



असम ऑयल डिवीजन  
Assam Oil Division

इंडियन ऑयल कॉर्पोरेशन लिमिटेड

एओडि - डिगबोई रिफाइनरी

पो.ओ. डिगबोई, पिन-786171, असम

Indian Oil Corporation Limited

AOD - Digboi Refinery

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Ref: HSE: 02 -714/23

Dated: 20.06.2024

To,

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

**Sub: Submission of the Half-Yearly Compliance Report for the period (1<sup>st</sup> Oct'23 to 31<sup>st</sup> March'24) 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 2023-March 2024)**.

Thanking you,

Yours sincerely,  
For Indian Oil Corporation (AOD)

D. K. Barua  
General Manager (TS & HSE)

**डी.के. बरुवा / D.K. BARUA**  
**जीएम (टीएस एवं एचएसई)**  
**GM (TS & HSE)**  
**आई.ओ.सी.एल. (एओडी), डिगबोई**  
**I.O.C. LTD. (AOD), DIGBOI**

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  
(1<sup>st</sup> October 2023 – 31<sup>st</sup> March 2024)**



## **INDEX**

| <b>Units</b>   | <b>Clearance No.</b>                           | <b>Page No.</b> |
|--|--|-----------------|
| Compliance status of DRMP (Digboi Refinery Modernization Project of AVU,DCU,HGU) | J-11011/12/87-1A<br>dated 19-10-1987           | 3               |
| Compliance status of CPP(Captive Power Plant)                                    | J-13011/3/1987-1A<br>dated 18-06-1987          | 5               |
| Compliance status of CRU(Catalytic Reformer Unit)                                | J-11011/8/89-1A<br>dated 26-07-1989            | 6               |
| Compliance status of SDU(Solvent Dew axing Unit)                                 | J-11011/41/97-1A.II(I)<br>dated 26-07-1989     | 11              |
| Compliance status of HDTU (Hydro Treated Unit)                                   | J-11013/71/99-1A(II)<br>dated 26-07-1989       | 12              |
| Compliance status of MSQU (Motor Spirit Quality)                                 | J-11011/482/2007-IA II (I) dated<br>18-03-2008 | 13              |
| Capacity Augmentation of Digboi Refinery to 1 MMTA                               | J-11011/482/2007-IA II (I)<br>dated 01-01-2024 | 19              |

## **REPORTS ATTACHED**

| <b>Report Name</b>   | <b>Annexure list</b> |
|--|----------------------|
| Average six monthly 21 MINAS parameter of ETP Effluent(polishing pond outlet) Reports by External Agency Nitya laboratories 43, sector -A1 Ext. Bhalla Enclave, channi Himmat, Jammu-180015, J&K (UT), India | Annexure-1           |
| Six monthly River water body sample Report by QC Department of Digboi Refinery   | Annexure-2           |
| Six monthly compliance Report on Quantum Limit (Kg/1000 MT Crude processed)  | Annexure-3           |
| Six month Stack emission Report by External Agency Nitya laboratories 43, sector -A1 Ext. Bhalla Enclave, channi Himmat, Jammu-180015, J&K (UT), India   | Annexure-4           |
| 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                                       | Annexure-5           |
| Fugitive Monitoring (LDAR) Report  | Annexure-6           |
| Latest compliance status of the CREP   | Annexure-7           |
|  |                      |
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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 31.03.2024  |
|--------|---|---|
| 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. | <p>The concentration levels of all the parameters of effluent after treatment at ETP meets the MINAS specification.</p> <p>As per revised CPCB guideline, Digboi Refinery meets the stipulations for all 21 parameters of effluent.</p> <p>Six monthly compliance Report on Quantum Limit (Kg/1000 MT Crude processed) is attached in <b>Annexure-3</b>.</p> <p>Online effluent monitoring &amp; connectivity to CPCB server was commissioned on 28<sup>th</sup> December 2015.<br/> <a href="http://cpcb.gov.in">WebSite: Online Emission and Effluent Monitoring System (cpcb.gov.in)</a></p> |
| 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.  | <p>These tests are carried out regularly and reports submitted to Pollution Control Board, Assam.</p> <p>Monitoring of receiving water bodies is also carried out every month.</p> <p>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&amp;K (UT), India is enclosed as <b>Annexure-1</b></p> <p>Six monthly nearby river water body sample by Digboi Refinery QC Laboratories is enclosed as <b>Annexure-2</b>.</p>  |
| 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.   | <p>One HDPE lining concrete oily sludge storage tank of 400m<sup>3</sup> capacity was constructed in 2014 to prevent leaching and seepage of oil to ground water.</p> <p>Another storage pit bottom is made up of concrete to avoid leaching.</p>   |
| 5.0    | The ambient air around Refinery   | Four nos. of Ambient Air quality monitoring stations have   |



|     |   |   |
|-----|---|---|
|     | should be monitored at least at four monitoring stations for SPM, SO <sub>x</sub> , NO <sub>x</sub> , Hydrocarbons and H <sub>2</sub> S.  | <p>been installed around Digboi Refinery-(I) Bazar Gate (II) Wax Sector Cooling Tower (III) New Tank Farm (IV) Effluent treatment Plant.</p> <p>Ambient air quality monitoring is being carried out on monthly basis by external agency.</p> <p>One no. of Continuous Ambient Air Quality Monitoring Station installed and commissioned in September 2012 at Welfare centre which is connected with CPCB and PCBA server.</p> <p>Six month Ambient Air Quality Monitoring Report by External Agency Nitya laboratories 43, sector -A1 Ext. Bhalla Enclave, channi Himmat, Jammu-180015, J&amp;K (UT), India is attached as <b>Annexure-5</b></p>  |
| 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.                 | <p>Monitoring of stack emissions is carried out with the help of portable monitoring kit.</p> <p>Fixed on-line analyzers are also installed in AVU, DCU, CPP HRSG's, CRU, SDU, HDT, HGU and MSQU and monitoring through RTDBMS.</p> <p>Online connectivity established with CPCB Server and PCBA for Furnaces having heat capacity of more than 10mkcal/hr (HGU &amp; HRSG's Stacks).</p> <p>Apart from own monitoring, external agencies, Nitya laboratories 43, sector -A1 Ext. Bhalla Enclave, channi Himmat, Jammu-180015, J&amp;K (UT), India is also employed to conduct stack emission analysis on regular basis.</p> <p>Six-month Stack emission Report by External Agency Nitya laboratories 43, sector -A1 Ext. Bhalla Enclave, channi Himmat, Jammu-180015, J&amp;K (UT), India is enclosed as <b>Annexure-4</b></p> |
| 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. | <p>Regular monitoring of Hydrocarbons is done with GMI Gas surveyor and as well as with VOC detector in plant &amp; offsite areas by an external CPCB approved agency.</p> <p>Leak detection and repair (LDAR) report for the Quarter 3 of FY 2023-24 is attached as <b>Annexure-6</b>.</p>   |
| 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.  | <p>Digboi Refinery is surrounded by the Upper Dehing Reserve Forest on south and south west side, which acts as a natural Green Belt.</p> <p>Green belt is developed with regular tree plantation around Refinery premises and township area.</p> <p>Since 2002, Digboi Refinery has planted around <b>1,75,099</b> trees till March'2024 in and around Digboi Refinery achieving a green belt coverage of 52.81% of the total IOCL area.</p>   |

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

| SL. NO | STIPULATIONS   | COMPLIANCE STATUS AS ON 31.03.2024   |
|--------|--|--|
| 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 <sub>2</sub> . Efforts should also be made to reduce the emissions of NO <sub>x</sub> . The existing sulphuric acid plant should be scrapped. | <p>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.</p> <p>Since the refinery is using natural gas, formation of NO<sub>x</sub> is very low and always remains within the prescribed limit. Further, low NO<sub>x</sub> burners are also fitted in all the new units viz. Solvent De-waxing Unit, Hydro-treater Unit, Delayed Coking Unit and MSQ Unit.</p> |
| 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.   | <b>Complied.</b>   |
| 5.0    | Green belt around the power plant should be raised.  | <p>Digboi Refinery is surrounded by the Upper Dehing Reserve Forest on south and south west side, which acts as a natural Green Belt. Green belt is developed with regular tree plantation around Refinery premises and township area.</p> <p>Since 2002, Digboi Refinery has planted around <b>1,75099</b> trees till March'2024 in and around Digboi Refinery achieving a green belt coverage of 52.81% of the total IOCL area.</p>  |
| 6.0    | Adequate precautionary measures for preventing and controlling fire and explosion hazards should be taken up specially in the gas storage area.  | <p>Natural gas used in the plants is transported through pipeline ex M/s OIL India Ltd.</p> <p>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.</p>   |

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

| SL. NO | STIPULATIONS  | COMPLIANCE STATUS AS ON 31.03.2024   |                         |                         |                        |                         |                         |        |      |      |      |     |        |      |     |     |     |
|--------|---|--|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|--------|------|------|------|-----|--------|------|-----|-----|-----|
| 1.0    | The project authority must strictly adhere to the stipulations made by State govt. and the State Pollution Control Board.   | The stipulations made by the State Govt. and the State Pollution Control Board are strictly followed with regard to effluent and emission norms.<br>The existing CTO has been renewed till 31 <sup>st</sup> March 2028.<br>Digboi Refinery meets all parameters of effluent as per revised CPCB guideline.   |                         |                         |                        |                         |                         |        |      |      |      |     |        |      |     |     |     |
| 2.0    | The project authority will not increase the throughput capacity of the refinery from the existing level.  | 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.  |                         |                         |                        |                         |                         |        |      |      |      |     |        |      |     |     |     |
| 3.0    | 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.   | Complied.  |                         |                         |                        |                         |                         |        |      |      |      |     |        |      |     |     |     |
| 4.0    | 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 the emission level should 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. | Complied.<br><br>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>Month</th><th>CRU-HDT(SOx)<br/>mg/Nm3</th><th>CRU-HDT(NOx)<br/>mg/Nm3</th><th>CRU-OBSG(SOx)<br/>mg/Nm3</th><th>CRU-OBSG(NOx)<br/>mg/Nm3</th></tr><tr><td>Dec'23</td><td>5.17</td><td>3.24</td><td>5.12</td><td>6.2</td></tr><tr><td>Feb'24</td><td>7.24</td><td>3.0</td><td>4.0</td><td>5.0</td></tr></table> | Month                   | CRU-HDT(SOx)<br>mg/Nm3  | CRU-HDT(NOx)<br>mg/Nm3 | CRU-OBSG(SOx)<br>mg/Nm3 | CRU-OBSG(NOx)<br>mg/Nm3 | Dec'23 | 5.17 | 3.24 | 5.12 | 6.2 | Feb'24 | 7.24 | 3.0 | 4.0 | 5.0 |
| Month  | CRU-HDT(SOx)<br>mg/Nm3  | CRU-HDT(NOx)<br>mg/Nm3   | CRU-OBSG(SOx)<br>mg/Nm3 | CRU-OBSG(NOx)<br>mg/Nm3 |                        |                         |                         |        |      |      |      |     |        |      |     |     |     |
| Dec'23 | 5.17  | 3.24   | 5.12                    | 6.2                     |                        |                         |                         |        |      |      |      |     |        |      |     |     |     |
| Feb'24 | 7.24  | 3.0  | 4.0                     | 5.0                     |                        |                         |                         |        |      |      |      |     |        |      |     |     |     |
| 5.0    | The project authority must explore the possibility of maximum recycling of effluent either as process water or for afforestation.   | 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.<br>During Oct'23 – Mar'24, 100 % of treated effluent was reused.   |                         |                         |                        |                         |                         |        |      |      |      |     |        |      |     |     |     |
| 6.0    | 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.  | Effluent is meeting MINAS specification both in quality and quantity before being discharged.<br>Six monthly compliance Report on Quantum Limit (Kg/1000 MT Crude processed) is attached in <b>Annexure-3</b> .  |                         |                         |                        |                         |                         |        |      |      |      |     |        |      |     |     |     |

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| 7.0 | <p>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.</p> | <p>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 monthly basis.</p> <p>1(One) number of Continuous Ambient Air Quality Monitoring Station installed and commissioned in September 2012 at Welfare centre.</p> <p>Online CAAQMS parameters are being monitored regularly d through <a href="https://aicpl.glensserver.com/#/login">https://aicpl.glensserver.com/#/login</a></p> <p>Six month Ambient Air quality Monitoring Report by External Agency Nitya laboratories 43, sector -A1 Ext. Bhalla Enclave, channi Himmat, Jammu-180015, J&amp;K (UT), India attached as <b>Annexure-5</b></p> <p>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.</p> <p>Online connectivity established with CPCB Server and PCBA server for Furnaces having heat capacity of more than 10mkcl/hr (HGU &amp; HRSG's Stacks).</p> <p>Apart from own monitoring, external agencies are also employed to conduct stack emission analysis on regular basis. Online stack monitoring regularly done through Website <a href="http://www.envsaindia.com/cpcb/login.php">http://www.envsaindia.com/cpcb/login.php</a></p> |
| 8.0 | <p>The liquid effluent quality must be ensured on 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.</p>                      | <p>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 on daily basis.</p> <ol style="list-style-type: none"> <li>1. 8(eight) parameters daily basis by QC (Digboi Refinery)</li> <li>2. 21(twenty-one) parameters on monthly basis tested by SPCB approved outside agency.</li> <li>3. In addition to above four parameters, BOD, COD, TSS &amp; pH being monitored through online analyzers connected with CPCB Server,</li> <li>4. Sample from Digboi River and Dihing River is being collected and analyzed by QC (Digboi Refinery) on monthly basis.</li> </ol>   |
| 9.0 | <p>The project authority must monitor the aquatic life (like fish, tortoise etc.) and report should be submitted to the Ministry once in six months.</p>   | <p>Digboi Refinery has carried out study on <b>"Bio-monitoring of aquatic life in lotic and lentic water bodies in and around Digboi Refinery"</b> by M/S A.B.N Scientific Services, Guwahati on May '23.</p> <p>The report was submitted to the office of IRO-Guwahati, MoEF &amp; CC on June'2024 along with the half yearly EC compliance Report.</p>  |

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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.  | <b>Complied.</b><br><br>Present PESO License <b>P/HQ/AS/15/880</b> is valid till 31.12.2026.   |
| 11. | The project authority must provide oil separator in the nullah and the effluents should be discharged through covered drains.  | At present 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. | <b>Complied.</b>   |
| 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.<br>Offsite drills are carried out regularly, once in a year, along with District Administration, Mutual Aid Partners & NGOs.<br>Onsite Disaster Mock drills are carried out once in a quarter with different scenarios.<br>Emergency response & Disaster Management Plan (ERDMP) of Digboi refinery as per guidelines of PNGRB has been drawn up and certified by <b>M/S Sanmarg Engineering Validation and Assessment Private Ltd.</b><br>Last Offsite Disaster drill was carried out on 26 December, 2023 on scenario of "Drone attack at Tank-001 Crude tank leading to explosion and fire".<br><br>Last Odd hours onsite Disaster drill was carried out on 28th March, 2024 on scenario of "Leakage from Crude / HGO Product Exchanger-01-EE-00-004 A/B shell side inlet isolation valve downstream flange due to gasket rupture lead to vapour cloud explosion and fire." |
| 14. | The Project authority must ensure that the effluent plant fully operational within the next 3 months.  | ETP is 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 <b>ISO/IEC 17025:2017</b>   |
| 16. | The project authority must provide necessary infrastructural facilities to the construction workers during construction.   | <b>Complied.</b><br>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 Dihing Reserve Forest on south and south west side, which acts as a natural Green Belt. Green belt is developed with regular tree plantation around Refinery premises and township area.<br><br>Since 2002, Digboi Refinery has planted around <b>1,75,099</b> trees till March'2024 in and around Digboi Refinery achieving a green belt coverage of 52.81% 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, Deputy General Manager, Chief Manager, Two Senior Managers and Officer. The HSE team regularly monitors and review the effectiveness of the EMP implementation.  |
| 20. | Adequate fund provision (capital and recurring expenditure) so provided for environmental control measure 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:<br><ul style="list-style-type: none"> <li>➤ 2020-21: Rs 7.74 Cr.</li> <li>➤ 2021-22: Rs 7.78 Cr.</li> <li>➤ 2022-23: Rs 8.83 Cr.</li> <li>➤ 2023-24: Rs 3.51 Cr</li> </ul> HSE allocated fund is used for environment control measures only and not diverted for other purposes.                             |



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

| SL.<br>NO | STIPULATIONS  | COMPLIANCE STATUS AS ON 31.03.2024   |
|-----------|---|--|
| 1.0       | The project authority should submit a Risk Analysis Report within a period of six months and submit the same to the Ministry. | <p>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. Another Quantitative Risk Analysis study for all the units, including MSQU, completed in March, 2012 and various recommendations for further risk reduction are under study for implementation. A fresh Quantitative Risk Assessment for Wax Palletisation Unit completed on August 2013 by ZEEPINE SYSTEM INDIA Pvt. Ltd.</p> <p>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 &amp; CC during Dec'2022 EC Compliance inspection Monitoring.</p> |

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

| SL. NO | STIPULATIONS  | COMPLIANCE STATUS AS ON 31.03.2024  |
|--------|---|---|
| 1.0    | The project authority should submit a Risk Analysis Report within a period of six months and submit the same to the Ministry. | <p>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 already implemented. Another Quantitative Risk Analysis study for all the units, including MSQU, completed in March, 2012 and various recommendations for further risk reduction are under study for implementation.</p> <p>Further Quantitative Risk Analysis 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 &amp; CC during Dec'2022 EC Compliance inspection Monitoring.</p> |

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

| <b>A</b>      | <b>Specific Conditions</b>   |  |
|---------------|--|--|
| <b>SL. NO</b> | <b>STIPULATIONS</b>  | <b>COMPLIANCE STATUS AS ON 31.03.2024</b>  |
| 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 <sub>2</sub> , NO <sub>x</sub> , 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.<br>The various Emission reports from Refinery are submitted to Assam State Pollution Control Board and MoEF & CC on regular basis.  |
| 3             | Ambient air quality monitoring stations. [SPM, SO <sub>2</sub> , NO <sub>x</sub> 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 <sub>2</sub> and NO <sub>x</sub> .     | 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.<br><br>Out of five stations one Continuous Ambient Air Quality Monitoring Station is connected with CPCB server.<br><br>Furnaces having heat capacity of more than 10mkcl/hr (HGU & HRSG's Stacks) are continuously connected with CPCB Server and PCBA server.<br><br>On line stack monitoring analyzers are already installed for monitoring stack emissions.<br><br>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 | <p>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.</p> | <p>Quarterly monitoring of fugitive emission (VOC) is being carried out regularly by external agency. Report is submitted regularly to the office of MoEF &amp; CC with six monthly compliance reports.</p> <p>For control of fugitive emissions, dual seal has been installed in all light oil pumps with provision of venting at Flare system.</p> <p>Leak detection and repair (LDAR) report for the Q 3 of FY 2023-24 is attached as <b>Annexure-6</b>.</p>   |
| 5 | <p>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 SO<sub>2</sub> emission.</p>   | <p>Fugitive emissions of HC from product storage tank yards etc is being monitored quarterly by external agency.</p> <p>HC detectors are already provided at the strategic locations at plants and tank farm areas. HC detectors are maintained by the vendors on quarterly basis. HC detector also provided at MS Quality up gradation unit.</p> <p>Digboi Refinery is using sweet natural gas with average sulphur content of 2.48 ppm.</p>   |
| 6 | <p>The company shall strictly follow all the recommendation mentioned In the charter on corporate responsibility for environmental protection (CREP).</p>  | <p>The latest compliance status of the CREP is enclosed as <b>Annexure -7</b></p> <p>Also, Digboi Refinery has carried out various CSR activities in and around Digboi with total CSR budget of Rs 38.05 Cr during last three fiscal years.</p> <p>The major activities include empowering underprivileged young girls by enrolling 60 students each year for nursing course (BSc &amp; GNM), empowering 45 students from under privileged section with Medical &amp; Engineering coaching, skill development of local women, lighting, provision of Drinking water facility etc.</p> |
| 7 | <p>The Company shall take necessary measures to prevent fire hazards, containing oil spill 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.</p>   | <p>At Digboi Refinery, flaring is done at the height of 108 meters through flare stack. Knockout drums are provided in the flare system</p> <p>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 &amp; 452.</p>   |

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| 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.  |
| 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 Digboi Refinery 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.                                   | <p>Digboi Refinery is surrounded by the Upper Dihing Reserve Forest on south and south west side, which acts as a natural Green Belt. Green belt is developed with regular tree plantation around Refinery premises and township area.</p> <p>Since 2002, Digboi Refinery has planted around 1,75,099 trees till March'2024 in and around Digboi Refinery achieving a green belt coverage of 52.81% of the total IOCL area.</p> |
| <b>B. General Conditions</b> |  |   |
| 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 statutory body.                                 | <p>The stipulations made by the State Govt. and the State Pollution Control Board are strictly followed with regard to effluent and emission norms.</p> <p>The existing CTO has been renewed till 31<sup>st</sup> March 2028.</p> <p>Digboi Refinery meets all parameters of effluent as per revised CPCB guideline.</p>  |

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| 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.  | <b>Complied.</b>   |
| 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 SO <sub>x</sub> and NO <sub>x</sub> are regularly monitored. Apart from own monitoring, external agencies are also employed to conduct stack emission analysis on regular basis as per CPCB guideline.  |
| 4 | Wastewater shall be properly collected and treated so as 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.<br>Digboi Refinery meets all MINAS parameters related to effluent discharge as per revised CPCB guideline and CTO.  |
| 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.<br><br>Moreover, all vehicle/trucks speed is limited to 20 km/hr inside the refinery, which is also less than 75 DB.<br><br>Quarterly Noise survey is also being carried out by Occupational Health Centre of Digboi Refinery hospital. |



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| 6 | <p>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.</p> | <p>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.</p> <p>Present PESO License <b>P/HQ/AS/15/880</b> is valid till 31.12.2026.</p> <p>Disaster Management Plan duly certified by PNGRB empanelled party. Copy of plan submitted to CIF Guwahati &amp; DC, Tinsukia.</p> <p>Offsite drills are carried out regularly, once in a year, along with District Administration, Mutual Aid Partners &amp; NGOs. Onsite Disaster Mock drills are carried out once in a quarter with different scenarios.</p> <p>Emergency response &amp; Disaster Management Plan (ERDMP) of Digboi refinery as per guidelines of PNGRB has been drawn up and certified by <b>M/S Sanmarg Engineering Validation and Assessment Private Ltd</b></p> |
| 7 | <p>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.</p>   | <p>Digboi Refinery has been granted of Hazardous Waste Authorization <b>WB/T-311/21-22/115/101</b> and is valid till 31-Mar-2027.</p> <p>Digboi Refinery annually files Hazardous Wastes Return to PCBA. Last Annual Hazardous Wastes Return for FY 2023-24 has been duly submitted to Pollution Control Board, Assam on 20.06.2023.</p>  |
| 8 | <p>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.</p>   | <p>The HSE department is supported with budgetary allocation. The allocation for the last three years are as follows:</p> <ul style="list-style-type: none"> <li>➤ 2020-21: Rs 7.74 Cr.</li> <li>➤ 2021-22: Rs 7.78 Cr.</li> <li>➤ 2022-23: Rs 8.83 Cr.</li> <li>➤ 2023-24: Rs. 3.51 Cr.</li> </ul> <p>HSE allocated fund is used for environment control measures only and not diverted for other purposes.</p>  |

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| 9  | The company shall develop rainwater harvesting structures to harvest the runoff water for recharge of ground water.   | <p>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 a very cost effective and environment friendly to increase the water table in Digboi area.</p> <p>During FY 2023-24 , 42.8 % of Industrial water requirement was met through harvested rain water as Cooling Tower Make up, DM plant, Service water and fire water make up.</p> |
| 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   | <p>Six-monthly EC compliance reports are duly submitted to IRO Guwahati. Last Report Submitted on 07 December 2023.</p> <p>Previous EC compliance reports of Digboi Refinery are uploaded on Indian Oil website.</p> <p>Link to the website is below.<br/> <a href="https://iocl.com/statutory-notice">https://iocl.com/statutory-notice</a></p>  |
| 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 <a href="http://www.envfor.nic.in">http://www.envfor.nic.in</a> 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.  |
| 12 | A separate environment management cell with full 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, Deputy General Manager , Chief Manager , Senior Manager and Officer (HSE). The HSE team regularly monitors and review the effectiveness of the EMP implementation.   |

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| 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  |   |
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| SL. NO | STIPULATIONS   | COMPLIANCE STATUS AS ON 31.03.2024  |
| 1      | The 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 16.02.24 recommending the project with 4 conditions. Letter from PCCF to DR issued on 27.02.24 with decision taken and conditions to be complied.<br><br>Refinery submitted the compliance report to PCCF (Wildlife) & CWW, Assam on 03.04.2024 <b>(Enclosed as Annexure -8)</b> |
| 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 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 has 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. <b>(Enclosed as Annexure -9)</b>                                     |
| 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 post commissioning of the project.<br><br>Treated effluent from ETP  |

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|    |   | shall be 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.  |
| 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. | <p>Project has been conceived for implementation with state-of-the-art technology with equipments to ensure negligible VOC emission to comply EC norm.</p> <p>Currently Digboi refinery doesn't use any liquid fuel and Natural Gas &amp; Fuel Gas (FG) 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.</p> <p>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.</p> |
| 7  | As proposed, the total SOx emission from 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.  | <p>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.</p> <p>All the activities under CER shall be completed before the commissioning of the plant.</p>  |

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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.<br>Total freshwater requirement shall be ensured within 13032 KLPD.  |
| 10. | The additional effluent generation shall not exceed 8 m <sup>3</sup> /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 m <sup>3</sup> /hr with present load of 90 m <sup>3</sup> /hr from refinery. | Present ETP load is around 90 m <sup>3</sup> /hr & post DR 1.0 additional load is considered within 8 m <sup>3</sup> /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.<br><br>Storm 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.<br><br>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) is 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 inside battery limit.<br>No evaporation salt is generated from ETP. |



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| 14 | <p>The company shall undertake waste minimization measures as below:</p> <p>Metering and control of quantities of active ingredients to minimize waste.</p> <p>Reuse of by-products from the process as raw materials or as raw material substitutes in other processes.</p> <p>Use of automated filling to minimize spillage.</p> <p>Use of Close Feed system into batch reactors.</p> <p>Venting equipment through vapour recovery system.</p> <p>Use of high pressure hoses for equipment clearing to reduce wastewater generation.</p> | <p>Slop oil generated if any is reprocessed as per prevailing practice.</p> <p>The process handles close loop system without any provision for manual filling.</p> <p>Venting of equipment through FG header/Flare has been considered.</p> <p>Use of high pressure hoses for equipment cleaning (e.g exchanger) shall be ensured.</p>  |
| 15 | <p>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</p>   | <p>Green belt developed with regular tree plantation around Refinery premises and township area. Currently, Digboi refinery has 52.8 % of greenbelt covers of the total refinery area and already achieved min. 33% greenbelt areas as per guidelines prescribed by MoEFCC.</p> <p>Digboi Refinery planted total 1,31,111 trees during FY 24-25 ( till 15<sup>th</sup> Jun) through Miyawaki Methodology besides 1,75,099 trees from 2002-2024.</p> |
| 16 | <p>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.</p>  | <p>Digboi Refinery has allocated 5.0 Crore towards extended EMP as per the proposed activities mentioned in the EIA report.</p> <p>Accordingly, preliminary activities have been started and all the CER recommendations shall be completed before the commissioning of the plant.</p>  |
| 17 | <p>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.</p>   | <p>Shall be complied</p>  |

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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.   | 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. | <p>Online connectivity established with CPCB Server and PCBA for Furnaces having heat capacity of more than 10mkcl/hr (HGU &amp; HRSG's Stacks)</p> <p>ETP is already installed with real time analyzers (pH, COD, BOD, TSS) and connected to CPCB and PCBA server.</p> <p>Further online Oil &amp; Grease analyser shall be installed by Mar'2026 at ETP effluent line.</p> <p>Installation of web camera with night vision capability in the channel/drain carrying effluent within the premises shall be installed.</p> |
| 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.  | <p>PME and WPME is being carried out as per Factories Act with.</p> <p>Budged provision of 0.5 Crore/Annum for Occupational Health Safety shall be ensured.</p>  |
| 21 | Process safety and risk assessment studies shall be further carried out using advanced models, and the mitigating measures shall be undertaken/implemented accordingly.   | <p>RRA study of DR 1.0 project has been carried out using PHAST by M/s EIL.</p> <p>All the RRA recommendations shall be considered and ensured implementation during DR 1.0 Project implementation alongwith Hazop recommendations.</p> <p>Post implementation, Process safety and risk</p>  |

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|                              |   | assessment studies shall be further be carried out using advanced models.   |
| 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 analyzer shall be installed before commissioning by March'26 at ETP effluent line.<br><br>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 2024 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>B. General Conditions</b> |   |   |
| 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 & ensured   |

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| 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  |
| 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).                                    | <p>Acoustic hoods are available all over the refinery and silencers exist in all sensitive parts of the plant where noise is a major concern.</p> <p>Moreover, all vehicle/trucks speed is limited to 20 km/hr inside the refinery.</p> <p>The ambient noise levels conforms to the standards prescribed under the Environment (Protection) Act, 1986 Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).</p> <p>Quarterly Noise survey is carried out by Occupational Health Centre of Digboi Refinery hospital.</p> |
| 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.  | <p>DR proposed to allocate Rs. 5.0 Crores towards Extended EMP (CER) which shall be spent as submitted in CER plan by involving local villages and administration.</p> <p>Actions have been already initiated and planned for compliance prior to commissioning of DR 1.0 project facilities.</p>   |
| 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<br>(No such suggestion / representations received from any bodies)   |

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| 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 in line with current practice. |
| 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 in line 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 <a href="https://parivesh.nic.in/">https://parivesh.nic.in/</a> . 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<br><b>Attached As Annexure 10</b>       |
| 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                      |



**TEST REPORT**

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|--|-------------------------|------------------------------------|
| <b>Name &amp; Address of the Customer</b><br><br><b>"Indian Oil Corporation Limited Digboi"</b><br><br><b>Assam Oil Division,</b><br><b>P.O.- Digboi, Assam - 786171</b> | <b>Report No.</b>       | <b>: MSK/GHY/2023-24/0829</b>      |
|  | <b>Report Date</b>      | <b>: 16.11.2023</b>                |
|  | <b>Nature of Sample</b> | <b>: Effluent Water</b>            |
|  | <b>Sample Mark</b>      | <b>: ETP API INLET</b>             |
|  | <b>Sample Drawn On</b>  | <b>: 30.10.2023</b>                |
| <b>Sample Number</b>   |                         | <b>: MSKGL/ED/2023-24/11/00904</b> |
| <b>Reference No.&amp; Date: 27371982 Dated : 19/11/2021</b>  |                         |                                    |

