ND
10/10/2024	35.40	64.10	18.20	25.50	25.60	ND	1..19	19.50	ND	ND	ND	ND
14/10/2024	36.10	62.10	20.40	24.10	24.50	ND	1.02	20.30	ND	ND	ND	ND
17/10/2024	34.20	60.80	17.80	22.50	23.10	ND	1.08	17.70	ND	ND	ND	ND
21/10/2024	34.50	59.40	19.70	23.90	22.20	ND	1.06	21.20	ND	ND	ND	ND
24/10/2024	33.80	61.20	20.80	24.60	24..5	ND	1.00	19.80	ND	ND	ND	ND
28/10/2024	37.60	63.80	21.20	26.40	23.90	ND	0.98	17.20	ND	ND	ND	ND
Minimum	**31.10**	**59.40**	**17.80**	**22.50**	**22.20**	-	**0.54**	**17.20**	-	-	-	-
Maximum	**37.60**	**64.10**	**21.20**	**26.40**	**25.60**	-	**1.16**	**21.40**	-	-	-	-
Average	**34.61**	**61.88**	**19.54**	**24.40**	**23.91**	-	**0.98**	**19.71**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:

*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

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Test Report

ssued To **M/s indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No.: 202410030112,202410070112, 202410100112, 202410140112 202410170112, 202410210112, 202410240112, 202410280112
Test Report Date: 09/10/2024

Sample Particulars

Nature of the Sample : **Ambient Air Quality Monitoring**
Sampling Location : Effluent Treatment Plant
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 14)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m[3]	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m[3]	Benzene (C6H6[5]) ug/m3
03/10/2024	34.80	58.90	20.40	22.40	23.50	ND	1.04	19.20	ND	ND	ND	ND
07/10/2024	35.50	50.20	19.50	25.50	25.50	ND	0.47	18.50	ND	ND	ND	ND
10/10/2024	38.20	60.20	18.20	26.60	26.10	ND	1.10	17.40	ND	ND	ND	ND
14/10/2024	34.90	62.46	20.80	22.60	20.80	ND	0.98	20.40	ND	ND	ND	ND
17/10/2024	36.20	49.20	19.10	21.80	22.60	ND	1.15	21.30	ND	ND	ND	ND
21/10/2024	33.80	59.10	18.40	22.20	24.70	ND	1.02	18.50	ND	ND	ND	ND
24/10/2024	34.00	60.10	19.40	26.20	23.50	ND	0.90	19.20	ND	ND	ND	ND
28/10/2024	37.50	54.50	21.20	25.60	21.60	ND	1.08	17.60	ND	ND	ND	ND
Minimum	**33.80**	**49.20**	**18.20**	**21.80**	**20.80**	-	**0.47**	**17.40**	-	-	-	-
Maximum	**38.20**	**62.46**	**21.20**	**26.60**	**26.10**	-	**1.15**	**21.30**	-	-	-	-
Average	**35.61**	**56.83**	**19.63**	**24.11**	**23.54**	-	**0.97**	**19.01**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:
*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analysed within Seven days from the date of sampling.

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

Test Report No.: 202410030113,202410070113, 202410100113, 202410140113 202410170113, 202410210113, 202410240113, 202410280113
Test Report Date: 09/10/2024

Sample Particulars

Nature of the Sample : **Ambient Air Quality Monitoring**
Sampling Location : New Tank Farm
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 14)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m[3]	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m[3]	Benzene (C6H6[5]) ug/m3
03/10/2024	29.60	53.60	15.60	18.80	19.60	ND	0.96	16.40	ND	ND	ND	ND
07/10/2024	27.50	46.40	16.50	19.60	20.40	ND	0.88	15.20	ND	ND	ND	ND
10/10/2024	29.50	54.70	17.00	22.40	18.80	ND	1.02	15.90	ND	ND	ND	ND
14/10/2024	27.90	56.20	15.20	20.10	24.10	ND	0.58	17.20	ND	ND	ND	ND
17/10/2024	28.40	44.60	15.90	19.70	20.50	ND	0.91	14.60	ND	ND	ND	ND
21/10/2024	30.60	51.20	16.70	20.80	17.80	ND	1.10	16.20	ND	ND	ND	ND
24/10/2024	31.20	54.60	14.80	18.10	21.60	ND	0.99	17.50	ND	ND	ND	ND
28/10/2024	29.80	48.60	17.20	21.00	20.90	ND	1.03	16.10	ND	ND	ND	ND
Minimum	**27.50**	**44.60**	**14.80**	**18.10**	**17.80**	-	**0.58**	**14.60**	-	-	-	-
Maximum	**31.20**	**56.20**	**17.20**	**22.40**	**24.10**	-	**1.10**	**17.50**	-	-	-	-
Average	**29.31**	**51.24**	**16.11**	**20.06**	**20.46**	-	**0.93**	**16.14**	-	-	-	-
NAAQM Standards	60	100	80	80	100	1	2	400	20	6	1	5
Test Method	40CFR Appendix L Part 53 CPCB Guidelines	IS:5182 (P-23)	IS:5182 (P-2)	IS:5182 (P-6)	IS:5182 (P-9)	NL/SOP /AAQ-11	IS:5182 (P-10)	Method of Air Sampling & Analysis	NL/SOP/AAQ-13	NL/SOP/ AAQ-12	IS:5182 (P-12)	IS:5182 (P-11)

Remark:

*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analysed within Seven days from the date of sampling.

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Dist. Tinsukia
Assam, INDIA

ULR No.: TC148142400000080F,149F, 230F, 279F, 312F, 414F, 489F, 534F
Test Report Date: 16/12/2024

Sample Particulars

Nature of the Sample	:	**Ambient Air Quality Monitoring**
Sampling Location	:	Wax Sector Cooling Tower
Purpose of Monitoring	:	To Check the Pollution Load
Method of Sampling	:	IS 5182 (Part 14)
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Duration (Hrs.)	:	24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m^3	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m^3	Benzene (C6H6[5]) ug/m3
04/11/2024	31.20	60.40	15.50	21.50	22.60	ND	0.96	16.20	ND	ND	ND	ND
07/11/2024	29.40	59.20	14.70	20.80	19.40	ND	0.62	11.40	ND	ND	ND	ND
11/11/2024	30.50	63.10	13.30	19.60	22.40	ND	1.10	12.30	ND	ND	ND	ND
14/11/2024	44.80	54.20	15.40	18.80	18.30	ND	1.25	13.60	ND	ND	ND	ND
18/11/2024	34.00	60.90	14.30	19.50	19.50	ND	1.05	14.40	ND	ND	ND	ND
21/11/2024	33.20	58.20	16.70	17.40	19.00	ND	1.02	13.20	ND	ND	ND	ND
25/11/2024	31.80	61.40	14.80	18.10	18.90	ND	0.92	15.50	ND	ND	ND	ND
28/11/2024	32.40	62.50	16.10	20.90	21.40	ND	1.05	17.40	ND	ND	ND	ND
Minimum	**29.40**	**54.20**	**13.30**	**17.40**	**18.30**	-	**0.62**	**11.40**	-	-	-	-
Maximum	**44.80**	**63.10**	**16.70**	**21.50**	**22.60**	-	**1.25**	**17.40**	-	-	-	-
Average	**33.41**	**59.99**	**15.10**	**19.58**	**20.19**	-	**1.00**	**14.25**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:

*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec -3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

TC-14814

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142400000081F,150F, 231F, 280F, 313F, 415F, 490F, 535F
Test Report Date: 16/12/2024

Sample Particulars

Nature of the Sample	:	**Ambient Air Quality Monitoring**
Sampling Location	:	Bazaar Gate
Purpose of Monitoring	:	To Check the Pollution Level
Method of Sampling	:	IS 5182 (Part 14)
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Duration (Hrs.)	:	24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m³	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m³	Benzene (C6H6[5]) ug/m3
04/11/2024	32.10	66.40	12.10	16.20	18.60	ND	1.31	12.10	ND	ND	ND	ND
07/11/2024	34.40	67.50	13.50	18.50	19.40	ND	0.28	13.80	ND	ND	ND	ND
11/11/2024	35.50	69.80	11.20	19.50	20.00	ND	1.05	14.10	ND	ND	ND	ND
14/11/2024	37.70	67.20	13.40	17.30	19.90	ND	1.18	12.80	ND	ND	ND	ND
18/11/2024	34.40	66.20	14.50	19.80	19.30	ND	1.11	14.40	ND	ND	ND	ND
21/11/2024	31.20	63.00	12.70	17.10	20.00	ND	1.14	13.20	ND	ND	ND	ND
25/11/2024	30.90	62.80	13.90	18.20	19.50	ND	1.12	15.20	ND	ND	ND	ND
28/11/2024	33.50	61.60	14.40	19.80	20.30	ND	0.98	14.60	ND	ND	ND	ND
Minimum	**30.90**	**61.60**	**11.20**	**16.20**	**18.60**	-	**0.28**	**12.10**	-	-	-	-
Maximum	**37.70**	**69.80**	**14.50**	**19.80**	**20.30**	-	**1.31**	**15.20**	-	-	-	-
Average	**33.71**	**65.56**	**13.21**	**18.30**	**19.63**	-	**1.02**	**13.78**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:

*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

TC-14814

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142400000082F,151F, 232F, 281F, 314F, 416F, 491F, 536F
Test Report Date: 16/12/2024

Sample Particulars

Nature of the Sample	:	**Ambient Air Quality Monitoring**
Sampling Location	:	Effluent Treatment Plant
Purpose of Monitoring	:	To Check the Pollution Load
Method of Sampling	:	IS 5182 (Part 14)
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Duration (Hrs.)	:	24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m^3	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m^3	Benzene (C6H6[5]) ug/m3
04/11/2024	37.60	66.20	13.70	16.90	18.30	ND	1.38	13.20	ND	ND	ND	ND
07/11/2024	38.80	47.20	12.40	19.80	19.50	ND	0.48	12.30	ND	ND	ND	ND
11/11/2024	40.50	68.30	11.80	16.30	20.20	ND	1.18	15.60	ND	ND	ND	ND
14/11/2024	36.10	70.20	13.50	16.60	18.30	ND	1.25	15.40	ND	ND	ND	ND
18/11/2024	39.20	43.30	12.40	18.70	18.70	ND	1.34	15.90	ND	ND	ND	ND
21/11/2024	35.50	63.70	12.10	19.60	19.30	ND	1.14	12.40	ND	ND	ND	ND
25/11/2024	34.20	62.20	14.60	20.30	21.30	ND	0.94	13.80	ND	ND	ND	ND
28/11/2024	33.80	61.50	15.60	18.10	20.10	ND	1.08	14.50	ND	ND	ND	ND
Minimum	**33.80**	**43.30**	**11.80**	**16.30**	**18.30**	-	**0.48**	**12.30**	-	-	-	-
Maximum	**40.50**	**70.20**	**15.60**	**20.30**	**21.30**	-	**1.38**	**15.90**	-	-	-	-
Average	**36.96**	**60.33**	**13.26**	**18.29**	**19.46**	-	**1.10**	**14.14**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:

*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5], [4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5], [2]Nickel-ND [DL- 1.0]
Sample Analysed within Seven days from the date of sampling.

TC-14814

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142400000083F,152F, 233F, 282F, 315F, 417F, 492F, 537F
Test Report Date: 16/12/2024

Sample Particulars

Nature of the Sample	:	**Ambient Air Quality Monitoring**
Sampling Location	:	New Tank Farm
Purpose of Monitoring	:	To Check the Pollution Load
Method of Sampling	:	IS 5182 (Part 14)
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Duration (Hrs.)	:	24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m^3	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m^3	Benzene (C6H6[5]) ug/m3
04/11/2024	39.70	66.40	13.50	16.80	19.10	ND	1.29	15.50	ND	ND	ND	ND
07/11/2024	37.60	52.20	14.20	17.40	20.30	ND	0.28	13.20	ND	ND	ND	ND
11/11/2024	40.10	69.50	15.60	18.20	21.80	ND	1.04	14.60	ND	ND	ND	ND
14/11/2024	38.20	70.30	13.90	19.80	19.60	ND	0.30	16.40	ND	ND	ND	ND
18/11/2024	39.20	50.50	14.80	20.30	18.40	ND	1.18	13.60	ND	ND	ND	ND
21/11/2024	41.20	64.60	15.20	20.90	19.20	ND	1.12	14.20	ND	ND	ND	ND
25/11/2024	39.80	65.80	16.10	21.30	20.50	ND	0.94	15.30	ND	ND	ND	ND
28/11/2024	40.60	64.00	14.50	19.20	18.80	ND	1.02	14.60	ND	ND	ND	ND
Minimum	**37.60**	**50.50**	**13.50**	**16.80**	**18.40**	-	**0.28**	**13.20**	-	-	-	-
Maximum	**41.20**	**70.30**	**16.10**	**21.30**	**21.80**	-	**1.29**	**16.40**	-	-	-	-
Average	**39.55**	**62.91**	**14.73**	**19.24**	**19.71**	-	**0.90**	**14.68**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:
*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analysed within Seven days from the date of sampling.

(AUTHORISED SIGNATORY)
(RAVINDER MITTAL)

C-14814

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Test Report

Issued To M/s Indian Oil Corporation Limited
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142400000620F, 716F, 788F, 854F,932F,986F, 1096F, 1177F, 1263F
Test Report Date: 06/01/2025

Sample Particulars

Nature of the Sample : **Ambient Air Quality Monitoring**
Sampling Location : Wax Sector Cooling Tower
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 14)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m^3	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m^3	Benzene (C6H6[5]) ug/m3
02/12/2024	30.40	62.90	10.90	19.20	24.10	ND	1.40	11.00	ND	ND	ND	ND
05/12/2024	32.60	66.40	11.40	21.40	20.10	ND	0.21	12.30	ND	ND	ND	ND
09/12/2024	43.50	68.10	12.60	18.20	21.60	ND	1.18	13.50	ND	ND	ND	ND
12/12/2024	48.60	55.40	10.60	17.20	23.50	ND	1.27	10.90	ND	ND	ND	ND
16/12/2024	31.50	58.40	13.20	18.90	17.90	ND	1.20	11.50	ND	ND	ND	ND
19/12/2024	30.90	57.20	11.10	17.10	21.50	ND	1.29	10.00	ND	ND	ND	ND
23/12/2024	37.50	55.40	12.00	19.40	20.90	ND	1.19	12.66	ND	ND	ND	ND
26/12/2024	35.90	56.30	10.10	18.30	22.40	ND	1.30	13.20	ND	ND	ND	ND
30/12/2024	36.20	54.80	13.00	19.00	21.60	ND	1.23	12.00	ND	ND	ND	ND
Minimum	**30.40**	**54.80**	**10.10**	**17.10**	**17.90**	-	**0.21**	**10.00**	-	-	-	-
Maximum	**48.60**	**68.10**	**13.20**	**21.40**	**24.10**	-	**1.40**	**13.50**	-	-	-	-
Average	**36.34**	**59.43**	**11.66**	**18.74**	**21.51**	-	**1.1[illegible]**	**11.90**	-	-	-	-
NAAQM Standards	60	100	80	80	100	1	2	400	20	6	1	5
Test Method	40CFR Appendix L Part 53 CPCB Guidelines	IS:5182 (P-23)	IS:5182 (P-2)	IS:5182 (P-6)	IS:5182 (P-9)	NL/SOP /AAQ-11	IS:5182 (P-10)	Method of Air Sampling & Analysis	NL/SOP/AAQ-13	NL/SOP/ AAQ-12	IS:5182 (P-12)	IS:5182 (P-11)

Remark:

*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analysed within Seven days from the date of sampling.

TC-14814

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Test Report

Issued To M/s Indian Oil Corporation Limited
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142400000621F, 717F, 789F, 855F,933F,987F, 1097F, 1178F, 1264F
Test Report Date: 06/01/2025

Sample Particulars

Nature of the Sample : Ambient Air Quality Monitoring
Sampling Location : Bazaar Gate
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 14)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m³	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m³	Benzene (C6H6[5]) ug/m3
02/12/2024	35.20	75.50	6.80	16.20	18.20	ND	1.35	11.90	ND	ND	ND	ND
05/12/2024	36.40	65.10	8.10	19.80	20.50	ND	0.11	10.50	ND	ND	ND	ND
09/12/2024	39.20	68.20	7.50	21.50	22.40	ND	1.10	12.50	ND	ND	ND	ND
12/12/2024	35.60	61.50	9.40	18.50	20.10	ND	1.20	13.60	ND	ND	ND	ND
16/12/2024	38.20	63.20	10.60	20.60	21.60	ND	1.11	10.20	ND	ND	ND	ND
19/12/2024	36.80	62.50	11.20	18.20	19.90	ND	1.18	14.10	ND	ND	ND	ND
23/12/2024	39.50	67.80	9.90	17.60	21.10	ND	1.24	12.20	ND	ND	ND	ND
26/12/2024	35.50	69.20	10.00	21.00	18.80	ND	1.30	13.00	ND	ND	ND	ND
30/12/2024	36.00	66.90	8.80	17.90	20.60	ND	1.26	12.00	ND	ND	ND	ND
Minimum	**35.20**	**61.50**	**6.80**	**16.20**	**18.20**	-	**0.11**	**10.20**	-	-	-	-
Maximum	**39.50**	**75.50**	**11.20**	**21.50**	**22.40**	-	**1.35**	**14.10**	-	-	-	-
Average	**36.93**	**66.66**	**9.14**	**19.03**	**20.36**	-	**1.09**	**12.22**	-	-	-	-
NAAQM Standards	60	100	80	80	100	1	2	400	20	6	1	5
Test Method	40CFR Appendix L Part 53 CPCB Guidelines	IS:5182 (P-23)	IS:5182 (P-2)	IS:5182 (P-6)	IS:5182 (P-9)	NL/SOP /AAQ-11	IS:5182 (P-10)	Method of Air Sampling & Analysis	NL/SOP/AAQ-13	NL/SOP/ AAQ-12	IS:5182 (P-12)	IS:5182 (P-11)

Remark:

*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analysed within Seven days from the date of sampling.

TC-14814

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(RAVINDER MITTAL)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142400000622F, 718F, 790F, 856F,934F,988F, 1098F, 1179F, 1265F
Test Report Date: 06/01/2025

Sample Particulars

Nature of the Sample : Ambient Air Quality Monitoring
Sampling Location : Effluent Treatment Plant
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 14)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m³	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m³	Benzene (C6H6[5]) ug/m3
02/12/2024	38.50	68.10	9.50	16.50	20.10	ND	1.42	13.20	ND	ND	ND	ND
05/12/2024	40.70	50.20	8.20	19.80	21.40	ND	0.19	12.40	ND	ND	ND	ND
09/12/2024	42.90	71.80	7.80	16.60	22.20	ND	1.18	11.80	ND	ND	ND	ND
12/12/2024	39.80	71.10	10.10	17.70	20.50	ND	1.26	10.90	ND	ND	ND	ND
16/12/2024	42.60	51.80	9.40	18.50	19.80	ND	1.32	11.00	ND	ND	ND	ND
19/12/2024	38.10	66.20	7.90	20.10	20.00	ND	1.08	13.80	ND	ND	ND	ND
23/12/2024	41.20	69.20	11.90	20.90	21.10	ND	1.24	12.60	ND	ND	ND	ND
26/12/2024	42.00	53.20	10.00	21.50	18.80	ND	1.30	11.40	ND	ND	ND	ND
30/12/2024	39.10	67.40	9.10	17.80	20.50	ND	1.20	13.00	ND	ND	ND	ND
Minimum	38.10	50.20	7.80	16.50	18.80	-	0.19	10.90	-	-	-	-
Maximum	42.90	71.80	11.90	21.50	22.20	-	1.42	13.80	-	-	-	-
Average	40.54	63.22	9.32	18.82	20.49	-	1.13	12.23	-	-	-	-
NAAQM Standards	60	100	80	80	100	1	2	400	20	6	1	5
Test Method	40CFR Appendix L Part 53 CPCB Guidelines	IS:5182 (P-23)	IS:5182 (P-2)	IS:5182 (P-6)	IS:5182 (P-9)	NL/SOP /AAQ-11	IS:5182 (P-10)	Method of Air Sampling & Analysis	NL/SOP/AAQ-13	NL/SOP/ AAQ-12	IS:5182 (P-12)	IS:5182 (P-11)

Remark:
*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analysed within Seven days from the date of sampling.

TC-14814

(AUTHORISED SIGNATORY)
(RAVINDER MITTAL)

CORPORATE OFFICE & CENTRAL LABORATORIES :-
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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142400000623F, 719F, 791F, 857F,935F,989F, 1099F, 1180F, 1266F
Test Report Date: 06/01/2025

Sample Particulars

Nature of the Sample : **Ambient Air Quality Monitoring**
Sampling Location : New Tank Farm
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 1 ;)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter												
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m^3	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m^3	Benzene (C6H6[5]) ug/m3
02/12/2024	40.20	67.40	7.90	16.90	20.20	ND	1.31	10.60	ND	ND	ND	ND
05/12/2024	39.50	53.20	8.50	15.40	21.40	ND	0.12	11.90	ND	ND	ND	ND
09/12/2024	41.80	70.60	9.40	16.20	22.00	ND	1.12	12.20	ND	ND	ND	ND
12/12/2024	38.90	71.50	8.10	18.60	21.60	ND	1.24	11.00	ND	ND	ND	ND
16/12/2024	41.10	51.90	9.60	17.80	19.90	ND	1.21	12.80	ND	ND	ND	ND
19/12/2024	42.80	65.40	10.00	19.50	18.90	ND	1.19	13.40	ND	ND	ND	ND
23/12/2024	42.60	68.40	8.90	18.80	20.30	ND	0.80	14.00	ND	ND	ND	ND
26/12/2024	40.80	55.20	10.50	15.10	18.00	ND	1.09	10.50	ND	ND	ND	ND
30/12/2024	39.90	56.40	9.00	16.00	19.40	ND	1.13	12.00	ND	ND	ND	ND
Minimum	38.90	51.90	7.90	15.10	18.00	-	0.12	10.50	-	-	-	-
Maximum	42.80	71.50	10.50	19.50	22.00	-	1.31	14.00	-	-	-	-
Average	40.84	62.22	9.10	17.14	20.19	-	1.02	12.04	-	-	-	-
NAAQM Standards	60	100	80	80	100	1	2	400	20	6	1	5
Test Method	40CFR Appendix L Part 53 CPCB Guidelines	IS:5182 (P-23)	IS:5182 (P-2)	IS:5182 (P-6)	IS:5182 (P-9)	NL/SOP /AAQ-11	IS:5182 (P-10)	Method of Air Sampling & Analysis	NL/SOP/AAQ-13	NL/SOP/ AAQ-12	IS:5182 (P-12)	IS:5182 (P-11)

Remark:

*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5], [4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analysed within Seven days from the date of sampling.

TC-14814

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(RAVINDER MITTAL)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142500000011F, 63F, 120F, 170F, 224F, 306F, 392F, 460F
Test Report Date: 04/02/2025

Sample Particulars

Nature of the Sample : **Ambient Air Quality Monitoring**
Sampling Location : Wax Sector Cooling Tower
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 14)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m³	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m³	Benzene (C6H6[5]) ug/m3
02/01/2025	34.60	67.80	14.80	24.20	30.40	ND	1.61	14.90	ND	ND	ND	ND
06/01/2025	37.90	72.40	12.20	26.80	24.20	ND	0.25	12.80	ND	ND	ND	ND
09/01/2025	48.20	74.60	13.40	22.60	26.50	ND	1.38	13.40	ND	ND	ND	ND
13/01/2025	53.00	60.20	14.20	20.80	28.20	ND	1.47	14.60	ND	ND	ND	ND
16/01/2025	36.60	64.40	13.80	21.20	22.60	ND	1.40	12.30	ND	ND	ND	ND
20/01/2025	35.80	62.20	12.70	22.20	26.20	ND	1.49	15.40	ND	ND	ND	ND
23/01/2025	42.20	60.90	15.20	24.60	25.50	ND	1.39	12.00	ND	ND	ND	ND
27/01/2025	40.60	61.40	14.60	23.30	27.50	ND	1.50	13.80	ND	ND	ND	ND
Minimum	**34.60**	**60.20**	**12.20**	**20.80**	**22.60**	-	**0.25**	**12.00**	-	-	-	-
Maximum	**53.00**	**74.60**	**15.20**	**26.80**	**30.40**	-	**1.61**	**15.40**	-	-	-	-
Average	**41.11**	**65.49**	**13.86**	**23.21**	**26.39**	-	**1.31**	**13.65**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:
*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

TC-14814

(AUTHORISED SIGNATORY)
(RAVINDER MITTAL)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142500000012F, 64F, 121F, 171F, 225F, 307F, 393F, 461F
Test Report Date: 04/02/2025

Sample Particulars

Nature of the Sample	:	**Ambient Air Quality Monitoring**
Sampling Location	:	Bazaar Gate
Purpose of Monitoring	:	To Check the Pollution Load
Method of Sampling	:	IS 5182 (Part 14)
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Duration (Hrs.)	:	24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb^1) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni^2) ng/m^3	Arsenic (as As^3) ng/m3	Benzo (a) pyrene (as BAP^4) ng/m^3	Benzene ($C6H6^5$) ug/m3
02/01/2025	40.60	80.40	9.80	22.40	24.20	ND	1.58	15.60	ND	ND	ND	ND
06/01/2025	42.50	70.40	8.50	26.20	26.20	ND	0.29	14.40	ND	ND	ND	ND
09/01/2025	44.40	74.20	8.90	28.20	28.20	ND	1.31	16.00	ND	ND	ND	ND
13/01/2025	41.00	66.60	10.20	25.20	25.20	ND	1.40	13.80	ND	ND	ND	ND
16/01/2025	43.60	68.20	11.30	27.30	27.20	ND	1.40	15.20	ND	ND	ND	ND
20/01/2025	42.70	67.60	12.20	26.50	25.50	ND	1.39	14.60	ND	ND	ND	ND
23/01/2025	44.00	72.40	9.80	24.80	28.40	ND	1.44	16.50	ND	ND	ND	ND
27/01/2025	40.20	74.80	10.40	28.00	24.90	ND	1.52	12.90	ND	ND	ND	ND
Minimum	40.20	66.60	8.50	22.40	24.20	-	0.29	12.90	-	-	-	-
Maximum	44.40	80.40	12.20	28.20	28.40	-	1.58	16.50	-	-	-	-
Average	42.38	71.83	10.14	26.08	26.23	-	1.29	14.88	-	-	-	-
NAAQM Standards	60	100	80	80	100	1	2	400	20	6	1	5
Test Method	40CFR Appendix L Part 53 CPCB Guidelines	IS:5182 (P-23)	IS:5182 (P-2)	IS:5182 (P-6)	IS:5182 (P-9)	NL/SOP /AAQ-11	IS:5182 (P-10)	Method of Air Sampling & Analysis	NL/SOP/AAQ-13	NL/SOP/ AAQ-12	IS:5182 (P-12)	IS:5182 (P-11)

Remark:

*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

TC-14814

AUTHORISED

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142500000013F, 65F, 122F, 172F, 226F, 308F, 394F, 462F
Test Report Date: 04/02/2025

Sample Particulars

Nature of the Sample : **Ambient Air Quality Monitoring**
Sampling Location : Effluent Treatment Plant
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 14)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m^3	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m^3	Benzene (C6H6[5]) ug/m3
02/01/2025	44.00	74.20	9.18	20.20	27.10	ND	1.61	13.20	ND	ND	ND	ND
06/01/2025	46.60	54.60	9.20	24.40	28.10	ND	0.25	12.60	ND	ND	ND	ND
09/01/2025	48.30	78.20	8.20	21.60	28.80	ND	1.38	16.50	ND	ND	ND	ND
13/01/2025	45.30	78.60	10.50	22.40	26.50	ND	1.46	15.80	ND	ND	ND	ND
16/01/2025	47.00	56.60	8.50	24.90	25.80	ND	1.41	13.90	ND	ND	ND	ND
20/01/2025	44.80	72.20	11.90	23.60	27.50	ND	1.28	13.30	ND	ND	ND	ND
23/01/2025	46.20	75.40	12.50	20.80	28.00	ND	1.45	17.60	ND	ND	ND	ND
27/01/2025	47.80	60.40	8.90	21.80	23.80	ND	1.52	12.80	ND	ND	ND	ND
Minimum	**44.00**	**54.60**	**8.20**	**20.20**	**23.80**	-	**0.25**	**12.60**	-	-	-	-
Maximum	**48.30**	**78.60**	**12.50**	**24.90**	**28.80**	-	**1.61**	**17.60**	-	-	-	-
Average	**46.25**	**68.78**	**9.86**	**22.46**	**26.95**	-	**1.30**	**14.46**	-	-	-	-
NAAQM Standards	60	100	80	80	100	1	2	400	20	6	1	5
Test Method	40CFR Appendix L Part 53 CPCB Guidelines	IS:5182 (P-23)	IS:5182 (P-2)	IS:5182 (P-6)	IS:5182 (P-9)	NL/SOP /AAQ-11	IS:5182 (P-10)	Method of Air Sampling & Analysis	NL/SOP/AAQ-13	NL/SOP/ AAQ-12	IS:5182 (P-12)	IS:5182 (P-11)

Remark:
*NAAQS: National Ambient Air Quality Standards, Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

TC-14814

(AUTHORISED SIGNATORY)
(RAVINDER MITTAL)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142500000014F, 66F, 123F, 173F, 227F, 309F, 395F, 463F
Test Report Date: 04/02/2025

Sample Particulars

Nature of the Sample : **Ambient Air Quality Monitoring**
Sampling Location : New Tank Farm
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 14)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m³	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m³	Benzene (C6H6[5]) ug/m3
02/01/2025	47.40	72.80	10.40	22.20	26.20	ND	1.51	15.40	ND	ND	ND	ND
06/01/2025	45.40	53.40	11.20	20.40	27.50	ND	0.32	14.60	ND	ND	ND	ND
09/01/2025	47.40	76.80	9.20	21.60	29.10	ND	1.32	17.20	ND	ND	ND	ND
13/01/2025	45.70	77.20	12.40	23.50	28.40	ND	1.46	16.20	ND	ND	ND	ND
16/01/2025	47.80	56.60	8.90	22.70	25.50	ND	1.41	12.80	ND	ND	ND	ND
20/01/2025	49.60	72.40	9.80	25.50	24.50	ND	1.39	13.80	ND	ND	ND	ND
23/01/2025	48.30	74.20	10.20	24.40	26.50	ND	1.00	14.90	ND	ND	ND	ND
27/01/2025	45.30	60.60	11.40	20.90	23.80	ND	1.29	16.40	ND	ND	ND	ND
Minimum	**45.30**	**53.40**	**8.90**	**20.40**	**23.80**	-	**0.32**	**12.80**	-	-	-	-
Maximum	**49.60**	**77.20**	**12.40**	**25.50**	**29.10**	-	**1.51**	**17.20**	-	-	-	-
Average	**47.11**	**68.00**	**10.44**	**22.65**	**26.44**	-	**1.21**	**15.16**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:
*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

TC-14814

(AUTHORISED SIGNATORY)
(RAVINDER MITTAL)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142500000558F, 632F, 733F, 805F, 910F, 996F, 1082F, 1166F
Test Report Date: 06/03/2025

Sample Particulars

Nature of the Sample : **Ambient Air Quality Monitoring**
Sampling Location : Wax Sector Cooling Tower
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 14)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m³	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m³	Benzene (C6H6[5]) ug/m3
03/02/2025	37.20	69.80	16.40	26.50	28.20	ND	1.54	17.20	ND	ND	ND	ND
06/02/2025	39.40	75.20	14.50	28.90	26.50	ND	0.38	15.40	ND	ND	ND	ND
10/02/2025	50.60	77.30	15.60	24.40	28.40	ND	1.46	15.80	ND	ND	ND	ND
13/02/2025	50.20	63.40	16.10	22.50	30.10	ND	1.54	17.70	ND	ND	ND	ND
17/02/2025	38.20	67.40	15.40	23.40	24.80	ND	1.50	15.10	ND	ND	ND	ND
20/02/2025	37.30	64.80	14.40	24.00	28.10	ND	1.59	18.40	ND	ND	ND	ND
24/02/2025	44.70	63.20	17.80	26.50	27.20	ND	1.48	15.90	ND	ND	ND	ND
27/02/2025	42.20	65.20	16.60	25.50	29.30	ND	1.60	16.40	ND	ND	ND	ND
Minimum	**37.20**	**63.20**	**14.40**	**22.50**	**24.80**	-	**0.38**	**15.10**	-	-	-	-
Maximum	**50.60**	**77.30**	**17.80**	**28.90**	**30.10**	-	**1.60**	**18.40**	-	-	-	-
Average	**42.48**	**68.29**	**15.85**	**25.21**	**27.83**	-	**1.39**	**16.49**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:
*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

TC-14814

(AUTHORISED SIGNATORY)
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Test Report

Issued To M/s Indian Oil Corporation Limited
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142500000559F, 633F, 734F, 806F, 911F, 997F, 1083F, 1167F
Test Report Date: 06/03/2025

Sample Particulars

Nature of the Sample : **Ambient Air Quality Monitoring**
Sampling Location : Bazaar Gate
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 14)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m³	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m³	Benzene (C6H6[5]) ug/m3
03/02/2025	37.30	76.20	11.20	24.20	26.40	ND	1.48	13.40	ND	ND	ND	ND
06/02/2025	39.40	67.20	10.40	28.30	28.20	ND	0.40	16.20	ND	ND	ND	ND
10/02/2025	41.20	71.20	11.00	30.50	25.50	ND	1.41	18.20	ND	ND	ND	ND
13/02/2025	38.80	62.20	12.20	27.70	27.70	ND	1.50	15.40	ND	ND	ND	ND
17/02/2025	40.40	64.40	13.30	29.20	29.40	ND	1.52	17.80	ND	ND	ND	ND
20/02/2025	39.50	64.10	14.40	28.50	27.50	ND	1.48	16.20	ND	ND	ND	ND
24/02/2025	41.10	69.20	11.60	26.60	30.20	ND	1.54	18.00	ND	ND	ND	ND
27/02/2025	37.70	71.50	12.00	31.20	26.60	ND	1.46	14.90	ND	ND	ND	ND
Minimum	**37.30**	**62.20**	**10.40**	**24.20**	**25.50**	-	**0.40**	**13.40**	-	-	-	-
Maximum	**41.20**	**76.20**	**14.40**	**31.20**	**30.20**	-	**1.54**	**18.20**	-	-	-	-
Average	**39.43**	**68.25**	**12.01**	**28.28**	**27.69**	-	**1.35**	**16.26**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:
*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

TC-14814

(AUTHORISED SIGNATORY)
(RAVINDER MITTAL)

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Test Report

Issued To M/s Indian Oil Corporation Limited
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142500000560F, 634F, 735F, 807F, 912F, 998F, 1084F, 1168F
Test Report Date: 06/03/2025

Sample Particulars

Nature of the Sample : **Ambient Air Quality Monitoring**
Sampling Location : Effluent Treatment Plant
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 14)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m³	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m³	Benzene (C6H6[5]) ug/m3
03/02/2025	40.80	70.50	11.20	23.30	25.50	ND	1.51	15.40	ND	ND	ND	ND
06/02/2025	42.20	50.80	12.40	27.70	26.10	ND	0.39	14.10	ND	ND	ND	ND
10/02/2025	44.60	73.30	13.00	24.50	27.40	ND	1.28	18.20	ND	ND	ND	ND
13/02/2025	41.20	74.20	13.20	25.50	23.30	ND	1.36	17.70	ND	ND	ND	ND
17/02/2025	43.40	52.40	10.50	27.30	24.50	ND	1.35	15.50	ND	ND	ND	ND
20/02/2025	40.50	48.20	13.40	26.60	25.10	ND	1.17	16.60	ND	ND	ND	ND
24/02/2025	42.30	70.90	14.50	23.80	26.20	ND	1.35	19.20	ND	ND	ND	ND
27/02/2025	43.30	56.60	10.90	24.80	21.90	ND	1.42	14.90	ND	ND	ND	ND
Minimum	**40.50**	**48.20**	**10.50**	**23.30**	**21.90**	-	**0.39**	**14.10**	-	-	-	-
Maximum	**44.60**	**74.20**	**14.50**	**27.70**	**27.40**	-	**1.51**	**19.20**	-	-	-	-
Average	**42.29**	**62.11**	**12.39**	**25.44**	**25.00**	-	**1.23**	**16.45**	-	-	-	-
NAAQM Standards	60	100	80	80	100	1	2	400	20	6	1	5
Test Method	40CFR Appendix L Part 53 CPCB Guidelines	IS:5182 (P-23)	IS:5182 (P-2)	IS:5182 (P-6)	IS:5182 (P-9)	NL/SOP /AAQ-11	IS:5182 (P-10)	Method of Air Sampling & Analysis	NL/SOP/AAQ-13	NL/SOP/ AAQ-12	IS:5182 (P-12)	IS:5182 (P-11)

Remark:
*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

TC-14814

(AUTHORISED SIGNATORY)
(RAVINDER MITTAL)

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Test Report

Issued To M/s Indian Oil Corporation Limited
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142500000561F, 635F, 736F, 808F, 913F, 999F, 1085F, 1169F
Test Report Date: 06/03/2025

Sample Particulars

Nature of the Sample : **Ambient Air Quality Monitoring**
Sampling Location : New Tank Farm
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 14)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m³	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m³	Benzene (C6H6[5]) ug/m3
03/02/2025	44.20	68.80	12.20	25.50	28.40	ND	1.48	17.20	ND	ND	ND	ND
06/02/2025	42.00	50.20	13.30	23.30	29.50	ND	0.46	16.30	ND	ND	ND	ND
10/02/2025	44.80	73.30	11.40	24.70	26.60	ND	1.40	19.50	ND	ND	ND	ND
13/02/2025	43.20	74.00	14.50	26.40	27.70	ND	1.52	18.30	ND	ND	ND	ND
17/02/2025	44.10	51.10	10.20	25.50	26.00	ND	1.50	14.20	ND	ND	ND	ND
20/02/2025	46.20	69.20	11.90	28.40	26.50	ND	1.48	15.30	ND	ND	ND	ND
24/02/2025	45.10	71.20	12.00	27.70	28.80	ND	1.10	16.60	ND	ND	ND	ND
27/02/2025	41.90	56.40	13.50	23.80	25.50	ND	1.38	18.80	ND	ND	ND	ND
Minimum	**41.90**	**50.20**	**10.20**	**23.30**	**25.50**	-	**0.46**	**14.20**	-	-	-	-
Maximum	**46.20**	**74.00**	**14.50**	**28.40**	**29.50**	-	**1.52**	**19.50**	-	-	-	-
Average	**43.94**	**64.28**	**12.38**	**25.66**	**27.38**	-	**1.29**	**17.03**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:
*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

TC-14814

(AUTHORISED SIGNATORY)
(RAVINDER MITTAL)

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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142500001248F, 1312F, 1434F, 1504F, 1515F, 1584F, 1779F, 1846F, 1988F
Test Report Date: 07/04/2025

Sample Particulars

Nature of the Sample : **Ambient Air Quality Monitoring**
Sampling Location : Wax Sector Cooling Tower
Purpose of Monitoring : To Check the Pollution Load
Method of Sampling : IS 5182 (Part 14)
Monitoring Conducted By : M/s Nitya Laboratories
Sampling Duration (Hrs.) : 24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m^3	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m^3	Benzene (C6H6[5]) ug/m3
03/03/2025	35.20	66.80	14.40	23.50	26.20	ND	1.44	14.20	ND	ND	ND	ND
07/03/2025	37.20	72.20	12.50	25.80	24.50	ND	1.28	12.40	ND	ND	ND	ND
10/03/2025	48.70	74.40	13.60	21.40	26.50	ND	1.36	12.80	ND	ND	ND	ND
13/03/2025	48.20	60.40	14.20	19.50	28.20	ND	1.44	15.70	ND	ND	ND	ND
17/03/2025	36.20	64.40	13.30	20.30	22.80	ND	1.40	13.20	ND	ND	ND	ND
20/03/2025	35.50	61.80	12.90	21.80	26.80	ND	1.49	16.40	ND	ND	ND	ND
24/03/2025	42.70	60.20	15.20	23.80	23.80	ND	1.38	13.90	ND	ND	ND	ND
27/03/2025	40.20	62.80	14.60	22.60	25.20	ND	1.50	13.40	ND	ND	ND	ND
31/03/2025	41.40	63.80	15.80	24.20	26.70	ND	1.35	14.80	ND	ND	ND	ND
Minimum	**35.20**	**60.20**	**12.50**	**19.50**	**22.80**	-	**1.28**	**12.40**	-	-	-	-
Maximum	**48.70**	**74.40**	**15.80**	**25.80**	**28.20**	-	**1.50**	**16.40**	-	-	-	-
Average	**40.59**	**65.20**	**14.06**	**22.54**	**25.63**	-	**1.40**	**14.09**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:
*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling

TC-14814

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(AUTHORISED SIGNATORY)
(RAVINDER MITTAL)

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NITYA LABORATORIES
43, Sector-A1 Ext., Bhalla Enclave, Channi Himmat, Jammu-180 015, J&K (UT), India
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info@nityalab.com www.nityalab.com

Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142500001249F, 1313F, 1435F, 1505F, 1516F, 1585F, 1780F, 1847F 1989F
Test Report Date: 07/04/2025

Sample Particulars

Nature of the Sample	:	**Ambient Air Quality Monitoring**
Sampling Location	:	Bazaar Gate
Purpose of Monitoring	:	To Check the Pollution Load
Method of Sampling	:	IS 5182 (Part 14)
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Duration (Hrs.)	:	24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m^3	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m^3	Benzene (C6H6[5]) ug/m3
03/03/2025	35.50	73.20	9.20	21.20	24.50	ND	1.38	10.40	ND	ND	ND	ND
07/03/2025	37.60	64.20	8.40	25.30	26.20	ND	1.30	13.20	ND	ND	ND	ND
10/03/2025	39.30	68.90	9.50	27.50	23.50	ND	1.31	15.20	ND	ND	ND	ND
13/03/2025	36.80	59.20	10.20	24.70	25.80	ND	1.40	12.40	ND	ND	ND	ND
17/03/2025	38.40	61.40	11.30	26.40	27.40	ND	1.42	14.80	ND	ND	ND	ND
20/03/2025	37.60	66.20	12.40	25.80	25.20	ND	1.38	13.40	ND	ND	ND	ND
24/03/2025	39.70	68.50	9.60	23.60	28.10	ND	1.44	15.80	ND	ND	ND	ND
27/03/2025	35.40	63.60	10.50	28.20	24.80	ND	1.36	11.70	ND	ND	ND	ND
31/03/2025	36.30	61.60	8.80	22.60	26.80	ND	1.32	12.60	ND	ND	ND	ND
Minimum	**35.40**	**59.20**	**8.40**	**21.20**	**23.50**	-	**1.30**	**10.40**	-	-	-	-
Maximum	**39.70**	**73.20**	**12.40**	**28.20**	**28.10**	-	**1.44**	**15.80**	-	-	-	-
Average	**37.40**	**65.20**	**9.99**	**25.03**	**25.81**	-	**1.37**	**13.28**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:
*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

TC-14814

NITYA LABORATORIES Authorised

(AUTHORISED SIGNATORY)
(RAVINDER MITTAL)

Nitya Work for Quality

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Test Report

Issued To	**M/s Indian Oil Corporation Limited** (Refinery Division) Assam Oil Division, Digboi, Distt.Tinsukia Assam, INDIA	ULR No.:	TC148142500001250F, 1314F, 1436F, 1506F, 1517F, 1586F, 1781F, 1848F 1990F
		Test Report Date:	07/04/2025

Sample Particulars

Nature of the Sample	:	**Ambient Air Quality Monitoring**
Sampling Location	:	Effluent Treatment Plant
Purpose of Monitoring	:	To Check the Pollution Load
Method of Sampling	:	IS 5182 (Part 14)
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Duration (Hrs.)	:	24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) µg/m3	Particulate Matter (PM10) µg/m3	Sulphur Dioxide (as SO2) µg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb^1) µg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni^2) ng/m^3	Arsenic (as As^3) ng/m3	Benzo (a) pyrene (as BAP^4) ng/m^3	Benzene ($C6H6^5$) ug/m3
03/03/2025	38.50	67.60	9.20	20.30	23.50	ND	1.41	12.40	ND	ND	ND	ND
07/03/2025	40.20	47.80	10.40	24.70	24.20	ND	1.29	11.20	ND	ND	ND	ND
10/03/2025	42.70	70.30	11.20	21.50	25.20	ND	1.18	15.30	ND	ND	ND	ND
13/03/2025	39.00	71.20	11.60	22.50	21.30	ND	1.26	14.70	ND	ND	ND	ND
17/03/2025	41.40	49.20	8.50	24.30	22.20	ND	1.25	12.80	ND	ND	ND	ND
20/03/2025	38.40	45.20	11.80	23.60	23.20	ND	1.07	13.60	ND	ND	ND	ND
24/03/2025	40.60	67.90	12.50	20.80	24.50	ND	1.28	16.40	ND	ND	ND	ND
27/03/2025	41.80	53.60	8.90	21.80	19.90	ND	1.32	11.90	ND	ND	ND	ND
31/03/2025	39.60	41.70	10.80	22.80	20.30	ND	1.28	15.80	ND	ND	ND	ND
Minimum	**38.40**	**41.70**	**8.50**	**20.30**	**19.90**	-	**1.07**	**11.20**	-	-	-	-
Maximum	**42.70**	**71.20**	**12.50**	**24.70**	**25.20**	-	**1.41**	**16.40**	-	-	-	-
Average	**40.24**	**57.17**	**10.54**	**22.48**	**22.70**	-	**1.26**	**13.79**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	**5**
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:

*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

TC-14814

Authorised

(AUTHORISED SIGNATORY)

(RAVINDER MITTAL)

CORPORATE OFFICE & CENTRAL LABORATORIES

PLOT NO. 118, CHURCH ROAD, BEHIND KAUSIK VATIKA, BHAGAT SINGH COLONY, BALLABHGARH, FARIDABAD - 121004, HARYANA, INDIA

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Nitya
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Test Report

Issued To **M/s Indian Oil Corporation Limited**
(Refinery Division)
Assam Oil Division, Digboi, Distt.Tinsukia
Assam, INDIA

ULR No.: TC148142500001251F, 1315F, 1437F, 1507F, 1518F, 1587F, 1782F, 1849F 1991F
Test Report Date: 07/04/2025

Sample Particulars

Nature of the Sample	:	**Ambient Air Quality Monitoring**
Sampling Location	:	New Tank Farm
Purpose of Monitoring	:	To Check the Pollution Load
Method of Sampling	:	IS 5182 (Part 14)
Monitoring Conducted By	:	M/s Nitya Laboratories
Sampling Duration (Hrs.)	:	24 Hrs.

Date of Sampling	Parameter											
	Particulate Matter (PM2.5) μg/m3	Particulate Matter (PM10) μg/m3	Sulphur Dioxide (as SO2) μg/m3	Nitrogen Dioxide (as NO2) ug/m3	Ozone (as O3) ug/m3	Lead (as Pb[1]) μg/ m3	Carbon Monoxide (as CO) mg/m3	Ammonia (as NH3) ug/m3	Nickel (as Ni[2]) ng/m3	Arsenic (as As[3]) ng/m3	Benzo (a) pyrene (as BAP[4]) ng/m3	Benzene (C6H6[5]) ug/m3
03/03/2025	42.20	65.80	10.20	22.50	26.50	ND	1.48	14.20	ND	ND	ND	ND
07/03/2025	40.20	47.20	11.30	20.30	27.50	ND	1.36	13.30	ND	ND	ND	ND
10/03/2025	42.80	70.30	9.40	21.70	24.50	ND	1.30	16.50	ND	ND	ND	ND
13/03/2025	41.00	71.30	12.50	23.40	25.80	ND	1.42	15.30	ND	ND	ND	ND
17/03/2025	42.70	48.20	8.20	22.80	24.20	ND	1.40	11.30	ND	ND	ND	ND
20/03/2025	44.00	66.20	9.90	25.40	24.80	ND	1.38	12.30	ND	ND	ND	ND
24/03/2025	43.20	68.20	10.50	24.70	26.60	ND	1.00	13.60	ND	ND	ND	ND
27/03/2025	39.70	53.40	11.60	20.80	23.50	ND	1.28	15.80	ND	ND	ND	ND
31/0372025	43.60	58.40	12.20	24.20	23.80	ND	1.32	12.60	ND	ND	ND	ND
Minimum	**39.70**	**47.20**	**8.20**	**20.30**	**23.50**	-	**1.00**	**11.30**	-	-	-	-
Maximum	**44.00**	**71.30**	**12.50**	**25.40**	**27.50**	-	**1.48**	**16.50**	-	-	-	-
Average	**42.16**	**61.00**	**10.64**	**22.87**	**25.24**	-	**1.33**	**13.88**	-	-	-	-
NAAQM Standards	**60**	**100**	**80**	**80**	**100**	**1**	**2**	**400**	**20**	**6**	**1**	5
Test Method	**40CFR Appendix L Part 53 CPCB Guidelines**	**IS:5182 (P-23)**	**IS:5182 (P-2)**	**IS:5182 (P-6)**	**IS:5182 (P-9)**	**NL/SOP /AAQ-11**	**IS:5182 (P-10)**	**Method of Air Sampling & Analysis**	**NL/SOP/AAQ-13**	**NL/SOP/ AAQ-12**	**IS:5182 (P-12)**	**IS:5182 (P-11)**

Remark:

*NAAQS: National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009
ND-Not Detected, [3]Arsenic-ND [DL- 0.5],[4]BAP-ND [DL- 0.5], [5]Benzene-ND [DL- 0.5], [1]Lead-ND [DL- 0.5],[2]Nickel-ND [DL- 1.0]
Sample Analyzed within Seven days from the date of sampling.