**CHEMICAL ANALYSIS RESULT**

| Sl. No. | Parameter                          | Unit | Limit   | Result           | Test Method                                |
|---------|------------------------------------|------|---------|------------------|--|
| 1.      | pH value                           | None | 6.0-8.5 | 6.95 at 25 Deg C | APHA(23rd Edition) 4500-H-B                |
| 2.      | Oil & Grease                       | mg/l | 5.0     | 38               | APHA (23 <sup>rd</sup> Edition) 5520B,2017 |
| 3.      | Total Suspended Solids (as TSS)    | mg/l | 20.0    | 20               | APHA (23 <sup>rd</sup> Edition) 2540 D     |
| 4.      | Biochemical Oxygen Demand (as BOD) | mg/l | 15.0    | 35               | APHA (23 <sup>rd</sup> Edition) 5210B,2017 |
| 5.      | Chemical Oxygen Demand (as COD)    | mg/l | 125.0   | 132              | APHA (23 <sup>rd</sup> Edition) 5220B,2017 |
| 6.      | Ammoniacal Nitrogen                | mg/l | 15.0    | 5.0              | APHA (23rd Edition) 4500-NH3-F 2017        |
| 7.      | Benzene                            | mg/l | 0.1     | <0.05            | APHA (23rd Edition) 6200_(O)               |
| 8.      | Benzo(a)Pyrene                     | mg/l | 0.2     | <0.05            | APHA 23rd Edtn -2012 6440C_(O)             |
| 9.      | Copper (as Cu)                     | mg/l | 1.0     | <0.02            | APHA (23rd Edition) 3120 B : 2017          |
| 10.     | Cyanide (as CN)                    | mg/l | 0.20    | <0.02            | APHA (23rd Edition) 4500 -CN- F; 2017      |
| 11.     | Hexavalent Chromium (as Cr+6)      | mg/l | 0.1     | <0.01            | APHA (23rd Edition) 3500 Cr B : 2017       |
| 12.     | Lead (as Pb)                       | mg/l | 0.1     | <0.005           | APHA (23rd Edition) 3120 B : 2017          |

Count to Page-2

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Reference No.&amp; Date: 27371982 Dated : 19/11/2021

Page-2

| Sl. No. | Parameter  | Unit | Limit | Result | Test Method                                 |
|---------|--|------|-------|--------|---|
| 13.     | Mercury (as Hg)  | mg/l | 0.01  | <0.001 | IS 3025 (Part 48): 1994                     |
| 14.     | Nickel (as Ni)   | mg/l | 1.0   | <0.02  | APHA (23rd Edition) 3120 B : 2017           |
| 15.     | Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH) | mg/l | 0.35  | 0.80   | APHA (23rd Edition) 5530C : 2017            |
| 16.     | Phosphorus (as P)  | mg/l | 3.0   | 0.27   | APHA (23rd Edition) 4500 -P D, 2017         |
| 17.     | Sulphide (as S)  | mg/l | 0.5   | <0.1   | APHA (23rd Edition) 4500 -S2- D: 2017       |
| 18.     | Total Chromium ( as Cr )                                 | mg/l | 2.0   | <0.01  | APHA (23rd Edition) 3120 B : 2017           |
| 19.     | Total Kjeldahl Nitrogen                                  | mg/l | 40.0  | 5.3    | APHA (23rd Edition) 2017 4500 -Norg B: 2017 |
| 20.     | Vanadium (as V)  | mg/l | 0.2   | <0.2   | APHA (23rd Edition) 3120B: 2017             |
| 21.     | Zinc (as Zn)   | mg/l | 5.0   | <0.02  | APHA (23rd Edition) 3120 B : 2017           |

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**TEST REPORT**

|  |                         |  |
|--|-------------------------|--|
| <b>Name &amp; Address of the Customer</b><br><b>"Indian Oil Corporation Limited Digboi"</b><br><b>Assam Oil Division, PO.- Digboi Assam</b><br><b>786171</b> | <b>Report No.</b>       | <b>: MSK/GHY/2023-24/0830</b>                    |
|  | <b>Report Date</b>      | <b>: 16.11.2023</b>                              |
|  | <b>Nature of Sample</b> | <b>: Effluent Water</b>                          |
|  | <b>Sample Mark</b>      | <b>: ETP PP OUTLET</b>                           |
|  | <b>Sample Drawn On</b>  | <b>: 30.10.2023</b>                              |
| <b>Reference No. &amp; Date: 27371982Dated : 19/11/2021</b>  |                         | <b>Sample Number : MSKGL/ED/2023-24/11/00905</b> |

**CHEMICAL ANALYSIS RESULT**

| Sl. No. | Parameter                          | Unit | Limit   | Result           | Test Method                                |
|---------|------------------------------------|------|---------|------------------|--|
| 1.      | pH value                           | None | 6.0-8.5 | 6.89 at 25 Deg C | APHA(23rd Edition) 4500-H-B                |
| 2.      | Oil & Grease                       | mg/l | 5.0     | 4.5              | APHA (23 <sup>rd</sup> Edition) 5520B,2017 |
| 3.      | Total Suspended Solids (as TSS)    | mg/l | 20.0    | 14               | APHA (23 <sup>rd</sup> Edition) 2540 D     |
| 4.      | Biochemical Oxygen Demand (as BOD) | mg/l | 15.0    | 6                | APHA (23 <sup>rd</sup> Edition) 5210B,2017 |
| 5.      | Chemical Oxygen Demand (as COD)    | mg/l | 125.0   | 26               | APHA (23 <sup>rd</sup> Edition) 5220B,2017 |
| 6.      | Ammoniacal Nitrogen                | mg/l | 15.0    | <0.1             | APHA (23rd Edition) 4500-NH3-F 2017        |
| 7.      | Benzene                            | mg/l | 0.1     | <0.05            | APHA (23rd Edition) 6200_(O)               |
| 8.      | Benzo(a)Pyrene                     | mg/l | 0.2     | <0.05            | APHA 23rd Edtn -2012 6440C_(O)             |
| 9.      | Copper (as Cu)                     | mg/l | 1.0     | <0.02            | APHA (23rd Edition) 3120 B : 2017          |
| 10.     | Cyanide (as CN)                    | mg/l | 0.20    | <0.02            | APHA (23rd Edition) 4500 -CN- F: 2017      |
| 11.     | Hexavalent Chromium (as Cr+6)      | mg/l | 0.1     | <0.01            | APHA (23rd Edition) 3500 Cr B : 2017       |
| 12.     | Lead (as Pb)                       | mg/l | 0.1     | <0.005           | APHA (23rd Edition) 3120 B : 2017          |

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Reference No.&amp; Date: 27371982 Dated : 19/11/2021

Page-2

| Sl. No. | Parameter  | Unit | Limit | Result | Test Method                                 |
|---------|--|------|-------|--------|---|
| 13.     | Mercury (as Hg )   | mg/l | 0.01  | <0.001 | IS 3025 (Part 48): 1994                     |
| 14.     | Nickel (as Ni )  | mg/l | 1.0   | <0.02  | APHA (23rd Edition) 3120 B : 2017           |
| 15.     | Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH) | mg/l | 0.38  | <0.001 | APHA (23rd Edition) 5530C : 2017            |
| 16.     | Phosphorus (as P)  | mg/l | 3.0   | 0.32   | APHA (23rd Edition) 4500 -P D, 2017         |
| 17.     | Sulphide (as S)  | mg/l | 0.7   | <0.1   | APHA (23rd Edition) 4500 -S2- D: 2017       |
| 18.     | Total Chromium ( as Cr )                                 | mg/l | 2.0   | <0.01  | APHA (23rd Edition) 3120 B : 2017           |
| 19.     | Total Kjeldahl Nitrogen                                  | mg/l | 42.0  | <0.3   | APHA (23rd Edition) 2017 4500 -Norg B: 2017 |
| 20.     | Vanadium (as V)  | mg/l | 0.5   | <0.2   | APHA (23rd Edition) 3120B: 2017             |
| 21.     | Zinc (as Zn)   | mg/l | 6.0   | <0.02  | APHA (23rd Edition) 3120 B : 2017           |

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**TEST REPORT**

|  |                         |                                    |
|--|-------------------------|------------------------------------|
| <b>Name &amp; Address of the Customer</b><br><br><b>"Indian Oil Corporation Limited Digboi"</b><br><br><b>Assam Oil Division,</b><br><b>P.O.- Digboi, Assam - 786171</b> | <b>Report No.</b>       | <b>: MSK/GHY/2023-24/0919</b>      |
|  | <b>Report Date</b>      | <b>: 13.12.2023</b>                |
|  | <b>Nature of Sample</b> | <b>: Effluent Water</b>            |
|  | <b>Sample Mark</b>      | <b>: ETP API INLET</b>             |
|  | <b>Sample Drawn On</b>  | <b>: 18.11.2023</b>                |
| <b>Sample Number</b>   |                         | <b>: MSKGL/ED/2023-24/12/00473</b> |
| <b>Reference No. &amp; Date: 27371982 Dated : 19/11/2021</b>   |                         |                                    |

**CHEMICAL ANALYSIS RESULT**

| Sl. No. | Parameter                          | Unit | Limit   | Result           | Test Method                                |
|---------|------------------------------------|------|---------|------------------|--|
| 1.      | pH value                           | None | 6.0-8.5 | 7.06 at 25 Deg C | APHA(23rd Edition) 4500-H-B                |
| 2.      | Oil & Grease                       | mg/l | 5.0     | 34               | APHA (23 <sup>rd</sup> Edition) 5520B,2017 |
| 3.      | Total Suspended Solids (as TSS)    | mg/l | 20.0    | 18               | APHA (23 <sup>rd</sup> Edition) 2540 D     |
| 4.      | Biochemical Oxygen Demand (as BOD) | mg/l | 15.0    | 26.50            | APHA (23 <sup>rd</sup> Edition) 5210B,2017 |
| 5.      | Chemical Oxygen Demand (as COD)    | mg/l | 125.0   | 111.32           | APHA (23 <sup>rd</sup> Edition) 5220B,2017 |
| 6.      | Ammoniacal Nitrogen                | mg/l | 15.0    | 4.0              | APHA (23rd Edition) 4500-NH3-F 2017        |
| 7.      | Benzene                            | mg/l | 0.1     | <0.05            | APHA (23rd Edition) 6200_(O)               |
| 8.      | Benzo(a)Pyrene                     | mg/l | 0.2     | <0.05            | APHA 23rd Edtn -2012 6440C_(O)             |
| 9.      | Copper (as Cu)                     | mg/l | 1.0     | <0.02            | APHA (23rd Edition) 3120 B : 2017          |
| 10.     | Cyanide (as CN)                    | mg/l | 0.20    | <0.02            | APHA (23rd Edition) 4500 -CN- F: 2017      |
| 11.     | Hexavalent Chromium (as Cr+6)      | mg/l | 0.1     | <0.01            | APHA (23rd Edition) 3500 Cr B : 2017       |
| 12.     | Lead (as Pb)                       | mg/l | 0.1     | <0.005           | APHA (23rd Edition) 3120 B : 2017          |

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Reference No.&amp; Date: 27371982Dated : 19/11/2021

Page-2

| Sl. No. | Parameter  | Unit | Limit | Result | Test Method                                 |
|---------|--|------|-------|--------|---|
| 13.     | Mercury (as Hg)  | mg/l | 0.01  | <0.001 | IS 3025 (Part 48): 1994                     |
| 14.     | Nickel (as Ni )  | mg/l | 1.0   | <0.02  | APHA (23rd Edition) 3120 B : 2017           |
| 15.     | Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH) | mg/l | 0.35  | 0.80   | APHA (23rd Edition) 5530C : 2017            |
| 16.     | Phosphorus (as P)  | mg/l | 3.0   | 0.236  | APHA (23rd Edition) 4500 -P D, 2017         |
| 17.     | Sulphide (as S)  | mg/l | 0.5   | <0.1   | APHA (23rd Edition) 4500 -S2- D: 2017       |
| 18.     | Total Chromium ( as Cr )                                 | mg/l | 2.0   | <0.01  | APHA (23rd Edition) 3120 B : 2017           |
| 19.     | Total Kjeldahl Nitrogen                                  | mg/l | 40.0  | 5.4    | APHA (23rd Edition) 2017 4500 -Norg B: 2017 |
| 20.     | Vanadium (as V)  | mg/l | 0.2   | <0.2   | APHA (23rd Edition) 3120B: 2017             |
| 21.     | Zinc (as Zn)   | mg/l | 5.0   | <0.02  | APHA (23rd Edition) 3120 B : 2017           |

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**TEST REPORT**

|  |                         |  |
|--|-------------------------|--|
| <b>Name &amp; Address of the Customer</b><br><b>"Indian Oil Corporation Limited Digboi"</b><br><b>Assam Oil Division, PO.- Digboi Assam</b><br><b>786171</b> | <b>Report No.</b>       | <b>: MSK/GHY/2023-24/0920</b>                    |
|  | <b>Report Date</b>      | <b>: 13.12.2023</b>                              |
|  | <b>Nature of Sample</b> | <b>: Effluent Water</b>                          |
|  | <b>Sample Mark</b>      | <b>: ETP PP OUTLET</b>                           |
|  | <b>Sample Drawn On</b>  | <b>: 18.11.2023</b>                              |
| <b>Reference No. &amp; Date: 27371982 Dated : 19/11/2021</b>   |                         | <b>Sample Number : MSKGL/ED/2023-24/12/00474</b> |

**CHEMICAL ANALYSIS RESULT**

| Sl. No. | Parameter                          | Unit | Limit   | Result           | Test Method                                      |
|---------|------------------------------------|------|---------|------------------|--|
| 1.      | pH value                           | None | 6.0-8.5 | 6.93 at 25 Deg C | APHA(23rd Edition) 4500-H-B                      |
| 2.      | Oil & Grease                       | mg/l | 5.0     | 4.3              | APHA (23 <sup>rd</sup> Edition) 5520B,2017       |
| 3.      | Total Suspended Solids (as TSS)    | mg/l | 20.0    | 12               | APHA (23 <sup>rd</sup> Edition) 2540 D           |
| 4.      | Biochemical Oxygen Demand (as BOD) | mg/l | 15.0    | 8.43             | APHA (23 <sup>rd</sup> Edition) 5210B,2017       |
| 5.      | Chemical Oxygen Demand (as COD)    | mg/l | 125.0   | 30.36            | APHA (23 <sup>rd</sup> Edition) 5220B,2017       |
| 6.      | Ammoniacal Nitrogen                | mg/l | 15.0    | <0.1             | APHA (23rd Edition) 4500-NH <sub>3</sub> -F 2017 |
| 7.      | Benzene                            | mg/l | 0.1     | <0.05            | APHA (23rd Edition) 6200_(O)                     |
| 8.      | Benzo(a)Pyrene                     | mg/l | 0.2     | <0.05            | APHA 23rd Edtn -2012 6440C_(O)                   |
| 9.      | Copper (as Cu)                     | mg/l | 1.0     | <0.02            | APHA (23rd Edition) 3120 B : 2017                |
| 10.     | Cyanide (as CN)                    | mg/l | 0.20    | <0.02            | APHA (23rd Edition) 4500 -CN- F: 2017            |
| 11.     | Hexavalent Chromium (as Cr+6)      | mg/l | 0.1     | <0.01            | APHA (23rd Edition) 3500 Cr B : 2017             |
| 12.     | Lead (as Pb)                       | mg/l | 0.1     | <0.005           | APHA (23rd Edition) 3120 B : 2017                |

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Reference No.&amp; Date: 27371982Dated : 19/11/2021

Page-2

| Sl. No. | Parameter  | Unit | Limit | Result | Test Method                                 |
|---------|--|------|-------|--------|---|
| 13.     | Mercury (as Hg )   | mg/l | 0.01  | <0.001 | IS 3025 (Part 48): 1994                     |
| 14.     | Nickel (as Ni )  | mg/l | 1.0   | <0.02  | APHA (23rd Edition) 3120 B : 2017           |
| 15.     | Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH) | mg/l | 0.38  | <0.001 | APHA (23rd Edition) 5530C : 2017            |
| 16.     | Phosphorus (as P)  | mg/l | 3.0   | 0.41   | APHA (23rd Edition) 4500 -P D, 2017         |
| 17.     | Sulphide (as S)  | mg/l | 0.7   | <0.1   | APHA (23rd Edition) 4500 -S2- D: 2017       |
| 18.     | Total Chromium ( as Cr )                                 | mg/l | 2.0   | <0.01  | APHA (23rd Edition) 3120 B : 2017           |
| 19.     | Total Kjeldahl Nitrogen                                  | mg/l | 42.0  | <0.3   | APHA (23rd Edition) 2017 4500 -Norg B: 2017 |
| 20.     | Vanadium (as V)  | mg/l | 0.5   | <0.2   | APHA (23rd Edition) 3120B: 2017             |
| 21.     | Zinc (as Zn)   | mg/l | 6\0   | <0.02  | APHA (23rd Edition) 3120 B : 2017           |

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### Test Report

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

**ULR No. :** TC636623000007074F  
**Test Report Date:** 10/01/2024

#### Sample Particulars

**Nature of the Sample :** Treated Effluent  
**Sample Quantity & Packaging :** 1 L HDPE Can+150 ml Sterile Container  
**Sample Received at Lab :** 03/01/2024  
**Test Started On :** 03/01/2024  
**Test Completed On :** 09/01/2024  
**Method of Sampling :** SOP/B/D-3  
**Date of Sampling :** 27/12/2024  
**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   | ...  | 7.25         | 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 | 3            | 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 | 60           | 125               | IS:3025 (P-58)            |
| 6       | Ammonical Nitrogen                                   | mg/L | 0.01         | 15                | IS:3025 (P-34)            |
| 7       | Total Kjeldhal Nitrogen                              | mg/L | 2.80         | 40                | IS:3025 (P-34)            |
| 8       | Lead as Pb   | mg/L | ND [DL-0.01] | 0.1               | APHA 23 <sup>rd</sup> Ed. |
| 9       | Chromium Hexavalent as Cr <sup>+6</sup>              | mg/L | ND [DL-0.1]  | 0.1               | APHA 23 <sup>rd</sup> Ed. |
| 10      | Chromium as Cr                                       | mg/L | ND [DL-0.05] | 2.0               | APHA 23 <sup>rd</sup> Ed. |
| 11      | Copper as Cu   | mg/L | 0.07         | 1.0               | APHA 23 <sup>rd</sup> Ed. |
| 12      | Zinc as Zn   | mg/L | 0.21         | 5.0               | APHA 23 <sup>rd</sup> Ed. |
| 13      | Sulphide as S <sup>2-</sup>                          | mg/L | ND [DL-0.05] | 0.5               | IS:3025 (P-29)            |
| 14      | Mercury as Hg  | mg/L | ND [DL-0.05] | 0.01              | APHA 23 <sup>rd</sup> Ed. |
| 15      | Phenolic Compounds(C <sub>6</sub> H <sub>5</sub> OH) | mg/L | ND [DL-1]    | 0.35              | IS:3025 (P-43)            |
| 16      | Nickel as Ni   | mg/L | ND [DL-0.1]  | 1.0               | APHA 23 <sup>rd</sup> Ed. |

**Remark:**  
ND-Not Detected



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If you have any complaint/feedback regarding the sample collection/testing/test report, please send an email at info@nityalab.com and call at +91-191-2465597, +91-9873924093

#### CORPORATE OFFICE & CENTRAL LABORATORIES :-

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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. : 202312270110  
Test Report Date: 10/01/2024

#### Sample Particulars

Nature of the Sample : Treated Effluent  
Sample Quantity & Packaging : 1 L HDPE Can+150 ml Sterile Container  
Sample Received at Lab : 03/01/2024  
Test Started On : 03/01/2024  
Test Completed On : 09/01/2024  
Method of Sampling : SOP/B/D-3  
Date of Sampling : 27/12/2024  
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 | 0.52           | 3.0               | IS:3025 (P-31) |
| 3       | Vanadium as V          | mg/L | ND [DL-0.01]   | 0.2               | 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    |

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**(RAVINDER MITTAL)**

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

ULR No. : TC636624000000604F  
Test Report Date: 03/02/2024

#### Sample Particulars

Nature of the Sample : **Treated Effluent**  
Sample Quantity & Packaging : 1 L HDPE Can+150 ml Sterile Container  
Sample Received at Lab : 26/01/2024  
Test Started On : 26/01/2024  
Test Completed On : 02/02/2024  
Method of Sampling : SOP/B/D-3  
Date of Sampling : 20/01/2024  
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   | ---  | 7.33         | 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 | 3            | 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 | 70           | 125               | IS:3025 (P-58)            |
| 6       | Ammonical Nitrogen                                   | mg/L | 0.02         | 15                | IS:3025 (P-34)            |
| 7       | Total Kjeldhal Nitrogen                              | mg/L | 2.24         | 40                | IS:3025 (P-34)            |
| 8       | Lead as Pb   | mg/L | ND [DL-0.01] | 0.1               | APHA 23 <sup>rd</sup> Ed. |
| 9       | Chromium Hexavalent as Cr <sup>+6</sup>              | mg/L | ND [DL-0.1]  | 0.1               | APHA 23 <sup>rd</sup> Ed. |
| 10      | Chromium as Cr                                       | mg/L | ND [DL-0.05] | 2.0               | APHA 23 <sup>rd</sup> Ed. |
| 11      | Copper as Cu   | mg/L | 0.04         | 1.0               | APHA 23 <sup>rd</sup> Ed. |
| 12      | Zinc as Zn   | mg/L | ND [DL-0.05] | 5.0               | APHA 23 <sup>rd</sup> Ed. |
| 13      | Sulphide as S <sup>2-</sup>                          | mg/L | ND [DL-0.05] | 0.5               | IS:3025 (P-29)            |
| 14      | Mercury as Hg  | mg/L | ND [DL-0.05] | 0.01              | APHA 23 <sup>rd</sup> Ed. |
| 15      | Phenolic Compounds(C <sub>6</sub> H <sub>5</sub> OH) | mg/L | ND [DL-1]    | 0.35              | IS:3025 (P-43)            |
| 16      | Nickel as Ni   | mg/L | ND [DL-0.1]  | 1.0               | APHA 23 <sup>rd</sup> Ed. |

Remark:  
ND-Not Detected



TC-6366



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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

Test Report No. : 202401200110  
Test Report Date: 03/02/2024

#### Sample Particulars

Nature of the Sample : Treated Effluent  
Sample Quantity & Packaging : 1 L HDPE Can+150 ml Sterile Container  
Sample Received at Lab : 26/01/2024  
Test Started On : 26/01/2024  
Test Completed On : 02/02/2024  
Method of Sampling : SOP/B/D-3  
Date of Sampling : 20/01/2024  
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 | 0.46           | 3.0               | IS:3025 (P-31) |
| 3       | Vanadium as V          | mg/L | ND [DL-0.01]   | 0.2               | 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    |

  
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(RAVINDER MITTAL)

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

ULR No. : TC636624000001422F  
Test Report Date: 29/02/2024

#### Sample Particulars

|                             |   |                                       |
|-----------------------------|---|---------------------------------------|
| Nature of the Sample        | : | Treated Effluent                      |
| Sample Quantity & Packaging | : | 1 L HDPE Can+150 ml Sterile Container |
| Sample Received at Lab      | : | 22/02/2024                            |
| Test Started On             | : | 22/02/2024                            |
| Test Completed On           | : | 28/02/2024                            |
| Method of Sampling          | : | SOP/B/D-3                             |
| Date of Sampling            | : | 14/02/2024                            |
| 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   | ...  | 7.19         | 6.0-8.5           | IS:3025 (P-11)            |
| 2       | Total Suspended Solids (TSS)                         | mg/L | 17           | 20                | IS:3025 (P-17)            |
| 3       | Oil & Grease (O&G)                                   | mg/L | 3            | 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 | 60           | 125               | IS:3025 (P-58)            |
| 6       | Ammonical Nitrogen                                   | mg/L | 0.08         | 15                | IS:3025 (P-34)            |
| 7       | Total Kjeldhal Nitrogen                              | mg/L | 2.24         | 40                | IS:3025 (P-34)            |
| 8       | Lead as Pb   | mg/L | ND [DL-0.01] | 0.1               | APHA 23 <sup>rd</sup> Ed. |
| 9       | Chromium Hexavalent as Cr <sup>+6</sup>              | mg/L | ND [DL-0.1]  | 0.1               | APHA 23 <sup>rd</sup> Ed. |
| 10      | Chromium as Cr                                       | mg/L | ND [DL-0.05] | 2.0               | APHA 23 <sup>rd</sup> Ed. |
| 11      | Copper as Cu   | mg/L | 0.03         | 1.0               | APHA 23 <sup>rd</sup> Ed. |
| 12      | Zinc as Zn   | mg/L | 0.14         | 5.0               | APHA 23 <sup>rd</sup> Ed. |
| 13      | Sulphide as S <sup>2-</sup>                          | mg/L | ND [DL-0.05] | 0.5               | IS:3025 (P-29)            |
| 14      | Mercury as Hg  | mg/L | ND [DL-0.05] | 0.01              | APHA 23 <sup>rd</sup> Ed. |
| 15      | Phenolic Compounds(C <sub>6</sub> H <sub>5</sub> OH) | mg/L | ND [DL-1]    | 0.35              | IS:3025 (P-43)            |
| 16      | Nickel as Ni   | mg/L | ND [DL-0.1]  | 1.0               | APHA 23 <sup>rd</sup> Ed. |

Remark:  
ND-Not Detected



TC-6366

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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

Test Report No. : 202402140110  
Test Report Date: 29/02/2024

### Sample Particulars

Nature of the Sample : Treated Effluent  
Sample Quantity & Packaging : 1 L HDPE Can+150 ml Sterile Container  
Sample Received at Lab : 22/02/2024  
Test Started On : 22/02/2024  
Test Completed On : 28/02/2024  
Method of Sampling : SOP/B/D-3  
Date of Sampling : 14/02/2024  
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 | 0.62           | 3.0               | IS:3025 (P-31) |
| 3       | Vanadium as V          | mg/L | ND [DL-0.01]   | 0.2               | 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    |

  
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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

ULR No. : TC636624000001980F  
Test Report Date: 16/03/2024

#### Sample Particulars

Nature of the Sample : Treated Effluent  
Sample Quantity & Packaging : 1 L HDPE Can+150 ml Sterile Container  
Sample Received at Lab : 09/03/2024  
Test Started On : 09/03/2024  
Test Completed On : 15/03/2024  
Method of Sampling : SOP/B/D-3  
Date of Sampling : 05/03/2024  
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   | ...  | 7.23         | 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 | 4            | 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 | 70           | 125               | IS:3025 (P-58)            |
| 6       | Ammonical Nitrogen                                   | mg/L | 0.06         | 15                | IS:3025 (P-34)            |
| 7       | Total Kjeldhal Nitrogen                              | mg/L | 2.01         | 40                | IS:3025 (P-34)            |
| 8       | Lead as Pb   | mg/L | ND [DL-0.01] | 0.1               | APHA 23 <sup>rd</sup> Ed. |
| 9       | Chromium Hexavalent as Cr <sup>+6</sup>              | mg/L | ND [DL-0.1]  | 0.1               | APHA 23 <sup>rd</sup> Ed. |
| 10      | Chromium as Cr                                       | mg/L | ND [DL-0.05] | 2.0               | APHA 23 <sup>rd</sup> Ed. |
| 11      | Copper as Cu   | mg/L | 0.05         | 1.0               | APHA 23 <sup>rd</sup> Ed. |
| 12      | Zinc as Zn   | mg/L | 0.21         | 5.0               | APHA 23 <sup>rd</sup> Ed. |
| 13      | Sulphide as S <sup>2-</sup>                          | mg/L | ND [DL-0.05] | 0.5               | IS:3025 (P-29)            |
| 14      | Mercury as Hg  | mg/L | ND [DL-0.05] | 0.01              | APHA 23 <sup>rd</sup> Ed. |
| 15      | Phenolic Compounds(C <sub>6</sub> H <sub>5</sub> OH) | mg/L | ND [DL-1]    | 0.35              | IS:3025 (P-43)            |
| 16      | Nickel as Ni   | mg/L | ND [DL-0.1]  | 1.0               | APHA 23 <sup>rd</sup> Ed. |

Remark:  
ND-Not Detected



TC-6366

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(RAVINDER MITTAL)

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## BUILDING &amp; ROAD, MATERIAL, SOIL, ENVIRONMENTAL &amp; CALIBRATION TESTING LAB

## Test Report

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

Test Report No. : 202403050110  
Test Report Date: 16/03/2024

## Sample Particulars

Nature of the Sample : Treated Effluent  
Sample Quantity & Packaging : 1 L HDPE Can+150 ml Sterile Container  
Sample Received at Lab : 09/03/2024  
Test Started On : 09/03/2024  
Test Completed On : 15/03/2024  
Method of Sampling : SOP/B/D-3  
Date of Sampling : 05/03/2024  
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 | 0.78           | 3.0               | IS:3025 (P-31) |
| 3       | Vanadium as V          | mg/L | ND [DL-0.01]   | 0.2               | 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    |

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| Effluent Parameters Test Report                          |           |         |          |          |         |          |       |         |
|--|-----------|---------|----------|----------|---------|----------|-------|---------|
| From October 2023 to March,2024 ( Digboi refinery QC)    |           |         |          |          |         |          |       |         |
| Parameters   | Limits    | October | November | December | January | February | March | Average |
| pH   | 6.0 - 8.5 | 8.00    | 8.10     | 7.40     | 6.15    | 6.10     | 6.25  | 7.000   |
| Oil & Grease   | 5.0       | 3.45    | 3.00     | 2.70     | 4.15    | 3.90     | 4.15  | 3.558   |
| BOD  | 15.0      | 8.00    | 11.00    | 9.50     | 8.50    | 8.50     | 8.00  | 8.917   |
| COD  | 125.0     | 58.50   | 65.50    | 42.00    | 60.50   | 65.00    | 64.50 | 59.333  |
| TSS  | 20.0      | 11.00   | 13.00    | 15.00    | 15.50   | 17.50    | 16.00 | 14.667  |
| Phenols  | 0.35      | 0.11    | 0.20     | 0.24     | 0.20    | 0.19     | 0.26  | 0.197   |
| Sulphides  | 0.5       | 0.07    | 0.09     | 0.10     | 0.08    | 0.09     | 0.08  | 0.084   |
| CN   | 0.20      | 0.009   | 0.011    | 0.011    | 0.010   | 0.01     | 0.01  | 0.010   |
| From October 2023, to March,2024(Source-External Agency) |           |         |          |          |         |          |       |         |
| Parameters   | Limits    | October | November | December | January | February | March | Average |
| pH   | 6.0 - 8.5 | 6.89    | 6.93     | 7.25     | 7.33    | 7.19     | 7.23  | 7.186   |
| Oil & Grease   | 5.0       | 4.50    | 4.30     | 3.00     | 3.00    | 3.00     | 4.00  | 3.460   |
| BOD  | 15.0      | 6.00    | 8.43     | 13.00    | 14.00   | 14.00    | 14.00 | 12.686  |
| COD  | 125.0     | 26.00   | 30.36    | 60.00    | 70.00   | 60.00    | 70.00 | 58.072  |
| TSS  | 20.0      | 14.00   | 12.00    | 15.00    | 18.00   | 17.00    | 18.00 | 16.000  |
| Phenols  | 0.35      | <0.001  | <0.001   | ND       | ND      | ND       | ND    | ND      |
| Sulphides  | 0.5       | <0.1    | <0.1     | ND       | ND      | ND       | ND    | ND      |
| CN   | 0.20      | <0.02   | <0.02    | ND       | ND      | ND       | ND    | ND      |
| Ammonia as N   | 15.0      | <0.1    | <0.1     | ND       | ND      | ND       | ND    | ND      |
| TKN  | 40.0      | <0.3    | <0.3     | ND       | ND      | ND       | ND    | ND      |
| P  | 3.0       | 0.32    | 0.41     | 0.52     | 0.46    | 0.62     | 0.78  | 0.558   |
| Cr (Hexavalent)  | 0.1       | <0.01   | <0.01    | ND       | ND      | ND       | ND    | 0.01    |
| Cr (Total)   | 2.0       | <0.01   | <0.01    | ND       | ND      | ND       | ND    | 0.05    |
| Pb   | 0.1       | <0.005  | <0.005   | ND       | ND      | ND       | ND    | ND      |
| Hg   | 0.01      | <0.001  | <0.001   | ND       | ND      | ND       | ND    | 0.007   |
| Zn   | 5.0       | <0.02   | <0.02    | ND       | ND      | ND       | ND    | ND      |
| Ni   | 1.0       | <0.02   | <0.02    | ND       | ND      | ND       | ND    | ND      |
| Cu   | 1.0       | <0.02   | <0.02    | ND       | ND      | ND       | ND    | 0.050   |
| V  | 0.2       | <0.2    | <0.2     | ND       | ND      | ND       | ND    | 0.100   |
| Benzene  | 0.1       | <0.05   | <0.05    | ND       | ND      | ND       | ND    | 0.010   |
| Benzo (a) -Pyrene  | 0.2       | <0.05   | <0.05    | ND       | ND      | ND       | ND    | 0.100   |