TC-14814

(AUTHORISED SIGNATORY)
(RAVINDER MITTAL)

LDAR Monitoring Report

for

Month of October to December 2024

at

IOCL, Digboi Refinery

Prepared by

NETEL (INDIA) LIMITED

Email: ems@netel-india.com,
emsne@netel-india.com

LDAR Monitoring Report for IOCL, Digboi

Name of client	M/s Indian Oli Corporation Assam Oil Division Digboi-786171 Assam
Name of Contractor	NETEL (INDIA) LIMITED Environment Management W-408, Rabale MIDC, TTC Industrial Area, Navi
Nature of job	LDAR Monitoring Report
Report Period	3 Months October to December,2024

For NETEL (INDIA) LIMITED

Shraddha Kere
Quality Manager

Fugitive Emission Survey for 3rd Quarter of 2024-2025

Environment Department is conducting quaterly " Fugitive Emission Survey" of potential soures of various process units under Leak Detection & Repair Program (LDAR)and as per revised Effluent & Emission Standerd.The locations for the survey were selected in consultation with the various departments The survey covered the following units and areas:

1. Process unit - AVU, CRU, DCU, MSQU, HGU, HDTU, SDU
2. Off site Area -Tank Area, SDU offsite, CRU offsite, OM&S, NTF

Leak definition: A leak is defined as the detection of VOC concentration more than the values (in PPM) specified below at the emission source using a hydrocarbon analyzer to measurement Protocol (US EPA – 453/R-95-017, 1995 Protocol for equipment leak emission estimates may be referred):

Sr. No.	Component	General Hydrocarbon (PPM)
		w. e. f. January 01, 2009
1	Pump/Compressor	5000
2	Valves/Flanges	3000
3	Other component	3000

In addition, any component observed to be leaking by sight, sound or smell regardless of concentration (liquid dripping, visible vapor leak) or presence of bubbles using soap solution should be considered as leak.
In this quarter, 5810 probable leak points are surveyed and 28 leaky points detected, which is having HC potential loss 39.20 Kg/Day

LEAK DETECTION AND REPAIR (LDAR) PROGRAM
VOC LEAK SUMMARY : October to December, 2024.

Sr. No.	Date	Unit	Equipment	Tag. No	Components	Line Size	Location	Statutory Limit PPM	Leak Type	Reading (ppm)	KG/per day	Readings After attending leak (ppm)	KG/per day	Total Saving
1	21-12-2024	CRU	Valve	P-002 B Discharge I/V	Valve	2"	Isolation Valve	3000	Gland	8500	0.710	150	0.007	0.703
2	21-12-2024		Valve	P-002 A Drain Line	Valve	1"	-	3000	Gland	7500	0.616	60	0.003	0.613
3	21-12-2024	MSQU	Valve	036-PA-CF-002 A OUT LET LINE	Flange	3"	-	3000	Flange	8200	0.682	80	0.015	0.667
4	21-12-2024		Valve	037-PA-CF-016 B OUT LET LINE	Valve	3"	-	3000	Gland	9500	0.806	150	0.007	0.799
5	20-12-2024	HGU	Valve	10 KA-RP-101B 2nd discharge I/V	Valve	6"	-	3000	Gland	7600	0.625	70	0.003	0.622
6	24-12-2024	SDU	Valve	08- VV-325 A Inlet Line I/V U/S Flange	Flange	6"	-	3000	Flange	9500	0.806	110	0.019	0.787
7	24-12-2024		Valve	08-EE-00-318 B Inlet Line 1st I/V	Valve	10"	-	3000	Gland	8200	0.682	50	0.002	0.680

LEAK DETECTION AND REPAIR (LDAR) PROGRAM
VOC QUATERLY REPORT : OCTOBER TO DECEMBER, 2024
PLANTWISE SUMMARY

Sr. No.	Name of the Unit	Date of Monitoring	Total No of Points Monitored	Page No.	No. of Points Where leaks found beyond standard limits	Before Repair Leak (kg/day)	After Repair Leak (kg/day)
1	AVU	23-12-2024	551	10 to 26	0	0.000	0.000
2	DCU	23-12-2024	1043	27 to 58	0	0.000	0.000
3	CRU	21-12-2024	272	58 to 66	2	1.326	0.010
4	MSQU	21-12-2024	1012	67 to 97	2	1.488	0.028
5	HDTU	20-12-2024	164	97 to 102	0	0.000	0.000
6	HGU	20-12-2024	165	103 to 108	1	0.625	0.003
7	OM & S (CTF)	24-12-2024	174	108 to 113	0	0.000	0.000
8	OM&S (PPH)	26-12-2024	1119	113 to 147	0	0.000	0.000
9	SDU	24-12-2024	336	147 to 158	2	1.488	0.007
10	CRU off side Pump house	21-12-2024	267	158 to 166	0	0.000	0.000
11	NEW TANK FARM	26-12-2024	587	166 to 184	0	0.000	0.000
12	SDU (Off side Pump House)	24-12-2024	120	184 to 188	0	0.000	0.000
Total in Kg/day						**4.93**	**0.05**
Toatl in MT/Annum						**1.798**	**0.018**
Total Saving in kg/day							**4.88**
Total in MT/Annum							**1.78**

Verified by

Neelima Dalvi
Technical Manager

Checked by

Shraddha Kere
Quality Manager

LDAR Monitoring Report

for

Month of January to March 2025

at

IndianOil

IOCL, Digboi Refinery

Prepared by

NETEL (INDIA) LIMITED

Email: ems@netel-india.com,
emsne@netel-india.com

LDAR Monitoring Report for IOCL, Digboi

Name of client	M/s Indian Oli Corporation Assam Oil Division Digboi-786171 Assam
Name of	NETEL (INDIA) LIMITED Environment Management W-408, Rabale MIDC, TTC Industrial Area, Navi
Nature of job	LDAR Monitoring Report
Report Period	3 Months January to March, 2025

For NETEL (INDIA) LIMITED

Shraddha Kere
Quality Manager

NETEL (INDIA) LIMITED RABALE NAVI-MUMBAI-400701

Fugitive Emission Survey for 4rth Quarter of 2024-2025

Environment Department is conducting quaterly " Fugitive Emission Survey" of potential soures of various process units under Leak Detection & Repair Program (LDAR)and as per revised Effluent & Emission Standerd.The locations for the survey were selected in consultation with the various departments The survey covered the following units and areas:

1. Process unit - AVU, CRU, DCU, MSQU, HGU, HDTU, SDU
2. Off site Area -Tank Area, SDU offsite, CRU offsite, OM&S, NTF

Leak definition: A leak is defined as the detection of VOC concentration more than the values (in PPM) specified below at the emission source using a hydrocarbon analyzer to measurement Protocol (US EPA – 453/R-95-017, 1995 Protocol for equipment leak emission estimates may be referred).

Sr. No.	Component	General Hydrocarbon (PPM) w. e. f. January 01, 2009
1	Pump/Compressor	5000
2	Valves/Flanges	3000
3	Other component	3000

In addition, any component observed to be leaking by sight, sound or smell regardless of concentration (liquid dripping, visible vapor leak) or presence of bubbles using soap solution should be considered as leak.
In this quarter, 5810 probable leak points are surveyed and 28 leaky points detected, which is having HC potential loss 39.20 Kg/Day

LEAK DETECTION AND REPAIR (LDAR) PROGRAM

VOC LEAK SUMMARY : JANUARY to MARCH, 2025.

Sr. No.	Date	Unit	Equipment	Tag. No	Components	Line Size	Location	Statutory Limit PPM	Leak Type	Reading (ppm)	KG/per day	Readings After attending leak (ppm)	KG/per day	Total Saving
1	17-03-2025	AVU	Pump Valve	P-0014 B Suction I/V	Valve	3"	Isolation Valve	3000	Gland	8500	0.710	120	0.006	0.704
2	18-03-2025	CRU	Pump Valve	P-002 A Discharge I/V	Valve	2"	Isolation Valve	3000	Gland	7500	0.616	150	0.007	0.609
3	18-03-2025	MSQU	V.GLAND	037-PA-CF-001A OUT LET LINE	Valve	3"	Isolation Valve	3000	Flange	8800	0.551	90	0.016	1.899
4	19-03-2025		VALVE	LINE TO 37-0226-B1AH 1st VALVE	Valve	3"	Isolation Valve	3000	Gland	6200	0.486	110	0.005	
5	20-03-2025		VALVE	LINE TO 37-0226-B1AH 2nd VALVE	Valve	3"	Isolation Valve	3000	Gland	5500	0.432	80	0.003	
6	21-03-2025		VALVE	LINE TO 37-0226-B1AH 3rd VALVE	Valve	3"	Isolation Valve	3000	Gland	5700	0.450	130	0.006	
7	19-03-2025	HDTU	Valve	09-FV-2602	Valve	2"	Isolation Valve	3000	Gland	8200	0.682	60	0.003	0.679
8	19-03-2025	HGU	F.JOINT	PRODUCT HYDROGEN LINE 2nd GATE VALVE	F.JOINT	3"	Isolation Valve	3000	Gland	6500	0.523	120	0.006	0.009
9	19-03-2025		F.JOINT	PRODUCT HYDROGEN LINE TO MSQU 1st GATE VALVE	F.JOINT	3"	Isolation Valve	3000	Gland	7800	0.625	80	0.003	
10	21-03-2025	SDU	Valve	KA -SC-101A/B discharge interconection I/V	Valve	10"	Isolation Valve	3000	Flange	6400	0.514	70	0.013	0.501

NETEL INDIA LIMITED RABALE NAVI-MUMBAI-400701

LEAK DETECTION AND REPAIR (LDAR) PROGRAM
VOC QUATERLY REPORT : JANUARY to MARCH, 2025
PLANTWISE SUMMARY

Sr. No.	Name of the Unit	Date of Monitoring	Total No of Points Monitored	Page No.	No. of Points Where leaks found beyond standard limits	Before Repair Leak (kg/day)	After Repair Leak (kg/day)
1	AVU	17-03-2025	551	10 to 26	1	0.710	0.006
2	DCU	17-03-2025	1043	27 to 58	0	0.000	0.000
3	CRU	18-03-2025	272	58 to 66	1	0.616	0.007
4	MSQU	18-03-2025	1012	67 to 97	4	1.929	0.030
5	HDTU	19-03-2025	164	97 to 102	1	0.682	0.003
6	HGU	19-03-2025	165	103 to 108	2	1.148	0.009
7	OM & S (CTF)	20-03-2025	174	108 to 113	0	0.000	0.000
8	OM&S (PPH)	20-03-2025	1119	113 to 147	0	0.000	0.000
9	SDU	21-03-2025	336	147 to 158	1	0.514	0.013
10	CRU off side Pump house	22-03-2025	267	158 to 166	0	0.000	0.000
11	NEW TANK FARM	22-03-2025	587	166 to 184	0	0.000	0.000
12	SDU (Off side Pump House)	21-03-2025	120	184 to 188	0	0.000	0.000
Total in Kg/day						**5.60**	**0.07**
Toatl in MT/Annum						**2.044**	**0.025**
Total Saving in kg/day							**5.53**
Total in MT/Annum							**2.02**

Verified by
Neelima Dalvi
Technical Manager

NETEL INDIA LIMITED
RABALE
NAVI-MUMBAI-400701

Checked by
Shraddha Kere
Quality Manager

Methane Monitoring Report

for

Month of January 2025

at

IOCL, Digboi Refinery

Prepared by

NETEL (INDIA) LIMITED

Email: ems@netel-india.com,
emsne@netel-india.com

LEAK DETECTION AND REPAIR (LDAR) PROGRAM

LDAR Monitoring Report for IOCL, Digboi

Name of client	M/s Indian Oli Corporation Limited Assam Oil Division Digboi-786171 Assam
Name of Contractor	NETEL (INDIA) LIMITED
	Environment Management Services W-408, Rabale MIDC, TTC Industrial Area, Navi Mumbai - 400 701
Nature of job	Methane Monitoring Report for IOCL, Digboi
Report Period	6 Months January to June-2025

For NETEL (INDIA) LIMITED

Shraddha Kere
Quality Manager

LEAK DETECTION AND REPAIR (LDAR) PROGRAM
METHANE LEAK SUMMARY : January to June, 2025.

Sr. No.	Date	Unit	Equipment	Tag. No	Components	Line Size	Location	Statutory Limit PPM	Leak Type	Reading (ppm)	KG/per day
1	03-01-2025	AVU	Flange	02-SDV-1103-A1 D/S Flange	Flange	4"	-	5500	Flange	3800	0.284
2	03-01-2025		Flange	02-PV-1104 D/S I/V U/S Flange	Flange	2"	-	6500	Gland	4300	0.327

LEAK DETECTION AND REPAIR (LDAR) PROGRAM
METHANE HLY REPORT : January to June, 2025
PLANTWISE SUMMARY

Sr. No.	Name of the Unit	Date of Monitoring	Total No of Points Monitored	Page No.	No. of Points Where leaks found beyond standard limits	Before Repair Leak (kg/day)
1	CPP	03-01-2025	200	08 to 12	0	0.000
2	HGU	02-01-2025	154	12 to 15	0	0.000
3	HGU Off side	03-01-2025	52	16 to 17	0	0.000
4	HDTU	02-01-2025	52	17 to 18	0	0.000
5	AVU	03-01-2025	100	18 to 20	2	0.611
6	DCU	03-01-2025	150	20 to 23	0	0.000
7	SDU	03-01-2025	50	24 to 25	0	0.000
8	CRU	03-01-2025	150	25 to 28	0	0.000
9	MSQU	03-01-2025	100	28 to 30	0	0.000
Total in Kg/day						**0.61**
Toatl in MT/Annum						**0.223**

Verified by

Neelima Dalvi
Technical Manager

Checked by

Shraddha Kere
Quality Manager

Annexure – 7

CREP – Present Status of Digboi Refinery

Sl No	Action Point	Present Status of Digboi Refinery
1.	Member Secretary, CPCB expressed serious concern on most of the Refineries not Monitoring all the New parameters (as per March, 2008 notification) in effluent and desired Refineries should develop capabilities to start monitoring each parameter and report the detail data to CPCB regularly. Further effluents discharged from the ETP outlet were found having high values of BOD and oil and grease indicating that effluent treatment facilities are not meeting standards and may require up-gradation. The effluent data to be sent CPCB on daily basis through the CPCB online air quality monitoring server	For Effluent, out of 21 parameters 9 Parameters i.e pH, oil and grease, BOD, COD, TSS, MLSS, Phenol, Sulphide & Cyanide are tested in Digboi Refinery daily. Reports of these tests are submitted to PCB, Assam regularly. Remaining tests are done by the Third-Party Nitya laboratories, 43, sector -A1 Ext. Bhalla Enclave, Channi Himmat, Jammu-180015, J&K (UT), India. Detailed up gradation study of ETP through M/s NEERI, Nagpur, was done in October 2014. Treated effluent from ETP is recycled to refinery as Fire water tank make up, cleaning and gardening purposes at ETP. Treated effluent is reused as make up for Coke Cutting water at delayed coking unit, Wax Sector Cooling Tower & Fire Water Network. During Oct'24 – Mar'25, 100% of treated effluent was reused.
2.	2.1 The PM Emission from furnace, boilers and captive power plant is not compiled in some of the units and the reason stated are (10 & 100 mg/Nm3 for FG and NG Respectively) too stringent and retrofitting like ESP or installation of filters for fuel is not feasible.	Emission of PM from furnace, boilers & Captive Power Plant is well within the prescribed limit due to the use of natural gas with very low Sulphur content and sweetened refinery fuel gas as fuel.
	2.2 Installation of low Nox burner is yet to be completed. Refineries shall give the status and time target for the same and if installation is not possible, reason to be given, so that decision could be arrived.	As natural gas is the primary fuel used at Digboi Refinery, NOx emissions from process units and Captive Power Plant are below the limit. Since the refinery is using natural gas, the formation of NOx is very low and always remains within the prescribed limit. Further, low NOx burners are also fitted in all the new units viz. Solvent De-waxing Unit, Hydro-treater Unit, Delayed Coking Unit and MSQ Unit

01.04.25

	2.3 IOC Refineries expressed inability to meet PM stipulations on neat fuel gas firing in furnaces. Member Secretary advised to generated data for both cases i.e. neat fuel gas firing and mixed (oil and gas)firing to look into the issue of PM standards compliance. All the Refineries are advised to submit in detail fuel gas & Oil analysis and emission data every month to HSE , RHQ for taking up with MoEF & CC.	• For firing, only fuel gas is used, and no liquid fuels are in use. • Emission of PM from stacks at Digboi refinery is within specified norms.
	2.4 PM in FCC regenerators is not achieved is some of the units. In some of the units it is proposed to be taken during revamp. Gujarat and Mathura Refineries to give detail action plan.	Not applicable for Digboi Refinery.
3	Member Secretary, CPCB expressed, although the units have started bioremediation of oily sludge, the disposal of bio-remediated material and storage will be a problem leading to space constraint and leachate problem on the nearby areas, He advised to find better avenues like Co-processing of oily sludge in cement plants or providing common remediation sites. Within 6 months.	The following actions taken by Digboi Refinery to liquidate legacy oily sludge stock: 1. 1st batch of 3000 MT of oily sludge sold to M/S Star Petrochem Industries via MSTC e-auction in March'22. Party lifted only 1333 MT till 31.03.2025. 2. Another batch of 3000 MT of oily sludge sold to M/S Falak Industries Fuel Pvt. Ltd via MSTC e-auction in May'23. Party lifted only 164.46 MT till 31.03.2025. 3. In view of poor upliftment by M/s Star Petrochem Industries & M/s Falak Industries Fuel Pvt. Ltd, fresh e-auction was done in Oct'24 & M/s KM Oils Pvt. Ltd., Gulbarga, Karnataka was allocated 6000 MT to be uplifted within 18 months. 4. Confined Bio-remediation batches are in progress since April,2024 FY-2024-25 (380.8 MT, from Oct'24 to Mar'25 (190.4 MT) 5. Insitu sludge processing FY-2024-25 (462.3 MT) 6. Reconciliation through internal committee in Feb'2025 (3560.7 MT)
4	Linking of CAAQMS & Stacks data to server. Target date June, 2013(to submit road map) and 7-8 months for Implementation. The pending Refineries shall submit activity-wise schedule within a month.	Online connectivity of Furnaces with heat capacity of 10MMkcal/hr. (HGU) established to CPCB Server. One no. of Continuous Ambient Air Quality Monitoring Station installed and commissioned in September 2012.

01.04.25

5	Member Secretary desired that all the parameters of treated effluent shall be Linked to CPCB server using online analyzer by taking advantage of the technological development. All the Refineries shall initiate necessary action for implementation of the same. Till such time, Refineries shall post the requisite data on CPCB server day-to-day basis (Target –July, 2013)	Online effluent monitoring & connectivity to CPCB server was commissioned on 28th December 2015. WebSite: Online Emission and Effluent Monitoring System (cpcb.gov.in)
6	Minimization of fugitive VOC emission from ETP 's- To meet the environmental standard, old Refineries shall take necessary action to cover effluent sump, API , TPI and other equipments exposed to atmosphere to reduce fugitive emission and also recovery facility.	1. For reduction of fugitive VOC emission from ETP, VOC reduction facility has been commissioned inside ETP on 04.12.2022 2. The CSS (Central Static Sump) inside the refinery has already been covered.
7	Member Secretary advised Refineries to follow LDAR programme in true spirit as per gazette notification of "Effluent & Emission Standards, 2008. Data shall be submitted in periodic intervals to CPCB	Quarterly LDAR surveys are being conducted. LDAR reports are being sent to MoEF & CC Bi-annually along with EC compliance report.
8	Member Secretary expressed concern on non-reporting incidents of fire, oil spills and pollution to CPCB. He advised all the Refineries to report such incidents to CPCB of concerned area during such occurrence.	No major oil spill occurred till 31.03.2025. If any occurs it shall be reported.

Place: Digboi

Date: 01.04.2025

Signature of the Authorized Person

01.04.25

Designation:

त्रिदिब सैकिया/ TRIDIB SAIKIA
मुख्य प्रबंधक (एच, एस व ई)
Chief Manager (HS,&E)
आई.ओ.सी.एल.(एओडी), डिगबोई
I.O.C. LTD. (AOD), DIGBOI

Annexure 8

इंडियन ऑयल कॉर्पोरेशन लिमिटेड
एओडि - डिगबोई रिफाइनरी
पो.ओ. डिगबोई, पिन-786171, असम

Indian Oil Corporation Limited
AOD - Digboi Refinery
P. O. Digboi, PIN: 786171, Assam
Tel. : 03751-262000
Fax : 03751-269015
E-mail : aoddigboi@indianoil.in
Website : www.iocl.com

असम ऑयल डिवीजन
Assam Oil Division

Ref: DR/CGM(TS&HSE)/NBWL/114/2025-26 **Date: 16.07.2025**

To,
The Principal Chief Conservator of Forests, Wildlife & Chief Wildlife Wardens, Assam
Aranya Bhavan, Panjabari,
Guwahati -781037.

Sub: Monitoring of Implementation of Terms and Conditions of Major Wildlife Proposals and submission of up-to-date annual compliance report.

Ref: (1) Govt. of India, MoEF &CC (Wildlife Division) letter F. No.6/51/2025-WL, dated 09.07.2025
(2) Principal Chief Conservator of Forests, Wildlife and Chief Wildlife Warden, Assam letter No. WL/FG.35/Compliance Certificate/Projects dated 11.07.2025 (copy enclosed as Annexure-I)

Through Divisional Forest Officer, Digboi Division, Digboi

Respected Sir,

With reference to the subject and letter cited above, Digboi Refinery is pleased to submit the up-to-date annual compliance report as per Annexure-II. The Annexure-II is enclosed herewith.

We humbly request your good office to kindly acknowledge the submitted annual compliance report.

Thanking You,

Yours faithfully,
For Indian Oil Corporation Limited
(Assam Oil Division)
Digboi Refinery
Dhanjit Baishya 16/07/25
(D Baishya)
Chief General Manager (TS & HSE)

धनजित बैश्य/Dhanjit Baishya
मुख्य महाप्रबंधक (टीएस व एच, एस CGM (TS&H, S&E)
आई.ओ.सी.एल. (एओडी)/I.O.C.L. (AOD)
डिगबोई /DIGBOI-786171

Enclosures: As above

Copy for information:

1. The Principal Chief Conservator of Forests & Head of Forest Force, Assam, Panjabari, Guwahati -781037.
2. Executive Director & Refinery Head, IOCL AOD Refinery

ANNEXURE-I

GOVERNMENT OF ASSAM
OFFICE OF THE PRINCIPAL CHIEF CONSERVATOR OF FORESTS (WILDLIFE) AND CHIEF WILDLIFE WARDEN, ASSAM::PANJABARI::GUWAHATI-37

Email Id :pccf.wl.assam@gmail.com

No. WL/FG.35/Compliance Certificate/Projects Date: 11.07.2025

To,

Chief General Manager (TS & HSE),
Digboi Refinery (Assam Oil Division), IOCL.

Sub: Monitoring of Implementation of Terms and Conditions of Major Wildlife Proposals and regarding

Ref: Govt. of India, MoEF & CC (Wildlife Division), letter F. No.6/51/2025-WL, dated 09.07.2025.

Sir,

With reference to the subject cited above, please find enclosed herewith a copy of letter received from Govt. of India, MoEF & CC (Wildlife Division), dated 09.07.2025 quoted under reference, the contents of which is self-explanatory, for your kind information and necessary action.

In view of the above, it is requested to kindly submit the up-to-date annual compliance report as per the enclosed Annexure-II through the Divisional Forest Officer under whose jurisdiction your proposal "Capacity Augmentation of Digboi Refinery to 1 MMTPA, Proposal No. WL/AS/IND/429055/2023" falls, for taking onward necessary action. Please submit the report on or before 18.07.2025 positively.

Enclo: As stated above.

Yours faithfully,

Vinay Gupta

(Dr. Vinay Gupta, IFS)
Principal Chief Conservator of Forests,
Wildlife & Chief Wildlife Warden, Assam

Copy for information and necessary action to DFO, Digboi Division, Digboi.

Vinay Gupta

Principal Chief Conservator of Forests,
Wildlife & Chief Wildlife Warden, Assam

Annexure II

Name of State: Assam Name of the project: Capacity Augmentation of Digboi Refinery to 1 MMTPA Proposal no.: WL/AS/IND/429055/2023 Date of approval/recommendation by the Standing Committee of the National Board for Wild Life: 27.02.2024	
Terms and conditions in order of approval letter	Status of implementation term/condition of the project (write "Yes" for the term/condition implemented and "No" for not implemented. If not implemented, give reason why project was allowed for completion when the term/ condition was not implemented
EIA with a scientifically robust Mitigation Plan shall have to be in place for taking appropriate steps to mitigate the adverse impacts on environment and wildlife in the event of breaking out of fire in the plant.	**YES** Rapid Risk Assessment Study (RRA) has been carried out by engaging NABET accredited consultant M/s Engineers India Limited to identify the hazards associated with the "NEW FACILITIES" under this project to analyse the consequences, draw suitable conclusions and provide necessary recommendations to mitigate the hazard/risk associated with the implementation of the new project facilities. Under the new facility for mitigation of fire inside new Golai Tank farm near Digboi marketing terminal, 2(two) numbers of Fire water tanks (each of capacity 4000 KL) with associated Fire Water pumps i.e. 2 nos of jockey motor driven (each of capacity 50m3/hr), 4 nos of Main Fire water pumps diesel driven (each of capacity of 410 m3/hr) have been considered to restrict hazard within Tank farm. Also, for mitigation of fire inside existing Refinery for the revamped facilities, 2(two) new fire water pumps with diesel driven (each of capacity 410 m3/hr) have been considered along with the existing firefighting system, fire prevention and protection facility (like HVLRM, water spray system, Hydrant, monitor, rim seal, HC detectors etc.) to restrict the fire within boundary. In addition to the RRA, Quantitative risk assessment (QRA) has also been recommended before commissioning of the project. Accordingly, action has been initiated to carry out the QRA study before commissioning of the project facilities.
At least 2% amount of the estimated cost of the project should be deposited as CORPUS fund to the	**YES** An amount of Rs. 14,80,40,000 (Rupees fourteen crore eighty lakh & forty thousand Only) has been deposited as corpus fund to the Chief Wildlife Warden for Conservation of Wildlife &

Chief Wildlife Warden for Conservation of Wildlife & Human Animal Conflict mitigation measures.	Human Animal Conflict mitigation measures. The deposited corpus amount is 2% of the approved Digboi Refinery expansion project Cost (Rs. 740.20 Crore). (1) Payment of Rs. 14.80 Crore made through NEFT UTR NO: SBIN524093816642--CHIEF WILDLIFE WARDEN, TRANSACTION DATE: 02-04-2024 (Payment receipt of Rs 14.80 Cr is enclosed as Annexure-IIA) (2) Payment of Rs. 40000/-(Rupees Forty thousand only) made through NEFT UTR NO: SBIN32419Z665769--CHIEF WILDLIFE WARDEN, TRANSACTION DATE: 10-07-2024 (Cash Credit Statement of Rs 40,000/- is enclosed as Annexure-IIB)
The User Agency shall also implement the conservation plan submitted along with the project proposal.	**YES** A total amount of Rs. 20.0 lakhs (for first 3 years of implementation of project) towards wildlife conservation in the surrounding areas of project site has been earmarked. The Wildlife Conservation Plan (WCP) has been submitted to Divisional Forest Officer (DFO), Digboi for further actions. DFO, Digboi Division has forwarded the letter to PCCF, Guwahati vide letter no. A/G-8 (a)/Diversion Proposal/2023/1239 dated 10/05/2023. (The DFO letter is enclosed as Annexure-III.) Digboi Refinery shall ensure the implementation of the submitted conservation plan in consultation with the DFO, Digboi Division
An annual compliance certificate on the stipulated conditions shall be submitted by the User Agency to the State Chief Wildlife Warden and an annual compliance certificate shall be submitted by the State Chief Wildlife Warden to Government of India.	**YES** (1) 1st compliance report submitted to The Principal Chief Conservator of Forests, Wildlife & Chief Wildlife Wardens, Assam on 03.04.2024. (2) 2nd compliance report is submitted with this letter on 16.07.2025.

ANNEXURE-II

Payment receipt of Rs 14.80 Cr to Chief Wildlife Warden for 1.0 MMTPA DR Expansion Project

Account Number :	_00000010776289584						
Description :	OD Clean (C and I)						
Name :	INDIAN OIL CORPORATION LIMTED						
Currency :	INR						
Corporate Address :	INDIAN OIL BHAVAN G-9 ALI YAVAR JUNG MARG BANDRA (EAST) MUMBAI MUMBAI MAHARASHTRA-400051						
Branch :	DIGBOI(06000)						
IFS Code :	SBIN0006000						
Start Date :	02-04-2024						
End Date :	02-04-2024						
Txn Date	Value Date	Description	Ref No./Cheque No.	Branch Code	Debit	Credit	Balance
02-04-2024	02-04-2024	TO TRANSFER-NEFT UTR NO: SBIN524093816642-- CHIEF WILDLIFE WARDEN	TRANSFER TO 4697160044302 / CHIEF WILDLIFE WARDEN	6000	14,80,00,000.00		

Cash Credit Statement

Account Statement

Account Number	00000010776289584	**Description**	OD Clean (C and I)
Name	INDIAN OIL CORPORATION LIMTED	**Currency**	INR
Corporate Address	INDIAN OIL BHAVAN G-9 ALI YAVAR JUNG MARG BANDRA (EAST) MUMBAI MUMBAI, MAHARASHTRA - 400051	**Branch**	DIGBOI (06000)
Rate of interest (% p.a.)	16.0%	**IFS Code**	SBIN0006000
Book Balance	-57,77,470.45	**Available Balance**	39,42,22,529.55
Hold Value	0.00		
Uncleared Amount	0.00	**Drawing Power** 40,00,00,000.00	**Limit Sanctioned** 40,00,00,000.00
Balance as on 10 Jul 2024	0.00	Return to Account Statement	

10-Jul-24 (10-Jul-2024)	TO TRANSFER CHIEF WILDLIFE WARDEN NEFT UTR NO: SBIN324192665769 -TRANSFER TO 4697154044300 BY TRANSFER	TRANSFER TO 4697154044300 / CHIEF WILDLIFE WARDEN	6000	40,000.00	-2,688.30

Annexure 9

~~Annexure III~~

Government of Assam
Office of the Divisional Forest Officer
Digboi Division: Digboi

Ph.No.03751-264433 *E-mail: dfodigboi@gmail.com*

Letter No. A/G-8 (a)/Diversion Proposal/2023/1239 Dated:10/05/2023

To,

The Principal Chief Conservator of Forests, Wildlife
& Chief Wildlife Warden, Assam, Aranya Bhawan,
Panjabari, Guwahati-37

Sub:- Conservation Plan with Budgetary allocation for Digboi Refinery Expansion Project under IOCL - regarding.

Sir,

In inviting a reference to the subject cited above, I have the honour to forward herewith the Conservation Plan with Budgetary allocation for Digboi Refinery Expansion Project under IOCL as received from the Chief General Manager (TS & HSE), Digboi Refinery, Indian Oil Corporation Limited for favour of your kind approval. A detailed wildlife management plan will be prepared in due course of time for management of other wildlife and habitats.

This is for favour of your kind information and necessary action.

Enclo :- Conservation Plan.

Yours faithfully

(T.C. Ranjith Ram, IFS)
Divisional Forest Officer
Digboi Division, Digboi

Memo No. B/G-8 (a)/Diversion/2023/1328 Dated:10/05/2023

Copy to the Chief General Manager (TS & HSE)) Indian Oil Corporation Limited (AOD), Digboi for his kind information and necessary action.

10/05/2023

(T.C. Ranjith Ram, IFS)
Divisional Forest Officer
Digboi Division, Digboi

CONSERVATION PLAN FOR SCHEDULE - I SPECIES

The Conservation Plan would focuses on conservation of habitats of Schedule-I species identified during the EIA process. Support in the form of donation of funds and active participation in awareness campaigns will be provided to the existing management plans undertaken by the Forest Department in the area. Awareness drives will be undertaken targeting different group of society at different times. During these, dialogue with locals will be established and importance of co-existence of these species will be explained.

Conservation of Schedule - I species

The schedule-I species are found in the surrounding areas of the project site. Wildlife Conservation Plan for threatened species is prepared and IOCL Digboi refinery will abide by the same. The following species are comes under Schedule-I category of Indian Wildlife Protection Act 1972.

Table 10.6 Listing of Schedule I species in the study area

Sl. No.	Species Name	Scientific Name
Bird		
1	Black kite	*Milvus migrans*
2	Crested Serpent Eagle	*Spilornis cheela*
3	Great Indian hornbill	*Buceros bicornis*
4	Hill Myna	*Gracula religiosa*
5	Mountain Bamboo Partridge	*Bambusicola fytchii*
6	Oriental pied hornbill	*Anthracoceros albirostris*
7	Shikra	*Accipiter badius*
8	Slender billed vulture	*Gyps tenuirostris*
9	White-rumped Shama	*Copsychus malabaricus*
10	Wreathed Hornbill	*Aceros undulatus*
Reptile		
11	Indian Rock Python	*Python molurus*
12	Bengal Monitor Lizard	*Varanus bengalensis*
13	Indian Flapshell Turtle	*Lissemys punctata*
Mammal		
14	Asian Elephant	*Elephas maximus*
15	Common leopard	*Panthera pardus*
16	Bengal Slow Loris	Nycticebus bengalensis
17	Western Hoolock Gibbon	Hoolock hoolock

Avifauna Conservation

Habitat: The above 10 species of birds are found in terrestrial ecosystem and forested areas of Dihing Patkai reserve forest.

Threat: Degradation of forested areas, chemicals in the carcasses, night operation, Tea factory works etc.

Conservation Action:

- The villagers, school children, industry workers working in the vicinity are to be made aware about the importance of wildlife, its habitat, importance of conservation etc.
- IOCL would support the Forest Department for habitat improvement program.
- IOCL will also conduct awareness campaigns at the village level to make the locals aware about the protected species in the area; their behaviour, habitat, ecology, breeding/nesting seasons, threats to habitats and species, laws regarding protection of species. Awareness generation campaigns will include preparation of brochures in local language, film shows and display of posters, etc.
- IOCL will ensure that minimum illumination comes out from the project area.
- Special care to be taken for identification of vulture nests, if any, and maintain distance from the nests.

Responsibilities: Primary responsibility lies with Assam Forest Department, and Digboi Wildlife Division of Assam. Secondary responsibility lies with IOCL who will support with monetary fund for conservation.

Reptile Conservation

Habitat: The above 03 species of reptiles are found in river banks, homestead gardens and forested areas of Dihing Patkai reserve forest depending the availability of food.

Threat: Degradation of forested areas, hunting by people, road kills etc.

Conservation Action:

- Identify basking sites of this species and enhance protection of these sites through village communities.
- Awareness campaigns to be carried out among village communities, focusing on local schools for protection of the species.
- While laying approach road, measures will be taken to keep natural drainage unhindered, by construction of culverts, which will provide crossing points for reptiles and minimize risk of road kill.
- Project proponent shall comply with all the pollution control and other conditions imposed in the environmental clearance by statutory authorities.
- It is also important to inform the workers about the presence of the species.

Responsibilities: Primary responsibility lies with Assam Forest Department, and Digboi Wildlife Division of Assam. Secondary responsibility lies with IOCL who will support with monetary fund for conservation.

Mammal Conservation

Habitat: The above 04 species of reptiles are found in forested areas of Jokai Dihing Patkai reserve forest and tea gardens.

Threat: Habitat fragmentation, human-animal conflict, blockage of wildlife corridor etc.
Conservation Action:

- Awareness campaign will be carried out in local villages, on conservation of leopards & elephants and their ecosystem services & values.
- Contributing to habitat improvement activity as planned by Forest Dept.
- IOCL would support the Forest Department for habitat improvement program and also in other programs for conservation of elephants.

- Project proponent shall comply with all the pollution control and other conditions imposed in the environmental clearance by statutory authorities.
- Conservation of the elephant's habitat and maintaining habitat connectivity by securing corridors;
- The management of human–elephant conflicts as part of an integrated land-use policy that recognizes elephants as economic assets from which local people need to benefit or at least no suffer;
- Better protection to the species through improved legislation and law enforcement, improved and enhanced field patrolling, and regulating/curbing trade in ivory and other elephant products

Responsibilities: Primary responsibility lies with Assam Forest Department, and Digboi Wildlife Division of Assam. Secondary responsibility lies with IOCL who will support with monetary fund for conservation.

10.11.1Step to Help Conservation

IOCL will formulate the competent team of experts headed by Head Environment to discuss with the forest department officials to know various existing habitat improvement and wildlife management activities conducted in study area. In consultation with the forest department, IOCL will provide support to the existing forest and wildlife conservation plans by earmarking separate, sufficient fund as mentioned in table below for such activities and through inclusion of 'wildlife awareness campaign's in various other IOCL programs from time to time. These campaigns will be conducted by team of experts in the field to make the locals aware about the protected species in the area; their behavior, habitat, ecology, breeding/nesting seasons, threats to habitats and species, laws regarding protection of species; through audio-visual aids, quiz competitions, arranging study tours to various locations in different seasons etc. on village level.

Financial Outlay

IOCL is committed to earmarked funds and utilized it only for purpose specified through forest department. Details of utilization of funds (amount is in lakhs) are given in following table.

Table 10.7: Details of utilization of funds (amount is in lakhs)

Sr. No.	Activity	Years from commencement of project			
		I	II	III	Total
I	**Direct & Indirect involvement of IOCL**	**Amount in lakhs**			
1.	To associate with forest department, and other agencies for effective implementation of conservation progamme	2.0	1.5	1.5	7.0
2	Identification of nesting sites for birds and habitat for reptiles, and mammals	1.5	1.0	1.5	5.0
3.	Cost of capacity building of forest department staffs	2.0	2.5	2.5	9.0
4.	Awareness Generation Meetings at villages (Development of Brochure; Arrangement of Meeting; Development of Posters)	1.0	1.5	1.5	4.0
	Total	**6.5**	**6.5**	**7.0**	**20.0**

IOCL will spend total **Rs. 20.0 lakhs** (for first 3 years of implementation of project) towards wildlife conservation in the surrounding areas of project site. IOCL has already submitted a letter to DFO, Digboi division earmarking Rs. 20 lakhs for conservation of Schedule I species in the surrounding areas.

Annexure -10

আমাৰ অসম

৬ জানুৱাৰী, ২০২৪ শনিবাৰ, যোৰহাট

ইণ্ডিয়ান অইল কৰ্পোৰেচন লিমিটেড
(অসম অইল সংগঠন)

ডিগবৈ শোধনাগাৰ, পো.অঃ ডিগবৈ, জিলাঃ তিনিচুকীয়া, পিনঃ ৭৮৬১৭১

ইণ্ডিয়ান অইল কৰ্পোৰেচন লিমিটেড, ডিগবৈ শোধনাগাৰত ১.০ এমএমটিপিএ লৈ ক্ষমতা বৃদ্ধিৰ বাবে পৰিবেশ অনুমোদন সম্পৰ্কীয় জাননী

ইয়াৰ দ্বাৰা জাননী দিয়া হৈছে যে পৰিবেশ, বন আৰু জলবায়ু পৰিবৰ্তন মন্ত্ৰালয়ে (MOEF&CC) ফাইল নং J-11011/482/2007-IA II (I), তাৰিখ ০১-০১-২০২৪ৰ ভিত্তিত ডিগবৈ শোধনাগাৰৰ ০.৬৫ এমএমটিপিএৰ পৰা ১.০ এমএমটিপিএলৈ ক্ষমতা বৃদ্ধিৰ বাবে পৰিবেশ অনুমোদন প্ৰদান কৰিছে। ক্লিয়াৰেন্স লেটাৰৰ প্ৰতিলিপি এছপিচিবি/ কমিটীৰ ওচৰত উপলব্ধ আৰু মন্ত্ৰালয়ৰ ৱেবছাইট আৰু **https://parivesh.nic.in/**তও চাব পাৰিব।

THE ASSAM TRIBUNE, DIBRUGARH

SATURDAY, JANUARY 6, 2024

Indian Oil Corporation Ltd.
(Assam Oil Division)

Digboi Refinery, P.O.: Digboi, Dist.: Tinsukia, PIN: 786171

NOTICE REGARDING ENVIRONMENTAL CLEARANCE ACCORDED TO IOCL, DIGBOI REFINERY FOR CAPACITY AUGMENTATION to 1.0 MMTPA

Notice is hereby given that the Ministry of Environment, Forest and Climate Change (MOEF&CC) vide File No. J-11011/482/2007-IA II (I), dated 01/01/2024 has accorded Environmental Clearance for capacity augmentation of Digboi Refinery from 0.65 MMTPA to 1.0 MMTPA. Copies of the clearance letter are available with the SPCB/ Committee and may also be seen at the Website of the Ministry and at **https://parivesh.nic.in/**.

DIGBOI REFINERY

INDIAN OIL COORPORATION LIITED

BIO-MONITORING SURVEY OF AQUATIC LIFE IN LOTIC AND LENTIC WATER BODIES IN AND AROUND DIGBOI REFINERY: MARCH 2025

Conducted By:

ABNS SCIENTIFIC SERVICES

Guwahati-781011, Assam; www.abnsscientific.com

PREFACE

Bio-Monitoring Survey of Aquatic Life in Lotic and Lentic Water Bodies in and around Digboi Refinery during February and March,2025 covering eleven locations

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❖ INTRODUCTION

Aquatic ecosystems, the most diverse on the planet, are home to the first life forms and support an extraordinary variety of plants and animals. Covering 71% of the Earth's surface, water is essential for all living organisms. These ecosystems provide critical resources for survival, including food, water, and ecosystem services such as climate regulation and nutrient cycling. Understanding the complexities of aquatic ecosystems is vital for their sustainable management and conservation.

However, the escalating demands of industrialization and growing populations have intensified the need for higher water quality. Human activities—such as unplanned urbanization, deforestation, chemical releases, untreated waste discharge, and excessive use of fertilizers and pesticides—pose significant threats to aquatic environments. To safeguard water resources and ensure their safety for human consumption, regular water quality assessment is crucial.

Biological Monitoring of Water Quality: A Crucial Tool

Biological monitoring is a key method for assessing the health of aquatic ecosystems. It involves examining changes in stream conditions, water quality, and habitat through the study of living organisms. Historically, invertebrates—particularly macroinvertebrates—have been widely used to monitor running water ecosystems. The relationships between macroinvertebrate community structures and environmental variables have been extensively researched, providing valuable insights into ecosystem health.

Advantages of Biological Monitoring

1. **Integrated Assessment of Ecosystem Quality**: Biological monitoring offers a holistic view of aquatic health, reflecting the cumulative effects of pollutants and environmental changes over time.
2. **Complementary to Physico-Chemical Evaluations:** While physico-chemical tests (e.g., pH, dissolved oxygen, nutrient levels) provide immediate snapshots of water quality, biological monitoring reveals the longer-term ecological impacts of these conditions.

3. **Reliable Detection of Anthropogenic Impacts**: Changes in the presence, absence, or abundance of certain species can indicate human-induced environmental stress. For example, sensitive species may decline due to pollution, while tolerant species may thrive in degraded conditions.
4. **Global Acceptance and Applicability**: The methods used in biological monitoring, especially those involving macroinvertebrates, are standardized and widely accepted by environmental agencies around the world. They are adaptable to various ecosystems, from freshwater rivers to coastal waters.

Key Indicators in Biological Monitoring

- **Macroinvertebrates:** Insects (e.g., mayflies, caddisflies), mollusks, crustaceans
- **Phytoplankton and Algae:** Indicators of nutrient enrichment and eutrophication
- **Fish Communities:** Reflect water quality and habitat integrity
- **Periphyton (Algal Biofilms):** Sensitive to changes in nutrient levels, light, and substrate conditions

Challenges and Future Directions

Despite its effectiveness, biological monitoring faces challenges such as seasonal variations, difficulties in taxonomic identification, and the influence of natural disturbances. However, advancements in molecular biology, such as environmental DNA (eDNA) analysis, offer promising tools for more accurate, efficient, and non-invasive monitoring in the future.

❖ BIO MONITORING METHODS and INDICES

Numerous indices have been developed for water quality assessment. Modern techniques involve using pollution-sensitive insects, particularly benthic macroinvertebrates, as biological indicators. Physico-chemical biomonitoring of aquatic plants includes analysing key water quality parameters—such as pH, temperature, dissolved oxygen, and heavy metals—and evaluating their impact on plant health and community composition. This approach helps assess the overall health of aquatic ecosystems.

Advantages of Biomonitoring:

a) **Integrated Assessment**: Biomonitoring provides a well-rounded assessment of water quality by factoring in both physicochemical and biological stressors, offering a more complete picture of ecosystem health.

b) **Long-Term Monitoring**: By tracking biological communities, biomonitoring captures the cumulative effects of pollution over time, delivering insights that go beyond short-term physicochemical measurements.

c) **Cost-Effective**: This method is often more affordable, particularly when utilizing easily accessible organisms that can be sampled without significant financial investment.

Limitations of Biomonitoring:

a) **Species Sensitivity**: Different plant species vary in their sensitivity to pollutants, which can complicate the interpretation of biomonitoring results and lead to inconsistencies.

b) **Spatial and Temporal Variability**: Water quality can fluctuate spatially and temporally, which can influence the reliability of biomonitoring data and make results less consistent.

c) **DataInterpretation**: Properly interpreting biomonitoring data demands specialized knowledge in ecology and toxicology, which can be challenging and may lead to complex analysis

Bio-monitoring as a Summary Parameter:

Bio-monitoring addresses the limitations of physico-chemical analyses by summing the effects of pollutants into easily measurable biological parameters. By evaluating the health of biological communities, bio-monitoring offers a more holistic view of environmental stressors.
Case Study: Digboi, Assam, India:
Digboi, known as India's oldest oil town, has undergone significant environmental changes due to oil exploration and refining. Bio-monitoring plays a crucial role in assessing the impact of these activities on the aquatic ecosystems of the region.

History of Digboi's Oil Industry:

- 1867: Discovery of oil
- 1889: First oil well drilled

- 1901: First refinery established
- World War II: Peak production at 7,000 barrels/day
- Current production: 240 barrels/day

Given the history of oil extraction and refining, biological monitoring in Digboi is essential for assessing the health of aquatic ecosystems and understanding the impacts of anthropogenic activities. Integrating biological assessments with physico-chemical data provides a comprehensive view of water quality.

❖ TYPES OF BIOLOGICAL ASSESSMENT*:*

Biological assessments are crucial for understanding the health and integrity of ecosystems. They involve studying various aspects of biological communities to evaluate environmental conditions. Here are some common types of biological assessments:

Terrestrial Ecosystems:

- **Wildlife Surveys:** Tracking and evaluating wildlife populations can offer key insights into habitat quality and help identify potential ecological threats.
- **Vegetation Surveys:** Assessing plant diversity, species composition, and overall health can serve as indicators of ecosystem condition and environmental disturbance.
- **Soil Biota Assessment:** Investigating soil organisms, including bacteria, fungi, and invertebrates, can provide valuable information about soil health and the efficiency of nutrient cycling.

Aquatic Ecosystems:

- **Benthic Macroinvertebrate Assessment:** This involves studying benthic organisms—such as insects, worms, and snails—that live at the bottom of water bodies. The presence or absence of these organisms can serve as indicators of water quality and pollution levels**.**
- **Fish Assessment:** Assessing fish populations—considering factors such as abundance, diversity, and health—can provide important insights into the overall health of an ecosystem**.**

- **Aquatic Vegetation Assessment:** Examining the types and abundance of aquatic plants can offer insights into nutrient levels, water depth, and the overall productivity of the ecosystem.

Other Methods:

- **Bioindicators:** Certain organisms can be used as indicators of environmental conditions. For example, specific species of lichens are particularly sensitive to air pollution, making them useful indicators of air quality.
- **Genetic Analysis**: Studying the genetic diversity of populations helps assess ecosystem health and its resilience to environmental changes.
- **Remote Sensing**: Satellite imagery and aerial photography are used to track large-scale changes in vegetation, land cover, and water bodies, aiding in comprehensive environmental monitoring.

Key Considerations(A):

- **Scale:** Biological assessments can be conducted at various scales, from small-scale site-specific studies to large-scale regional assessments.
- **Objectives:** The specific objectives of the assessment will determine the appropriate methods and data collection techniques.
- **Data Analysis:** Statistical methods are often used to analyze biological data and draw conclusions about ecosystem health.
- **Toxicity/Bioassay test** - To know acute or chronic effect of pollutants on biological system, this test is used both in laboratory by exposing specified number of test organisms directly in the water body or in test sample specified time period.

Bio-accumulation and bio-magnification studies – **Bioaccumulation** and **biomagnification** are two important ecological processes that describe the movement of pollutants through food chains. Bioaccumulation is the gradual build-up of a substance in the tissues of an organism over time. This occurs when an organism takes in more of a substance than it can eliminate. Several factors can influence bioaccumulation, including:

- **Persistence:** The ability of a pollutant to remain in the environment for a long time.
- **Bioavailability:** The ability of an organism to absorb a pollutant from its environment.