ND- Not Detectable

Checked by:-

डी.के. बरुवा / D.K. BARUA  
जीएम (टीएस एवं एवएसई)  
GM (TS & HSE)  
आई.ओ.सी.एल. (एओडी), डिगबोई  
I.O.C. LTD. (AOD), DIGBOI

Prepared by:

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





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)



### Analysis Lab Report of Dihing and Digboi Rivers

Source: Dihing and Digboi Rivers

रिपोर्ट संख्या/ Report No.: DR/QC/OCT-2023

Dated 28.10.2023

Dated of sample Collection :- 23.10.2023

| 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               | 2.9          | 0.08          | 0.07              | 71           | 11.0                |
| 2  | Digboi River Water (15 km away from Digboi Refinery on Digboi | 7                 | 2.1          | 0.01          | BDL               | 56           | 7.0                 |
| 3  | Digboi River Water (26 km away from Digboi Refinery on Digboi | 7                 | 1.2          | BDL           | BDL               | 43           | 6.5                 |
| 4  | Dihing River water before confluence with Digboi river        | 7.1               | 0.9          | BDL           | BDL               | 39           | 6.0                 |
| 5  | Dihing River water after confluence with Digboi river         | 7.1               | 0.9          | BDL           | BDL               | 33           | 7.0                 |

\*\*\*BDL = Below Detection Limit

Tested & Report by: -  
 B CHAKRABORTY (JQCA)  
 Inter Com Water Lab No:-3592

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)



### Analysis Lab Report of Dihing and Digboi Rivers

Source: Dihing and Digboi Rivers

रिपोर्ट संख्या/ Report No.:DR/QC/NOV-2023

Dated 25.11.2023

Dated of sample Collection :-15.11.2023

| 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 norms (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               | 3.1          | 0.08          | 0.07              | 69           | 11.0                |
| 2  | Digboi River Water (15 km away from Digboi Refinery on Digboi) | 7.1               | 2            | 0.01          | BDL               | 53           | 6.0                 |
| 3  | Digboi River Water (26 km away from Digboi Refinery on Digboi) | 7                 | 1.1          | BDL           | BDL               | 42           | 5.0                 |
| 4  | Dihing River water before confluence with Digboi river         | 7.1               | 0.9          | BDL           | BDL               | 37           | 5.0                 |
| 5  | Dihing River water after confluence with Digboi river          | 7                 | 0.8          | BDL           | BDL               | 31           | 5.0                 |

\*\*\*BDL = Below Detection Limit

Tested & Report by: -  
B CHAKRABORTY (JQCA)  
Inter Com Water Lab No:-3592

  
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)



### Analysis Lab Report of Dihing and Digboi Rivers

Source: Dihing and Digboi Rivers

रिपोर्ट संख्या/ Report No.: DR/QC/Dec-2023

Dated 30.12.2023

Dated of sample Collection :- 18.12.2023

| 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                          | 7.3               | 2.3          | 0.14          | 0.08              | 56           | 11.0                |
| 2  | Digboi River Water (15 km away from Digboi Refinery on Digboi | 7.2               | 1.9          | 0.13          | BDL               | 46           | 9.0                 |
| 3  | Digboi River Water (26 km away from Digboi Refinery on Digboi | 7.2               | 1.3          | 0.1           | BDL               | 38           | 8.0                 |
| 4  | Dihing River water before confluence with Digboi river        | 7.7               | 0.9          | 0.05          | BDL               | 34           | 6.0                 |
| 5  | Dihing River water after confluence with Digboi river         | 7.7               | 0.8          | 0.09          | BDL               | 30           | 6.0                 |

\*\*\*BDL = Below Detection Limit

Tested & Report by: -  
 B CHAKRABORTY (JQCA)  
 Inter Com Water Lab No:-3592

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)



### Analysis Lab Report of Dihing and Digboi Rivers

Source: Dihing and Digboi Rivers

रिपोर्ट संख्या/ Report No.: DR/QC/Jan-2024

Dated 29.01.2024

Dated of sample Collection :- 23.01.2024

| 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 norms (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                           | 6.2               | 2            | 0.12          | 0.1               | 47           | 6.0                 |
| 2  | Digboi River Water (15 km away from Digboi Refinery on Digboi) | 6.7               | 1.8          | 0.08          | 0.1               | 32           | 5.0                 |
| 3  | Digboi River Water (26 km away from Digboi Refinery on Digboi) | 6.9               | 1.5          | 0.07          | BDL               | 30           | 5.0                 |
| 4  | Dihing River water before confluence with Digboi river         | 7.5               | 0.7          | 0.06          | BDL               | 27           | 4.0                 |
| 5  | Dihing River water after confluence with Digboi river          | 7.8               | 0.5          | 0.06          | BDL               | 30           | 5.0                 |

\*\*\*BDL = Below Detection Limit

Tested & Report by: -  
Dipankar Rajkhowa (JQCA)  
Inter Com Water Lab No:-3592

  
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)



### Analysis Lab Report of Dihing and Digboi Rivers

Source: Dihing and Digboi Rivers

रिपोर्ट संख्या/ Report No.: DR/QC/Feb-2024

Dated 29.02.2024

Dated of sample Collection :- 26.02.2024

| 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 norms (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                           | 6.2               | 2.1          | 0.13          | 0.1               | 48           | 6.0                 |
| 2  | Digboi River Water (15 km away from Digboi Refinery on Digboi) | 6.6               | 1.8          | 0.09          | 0.1               | 33           | 5.0                 |
| 3  | Digboi River Water (26 km away from Digboi Refinery on Digboi) | 6.9               | 1.6          | 0.08          | BDL               | 30           | 5.0                 |
| 4  | Dihing River water before confluence with Digboi river         | 7.4               | 0.8          | 0.07          | BDL               | 27           | 4.0                 |
| 5  | Dihing River water after confluence with Digboi river          | 7.6               | 0.6          | 0.06          | BDL               | 25           | 4.0                 |

\*\*\*BDL = Below Detection Limit

Tested & Report by: -  
Dipankar Rajkhowa (JQCA)  
Inter Com Water Lab No:-3592

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)



### Analysis Lab Report of Dihing and Digboi Rivers

Source: Dihing and Digboi Rivers

रिपोर्ट संख्या/ Report No.: DR/QC/March-2024

Dated 22.03.2024

Dated of sample Collection :- 12.03.2024

| 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 norms (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               | 3.0          | 0.14          | 0.10              | 52.0         | 10.0                |
| 2  | Digboi River Water (15 km away from Digboi Refinery on Digboi) | 6.7               | 2.6          | 0.10          | 0.10              | 45.0         | 8.0                 |
| 3  | Digboi River Water (26 km away from Digboi Refinery on Digboi) | 6.8               | 2.0          | 0.09          | 0.05              | 40.0         | 6.0                 |
| 4  | Dihing River water before confluence with Digboi river         | 7.6               | 0.8          | 0.05          | BDL               | 28.0         | 4.0                 |
| 5  | Dihing River water after confluence with Digboi river          | 7.4               | 0.5          | 0.08          | BDL               | 26.0         | 5.0                 |

\*\*\*BDL = Below Detection Limit

Tested & Report by: -  
Dipankar Rajkhowa (JQCA)  
Inter Com Water Lab No:-3592

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

**ANNEXURE-3**  
**COMPLIANCE OF EFFLUENT STANDARDS (In Kg/TMT of Crude)**

| PARAMETER         | LIMIT | (October'23 -March'24) Source-External agency |          |          |         |          |       | Average |
|-------------------|-------|---|----------|----------|---------|----------|-------|---------|
|                   |       | October                                       | November | December | January | February | March |         |
| 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:

डी.के. बरुवा / D.K. BARUA  
जीएम (टीएस एवं एचएसई)  
GM (TS & HSE)  
आई.ओ.सी.एल. (एओडी), डिगबोई  
I.O.C. LTD. (AOD), DIGBOI

Prepared by:

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



**Test Report**

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

**ULR No. :** TC636623000007055F  
**Test Report Date:** 08/01/2024

**Sample Particulars:**

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : 26/12/2023  
Sample Received at Lab : 30/12/2023  
Test Started On : 30/12/2023  
Test Completed On : 06/01/2024  
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 : 138  
Ambient Air Temperature °C : 24  
Flue Gas Velocity (m/s) : 12.39  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : 71714.7  
Barometric Pressure, mmHg : 754

**Analysis Report**

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



NOTE: The laboratory accepts the responsibility for content of report. The results contained in this test report related only to the sample tested. Test report shall not be reproduced except in full, without written approval of the laboratory. This report is intended only for your guidance and not for legal purpose or for advertisement. This report shall not be reproduced except in full without the written approval of this organization. Samples will be destroyed after 30 days from the date of issue of test certificate unless otherwise specified. Any complaints about this report should be communicated in writing within 7 days of issue of this report. Total liability of Nitya Laboratories is limited to the amount of fee only. All above Parameters are not in NABL Scope. Results subject to the movement of vehicle at that particular time.

**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

**Test Report No.:** 202312260110

**Test Report Date:** 08/01/2024

**Sample Particulars:**

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : 26/12/2023  
Sample Received at Lab : 30/12/2023  
Test Started On : 30/12/2023  
Test Completed On : 06/01/2024  
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 : 138  
Ambient Air Temperature °C : 24  
Flue Gas Velocity (m/s) : 12.39  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : 71714.7  
Barometric Pressure, mmHg : 754

**Analysis Report**

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 7.32         | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 20           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 3.46         | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 3.6          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 16.9         | -                  | SOP No.: NL/ SOP / FGA /11 |

**Remark:**

ND-Not Detected, DL-Detection Limit

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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. :**

TC636623000007056F

**Test Report Date:**

08/01/2024

### Sample Particulars:

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : 26/12/2023  
Sample Received at Lab : 30/12/2023  
Test Started On : 30/12/2023  
Test Completed On : 06/01/2024  
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 : 299  
Ambient Air Temperature °C : 26  
Flue Gas Velocity (m/s) : 20.58  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : 22179  
Barometric Pressure, mmHg : 754

### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 5.24         | 10                 | IS:11255(P-1) |



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### CORPORATE OFFICE & CENTRAL LABORATORIES :-

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**BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB**

**Test Report**

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

**Test Report No.:** 202312260111

**Test Report Date:** 08/01/2024

**Sample Particulars:**

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : 26/12/2023  
Sample Received at Lab : 30/12/2023  
Test Started On : 30/12/2023  
Test Completed On : 06/01/2024  
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 : 299  
Ambient Air Temperature °C : 26  
Flue Gas Velocity (m/s) : 20.58  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : 22179  
Barometric Pressure, mmHg : 754

**Analysis Report**

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 4            | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 22           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 6            | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 14.7         | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 4.8          | -                  | 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. :**

**Test Report Date:**

**TC636623000007057F**

**08/01/2024**

### Sample Particulars:

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : **26/12/2023**  
Sample Received at Lab : **30/12/2023**  
Test Started On : **30/12/2023**  
Test Completed On : **06/01/2024**  
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 : **161**  
Ambient Air Temperature °C : **25**  
Flue Gas Velocity (m/s) : **13.24**  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : **25722**  
Barometric Pressure, mmHg : **754**

### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 6.80         | 10                 | IS:11255(P-1) |



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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

**Test Report No.:** 202312260112

**Test Report Date:** 08/01/2024

#### Sample Particulars:

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : 26/12/2023  
Sample Received at Lab : 30/12/2023  
Test Started On : 30/12/2023  
Test Completed On : 06/01/2024  
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 : 161  
Ambient Air Temperature °C : 25  
Flue Gas Velocity (m/s) : 13.24  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : 25722  
Barometric Pressure, mmHg : 754

#### Analysis Report

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 7.14         | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 14           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 5.39         | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 1.6          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 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  
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Assam Oil Division, Digboi, Distt. Tinsukia  
Assam, INDIA

**ULR No. :**

**Test Report Date:**

**TC636623000007058F**

**08/01/2024**

### Sample Particulars:

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : **26/12/2023**  
Sample Received at Lab : **30/12/2023**  
Test Started On : **30/12/2023**  
Test Completed On : **06/01/2024**  
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 : **138**  
Ambient Air Temperature °C : **22**  
Flue Gas Velocity (m/s) : **14.53**  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : **268250.5**  
Barometric Pressure, mmHg : **754**

### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 8.40         | 10                 | IS:11255(P-1) |



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**Test Report**

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

**Test Report No.:** 202312260113  
**Test Report Date:** 08/01/2024

**Sample Particulars:**

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : 26/12/2023  
Sample Received at Lab : 30/12/2023  
Test Started On : 30/12/2023  
Test Completed On : 06/01/2024  
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 : 138  
Ambient Air Temperature °C : 22  
Flue Gas Velocity (m/s) : 14.53  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : 268250.5  
Barometric Pressure, mmHg : 754

**Analysis Report**

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 36.59        | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 15           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 1.24         | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 3.6          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 16.9         | -                  | SOP No.: NL/ SOP / FGA /11 |

**Remark:**

ND-Not Detected, DL-Detection Limit

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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. :

Test Report Date:

TC636623000007059F

08/01/2024

**Sample Particulars:**

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : 26/12/2023  
Sample Received at Lab : 30/12/2023  
Test Started On : 30/12/2023  
Test Completed On : 06/01/2024  
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 : 155  
Ambient Air Temperature °C : 24  
Flue Gas Velocity (m/s) : 15.99  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : 125940.7  
Barometric Pressure, mmHg : 754

**Analysis Report**

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 8.62         | 10                 | IS:11255(P-1) |



TC-6366



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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.:** 202312260114

**Test Report Date:** 08/01/2024

**Sample Particulars:**

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : 26/12/2023  
Sample Received at Lab : 30/12/2023  
Test Started On : 30/12/2023  
Test Completed On : 06/01/2024  
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 : 155  
Ambient Air Temperature °C : 24  
Flue Gas Velocity (m/s) : 15.99  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : 125940.7  
Barometric Pressure, mmHg : 754

**Analysis Report**

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 11.86        | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 18           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 1.38         | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 1.4          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 19.4         | -                  | SOP No.: NL/ SOP / FGA /11 |

**Remark:**

ND-Not Detected, DL-Detection Limit

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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. :**

**Test Report Date:**

**TC636623000007060F**

**08/01/2024**

### Sample Particulars:

|                                    |   |                             |
|------------------------------------|---|-----------------------------|
| Nature of the Sample               | : | <b>Stack Gas Emission</b>   |
| Date of Sampling                   | : | 27/12/2023                  |
| Sample Received at Lab             | : | 30/12/2023                  |
| Test Started On                    | : | 30/12/2023                  |
| Test Completed On                  | : | 06/01/2024                  |
| 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                   | : | 234     |
| Ambient Air Temperature °C                | : | 25      |
| Flue Gas Velocity (m/s)                   | : | 16.07   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : | 33661.6 |
| Barometric Pressure, mmHg                 | : | 754     |

### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 5.40         | 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.:** 202312260115  
**Test Report Date:** 08/01/2024

**Sample Particulars:**

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : 27/12/2023  
Sample Received at Lab : 30/12/2023  
Test Started On : 30/12/2023  
Test Completed On : 06/01/2024  
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 : 234  
Ambient Air Temperature °C : 25  
Flue Gas Velocity (m/s) : 16.07  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : 33661.6  
Barometric Pressure, mmHg : 754

**Analysis Report**

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 3.24         | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 21           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 5.17         | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 4.5          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 15.4         | -                  | SOP No.: NL/ SOP / FGA /11 |

**Remark:**

ND-Not Detected, DL-Detection Limit

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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. :** TC636623000007062F  
**Test Report Date:** 08/01/2024

**Sample Particulars:**

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : 27/12/2023  
Sample Received at Lab : 30/12/2023  
Test Started On : 30/12/2023  
Test Completed On : 06/01/2024  
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 : 172  
Ambient Air Temperature °C : 26  
Flue Gas Velocity (m/s) : 16.27  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : 94370.8  
Barometric Pressure, mmHg : 754

**Analysis Report**

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 6.24         | 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.:** 202312260117  
**Test Report Date:** 08/01/2024

**Sample Particulars:**

|                                    |   |                             |
|------------------------------------|---|-----------------------------|
| Nature of the Sample               | : | <b>Stack Gas Emission</b>   |
| Date of Sampling                   | : | 27/12/2023                  |
| Sample Received at Lab             | : | 30/12/2023                  |
| Test Started On                    | : | 30/12/2023                  |
| Test Completed On                  | : | 06/01/2024                  |
| 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                   | : | 172     |
| Ambient Air Temperature °C                | : | 26      |
| Flue Gas Velocity (m/s)                   | : | 16.27   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : | 94370.8 |
| Barometric Pressure, mmHg                 | : | 754     |

**Analysis Report**

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 6.20         | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 18           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 5.12         | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 12.7         | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 6.8          | -                  | 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. :**

**Test Report Date:**

TC636623000007061F

08/01/2024

**Sample Particulars:**

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : 27/12/2023  
Sample Received at Lab : 30/12/2023  
Test Started On : 30/12/2023  
Test Completed On : 06/01/2024  
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 : 317  
Ambient Air Temperature °C : 25  
Flue Gas Velocity (m/s) : 20.55  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : 29355.1  
Barometric Pressure, mmHg : 754

**Analysis Report**

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 5.80         | 10                 | IS:11255(P-1) |



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**Test Report**

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

**Test Report No.:** 202312260116  
**Test Report Date:** 08/01/2024

**Sample Particulars:**

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : 27/12/2023  
Sample Received at Lab : 30/12/2023  
Test Started On : 30/12/2023  
Test Completed On : 06/01/2024  
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 : 317  
Ambient Air Temperature °C : 25  
Flue Gas Velocity (m/s) : 20.55  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : 29355.1  
Barometric Pressure, mmHg : 754

**Analysis Report**

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 3.27         | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 25           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 8.32         | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 5.3          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 17.8         | -                  | SOP No.: NL/ SOP / FGA /11 |

**Remark:**  
ND-Not Detected, DL-Detection Limit

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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. :

TC636623000007063F

Test Report Date:

08/01/2024

#### Sample Particulars:

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : 27/12/2023  
Sample Received at Lab : 30/12/2023  
Test Started On : 30/12/2023  
Test Completed On : 06/01/2024  
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 : 189  
Ambient Air Temperature °C : 25  
Flue Gas Velocity (m/s) : 15.37  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : 53395.5  
Barometric Pressure, mmHg : 754

### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 8.64         | 10                 | IS:11255(P-1) |



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### Test Report

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

**Test Report No.:** 202312260118

**Test Report Date:** 08/01/2024

#### Sample Particulars:

|                                    |                               |
|------------------------------------|-------------------------------|
| Nature of the Sample               | : Stack Gas Emission          |
| Date of Sampling                   | : 27/12/2023                  |
| Sample Received at Lab             | : 30/12/2023                  |
| Test Started On                    | : 30/12/2023                  |
| Test Completed On                  | : 06/01/2024                  |
| 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                   | : 189     |
| Ambient Air Temperature °C                | : 25      |
| Flue Gas Velocity (m/s)                   | : 15.37   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : 53395.5 |
| Barometric Pressure, mmHg                 | : 754     |

### Analysis Report

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 32.43        | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 16           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 34.28        | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 2.8          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 15.2         | -                  | 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  
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Assam Oil Division, Digboi, Distt.Tinsukia  
Assam, INDIA

**ULR No. :** TC636623000007064F  
**Test Report Date:** 08/01/2024

### Sample Particulars:

|                                    |                               |
|------------------------------------|-------------------------------|
| Nature of the Sample               | : Stack Gas Emission          |
| Date of Sampling                   | : 27/12/2023                  |
| Sample Received at Lab             | : 30/12/2023                  |
| Test Started On                    | : 30/12/2023                  |
| Test Completed On                  | : 06/01/2024                  |
| 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                   | : 124     |
| Ambient Air Temperature °C                | : 25      |
| Flue Gas Velocity (m/s)                   | : 14.25   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : 76474.9 |
| Barometric Pressure, mmHg                 | : 754     |

### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 5.80         | 10                 | IS:11255(P-1) |



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(RAVINDER MITTAL)

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### 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

**Test Report No.:** 202312260110

**Test Report Date:** 08/01/2024

**Sample Particulars:**

Nature of the Sample : **Stack Gas Emission**  
Date of Sampling : 27/12/2023  
Sample Received at Lab : 30/12/2023  
Test Started On : 30/12/2023  
Test Completed On : 06/01/2024  
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 : 124  
Ambient Air Temperature °C : 25  
Flue Gas Velocity (m/s) : 14.25  
Quantity of Gas Flow, Nm<sup>3</sup>/hr : 76474.9  
Barometric Pressure, mmHg : 754

**Analysis Report**

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 6.75         | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 34           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 3.16         | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 4.2          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 14.7         | -                  | SOP No.: NL/ SOP / FGA /11 |

**Remark:**

ND-Not Detected, DL-Detection Limit

(AUTHORISED SIGNATORY)

(RAVINDER MITTAL)

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

Issued To **M/s Indian Oil Corporation Limited**

(Refinery Division)

Assam Oil Division, Digboi, Distt. Tinsukia  
Assam, INDIA

ULR No. :

TC636624000001796F

Test Report Date:

06/03/2024

#### Sample Particulars:

|                                    |                               |
|------------------------------------|-------------------------------|
| Nature of the Sample               | : <b>Stack Gas Emission</b>   |
| Date of Sampling                   | : 27/02/2024                  |
| Sample Received at Lab             | : 02/03/2024                  |
| Test Started On                    | : 02/03/2024                  |
| Test Completed On                  | : 06/03/2024                  |
| 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                   | : 132     |
| Ambient Air Temperature °C                | : 26      |
| Flue Gas Velocity (m/s)                   | : 11.40   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : 66988.7 |
| Barometric Pressure, mmHg                 | : 752     |

#### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 5.8          | 10                 | IS:11255(P-1) |



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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

Test Report No.: 202402260110  
Test Report Date: 06/03/2024

#### Sample Particulars:

|                                    |   |                             |
|------------------------------------|---|-----------------------------|
| Nature of the Sample               | : | <b>Stack Gas Emission</b>   |
| Date of Sampling                   | : | 27/02/2024                  |
| Sample Received at Lab             | : | 02/03/2024                  |
| Test Started On                    | : | 02/03/2024                  |
| Test Completed On                  | : | 06/03/2024                  |
| 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                   | : | 132     |
| Ambient Air Temperature °C                | : | 26      |
| Flue Gas Velocity (m/s)                   | : | 11.40   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : | 66988.7 |
| Barometric Pressure, mmHg                 | : | 752     |

#### Analysis Report

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 6.98         | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 23           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 3.17         | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 3.3          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 16.6         | -                  | SOP No.: NL/ SOP / FGA /11 |

Remark:

ND-Not Detected, DL-Detection Limit

(AUTHORISED SIGNATORY)

(RAVINDER MITTAL)

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

ULR No. :

TC636624000001744F

Test Report Date:

06/03/2024

#### Sample Particulars:

|                                    |   |                             |
|------------------------------------|---|-----------------------------|
| Nature of the Sample               | : | <b>Stack Gas Emission</b>   |
| Date of Sampling                   | : | 26/02/2024                  |
| Sample Received at Lab             | : | 02/03/2024                  |
| Test Started On                    | : | 02/03/2024                  |
| Test Completed On                  | : | 06/03/2024                  |
| 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                   | : | 267     |
| Ambient Air Temperature °C                | : | 26      |
| Flue Gas Velocity (m/s)                   | : | 14.47   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : | 21975.7 |
| Barometric Pressure, mmHg                 | : | 753     |

#### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 5.80         | 10                 | IS:11255(P-1) |



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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

Test Report No.: 202402260111  
Test Report Date: 06/03/2024

#### Sample Particulars:

|                                    |                               |
|------------------------------------|-------------------------------|
| Nature of the Sample               | : Stack Gas Emission          |
| Date of Sampling                   | : 26/02/2024                  |
| Sample Received at Lab             | : 02/03/2024                  |
| Test Started On                    | : 02/03/2024                  |
| Test Completed On                  | : 06/03/2024                  |
| 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                   | : 267     |
| Ambient Air Temperature °C                | : 26      |
| Flue Gas Velocity (m/s)                   | : 14.47   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : 21975.7 |
| Barometric Pressure, mmHg                 | : 753     |

#### Analysis Report

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 5            | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 20           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 4            | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 13.6         | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 4.2          | -                  | SOP No.: NL/ SOP / FGA /11 |

Remark:

ND-Not Detected, DL-Detection Limit

**(AUTHORISED SIGNATORY)**  
**(RAVINDER MITTAL)**

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

ULR No. :

TC636624000001798F

Test Report Date:

06/03/2024

#### Sample Particulars:

|                                    |                               |
|------------------------------------|-------------------------------|
| Nature of the Sample               | : Stack Gas Emission          |
| Date of Sampling                   | : 27/02/2024                  |
| Sample Received at Lab             | : 02/03/2024                  |
| Test Started On                    | : 02/03/2024                  |
| Test Completed On                  | : 06/03/2024                  |
| 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                   | : 172     |
| Ambient Air Temperature °C                | : 25      |
| Flue Gas Velocity (m/s)                   | : 14.41   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : 27293.9 |
| Barometric Pressure, mmHg                 | : 753     |

#### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 5.40         | 10                 | IS:11255(P-1) |



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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

**Test Report No.:** 202402260112  
**Test Report Date:** 06/03/2024

#### Sample Particulars:

|                                    |   |                             |
|------------------------------------|---|-----------------------------|
| Nature of the Sample               | : | <b>Stack Gas Emission</b>   |
| Date of Sampling                   | : | 27/02/2024                  |
| Sample Received at Lab             | : | 02/03/2024                  |
| Test Started On                    | : | 02/03/2024                  |
| Test Completed On                  | : | 06/03/2024                  |
| 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                   | : | 172     |
| Ambient Air Temperature °C                | : | 25      |
| Flue Gas Velocity (m/s)                   | : | 14.41   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : | 27293.9 |
| Barometric Pressure, mmHg                 | : | 753     |

#### Analysis Report

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 6            | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 16           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 7            | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 2.2          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 18.6         | -                  | SOP No.: NL/ SOP / FGA /11 |

Remark:

ND-Not Detected, DL-Detection Limit

(AUTHORISED SIGNATORY)  
(RAVINDER MITTAL)

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

Issued To **M/s Indian Oil Corporation Limited**

(Refinery Division)

Assam Oil Division, Digboi, Distt. Tinsukia  
Assam, INDIA

ULR No. :

TC636624000001877F

Test Report Date:

06/03/2024

#### Sample Particulars:

|                                    |   |                             |
|------------------------------------|---|-----------------------------|
| Nature of the Sample               | : | <b>Stack Gas Emission</b>   |
| Date of Sampling                   | : | 28/02/2024                  |
| Sample Received at Lab             | : | 02/03/2024                  |
| Test Started On                    | : | 02/03/2024                  |
| Test Completed On                  | : | 06/03/2024                  |
| 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                   | : | 127      |
| Ambient Air Temperature °C                | : | 24       |
| Flue Gas Velocity (m/s)                   | : | 15.74    |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : | 298447.2 |
| Barometric Pressure, mmHg                 | : | 753      |

#### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 7.24         | 10                 | IS:11255(P-1) |



TC-6366

(AUTHORISED SIGNATORY)  
(RAVINDER MITTAL)

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#### CORPORATE OFFICE & CENTRAL LABORATORIES :-

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

**Test Report No.:** 202402260113  
**Test Report Date:** 06/03/2024

#### Sample Particulars:

|                                    |   |                             |
|------------------------------------|---|-----------------------------|
| Nature of the Sample               | : | <b>Stack Gas Emission</b>   |
| Date of Sampling                   | : | 28/02/2024                  |
| Sample Received at Lab             | : | 02/03/2024                  |
| Test Started On                    | : | 02/03/2024                  |
| Test Completed On                  | : | 06/03/2024                  |
| 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                   | : | 127      |
| Ambient Air Temperature °C                | : | 24       |
| Flue Gas Velocity (m/s)                   | : | 15.74    |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : | 298447.2 |
| Barometric Pressure, mmHg                 | : | 753      |

#### Analysis Report

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 34           | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 19           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 2            | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 4.2          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 15.7         | -                  | SOP No.: NL/ SOP / FGA /11 |

**Remark:**

ND-Not Detected, DL-Detection Limit

(AUTHORISED SIGNATORY)  
(RAVINDER MITTAL)

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

Issued To **M/s Indian Oil Corporation Limited**

(Refinery Division)

Assam Oil Division, Digboi, Distt. Tinsukia  
Assam, INDIA

ULR No. :

TC636624000001878F

Test Report Date:

06/03/2024

#### Sample Particulars:

|                                    |                               |
|------------------------------------|-------------------------------|
| Nature of the Sample               | : <b>Stack Gas Emission</b>   |
| Date of Sampling                   | : 28/02/2024                  |
| Sample Received at Lab             | : 02/03/2024                  |
| Test Started On                    | : 02/03/2024                  |
| Test Completed On                  | : 06/03/2024                  |
| 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                   | : 142      |
| Ambient Air Temperature °C                | : 23       |
| Flue Gas Velocity (m/s)                   | : 16.24    |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : 131964.5 |
| Barometric Pressure, mmHg                 | : 753      |

#### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 7.46         | 10                 | IS:11255(P-1) |



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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

**Test Report No.:** 202402260114

**Test Report Date:** 06/03/2024

#### Sample Particulars:

|                                    |                               |
|------------------------------------|-------------------------------|
| Nature of the Sample               | : Stack Gas Emission          |
| Date of Sampling                   | : 28/02/2024                  |
| Sample Received at Lab             | : 02/03/2024                  |
| Test Started On                    | : 02/03/2024                  |
| Test Completed On                  | : 06/03/2024                  |
| 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                   | : 142      |
| Ambient Air Temperature °C                | : 23       |
| Flue Gas Velocity (m/s)                   | : 16.24    |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : 131964.5 |
| Barometric Pressure, mmHg                 | : 753      |

#### Analysis Report

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 10           | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 20           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 3            | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 1.9          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 21.5         | -                  | SOP No.: NL/ SOP / FGA /11 |

**Remark:**

ND-Not Detected, DL-Detection Limit

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(RAVINDER MITTAL)