- **Lipid solubility:** Pollutants that are soluble in lipids (fats) tend to accumulate in fatty tissues.

Biomagnification: Biomagnification refers to the increasing concentration of a pollutant as it moves up the food chain. This happens because predators consume prey that have already accumulated the pollutant in their tissues. A classic example of biomagnification is DDT, a pesticide widely used in the mid-20th century. DDT accumulated in the tissues of small organisms, such as insects, and was then passed on to larger predators, like birds and fish. This process contributed to the decline of many bird populations, as the accumulated pollutant affected their reproduction and survival.

- Bioaccumulation and biomagnification studies are used to monitor the levels of pollutants in ecosystems and assess the potential risks to wildlife and human health.
- These studies help to identify and assess the potential risks of exposure to pollutants through the food chain.
- The results of bioaccumulation and biomagnification studies can inform the development of environmental regulations and policies.

Key Considerations(B):

- **Species Sensitivity:** Different species exhibit varying degrees of sensitivity to pollutants, with some being more susceptible to bioaccumulation and biomagnification.
- **Food Chain Dynamics:** The structure and interactions within food chains play a crucial role in influencing the extent and rate of biomagnification.
- **Environmental Factors:** Factors like temperature, pH, and nutrient availability can impact how pollutants accumulate and magnify throughout an ecosystem.

Bio assessment methods such as studying biotic communities and populations are crucial for understanding ecosystem health. Of these methods, studying biotic communities and the populations of various organisms is particularly common in bioassessment. This is because all organisms within an ecosystem are interconnected, and any disruption to one group can affect the entire system. These methods provide valuable insights into how organisms interact and depend on each other, as well as how changes in one group can influence the broader ecosystem. Additionally, ecosystem studies are essential for detecting gradual changes in both

the structure and function of ecosystems, making them indispensable for long-term environmental monitoring and management.

- **SITE SELECTION:**

The sites for bio-monitoring studies have been selected in consultation with the Digboi Refinery authorities, based on upstream and downstream conditions. Samples for physico-chemical and bio-monitoring analysis, as outlined in this study, are collected from the sites listed in Table

Table-1: Sampling Location

1.	Dihing - Margherita: 27.284275° 95.663482°
2.	Dihing - Makum: 27.292424° 95.616147°
3.	Dihing - Mirika: 27.273380° 95.564508°
4.	Dihing - Gammon bridge: 27.311866° 94.882183°
5.	Dihing mukh: 27.262802° 94.703727°
6.	Digboi river - Kenduguri: 27.402045° 95.580806°
7.	Digboi river - 15 KM pt: 27.345290° 95.479622°
8.	Digboi river - 26 KM pt: 27.323431° 95.364031°
9.	Dihing - before confluence with Digboi river: 27.302082° 95.347753°
10.	Dihing - after confluence with Digboi river: 27.302421° 95.344287°
11.	Digboi Sanitary Park River (Durgapukhuri): 27.387166^0 95.615823^0

The GPS map present below shows the sample collection sites:

Fig 1: GPS map showing the sampling sites

❖ AQUATIC ORGANISMS USED IN BIO-MONITORING:

Aquatic organisms play a crucial role in assessing the health of aquatic ecosystems. Their sensitivity to various pollutants, habitat degradation, and environmental stressors makes them effective indicators for monitoring water quality and ecosystem vitality. By studying these organisms, we can gain insights into the overall condition of aquatic environments. Below are some of the common aquatic organisms used in bio-monitoring:

Aquatic Organisms as Bio-indicators:

Aquatic organisms serve as essential bio-indicators due to their sensitivity to environmental stressors such as pollution and habitat degradation. By monitoring these organisms, we can assess the health of aquatic ecosystems. Below are common types of aquatic organisms used in bio-monitoring:

Macroinvertebrates:

- **Benthic Macroinvertebrates**: These organisms live on or near the bottom of water bodies and are highly sensitive to changes in water quality, pollution, and habitat disturbances. They are widely used to gauge water quality.

  Examples: Mayflies, stoneflies, caddisflies, midges, crayfish, and aquatic worms.

Fish:

- Fish Species: Fish have varying tolerances to pollution and environmental conditions. By monitoring the presence or absence of certain fish species, scientists can assess water quality and ecosystem health.

  Examples: Trout, bass, minnows, and catfish.

Algae and Aquatic Plants:

- **Aquatic Plants**: These plants reflect the health of the water body by indicating nutrient levels, water quality, and habitat conditions.
- **Algae**: Sensitive to pollution, algae can be used to monitor changes in water quality, as they respond quickly to variations in nutrient levels.

Microorganisms:

- **Bacteria**: Certain bacteria species are sensitive to pollution and can indicate the presence of contaminants in the water.
- **Diatoms:** These microscopic algae are useful for monitoring water quality and nutrient levels, as they react to environmental changes.

By analyzing the abundance, diversity, and health of aquatic organisms, scientists can gain valuable insights into the condition of aquatic ecosystems, which is essential for developing effective conservation and management strategies.

Among various groups of organisms, **macro-invertebrates** are especially well-suited for bio-monitoring and are used globally due to their numerous advantages. These organisms provide more ecological information through their taxonomic groups, making them reliable indicators. In bio-monitoring, taxonomic richness and composition of macroinvertebrates are key metrics, with identification typically carried out up to the family level.

Sample Collection:

For this study, samples were collected to assess general physico-chemical properties and bio-monitoring characteristics from the selected locations. A semi-quantitative sampling technique was employed using a D-frame net to collect benthic macroinvertebrates from various habitats within the Digboi River catchment. This method is commonly used in aquatic ecology to effectively evaluate water quality and ecosystem health**.**

❖ METHODOLOGY:

- **Habitat Diversity:** Sampling from various habitats, such as pools, riffles, and cascades, ensures a well-rounded and representative assessment of the aquatic fauna.
- **Preservation:** To preserve the collected organisms for future identification, they are stored in 70% ethyl alcohol.
- **Identification:** Organisms are identified at the family level, which is a standard and effective method commonly used in aquatic ecology studies.

Given the nature of the data collected, several analytical approaches can be applied to assess the health and biodiversity of the aquatic ecosystem:

1. Biodiversity Indices:

- **Species Richness**: Counting the total number of unique species or families present in the sample.
- **Species Diversity**: Indices such as the **Shannon-Wiener** or **Simpson's Index** provide a measure of both species richness and the evenness of species distribution.
- **Evenness**: This metric assesses how evenly individuals are distributed among species or families, providing insight into community balance.

2. Tolerance Values:

- **Biological Assessment Index (BAI)**: Tolerance values are assigned to each macro-invertebrate family based on their sensitivity to pollution. This helps assess the water quality and ecological condition.
- **Water Quality Index**: The BAI values can be used to calculate an overall water quality index, summarizing the health of different sampling sites.

3. Community Composition Analysis:

- **Ordination Techniques**: Methods like **Principal Component Analysis (PCA)** or **Non-metric Multidimensional Scaling (NMDS)** are used to visualize the relationships between sampling sites based on their macro-invertebrate assemblages.
- **Cluster Analysis**: Grouping sites based on the similarity of their macro-invertebrate communities helps identify patterns and assess ecological health.

4. Statistical Tests:

- **ANOVA or T-tests**: These tests compare the abundance or diversity of macro-invertebrates between different habitats or sampling sites.
- **Correlation Analysis**: This analysis explores relationships between macro-invertebrate metrics and environmental factors such as water temperature, pH, and dissolved oxygen.

Potential Insights from Data Analysis:

Analyzing the collected data could provide key insights into:

- **Water Quality**: The presence or absence of specific macro-invertebrate families can indicate the overall water quality and health of the ecosystem.
- **Habitat Preferences**: Understanding the distribution of macro-invertebrates across different habitats (e.g., pools, riffles, cascades) can reveal their ecological requirements.
    - **Impact of Human Activities**: Comparing macro-invertebrate communities upstream and downstream of pollution sources helps assess the effects of human activities on the aquatic ecosystem.
    - **Biodiversity Patterns**: The study contributes to understanding the biodiversity and ecological dynamics of benthic macro-invertebrates within the **Digboi River catchment.**

❖ **MACRO-INVERTEBRATES SAMPLE COLLECTION**:

Macro-invertebrate samples were collected according to standard procedures and stored in sterilized bottles. The samples were taken from 10 designated sampling stations, as previously mentioned, in February 2025.

A detailed overview of the sample collection procedure is provided in Figure 2 below.


GPS Map Camera
Powai Mukh No.1, Assam, India
Powai Mukh No.1, Assam, India
Lat 27.27388°
Long 95.564508°
14/03/23 11:00 AM GMT +05:30
Google


GPS Map Camera
Nowjan Gaon No.2, Assam, India
8V6J+WR9 Cammon Dolong, Buri Dihing Bridge, NH12, Nowjan Gaon No.2, Assam 785676, India
Lat 27.312448° Long 94.881491°
105 m
21%
1006 hpa
25.93° C
213° SW
31.0 µT
Google

Fig2: Collection of Macro-invertibrates in the present study

Collection of Water Samples:

Water samples were collected according to the standard methods outlined in the Standard Methods for the Examination of Water and Wastewater (APHA, 23rd edition). To analyze chemical variables, 1000 ml plastic containers were used. Water was collected facing upstream, as per the guidelines in APHA et al. (1971), and the containers were filled to the neck to minimize headspace. The samples were then transported to the laboratory in an ice-filled cooler box and stored at 4^0C for chemical analysis. All analyses were conducted within 24 hours of sample collection.

To ensure reliable results, each sample was analyzed in triplicate, and the average of these readings was used to minimize variability and provide more representative data.

❖ **KEY POINTS REGARDING SAMPLING:**

- **Representative Sampling**: It is critical to ensure that the collected sample accurately represents all habitats within the study area for a reliable assessment.
- **Individual Organism Count**: Counting the number of individual organisms helps assess the population sizes of different macro-invertebrate groups, providing valuable data for ecosystem health evaluation.
- **Sampling Methods**: The sampling method selected depends on the type of substratum where macro-invertebrates are found, ensuring appropriate habitat representation.

❖ THE ROLE OF BWQC IN WATER QUALITY EVALUATION:

The Biological Water Quality Criteria (BWQC) framework, developed by the Central Pollution Control Board (CPCB**)**, is essential for evaluating water quality based on macro-invertebrate family presence and abundance. The saprobic score method is used to assign values to families according to their pollution tolerance.

Key Aspects of BWQC:

- **Saprobic Values**: Higher saprobic values indicate greater tolerance to pollution, while lower values reflect higher sensitivity to contaminants.
- **Family-Level Identification**: BWQC assessments are based on identifying macro-invertebrates up to the family level.
- **Scoring System**: Each macro-invertebrate family is assigned a score from 1to 10, with 10 indicating high sensitivity to pollution and 1-2 indicating high tolerance.

Potential Data Analysis Approaches:

To analyze macro-invertebrate data and assess water quality using BWQC, the following approaches can be implemented:

1. **Calculating Saprobic Index**:
    - Sum the saprobic values of all identified macro-invertebrate families.
    - Divide the total by the number of individuals or families.
    - This gives the overall saprobic index of the sample.
2. **Comparing with BWQC**:
    - Compare the saprobic index to BWQC thresholds to categorize water quality (e.g., clean, moderately polluted, or heavily polluted).
    - Examine the presence or absence of pollution-sensitive or tolerant families to infer water quality conditions.
3. **Relating to Environmental Factors**:

- Explore how the saprobic index and macro-invertebrate abundance correlate with environmental factors like dissolved oxygen, pH, and temperature.
- Identify key environmental drivers influencing water quality.

4. **Temporal and Spatial Trends**:
    - Analyze changes in macro-invertebrate populations and saprobic indices over time to detect trends in water quality.
    - Compare data across different sampling sites to identify spatial variations in water quality.

Range of Saprobic Score	Range of Diversity Score	Water Quality	Water Quality Class	Indicator Colour
6-7	0.5-1.0	Slight pollution	B	Light Blue
3-6	0.3-0.9	Moderate pollution	C	Green
2-5	0.4-less	Heavy pollution	D	Orange
0-2	0-0.2	Severe pollution	E	Red

Table 2: Range of Saprobic Score

The samples are collected depending on the characteristic of River bed.

Macro-Invertebrate Sampling Procedures:

1. **Sampling from Boulders and Cobbles**:
    - **Method**: Randomly lift stones from the riverbed. Organisms attached to the boulders and cobbles are collected using soft forceps or gently brushed into a white tray for further examination.
2. **Sampling from Pebbles and Gravels**:
    - **Method**: Position a hand net firmly on the streambed, against the flow of water. Dislodge the organisms by gently kicking the streambed with your foot, allowing the disturbed material to flow into the net. After collecting the material, wash it through a sieve with a mesh size of 0.6 mm (as per ISO standards) to separate the organisms. The collected macro-invertebrates are then transferred into plastic bottles containing a 4% formalin solution for preservation.
3. **Sampling from Macrophyte-Covered River Beds**:

- **Method**: In areas where the riverbed is covered with macrophytes, uproot the plants and wash the roots into a sieve using water. The dislodged organisms are collected in a white tray. Macro-invertebrates are then carefully picked using forceps and preserved in 4% formalin for further study.

❖ IDENTIFICATION OF MACROINVERTEBRATES:

Macroinvertebrate specimens were sorted and identified based on guidelines from published journals and expert consultation. Larger specimens were documented using a digital camera, while smaller specimens were examined under a stereomicroscope for accurate identification.

Some of the macro invertibrates collected is shown in the figures below.

Fig 3: Some of Macro-invertibrates found in present study

❖ BIOLOGICAL MONITORING WORKING PARTY (BMWP) SCORE:

The BMWP (Biological Monitoring Working Party) score was originally developed in the United Kingdom and is not tied to any specific river catchment or geographical region. Despite this, the system has been widely adopted worldwide, with local modifications to account for regional differences in invertebrate species and environmental conditions.

The BMWP score is based on the assessment of macroinvertebrate communities and their sensitivity to organic pollution, acting as an indicator of the water's saprobic condition (level of organic pollution). Each macroinvertebrate family observed is assigned a saprobic indicator value on a scale from 1 to 10, with higher scores indicating sensitivity to organic pollution.

- **Highly sensitive families** are given the highest score of 10.
- **Pollution-tolerant families** are assigned the lowest score of 1.
- **Families with intermediate sensitivity** are given scores ranging from 2 to 9.

The BMWP score for a given sample is calculated by multiplying the number of families observed by their respective weightage value (as outlined in the BMWP score chart, Table 3). The results are summed to produce the total BMWP score.

In India, the original BMWP scoring system has been slightly modified to suit local conditions, incorporating or excluding specific families based on their presence or absence in Indian aquatic ecosystems. These modifications were made after extensive testing and consultation with experts. Table 3 provides a summary of the BMWP scoring system as adopted by the CPCB.

BMWP Score = Σ No. of families in one group × Weightage score

Table.3: BMWP score system adopted by CPCB

Sl No	Taxonomical Families	Weightage Score
1	Siphlonuridae, Heptageniidae, Leptophlebiidae, Ephemerelidae, Potaminthidae, Ephemeridae, Prosopistomatidae, Neoephemeridae, Ameletidae, Taeniopterygidae, Leuctridae,	10

	Capniidae, Perlodidae, Perlidae, Aphelocheridae, Leptoceridae, Georidae, Lepidostomatidae, Brachycentridae, Sericostomatidae, , Glossosomatidae, Helicopsychidae , Leptohyphidae	
2	Chloroperlidae	9
3	Euphaidae, Protoneuridae, Plathycnemididae, Lestidae, Gomphidae, Cordulegastridae, Aeshnidae, Corduliidae, Libellulidae, Macromiidae, Psychomyiidae, Philopotamidae, Cheumatopsychidae, Chrysomelidae, Hydrenidae,Sciomyzidae, Limoniidae	8
4	Caenidae, Nemouridae, Rhycophilidae, Polycaltropodidae, Limnephilidae, Stenopsychidae	7
5	Ancylidae, Hydrobiidae, Neritidae, Viviparidae, Thiaridae, Bithynidae, Unionidae, Pleuroceridae, Amblemidae, Septariidae, Assiminidae, Ampullaridae, Solecurtidae, Stenothyridae, Arcidae, Succinidae, Hydroptilidae, Palaemonidae, Atyidae, Genocentridae, Gammaridae, Potamidae, Parathelphusidae, Anthuridae, Niphargidae, Talitridae, Mysidae, Hymenosomatidae, Varunidae, Sesarmidae, Gecarcinucidae, Nereidae, Nephthyidae, Nereididae, Sabellidae, Pisionidae, Histriobdellidae, Megascolecidae, Coenagrionidae, Agriidae	6
6	Mesovelidae, Hydrometridae, Gerridae, Nepidae, Naucaridae, Notonectidae, Pleidae, Corixidae, Vellidae, Hebridae, Belastomatidae, Haliplidae, Hygrobidae, Dytiscidae, Gyrinidae, Hydrophilidae, Noteridae, Dryopidae, Elminthidae, Psephenidae, Heteroceridae, Elmididae, Scritidae, Eulichadidae, Histeridae, Curculionidae, Hydropsychidae, Ecnomidae, Tipulidae, Culicidae, Blepharoceridae, Simulidae, Nymphomyidae, Sarcophagidae, Stratiomyiidae, Ceratopogonidae, Pyralidae,Planariidae, Dendrocoeclidae , Carabidae, Hydrochidae, Staphylinidae	5
7	Baetidae, Sialidae, Corydalidae, Piscicolidae, Hirudinidae	4
8	Lymnaeidae, Planorbidae, Sphaeridae, Physidae, orbiculidae, Onchididae, Glossophonidae, Hirudidae, Erpobdellidae,	3

	Haemadipsidae, Salifidae, Dugesidae, Aselidae, Cirolanidae, Aegidae, Stenasellidae, Cymothoidae,	
9	Chironomidae, Syrphidae, Ephydridae, Muscidae, Psychodidae	2
10	Tubifiscidae, Naididae, Octochaetidae, Lumbricidae, Lumbricullidae	1

The Saprobic Score is calculated by

Saprobic Score = BMWP Score/ ∑Number of families encountered

❖ RESULTS AND DISCUSSION:

Understanding the Community Composition

The study reveals a diverse macro-invertebrate community in Digboi River, with representatives from three phyla: Arthropoda, Annelida, and Mollusca.

Key findings:

- **Dominant phyla:** Arthropoda is the most dominant phylum, followed by Mollusca.
- **Dominant classes:** Insecta and Gastropoda are the most represented classes.
- **Dominant orders:** Hemiptera, Decapoda, and Coleoptera are the most abundant orders within Insecta.
- **Dominant families:** Ancylidae, Ampullaridae, Haliplidae, Hydrometridae and Nemouridae are the most abundant families within Gastropoda.

Assessing Water Quality Using Macro-Invertebrates

While the study doesn't explicitly use a water quality index like BWQC, the presence and abundance of certain macro-invertebrate groups can provide valuable insights into water quality:

- **Pollution-tolerant species:** The dominance of pollution-tolerant species like Laccotrephes sp., Notonecta sp., and Hydaticus sp. may indicate potential pollution issues.

- **Sensitive species:** The presence of sensitive species like Hirudinaria manillensis suggests relatively good water quality conditions.
- **Habitat preferences:** The distribution of macro-invertebrates across different habitats (e.g., pools, riffles) can reveal their tolerance to varying environmental conditions.

Results and Discussion:

Understanding the Community Composition:

The study of macro-invertebrate communities in the Digboi River revealed a diverse array of species from three major phyla: **Arthropoda**, **Annelida**, and **Mollusca**. These phyla represent key contributors to the river's biodiversity and offer valuable information on the overall ecological health of the river.

Key Findings:

- **Dominant Phyla: Arthropoda** was the most abundant phylum, followed by **Mollusca**. The dominance of Arthropoda, particularly insects, indicates a healthy and varied aquatic community, as these organisms are typically abundant in freshwater ecosystems.
- **Dominant Classes:** Within Arthropoda, the class **Insecta** was the most represented, while **Gastropoda** was the dominant class within Mollusca. This suggests that aquatic insects and snails form a significant part of the river's benthic fauna and contribute heavily to ecosystem processes like decomposition and nutrient cycling.
- **Dominant Orders:** Among the Insecta, the most abundant orders were **Hemiptera**, **Decapoda**, and **Coleoptera**. These include a variety of aquatic insects such as water striders, crayfish, and beetles, which are key components in the food web and contribute to the ecosystem's resilience.
- **Dominant Families:** Notable families within **Gastropoda** included **Ancylidae**, **Ampullaridae**, **Haliplidae**, **Hydrometridae**, and **Nemouridae**. These families are critical to nutrient recycling and contribute to the overall productivity of the river's ecosystems.

❖ ASSESSING WATER QUALITY USING MACRO-INVERTEBRATES:

Although the study did not directly utilize a formal water quality index like **Biological Water Quality Criteria (BWQC)**, the composition and abundance of specific macro-invertebrate groups provide indirect evidence of water quality and ecosystem health.

- **Pollution-Tolerant Species:** The prevalence of species known for their pollution tolerance, such as Laccotrephes sp., Notonecta sp., and Hydaticus sp., suggests that some parts of the river may be experiencing environmental stress. These species are often associated with degraded water quality and may indicate organic pollution.
- **Sensitive Species**: The presence of more sensitive species like Hirudinaria manillensis, a leech species, points to sections of the river where water quality remains relatively good. Sensitive species are typically found in habitats that are less disturbed, as they are more susceptible to changes in water chemistry and quality.
- **Habitat Preferences:** The distribution of macro-invertebrates across different habitats within the river, such as pools and riffles, further emphasizes the varying water quality conditions in different sections of the river. Pollution-tolerant species were more prevalent in slower-moving sections, while more sensitive species were found in faster-flowing, oxygen-rich habitats.

In conclusion, the study provides important insights into the state of the Digboi River's aquatic health. While the river exhibits some signs of pollution, particularly through the dominance of pollution-tolerant species, the presence of sensitive species highlights areas of the river that are still in relatively good condition. The macro-invertebrate community structure serves as a valuable tool for assessing water quality and can help guide future conservation and management efforts for the river.

1. Water Quality Index (WQI) Application:

Objective: Use a suitable Water Quality Index (such as the Biological Water Quality Classification or other indices) to assess the river's overall health based on macro-invertebrate data.

Steps:

- **Select an Appropriate WQI:** The BWQC (Biological Water Quality Classification) is one option, but others like the **Macroinvertebrate Biotic Index (MBI)**, **Hilsenhoff Biotic Index (HBI)**, or **EPT (Ephemeroptera, Plecoptera, Trichoptera) Index** can also be applied based on the macro-invertebrate data you have.
- **Gather Macro-Invertebrate Data:**
    - Collect samples of macro-invertebrates across different sites and times to represent diverse river conditions.
    - Record species composition, abundance, and diversity at each site.
- **Apply the WQI Methodology:**
    - Use the macro-invertebrate data to calculate the WQI score. Typically, these indices consider the abundance of pollution-tolerant vs. pollution-sensitive species, species diversity, and richness.
    - The index will categorize the health of the river into categories such as "excellent", "good", "fair", or "poor."
- **Interpret Results:**
    - Low WQI scores (e.g., poor or fair quality) might point to pollution or other environmental stressors. Compare these scores across different locations and over time to monitor water quality changes and trends.

2. Environmental Factors Analysis:

Objective: Analyze how macro-invertebrate abundance correlates with environmental variables (e.g., dissolved oxygen, pH, temperature) to understand the factors influencing water quality.

Steps:

- **Collect Environmental Variables:**
    - Measure key environmental parameters at each sampling site, including **dissolved oxygen (DO)**, **pH**, **temperature**, **turbidity**, **conductivity**, and possibly **nutrient levels** (nitrogen, phosphorus).
- **Statistical Analysis:**
    - Use **correlation analysis** (Pearson/Spearman) to identify relationships between environmental variables and macro-invertebrate abundance or diversity. This helps to pinpoint variables most strongly linked to changes in the community.

- For a more nuanced approach, **multiple regression models** can help assess the combined influence of multiple environmental factors on the macro-invertebrate population.
- Consider using **Principal Component Analysis (PCA)** to reduce the dimensionality of environmental data and identify the most important environmental variables impacting the community structure.

❖ **INTERPRETING MACRO INVETERATE DATA:**

If there is a strong correlation between dissolved oxygen levels and macro-invertebrate diversity, this indicates that DO is a key driver of river health. Similarly, temperature and pH may reveal critical thresholds for sensitive species.

3. Spatial and Temporal Trends:

Objective: Examine the temporal and spatial variations in macro-invertebrate communities to assess the influence of human activities or natural factors.