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

Issued To **M/s Indian Oil Corporation Limited**

(Refinery Division)

Assam Oil Division, Digboi, Distt. Tinsukia  
Assam, INDIA

ULR No. :

TC636624000001742F

Test Report Date:

06/03/2024

#### Sample Particulars:

|                                    |                             |
|------------------------------------|-----------------------------|
| Nature of the Sample               | Stack Gas Emission          |
| Date of Sampling                   | 26/02/2024                  |
| Sample Received at Lab             | 02/03/2024                  |
| Test Started On                    | 02/03/2024                  |
| Test Completed On                  | 06/03/2024                  |
| 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                   | 237     |
| Ambient Air Temperature °C                | 24      |
| Flue Gas Velocity (m/s)                   | 16.96   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | 33917.0 |
| Barometric Pressure, mmHg                 | 752     |

#### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 7.24         | 10                 | IS:11255(P-1) |



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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

**Test Report No.:** 202402260115

**Test Report Date:** 06/03/2024

#### Sample Particulars:

Nature of the Sample

Date of Sampling

Sample Received at Lab

Test Started On

Test Completed On

Purpose of Monitoring

Sampling Location

Method of Sampling

Normal Operating Schedule

Type of Stack /Duct

Stack height from Ground Level (m)

Diameter of the Stack(m)

Sampling Duration (min)

#### Stack Gas Emission

26/02/2024

02/03/2024

02/03/2024

06/03/2024

To Check the Pollution Load

CRU (HDT)

IS: 11255 (P-7)

As per requirement

Mild Steel

40

1.1

40

#### Observations:

Flue Gas Temperature °C

Ambient Air Temperature °C

Flue Gas Velocity (m/s)

Quantity of Gas Flow, Nm<sup>3</sup>/hr

Barometric Pressure, mmHg

237

24

16.96

33917.0

752

#### Analysis Report

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 4            | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 17           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 3            | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 5.6          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 16.7         | -                  | SOP No.: NL/ SOP / FGA /11 |

Remark:

ND-Not Detected, DL-Detection Limit

(AUTHORISED SIGNATORY)  
(RAVINDER MITTAL)

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

**ULR No. :** TC636624000001879F  
**Test Report Date:** 06/03/2024

#### Sample Particulars:

|                                    |                               |
|------------------------------------|-------------------------------|
| Nature of the Sample               | : Stack Gas Emission          |
| Date of Sampling                   | : 28/02/2024                  |
| Sample Received at Lab             | : 02/03/2024                  |
| Test Started On                    | : 02/03/2024                  |
| Test Completed On                  | : 06/03/2024                  |
| 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                   | : 185     |
| Ambient Air Temperature °C                | : 25      |
| Flue Gas Velocity (m/s)                   | : 16.89   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : 54947.5 |
| Barometric Pressure, mmHg                 | : 753     |

#### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 5.26         | 10                 | IS:11255(P-1) |



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(RAVINDER MITTAL)

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

**Test Report No.:** 202402260117  
**Test Report Date:** 06/03/2024

#### Sample Particulars:

|                                    |                               |
|------------------------------------|-------------------------------|
| Nature of the Sample               | : Stack Gas Emission          |
| Date of Sampling                   | : 28/02/2024                  |
| Sample Received at Lab             | : 02/03/2024                  |
| Test Started On                    | : 02/03/2024                  |
| Test Completed On                  | : 06/03/2024                  |
| 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                   | : 185     |
| Ambient Air Temperature °C                | : 25      |
| Flue Gas Velocity (m/s)                   | : 16.89   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : 54947.5 |
| Barometric Pressure, mmHg                 | : 753     |

#### Analysis Report

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 5            | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 21           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 4            | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 14.2         | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 7.3          | -                  | SOP No.: NL/ SOP / FGA /11 |

Remark:

ND-Not Detected, DL-Detection Limit

(AUTHORISED SIGNATORY)  
(RAVINDER MITTAL)

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#### CORPORATE OFFICE & CENTRAL LABORATORIES :-

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

Issued To **M/s Indian Oil Corporation Limited**

(Refinery Division)  
Assam Oil Division, Digboi, Distt. Tinsukia  
Assam, INDIA

ULR No. :

TC636624000001797F

Test Report Date:

06/03/2024

#### Sample Particulars:

|                                    |                               |
|------------------------------------|-------------------------------|
| Nature of the Sample               | : Stack Gas Emission          |
| Date of Sampling                   | : 27/02/2024                  |
| Sample Received at Lab             | : 02/03/2024                  |
| Test Started On                    | : 02/03/2024                  |
| Test Completed On                  | : 06/03/2024                  |
| 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                   | : 324     |
| Ambient Air Temperature °C                | : 24      |
| Flue Gas Velocity (m/s)                   | : 21.56   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : 30443.3 |
| Barometric Pressure, mmHg                 | : 753     |

#### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 6.28         | 10                 | IS:11255(P-1) |



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(RAVINDER MITTAL)

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

**Test Report No.:** 202402260116  
**Test Report Date:** 06/03/2024

#### Sample Particulars:

|                                    |                               |
|------------------------------------|-------------------------------|
| Nature of the Sample               | : Stack Gas Emission          |
| Date of Sampling                   | : 27/02/2024                  |
| Sample Received at Lab             | : 02/03/2024                  |
| Test Started On                    | : 02/03/2024                  |
| Test Completed On                  | : 06/03/2024                  |
| 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                   | : 324     |
| Ambient Air Temperature °C                | : 24      |
| Flue Gas Velocity (m/s)                   | : 21.56   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : 30443.3 |
| Barometric Pressure, mmHg                 | : 753     |

#### Analysis Report

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 5            | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 21           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 6            | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 5.8          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 15.4         | -                  | SOP No.: NL/ SOP / FGA /11 |

Remark:

ND-Not Detected, DL-Detection Limit

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(RAVINDER MITTAL)

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

Issued To **M/s Indian Oil Corporation Limited**

(Refinery Division)

Assam Oil Division, Digboi, Distt. Tinsukia  
Assam, INDIA

ULR No. :

TC636624000001876F

Test Report Date:

06/03/2024

#### Sample Particulars:

|                                    |   |                             |
|------------------------------------|---|-----------------------------|
| Nature of the Sample               | : | <b>Stack Gas Emission</b>   |
| Date of Sampling                   | : | 28/02/2024                  |
| Sample Received at Lab             | : | 02/03/2024                  |
| Test Started On                    | : | 02/03/2024                  |
| Test Completed On                  | : | 06/03/2024                  |
| 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                   | : | 175     |
| Ambient Air Temperature °C                | : | 24      |
| Flue Gas Velocity (m/s)                   | : | 15.34   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : | 54947.5 |
| Barometric Pressure, mmHg                 | : | 753     |

#### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 7.20         | 10                 | IS:11255(P-1) |



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(RAVINDER MITTAL)

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

**Test Report No.:** 202402260118

**Test Report Date:** 06/03/2024

#### Sample Particulars:

|                                    |                               |
|------------------------------------|-------------------------------|
| Nature of the Sample               | : Stack Gas Emission          |
| Date of Sampling                   | : 28/02/2024                  |
| Sample Received at Lab             | : 02/03/2024                  |
| Test Started On                    | : 02/03/2024                  |
| Test Completed On                  | : 06/03/2024                  |
| 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                   | : 175     |
| Ambient Air Temperature °C                | : 24      |
| Flue Gas Velocity (m/s)                   | : 15.34   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : 54947.5 |
| Barometric Pressure, mmHg                 | : 753     |

#### Analysis Report

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 30           | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 18           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 28           | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 2.6          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 17.2         | -                  | SOP No.: NL/ SOP / FGA /11 |

**Remark:**

ND-Not Detected, DL-Detection Limit

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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. :

TC636624000001743F

Test Report Date:

06/03/2024

#### Sample Particulars:

|                                    |                               |
|------------------------------------|-------------------------------|
| Nature of the Sample               | : <b>Stack Gas Emission</b>   |
| Date of Sampling                   | : 26/02/2024                  |
| Sample Received at Lab             | : 02/03/2024                  |
| Test Started On                    | : 02/03/2024                  |
| Test Completed On                  | : 06/03/2024                  |
| 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                | : 24      |
| Flue Gas Velocity (m/s)                   | : 14.64   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : 79172.4 |
| Barometric Pressure, mmHg                 | : 753     |

#### Analysis Report

| Sr. No. | Parameter                                       | Test Results | Permissible Limits | Test Method   |
|---------|---|--------------|--------------------|---------------|
| 1       | Particulate Matter, (as PM), mg/Nm <sup>3</sup> | 7.60         | 10                 | IS:11255(P-1) |



TC-6366

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(RAVINDER MITTAL)

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

**Test Report No.:** 202402260119  
**Test Report Date:** 06/03/2024

#### Sample Particulars:

|                                    |                               |
|------------------------------------|-------------------------------|
| Nature of the Sample               | : Stack Gas Emission          |
| Date of Sampling                   | : 26/02/2024                  |
| Sample Received at Lab             | : 02/03/2024                  |
| Test Started On                    | : 02/03/2024                  |
| Test Completed On                  | : 06/03/2024                  |
| 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                | : 24      |
| Flue Gas Velocity (m/s)                   | : 14.64   |
| Quantity of Gas Flow, Nm <sup>3</sup> /hr | : 79172.4 |
| Barometric Pressure, mmHg                 | : 753     |

#### Analysis Report

| Sr. No. | Parameter   | Test Results | Permissible Limits | Test Method                |
|---------|---|--------------|--------------------|----------------------------|
| 1       | Oxide of Nitrogen (as NO <sub>x</sub> ), mg/Nm <sup>3</sup> | 5            | 350                | USEPA OTM-39               |
| 2       | Carbon Monoxide (as CO), mg/Nm <sup>3</sup>                 | 28           | -                  | USEPA OTM-39               |
| 3       | Oxides of Sulphur (as SO <sub>x</sub> ), mg/Nm <sup>3</sup> | 2            | 50                 | SOP No.: NL/ SOP / FGA /01 |
| 4       | Hydrogen Sulphide (as H <sub>2</sub> S), mg/Nm <sup>3</sup> | ND (DL-4)    | 150                | SOP No.: NL/ SOP / FGA /10 |
| 5       | Carbon Dioxide (as CO <sub>2</sub> ), %                     | 4.9          | -                  | SOP No.: NL/ SOP / FGA /11 |
| 6       | Oxygen (as O <sub>2</sub> ), %                              | 13.4         | -                  | SOP No.: NL/ SOP / FGA /11 |

Remark:

ND-Not Detected, DL-Detection Limit

**(AUTHORISED SIGNATORY)**  
**(RAVINDER MITTAL)**

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**TEST REPORT**

|   |  |
|---|--|
| <b>Name &amp; Address of the Customer :</b>                 | <b>Report No. : MSK/GHY/2023-24/0824</b>               |
| <b>"Indian Oil Corporation Limited Digboi"</b>              | <b>Report Date : 16.11.2023</b>                        |
| Assam Oil Division,   | <b>Sample Description : Ambient Air</b>                |
| P.O.- Digboi, Assam - 786171                                | <b>Sample Number : MSKGL/ED/2023-24/11/00639-00645</b> |
| <b>Reference No.&amp; Date: 27371982 Dated : 19/11/2021</b> | <b>Sampling Location : BAZAAR GATE</b>                 |

**ANALYSIS RESULT**

| SL. NO.  | Date of Monitoring | PM <sub>10</sub> (µg/m <sup>3</sup> ) | PM <sub>2.5</sub> (µg/m <sup>3</sup> ) | SO <sub>2</sub> (µg/m <sup>3</sup> ) | NO <sub>2</sub> (µg/m <sup>3</sup> ) | CO (mg/m <sup>3</sup> )   | O <sub>3</sub> (µg/m <sup>3</sup> )                               | NH <sub>3</sub> (µg/m <sup>3</sup> )                              | Pb (µg/m <sup>3</sup> ) | Ni (ng/m <sup>3</sup> ) | As (ng/m <sup>3</sup> ) | Benzene (µg/m <sup>3</sup> ) | Benzo(a) pyrene (ng/m <sup>3</sup> ) |
|--|--------------------|---------------------------------------|--|--------------------------------------|--------------------------------------|---------------------------|---|---|-------------------------|-------------------------|-------------------------|------------------------------|--------------------------------------|
| 1.   | 03.10.2023         | 72                                    | 38                                     | 73                                   | 24                                   | 1.3                       | 23  | 11  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 2.   | 05.10.2023         | 65                                    | 36                                     | 6.7                                  | 21                                   | 1.1                       | 20  | 10  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 3.   | 09.10.2023         | 69                                    | 33                                     | 7.1                                  | 23                                   | 1.2                       | 22  | 11  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 4.   | 19.10.2023         | 56                                    | 29                                     | <6.0                                 | 16                                   | 1.0                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 5.   | 23.10.2023         | 62                                    | 34                                     | 6.5                                  | 18                                   | 1.1                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 6.   | 26.10.2023         | 76                                    | 36                                     | 7.9                                  | 25                                   | 1.4                       | 24  | 12  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 7.   | 30.10.2023         | 55                                    | 32                                     | <6.0                                 | 14                                   | 1.0                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| Limit as per CPCB notification, New Delhi, 18th Nov, 2009, for Ambient air quality |                    | 100                                   | 60                                     | 80                                   | 80                                   | 2                         | 180   | 400   | 1                       | 20                      | 6                       | 5                            | 1                                    |
| Sampling and Analysis done according to  |                    | IS: 5182 (Part-23) -2006              | IS: 5182 (Part-24) -2019               | IS: 5182 (Part-2) -2001              | IS: 5182 (Part-6) -2006              | IS 5182 : (Part-10) :1999 | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-417) | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-401) | USEPA IO-3.4            | USEPA IO-3.4            | USEPA IO-3.4            | IS 5182 : (Part 11) :2006    | IS 5182 : (Part 12) :2004            |

BDL VALUES : SO<sub>2</sub>- <6.0, OZONE- <20.0, NH<sub>3</sub>- <10.0, Pb-<0.01, Ni- <5.0, As- <1.0, BENZENE- <4.2, BENZO(a)PYRENE- <0.5

Report Prepared By :



For Mitra S.K. Pvt. Ltd.

  
 Authorized Signatory

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**TEST REPORT**

|  |  |
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| <b>Name &amp; Address of the Customer :</b>                  | <b>Report No. : MSK/GHY/2023-24/0825</b>               |
| <b>"Indian Oil Corporation Limited Digboi"</b>               | <b>Report Date : 16.11.2023</b>                        |
| Assam Oil Division,  | <b>Sample Description : Ambient Air</b>                |
| P.O.- Digboi, Assam - 786171                                 | <b>Sample Number : MSKGL/ED/2023-24/11/00646-00652</b> |
| <b>Reference No. &amp; Date: 27371982 Dated : 19/11/2021</b> | <b>Sampling Location : NEW TANK FIRM</b>               |

**ANALYSIS RESULT**

| SL. NO.  | Date of Monitoring | PM <sub>10</sub> (µg/m <sup>3</sup> ) | PM <sub>2.5</sub> (µg/m <sup>3</sup> ) | SO <sub>2</sub> (µg/m <sup>3</sup> ) | NO <sub>2</sub> (µg/m <sup>3</sup> ) | CO (mg/m <sup>3</sup> )   | O <sub>3</sub> (µg/m <sup>3</sup> )                               | NH <sub>3</sub> (µg/m <sup>3</sup> )                              | Pb (µg/m <sup>3</sup> ) | Ni (ng/m <sup>3</sup> ) | As (ng/m <sup>3</sup> ) | Benzene (µg/m <sup>3</sup> ) | Benzo(a) pyrene (ng/m <sup>3</sup> ) |
|--|--------------------|---------------------------------------|--|--------------------------------------|--------------------------------------|---------------------------|---|---|-------------------------|-------------------------|-------------------------|------------------------------|--------------------------------------|
| 1.   | 03.10.2023         | 67                                    | 37                                     | 6.8                                  | 18                                   | 1.2                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 2.   | 05.10.2023         | 74                                    | 39                                     | 7.5                                  | 25                                   | 1.5                       | 24  | 12  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 3.   | 09.10.2023         | 62                                    | 36                                     | 6.3                                  | 13                                   | 1.1                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 4.   | 19.10.2023         | 54                                    | 30                                     | <6.0                                 | 12                                   | 1.0                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 5.   | 23.10.2023         | 65                                    | 36                                     | 6.6                                  | 17                                   | 1.1                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 6.   | 26.10.2023         | 72                                    | 34                                     | 7.3                                  | 23                                   | 1.4                       | 22  | 11  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 7.   | 30.10.2023         | 68                                    | 40                                     | 6.9                                  | 21                                   | 1.2                       | 20  | 10  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| Limit as per CPCB notification, New Delhi, 18th Nov, 2009, for Ambient air quality |                    | 100                                   | 60                                     | 80                                   | 80                                   | 2                         | 180   | 400   | 1                       | 20                      | 6                       | 5                            | 1                                    |
| Sampling and Analysis done according to  |                    | IS: 5182 (Part-23) -2006              | IS: 5182 (Part-24) -2019               | IS: 5182 (Part-2) -2001              | IS: 5182 (Part-6) -2006              | IS 5182 : (Part-10) :1999 | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-417) | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-401) | USEPA IO-3.4            | USEPA IO-3.4            | USEPA IO-3.4            | IS 5182 : (Part 11) :2006    | IS 5182 : (Part 12) :2004            |

BDL VALUES : SO<sub>2</sub>- <6.0, OZONE- <20.0, NH<sub>3</sub>- <10.0, Pb-<0.01, Ni- <5.0, As- <1.0, BENZENE- <4.2, BENZO(a)PYRENE- <0.5

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**TEST REPORT**

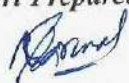
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|--|--|
| <b>Name &amp; Address of the Customer :</b>                  | <b>Report No. : MSK/GHY/2023-24/0826</b>               |
| <b>"Indian Oil Corporation Limited Digboi"</b>               | <b>Report Date : 16.11.2023</b>                        |
| Assam Oil Division,  | <b>Sample Description : Ambient Air</b>                |
| P.O.- Digboi, Assam - 786171                                 | <b>Sample Number : MSKGL/ED/2023-24/11/00653-00659</b> |
| <b>Reference No. &amp; Date: 27371982 Dated : 19/11/2021</b> | <b>Sampling Location : EFFLUENT TREATMENT PLANT</b>    |

**ANALYSIS RESULT**

| SL. NO.  | Date of Monitoring | PM <sub>10</sub> (µg/m <sup>3</sup> ) | PM <sub>2.5</sub> (µg/m <sup>3</sup> ) | SO <sub>2</sub> (µg/m <sup>3</sup> ) | NO <sub>2</sub> (µg/m <sup>3</sup> ) | CO (mg/m <sup>3</sup> )   | O <sub>3</sub> (µg/m <sup>3</sup> )                               | NH <sub>3</sub> (µg/m <sup>3</sup> )                              | Pb (µg/m <sup>3</sup> ) | Ni (ng/m <sup>3</sup> ) | As (ng/m <sup>3</sup> ) | Benzene (µg/m <sup>3</sup> ) | Benzo(a) pyrene (ng/m <sup>3</sup> ) |
|--|--------------------|---------------------------------------|--|--------------------------------------|--------------------------------------|---------------------------|---|---|-------------------------|-------------------------|-------------------------|------------------------------|--------------------------------------|
| 1.   | 03.10.2023         | 65                                    | 34                                     | 6.7                                  | 16                                   | 1.2                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 2.   | 05.10.2023         | 72                                    | 40                                     | 7.4                                  | 22                                   | 1.4                       | 21  | 11  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 3.   | 09.10.2023         | 55                                    | 32                                     | <6.0                                 | 11                                   | 1.0                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 4.   | 19.10.2023         | 62                                    | 34                                     | 6.3                                  | 14                                   | 1.1                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 5.   | 23.10.2023         | 66                                    | 37                                     | 6.7                                  | 17                                   | 1.3                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 6.   | 26.10.2023         | 74                                    | 35                                     | 7.6                                  | 25                                   | 1.5                       | 24  | 12  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 7.   | 30.10.2023         | 51                                    | 27                                     | <6.0                                 | 10                                   | 1.1                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| Limit as per CPCB notification, New Delhi, 18th Nov, 2009. for Ambient air quality |                    | 100                                   | 60                                     | 80                                   | 80                                   | 2                         | 180   | 400   | 1                       | 20                      | 6                       | 5                            | 1                                    |
| Sampling and Analysis done according to  |                    | IS: 5182 (Part-23) -2006              | IS: 5182 (Part-24) -2019               | IS: 5182 (Part-2) -2001              | IS: 5182 (Part-6) -2006              | IS 5182 : (Part-10) :1999 | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-417) | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-401) | USEPA IO-3.4            | USEPA IO-3.4            | USEPA IO-3.4            | IS 5182 : (Part 11) :2006    | IS 5182 : (Part 12) :2004            |

BDL VALUES : SO<sub>2</sub>- <6.0, OZONE- <20.0, NH<sub>3</sub>- <10.0, Pb-<0.01, Ni- <5.0, As- <1.0, BENZENE- <4.2, BENZO(a)PYRENE- <0.5

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**TEST REPORT**

|   |  |
|---|--|
| <b>Name &amp; Address of the Customer :</b>                 | <b>Report No. : MSK/GHY/2023-24/0827</b>               |
| <b>"Indian Oil Corporation Limited Digboi"</b>              | <b>Report Date : 16.11.2023</b>                        |
| Assam Oil Division,   | <b>Sample Description : Ambient Air</b>                |
| P.O.- Digboi, Assam - 786171                                | <b>Sample Number : MSKGL/ED/2023-24/11/00660-00666</b> |
| <b>Reference No.&amp; Date: 27371982 Dated : 19/11/2021</b> | <b>Sampling Location : COOLING TOWER-WAX SECTOR</b>    |

**ANALYSIS RESULT**

| SL. NO.   | Date of Monitoring | PM <sub>10</sub> (µg/m <sup>3</sup> ) | PM <sub>2.5</sub> (µg/m <sup>3</sup> ) | SO <sub>2</sub> (µg/m <sup>3</sup> ) | NO <sub>2</sub> (µg/m <sup>3</sup> ) | CO (mg/m <sup>3</sup> )   | O <sub>3</sub> (µg/m <sup>3</sup> )                               | NH <sub>3</sub> (µg/m <sup>3</sup> )                              | Pb (µg/m <sup>3</sup> ) | Ni (ng/m <sup>3</sup> ) | As (ng/m <sup>3</sup> ) | Benzene (µg/m <sup>3</sup> ) | Benzo(a) pyrene (ng/m <sup>3</sup> ) |
|---|--------------------|---------------------------------------|--|--------------------------------------|--------------------------------------|---------------------------|---|---|-------------------------|-------------------------|-------------------------|------------------------------|--------------------------------------|
| 1.  | 03.10.2023         | 62                                    | 30                                     | 6.3                                  | 14                                   | 1.2                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 2.  | 05.10.2023         | 73                                    | 41                                     | 7.4                                  | 22                                   | 1.4                       | 21  | 10  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 3.  | 09.10.2023         | 55                                    | 29                                     | <6.0                                 | 12                                   | 1.1                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 4.  | 19.10.2023         | 75                                    | 42                                     | 7.6                                  | 26                                   | 1.6                       | 25  | 13  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 5.  | 23.10.2023         | 69                                    | 38                                     | 7.1                                  | 20                                   | 1.3                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 6.  | 26.10.2023         | 56                                    | 31                                     | <6.0                                 | 13                                   | 1.1                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 7.  | 30.10.2023         | 74                                    | 35                                     | 7.5                                  | 25                                   | 1.5                       | 24  | 12  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| Limit as per CPCB notification, New Delhi, 18th Nov, 2009. for Ambient air quality  |                    | 100                                   | 60                                     | 80                                   | 80                                   | 2                         | 180   | 400   | 1                       | 20                      | 6                       | 5                            | 1                                    |
| Sampling and Analysis done according to   |                    | IS: 5182 (Part-23) -2006              | IS: 5182 (Part-24) -2019               | IS: 5182 (Part-2) -2001              | IS: 5182 (Part-6) -2006              | IS 5182 : (Part-10) :1999 | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-417) | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-401) | USEPA IO-3.4            | USEPA IO-3.4            | USEPA IO-3.4            | IS 5182 : (Part 11) :2006    | IS5182 : (Part 12) :2004             |
| BDL VALUES : SO <sub>2</sub> - <6.0, OZONE- <20.0, NH <sub>3</sub> - <10.0, Pb-<0.01, Ni- <5.0, As- <1.0, BENZENE- <4.2, BENZO(a)PYRENE- <0.5 |                    |                                       |  |                                      |                                      |                           |   |   |                         |                         |                         |                              |                                      |

Report Prepared By :



For Mitra S.K. Pvt. Ltd.


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**TEST REPORT****Name & Address of the Customer :**

"Indian Oil Corporation Limited Digboi"  
Assam Oil Division,  
P.O.- Digboi, Assam - 786171

Reference No. & Date: 27371982 Dated : 19/11/2021

Report No. : MSK/GHY/2023-24/0963

Report Date : 20.12.2023

Sample Description : Ambient Air

Sample Number : MSKGL/ED/2023-24/12/00493-00497

Sampling Location : BAZAAR GATE

**ANALYSIS RESULT**

| SL. NO.  | Date of Monitoring | PM <sub>10</sub> (µg/m <sup>3</sup> ) | PM <sub>2.5</sub> (µg/m <sup>3</sup> ) | SO <sub>2</sub> (µg/m <sup>3</sup> ) | NO <sub>2</sub> (µg/m <sup>3</sup> ) | CO (mg/m <sup>3</sup> )   | O <sub>3</sub> (µg/m <sup>3</sup> )                               | NH <sub>3</sub> (µg/m <sup>3</sup> )                              | Pb (µg/m <sup>3</sup> ) | Ni (ng/m <sup>3</sup> ) | As (ng/m <sup>3</sup> ) | Benzene (µg/m <sup>3</sup> ) | Benzo(a) pyrene (ng/m <sup>3</sup> ) |
|--|--------------------|---------------------------------------|--|--------------------------------------|--------------------------------------|---------------------------|---|---|-------------------------|-------------------------|-------------------------|------------------------------|--------------------------------------|
| 1.   | 02.11.2023         | 76                                    | 40                                     | 7.9                                  | 25                                   | 1.4                       | 24  | 12  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 2.   | 06.11.2023         | 62                                    | 34                                     | 6.5                                  | 20                                   | 1.1                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 3.   | 09.11.2023         | 73                                    | 35                                     | 7.4                                  | 24                                   | 1.2                       | 23  | 11  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 4.   | 13.11.2023         | 59                                    | 31                                     | <6.0                                 | 15                                   | 1.0                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 5.   | 16.11.2023         | 64                                    | 36                                     | 6.7                                  | 21                                   | 1.1                       | 20  | 10  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| Limit as per CPCB notification, New Delhi, 18th Nov, 2009, for Ambient air quality |                    | 100                                   | 60                                     | 80                                   | 80                                   | 2                         | 180   | 400   | 1                       | 20                      | 6                       | 5                            | 1                                    |
| Sampling and Analysis done according to  |                    | IS: 5182 (Part-23) -2006              | IS: 5182 (Part-24) -2019               | IS: 5182 (Part-2) -2001              | IS: 5182 (Part-6) -2006              | IS 5182 : (Part-10) :1999 | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-417) | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-401) | USEPA IO-3.4            | USEPA IO-3.4            | USEPA IO-3.4            | IS 5182 : (Part 11) :2006    | IS 5182 : (Part 12) :2004            |

BDL VALUES : SO<sub>2</sub>- <6.0, OZONE- <20.0, NH<sub>3</sub>- <10.0, Pb- <0.01, Ni- <5.0, As- <1.0, BENZENE- <4.2, BENZO(a)PYRENE- <0.5

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**TEST REPORT****Name & Address of the Customer :**

"Indian Oil Corporation Limited Digboi"  
 Assam Oil Division,  
 P.O.- Digboi, Assam - 786171

Reference No. & Date: 27371982 Dated : 19/11/2021

Report No. : MSK/GHY/2023-24/0964

Report Date : 20.12.2023

Sample Description : Ambient Air

Sample Number : MSKGL/ED/2023-24/12/00498-00502

Sampling Location : NEW TANK FIRM

**ANALYSIS RESULT**

| SL. NO.  | Date of Monitoring | PM <sub>10</sub> (µg/m <sup>3</sup> ) | PM <sub>2.5</sub> (µg/m <sup>3</sup> ) | SO <sub>2</sub> (µg/m <sup>3</sup> ) | NO <sub>2</sub> (µg/m <sup>3</sup> ) | CO (mg/m <sup>3</sup> )   | O <sub>3</sub> (µg/m <sup>3</sup> )                               | NH <sub>3</sub> (µg/m <sup>3</sup> )                              | Pb (µg/m <sup>3</sup> ) | Ni (ng/m <sup>3</sup> ) | As (ng/m <sup>3</sup> ) | Benzene (µg/m <sup>3</sup> ) | Benzo(a) pyrene (ng/m <sup>3</sup> ) |
|--|--------------------|---------------------------------------|--|--------------------------------------|--------------------------------------|---------------------------|---|---|-------------------------|-------------------------|-------------------------|------------------------------|--------------------------------------|
| 1.   | 02.11.2023         | 69                                    | 38                                     | 7.2                                  | 21                                   | 1.2                       | 20  | 10  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 2.   | 06.11.2023         | 76                                    | 40                                     | 8.1                                  | 26                                   | 1.5                       | 25  | 12  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 3.   | 09.11.2023         | 64                                    | 38                                     | 6.7                                  | 17                                   | 1.1                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 4.   | 13.11.2023         | 58                                    | 32                                     | <6.0                                 | 13                                   | 1.0                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 5.   | 16.11.2023         | 67                                    | 37                                     | 6.9                                  | 19                                   | 1.1                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| Limit as per CPCB notification, New Delhi, 18th Nov, 2009. for Ambient air quality |                    | 100                                   | 60                                     | 80                                   | 80                                   | 2                         | 180   | 400   | 1                       | 20                      | 6                       | 5                            | 1                                    |
| Sampling and Analysis done according to  |                    | IS: 5182 (Part-23) -2006              | IS: 5182 (Part-24) -2019               | IS: 5182 (Part-2) -2001              | IS: 5182 (Part-6) -2006              | IS 5182 : (Part-10) :1999 | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-417) | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-401) | USEPA IO-3.4            | USEPA IO-3.4            | USEPA IO-3.4            | IS 5182 : (Part 11) :2006    | IS 5182 : (Part 12) :2004            |

BDL VALUES : SO<sub>2</sub>- <6.0, OZONE- <20.0, NH<sub>3</sub>- <10.0, Pb-<0.01, Ni- <5.0, As- <1.0, BENZENE- <4.2, BENZO(a)PYRENE- <0.5

Report Prepared By :



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 Email : info@mitrask.com. Website: [www.mitrask.com](http://www.mitrask.com)

**TEST REPORT**

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| <b>Name &amp; Address of the Customer :</b>                  | <b>Report No. : MSK/GHY/2023-24/0965</b>               |
| "Indian Oil Corporation Limited Digboi"                      | <b>Report Date : 20.12.2023</b>                        |
| Assam Oil Division,  | <b>Sample Description : Ambient Air</b>                |
| P.O.- Digboi, Assam - 786171                                 | <b>Sample Number : MSKGL/ED/2023-24/12/00503-00507</b> |
| <b>Reference No. &amp; Date: 27371982 Dated : 19/11/2021</b> | <b>Sampling Location : EFFLUENT TREATMENT PLANT</b>    |

**ANALYSIS RESULT**

| SL. NO.  | Date of Monitoring | PM <sub>10</sub> (µg/m <sup>3</sup> ) | PM <sub>2.5</sub> (µg/m <sup>3</sup> ) | SO <sub>2</sub> (µg/m <sup>3</sup> ) | NO <sub>2</sub> (µg/m <sup>3</sup> ) | CO (mg/m <sup>3</sup> )   | O <sub>3</sub> (µg/m <sup>3</sup> )                               | NH <sub>3</sub> (µg/m <sup>3</sup> )                              | Pb (µg/m <sup>3</sup> ) | Ni (ng/m <sup>3</sup> ) | As (ng/m <sup>3</sup> ) | Benzene (µg/m <sup>3</sup> ) | Benzo(a) pyrene (ng/m <sup>3</sup> ) |
|--|--------------------|---------------------------------------|--|--------------------------------------|--------------------------------------|---------------------------|---|---|-------------------------|-------------------------|-------------------------|------------------------------|--------------------------------------|
| 1.   | 02.11.2023         | 69                                    | 36                                     | 7.3                                  | 18                                   | 1.2                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 2.   | 06.11.2023         | 74                                    | 41                                     | 7.9                                  | 24                                   | 1.4                       | 23  | 11  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 3.   | 09.11.2023         | 52                                    | 31                                     | <6.0                                 | 11                                   | 1.0                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 4.   | 13.11.2023         | 65                                    | 36                                     | 6.8                                  | 16                                   | 1.1                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 5.   | 16.11.2023         | 78                                    | 43                                     | 8.1                                  | 26                                   | 1.3                       | 25  | 12  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| Limit as per CPCB notification, New Delhi, 18th Nov, 2009, for Ambient air quality |                    | 100                                   | 60                                     | 80                                   | 80                                   | 2                         | 180   | 400   | 1                       | 20                      | 6                       | 5                            | 1                                    |
| Sampling and Analysis done according to  |                    | IS: 5182 (Part-23) -2006              | IS: 5182 (Part-24) -2019               | IS: 5182 (Part-2) -2001              | IS: 5182 (Part-6) -2006              | IS 5182 : (Part-10) :1999 | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-417) | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-401) | USEPA IO-3.4            | USEPA IO-3.4            | USEPA IO-3.4            | IS 5182 : (Part 11) :2006    | IS 5182 : (Part 12) :2004            |

BDL VALUES : SO<sub>2</sub>- <6.0, OZONE- <20.0, NH<sub>3</sub>- <10.0, Pb-<0.01, Ni- <5.0, As- <1.0, BENZENE- <4.2, BENZO(a)PYRENE- <0.5

Report Prepared By :



For Mitra S.K. Pvt. Ltd.

  
 Authorized Signatory

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**TEST REPORT****Name & Address of the Customer :**

"Indian Oil Corporation Limited Digboi"  
Assam Oil Division,  
P.O.- Digboi, Assam - 786171

Reference No. & Date: 27371982 Dated : 19/11/2021

Report No. : MSK/GHY/2023-24/0966

Report Date : 20.12.2023

Sample Description : Ambient Air

Sample Number : MSKGL/ED/2023-24/12/00508-00512

Sampling Location : COOLING TOWER-WAX SECTOR

**ANALYSIS RESULT**

| SL. NO.  | Date of Monitoring | PM <sub>10</sub> (µg/m <sup>3</sup> ) | PM <sub>2.5</sub> (µg/m <sup>3</sup> ) | SO <sub>2</sub> (µg/m <sup>3</sup> ) | NO <sub>2</sub> (µg/m <sup>3</sup> ) | CO (mg/m <sup>3</sup> )   | O <sub>3</sub> (µg/m <sup>3</sup> )                               | NH <sub>3</sub> (µg/m <sup>3</sup> )                              | Pb (µg/m <sup>3</sup> ) | Ni (ng/m <sup>3</sup> ) | As (ng/m <sup>3</sup> ) | Benzene (µg/m <sup>3</sup> ) | Benzo(a) pyrene (ng/m <sup>3</sup> ) |
|--|--------------------|---------------------------------------|--|--------------------------------------|--------------------------------------|---------------------------|---|---|-------------------------|-------------------------|-------------------------|------------------------------|--------------------------------------|
| 1.   | 03.10.2023         | 62                                    | 30                                     | 6.3                                  | 14                                   | 1.2                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 2.   | 05.10.2023         | 73                                    | 41                                     | 7.4                                  | 22                                   | 1.4                       | 21  | 10  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 3.   | 09.10.2023         | 55                                    | 29                                     | <6.0                                 | 12                                   | 1.1                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 4.   | 19.10.2023         | 75                                    | 42                                     | 7.6                                  | 26                                   | 1.6                       | 25  | 13  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 5.   | 23.10.2023         | 69                                    | 38                                     | 7.1                                  | 20                                   | 1.3                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 6.   | 26.10.2023         | 56                                    | 31                                     | <6.0                                 | 13                                   | 1.1                       | <20   | <10   | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| 7.   | 30.10.2023         | 74                                    | 35                                     | 7.5                                  | 25                                   | 1.5                       | 24  | 12  | <0.01                   | <5.0                    | <1.0                    | <4.2                         | <0.5                                 |
| Limit as per CPCB notification, New Delhi, 18th Nov, 2009, for Ambient air quality |                    | 100                                   | 60                                     | 80                                   | 80                                   | 2                         | 180   | 400   | 1                       | 20                      | 6                       | 5                            | 1                                    |
| Sampling and Analysis done according to  |                    | IS: 5182 (Part-23) -2006              | IS: 5182 (Part-24) -2019               | IS: 5182 (Part-2) -2001              | IS: 5182 (Part-6) -2006              | IS 5182 : (Part-10) :1999 | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-417) | Air Sampling, 3 <sup>rd</sup> Edn. By James P. Lodge (Method-401) | USEPA IO-3.4            | USEPA IO-3.4            | USEPA IO-3.4            | IS 5182 : (Part 11) :2006    | IS 5182 : (Part 12) :2004            |

BDL VALUES : SO<sub>2</sub>- <6.0, OZONE- <20.0, NH<sub>3</sub>- <10.0, Pb- <0.01, Ni- <5.0, As- <1.0, BENZENE- <4.2, BENZO(a)PYRENE- <0.5

Report Prepared By :



For Mitra S.K. Pvt. Ltd.

Authorized Signatory

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**BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB**

2

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

ULR No.: TC636624000000100F, 157F, 336F, 414F, 551F, 635F, 713F, 857F  
Test Report Date: 09/02/2024

**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 (PM <sub>2.5</sub> ) µg/m <sup>3</sup> | Particulate Matter (PM <sub>10</sub> ) µg/m <sup>3</sup> | Sulphur Dioxide (as SO <sub>2</sub> ) µg/m <sup>3</sup> | Nitrogen Dioxide (as NO <sub>2</sub> ) µg/m <sup>3</sup> | Ozone (as O <sub>3</sub> ) µg/m <sup>3</sup> | Lead (as Pb <sup>1</sup> ) µg/m <sup>3</sup> | Carbon Monoxide (as CO) mg/m <sup>3</sup> | Ammonia (as NH <sub>3</sub> ) µg/m <sup>3</sup> | Nickel (as Ni <sup>2</sup> ) ng/m <sup>3</sup> | Arsenic (as As <sup>3</sup> ) ng/m <sup>3</sup> | Benzo (a) pyrene (as BAP <sup>4</sup> ) ng/m <sup>3</sup> | Benzen e (C <sub>6</sub> H <sub>6</sub> <sup>5</sup> ) µg/m <sup>3</sup> |
| 05/01/2024       | 32.60   | 65.80  | 12.80   | 22.10  | 28.40  | ND   | 1.51                                      | 12.90   | ND   | ND  | ND  | ND   |
| 08/01/2024       | 35.90   | 70.40  | 10.20   | 24.80  | 22.20  | ND   | 0.15                                      | 10.80   | ND   | ND  | ND  | ND   |
| 12/01/2024       | 46.20   | 72.60  | 11.40   | 20.60  | 24.50  | ND   | 1.28                                      | 11.40   | ND   | ND  | ND  | ND   |
| 17/01/2024       | 51.10   | 58.20  | 12.70   | 18.90  | 26.10  | ND   | 1.37                                      | 12.60   | ND   | ND  | ND  | ND   |
| 19/01/2024       | 34.20   | 62.30  | 11.80   | 19.20  | 20.60  | ND   | 1.30                                      | 10.30   | ND   | ND  | ND  | ND   |
| 22/01/2024       | 33.80   | 60.10  | 10.70   | 20.80  | 24.60  | ND   | 1.39                                      | 13.40   | ND   | ND  | ND  | ND   |
| 24/01/2024       | 40.20   | 58.90  | 13.20   | 22.60  | 23.50  | ND   | 1.29                                      | 10.00   | ND   | ND  | ND  | ND   |
| 29/01/2024       | 38.60   | 59.40  | 12.40   | 21.30  | 25.50  | ND   | 1.40                                      | 11.90   | ND   | ND  | ND  | ND   |
| Minimum          | 32.60   | 58.20  | 10.20   | 18.90  | 20.60  | -  | 0.15                                      | 10.00   | -  | -   | -   | -  |
| Maximum          | 51.10   | 72.60  | 13.20   | 24.80  | 28.40  | -  | 1.51                                      | 13.40   | -  | -   | -   | -  |
| Average          | 39.08   | 63.46  | 11.90   | 21.29  | 24.43  | -  | 1.21                                      | 11.66   | -  | -   | -   | -  |
| 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/SO P/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, <sup>3</sup>Arsenic-ND [DL- 0.5], <sup>4</sup>BAP-ND [DL- 0.5], <sup>5</sup>Benzene-ND [DL- 0.5], <sup>1</sup>Lead-ND [DL- 0.5], <sup>2</sup>Nickel-ND [DL- 1.0]  
Sample Analysed within Seven days from the date of sampling.



TC-6366



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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

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

ULR No.: TC636624000000101F, 158F, 337F, 415F, 552F, 636F, 714F, 858F  
Test Report Date: 09/02/2024

#### 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) µg/m3 | Ozone (as O3) µg/m3 | Lead (as Pb <sup>1</sup> ) µg/m3 | Carbon Monoxide (as CO) mg/m3 | Ammonia (as NH3) µg/m3            | Nickel (as Ni <sup>2</sup> ) ng/m3 | Arsenic (as As <sup>3</sup> ) ng/m3 | Benzo (a) pyrene (as BAP <sup>4</sup> ) ng/m3 | Benzen e (C6H6 <sup>5</sup> ) ug/m3 |
| 05/01/2024       | 38.60                                    | 78.20                           | 7.80                           | 20.40                           | 22.00               | ND                               | 1.48                          | 13.60                             | ND                                 | ND                                  | ND  | ND                                  |
| 08/01/2024       | 40.50                                    | 68.40                           | 6.50                           | 24.20                           | 24.00               | ND                               | 0.19                          | 12.40                             | ND                                 | ND                                  | ND  | ND                                  |
| 12/01/2024       | 42.60                                    | 72.10                           | 6.80                           | 26.10                           | 26.00               | ND                               | 1.21                          | 14.00                             | ND                                 | ND                                  | ND  | ND                                  |
| 17/01/2024       | 39.20                                    | 64.60                           | 8.40                           | 23.10                           | 23.00               | ND                               | 1.30                          | 11.80                             | ND                                 | ND                                  | ND  | ND                                  |
| 19/01/2024       | 41.70                                    | 66.20                           | 9.10                           | 25.40                           | 25.10               | ND                               | 1.20                          | 13.40                             | ND                                 | ND                                  | ND  | ND                                  |
| 22/01/2024       | 40.50                                    | 65.60                           | 10.20                          | 24.60                           | 24.20               | ND                               | 1.29                          | 12.60                             | ND                                 | ND                                  | ND  | ND                                  |
| 24/01/2024       | 42.10                                    | 70.40                           | 7.90                           | 22.80                           | 26.40               | ND                               | 1.34                          | 14.50                             | ND                                 | ND                                  | ND  | ND                                  |
| 29/01/2024       | 38.10                                    | 72.80                           | 8.10                           | 26.00                           | 22.90               | ND                               | 1.40                          | 10.90                             | ND                                 | ND                                  | ND  | ND                                  |
| Minimum          | 38.10                                    | 64.60                           | 6.50                           | 20.40                           | 22.00               | -                                | 0.19                          | 10.90                             | -                                  | -                                   | -   | -                                   |
| Maximum          | 42.60                                    | 78.20                           | 10.20                          | 26.10                           | 26.40               | -                                | 1.48                          | 14.50                             | -                                  | -                                   | -   | -                                   |
| Average          | 40.41                                    | 69.79                           | 8.10                           | 24.08                           | 24.20               | -                                | 1.18                          | 12.90                             | -                                  | -                                   | -   | -                                   |
| 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, <sup>3</sup>Arsenic-ND [DL- 0.5], <sup>4</sup>BAP-ND [DL- 0.5], <sup>5</sup>Benzen-ND [DL- 0.5], <sup>1</sup>Lead-ND [DL- 0.5], <sup>2</sup>Nickel-ND [DL- 1.0]  
Sample Analysed within Seven days from the date of sampling.



TC-6366



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(RAVINDER MITTAL)

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

4

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

**ULR No.:** TC636624000000102F, 159F, 338F, 416F, 553F, 637F, 715F, 859F  
**Test Report Date:** 09/02/2024

#### 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/m <sup>3</sup> | Particulate Matter (PM10) µg/m <sup>3</sup> | Sulphur Dioxide (as SO <sub>2</sub> ) µg/m <sup>3</sup> | Nitrogen Dioxide (as NO <sub>2</sub> ) µg/m <sup>3</sup> | Ozone (as O <sub>3</sub> ) µg/m <sup>3</sup> | Lead (as Pb <sup>1</sup> ) µg/m <sup>3</sup> | Carbon Monoxide (as CO) mg/m <sup>3</sup> | Ammonia (as NH <sub>3</sub> ) µg/m <sup>3</sup> | Nickel (as Ni <sup>2</sup> ) ng/m <sup>3</sup> | Arsenic (as As <sup>3</sup> ) ng/m <sup>3</sup> | Benzo (a) pyrene (as BAP <sup>4</sup> ) ng/m <sup>3</sup> | Benzen e (C <sub>6</sub> H <sub>6</sub> <sup>5</sup> ) µg/m <sup>3</sup> |
| 05/01/2024       | 42.20  | 72.20                                       | 7.20  | 18.20  | 25.20  | ND   | 1.51                                      | 11.20   | ND   | ND  | ND  | ND   |
| 08/01/2024       | 44.60  | 52.60                                       | 7.40  | 22.40  | 26.10  | ND   | 0.15                                      | 10.60   | ND   | ND  | ND  | ND   |
| 12/01/2024       | 46.10  | 76.20                                       | 6.60  | 19.60  | 26.80  | ND   | 1.28                                      | 14.50   | ND   | ND  | ND  | ND   |
| 17/01/2024       | 43.20  | 76.40                                       | 8.20  | 20.40  | 24.60  | ND   | 1.37                                      | 13.80   | ND   | ND  | ND  | ND   |
| 19/01/2024       | 45.10  | 54.60                                       | 6.70  | 22.90  | 23.90  | ND   | 1.30                                      | 12.40   | ND   | ND  | ND  | ND   |
| 22/01/2024       | 42.80  | 70.20                                       | 9.40  | 21.60  | 25.10  | ND   | 1.18                                      | 11.90   | ND   | ND  | ND  | ND   |
| 24/01/2024       | 44.10  | 73.40                                       | 10.20   | 18.80  | 26.00  | ND   | 1.34                                      | 15.60   | ND   | ND  | ND  | ND   |
| 29/01/2024       | 45.90  | 58.40                                       | 7.90  | 19.50  | 22.40  | ND   | 1.40                                      | 10.90   | ND   | ND  | ND  | ND   |
| Minimum          | 42.20  | 52.60                                       | 6.60  | 18.20  | 22.40  | -  | 0.15                                      | 10.60   | -  | -   | -   | -  |
| Maximum          | 46.10  | 76.40                                       | 10.20   | 22.90  | 26.80  | -  | 1.51                                      | 15.60   | -  | -   | -   | -  |
| Average          | 44.25  | 66.75                                       | 7.95  | 20.43  | 25.01  | -  | 1.19                                      | 12.61   | -  | -   | -   | -  |
| 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, <sup>3</sup>Arsenic-ND [DL- 0.5], <sup>4</sup>BAP-ND [DL- 0.5], <sup>5</sup>Benzene-ND [DL- 0.5], <sup>1</sup>Lead-ND [DL- 0.5], <sup>2</sup>Nickel-ND [DL- 1.0]  
Sample Analysed within Seven days from the date of sampling.



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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

5

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

**ULR No.:** TC636624000000103F, 160F, 339F, 417, 554F, 638F, 716F, 860F  
**Test Report Date:** 09/02/2024

#### 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 (PM <sub>2.5</sub> ) µg/m <sup>3</sup> | Particulate Matter (PM <sub>10</sub> ) µg/m <sup>3</sup> | Sulphur Dioxide (as SO <sub>2</sub> ) µg/m <sup>3</sup> | Nitrogen Dioxide (as NO <sub>2</sub> ) µg/m <sup>3</sup> | Ozone (as O <sub>3</sub> ) µg/m <sup>3</sup> | Lead (as Pb <sup>1</sup> ) µg/m <sup>3</sup> | Carbon Monoxide (as CO) mg/m <sup>3</sup> | Ammonia (as NH <sub>3</sub> ) µg/m <sup>3</sup> | Nickel (as Ni <sup>2</sup> ) ng/m <sup>3</sup> | Arsenic (as As <sup>3</sup> ) ng/m <sup>3</sup> | Benzo (a) pyrene (as BAP <sup>4</sup> ) ng/m <sup>3</sup> | Benzen e (C <sub>6</sub> H <sub>6</sub> <sup>5</sup> ) µg/m <sup>3</sup> |
| 05/01/2024       | 45.60   | 71.80  | 8.40  | 20.10  | 24.10  | ND   | 1.41                                      | 13.40   | ND   | ND  | ND  | ND   |
| 08/01/2024       | 43.20   | 51.40  | 9.10  | 18.40  | 25.60  | ND   | 0.21                                      | 12.60   | ND   | ND  | ND  | ND   |
| 12/01/2024       | 45.40   | 74.80  | 7.20  | 19.60  | 27.20  | ND   | 1.22                                      | 15.20   | ND   | ND  | ND  | ND   |
| 17/01/2024       | 43.50   | 75.20  | 10.40   | 21.50  | 26.40  | ND   | 1.34                                      | 14.10   | ND   | ND  | ND  | ND   |
| 19/01/2024       | 45.80   | 54.60  | 6.90  | 20.80  | 23.60  | ND   | 1.31                                      | 10.90   | ND   | ND  | ND  | ND   |
| 22/01/2024       | 47.20   | 70.90  | 7.80  | 23.60  | 22.40  | ND   | 1.29                                      | 11.80   | ND   | ND  | ND  | ND   |
| 24/01/2024       | 46.00   | 72.20  | 8.20  | 22.40  | 24.70  | ND   | 0.90                                      | 12.90   | ND   | ND  | ND  | ND   |
| 29/01/2024       | 43.10   | 58.60  | 9.40  | 18.90  | 21.80  | ND   | 1.19                                      | 14.40   | ND   | ND  | ND  | ND   |
| Minimum          | 43.10   | 51.40  | 6.90  | 18.40  | 21.80  | -  | 0.21                                      | 10.90   | -  | -   | -   | -  |
| Maximum          | 47.20   | 75.20  | 10.40   | 23.60  | 27.20  | -  | 1.41                                      | 15.20   | -  | -   | -   | -  |
| Average          | 44.98   | 66.19  | 8.43  | 20.66  | 24.48  | -  | 1.11                                      | 13.16   | -  | -   | -   | -  |
| 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/SO P/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, <sup>3</sup>Arsenic-ND [DL- 0.5], <sup>4</sup>BAP-ND [DL- 0.5], <sup>5</sup>Benzene-ND [DL- 0.5], <sup>1</sup>Lead-ND [DL- 0.5], <sup>2</sup>Nickel-ND [DL- 1.0]  
Sample Analysed within Seven days from the date of sampling.



TC-6366



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#### CORPORATE OFFICE & CENTRAL LABORATORIES :-

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

ULR No.: TC636624000001057F, 1203F, 1278F, 1370F, 1478F,1583F, 1638F, 1761F  
1893F  
Test Report Date: 07/03/2024

#### 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) µg/m3 | Ozone (as O3) µg/m3 | Lead (as Pb <sup>1</sup> ) µg/m3 | Carbon Monoxide (as CO) mg/m3 | Ammonia (as NH3) µg/m3              | Nickel (as Ni <sup>2</sup> ) ng/m <sup>3</sup> | Arsenic (as As <sup>3</sup> ) ng/m3 | Benzo (a) pyrene (as BAP <sup>4</sup> ) ng/m <sup>3</sup> | Benzen e (C6H6 <sup>5</sup> ) ug/m3 |
| 01/02/2024       | 30.40                                     | 62.90                           | 10.90                          | 19.20                           | 24.10               | ND                               | 1.40                          | 11.00                               | ND   | ND                                  | ND  | ND                                  |
| 05/02/2024       | 32.60                                     | 66.40                           | 11.40                          | 21.40                           | 20.10               | ND                               | 0.21                          | 12.30                               | ND   | ND                                  | ND  | ND                                  |
| 08/02/2024       | 43.50                                     | 68.10                           | 12.60                          | 18.20                           | 21.60               | ND                               | 1.18                          | 13.50                               | ND   | ND                                  | ND  | ND                                  |
| 12/02/2024       | 48.60                                     | 55.40                           | 10.60                          | 17.20                           | 23.50               | ND                               | 1.27                          | 10.90                               | ND   | ND                                  | ND  | ND                                  |
| 15/02/2024       | 31.50                                     | 58.40                           | 13.20                          | 18.90                           | 17.90               | ND                               | 1.20                          | 11.50                               | ND   | ND                                  | ND  | ND                                  |
| 19/02/2024       | 30.90                                     | 57.20                           | 11.10                          | 17.10                           | 21.50               | ND                               | 1.29                          | 10.00                               | ND   | ND                                  | ND  | ND                                  |
| 22/02/2024       | 37.50                                     | 55.40                           | 12.00                          | 19.40                           | 20.90               | ND                               | 1.19                          | 12.66                               | ND   | ND                                  | ND  | ND                                  |
| 26/02/2024       | 35.90                                     | 56.30                           | 10.10                          | 18.30                           | 22.40               | ND                               | 1.30                          | 13.20                               | ND   | ND                                  | ND  | ND                                  |
| 29/02/2024       | 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               | -                                | 1.14                          | 11.90                               | -  | -                                   | -   | -                                   |
| NAAQM Standards  | 60  | 100                             | 80                             | 80                              | 100                 | 1                                | 2                             | 400                                 | 20   | 6                                   | 1   | 5                                   |
| Test Method      | 40CFR Appendix L Part 53 CPCB Guideline s | 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 g & Analysis | NL/SO P/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, <sup>3</sup>Arsenic-ND [DL- 0.5],<sup>4</sup>BAP-ND [DL- 0.5], <sup>5</sup>Benzen e-ND [DL- 0.5], <sup>1</sup>Lead-ND [DL- 0.5],<sup>2</sup>Nickel-ND [DL- 1.0]  
Sample Analysed within Seven days from the date of sampling.



TC-6366



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## BUILDING &amp; ROAD, MATERIAL, SOIL, ENVIRONMENTAL &amp; CALIBRATION TESTING LAB

## Test Report

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

ULR No.: TC636624000001058F, 1204F, 1279F, 1371F, 1479F, 1584F, 1639F, 1762F  
1894F  
Test Report Date: 07/03/2024

## 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) µg/m3 | Ozone (as O3) µg/m3 | Lead (as Pb <sup>1</sup> ) µg/m3 | Carbon Monoxide (as CO) mg/m3 | Ammonia (as NH3) µg/m3              | Nickel (as Ni <sup>2</sup> ) ng/m3 | Arsenic (as As <sup>3</sup> ) ng/m3 | Benzo (a) pyrene (as BAP <sup>4</sup> ) ng/m3 | Benzen e (C6H6 <sup>5</sup> ) ug/m3 |
| 01/02/2024       | 35.20                                     | 75.50                           | 6.80                           | 16.20                           | 18.20               | ND                               | 1.35                          | 11.90                               | ND                                 | ND                                  | ND  | ND                                  |
| 05/02/2024       | 36.40                                     | 65.10                           | 8.10                           | 19.80                           | 20.50               | ND                               | 0.11                          | 10.50                               | ND                                 | ND                                  | ND  | ND                                  |
| 08/02/2024       | 39.20                                     | 68.20                           | 7.50                           | 21.50                           | 22.40               | ND                               | 1.10                          | 12.50                               | ND                                 | ND                                  | ND  | ND                                  |
| 12/02/2024       | 35.60                                     | 61.50                           | 9.40                           | 18.50                           | 20.10               | ND                               | 1.20                          | 13.60                               | ND                                 | ND                                  | ND  | ND                                  |
| 15/02/2024       | 38.20                                     | 63.20                           | 10.60                          | 20.60                           | 21.60               | ND                               | 1.11                          | 10.20                               | ND                                 | ND                                  | ND  | ND                                  |
| 19/02/2024       | 36.80                                     | 62.50                           | 11.20                          | 18.20                           | 19.90               | ND                               | 1.18                          | 14.10                               | ND                                 | ND                                  | ND  | ND                                  |
| 22/02/2024       | 39.50                                     | 67.80                           | 9.90                           | 17.60                           | 21.10               | ND                               | 1.24                          | 12.20                               | ND                                 | ND                                  | ND  | ND                                  |
| 26/02/2024       | 35.50                                     | 69.20                           | 10.00                          | 21.00                           | 18.80               | ND                               | 1.30                          | 13.00                               | ND                                 | ND                                  | ND  | ND                                  |
| 29/02/2024       | 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 Guideline s | 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 g & Analysis | NL/SO P/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, <sup>3</sup>Arsenic-ND [DL- 0.5], <sup>4</sup>BAP-ND [DL- 0.5], <sup>5</sup>Benzene-ND [DL- 0.5], <sup>1</sup>Lead-ND [DL- 0.5], <sup>2</sup>Nickel-ND [DL- 1.0]  
Sample Analysed within Seven days from the date of sampling.



TC-6366



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## BUILDING &amp; ROAD, MATERIAL, SOIL, ENVIRONMENTAL &amp; CALIBRATION TESTING LAB

## Test Report

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

ULR No.: TC636624000001059F, 1205F, 1280F, 1372F, 1480F, 1585F, 1640F, 1763F  
1895F  
Test Report Date: 07/03/2024

## 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 (PM <sub>2.5</sub> ) µg/m <sup>3</sup> | Particulate Matter (PM <sub>10</sub> ) µg/m <sup>3</sup> | Sulphur Dioxide (as SO <sub>2</sub> ) µg/m <sup>3</sup> | Nitrogen Dioxide (as NO <sub>2</sub> ) µg/m <sup>3</sup> | Ozone (as O <sub>3</sub> ) µg/m <sup>3</sup> | Lead (as Pb <sup>1</sup> ) µg/m <sup>3</sup> | Carbon Monoxide (as CO) mg/m <sup>3</sup> | Ammonia (as NH <sub>3</sub> ) µg/m <sup>3</sup> | Nickel (as Ni <sup>2</sup> ) ng/m <sup>3</sup> | Arsenic (as As <sup>3</sup> ) ng/m <sup>3</sup> | Benzo (a) pyrene (as BAP <sup>4</sup> ) ng/m <sup>3</sup> | Benzen e (C <sub>6</sub> H <sub>6</sub> <sup>5</sup> ) µg/m <sup>3</sup> |
| 01/02/2024       | 38.50   | 68.10  | 9.50  | 16.50  | 20.10  | ND   | 1.42                                      | 13.20   | ND   | ND  | ND  | ND   |
| 05/02/2024       | 40.70   | 50.20  | 8.20  | 19.80  | 21.40  | ND   | 0.19                                      | 12.40   | ND   | ND  | ND  | ND   |
| 08/02/2024       | 42.90   | 71.80  | 7.80  | 16.60  | 22.20  | ND   | 1.18                                      | 11.80   | ND   | ND  | ND  | ND   |
| 12/02/2024       | 39.80   | 71.10  | 10.10   | 17.70  | 20.50  | ND   | 1.26                                      | 10.90   | ND   | ND  | ND  | ND   |
| 15/02/2024       | 42.60   | 51.80  | 9.40  | 18.50  | 19.80  | ND   | 1.32                                      | 11.00   | ND   | ND  | ND  | ND   |
| 19/02/2024       | 38.10   | 66.20  | 7.90  | 20.10  | 20.00  | ND   | 1.08                                      | 13.80   | ND   | ND  | ND  | ND   |
| 22/02/2024       | 41.20   | 69.20  | 11.90   | 20.90  | 21.10  | ND   | 1.24                                      | 12.60   | ND   | ND  | ND  | ND   |
| 26/02/2024       | 42.00   | 53.20  | 10.00   | 21.50  | 18.80  | ND   | 1.30                                      | 11.40   | ND   | ND  | ND  | ND   |
| 29/02/2024       | 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/SO P/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, <sup>3</sup>Arsenic-ND [DL- 0.5], <sup>4</sup>BAP-ND [DL- 0.5], <sup>5</sup>Benzene-ND [DL- 0.5], <sup>1</sup>Lead-ND [DL- 0.5], <sup>2</sup>Nickel-ND [DL- 1.0]  
Sample Analysed within Seven days from the date of sampling.



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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

**ULR No.:** TC636624000001060F, 1206F, 1281F, 1373F, 1481F, 1586F, 1641F, 1764F  
1896F  
**Test Report Date:** 07/03/2024

#### 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) µg/m3 | Ozone (as O3) µg/m3 | Lead (as Pb <sup>1</sup> ) µg/m3 | Carbon Monoxide (as CO) mg/m3 | Ammonia (as NH3) µg/m3            | Nickel (as Ni <sup>2</sup> ) ng/m3 | Arsenic (as As <sup>3</sup> ) ng/m3 | Benzo (a) pyrene (as BAP <sup>4</sup> ) ng/m3 | Benzen e (C6H6 <sup>5</sup> ) ug/m3 |
| 01/02/2024       | 40.20                                    | 67.40                           | 7.90                           | 16.90                           | 20.20               | ND                               | 1.31                          | 10.60                             | ND                                 | ND                                  | ND  | ND                                  |
| 05/02/2024       | 39.50                                    | 53.20                           | 8.50                           | 15.40                           | 21.40               | ND                               | 0.12                          | 11.90                             | ND                                 | ND                                  | ND  | ND                                  |
| 08/02/2024       | 41.80                                    | 70.60                           | 9.40                           | 16.20                           | 22.00               | ND                               | 1.12                          | 12.20                             | ND                                 | ND                                  | ND  | ND                                  |
| 12/02/2024       | 38.90                                    | 71.50                           | 8.10                           | 18.60                           | 21.60               | ND                               | 1.24                          | 11.00                             | ND                                 | ND                                  | ND  | ND                                  |
| 15/02/2024       | 41.10                                    | 51.90                           | 9.60                           | 17.80                           | 19.90               | ND                               | 1.21                          | 12.80                             | ND                                 | ND                                  | ND  | ND                                  |
| 19/02/2024       | 42.80                                    | 65.40                           | 10.00                          | 19.50                           | 18.90               | ND                               | 1.19                          | 13.40                             | ND                                 | ND                                  | ND  | ND                                  |
| 22/02/2024       | 42.60                                    | 68.40                           | 8.90                           | 18.80                           | 20.30               | ND                               | 0.80                          | 14.00                             | ND                                 | ND                                  | ND  | ND                                  |
| 26/02/2024       | 40.80                                    | 55.20                           | 10.50                          | 15.10                           | 18.00               | ND                               | 1.09                          | 10.50                             | ND                                 | ND                                  | ND  | ND                                  |
| 29/02/2024       | 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/SO P/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, <sup>3</sup>Arsenic-ND [DL- 0.5], <sup>4</sup>BAP-ND [DL- 0.5], <sup>5</sup>Benzene-ND [DL- 0.5], <sup>1</sup>Lead-ND [DL- 0.5], <sup>2</sup>Nickel-ND [DL- 1.0]  
Sample Analysed within Seven days from the date of sampling.