Steps:

- **Temporal Trends Analysis:**
  - Compare data across different seasons, years, or before and after certain events (such as industrial discharge or flooding) to understand how macro-invertebrate communities change over time.
  - Use **repeated measures ANOVA** or **time series analysis** to detect trends and identify specific periods of stress or recovery in the river ecosystem.
- **Spatial Variability Assessment:**
  - Analyze spatial patterns of macro-invertebrate diversity and abundance across different sampling sites. This could reflect varying levels of pollution, land use, or habitat types.
  - Use **spatial statistical tools** such as **K-means clustering** or **Ordination techniques (e.g., PCA, NMDS)** to identify patterns in macro-invertebrate communities related to environmental gradients across the sites.

- **Human Activity and Natural Factors:**
  - Overlay human activities (e.g., industrial, agricultural runoff) and natural events (e.g., seasonal floods, droughts) with spatial and temporal trends in macro-invertebrate data.

- Consider using **land-use analysis** with GIS tools to assess how land cover types around the river may influence water quality and macro-invertebrate communities.

4. Conservation Implications:

Objective: Identify species of conservation concern and develop effective conservation strategies.

Steps:

- **Species of Concern Identification:**
  - Identify macro-invertebrate species that are highly sensitive to pollution and habitat degradation. These species can act as bioindicators of ecological health and may be listed as species of conservation concern.
  - Track species that have declined in abundance over time, especially those that are pollution-sensitive or have restricted habitat preferences.
  - Use IUCN Red List or national/local conservation lists to cross-reference species of interest.

- **Conservation Strategy Development:**

  - **Habitat Protection:** Identify critical habitats for vulnerable species (e.g., riverbanks, riffles) and prioritize them for protection. Protecting riparian zones and minimizing sedimentation can support biodiversity.
  - **Pollution Control Measures:** If human activities (e.g., agricultural runoff, industrial discharge) are impacting water quality, advocate for mitigation strategies such as improved waste management, buffer zones, or stricter water quality standards.
  - **Restoration Programs:** Develop and implement river restoration strategies, such as planting vegetation along the riverbanks to improve water quality, stabilize sediments, and enhance habitat for macro-invertebrates.
  - **Invasive Species Management:** If invasive species are negatively impacting the native macro-invertebrate community, implement strategies for their control or removal.
- **Community and Stakeholder Engagement:** Work with local communities, policymakers, and landowners to raise awareness about the river's ecological importance and encourage sustainable land and water management practices.

❖ ANALYSIS OF RESULTS

Site 1: Digboi Nala

Key Observations:

- **Oily Film:** The presence of an oily film suggests **hydrocarbon contamination**, likely from industrial or wastewater runoff. This is a strong indicator of pollution.
- **Greasy Coating on Substrata:** This could be linked to **organic contamination**, possibly from industrial waste or agricultural runoff. Such coatings may reduce oxygen availability and harm benthic organisms.
- **Excessive Algal Growth:** This is commonly associated with **nutrient enrichment** (high nitrogen and phosphorus levels), often due to agricultural runoff or wastewater discharge. Excessive nutrients lead to eutrophication, impacting water quality.
- **Hydrilla Presence:** The abundance of **Hydrilla**, a nutrient-loving aquatic plant, suggests **eutrophic conditions**. While Hydrilla is not inherently harmful, its overgrowth can displace native plants and disrupt aquatic ecosystems.

Macro-Invertebrate Data Interpretation:

- **Pollution-Tolerant Taxa:** Families like **Tubifiscidae**, **Naididae**, **Octochaetidae**, **Lumbricullidae**, **Cirolanidae**, **Psychodidae**, and **Muscidae** are common in polluted environments. These taxa thrive in low-oxygen, nutrient-rich, and contaminated waters.
- **Degraded Habitat:** The dominance of pollution-tolerant taxa indicates a **loss of habitat quality** for more sensitive species, signaling significant ecological stress.

Implications:

- The site shows **poor water quality** due to pollution, and the macro-invertebrate community reflects this with a dominance of tolerant species. **Restoration efforts** should focus on reducing pollutants and restoring habitat quality for sensitive species.

Site 2: Digboi Nala

Key Observations:

- **Oil Slick:** The presence of an oil slick suggests ongoing **pollution** at this site, likely from industrial runoff or other sources of hydrocarbon contamination.
- **Pollution-Resistant Families:** The presence of families like **Odonata**, **Histeridae**, **Corydalidae**, and **Lumbricidae** indicates that the site still supports some macro-

invertebrate life, but these families are more tolerant of pollution and can survive in degraded environments.

- **Absence of Sensitive Orders:** The absence of pollution-sensitive orders like **Ephemeroptera**, **Ancylidae**, **Heptageniidae**, and **Trichoptera** suggests that the water quality is too poor to support these species, which are typically sensitive to pollution.
- **Marginal Vegetation:** The site has some vegetation, but it is **insufficient to counteract pollution impacts**, potentially reducing habitat complexity and limiting ecological functions.

Macro-Invertebrate Data Interpretation:

- **Pollution-Resistant Families:** Families such as **Mesovelidae**, **Hygrobidae**, **Planariidae**, **Hirudidae**, and **Erpobdellidae** are capable of surviving in degraded conditions, suggesting moderate pollution stress.
- **Absence of Sensitive Species:** The lack of sensitive taxa (e.g., **Ephemeroptera** and **Trichoptera**) is a strong indicator of degraded water quality and habitat conditions.

Implications:

- The site exhibits **moderate pollution** with a decline in biodiversity, primarily supported by pollution-tolerant species. **Long-term pollution** could lead to further degradation and loss of ecosystem services, such as water filtration and biodiversity.

Site 3: Digboi Nala

Environmental Conditions:

- **Turbid Water:** The presence of turbid water suggests suspended sediments, organic matter, or pollutants, contributing to poor light penetration and oxygen availability.
- **Oil Slick:** The oil slick indicates **hydrocarbon contamination**, likely from industrial or sewage discharges.

Macro-Invertebrate Data Interpretation:

- **Pollution-Tolerant Families:** The dominance of families like **Hygrobidae**, **Dytiscidae**, **Odonata**, **Nereidae**, **Histriobdellidae**, **Nereididae**, and **Heteroceridae** suggests a **pollution-tolerant community**. These species are more resilient to environmental degradation.

- **Absence of Sensitive Orders:** The absence of **Ephemeroptera** and **Trichoptera** indicates a **decline in water quality**, as these taxa are typically sensitive to pollutants.

Implications:

- **Habitat Degradation:** The oil slick and suspended particles severely impact habitat quality, limiting the survival of sensitive species.
- **Long-term Effects:** Continued pollution could cause **further degradation** of aquatic biodiversity, compromising ecosystem services.

Site 4: Dihing River (Before Confluence with Digboi River)

Environmental Conditions:

- **Healthier Water Quality:** The presence of **sensitive taxa** such as **Varunidae**, **Sesarmidae**, **Gecarcinucidae**, **Nereidae**, and **Nephthyidae** suggests **lower pollution levels** compared to earlier sites.
- **Dominance of Odonates and Trichopterans:** These are commonly found in **cleaner waters**, indicating a healthier aquatic environment.

Macro-Invertebrate Data Interpretation:

- **Presence of Sensitive Taxa:** These species indicate a **less polluted environment**, with a greater diversity of macro-invertebrates able to thrive.
- **Moderate Incidence of Agriidae:** The presence of this family suggests moderate tolerance to pollution but not a cause for concern.

Implications:

- **Better Habitat Quality:** The diversity and presence of sensitive taxa indicate **healthy ecosystem functioning**.
- **Reduced Pollution Impact: Lower pollution levels** allow for a more diverse and resilient macro-invertebrate community.

Site 5: Dihing River (After Confluence with Digboi River)

Environmental Conditions:

- **Turbid Water and Oil Slick:** Both indicate the **presence of contamination**, likely from industrial or urban runoff.

Macro-Invertebrate Data Interpretation:

- **Moderate Pollution-Resistant Taxa:** The presence of **Arcidae**, **Succinidae**, **Hydroptilidae**, **Palaemonidae**, and others suggests a moderate level of pollution tolerance, though the absence of highly sensitive species signals degradation.

- **Absence of Sensitive Species:** Sensitive taxa are absent, which is indicative of **some level of pollution** impacting water quality.

Implications:

- **Moderate Habitat Degradation:** The pollution and oil slick likely limit the habitat quality for more sensitive species, reducing biodiversity.
- **Potential Long-Term Effects:** If pollution continues, **biodiversity loss** and further habitat degradation are likely.

Site 6: Dihing River (Margherita)

Environmental Conditions:

- **Relatively Good Water Quality with Some Pollution Signs:** While the water quality is generally good, the **presence of Chironomus larvae** suggests possible **nutrient enrichment** or **organic pollution**.

Macro-Invertebrate Data Interpretation:

- **Dominance of Odonates:** The presence of Odonates indicates **relatively healthy water**.
- **Absence of Ephemeroptera and Trichoptera:** While not a major concern, their absence suggests **moderate pollution**.
- **Sensitive Taxa:** The presence of families like **Baetidae**, **Sialidae**, **Corydalidae**, and **Hirudinidae** suggests a **less polluted environment**.

Implications:

- **Moderate Habitat Degradation:** The significant presence of Chironomus larvae could be indicative of **organic pollution**, potentially affecting habitat quality.
- **Long-Term Effects:** The persistence of nutrient enrichment could lead to **further degradation** if not addressed

  .

Site 7: Dihing River (Makum)

Environmental Conditions:

- **Moderately Polluted Conditions:** The presence of pollution-tolerant and moderately resistant taxa suggests a **degraded aquatic environment**.

Macro-Invertebrate Data Interpretation:

- **Pollution-Resistant Taxa:** The presence of families like **Physidae**, **Lymnaeidae**, **Planorbidae**, and **Gammaridae** indicates that water quality has been affected, but not as severely as at other sites.
- **Absence of Sensitive Species:** The absence of more sensitive taxa suggests that pollution has degraded the habitat.

Implications:

- **Habitat Degradation:** Moderate pollution levels are likely impacting the ecosystem, restricting the diversity of sensitive species.
- **Long-Term Effects:** Continued degradation could result in **loss of biodiversity** and ecosystem function.

Site 8: Dihing River (Mikira)

Environmental Conditions:

- **Relatively Healthy Water Quality with Some Pollution Indicators:** The presence of sensitive taxa and Odonates suggests **good water quality**, though pollution indicators such as **Trichoptera and Coleoptera** suggest moderate habitat degradation.

Macro-Invertebrate Data Interpretation:

- **Dominance of Odonates and Sensitive Taxa:** The dominance of these groups indicates a **relatively healthy aquatic ecosystem**.
- **Moderate Pollution Indicators:** While **Trichoptera** and **Coleoptera** suggest some pollution, the overall community reflects **moderate water quality**.

Implications:

- **Good Habitat Quality:** The presence of sensitive species suggests that **habitat quality is still viable** for diverse invertebrate communities.
- **Potential for Improvement:** Continued management and pollution reduction could further improve water quality and increase biodiversity.

Site 9: Dihing River (Gammon Bridge)

Environmental Conditions:

- **Relatively Healthy Aquatic Conditions:** The **dominance of cyprinids** and presence of moderately pollution-sensitive taxa suggest **good water quality**.

Macro-Invertebrate Data Interpretation:

- **Moderate Pollution-Sensitive Taxa:** Species like **Ancylidae**, **Cordulegastridae**, **Aeshnidae**, and others indicate that the water quality supports a diverse community.

- **Cyprinid Dominance:** The healthy fish population further suggests **good water quality**.

Implications:

- **Healthy Ecosystem:** The presence of sensitive taxa and cyprinids indicates a **stable aquatic ecosystem**.
- **Reduced Pollution Impact: Lower pollution levels** have allowed for a **diverse community** to thrive.

Site 10: Dihing Mukh

Environmental Conditions:

- **Severely Polluted Conditions:** The presence of **animal carcasses** and **pollution-tolerant macro-invertebrates** indicate a highly **polluted environment**.

Macro-Invertebrate Data Interpretation:

- **Dominance of Pollution-Tolerant Taxa:** Species like **Hirudinea**, **Gastropoda**, **Bivalvia**, **Crustacea**, and **Chironomidae** reflect **severely degraded water quality**.
- **Absence of Sensitive Species:** The lack of sensitive species is a clear indicator of **poor water quality**.

Implications:

- **Severe Habitat Degradation:** Pollution, including organic contamination, is likely causing **severe habitat loss** and **biodiversity decline**.
- **Long-Term Effects:** Continued pollution could result in **complete loss of biodiversity** and **ecosystem collapse**.

Further Analysis and Considerations:

To gain a more comprehensive understanding, the following analyses should be conducted:

1. **Water Quality Parameters:** Regular measurements of **dissolved oxygen**, **pH**, **temperature**, **conductivity**, and **nutrient levels** to identify pollution sources.
2. **Sediment Analysis:** Investigating **contaminants** such as heavy metals, hydrocarbons, and organic matter in sediments.
3. **Biological Assessment:** Incorporating other bioindicators like **fish** and **zooplankton** to assess ecosystem health.
4. **Pollution Source Identification:** Investigating sources of pollution, including industrial discharges, agricultural runoff, or wastewater.

Recommendations:

- **Pollution Control Measures:** Implement stricter regulations to **reduce industrial discharges**, agricultural runoff, and **wastewater contamination**.
- **Habitat Restoration:** Focus on restoring degraded habitats to improve water quality and support more diverse aquatic life.
- **Continuous Monitoring:** Regular monitoring of **water quality** and **macro-invertebrate populations** to assess the success of remediation efforts.
- **Public Awareness:** Increase awareness of the importance of water quality and engage the community in pollution prevention efforts.

Ecological Roles of Macro-Invertebrates:

Macro-invertebrates play essential roles in aquatic ecosystems, including:

- **Decomposition and Nutrient Cycling:** Breaking down organic matter and facilitating nutrient recycling.
- **Predator-Prey Interactions:** Forming the base of the food web and contributing to food availability for higher trophic levels.
- **Bioindicators:** Their presence or absence serves as an indicator of **water quality** and the overall health of the ecosystem.

❖ ASSESSING WATER QUALITY USING THE FAMILY BIOTIC INDEX (FBI)

The **Family Biotic Index (FBI)** is a valuable tool for assessing water quality by analyzing the presence and abundance of macro-invertebrate families. A lower FBI score indicates poorer water quality, often associated with pollution, while a higher score suggests better environmental conditions.

The **FBI results** for this study indicate significant pollution in the **Dihing River section**, characterized by a high presence of pollution-tolerant macro-invertebrates. This suggests that the habitat has been substantially degraded. In addition, the difficulty in selecting a suitable reference site in **Digboi Nala** underscores the severe degradation in the area. This highlights the need for careful site selection when identifying reference locations in pollution-impacted environments.

Future Directions for Comprehensive Monitoring

To gain a more in-depth understanding of water quality and macro-invertebrate communities in the **Dihing River catchment**, future research should consider the following:

1. **Expanding the number of sampling sites**: This would allow for a broader representation of aquatic habitats and environmental conditions, providing a more complete picture of the water quality across different regions.
2. **Long-term monitoring**: Tracking the changes in macro-invertebrate communities and water quality over extended periods would help identify trends and assess the effectiveness of pollution control measures.
3. **Analyzing environmental factors**: Investigating how macro-invertebrate distribution correlates with environmental variables such as temperature, dissolved oxygen, pH, and nutrient levels can help identify specific pollution drivers.
4. **Evaluating habitat restoration efforts**: Future studies should assess how habitat restoration measures impact macro-invertebrate communities and water quality, providing guidance for future conservation actions.

Key Findings

The **Digboi Nala** and **Digboi Nadi** sections are heavily impacted by pollution from both point and non-point sources. Significant sources of pollution include:

- **Effluent discharge from the Effluent Treatment Plant (ETP)**, which, despite regulation, continues to degrade water quality.
- **Municipal waste dumping** and **agricultural runoff**, which contribute to water pollution, especially during seasonal flow fluctuations.

Recommendations for Pollution Management

To address these challenges, it is essential to combine **biological surveys** with **chemical monitoring**. This dual approach will allow for a more accurate understanding of the pollution sources:

- **Point-source pollution** (e.g., ETP discharges) and **non-point source pollution** (e.g., runoff from urban and agricultural areas) can be differentiated.
- **Laboratory studies** on how specific pollutants affect the biota can offer valuable insights into the impacts of different contaminants under real-world conditions.

Immediate action is necessary to restore the health of the **Digboi Nala** and **Digboi Nadi** systems. By implementing corrective measures based on the findings from this study, significant improvements in water quality and ecosystem health are achievable.

Status of the Dihing River

The **Dihing River** remains largely unaffected by pollution, with relatively healthier aquatic conditions compared to the Digboi Nala and Nadi systems. However, **public awareness** in areas near the confluence of the **Digboi Nadi** and **Dihing River** is crucial to ensure that any potential contamination at this confluence point is mitigated.

This study emphasizes the importance of regular monitoring and a comprehensive approach to pollution assessment, combining both biological and chemical analyses. By addressing the pollution sources and implementing effective habitat restoration strategies, it is possible to improve water quality and the overall health of the **Dihing River** ecosystem. Continued efforts in pollution management and public education are essential to safeguarding the region's aquatic resources.

To restore the Digboi Nala-Digboi Nadi system effectively, the following suggestions could be implemented:

Revised Framework for Mitigating Degradation of the Digboi Nala-Digboi Nadi System

1. **Define Attainable Conditions**

    - **Objective:** Establish baseline ecological conditions for the Digboi Nala-Digboi Nadi system using a combination of historical data and current biological surveys. This baseline should take into account spatial variations (across different sections of the river) and temporal fluctuations (seasonal or annual changes).

    - **Approach:**
        - Leverage historical water quality data, along with present macro-invertebrate and fish community data, to understand the river's health at different points in time.

- Conduct surveys at strategic locations throughout the system to reflect spatial diversity in habitat and community composition.
- Incorporate seasonal variations by monitoring the ecosystem during different weather patterns or water flow conditions.

- **Goal:** By defining attainable conditions, the restoration goals become both practical and achievable, helping to focus efforts on restoring the ecosystem to a realistic, sustainable state.

2. **Develop an Index of Biological Integrity (IBI)**

- **Objective:** Construct a **quantitative Index of Biological Integrity (IBI)** to monitor the health of the ecosystem through changes in the biological community.

- **Approach:**

  - Select macro-invertebrates or fish, based on the system's ecological characteristics, as the biological assemblages to track.
  - Develop specific IBI metrics (e.g., species diversity, abundance of pollution-sensitive species, or community composition) that reflect ecological integrity in the river system.
  - Calculate an overall IBI score by comparing the observed biological conditions to the expected natural conditions, creating a clear indicator of the river's health.
- **Goal:** The IBI will serve as a reliable tool to measure the progress of restoration efforts, track improvements over time, and identify any declines in water quality or biodiversity.

3. **Setup Laboratory Monitoring**

- **Objective:** Create laboratory facilities dedicated to investigating the effects of point-source pollution on selected species under controlled conditions.

- **Approach:**
  - Choose species that are sensitive to common point-source pollutants, such as heavy metals, hydrocarbons, or sewage effluents.
  - Conduct controlled laboratory experiments to observe how pollutants affect various physiological and ecological functions of these species, such as reproduction, survival, or behavior.
  - Compare the impacts of point-source pollution to those of non-point sources (e.g., agricultural runoff) to better understand the differential effects of pollution types.
- **Goal:** This controlled environment will allow researchers to isolate the effects of specific pollutants, contributing to the design of targeted pollution management and mitigation strategies.

4. **Implement Continuous Bio-Monitoring**

- **Objective:** Establish an ongoing, systematic bio-monitoring program that allows for early detection of ecological shifts due to water quality changes.
- **Approach:**
  - Deploy trained field personnel to regularly collect biological samples (e.g., macro-invertebrates, fish) and water quality data at designated sites along the river.
  - Install real-time water quality sensors to measure key parameters like pH, dissolved oxygen, temperature, turbidity, and nutrient levels.
  - Incorporate regular biological surveys throughout the year to capture potential seasonal variations in the aquatic community.

Ongoing bio-monitoring will provide real-time data that can detect changes in the ecosystem, ensuring rapid response to pollution events and enabling adaptive management of the ecosystem's health.

By incorporating the following elements — **Defining Attainable Conditions**, **Developing an IBI**, **Setting up Laboratory Monitoring**, and **Implementing Continuous Bio-Monitoring** — this framework offers a robust, holistic approach for the long-term management and restoration of the **Digboi Nala-Digboi Nadi system**:

- **Clear Baseline and Restoration Targets**: Defining the attainable conditions for the ecosystem, informed by historical and current data, provides a well-grounded reference point for assessing future restoration efforts.
- **Monitoring Ecological Integrity**: The IBI serves as an effective tool for tracking the biological health of the ecosystem, allowing for quantitative assessments of restoration progress and ecological resilience.
- **Targeted Pollution Management**: Laboratory monitoring enables focused investigations into the specific impacts of point-source pollution, leading to tailored mitigation strategies.
- **Timely Intervention**: Continuous bio-monitoring ensures that water quality and biological health are regularly assessed, making it possible to identify and respond to degradation in a timely manner.

Together, these strategies will offer a comprehensive framework for improving the health of the **Digboi Nala-Digboi Nadi system**, facilitating the restoration of both water quality and ecological function. By integrating biological, chemical, and physical monitoring, this approach will foster long-term resilience and sustainability for the region's aquatic ecosystem.

❖ PHYSICO-CHEMICAL STUDY

Along with Bio-monitoring, the determination of the following water quality parameters was carried out simultaneously at all the stations:

1. Temperature
2. Free CO_2
3. pH Value,
4. Turbidity
5. Dissolved Oxygen
6. Oil & Grease
7. TDS,
8. TSS,
9. Sulphate
10. BOD

11. COD
12. Nitrate
13. Total Hardness
14. Total Alkalinity
15. Heavy Metals as Arsenic, Lead, Iron, Zinc

❖ Results and discussion Physico-chemical parameters:

Table: 4 Physico-chemical parameters for the Surface water samples

Parameter	Unit	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**	**Site 7**	**Site 8**	**Site 9**	**Site10**	Site 11
Temperature	^{0}C	**21.6**	**22.1**	**20.8**	**21.7**	**22.1**	**23.5**	**21.4**	**20.9**	**20.7**	**21.5**	**21.2**
Free CO2	Mg/L	**10.0**	**8.2**	**12.6**	**11.8**	**9.8**	**8.1**	**8.6**	**12.2**	**11.5**	**10.3**	**11.0**
pH		**7.5**	**7.1**	**7.3**	**7.0**	**7.4**	**7.6**	**7.5**	**7.3**	**7.2**	**7.6**	**7.7**
Turbidity	NTU	**12.1**	**18.2**	**20.5**	**9.5**	**10.8**	**21.8**	**9.3**	**12.2**	**10.1**	**13.4**	**6.4**
DO	mg/L	**2.2**	**2.9**	**3**	**6.1**	**4.9**	**4.1**	**6.3**	**5.9**	**2.9**	**5.3**	**3.5**
BOD	mg/L	**4.2**	**5.2**	**8.0**	**4.7**	**24.0**	**9.2**	**5.2**	**6.8**	**8.0**	**12.0**	**8.0**
COD	mg/L	**21.0**	**15.0**	**34.0**	**8.0**	**83.0**	**32.0**	**24.0**	**28.0**	**30.0**	**58.0**	**24.0**
Oil & Grease	mg/L	**6.5**	**18.0**	**8.5**	**8.5**	**4.0**	**19.6**	**10.0**	**23.0**	**4.5**	**11.6**	**9.2**
TSS	mg/L	**2.0**	**1.0**	**0.8**	**2.5**	**2.4**	**1.2**	**1.3**	**0.9**	**0.6**	**1.1**	**1.0**
TDS	mg/L	**312**	**274**	**203**	**382**	**352**	**250**	**289**	**236**	**205**	**215**	**220**
Sulphate	mg/L	**1.31**	**3.20**	**0.30**	**0.21**	**2.51**	**1.28**	**0.18**	**0.15**	**11.23**	**4.51**	**2.13**
Nitrate	mg/L	**0.66**	**0.34**	**0.39**	**1.0**	**2.31**	**3.5**	**3.0**	**2.8**	**0.7**	**1.5**	**1.8**
Totel Hardness	mg/L	**64.2**	**55.8**	**49.4**	**72.0**	**52.4**	**145.4**	**58.6**	**62.4**	**110.2**	**56.6**	**167.3**
Totel Alkalinity	mg/L	**48.4**	**51.7**	**38.4**	**45.5**	**42.4**	**53**	**60.4**	**57.7**	**62.3**	**56.6**	**45.8**
Arsenic	ug/L	**BDL**	**0.02**	**BDL**	**BDL**	**BDL**	**BDL**	**0.03**	**BDL**	**BDL**	**BDL**	**BDL**
Lead	mg/L	**BDL**	**BDL**	**0.53**	**BDL**	**BDL**	**0.09**	**BDL**	**0.02**	**0.18**	**BDL**	**BDL**
Iron	mg/L	**0.16**	**0.43**	**0.20**	**0.36**	**0.21**	**0.18**	**0.19**	**0.39**	**0.24**	**0.17**	**0.18**
Zinc	mg/L	**0.08**	**0.30**	**0.10**	**0.92**	**0.08**	**BDL**	**BDL**	**0.32**	**0.13**	**0.06**	**0.22**

Discussion of the Results

The analysis of various physico-chemical parameters provides critical insights into the quality and productivity of aquatic systems. Among these, temperature is particularly influential in shaping the conditions of aquatic ecosystems. This section delves into the significant role that temperature, along with other physico-chemical parameters, plays in the health and functioning of the ecosystem.