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#### CORPORATE OFFICE & CENTRAL LABORATORIES :-

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

ULR No.: TC636624000001960F, 2014F, 2090F, 2147F, 2349F, 2493F, 2593F  
Test Report Date: 06/04/2024

#### 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/m <sup>3</sup> | Particulate Matter (PM10) µg/m <sup>3</sup> | Sulphur Dioxide (as SO <sub>2</sub> ) µg/m <sup>3</sup> | Nitrogen Dioxide (as NO <sub>2</sub> ) µg/m <sup>3</sup> | Ozone (as O <sub>3</sub> ) µg/m <sup>3</sup> | Lead (as Pb <sup>1</sup> ) µg/m <sup>3</sup> | Carbon Monoxide (as CO) mg/m <sup>3</sup> | Ammonia (as NH <sub>3</sub> ) µg/m <sup>3</sup> | Nickel (as Ni <sup>2</sup> ) ng/m <sup>3</sup> | Arsenic (as As <sup>3</sup> ) ng/m <sup>3</sup> | Benzo (a) pyrene (as BAP <sup>4</sup> ) ng/m <sup>3</sup> | Benzen e (C <sub>6</sub> H <sub>6</sub> <sup>5</sup> ) µg/m <sup>3</sup> |
| 04/03/2024       | 27.60  | 56.60                                       | 12.80   | 17.40  | 19.20  | ND   | 1.30                                      | 13.20   | ND   | ND  | ND  | ND   |
| 07/03/2024       | 29.50  | 60.80                                       | 13.90   | 18.20  | 15.20  | ND   | 0.35                                      | 10.80   | ND   | ND  | ND  | ND   |
| 11/03/2024       | 40.20  | 62.10                                       | 10.40   | 16.90  | 19.10  | ND   | 1.07                                      | 11.40   | ND   | ND  | ND  | ND   |
| 14/03/2024       | 45.90  | 50.80                                       | 12.10   | 15.40  | 18.40  | ND   | 1.16                                      | 12.80   | ND   | ND  | ND  | ND   |
| 18/03/2024       | 28.40  | 52.80                                       | 10.90   | 16.10  | 14.20  | ND   | 1.10                                      | 13.60   | ND   | ND  | ND  | ND   |
| 21/03/2024       | 27.20  | 51.30                                       | 13.20   | 14.20  | 19.80  | ND   | 1.18                                      | 12.00   | ND   | ND  | ND  | ND   |
| 26/03/2024       | 34.10  | 50.40                                       | 11.80   | 16.80  | 15.80  | ND   | 1.09                                      | 10.50   | ND   | ND  | ND  | ND   |
| 28/03/2024       | 32.80  | 51.80                                       | 11.00   | 15.90  | 19.90  | ND   | 1.20                                      | 11.00   | ND   | ND  | ND  | ND   |
| Minimum          | 27.20  | 50.40                                       | 10.40   | 14.20  | 14.20  | -  | 0.35                                      | 10.50   | -  | -   | -   | -  |
| Maximum          | 45.90  | 62.10                                       | 13.90   | 18.20  | 19.90  | -  | 1.30                                      | 13.60   | -  | -   | -   | -  |
| Average          | 33.21  | 54.58                                       | 12.01   | 16.36  | 17.70  | -  | 1.06                                      | 11.91   | -  | -   | -   | -  |
| 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, \*Arsenic-ND [DL- 0.5], \*BAP-ND [DL- 0.5], \*Benzene-ND [DL- 0.5], \*Lead-ND [DL- 0.5], \*Nickel-ND [DL- 1.0]  
Sample Analyzed within Seven days from the date of sampling.



TC-6366



(AUTHORISED SIGNATORY)

(RAVINDER MITTAL)

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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

ULR No.: TC636624000001961F, 2015F, 2091F, 2148F, 2350F, 2494F, 2594  
Test Report Date: 06/04/2024

#### 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 (PM <sub>2.5</sub> ) µg/m <sup>3</sup> | Particulate Matter (PM <sub>10</sub> ) µg/m <sup>3</sup> | Sulphur Dioxide (as SO <sub>2</sub> ) µg/m <sup>3</sup> | Nitrogen Dioxide (as NO <sub>2</sub> ) µg/m <sup>3</sup> | Ozone (as O <sub>3</sub> ) µg/m <sup>3</sup> | Lead (as Pb <sup>1</sup> ) µg/m <sup>3</sup> | Carbon Monoxide (as CO) mg/m <sup>3</sup> | Ammonia (as NH <sub>3</sub> ) µg/m <sup>3</sup> | Nickel (as Ni <sup>2</sup> ) ng/m <sup>3</sup> | Arsenic (as As <sup>3</sup> ) ng/m <sup>3</sup> | Benzo (a) pyrene (as BAP <sup>4</sup> ) ng/m <sup>3</sup> | Benzen e (C <sub>6</sub> H <sub>6</sub> <sup>5</sup> ) µg/m <sup>3</sup> |
| 04/03/2024       | 32.30   | 72.20  | 9.90  | 14.80  | 15.80  | ND   | 1.25                                      | 10.10   | ND   | ND  | ND  | ND   |
| 07/03/2024       | 33.40   | 61.40  | 10.40   | 16.90  | 17.40  | ND   | 0.20                                      | 12.60   | ND   | ND  | ND  | ND   |
| 11/03/2024       | 36.10   | 64.20  | 9.50  | 17.20  | 18.50  | ND   | 1.01                                      | 11.20   | ND   | ND  | ND  | ND   |
| 14/03/2024       | 32.80   | 57.70  | 11.20   | 15.50  | 17.80  | ND   | 1.10                                      | 10.90   | ND   | ND  | ND  | ND   |
| 18/03/2024       | 35.70   | 59.90  | 12.30   | 17.80  | 18.10  | ND   | 1.01                                      | 12.20   | ND   | ND  | ND  | ND   |
| 21/03/2024       | 33.60   | 58.60  | 10.30   | 15.10  | 16.80  | ND   | 1.07                                      | 11.40   | ND   | ND  | ND  | ND   |
| 26/03/2024       | 36.40   | 62.80  | 11.80   | 14.90  | 18.00  | ND   | 1.14                                      | 14.10   | ND   | ND  | ND  | ND   |
| 28/03/2024       | 32.60   | 64.20  | 12.00   | 17.00  | 15.20  | ND   | 1.20                                      | 12.20   | ND   | ND  | ND  | ND   |
| Minimum          | 32.30   | 57.70  | 9.50  | 14.80  | 15.20  | -  | 0.20                                      | 10.10   | -  | -   | -   | -  |
| Maximum          | 36.40   | 72.20  | 12.30   | 17.80  | 18.50  | -  | 1.25                                      | 14.10   | -  | -   | -   | -  |
| Average          | 34.11   | 62.63  | 10.77   | 16.15  | 17.20  | -  | 1.00                                      | 11.84   | -  | -   | -   | -  |
| 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, <sup>3</sup>Arsenic-ND [DL- 0.5], <sup>4</sup>BAP-ND [DL- 0.5], <sup>5</sup>Benzen-ND [DL- 0.5], <sup>1</sup>Lead-ND [DL- 0.5] <sup>2</sup>Nickel-ND [DL- 1.0]  
Sample Analyzed within Seven days from the date of sampling.



TC-6366



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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

**ULR No.:** TC636624000001962F, 2016F, 2092F, 2149F, 2351F, 2495F, 2595F  
**Test Report Date:** 06/04/2024

#### 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/m <sup>3</sup> | Particulate Matter (PM10) µg/m <sup>3</sup> | Sulphur Dioxide (as SO <sub>2</sub> ) µg/m <sup>3</sup> | Nitrogen Dioxide (as NO <sub>2</sub> ) µg/m <sup>3</sup> | Ozone (as O <sub>3</sub> ) µg/m <sup>3</sup> | Lead (as Pb <sup>1</sup> ) µg/m <sup>3</sup> | Carbon Monoxide (as CO) mg/m <sup>3</sup> | Ammonia (as NH <sub>3</sub> ) µg/m <sup>3</sup> | Nickel (as Ni <sup>2</sup> ) ng/m <sup>3</sup> | Arsenic (as As <sup>3</sup> ) ng/m <sup>3</sup> | Benzo (a) pyrene (as BAP <sup>4</sup> ) ng/m <sup>3</sup> | Benzene (C <sub>6</sub> H <sub>6</sub> <sup>5</sup> ) µg/m <sup>3</sup> |
| 04/03/2024       | 34.60  | 64.60                                       | 11.40   | 14.60  | 17.10  | ND   | 1.30                                      | 11.80   | ND   | ND  | ND  | ND  |
| 07/03/2024       | 36.75  | 45.50                                       | 10.60   | 17.20  | 18.37  | ND   | 0.28                                      | 10.38   | ND   | ND  | ND  | ND  |
| 11/03/2024       | 38.88  | 66.20                                       | 9.40  | 14.40  | 19.20  | ND   | 1.08                                      | 13.80   | ND   | ND  | ND  | ND  |
| 14/03/2024       | 35.89  | 67.00                                       | 11.20   | 15.30  | 17.50  | ND   | 1.16                                      | 12.90   | ND   | ND  | ND  | ND  |
| 18/03/2024       | 38.88  | 47.80                                       | 10.60   | 16.20  | 16.77  | ND   | 1.22                                      | 13.12   | ND   | ND  | ND  | ND  |
| 21/03/2024       | 34.61  | 61.20                                       | 9.90  | 17.90  | 17.00  | ND   | 1.01                                      | 10.80   | ND   | ND  | ND  | ND  |
| 26/03/2024       | 37.60  | 63.80                                       | 10.10   | 17.40  | 18.08  | ND   | 1.14                                      | 11.61   | ND   | ND  | ND  | ND  |
| 28/03/2024       | 38.46  | 49.60                                       | 12.10   | 18.80  | 15.80  | ND   | 1.20                                      | 13.43   | ND   | ND  | ND  | ND  |
| Minimum          | 34.60  | 45.50                                       | 9.40  | 14.40  | 15.80  | -  | 0.28                                      | 10.38   | -  | -   | -   | -   |
| Maximum          | 38.88  | 67.00                                       | 12.10   | 18.80  | 19.20  | -  | 1.30                                      | 13.80   | -  | -   | -   | -   |
| Average          | 36.96  | 58.21                                       | 10.66   | 16.48  | 17.48  | -  | 1.05                                      | 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, <sup>1</sup>Arsenic-ND [DL- 0.5], <sup>2</sup>BAP-ND [DL- 0.5], <sup>3</sup>Benzene-ND [DL- 0.5], <sup>4</sup>Lead-ND [DL- 0.5], <sup>5</sup>Nickel-ND [DL- 1.0]  
Sample Analysed within Seven days from the date of sampling.



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### BUILDING & ROAD, MATERIAL, SOIL, ENVIRONMENTAL & CALIBRATION TESTING LAB

#### Test Report

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

**ULR No.:** TC636624000001963F, 2017F, 2093F, 2150F, 2352F, 2496F, 2596F  
**Test Report Date:** 06/04/2024

#### 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/m <sup>3</sup> | Particulate Matter (PM10) µg/m <sup>3</sup> | Sulphur Dioxide (as SO <sub>2</sub> ) µg/m <sup>3</sup> | Nitrogen Dioxide (as NO <sub>2</sub> ) µg/m <sup>3</sup> | Ozone (as O <sub>3</sub> ) µg/m <sup>3</sup> | Lead (as Pb <sup>1</sup> ) µg/m <sup>3</sup> | Carbon Monoxide (as CO) mg/m <sup>3</sup> | Ammonia (as NH <sub>3</sub> ) µg/m <sup>3</sup> | Nickel (as Ni <sup>2</sup> ) ng/m <sup>3</sup> | Arsenic (as As <sup>3</sup> ) ng/m <sup>3</sup> | Benzo (a) pyrene (as BAP <sup>4</sup> ) ng/m <sup>3</sup> | Benzen e (C <sub>6</sub> H <sub>6</sub> <sup>5</sup> ) µg/m <sup>3</sup> |
| 04/03/2024       | 36.32  | 63.40                                       | 10.40   | 13.90  | 17.16  | ND   | 1.21                                      | 12.40   | ND   | ND  | ND  | ND   |
| 07/03/2024       | 34.61  | 49.20                                       | 11.20   | 12.40  | 18.37  | ND   | 0.20                                      | 10.20   | ND   | ND  | ND  | ND   |
| 11/03/2024       | 37.60  | 66.60                                       | 11.60   | 13.20  | 19.00  | ND   | 1.02                                      | 11.60   | ND   | ND  | ND  | ND   |
| 14/03/2024       | 35.90  | 67.50                                       | 10.10   | 15.60  | 18.57  | ND   | 1.14                                      | 13.20   | ND   | ND  | ND  | ND   |
| 18/03/2024       | 37.17  | 47.90                                       | 11.40   | 14.80  | 16.87  | ND   | 1.11                                      | 10.80   | ND   | ND  | ND  | ND   |
| 21/03/2024       | 38.88  | 61.40                                       | 12.50   | 16.50  | 15.90  | ND   | 1.09                                      | 11.10   | ND   | ND  | ND  | ND   |
| 26/03/2024       | 38.46  | 64.40                                       | 10.20   | 15.80  | 17.30  | ND   | 0.70                                      | 12.40   | ND   | ND  | ND  | ND   |
| 28/03/2024       | 36.75  | 51.20                                       | 12.00   | 12.10  | 15.00  | ND   | 1.00                                      | 12.00   | ND   | ND  | ND  | ND   |
| Minimum          | 34.61  | 47.90                                       | 10.10   | 12.10  | 15.00  | -  | 0.20                                      | 10.20   | -  | -   | -   | -  |
| Maximum          | 38.88  | 67.50                                       | 12.50   | 16.50  | 19.00  | -  | 1.21                                      | 13.20   | -  | -   | -   | -  |
| Average          | 36.96  | 58.95                                       | 11.18   | 14.29  | 17.27  | -  | 0.93                                      | 11.71   | -  | -   | -   | -  |
| 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, <sup>3</sup>Arsenic-ND [DL- 0.5], <sup>4</sup>BAP-ND [DL- 0.5], <sup>5</sup>Benzene-ND [DL- 0.5], <sup>1</sup>Lead-ND [DL- 0.5], <sup>2</sup>Nickel-ND [DL- 1.0]  
Sample Analysed within Seven days from the date of sampling.



**NOTE:** The laboratory accepts the responsibility for content of report. The results contained in this test report related only to the sample tested. Test report shall not be reproduced except in full, without written approval of the laboratory. This report is intended only for your guidance and not for legal purpose or for advertisement. This report shall not be reproduced except in full without the written approval of this organization. Samples will be destroyed after 30 days from the date of issue of test certificate unless otherwise specified. Any complaints about this report should be communicated in writing within 7 days of issue of this report. Total liability of Nitya Laboratories is limited to the amount only. If you have any complaint/feedback regarding the sample collection/testing/test report, please send an email at [info@nityalab.com](mailto:info@nityalab.com) and call at +91-191-2465597, +91-9873924093

#### CORPORATE OFFICE & CENTRAL LABORATORIES :-

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## **LDAR Monitoring Report for IOCL, Digboi**

|                           |   |
|---------------------------|---|
| <b>Name of client</b>     | M/s Indian Oli Corporation<br>Assam Oil Division<br>Digboi-786171<br>Assam                          |
| <b>Name of Contractor</b> | NETEL (INDIA) LIMITED<br>Environment Management<br>W-408, Rabale MIDC,<br>TTC Industrial Area, Navi |
| <b>Nature of job</b>      | LDAR Monitoring Report  |
| <b>Report Period</b>      | 3 Months October to<br>December,2023  |

**For NETEL (INDIA) LIMITED**

**Shraddha Kere**  
**Quality Manager**

## **Fugitive Emission Survey for 3rd Quarter of 2023-2024**

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, 2023.**

| 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       | 29/11/2023 | AVU         | Pump Valve  | 01-PA -00-014A Suction I/V                  | Valve      | 3"        | Isolation Valve | 3000                | Gland     | 29000         | 2.877      | 0                                   | 0.000      | 0.000        |
| 2       | 30/11/2023 | CRU         | Valve       | 04-FCV-1101 U/S I/V                         | Valve      | 2"        | -               | 3000                | Gland     | 25000         | 2.430      | 0                                   | 0.000      | 0.000        |
| 3       | 30/11/2023 |             | Flange      | 04-ECV-1102 to Moc No 706 flange            | Flange     | 2"        | -               | 3000                | Gland     | 20000         | 1.884      | 0                                   | 0.000      |              |
| 4       | 30/11/2023 | DCU         | Pump Valve  | 07-PA-042B discharge I/V                    | Valve      | 3"        | -               | 3000                | Gland     | 15000         | 1.357      | 0                                   | 0.000      | 0.000        |
| 5       | 30/11/2023 |             | Pump seal   | 07-PA-042A Pump seal                        | Seal       | -         | -               | 3000                | Gland     | 21000         | 1.992      | 0                                   | 0.000      |              |
| 6       | 30/11/2023 |             | Pump Valve  | 07-PA -00-002A Suction I/V                  | Valve      | 4"        | Isolation Valve | 3000                | Gland     | 20000         | 1.884      | 0                                   | 0.000      |              |
| 7       | 1/12/2023  | MSQU        | Pump Valve  | 034-PA-CF -002 discharge I/V                | Valve      | 4"        | -               | 3000                | Gland     | 12000         | 1.052      | 0                                   | 0.000      | 0.000        |
| 8       | 1/12/2023  |             | Valve       | 34-FC-109 U/S I/V                           | Valve      | 3"        | -               | 3000                | Gland     | 10000         | 0.855      | 0                                   | 0.000      |              |
| 9       | 1/12/2023  |             | Pump Valve  | 036-PA-CF -001B discharge I/V               | Valve      | 2"        | -               | 3000                | Gland     | 10000         | 0.855      | 0                                   | 0.000      |              |
| 10      | 1/12/2023  |             | Valve       | 037-FV-803 Control Valve                    | Valve      | 4"        | -               | 3000                | Flange    | 10000         | 0.855      | 0                                   | 0.000      |              |
| 11      | 1/12/2023  |             | Valve       | 037-FV-804 Control Valve                    | Valve      | 4"        | Isolation Valve | 3000                | Gland     | 15000         | 1.357      | 0                                   | 0.000      |              |
| 12      | 1/12/2023  | HDTU        | Valve       | 09-EE-004 outlet Line PG I/V                | Valve      | 1"        | -               | 3000                | Gland     | 10000         | 0.855      | 0                                   | 0.000      | 0.000        |
| 13      | 1/12/2023  |             | Valve       | 09- VV-007 U/S 1st I/V (From CRU)           | Valve      | -         | -               | 3000                | Gland     | 15000         | 1.357      | 0                                   | 0.000      |              |
| 14      | 1/12/2023  |             | Pump Flange | 09- VV-007 U/S 1st I/V flange(From CRU)     | Flange     | 3"        | -               | 3000                | Gland     | 10000         | 0.855      | 0                                   | 0.000      |              |
| 15      | 1/12/2023  | HGU         | Valve       | 10 KA-RP-101B 1st discharge I/V             | Valve      | 6"        | -               | 3000                | Gland     | 10000         | 0.855      | 0                                   | 0.000      | 0.000        |
| 16      | 1/12/2023  |             | Valve       | 11 KA-RP-101B 2nd discharge I/V             | Valve      | 6"        | -               | 3000                | Gland     | 12000         | 1.052      | 0                                   | 0.000      |              |
| 17      | 1/12/2023  |             | Valve       | 0PV-2404 Control Valve                      | Valve      | 3"        | -               | 3000                | Gland     | 20000         | 1.884      | 0                                   | 0.000      |              |
| 18      | 2/12/2023  | OMS (CTF)   | Valve       | 040-PM-001A Crude Suction I/V               | Valve      | 6"        | -               | 3000                | Gland     | 12000         | 1.052      | 0                                   | 0.000      | 0.000        |
| 19      | 2/12/2023  | OMS (PPH)   | Valve       | 043-PA-015T Suction line I/V                | Valve      | 3"        | Isolation Valve | 3000                | Gland     | 10000         | 0.855      | 0                                   | 0.000      | 0.000        |
| 20      | 2/12/2023  |             | Valve       | 043-PA-016T discharge line 1st I/V          | Valve      | 3"        | -               | 3000                | Gland     | 15000         | 1.357      | 0                                   | 0.000      |              |
| 21      | 2/12/2023  | SDU         | Valve       | 08- VV-325A 1st outlet I/V                  | Valve      | 6"        | -               | 3000                | Gland     | 10000         | 0.855      | 0                                   | 0.000      | 0.000        |
| 22      | 2/12/2023  |             | Valve       | 08- VV-325B 2nd outlet I/V                  | Valve      | 6"        | -               | 3000                | Gland     | 15000         | 1.357      | 0                                   | 0.000      |              |
| 23      | 2/12/2023  |             | Valve       | 08- VV-325B 1st outlet I/V                  | Valve      | 6"        | -               | 3000                | Gland     | 12000         | 1.052      | 0                                   | 0.000      |              |
| 24      | 2/12/2023  |             | Valve       | 08- VV-325B inlet I/V                       | Valve      | 6"        | -               | 3000                | Gland     | 20000         | 1.884      | 0                                   | 0.000      |              |
| 25      | 2/12/2023  |             | Valve       | KA -SC-101A/B discharge interconnection I/V | Valve      | 10"       | -               | 3000                | Gland     | 25000         | 2.430      | 0                                   | 0.000      |              |
| 26      | 2/12/2023  |             | Pump Flange | 08-EE-318B shell outlet flange              | Flange     | 10"       | -               | 3000                | Gland     | 15000         | 1.357      | 0                                   | 0.000      |              |
| 27      | 4/12/2023  | NTF         | Valve       | MS suction line Ex. Tank No. 560/601 I/V    | Valve      | 8"        | -               | 3000                | Gland     | 10000         | 0.855      | 0                                   | 0.000      | 0.000        |
| 28      | 4/12/2023  | CRU offside | Pump Valve  | P-001 A Discharge I/V                       | Valve      | 3"        | -               | 3000                | Gland     | 20000         | 1.884      | 0                                   | 0.000      | 0.000        |



**LEAK DETECTION AND REPAIR (LDAR) PROGRAM**  
**VOC QUARTERLY REPORT : OCTOBER TO DECEMBER,2023**

**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                       | 29/11/2023         | 551                          | 10 to 26   | 1  | 2.877                       | 0.000                      |
| 2                             | DCU                       | 30/11/2023         | 1043                         | 27 to 58   | 2  | 4.314                       | 0.000                      |
| 3                             | CRU                       | 30/11/2023         | 272                          | 58 to 66   | 3  | 5.233                       | 0.000                      |
| 4                             | MSQU                      | 1/12/2023          | 1012                         | 67 to 97   | 5  | 4.974                       | 0.000                      |
| 5                             | HDTU                      | 1/12/2023          | 164                          | 97 to 102  | 3  | 3.067                       | 0.000                      |
| 6                             | HGU                       | 1/12/2023          | 165                          | 103 to 108 | 3  | 3.791                       | 0.000                      |
| 7                             | OM & S (CTF)              | 2/12/2023          | 174                          | 108 to 113 | 1  | 1.052                       | 0.000                      |
| 8                             | OM&S (PPH)                | 2/12/2023          | 1119                         | 113 to 147 | 2  | 2.212                       | 0.000                      |
| 9                             | SDU                       | 2/12/2023          | 336                          | 147 to 158 | 6  | 8.935                       | 0.000                      |
| 10                            | CRU off side Pump house   | 4/12/2023          | 267                          | 158 to 166 | 1  | 1.884                       | 0.000                      |
| 11                            | NEW TANK FARM             | 4/12/2023          | 587                          | 166 to 184 | 1  | 0.855                       | 0.000                      |
| 12                            | SDU (Off side Pump House) | 4/12/2023          | 120                          | 184 to 188 | 0  | 0.002                       | 0.000                      |
| <b>Total in Kg/day</b>        |                           |                    |                              |            |  | <b>39.20</b>                | <b>0.00</b>                |
| <b>Toatl in MT/Annum</b>      |                           |                    |                              |            |  | <b>14.307</b>               | <b>0.00</b>                |
| <b>Total Saving in kg/day</b> |                           |                    |                              |            |  |                             | <b>0.00</b>                |
| <b>Total in MT/Annum</b>      |                           |                    |                              |            |  |                             | <b>0.00</b>                |

**Verified by**

**Neelima Dalvi**  
**Technical Manager**

**Checked by**

**Shraddha Kere**  
**Quality Manager**

**CREP - Present Status of Digboi Refinery**

| <b>Sl No</b> | <b>Action Point</b>   | <b>Present Status of Digboi Refinery</b>  |
|--------------|---|---|
| 1.           | <p>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</p> | <p>For Effluent out of 21 parameters 9 Parameters i.e pH, oil and grease, BOD, COD, TSS, MLSS, Phenol, Sulphide &amp; Cyanide are tested in Digboi Refinery on daily basis. Report of these test are submitted to PCB, Assam regularly. Remaining tests are done by the Third Party<br/>Nitya laboratories<br/>43, sector -A1 Ext. Bhalla Enclave, channi Himmat, Jammu-180015, J&amp;K (UT), India</p> <p>Detailed up gradation study of ETP through M/s NEERI, Nagpur, was done in October 2014.</p> <p>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 &amp; Fire Water Network.</p> <p>During Oct'23 - Mar'24, 100% of treated effluent was reused.</p> |
| 2.           | <p>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 &amp; 100 mg/Nm<sup>3</sup> for FG and NG Respectively ) too stringent and retrofitting like ESP or installation of filters for fuel is not feasible.</p>   | <p>Emission of PM from furnace, boilers &amp; 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.</p>   |
|              | <p>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.</p>   | <p>As natural gas is the primary fuel used at Digboi Refinery, emissions of NO<sub>x</sub> from process units and Captive Power Plant is below the limit.</p> <p>Since the refinery is using natural gas, formation of NO<sub>x</sub> is very low and always remains within the prescribed limit. Further, low NO<sub>x</sub> burners are also fitted in all the new units viz. Solvent De-waxing Unit, Hydro-treater Unit, Delayed Coking Unit and MSQ Unit</p>  |

|   |   |  |
|---|---|--|
|   | <p>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 &amp; Oil analysis and emission data every month to HSE , RHQ for taking up with MoEF &amp; CC.</p> | <ul style="list-style-type: none"> <li>For firing, only fuel gas is used and no liquid fuels are in use.</li> <li>Emission of PM from stacks at Digboi refinery is within specified norms.</li> </ul>  |
|   | <p>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.</p>   | <p>Not applicable for Digboi Refinery.</p>   |
| 3 | <p>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.</p>  | <ol style="list-style-type: none"> <li>Bioremediation of 4500MT Oily sludge is in progress through M/s Innotech Interventions Private Limited, Guwahati. (3259 MT Bio remediation done)</li> <li>1<sup>st</sup> batch of 3000 MT of oily sludge sold to M/S Star Petrochem Industries via MSTC e-auction in March'22 (1332 MT uplifted)</li> <li>Another batch of 3000 MT of oily sludge sold to M/S Falk Industries Fuel Pvt. Ltd via MSTC e-auction on May'23 (53.65 MT uplifted)</li> </ol> |
| 4 | <p>Linking of CAAQMS &amp; 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.</p>  | <p>Online connectivity of Furnaces with heat capacity of 10mkcl/hr (HGU) established to CPCB Server.</p> <p>One no. of Continuous Ambient Air Quality Monitoring Station installed and commissioned in September 2012.</p>   |
| 5 | <p>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)</p>   | <p>Online effluent monitoring &amp; connectivity to CPCB server was commissioned on 28<sup>th</sup> December 2015.</p> <p>WebSite: <a href="http://Online Emission and Effluent Monitoring System (cpcb.gov.in)"><u>Online Emission and Effluent Monitoring System (cpcb.gov.in)</u></a></p>   |



|   |  |  |
|---|--|--|
| 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. | <ol style="list-style-type: none"> <li>1. For reduction of fugitive VOC emission from ETP, VOC reduction facility has been commissioned inside ETP on 04.12.2022.</li> <li>2. The CSS (Central Static Sump) inside refinery has already been covered.</li> </ol> |
| 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 followed. LDAR reports are being sent to MoEF & CC Bi-annually along with EC compliance report.   |
| 8 | Member Secretary expressed concern on non-reporting of incidents of fire, oil spills and pollution to CPCB. He advised all the Refineries to reporting of such incidents to CPCB of concerned area during such occurrence.   | No major oil spill has occurred till 31/03/2024.<br>Shall be ensured.  |

Place: Digboi

Date: 20.06.2024

Signature of the Authorized Person

Designation: GM( TS&HSE)

**डी.के. बरुवा / D.K. BARUA**

**जीएम (टीएस एवं एचएसई)**

**GM (TS & HSE)**

**आई.ओ.सी.एल. (एओडी), डिगबोई**

**I.O.C. LTD. (AOD), DIGBOI**



## Annexure 8

असम ऑयल डिवीजन  
Assam Oil Division

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



Ref: HSE/760/01/2024

Date: 03.04.2024

To

The Principal Chief Conservator of Forests (Wildlife) and Chief Wildlife Wardens, Assam  
Aranya Bhavan, Panjabari,  
Guwahati -781037.

**Sub:** Compliance Certificate against recommendation of SC, NBWL on the "Proposal for use of 63.95 ha of non-forest land from default Eco-Sensitive Zone about 3.6 Km from Dihing Patkai National Park for expansion of capacity Augmentation of Digboi Refinery to 1 MMTPA in favour of Indian Oil Corporation Ltd. Assam- **WL/AS/IND/429055/2023**" and regarding.

**Ref:** Principal Chief Conservator of Forests (Wildlife) and Chief Wildlife Warden letter No. **WL/FG.35/Diversification of Capacity Augmentation of Digboi to 1 MMTPA/Oil** dated 27.02.2024 (copy enclosed as Annexure-I)

Respected Sir,

With reference to the subject and letter cited above Digboi Refinery is pleased to submit the ATR on the recommendation by the Standing Committee, NBWL for the proposal.

| NBWL Recommendation  | Compliance Status   |
|--|---|
| 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. | <p>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.</p> <p>Under the new facility for mitigation of fire inside new Golai Tank farm near Digboi marketing terminal, 2(two) numbers of Fire water tanks with associated Fire Water pumps (2 no's of jockey, 1 motor driven and 2 diesel driven) has been considered to restrict hazard within Tank farm.</p> <p>Also, for mitigation of fire inside existing Refinery for the revamped facilities, 2(two) new fire water pumps 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</p> |

1 | Page

|  |  |
|--|--|
|  | <p>restrict the fire within boundary.</p> <p>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.</p>   |
| <p>At least 2% amount of the estimated cost of the project should be deposited as CORPUS fund to the Chief Wildlife Warden for Conservation of Wildlife &amp; Human Animal Conflict mitigation measures.</p>   | <p>An amount of Rs. 14.80 crore has been deposited as corpus fund to the Chief Wildlife Warden for Conservation of Wildlife &amp; Human Animal Conflict mitigation measures. The deposited corpus amount is 2% of the approved Digboi Refinery expansion project Cost (Rs. 740 Crore).</p> <p>NEFT UTR NO: SBIN524093816642-CHIEF WILDLIFE WARDEN<br/>TRANSACTION DATE: 02-04-2024<br/>(Payment receipt of Rs 14.80 Cr is enclosed as Annexure-II)</p>   |
| <p>The User Agency shall also implement the conservation plan submitted along with the project proposal.</p>   | <p>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.</p> <p>The Wildlife Conservation Plan (WCP) has been submitted to Divisional Forest Officer (DFO), Digboi for further actions.</p> <p>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.)</p> <p>Digboi Refinery shall ensure the implementation of the submitted conservation plan in consultation with the DFO, Digboi Division.</p> |
| <p>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.</p> | <p>Shall be duly complied.</p>   |

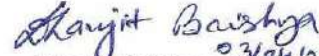




We humbly request your good office to kindly acknowledge the above submitted compliance status against the recommendations of the standing Committee, NBWL and grant the final approval for the Digboi Refinery 1MMTPA capacity Expansion Project.

Thanking You,

Yours faithfully,

  
Dhanjit Baishya 03/04/2024

Chief General Manager (TS & HSE)  
Digboi Refinery (Assam Oil Division)  
Indian Oil Corporation Limited

धनजित बैश्य/Dhanjit Baishya

मुख्य महाप्रबंधक (टीएस व एच, एस व ई)/CGM (TS&H, S&E)

आई.ओ.सी.एल. (एओडी)/I.O.C.L. (AOD)

डिगबोई /DIGBOI-786174

Enclosures: As above

**Copy for information:**

1. The Special Chief Secretary to the Govt, of Assam, Environment & Forest Department, Dispur, Guwahati-781006.
2. The Principal Chief Conservator of Forests & Head of Forest Force, Assam, Panjabari, Guwahati -781037.
3. The Deputy Director General of Forests, Regional Office, Ministry of Environment, Forest & Climate Change, 4th Floor, HOUSEFED, GS, Road Rukminigaon, Guwahati – 781022.
4. The Regional Officer-Scientist F, Integrated Regional Office, Ministry of Environment Forest and Climate Change, Guwahati-781022.
5. The Divisional Forest Officer(DFO), Digboi Division, Digboi



## GOVERNMENT OF ASSAM

OFFICE OF THE PRINCIPAL CHIEF CONSERVATOR OF FORESTS (WILDLIFE) AND  
CHIEF WILDLIFE WARDEN, ASSAM::PANJABARI::GUWAHATI-37Email Id : [pccf.wl.assam@gmail.com](mailto:pccf.wl.assam@gmail.com)

No. WL/FG.35/Diversion of Capacity Augmentation of Digboi to 1 MMTA/Oil Date:27.02.2024

To,

Chief Manager (HSE),  
IOCL Refinery, Digboi,  
Tinsukia, Assam-786171

**Sub:** Recommendation of SC, NBWL on the "Proposal for use of 63.95 ha of non-forest land from default Eco-Sensitive Zone about 3.6 Km from Dihing Patkai National Park for expansion of capacity Augmentation of Digboi Refinery to 1 MMTA in favour of Indian Oil Corporation Ltd. Assam- WL/AS/IND/429055/2023" and regarding.

**Ref:** Govt. of India, MoEF & CC (Wildlife Division)'s letter F.No. WL-6/41/2024 WL, dated.09.02.2024. (Copy enclosed)

Sir,

With reference to the subject and letter cited above, I would like to inform you that the above quoted project proposal was discussed in the 77<sup>th</sup> meeting of SC, NBWL held on 30.01.2024 and the SC has recommended the proposal subject to the following conditions:

1. 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.
2. At least 2% amount of the estimated cost of the project should be deposited as CORPUS fund to the Chief Wildlife Warden for Conservation of Wildlife & Human Animal Conflict mitigation measures.
3. The User Agency shall also implement the conservation plan submitted along with the project proposal.
4. 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.

Therefore, it is requested kindly to deposit 2% amount of the estimated cost of the project (at current price level) as CORPUS Fund to the Chief Wildlife Warden as per the condition laid by the SC, NBWL (condition SI.No.2) at an early date. The details of the bank account are given below. Further, it is requested to please comply with the rest of the conditions as recommended by the SC, NBWL during its 77<sup>th</sup> meeting.

**Bank Name & Branch:** Union Bank of India, Panbazar, Guwahati-781001  
**Account No.:** 520141001521639  
**IFSC Code:** UBIN0908746

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

Encl: As stated above.

Yours faithfully,

**Sandeep  
Kumar**

Digitally signed by  
Sandeep Kumar  
Date: 2024.02.27  
14:31:03 +05'30'

(Sandeep Kumar, IFS),  
Principal Chief Conservator of Forests,  
Wildlife & Chief Wildlife Warden, Assam

Copy to Divisional Forest Officer, Digboi Division, Digboi for his information and necessary action.

**Sandeep  
Kumar**  
Principal Chief Conservator of Forests,  
Wildlife & Chief Wildlife Warden, Assam

Digitally signed by  
Sandeep Kumar  
Date: 2024.02.27  
14:31:31 +05'30'

Copy for information:

1. Spl. Chief Secretary to the Govt. of Assam, Environment & Forest Department, Dispur, Guwahati-06.
2. Principal Chief Conservator of Forests & Head of Forest Force, Assam, Panjabari, Guwahati-37.

**Sandeep  
Kumar**  
Principal Chief Conservator of Forests,  
Wildlife & Chief Wildlife Warden, Assam

Digitally signed by  
Sandeep Kumar  
Date: 2024.02.27  
14:31:44 +05'30'



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)<br>INDIAN OIL CORPORATION   |   |   |             |                 |        |         |
| Name              | : | LIMITED  |   |   |             |                 |        |         |
| Currency          | : | INR  |   |   |             |                 |        |         |
| Corporate Address | : | INDIAN OIL BHAVAN G-9 ALI YAVAR JUNG<br>MARG<br>BANDRA (EAST) MUMBAI<br>MUMBAI  <br>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<br>NO: SBIN524093816642--<br>CHIEF WILDLIFE WARDEN | TRANSFER TO<br>4697160044302 / CHIEF<br>WILDLIFE WARDEN | 6000        | 14,80,00,000.00 |        |         |



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

Ph.No.03751-264433

E-mail: [dfodigboi@gmail.com](mailto: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.

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

## **CONSERVATION PLAN FOR SCHEDULE - I SPECIES**

The Conservation Plan would focus 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 groups 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 covered under Schedule-I category of Indian Wildlife Protection Act 1972.

**Table 10.6 Listing of Schedule I species in the study area**

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

#### 10.11.1 Step 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            | <b>Direct &amp; Indirect involvement of IOCL</b>  | <b>Amount in lakhs</b>             |            |            |             |
| 1.           | To associate with forest department, and other agencies for effective implementation of conservation programme      | 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         |
| <b>Total</b> |   | <b>6.5</b>                         | <b>6.5</b> | <b>7.0</b> | <b>20.0</b> |

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.





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

Ph.No.03751-264433

E-mail: [dfodigboi@gmail.com](mailto:dfodigboi@gmail.com)

Letter No. A/G-8 (a)/Diversion Proposal/2023/1239

Dated:10/05/2023

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Enclo :- Conservation Plan.

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

Memo No. B/G-8 (a)/Diversion/2023/1328

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#### Financial Outlay

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| Sr. No.      | Activity  | Years from commencement of project |            |            |             |
|--------------|---|------------------------------------|------------|------------|-------------|
|              |   | I                                  | II         | III        | Total       |
| I            | <b>Direct &amp; Indirect involvement of IOCL</b>  | <b>Amount in lakhs</b>             |            |            |             |
| 1.           | To associate with forest department, and other agencies for effective implementation of conservation programme      | 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         |
| <b>Total</b> |   | <b>6.5</b>                         | <b>6.5</b> | <b>7.0</b> | <b>20.0</b> |

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.

# আমাৰ অসম

৬ জানুৱাৰী, ২০২৪ শনিবাৰ, যোৰহাট

|   |  |   |
|---|--|---|
|    | <b>ইণ্ডিয়ান অইল কৰ্পোৰেচন লিমিটেড</b><br>(অসম অইল সন্মণ্ডল) |  |
| 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 পৰিৱৰ্তন 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 প্রদান কৰিছে। |  |   |
| ক্লিমাৰেঞ্চ লেটাৰৰ প্রতিলিপি এছপিচিবি/ কমিটিৰ ওচৰত উপলব্ধ আৰু মন্ত্ৰালয়ৰ ৱেবছাইট আৰু <a href="https://parivesh.nic.in/">https://parivesh.nic.in/</a> তও চাব পাৰিব।   |  |   |

THE ASSAM TRIBUNE, DIBRUGARH

SATURDAY, JANUARY 6, 2024

|  |  |  |
|--|--|--|
|    | <b>Indian Oil Corporation Ltd.</b><br>(Assam Oil Division) |  |
| Digboi Refinery, P.O.: Digboi, Dist.: Tinsukia, PIN: 786171  |  |  |
| <b>NOTICE REGARDING ENVIRONMENTAL CLEARANCE ACCORDED TO IOCL, DIGBOI REFINERY FOR CAPACITY AUGMENTATION to 1.0 MMTPA</b>   |  |  |
| 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 <a href="https://parivesh.nic.in/">https://parivesh.nic.in/</a> . |  |  |



**DIGBOI REFINERY**

INDIAN OIL CORPORATION LIMITED

**BIO-MONITORING SURVEY OF  
AQUATIC LIFE IN LOTIC AND LENTIC  
WATER BODIES IN AND AROUND  
DIGBOI REFINERY:2024**

*Conducted By:*



**ABNS SCIENTIFIC SERVICES**

Guwahati-781011, Assam; [www.abnsscientific.com](http://www.abnsscientific.com)

## **PREFACE**

*This survey is done for Bio-Monitoring of Aquatic Life in Lotic and Lentic Water Bodies in and around Digboi Refinery in the month of Februarury, 2024 covering eleven locations.*

## List of Contents

| <b><i>Sl no</i></b> | <b><i>Content</i></b>                                       | <b><i>Page no</i></b> |
|---------------------|---|-----------------------|
| <i>1</i>            | <i>Introduction</i>   | <i>5</i>              |
| <i>2</i>            | <i>Types of biological assessment</i>                       | <i>8</i>              |
| <i>3</i>            | <i>Site selection</i>                                       | <i>9</i>              |
| <i>4</i>            | <i>Aquatic organisms used in bio-monitoring</i>             | <i>10</i>             |
| <i>5</i>            | <i>Pollution tolerant index (PTI)</i>                       | <i>13</i>             |
| <i>6</i>            | <i>Study of plankton composition</i>                        | <i>17</i>             |
| <i>7</i>            | <i>Shannon wiener diversity index (SWDI)</i>                | <i>18</i>             |
| <i>8</i>            | <i>Fish fauna in lotic and lentic water bodies</i>          | <i>20</i>             |
| <i>9</i>            | <i>Identification of macroinvertebrates</i>                 | <i>26</i>             |
| <i>10</i>           | <i>Biological monitoring working party (BMWP) score</i>     | <i>27</i>             |
|                     | <i>Results and discussion</i>                               | <i>29</i>             |
| <i>11</i>           | <i>Analysis of results</i>                                  | <i>29</i>             |
| <i>12</i>           | <i>Discussion of the results</i>                            | <i>32</i>             |
| <i>13</i>           | <i>Physico-chemical study</i>                               | <i>35</i>             |
| <i>16</i>           | <i>Conclusion</i>   | <i>39</i>             |
| <i>17</i>           | <i>Annexure: Pollution Tolerant Index (PTI) Field Sheet</i> | <i>43</i>             |



## List of Table

| <b><i>Sl No</i></b> | <b><i>Tables</i></b>   | <b><i>Page No</i></b> |
|---------------------|--|-----------------------|
| <i>1</i>            | <i>List of areas of Study area</i>   | <i>10</i>             |
| <i>2</i>            | <i>Organisms used in Bio-monitoring and their Advantages and Disadvantages</i> | <i>12</i>             |
| <i>3</i>            | <i>Zooplankton and Phytoplankton found in the present study</i>                | <i>18</i>             |
| <i>4</i>            | <i>Fish species recorded from Digboi River</i>                                 | <i>21</i>             |
| <i>5</i>            | <i>Criteria for Biological Water Quality Evaluation</i>                        | <i>24</i>             |
| <i>6</i>            | <i>Range of Saprobic Score</i>   | <i>26</i>             |
| <i>7</i>            | <i>BMWP score system adopted by CPCB</i>                                       | <i>28</i>             |
| <i>8</i>            | <i>Physico-chemical analysis of surface water</i>                              | <i>38</i>             |

## List of Figure

| <b><i>Sl No</i></b> | <b><i>Figures</i></b>   | <b><i>Page No</i></b> |
|---------------------|---|-----------------------|
| <i>1</i>            | <i>GPS map showing the sampling sites.</i>  | <i>11</i>             |
| <i>2</i>            | <i>Macro-invertebrate grouping as per standard for collection of sample</i>         | <i>17</i>             |
| <i>3</i>            | <i>Some species of Fish found in the present study area which are listed above.</i> | <i>21</i>             |
| <i>4</i>            | <i>Collection of Macro-invertebrates in the present study.</i>                      | <i>25</i>             |
| <i>5</i>            | <i>Some of Macro-invertibrates found in present study.</i>                          | <i>28</i>             |

# **BIO-MONITORING SURVEY OF AQUATIC LIFE IN LOTIC AND LENTIC WATER BODIES IN AND AROUND DIGBOI REFINERY**

## **Introduction:**

Freshwater resources play a pivotal role in sustaining life and meeting various domestic, agricultural, economic, and industrial demands. As such, there is a significant need to monitor the water quality of these resources. Water quality index (WQI) models have gradually gained popularity since their maiden introduction in the 1960s for evaluating and classifying the water quality of aquatic ecosystems. WQIs transform complex water quality data into a single dimensionless number to enable accessible communication of the water quality status of water resource ecosystems

This research will employ various methodologies, including habitat assessment, species identification, and biometric analysis. The data collected will serve as a baseline for future monitoring efforts and contribute to the ongoing efforts to ensure the sustainable development of the Digboi Refinery and the preservation of its surrounding aquatic ecosystems.

Bio-monitoring or bio-assessment is one of such effect parameters used to determine the impact of pollutants on aquatic life mainly of surface water bodies. Analysis of physio-chemical parameters has some limitations. Firstly, the water especially wastewaters are highly complex in nature and may contain thousands of chemicals, many of which may be present in such a low concentration that they may be beyond detection limit of existing analytical techniques and for many of them even the analytical techniques are inadequate. Moreover, the impact of these chemicals individually and in combination, on biological system varies significantly. Further, many of these chemicals and by-products are present as trace pollutants they may still be harmful even in low concentrations. To overcome these problems, application of summery parameters which are generally affect parameters are increasing during the recent past to assess the status of aquatic water bodies. Bio-monitoring as a summary parameter sums all the effects of cause parameters in an easy to measure parameters.

Digboi is a town and a town area committee in Tinsukia district in the north-eastern part of the state of Assam, India. Crude oil was discovered here in late 19th century and first oil well was dug in 1866. Digboi is known as the Oil City of Assam where the first oil well in Asia was drilled. The first refinery was started here as early as 1901. Digboi has the oldest oil well in

operation. With a significant number of British professionals working for Assam Oil Company until the decade following independence of India, Digboi had a well-developed infrastructure and a number of bungalows unique to the town. It has eighteen holes golf course as part of the Digboi Club. It has guest houses and tourist residential apartments laid on Italian architectural plan to promote tourism in upper Assam. It is said that the town gets its name from the phrase "dig-boy-dig," which is what the English and Canadian miners told the labourers as they dug for crude oil. It is said that Canadians first noticed oil on the feet of elephants. That's how oil was discovered here. The town's history begins in 1867 when a small group of men from the Assam Railway and Trading Co. found their elephants' legs soaked in black mud, which smelled somewhat like oil. The men began exploring more, and in 1889, the English started a small oil installation. India (and Asia) obtained its first refinery in Digboi in the year 1901. Assam Oil Company was formed in 1899 to look after the running of the oil business in this area. The Digboi oil field produced close to 7,000 barrels per day ( $1,100 \text{ m}^3/\text{d}$ ) of crude oil at its peak, which was during World War II. The field was pushed to produce the maximum amount of oil with little regard to reservoir management; as a result, production started to drop almost immediately after the war. The current production from the Digboi fields is about 240 barrels per day ( $38 \text{ m}^3/\text{d}$ ). Over 1,000 wells have been drilled at Digboi – the first well in 1889 had stuck oil at 178 feet (54 m). In 1989, the Department of Posts, India came out with a stamp commemorating 100 years of the Digboi fields.

Today, though the crude production is not high, Digboi has the distinction of being India's oldest continuously producing oilfield. Digboi refinery, now a division of Indian Oil Corporation, had a capacity of about 0.65 million tonnes per year as of 2003.

Bio monitoring is the main tool to determine river water quality or condition and instant insights into changes in river water and habitat. Traditionally, invertebrates and fish received good quality of attention in the study of running water ecosystems; in particular relationships between macro invertebrate community structures and environmental variables have been the subject of numerous investigations. Evaluating changes in genetic composition of specific populations, bioaccumulation of toxins and related occurrence of morphological deformities, changes in community composition and ecosystem functioning.

Living organism observation of river water provides an integrated approach to assess the overall environmental quality of aquatic ecosystem and it have been become one of the most common method for reliable assessment of anthropogenic impacts on aquatic ecosystem, which are also a complementary tool to the alternative method of physico-chemical characteristics of water quality. There has been enormous advancement in bio-monitoring methods and a variety of



indices have been developed for the purpose of water quality assessment. Bio-monitoring of river water with the help of macro-invertebrates has gained wide acceptance since the beginning of the twentieth century and the method has been tested reliably in both temperate and tropical aquatic ecosystems. It underlies the assumptions that any modifications/alteration in the aquatic process would most likely to be manifested in qualitative and quantitative changes in macro invertebrate assemblages.

Most advanced techniques for pollution monitoring in river water involves the use of pollution-sensitive insects, especially benthic macro invertebrates as biological indicators or “sentinels”. Since benthic aquatic insects are sensitive indicators of environmental changes they can be employed to indicate long-term changes in water and habitat quality rather than instantaneous conditions.

Bio-monitoring or bio-assessment is one of that parameters/tolls widely used to determine the impact of pollutants on aquatic life mainly of surface water bodies. To overcome the problems of physico-chemical analysis, application of summary parameters which are generally effect parameters are increasing during the recent past to assess the status of aquatic water bodies. Bio-monitoring as a summary parameter sums all the effects of cause parameters in an easy to measure parameters.

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## Types of biological assessment

Bio monitoring for aquatic field uses various methodologies to study the behaviour of river quality which are detailed below:

- **Ecosystem study** – The Ecosystem study relates to the study of biotic organism living in physical habitat along with study of population of various groups of organism.
- **Measurement of primary production** – The most popular method used for measurement of primary production of a water body is the measurement of Oxygen production and its consumption through dark and light bottle experiment and chlorophyll estimation.
- **Observation of behavioural changes** - Changes in the behaviour of aquatic organisms have to observe which includes feeding and predatory behaviour, locomotor behaviour, reproductive behaviour etc.
- **Assessment of morphological and physiological changes** - These changes include physical appearance, deformities in various body parts and their abnormal functioning e.g. operculum movements, opening and closing of valves in Molluscs, growth inhibition etc.
- **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** –Bio-accumulation study contains certain chemicals that are taken up by organisms through the entire body surface (as occurs in many annelids and simple plants) or through specific surfaces such as the gill membranes of fish. These chemicals/toxicants may tend to be retained by organisms in concentrations that exceed ambient levels.

Bio-magnification is another type of bio-accumulation. Consumers at successive trophic levels in the food pyramid feed on populations much larger than their own. Therefore, any material that is retained in individuals at lower trophic levels may be further concentrated near the top of the food pyramid. The study of these two parameters is being used to have an idea accumulation of toxicants in food chain components at levels high enough to exert a toxic effect.

Among these methods, Bio-assessment are widely used to study of biotic community and population of different organisms because in an ecosystem all groups of organisms are interdependent on each other, any impact on one group of organisms affects the entire ecosystem. Population also possess genetic characteristics related to their ecology e.g. adaptability, fitness,

persistence etc. The ecosystem study can also be used to detect slow changes in the ecosystem both structural and functional.

### Site Selection:

Selecting sites for bio-monitoring in both Lotic (running water) and Lentic (standing or slow-moving water) water bodies involves careful consideration of several factors to ensure accurate and meaningful data collection. Some steps to guide the selection process are -- assessing water quality, tracking pollutant levels, or monitoring the health of aquatic ecosystems. This will help in selecting appropriate indicators and sites.

After analysing the water samples from the preliminary assessment sites for the key water quality parameters, such as pH, dissolved oxygen, temperature, turbidity, and nutrient levels for the quality of the river water, sites with poor water quality should be identified for bio-monitoring. It is required to choose appropriate bio-indicators based on the study objectives, water quality parameters, and the type of water body (Lotic or Lentic). For example, macroinvertebrates, algae, fish, and aquatic plants can be used as bio-indicators for water quality assessment.

Based on above criteria & requirements and after discussing the condition with Digboi refinery authorities' samples are collected from the following sites for Physio-chemical and Bio monitoring analysis covered in the present study:

Table 1 List of areas of Study area:

| S/N | Sampling Site                                 | Site Code |
|-----|---|-----------|
| 1   | Dihing - Margherita                           | Site-1    |
| 2   | Dihing - Makum                                | Site-2    |
| 3   | Dihing - Mirika                               | Site-3    |
| 4   | Dihing - Gammon bridge                        | Site-4    |
| 5   | Dihing mukh                                   | Site-5    |
| 6   | Digboi river - Kenduguri                      | Site-6    |
| 7   | Digboi river - 15 KM pt                       | Site-7    |
| 8   | Digboi river - 26 KM pt                       | Site-8    |
| 9   | Dihing - before confluence with Digboi river: | Site-9    |
| 10  | Dihing - after confluence with Digboi river   | Site-10   |
| 11  | Digboi Sanitary Park River (Durgapukhuri)     | Site-11   |



The GPS map present below shows the sample collection locations...

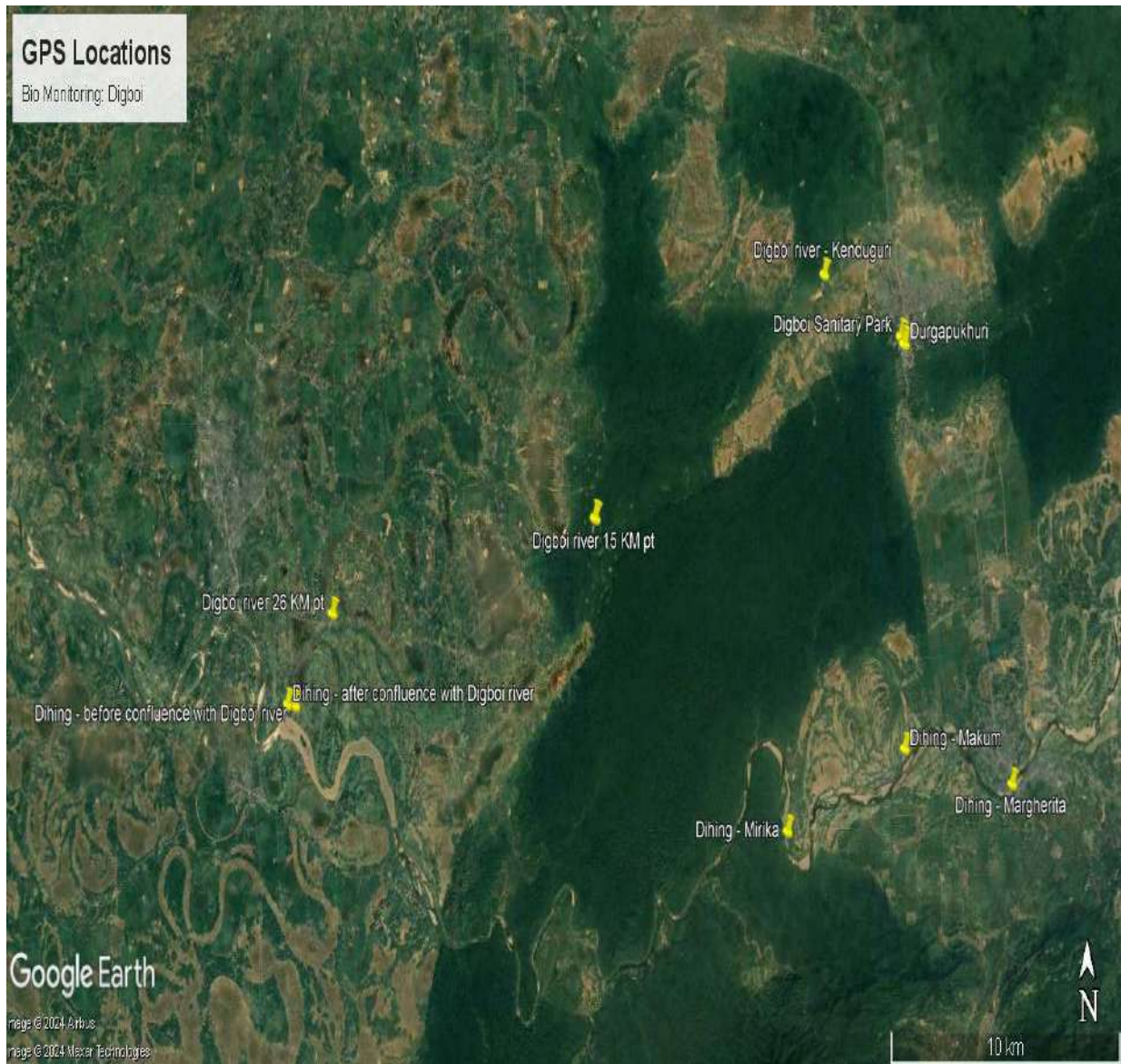


Fig 1: GPS map showing the sampling sites.

### **Aquatic organisms used in Bio-monitoring**

Several groups of organisms are being used for bio-monitoring and belongs to various trophic levels of food chain. Decomposers include bacteria and protozoa, producers include phytoplankton and aquatic plants, herbivores consist zooplanktons, crustaceans etc., lower level carnivores comprise worms, insects, molluscs, small fishes etc. whereas, top level carnivores are large sized fishes, reptiles etc. The advantages and disadvantages of various groups of organisms in bio-assessment are summarised in Table 1.

**Table.2: Organisms used in Bio-monitoring and their Advantages and Disadvantages**

| <b>Group of Organisms</b>  | <b>Advantages</b>   | <b>Disadvantages</b>   |
|----------------------------|---|--|
| Bacteria                   | <ul style="list-style-type: none"> <li>• Well-developed methodology for regular assessment.</li> <li>• Collection is easy.</li> <li>• Rapid response to changes, including pollution.</li> <li>• Good indicators of faecal contamination.</li> </ul>  | <ul style="list-style-type: none"> <li>• Cells may not have originated from sampling point.</li> <li>• Populations recover rapidly from intermittent pollution.</li> <li>• Expertise and specific infrastructure is required for analysis.</li> </ul>    |
| Protozoa                   | <ul style="list-style-type: none"> <li>• Saprobic values well known.</li> <li>• Collection is easy.</li> <li>• Rapid responses to changes.</li> </ul>   | <ul style="list-style-type: none"> <li>• Taxonomic expertise is required.</li> <li>• Cells may not have originated from sampling point.</li> <li>• Indicator species of impacts often present in normal environments also.</li> </ul>                    |
| Planktons                  | <ul style="list-style-type: none"> <li>• Can tolerate pollution stress.</li> <li>• Good indicators of pollutants.</li> <li>• Good taxonomic keys are available for identification.</li> </ul>   | <ul style="list-style-type: none"> <li>• Taxonomic expertise required.</li> <li>• Not very useful for severe organic pollution.</li> <li>• Sampling and enumeration problems with certain groups.</li> <li>• Not good for lotic environment</li> </ul>   |
| <b>Macro-invertebrates</b> | <ul style="list-style-type: none"> <li>• Present in abundant numbers and belongs to diverse groups.</li> <li>• Many invertebrates are sedentary and are unable to avoid the effects of pollutants due to limited mobility.</li> <li>• Waterbodies that often do not support organisms of higher level of food chain but support macroinvertebrate communities.</li> <li>• Good indicators of pollution especially organic pollution.</li> </ul> | <ul style="list-style-type: none"> <li>• Sampling procedure is time consuming.</li> <li>• Quantitative sampling is difficult.</li> <li>• Occurrence is less in fast moving waters.</li> <li>• Require taxonomic expertise for identification.</li> </ul> |

|             |  |   |
|-------------|--|---|
|             | <ul style="list-style-type: none"> <li>• Small size facilitates easy collection and identification.</li> <li>• Requires less sampling devices.</li> <li>• Good taxonomic keys are available for macroinvertebrates identification.</li> <li>• Reappears quickly when conditions become favourable.</li> </ul>                                |   |
| Macrophytes | <ul style="list-style-type: none"> <li>• Species usually attached, easy to observe and identify.</li> <li>• Good indicators of suspended solids and nutrient enrichment.</li> </ul>  | <ul style="list-style-type: none"> <li>• Responses to pollution not well documented.</li> <li>• Often tolerant to intermittent pollution.</li> <li>• Mostly seasonal occurrence.</li> </ul> |
| Fishes      | <ul style="list-style-type: none"> <li>• Easy collection.</li> <li>• Effect of impact can easily be accessed through behavioural, physiological, morphological effects etc.</li> <li>• Can be used for measurement of long and short term effects.</li> <li>• Can indicate food chain effects.</li> <li>• Identification is easy.</li> </ul> | <ul style="list-style-type: none"> <li>• Able to migrate to avoid pollution.</li> </ul>   |

From the above groups of organisms, **macro-invertebrates** are commonly used for bio-monitoring and are used worldwide because of more advantages. Further, more ecological information available for their taxonomic groups and in bio-monitoring, taxonomic richness and composition characterization of macro-invertebrates are being used. Taxonomic identification of macro-invertebrates is done up to family level.

The samples from the above sites are being collected for general physico-chemical and Bio-monitoring Characterization for review of water quality of Digboi river.