Temperature and Its Impact on Aquatic Ecosystems

Temperature is a fundamental factor that influences the behavior, metabolism, and survival of aquatic organisms. Here's a more in-depth look at how temperature affects various aspects of the aquatic environment:

1. **Metabolic Rates and Activity**:
    - Higher temperatures generally lead to an increase in the metabolic rates of ectothermic organisms (cold-blooded animals). This results in heightened feeding and reproductive behaviors. However, extreme temperatures can cause stress and may even lead to mortality if the conditions exceed an organism's tolerance limits.
    - Thermal stress often forces aquatic organisms to alter their behavior, such as migrating to cooler areas or reducing their activity levels to conserve energy.
2. **Dissolved Oxygen**:
    - Warmer water typically holds less dissolved oxygen, which is essential for the survival of fish and other aerobic organisms. If oxygen levels drop too low, it can result in hypoxia (low oxygen conditions), causing significant stress and even death for aquatic organisms.
    - In high-temperature conditions, organisms may have to compete for the limited oxygen available, which can disrupt food webs and affect species distribution.
3. **Gas Solubility and Photosynthesis**:
    - Temperature also affects the solubility of gases like carbon dioxide (CO2). Warmer waters have lower solubility for CO2, which can influence the rate of photosynthesis in aquatic plants. Decreased photosynthesis can lead to reduced oxygen production, further exacerbating hypoxic conditions.
    - As temperature rises, the rate of chemical reactions within the water accelerates. While this can promote nutrient cycling, it can also lead to excess nutrient release, contributing to nutrient imbalances and potential eutrophication.
4. **Evaporation and Salinity**:
    - Increased temperatures often lead to higher evaporation rates, particularly in shallow or small water bodies. This can concentrate salts, changing salinity levels in both freshwater and estuarine environments. Species that are sensitive to changes in salinity may be impacted by these shifts.

- The concentration of salts and minerals due to evaporation can alter the biological communities in these habitats, particularly affecting species that have a narrow tolerance for salinity changes.

5. **Nutrient Cycling and Eutrophication**:
    - Warmer temperatures can accelerate decomposition processes, releasing nutrients like nitrogen and phosphorus into the water. While these nutrients are vital for plant growth, an excess can lead to eutrophication, where an overabundance of nutrients fuels algal blooms. This can lead to oxygen depletion, fish kills, and a general decline in water quality.
    - Temperature-induced changes in nutrient cycling, coupled with excess nutrients from external pollution, can create a feedback loop, exacerbating water quality problems.

Temperature Variations in the Study

In this study, water temperatures were observed to vary from **20.7°C** at **Site 9** to **23.5°C** at **Site 6**. These differences reflect natural fluctuations that can be attributed to factors such as geographic location, local climate, water depth, and human activity in surrounding areas.

pH and Alkalinity

The pH levels in the study area showed a clear correlation with temperature changes. As the temperature increased, the activity of photosynthetic algae also increased, which led to a reduction in dissolved CO2. This process resulted in higher pH levels, as the decreased CO2 levels led to a more alkaline environment.

- **Alkalinity**: Alkalinity, which helps buffer pH changes, was also found to be influenced by temperature. The increased photosynthetic activity at higher temperatures consumed more CO2, raising pH and increasing the alkalinity of the water. This buffering capacity helps maintain a stable environment for aquatic life but can also influence nutrient availability and biological processes in the ecosystem.

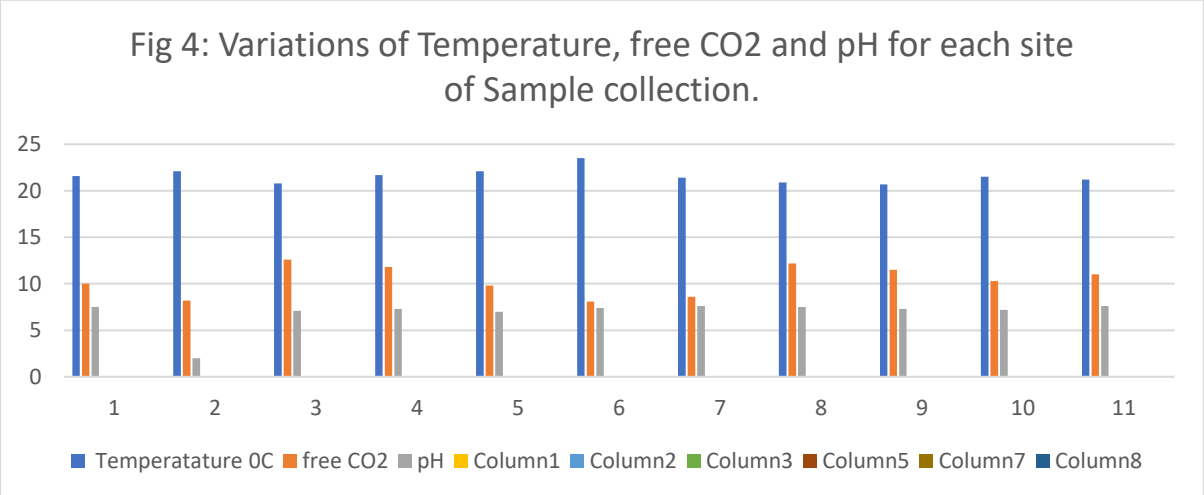
Graphical Representation

The relationship between **Temperature**, **Free CO2**, and **pH** is illustrated in **Figure 4**. This graph highlights how temperature fluctuations influence both CO2 concentrations and pH levels. It shows that as temperature increases, the CO2 concentrations decrease, leading to a rise in pH and an increase in alkalinity. This interaction provides further insights into the

dynamics of the aquatic system and the potential impacts on biodiversity and ecosystem functions.

The findings from this investigation underscore the importance of temperature and other physico-chemical parameters in shaping the health and productivity of aquatic ecosystems. Temperature not only influences the metabolic and reproductive rates of organisms but also affects oxygen solubility, nutrient cycling, and the overall chemical balance of the water. Monitoring temperature fluctuations, along with other related parameters like pH and CO2, is vital for assessing the health of aquatic environments and predicting how they might respond to environmental changes.

In this study, even modest shifts in temperature were found to have significant effects on water chemistry and biological activity. These findings highlight the need for continuous monitoring and adaptive management to safeguard the health and resilience of aquatic ecosystems. Understanding the interplay between temperature and other key physico-chemical factors will aid in the development of effective conservation strategies for maintaining the integrity of freshwater habitats.



Dissolved oxygen (DO) is a crucial parameter for the health of aquatic ecosystems. It supports the respiration of aquatic organisms, including fish, invertebrates, and microorganisms. When DO levels fall below a certain threshold, it can lead to stress, disease, and even mortality among these organisms.

The data collected from the various sampling sites reveals several key findings related to water quality, which are critical for understanding the current state of the ecosystem and identifying sources of pollution. The results highlight issues concerning dissolved oxygen

(DO), free carbon dioxide (FCO2), pH, turbidity, biochemical oxygen demand (BOD), total dissolved solids (TDS), and potential contamination from local industrial activities. This section delves into the factors influencing these parameters and their implications for the aquatic environment.

Dissolved Oxygen (DO)

Sites 1, 2, 3, and 6 show significantly depleted levels of dissolved oxygen (DO), with values recorded as low as **2.2 mg/L**, **6.1** to **mg/L**. These levels are below the minimum threshold required for many aquatic species to thrive, which typically ranges from **4-6 mg/L** for healthy ecosystems. Low DO concentrations are a clear indicator of organic pollution and can have serious consequences for aquatic life.

Several factors contribute to these low DO levels:

1. **Excess Organic Matter**: Organic pollutants from sewage or agricultural runoff can decompose in the water, consuming large amounts of oxygen during the process.
2. **Algal Blooms**: Nutrient-rich pollution, often stemming from agricultural runoff or wastewater discharge, can lead to the formation of algal blooms. When these blooms decompose, they consume oxygen, further depleting DO levels.
3. **Temperature**: Warmer water holds less oxygen, exacerbating DO depletion, especially in areas with high organic loads.
4. **Lack of Water Movement**: In stagnant waters, the diffusion of oxygen from the atmosphere into the water is limited, leading to lower DO levels.
5. **Industrial Discharges**: Certain industrial activities can release pollutants that reduce DO concentrations, either directly through chemical discharges or indirectly by promoting organic decay.

Free Carbon Dioxide (FCO2)

Free carbon dioxide (FCO2) is a critical parameter in aquatic ecosystems, as it plays a vital role in regulating pH, carbonate chemistry, and overall gas balance. Elevated FCO2 levels can lead to increased acidity, which can harm aquatic organisms.

The FCO2 values observed in this study range from **8.1 mg/L** (site 7) to **11.8 mg/L** (site 4), indicating significant variation across sites. This suggests that certain locations are more prone to high FCO2 concentrations due to various factors:

1. **Decomposition of Organic Matter**: As organic matter decomposes, carbon dioxide is released into the water.

2. **Respiration by Aquatic Organisms**: Fish, invertebrates, and microorganisms release CO2 as a byproduct of respiration.
3. **Industrial Discharges**: Some industrial processes release CO2-containing effluents into the water.
4. **Groundwater Contributions**: High levels of FCO2 in groundwater can contribute to elevated concentrations in surface waters.

pH Levels

The pH values in the study ranged from **7 to 7.7**, which are within the **World Health Organization (WHO) permissible limits** for drinking water. This suggests that the water body is relatively stable in terms of acidity and alkalinity. However, several factors can still influence pH fluctuations:

1. **Decomposition of Organic Matter**: As organic matter decays, CO2 is produced, which can lower pH, making the water more acidic.
2. **Respiration by Aquatic Organisms**: The respiration of aquatic organisms, particularly in high-density populations, can also influence pH levels.
3. **Pollution**: Runoff from agricultural or industrial sites can introduce substances that alter pH levels, either making the water more acidic or alkaline.
4. **Carbon Dioxide Levels**: As CO2 dissolves in water, it forms carbonic acid, which can lower pH.

Despite the generally stable pH levels, continuous monitoring is necessary to detect any potential acidification trends, particularly in areas near industrial discharges or urban runoff.

Turbidity

Turbidity, a measure of water clarity, varies significantly across sites, with values ranging from **9.3 NTU** to **21.8 NTU**. Higher turbidity levels can reduce light penetration, hindering photosynthesis in aquatic plants and affecting the overall health of the ecosystem.
Several factors contribute to increased turbidity:

1. **Erosion and Soil Runoff**: Heavy rainfall, construction, or agricultural activities can cause soil erosion, which increases turbidity.
2. **Algal Blooms**: Dense blooms of algae can raise turbidity levels due to the suspended algal cells.
3. **Industrial Discharges**: Certain industrial activities release suspended solids, contributing to turbidity.

4. **Human Activities**: Construction projects, land development, and urbanization can lead to higher turbidity by releasing sediments into water bodies.

High turbidity levels can have several detrimental effects:

- **Reduced Light Penetration**: Algae and aquatic plants rely on sunlight for photosynthesis. Increased turbidity can block this essential light, affecting plant growth.
- **Visibility**: High turbidity can impair the ability of aquatic organisms to see, which can interfere with their feeding and predator-avoidance behaviors.
- **Habitat Degradation**: Suspended solids can settle on the waterbed, smothering habitats and disrupting oxygen availability.

Biochemical Oxygen Demand (BOD)

BOD is a measure of the oxygen demand required by microorganisms to decompose organic matter. High BOD levels indicate significant organic pollution, which can lead to oxygen depletion and harm aquatic organisms.

BOD values in this study range from **4.2 mg/L** to **12 mg/L** . These elevated values point to significant organic pollution, primarily from:

1. **Domestic Household Waste**: The discharge of untreated sewage from Digboi Township into the river is a major source of organic pollution.
2. **Agricultural Runoff**: Runoff containing organic matter from agricultural activities can also contribute to high BOD.

To mitigate the impact of high BOD levels and improve water quality, the following actions are recommended:

- **Wastewater Treatment**: Establishing a wastewater treatment facility in Digboi Township to treat sewage before discharge would help reduce organic pollution.
- **Public Awareness**: Educating the public about proper waste management practices to minimize organic waste entering water systems.
- **Drainage System Upgrades**: Ensuring that the drainage infrastructure is capable of handling waste without leakage or overflow.

Total Dissolved Solids (TDS)

TDS levels in the Digboi River vary from **215 mg/L** (site 10) to **250 mg/L** (site 6).

Several factors contribute to elevated TDS levels:

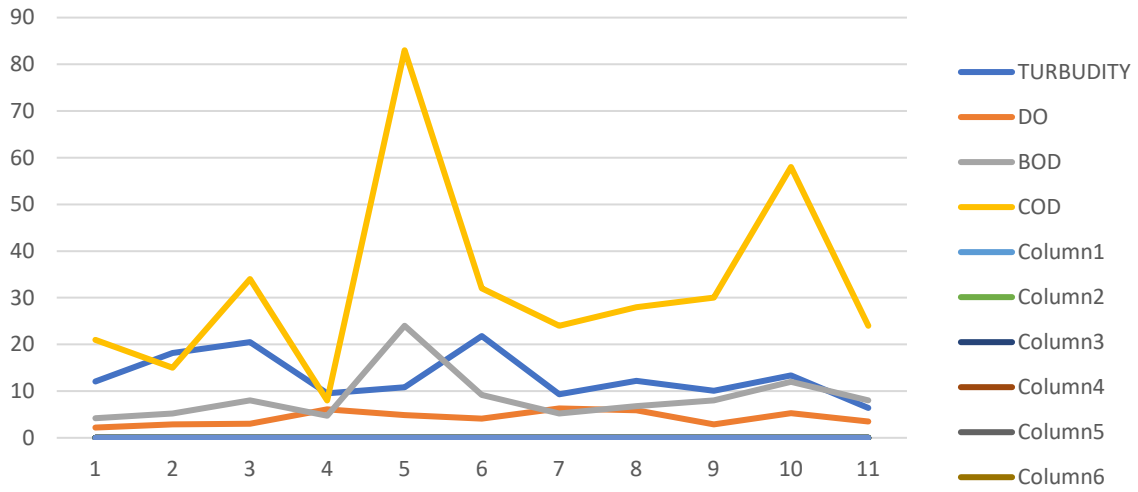
1. **Geological Contributions**: The dissolution of minerals and salts from the surrounding rocks and soil.

2. **Agricultural and Industrial Activities**: Runoff from agricultural fields and discharge from industrial processes introduce dissolved solids into the water.
3. **Evaporation**: In areas with limited water flow, evaporation can concentrate dissolved solids.

To address high TDS levels, the following measures are recommended:

1. **Source Identification**: Identifying the specific sources of TDS and targeting them for mitigation.
2. **Pollution Reduction**: Implementing practices to reduce pollution from agriculture, industry, and urbanization.
3. **Water Treatment**: Exploring water treatment technologies, such as reverse osmosis, to remove excess TDS.

Chart Fig 5: Variations of Turbidity, DO, BOD and COD for each site



Hardness and Alkalinity in the Digboi River

Hardness

Hardness is a measure of the concentration of divalent metal ions, particularly calcium (Ca^{2+}) and magnesium (Mg^{2+}), in water. It is typically expressed as calcium carbonate equivalents and plays an important role in water quality and treatment processes. The total hardness in Digboi River varies from **49.4mg/L** (site 3) to **145.4mg/L** (site 6), with site 3 having the highest hardness and site 6 the lowest.

Several factors contribute to hardness in the water:

1. **Geological Composition**: The type of rocks and minerals in the catchment area, such as limestone, can influence the dissolution of calcium and magnesium ions into the water.
2. **Agricultural and Industrial Activities**: The use of certain fertilizers, lime, or other industrial chemicals can introduce hardness-causing ions into the water.
3. **Rainfall**: Rainfall can influence the leaching of minerals from the soil, which then enter the river, affecting the overall hardness levels.

Negative Implications of High Hardness

While hardness is generally not a major health concern, it can have several negative consequences:

1. **Scaling in Pipes and Appliances**: Hard water reacts with soap and detergents to form scale deposits, which can clog pipes and damage appliances like water heaters.
2. **Complicated Water Treatment**: High hardness complicates water treatment processes, especially softening and filtration. In particular, lime-soda softening may be required to remove excess hardness, which can increase treatment costs.
3. **Taste and Odor Issues**: Elevated hardness can impact the aesthetic quality of the water, affecting its taste and sometimes even its odor.
4. **Potential Health Impact**: While hard water is generally safe to drink, excessive hardness may cause gastrointestinal issues in sensitive individuals, especially in the case of very high concentrations.

Measures to Address High Hardness

To mitigate the effects of high hardness in Digboi River, the following actions are recommended:

1. **Water Softening Techniques**: Implementing water softening methods, such as ion exchange or lime-soda softening, can effectively reduce hardness levels.
2. **Adapt Water Treatment**: Water treatment processes should be adjusted to accommodate higher hardness levels. This could include additional filtration or softening steps.
3. **Public Education**: Raising awareness among the public about the impact of water hardness, the importance of proper water treatment, and how it affects daily life could encourage better water management practices.

4. **Alternative Water Sources**: If feasible, exploring alternative water sources with lower hardness levels may provide a longer-term solution.

Alkalinity

Total alkalinity in water is a measure of the water's ability to neutralize acids. It primarily reflects the concentration of bicarbonate (HCO_3^-), carbonate (CO_3^{2-}), and hydroxide (OH^-) ions. Alkalinity values in Digboi River range from **38.5 mg/L** (site 3) to **62.3 mg/L** (site 9), with site 9 showing the highest alkalinity and site 3 the lowest.

Several factors influence alkalinity:

1. **Geology**: Alkaline substances in water, such as bicarbonates and carbonates, often derive from the dissolution of minerals in the catchment area, particularly limestone or dolomite.
2. **Human Activity**: Agricultural runoff, industrial discharge, and urbanization can contribute to variations in alkalinity by introducing substances that either increase or decrease the water's buffering capacity.
3. **Rainfall**: Precipitation can leach alkaline substances from the soil, transporting them into the river, thus altering alkalinity levels.

Implications of High Alkalinity

While high alkalinity is generally not a major threat to aquatic life, it can still have several important implications:

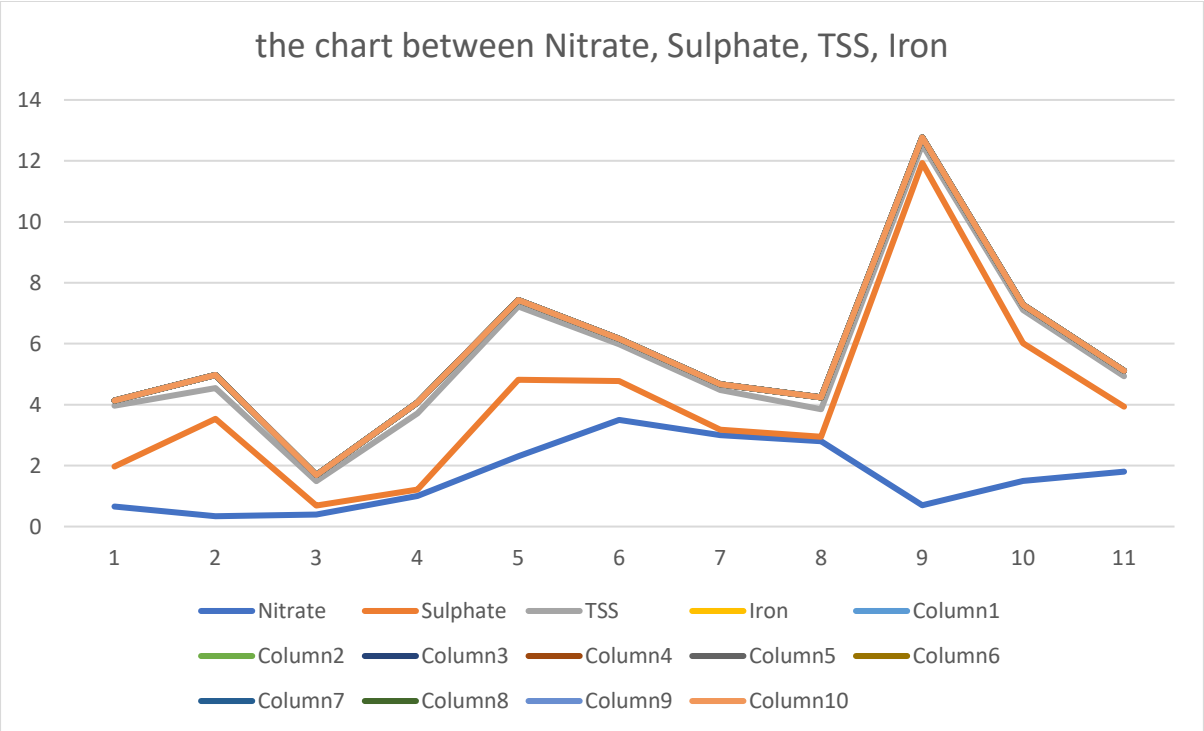
1. **Water Treatment Issues**: High alkalinity can complicate water treatment processes, particularly those that involve pH adjustment or softening. It can interfere with the efficiency of some chemicals used in treatment.
2. **Corrosion**: Alkaline water can increase the rate of corrosion in pipes, equipment, and infrastructure, leading to higher maintenance costs.
3. **Scaling**: Alkalinity contributes to the formation of scale in boilers, heat exchangers, and other industrial equipment, potentially reducing efficiency and increasing operational costs.
4. **Aquatic Life**: Although most aquatic species can tolerate moderate levels of alkalinity, excessive alkalinity can affect the health of sensitive species by altering the water's pH balance and influencing nutrient availability.

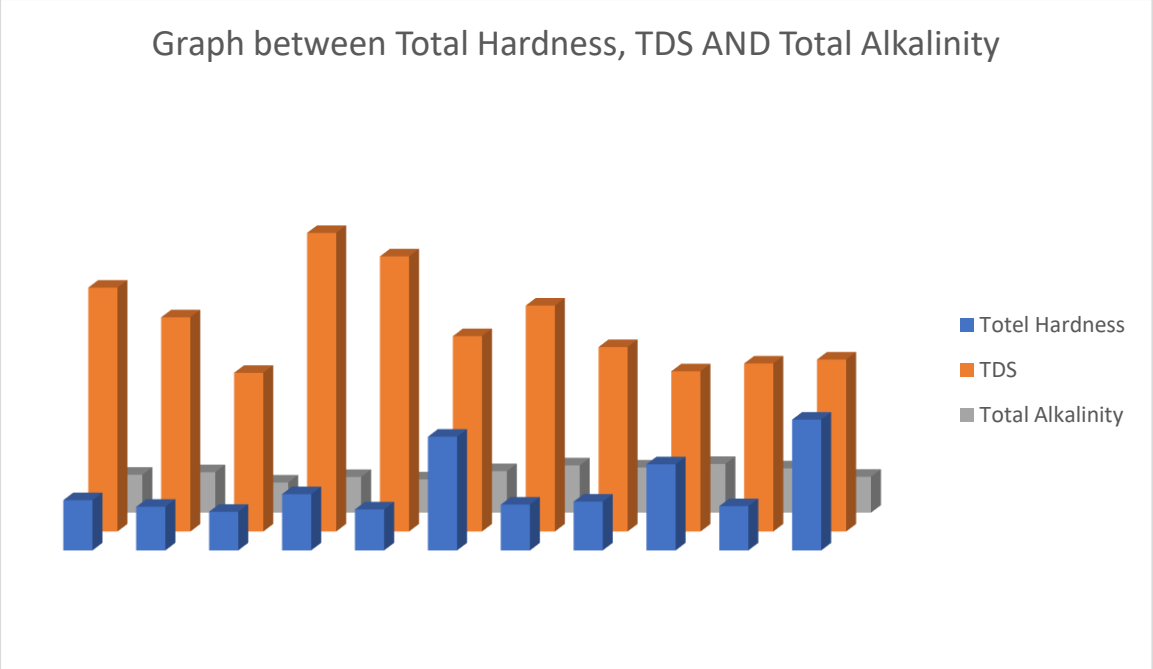
Measures to Address High Alkalinity

To address the challenges posed by high alkalinity in Digboi River, consider the following approaches:

1. **Water Treatment Adjustments**: Modify water treatment processes to manage high alkalinity. This could involve using acid addition or other methods to neutralize the excess alkalinity.
2. **Source Management**: Implement land management practices in the catchment area to reduce the input of alkalinity-enhancing substances from agricultural runoff, industrial discharge, and urban pollution.
3. **Monitor Alkalinity Trends**: Regular monitoring of alkalinity levels will help in tracking changes over time and assessing the effectiveness of mitigation measures.

Both hardness and alkalinity play significant roles in determining the water quality in the Digboi River. While hardness is mainly a concern for domestic use, affecting water treatment, appliances, and the aesthetic quality of the water, high alkalinity can interfere with water treatment processes and affect aquatic life. Addressing these issues requires a combination of treatment strategies, including water softening and adjusting water treatment processes to accommodate high alkalinity levels. Additionally, understanding the sources of these parameters and managing catchment area activities can help in maintaining water quality.





Summary of Metal Contamination in Water Samples

Metal Concentration Overview:

- **Lead (Pb):**
  - **Detected only in Sites 3, 4, and 7** → Indicates localized contamination, likely from specific sources (e.g., industrial discharge or waste dumping in these areas).
- **Arsenic (As):**
  - Ranges from **Below Detection Limit (BDL) to moderate**.
    May arise from **natural sources or anthropogenic inputs** like galvanization industries or runoff from fertilizers
- **Iron (Fe):**
  - **Consistently elevated across all sites** (0.16 – 0.43 mg/L).
  - May indicate **natural leaching** from soil/rocks, but **human activities (e.g., mining, infrastructure corrosion)** could be contributing factors.
- **Zinc (Zn):**
  - Ranges from **Below Detection Limit (BDL) to moderate**.

Potential Sources of Contamination:

- **Industrial Effluents:** Commonly release lead, arsenic, zinc, and iron.
- **Mining Operations:** Can lead to runoff/leaching of multiple metals.

- **Agricultural Runoff:** Pesticides and fertilizers may contain trace metals.
- **Natural Geology:** Iron and zinc often originate from local soils and rocks

Health & Ecological Risks:

Elevated metal levels, especially **lead, arsenic, and zinc**, are toxic and pose risks such as:

- **Neurological disorders** (especially from lead)
- **Reproductive issues**
- **Kidney damage**
- **Cancer (arsenic is a known carcinogen)**

Also harmful to aquatic ecosystems, with risks of bioaccumulation and biomagnification.

❖ CONCLUSION:

This study evaluated the water quality of the Digboi and Dihing Rivers and Durgapukhuri, focusing on both physico-chemical and biological parameters.

- Physico-chemical parameters such as pH, EC, TDS, turbidity, hardness, alkalinity, oil and grease, BOD, COD, and DO indicate slight to moderate pollution, with variations observed across sampling sites.
- Biological assessment, based on macroinvertebrate diversity, particularly molluscan species from five families, provided valuable insights into the ecological health of the water bodies.

Findings suggest that localized pollution, likely from anthropogenic activities, is affecting water quality. The variation in biological indicators reinforces the need to integrate ecological monitoring with chemical analysis for a holistic understanding of river health.

Key Recommendations:

- Establish regular monitoring programs to track water quality changes and identify pollution trends.
- Investigate and manage local sources of contamination, including industrial, agricultural, and domestic inputs.
- Use biological indicators, such as macroinvertebrate diversity and diversity indices, to assess ecological stress.
- Enhance community awareness and promote responsible environmental practices.

- Encourage collaboration among local communities, government agencies, research institutions, and NGOs.
- Support the development of innovative monitoring technologies and strengthen enforcement of environmental regulations.
- Promote water conservation and sustainable land use to reduce pollution pressures.

Sustainable water resource management demands a collaborative, science-based, and community-driven approach. By combining robust monitoring, ecological indicators, public engagement, and effective policy, we can protect our freshwater ecosystems and ensure access to clean water for future generations.

Biological Monitoring Data Sheet

Date: 08/02/25 Sampler ID: _____ Site ID: _____

Stream Name: Diving Gammon bridge

Time ____:____ AM / PM Time Sampling: _____ hrs Air Temp.: _____ °C

Current **Weather:** ☐ Clear/Sunny ☑ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Worst Weather (past 48 hours): ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Check **Methods Used:** ☐ Kick Seine Net (3 times) ☐ Dip Net (20 jabs or scoops)

Check **Habitats Sampled:** ☐ Undercut Banks ☐ Riffles ☐ Leaf Packs ☐ Snags/Vegetation ☐ Sediment

Pollution Tolerance Index (PTI)

Record the taxa (group) represented in your sampling by either entering the number of organisms you counted or a ✓

Group 1 - Intolerant		Group 2 - Moderately Intolerant		Group 3 - Fairly Tolerant		Groups 4 - Very Tolerant	
	Stonefly nymph		Damselfly nymph	2	Leech	2	Aquatic worm
	Mayfly nymph	1	Dragonfly nymph		Midge larva		Blood midge larva (red)
	Caddisfly larva		Scud		Planaria/ Flatworm		Rat-tailed Maggot
	Riffle Beetle	3	Sowbug		Black fly larva	7	Left-Handed or Pouch snail
1	Dobsonfly Larva		Cranefly larva				
	Right-Handed or Gilled snail	2	Clam/Mussel				
	Water Penny		Crayfish				
	# of TAXA represented		# of TAXA represented		# of TAXA represented		# of TAXA represented
1	Weighting Factor (x4)	3	Weighting Factor (x3)	1	Weighting Factor (x2)	2	Weighting Factor (x1)

Pollution Tolerance Index Rating
(Add the final index values for each group)

15

PTI Ratings	
Excellent	23 or More
Good	17 - 22
Fair	11 - 16
Poor	10 or Less

08/02/2025

Biological Monitoring Data Sheet

Date: 24/02/25 Sampler ID: _____ Site ID: _____

Stream Name: Diking before Confluence with Digboi River

Time ____:____ AM / PM Time Sampling: _____ hrs Air Temp.: _____ °C

Current **Weather:** ☐ Clear/Sunny ☑ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Worst **Weather (past 48 hours):** ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Check **Methods Used:** ☑ Kick Seine Net (3 times) ☐ Dip Net (20 jabs or scoops)

Check **Habitats Sampled:** ☐ Undercut Banks ☐ Riffles ☐ Leaf Packs ☐ Snags/Vegetation ☐ Sediment

Pollution Tolerance Index (PTI)

Record the taxa (group) represented in your sampling by either entering the number of organisms you counted or a ✓

Group 1 - Intolerant		Group 2 - Moderately Intolerant		Group 3 - Fairly Tolerant		Groups 4 - Very Tolerant	
2	Stonefly nymph	2	Damselfly nymph	1	Leech	1	Aquatic worm
	Mayfly nymph		Dragonfly nymph		Midge larva		Blood midge larva (red)
3	Caddisfly larva		Scud		Planaria/ Flatworm		Rat-tailed Maggot
	Riffle Beetle	5	Sowbug		Black fly larva		Left-Handed or Pouch snail
	Dobsonfly Larva		Cranefly larva				
7	Right-Handed or Gilled snail	3	Clam/Mussel				
	Water Penny	2	Crayfish				
	# of TAXA represented		# of TAXA represented		# of TAXA represented		# of TAXA represented
3	Weighting Factor (x4)	4	Weighting Factor (x3)	1	Weighting Factor (x2)	1	Weighting Factor (x1)

Pollution Tolerance Index Rating (Add the final index values for each group) 24

PTI Ratings	
Excellent	23 or More
Good	17 - 22
Fair	11 - 16
Poor	10 or Less

24/02/25

Biological Monitoring Data Sheet

Date: 01/03/25 Sampler ID: _____ Site ID: _____

Stream Name: Digboi River 26KM pt

Time ____:____ AM / PM Time Sampling: _____ hrs Air Temp.: _____ °C

Current **Weather:** ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Worst **Weather (past 48 hours):** ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Check **Methods Used:** ☐ Kick Seine Net (3 times) ☐ Dip Net (20 jabs or scoops)

Check **Habitats Sampled:** ☐ Undercut Banks ☐ Riffles ☐ Leaf Packs ☐ Snags/Vegetation ☐ Sediment

Pollution Tolerance Index (PTI)

Record the taxa (group) represented in your sampling by either entering the number of organisms you counted or a ✓

Group 1 - Intolerant

- [ ] Stonefly nymph 
- [ ] Mayfly nymph 
- [ ] Caddisfly larva 
- [ ] Riffle Beetle 
- [ ] Dobsonfly Larva 
- [ ] Right-Handed or Gilled snail 
- [ ] Water Penny 

[ ] **# of TAXA represented**

[ ] Weighting Factor (x4)

Group 2 - Moderately Intolerant

- [ ] Damselfly nymph 
- [4] Dragonfly nymph 
- [ ] Scud 
- [ ] Sowbug 
- [3] Cranefly larva 
- [2] Clam/Mussel 
- [ ] Crayfish 

[ ] **# of TAXA represented**

[3] Weighting Factor (x3)

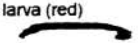
Group 3 - Fairly Tolerant

- [2] Leech 
- [ ] Midge larva 
- [ ] Planaria/ Flatworm 
- [1] Black fly larva 

[ ] **# of TAXA represented**

[2] Weighting Factor (x2)

Groups 4 - Very Tolerant

- [1] Aquatic worm 
- [ ] Blood midge larva (red) 
- [ ] Rat-tailed Maggot 
- [ ] Left-Handed or Pouch snail 

[ ] **# of TAXA represented**

[1] Weighting Factor (x1)

Pollution Tolerance Index Rating

(Add the final index values for each group)

13

PTI Ratings	
Excellent	23 or More
Good	17 - 22
Fair	11 - 16
Poor	10 or Less

01/03/25

Biological Monitoring Data Sheet

Date: 07/03/25 Sampler ID: _____ Site ID: _____

Stream Name: Dihing Misika

Time ____:____ AM / PM Time Sampling: _____ hrs Air Temp.: _____ °C

Current **Weather:** ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Worst **Weather (past 48 hours):** ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Check **Methods Used:** ☐ Kick Seine Net (3 times) ☐ Dip Net (20 jabs or scoops)

Check **Habitats Sampled:** ☐ Undercut Banks ☐ Riffles ☐ Leaf Packs ☐ Snags/Vegetation ☐ Sediment

Pollution Tolerance Index (PTI)

Record the taxa (group) represented in your sampling by either entering the number of organisms you counted or a ✓

Group 1 - Intolerant

- [ ] Stonefly nymph
- [ ] Mayfly nymph
- [ ] Caddisfly larva
- [ ] Riffle Beetle
- [3] Dobsonfly Larva
- [ ] Right-Handed or Gilled snail
- [ ] Water Penny

[ ] # of TAXA represented

[1] Weighting Factor (x4)

Group 2 - Moderately Intolerant

- [ ] Damselfly nymph
- [ ] Dragonfly nymph
- [ ] Scud
- [ ] Sowbug
- [ ] Cranefly larva
- [ ] Clam/Mussel
- [2] Crayfish

[ ] # of TAXA represented

[1] Weighting Factor (x3)

Group 3 - Fairly Tolerant

- [6] Leech
- [ ] Midge larva
- [ ] Planaria/ Flatworm
- [ ] Black fly larva

[ ] # of TAXA represented

[1] Weighting Factor (x2)

Groups 4 - Very Tolerant

- [ ] Aquatic worm
- [3] Blood midge larva (red)
- [ ] Rat-tailed Maggot
- [ ] Left-Handed or Pouch snail

[ ] # of TAXA represented

[1] Weighting Factor (x1)

Pollution Tolerance Index Rating

(Add the final index values for each group) [4]

PTI Ratings	
Excellent	23 or More
Good	17 - 22
Fair	11 - 16
Poor	10 or Less

07/03/2025

Biological Monitoring Data Sheet

Date: 17/03/25 Sampler ID: _____ Site ID: _____

Stream Name: Diving Mukh

Time ____:____ AM / PM Time Sampling: _____ hrs Air Temp.: _____ °C

Current **Weather:** ☐ Clear/Sunny ☑ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Worst **Weather (past 48 hours):** ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Check **Methods Used:** ☐ Kick Seine Net (3 times) ☐ Dip Net (20 jabs or scoops)

Check **Habitats Sampled:** ☐ Undercut Banks ☐ Riffles ☐ Leaf Packs ☐ Snags/Vegetation ☐ Sediment

Pollution Tolerance Index (PTI)

Record the taxa (group) represented in your sampling by either entering the number of organisms you counted or a ✓

Group 1 - Intolerant		Group 2 - Moderately Intolerant		Group 3 - Fairly Tolerant		Groups 4 - Very Tolerant	
5	Stonefly nymph	1	Damselfly nymph	1	Leech	9	Aquatic worm
	Mayfly nymph	5	Dragonfly nymph	3	Midge larva		Blood midge larva (red)
	Caddisfly larva		Scud		Planaria/ Flatworm		Rat-tailed Maggot
	Riffle Beetle		Sowbug		Black fly larva	2	Left-Handed or Pouch snail
	Dobsonfly Larva		Cranefly larva				
1	Right-Handed or - Gilled snail		Clam/Mussel				
	Water Penny		Crayfish				
	# of TAXA represented		**# of TAXA represented**		**# of TAXA represented**		**# of TAXA represented**
2	Weighting Factor (x4)	2	Weighting Factor (x3)	2	Weighting Factor (x2)	2	Weighting Factor (x1)

Pollution Tolerance Index Rating (Add the final index values for each group) **11**

PTI Ratings	
Excellent	23 or More
Good	17 - 22
Fair	11 - 16
Poor	10 or Less

17/3/25

Biological Monitoring Data Sheet

Date: 03/02/25 Sampler ID: _____ Site ID: _____

Stream Name: Diking Margherita

Time ____:____ AM / PM Time Sampling: _____ hrs Air Temp.: _____ °C

Current **Weather:** ☐ Clear/Sunny ☑ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Worst **Weather (past 48 hours):** ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Check **Methods Used:** ☐ Kick Seine Net (3 times) ☐ Dip Net (20 jabs or scoops)

Check **Habitats Sampled:** ☐ Undercut Banks ☐ Riffles ☐ Leaf Packs ☐ Snags/Vegetation ☐ Sediment

Pollution Tolerance Index (PTI)

Record the taxa (group) represented in your sampling by either entering the number of organisms you counted or a ✓

Group 1 - Intolerant	Group 2 - Moderately Intolerant	Group 3 - Fairly Tolerant	Groups 4 - Very Tolerant
☐ Stonefly nymph	☐ Damselfly nymph	2 Leech	1 Aquatic worm
☐ Mayfly nymph	☐ Dragonfly nymph	2 Midge larva	☐ Blood midge larva (red)
☐ Caddisfly larva	☐ Scud	☐ Planaria/ Flatworm	☐ Rat-tailed Maggot
☐ Riffle Beetle	☐ Sowbug	☐ Black fly larva	3 Left-Handed or Pouch snail
☐ Dobsonfly Larva	☐ Cranefly larva		
☐ Right-Handed or-Gilled snail	☐ Clam/Mussel		
☐ Water Penny	☐ Crayfish		
☐ # of TAXA represented	☐ # of TAXA represented	2 # of TAXA represented	☐ # of TAXA represented
☐ Weighting Factor (x4)	☐ Weighting Factor (x3)	2 Weighting Factor (x2)	2 Weighting Factor (x1)

Pollution Tolerance Index Rating
(Add the final index values for each group) 7

PTI Ratings	
Excellent	23 or More
Good	17 - 22
Fair	11 - 16
Poor	10 or Less

03/02/2025

Biological Monitoring Data Sheet

Date: 10/03/25 Sampler ID: _____ Site ID: _____

Stream Name: Digboi River Kendugiri

Time ____:____ AM / PM Time Sampling: _____ hrs Air Temp.: _____ °C

Current **Weather:** ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Worst **Weather (past 48 hours):** ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Check **Methods Used:** ☐ Kick Seine Net (3 times) ☐ Dip Net (20 jabs or scoops)

Check **Habitats Sampled:** ☐ Undercut Banks ☐ Riffles ☐ Leaf Packs ☐ Snags/Vegetation ☐ Sediment

Pollution Tolerance Index (PTI)

Record the taxa (group) represented in your sampling by either entering the number of organisms you counted or a ✓

Group 1 - Intolerant	Group 2 - Moderately Intolerant	Group 3 - Fairly Tolerant	Groups 4 - Very Tolerant
☐ Stonefly nymph	☐ Damselfly nymph	3 Leech	☐ Aquatic worm
☐ Mayfly nymph	☐ Dragonfly nymph	☐ Midge larva	☐ Blood midge larva (red)
☐ Caddisfly larva	2 Scud	3 Planaria/ Flatworm	☐ Rat-tailed Maggot
☐ Riffle Beetle	☐ Sowbug	1 Black fly larva	2 Left-Handed or Pouch snail
1 Dobsonfly Larva	☐ Cranefly larva		
☐ Right-Handed or Gilled snail	☐ Clam/Mussel		
☐ Water Penny	2 Crayfish		
☐ # of TAXA represented	☐ # of TAXA represented	☐ # of TAXA represented	☐ # of TAXA represented
1 Weighting Factor (x4)	2 Weighting Factor (x3)	3 Weighting Factor (x2)	1 Weighting Factor (x1)

Pollution Tolerance Index Rating

(Add the final index values for each group) 15

PTI Ratings	
Excellent	23 or More
Good	17 - 22
Fair	11 - 16
Poor	10 or Less

10/3/25

Biological Monitoring Data Sheet

Date: 05/03/25 Sampler ID: _____ Site ID: _____

Stream Name: Digboi River 15KM Pt

Time ____:____ AM / PM Time Sampling: _____ hrs Air Temp.: _____ °C

Current **Weather:** ☐ Clear/Sunny ☑ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Worst **Weather (past 48 hours):** ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Check **Methods Used:** ☐ Kick Seine Net (3 times) ☐ Dip Net (20 jabs or scoops)

Check **Habitats Sampled:** ☐ Undercut Banks ☐ Riffles ☐ Leaf Packs ☐ Snags/Vegetation ☐ Sediment

Pollution Tolerance Index (PTI)

Record the taxa (group) represented in your sampling by either entering the number of organisms you counted or a ✓

Group 1 - Intolerant		Group 2 - Moderately Intolerant		Group 3 - Fairly Tolerant		Groups 4 - Very Tolerant	
2	Stonefly nymph		Damselfly nymph	1	Leech		Aquatic worm
	Mayfly nymph	1	Dragonfly nymph		Midge larva		Blood midge larva (red)
2	Caddisfly larva		Scud		Planaria/ Flatworm		Rat-tailed Maggot
	Riffle Beetle	5	Sowbug		Black fly larva		Left-Handed or Pouch snail
3	Dobsonfly Larva		Cranefly larva				
	Right-Handed or Gilled snail		Clam/Mussel				
	Water Penny		Crayfish				
	# of TAXA represented		**# of TAXA represented**		**# of TAXA represented**		**# of TAXA represented**
3	Weighting Factor (x4)	2	Weighting Factor (x3)	1	Weighting Factor (x2)		Weighting Factor (x1)

Pollution Tolerance Index Rating
(Add the final index values for each group) 21

PTI Ratings	
Excellent	23 or More
Good	17 - 22
Fair	11 - 16
Poor	10 or Less

S. Das 05/03/25

Biological Monitoring Data Sheet

Date: 17/02/25 Sampler ID: _____ Site ID: _____

Stream Name: Diving – after confluence with Digboi River

Time ____:____ AM / PM Time Sampling: _____ hrs Air Temp.: _____ °C

Current **Weather:** ☐ Clear/Sunny ☑ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Worst **Weather (past 48 hours):** ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Check **Methods Used:** ☑ Kick Seine Net (3 times) ☐ Dip Net (20 jabs or scoops)

Check **Habitats Sampled:** ☐ Undercut Banks ☐ Riffles ☐ Leaf Packs ☐ Snags/Vegetation ☐ Sediment

Pollution Tolerance Index (PTI)

Record the taxa (group) represented in your sampling by either entering the number of organisms you counted or a ✓

Group 1 - Intolerant		Group 2 - Moderately Intolerant		Group 3 - Fairly Tolerant		Groups 4 - Very Tolerant	
	Stonefly nymph		Damselfly nymph	6	Leech	1	Aquatic worm
6	Mayfly nymph	3	Dragonfly nymph	1	Midge larva		Blood midge larva (red)
	Caddisfly larva		Scud		Planaria/ Flatworm		Rat-tailed Maggot
	Riffle Beetle	5	Sowbug		Black fly larva	1	Left-Handed or Pouch snail
	Dobsonfly Larva		Cranefly larva				
	Right-Handed or Gilled snail		Clam/Mussel				
	Water Penny		Crayfish				
	# of TAXA represented		**# of TAXA represented**		**# of TAXA represented**		**# of TAXA represented**
1	Weighting Factor (x4)	2	Weighting Factor (x3)	2	Weighting Factor (x2)	2	Weighting Factor (x1)

Pollution Tolerance Index Rating (Add the final index values for each group) 15

PTI Ratings	
Excellent	23 or More
Good	17 - 22
Fair	11 - 16
Poor	10 or Less

17/2/25

Biological Monitoring Data Sheet

Date: 11/02/25 Sampler ID: _____ Site ID: _____

Stream Name: Digboi Sanitary Park River (Durgapukhuri)

Time ____:____ AM / PM Time Sampling: _____ hrs Air Temp.: _____ °C

Current Weather: ☐ Clear/Sunny ☑ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Worst Weather (past 48 hours): ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Check Methods Used: ☑ Kick Seine Net (3 times) ☐ Dip Net (20 jabs or scoops)

Check Habitats Sampled: ☐ Undercut Banks ☐ Riffles ☐ Leaf Packs ☐ Snags/Vegetation ☐ Sediment

Pollution Tolerance Index (PTI)

Record the taxa (group) represented in your sampling by either entering the number of organisms you counted or a ✓

Group 1 - Intolerant		Group 2 - Moderately Intolerant		Group 3 - Fairly Tolerant		Groups 4 - Very Tolerant	
6	Stonefly nymph	4	Damselfly nymph		Leech	1	Aquatic worm
	Mayfly nymph		Dragonfly nymph		Midge larva		Blood midge larva (red)
4	Caddisfly larva		Scud		Planaria/ Flatworm		Rat-tailed Maggot
	Riffle Beetle	3	Sowbug	2	Black fly larva	1	Left-Handed or Pouch snail
3	Dobsonfly Larva		Cranefly larva				
	Right-Handed or Gilled snail	3	Clam/Mussel				
	Water Penny		Crayfish				
	# of TAXA represented		# of TAXA represented		# of TAXA represented		# of TAXA represented
3	Weighting Factor (x4)	3	Weighting Factor (x3)	1	Weighting Factor (x2)	2	Weighting Factor (x1)

Pollution Tolerance Index Rating
(Add the final index values for each group) 19

PTI Ratings	
Excellent	23 or More
Good	17 - 22
Fair	11 - 16
Poor	10 or Less

11.02.25

Biological Monitoring Data Sheet

Date: 05/02/25 Sampler ID: _____ Site ID: _____

Stream Name: Diring Makum

Time ____:____ AM / PM Time Sampling: _____ hrs Air Temp.: _____ °C

Current **Weather:** ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Worst **Weather (past 48 hours):** ☐ Clear/Sunny ☐ Overcast ☐ Showers ☐ Rain (steady) ☐ Storm (Heavy)

Check **Methods Used:** ☐ Kick Seine Net (3 times) ☐ Dip Net (20 jabs or scoops)

Check **Habitats Sampled:** ☐ Undercut Banks ☐ Riffles ☐ Leaf Packs ☐ Snags/Vegetation ☐ Sediment

Pollution Tolerance Index (PTI)

Record the taxa (group) represented in your sampling by either entering the number of organisms you counted or a ✓

Group 1 - Intolerant	Group 2 - Moderately Intolerant	Group 3 - Fairly Tolerant	Groups 4 - Very Tolerant
☐ Stonefly nymph	☐ Damselfly nymph	7 Leech	☐ Aquatic worm
☐ Mayfly nymph	☐ Dragonfly nymph	☐ Midge larva	4 Blood midge larva (red)
☐ Caddisfly larva	☐ Scud	1 Planaria/ Flatworm	☐ Rat-tailed Maggot
☐ Riffle Beetle	☐ Sowbug	☐ Black fly larva	3 Left-Handed or Pouch snail
☐ Dobsonfly Larva	☐ Cranefly larva		
☐ Right-Handed or-Gilled snail	☐ Clam/Mussel		
☐ Water Penny	☐ Crayfish		
☐ # of TAXA represented	☐ # of TAXA represented	☐ # of TAXA represented	☐ # of TAXA represented
☐ Weighting Factor (x4)	☐ Weighting Factor (x3)	2 Weighting Factor (x2)	2 Weighting Factor (x1)

Pollution Tolerance Index Rating
(Add the final index values for each group) 8

PTI Ratings	
Excellent	23 or More
Good	17 - 22
Fair	11 - 16
Poor	10 or Less

Jonmoni R
05.02.25