Benthic Macro-invertebrates comprising of lower aquatic organisms mostly of insect larvae, which are regarded as the prominent indicators of water quality and aquatic ecosystem health, were sampled from a total of 11 locations in the catchment of the Digboi River, Digboi, Assam during February, 2024. A semi-quantitative sampling of aquatic macro-fauna was performed by employing a 'D-frame' aquatic dip net having mesh size of 200 microns. In general, the benthic macro-invertebrates were collected by vigorously churning the running water in the stream bed immediately above the location where the hand held net was placed at the bottom vertically by its long handle so as to kick and dislodge the bottom substrata such as pebbles, broken logs, foliages, etc., into the net. In case of pools, the net was towed along the bottom as well as vegetated margins. The dislodged organisms along with the debris carried by the running water to the net were then transferred into a sorting tray and after initial sorting; the samples were preserved in 70% ethyl alcohol in the field and later sorted and identified up to the maximum lowest taxonomic level possible under stereo-zoom microscope in the laboratory following standard identification manuals. Wherever possible, different kinds of habitats such as pools, riffles and cascades in a location were sampled preferably in duplicate to get a uniform representation of the aquatic fauna. This short-term study employing macro-invertebrates as indicators for monitoring streams, lower resolution identification especially at the family level is considered rather than species level, since most studies of a similar nature have recommended family level identification as the best resolution for resolving patterns in macro-invertebrate assemblages as well as assigning the most appropriate tolerance value for calculating the water quality index.

The species inhabiting bottom of the river play an rich productivity. The species inhabiting bottom of the river play an important role in converting organic matter into biomass which in turn is consumed by fishes. important role in converting organic matter into biomass which in turn is consumed by fishes.

### **Pollution Tolerant Index (PTI)**

The Pollution Tolerance Index (PTI) is currently the most used technique to monitor the pollution level of a river. The PTI is based on the technique of indicator organisms and their tolerance levels to the pollution. The procedures are designed to be done quickly and easily; they provide a rapid means of sampling riffle and other shallow areas to detect moderate to severe stream quality degradation. The advantages of the PTI are that it provides a relatively rapid means of assessing stream quality, it is useful in developing an information base, and it develops concepts

of tolerance ranges of organisms. They are then divided into three groups based on their tolerance for pollution. Each of the three groups is given an index value, with the least tolerant group having the highest value. The general abundance of each kind of organism is also noted and factored into the index.

**Procedure:**

1. For sampling for PTI, representative sampling area of 1-meter by 1-meter riffle or shallow area is selected and sampling is done by using the kick screen method.
2. Three samples (each 1m x 1m) must be taken at each site to make real representative samples. Samples may also be taken from different microhabitats at the site, such as rocks, in slow-moving water, or near banks; different organisms may be found in these microhabitats.
3. Samples are then stored in containers filled with 70 percent alcohol solution for later identification. The clinging organisms from the kick net should also be collected.
4. Using the attached data sheet, record the number and kind of each organism collected in the kick samples. Data from the three trials may be pooled on this data sheet.
5. After all organisms have been recorded, assign each type of organism an abundance code as follows: R (Rare) = 1 to 9 organisms found in the sample C (Common) = 10 to 99 organisms found in the sample D (Dominant) = 100 or more organisms found in the sample Record the code next to the actual count on the data sheet.
6. Note that the data sheet divides the macroinvertebrates into three groups based on their ability to tolerate pollution. The three tolerance groups are:

Group I – Organisms that are Intolerant to pollution and are typically found in good quality water.

Group II – Organisms that are moderately intolerant to pollution and are typically found in fair quality water.

Group III – Organisms that are Fairly tolerant of pollution and are typically found in poor quality water.

Group IV-- Organisms that are Very tolerant of pollution and are typically found in polluted water.

7. By using the data sheet to calculate the stream water quality rating.

Aquatic macroinvertebrates are good indicators of stream quality because: They are affected by the physical, chemical, and biological conditions of the stream.

The use of benthic macroinvertebrates to ascertain the overall health status of aquatic environments remains the most suitable, reliable, and the most widely acclaimed method globally. Macro benthic invertebrates are useful bio-indicators in understanding the ecological health of an aquatic ecosystem,

Tolerance levels refer to the amount of pollution the organisms can handle before dying or moving to another habitat.

In this study, we attempt to define pollution tolerance index (PTI) as a method of measuring the overall health status of aquatic bodies through the use of macro benthic invertebrates.

**Macroinvertebrates have different levels of tolerance for low water quality.**

Group 1 invertebrates – Intolerant of pollution

Group 2 Invertebrates – Moderately intolerant.

Group 3 Invertebrates – Fairly tolerant.

Group 4 Invertebrates – Very tolerant.

PTI Rating:

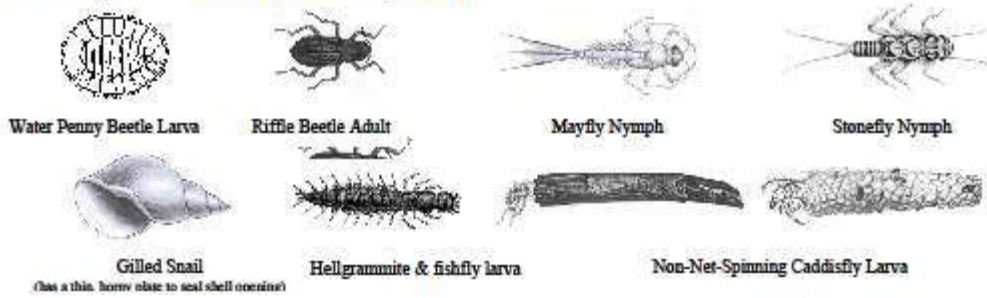
|            |           |
|------------|-----------|
| 23 or more | Excellent |
| 17-22      | Good      |
| 11-16      | Fair      |
| 10 or less | Poor      |



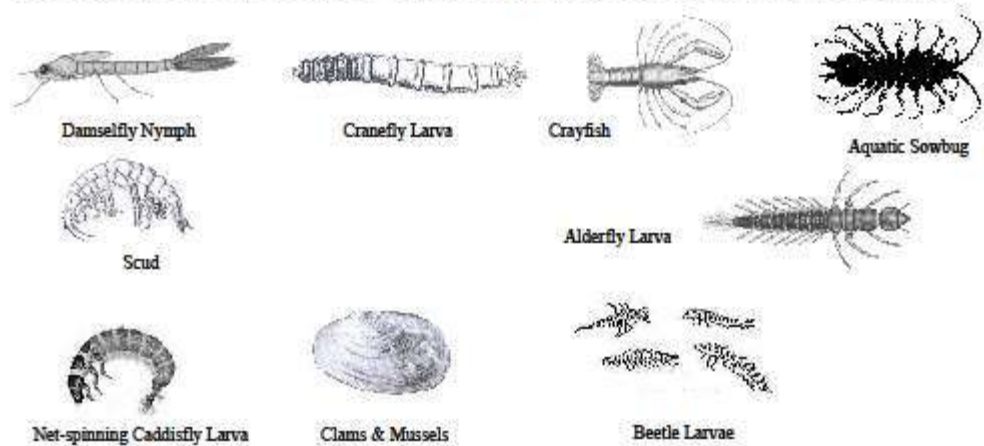
## Macroinvertebrates Grouped by Level of Pollution Tolerance

(Adapted from EASI and the Senior Environmental Corps, *Volunteer Water Quality Monitoring Field Manual*  
Images from McCafferty, *Aquatic Entomology*, 1981 AND Kallogg, *Monitor's Guide to Aquatic Macroinvertebrates*, 1994.)

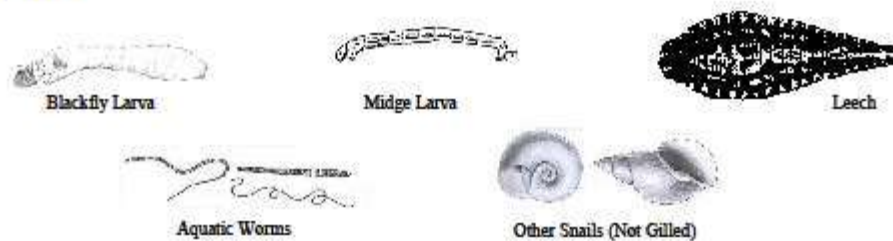
**Group I: Generally sensitive to pollution. Large numbers of these types of organisms normally indicate GOOD WATER QUALITY.**



**Group II: Can exist under a wide range of water quality conditions. Large numbers of these organisms, in the absence of Group I organisms, normally indicate MODERATE**



**Group III: Generally tolerant of pollution. Large numbers of these types of organisms normally, in the absence of Group I and Group II organisms, indicate POOR WATER QUALITY.**



NOTE: These organisms are the only macroinvertebrates used to calculate the PTL. Other organisms will be found; to identify them, refer to other macroinvertebrate identification sheets in this section of the handbook.

Creek Connections Aquatic Macroinvertebrates Module – PTL Bag of Bugs

Fig 2: Macro-invertebrate grouping as per standard for collection of sample

### Study of plankton composition:

Planktons are an important constituent of the wetland ecology and may serve as an indicator of altering water quality. Aquatic plants and animals can find a suitable habitat in the aquatic environment. Zooplankton mostly obtains its nutrition from phytoplankton, an ecosystem producer. Most fish larvae and other plankton-eating fishes feed primarily on zooplankton species. All aquatic ecosystems' dynamics revolve around primary productivity, which sustains various food chains and food webs. The contamination of water bodies by various anthropogenic activities have put pressure on river ecosystems. Algae is an ecologically important group in most aquatic ecosystems and have been an important component of biological monitoring programs. Algae are ideally suited for water quality assessment because they have rapid reproduction rates and very short life cycles, making them valuable indicators of short-term impacts. Algal assemblages are typically species rich, and algal species exhibit wider distributions among ecosystems and geographical regions. As primary producers, algae are most directly affected by physical and chemical factors. Algal assemblages are sensitive to some pollutants and they readily accumulate pollutants, and algal metabolism is also sensitive to the variation of environmental and natural disturbances.

Most plants and animals struggle to survive in polluted environments, but those that can handle the stress of pollution on their own may be able to. These creatures can serve as pollution indicators, or more particularly, as bioindicators of the ecosystem's trophic condition.

In this Biomonitoring survey, phytoplankton and zooplankton communities were evaluated at eleven different locations.

Table 3: Zooplankton and Phytoplankton found in the present study

|   | SPECIES                     | S-1 | S-2 | S-3 | S-4 | S-5 | S-6 | S-7 | S-8 | S-9 | S-10 | S-11 |
|---|-----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| 1 | <b>ZOOPLANKTON (/lit)</b>   |     |     |     |     |     |     |     |     |     |      |      |
| a | Rotifera                    | 42  | 62  | 56  | 89  | 34  | 56  | 0   | 39  | 66  | 38   | 12   |
| b | Rhizopoda                   | 09  | 56  | 23  | 29  | 0   | 21  | 51  | 18  | 0   | 12   | 0    |
| c | Cladocera                   | 08  | 22  | 0   | 15  | 18  | 15  | 0   | 06  | 18  | 09   | 02   |
| d | Copepoda                    | 0   | 06  | 19  | 05  | 0   | 0   | 12  | 0   | 0   | 03   | 01   |
| e | Ostracoda                   | 0   | 4   | 1   | 0   | 2   | 1   | 0   | 1   | 2   | 0    | 0    |
| 2 | <b>PHYTOPLANKTON (/lit)</b> |     |     |     |     |     |     |     |     |     |      |      |
| a | Synedra                     | 6   | 0   | 0   | 22  | 0   | 102 | 98  | 62  | 54  | 2    | 0    |
| b | Phormidium                  | 0   | 0   | 0   | 79  | 0   | 0   | 34  | 0   | 0   | 42   | 0    |
| c | Oscillatoria                | 0   | 0   | 68  | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 0    |
| d | Zygnema                     | 20  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 0    |

|   |                |    |     |    |    |     |    |    |     |    |   |   |
|---|----------------|----|-----|----|----|-----|----|----|-----|----|---|---|
| e | Closteridium   | 0  | 0   | 0  | 20 | 0   | 70 | 66 | 0   | 0  | 8 | 1 |
| f | Cladophora     | 32 | 94  | 0  | 0  | 65  | 0  | 12 | 0   | 0  | 0 | 0 |
| g | Desmium        | 0  | 0   | 1  | 0  | 0   | 44 | 0  | 0   | 0  | 0 | 0 |
| h | Anabaena       | 0  | 1   | 0  | 0  | 30  | 0  | 0  | 30  | 30 | 0 | 0 |
| i | Phormidium     | 62 | 0   | 90 | 0  | 78  | 47 | 55 | 170 | 46 | 0 | 0 |
| j | Spirogyra      | 0  | 66  | 0  | 0  | 89  | 0  | 0  | 71  | 71 | 0 | 0 |
| k | Cladophora     | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0 | 0 |
| l | Navicula       | 0  | 0   | 0  | 0  | 89  | 38 | 0  | 0   | 0  | 0 | 0 |
| m | Fragilaria     | 0  | 410 | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0 | 0 |
| n | Ulothrix       | 0  | 0   | 0  | 41 | 228 | 0  | 24 | 0   | 0  | 0 | 0 |
| o | Microcoleus    | 0  | 0   | 18 | 0  | 0   | 0  | 2  | 0   | 0  | 0 | 0 |
| p | Hildenbrandia  | 48 | 48  | 0  | 0  | 326 | 59 | 0  | 0   | 0  | 0 | 0 |
| 3 | <b>BENTHOS</b> |    |     |    |    |     |    |    |     |    |   |   |
| a | amphipoda      | 0  | 1   | 1  | 0  | 10  | 6  | 1  | 2   | 2  | 3 | 0 |
| b | insecta        | 0  | 3   | 0  | 4  | 0   | 0  | 0  | 0   | 0  | 0 | 0 |
| c | gastropoda     | 2  | 0   | 12 | 1  | 5   | 3  | 0  | 1   | 2  | 1 | 0 |
| d | cladocera      | 0  | 0   | 2  | 0  | 0   | 3  | 1  | 0   | 0  | 2 | 0 |
| e | calanoida      | 0  | 0   | 0  | 3  | 0   | 2  | 0  | 1   | 0  | 0 | 0 |
| f | harpacticoida  | 1  | 0   | 0  | 1  | 0   | 2  | 0  | 3   | 6  | 2 | 0 |
| g | cyclopoida     | 0  | 0   | 2  | 0  | 9   | 4  | 0  | 1   | 1  | 0 | 0 |

In general, Phytoplankton Synedra, Phormidium, Oscillatoria, Zygnema, Closteridium, Cladophora, Desmium, Anabaena, Phormidium, Spirogyra, Cladophora, Navicula, Fragilaria, Ulothrix, Microcoleus and Hildenbrandia are commonly found in the study area. Synedra, Cladophora, Phormidium and Hildenbrandia are some of the dominant species recorded during the study.

Zooplankton density ranged between 1-89 n/l and the most dominant species is Rotifera followed by Rhizopoda and Cladocera. Apart from that in the present study total nine species of protozoan have been found. Results of the study revealed a diverse array of freshwater protozoa, including ciliates, flagellates, and sporozoans, were mainly available in Site-6, Site-8 and Site-11.

### **Shannon Wiener Diversity Index (SWDI).**

The Shannon diversity index (H) also called information statistics indices is another index that is commonly used to characterize species diversity in a community. It is not itself diversity, but just indices of diversity. Just like the diameter of a sphere is an index of its volume but is not itself the volume. Diversity is most easily defined by use of a formula. Many indices of diversity have been proposed, but the one most commonly used is the Shannon-Weaver diversity index H.



The formula for Shannon diversity index is,

$$H = -\sum P_i (\ln P_i)$$

Where,

H = The Shannon diversity index

$P_i$  = fraction of the entire population made up of species i, i.e.  $p_i$  is the proportion ( $n/N$ ) of individuals of one particular species found ( $n$ ) divided by the total number of individuals found ( $N$ )

S = Numbers of species encountered

$\ln$  = natural logarithm

$\sum$  = sum from species 1 to species S

Note: The power to which the base e ( $e = 2.718281828\dots$ ) must be raised to obtain a number is called the natural logarithm ( $\ln$ ) of the number.

To calculate the index

1. We first divide the number of individuals of species found in sample by the total number of individuals of all species. This is  $p_i$ .
2. Multiply the fraction by its natural log ( $p_i \cdot \ln p_i$ )
3. Repeat this for all the different species that we have. The last species is species S.
4. Sum all the ( $p_i \cdot \ln p_i$ ) products.
5. Now, the value which we get should be multiplied by -1, and then we get H.

Although the equation is here written with natural logarithm, the base of the logarithm used when calculating the Shannon entropy can be chosen freely. Shannon himself discussed logarithm bases 2, 10 and e, and these have since become the most popular bases in application that use the Shannon entropy. In this article, we have taken base 2 for calculating Shannon diversity index. High values of H would be representative of more diverse communities. A community with only one species would have an H value of 0 because  $P_i$  would be equal to 1 and be multiplied by  $\ln P_i$  which would equal to zero. If the species are evenly distributed, then the H value would be high. So the H value allows us to know not only the number of species but how the abundance of the species is distributed among all the species in the community.

This diversity index helps in calculation of taxon relative abundance. A large H value indicates greater diversity, as influenced by a greater number and/or a more equitable distribution of taxon. The index values range between 0 and 5, where higher index values demonstrate higher diversity, while low index values are considered to indicate pollution. Diversity and anthropogenic disturbances are inversely related. The Shannon-Wiener index takes account of taxon richness as well as abundance. It is simply the information entropy of the distribution, treating genus as symbols and their relative population sizes as the probability. The advantage of this index is that it takes into account the number of taxon and the evenness of the taxon. The index is increased either by having additional unique taxon, or by having greater taxon evenness.

Macroinvertebrates' seasonal occurrence, compositions, and diversity indices are illustrated Below. Water leach dominated all the sites from February 2024 to March 2024. At site 1, moderately intolerant Clam/Mussel found in large number and also, very tolerant left handed or pouch snail. At site 2, Fairly Tolerant Leech and very tolerant aquatic Worm was found to be dominant. At site 3, moderately intolerant Damselfly and Mussel are found to present in large numbers. In Site 4, very tolerant aquatic worm and Pouch snail were found to be dominant. At site 5, very tolerant Pouch snail and aquatic worm were present. Except Site 11, all the other site has very tolerant macro-invertebrates present in the water. Shannon-Wiener Index values of 2.13, 1.63, 2.32, 1.94, 2.11, 2.17, 2.41, 1.74, 1.52, 2.16 and 2.74 were determined for macroinvertebrates found during the survey.

### **Fish fauna in lotic and lentic water bodies:**

Environmental variation can exert direct or indirect effects on species arranged along a gradient from proximal to distal attributes. Freshwater habitats harbour diverse fauna, with fish serving as prime indicators of ecosystem status. Riverine fauna shows a high degree of endemism, with most endemic fish species living in headwater streams and/or short stretches of river. The present investigation was carried out with the objective to analyse certain geomorphological features and fish fauna of river Digboi for analysing the pollution status of the river water with respect to Fish Fauna.

**Table 4:** Fish species recorded from Digboi River.

| <i>Order/Family<br/>Frequency of abundance</i> | <i>Scientific name</i> |   |
|--|------------------------|---|
| Cypriniformes/Cyprinidae                       | <i>Labeo rohita</i>    | A |
|  | <i>Labeo gonius</i>    | A |








|                                |                                |   |
|--------------------------------|--------------------------------|---|
|                                | <i>Labeo calbasu</i>           | C |
|                                | <i>Cirrhinus mrigala</i>       | A |
|                                | <i>Chela atpar</i>             | R |
|                                | <i>Aspidoparia morar</i>       | C |
|                                | <i>Amblypharyngodon mola</i>   | C |
|                                | <i>Puntius sophore</i>         | C |
|                                | <i>Pethia sarana</i>           | C |
|                                | <i>Esomus danrica</i>          | O |
|                                | <i>Rasbora elanga</i>          | R |
| Cypriniformes/Cobitidae        | <i>Lepidocephalus guntea</i>   | R |
| Siluriformes/Bagridae          | <i>Mystus bleekeri</i>         | O |
|                                | <i>Mystus cavasius</i>         | O |
|                                | <i>Mystus vittatus</i>         | C |
| Siluriformes/Clariidae         | <i>Clarias magur</i>           | C |
| Siluriformes/Heteropneustidae  | <i>Heteropneustes fossilis</i> | C |
| Synbranchiformes/Synbranchidae | <i>Monopterus cuchia</i>       | O |
| Perciformes/Nandidae           | <i>Nandus nandus</i>           | R |
| Perciformes/Centropomidae      | <i>Chanda nama</i>             | R |
| Perciformes/Anabantidae        | <i>Anabas testudineus</i>      | O |
|                                | <i>Trichogaster fasciatus</i>  | R |
| Perciformes/Channidae          | <i>Channa gachua</i>           | O |
|                                | <i>Channa marulius</i>         | R |
|                                | <i>Channa punctata</i>         | C |
|                                | <i>Channa striata</i>          | R |
| Perciformes/Gobiidae           | <i>Glossogobius giuris</i>     | R |
| Tetradontiformes/Tetradontidae | <i>Leiodon cutcutia</i>        | R |
| Anguilliformes/Anguillidae     | <i>Anguilla bengalensis</i>    | R |
| Clupeiformes/Notopteridae      | <i>Notopterus notopterus</i>   | O |
| Beloniformes/Belonidae         | <i>Xenentodon cancila</i>      | R |
| Beloniformes/Mastacembelidae   | <i>Macrognathus pancalus</i>   | R |
|                                | <i>Macrognathus aral</i>       | R |

---

\*R= Rare, \*O= Occasional, \*C= Common and \*A= Abundant.



**Fig 3:** Some species of Fish found in the present study area which are listed above.

|   |  |   |
|---|--|---|
|    |    |    |
| <i>Clarias magur</i>  | <i>Labeogonius</i>   | <i>Labeocalbasu</i>   |
|   |   |   |
| <i>Chelaatpar</i>   | <i>Aspidopariamorar</i>  | <i>Amblypharyngodon mola</i>  |
|  |  |  |
| <i>Esomus danrica</i>   | <i>Lepidocephalus guntea</i>   | <i>Mystus bleekeri</i>  |

It is a well establish fact that benthic macro-invertebrates are most useful in monitoring fresh-water ecosystems.

Central Pollution Control Board has initiated studies on Water Quality Management under provision of the Water (Prevention & Control of Pollution) Act, 1974. The Biological Monitoring system has been well established & emphasized as one of the cost-effective system in order to maintain & restore the wholesomeness of water in terms of various designated best uses of Water Bodies.

**Table 5: Criteria for Biological Water Quality Evaluation:**

| Water Quality Class | Range Of Saprobic Score | Range Of Diversity Score | Water Quality      | Indicator Colour |
|---------------------|-------------------------|--------------------------|--------------------|------------------|
| A                   | 7 and more              | 0.2-1                    | Clean              | Blue             |
| B                   | 6-7                     | 0.5-1                    | Slight Pollution   | Light Blue       |
| C                   | 3-6                     | 0.3-0.9                  | Moderate Pollution | Green            |
| D                   | 2-5                     | 0.4 & less               | Heavy Pollution    | Orange           |
| E                   | 0-2                     | 0-0.2                    | Severe Pollution   | Red              |

### Macro-invertebrates sample collection

Water samples were collected and stored in thoroughly sterilized bottles on seasonal basis for one year (February -2024) from the 11 sampling stations of as mentioned above.

Sample collection procedures are shown in figure below.







Fig4: Collection of Macro-invertebrates in the present study.

Collection of water samples was undertaken according to the standard methods for examination of water (APHA, 23<sup>rd</sup> edition). River water samples for analysis of chemical parameters were collected in 1000 ml plastic container according to the sampling protocol for each parameter. Water samples were collected facing upstream of the river as per standard methods and the



bottles were filled to the neck allowing no head space and transported to the laboratory in an ice-filled cooler box. Samples were preserved at 4°C in the laboratory for chemical analysis. Analyses were conducted for three replicates for each sample and averaged. This method was adopted due to the fact that average readings were more representative besides reducing variability in the measured results.

Macro-invertebrates samples are collected in such a manner that it represents all the habitats including boulders, cobbles, pebbles, gravels, sand, silt, clay, macrophytic vegetation etc. The number of collected individual organisms in the sample shall represent the population of organisms in the community. Macro-invertebrates sample collection requires use of different sampling methods and devices depending on the type of substratum in which they exist. To assess the actual health of water bodies, CPCB has derived a Biological Water Quality Criteria (BWQC) for water quality evaluation (Table 5). This system is based on the range of saprobic values and diversity of the benthic macro invertebrate families with respect to water quality. Saprobic score method involves a quantitative inventory of the presence of Macro-Invertebrate benthic fauna up to family level of taxonomic precision. All possible families having saprobic indicator value are classified on a score scale of 1 to 10 according to the preference for saprobic water quality. The families which are more sensitive to pollution are getting a score of 10 while the most pollution tolerant families are getting a score of 1 and 2.

**Table 6: Range of Saprobic Score:**

| 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              |

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

a) **Boulders and Cobbles:** The stones are lifted randomly and the organisms are picked up using soft forceps or brushed off into the white tray.

b) **Pebbles and Gravels:** The hand net is placed firmly on the stream bed against the flow. The stream bed is kicked up by foot and the organisms are collected into the net. After this, the

collected material is washed using sieve (recommended mesh size 0.6 mm as per ISO) and macro-invertebrates are collected into plastic bottles containing formalin (4%).

### **SUBSTRATUM CONSISTS OF SAND OR SILT**

- a. In deep-flowing and still water- In such conditions, organisms are collected by drawing or pushing the hand-net through the surface layer of the substratum.
- b. In shallow stream with clay- the grab samples are picked up using the shovel. Then, samples are washed using sieve to remove sediments and debris. Finally, the organisms are collected by hand or soft forceps.

### **SUBSTRATUM CONSISTS OF ATTACHED MACROPHYTES**

If the river bed is covered with macrophytes then, BMIs are collected by uprooting the plants first and washing the roots with water into sieve and collected into white tray. From the tray organisms are picked up using forceps and preserved in 4% formalin for further study.

### **IDENTIFICATION OF MACROINVERTEBRATES:**

The macroinvertebrates were sorted and identified as suggested by online published journals, with consultation of experts. Digital Camera was used to document larger specimens, while Stereomicroscope for smaller samples.

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





Fig 5: Some of Macro-invertebrates found in present study.

### **BIOLOGICAL MONITORING WORKING PARTY (BMWP) SCORE:**

The BMWP score was first used in the United Kingdom. This scoring system which is based on study of macro-invertebrates' community is being used worldwide with modifications considering local conditions and type of invertebrates present/ absent in the aquatic system. The system uses sensitivity of invertebrates towards organic pollution (indicators of organic pollution) i.e. saprobic condition. All the macro-invertebrate families have a specific saprobic indicator value and are classified on the scale of 1 to 10. The families which are most sensitive to organic pollution are on the top of the list with weightage score of 10 while the tolerant families are at the bottom of the list with score value of 1. The other intermediately sensitive families are placed in between the scoring scale of 2 to 9.

BMWP Score is calculated by assigning all the observed families as per BMWP Score chart (Table 3). Total no. of families observed in one particular group is multiplied with its respective weightage value and then all multiplied values are added to generate BMWP Score. The original BMWP Score chart with some minor modifications, by including/ excluding families present/ absent in Indian conditions was adopted in India after thorough testing and discussion with experts. Table 3 summarises BMWP Scoring system adopted by CPCB.

$$\text{BMWP Score} = \sum \text{No. of families in one group} \times \text{Weightage score}$$



**Table7:** BMWP score system adopted by CPCB

| SI No | Taxonomical Families   | Weightage Score |
|-------|--|-----------------|
| 1     | Siphonuridae, Heptageniidae, Leptophlebiidae, Ephemerelidae, Potaminiidae, Ephemeridae, Prosopistomatidae, Neoephemeridae, Ameletidae, Taeniopterygidae, Leuctridae, Capniidae, Perlodidae, Perlidae, Aphelocheridae, Leptoceridae, Georidae, Lepidostomatidae, Brachycentridae, Sericostomatidae, , Glossosomatidae, Helicopsychidae , Leptohyphidae  | 10              |
| 2     | Chloroperlidae   | 9               |
| 3     | Euphaidae, Protoneuridae, Plathyncnemididae, Lestidae, Gomphidae, Cordulegastridae, Aeshnidae, Corduliidae, Libellulidae, Macromiidae, Psychomyiidae, Philopotamidae, Cheumatopsychoidea, Chrysomelidae, Hydrenidae, Sciomyzidae, Limoniidae   | 8               |
| 4     | Caenidae, Nemouridae, Rhycophilidae, Polycaltropodidae, Limnephilidae, Stenopsychidae  | 7               |
| 5     | Ancylidae, Hydrobiidae, Neritidae, Viviparidae, Thiaridae, Bithynidae, Unionidae, Pleuroceridae, Amblemidae, Septariidae, Assiminiidae, 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, Histiobdellidae, Megascolecidae, Coenagrionidae, Agriidae | 6               |
| 6     | Mesovelidae, Hydrometridae, Gerridae, Nepidae, Naucaridae, Notonectidae, Pleidae, Corixidae, Vellidae, Hebridae, Belastomatidae, Haliplidae, Hygrobiidae, Dytiscidae, Gyrinidae, Hydrophilidae, Noteridae, Dryopidae, Elminthidae, Psephenidae, Heteroceridae, Elmidae, Scirtidae, Eulichadidae, Histeridae, Curculionidae, Hydropsychidae, Ecnomidae, Tipulidae, Culicidae, Blepharoceridae, Simuliidae, Nymphomyiidae, Sarcophagidae,  | 5               |

|    |   |   |
|----|---|---|
|    | Stratiomyiidae, Ceratopogonidae, Pyralidae, Planariidae, Dendrocoelidae, Carabidae, Hydrochidae, Staphylinidae  |   |
| 7  | Baetidae, Sialidae, Corydalidae, Piscicolidae, Hirudinidae  | 4 |
| 8  | Lymnaeidae, Planorbidae, Sphaeriidae, Physidae, orbiculidae, Onchididae, Glossophoridae, Hirudidae, Erpobdellidae, Haemadipsidae, Salicidae, Dugesidae, Aselidae, Cirolanidae, Aegidae, Stenasellidae, Cymothoidae, | 3 |
| 9  | Chironomidae, Syrphidae, Ephydriidae, Muscidae, Psychodidae   | 2 |
| 10 | Tubificidae, Naididae, Octochaetidae, Lumbricidae, Lumbricullidae   | 1 |

The Saprobic Score is calculated by

$$\text{Saprobic Score} = \text{BMWP Score} / \sum \text{Number of families encountered}$$

## RESULTS AND DISCUSSION:

In the present study, Digboi River recorded *Hirudinaria granulosa* (leech) is the most abundant species recorded and the least species was *Asellus aquaticus*.

The study revealed the presence of 12 species of aquatic insects belonging to 10 families and 2 orders at Eleven (11) different sampling sites of river Digboi. The orders are Physella acuta, Hirudinea, Trichoptera, Oligochaeta, Bivalvia, Zygoptera, planarian, Cambarus sp and Odonata. Insect species were dominated by the orders Hemiptera and Decapoda with 4 and 5 representatives of each respectively. The representative species of Hirudinea are Laccotrephes sp., Curicta sp., Micronecta sp. and Notonecta sp. Gyrulus convexusculus, Brotia costula and Pila globosa were the dominant molluscan species in the aquatic system. Physella acuta was found to be the dominant taxa represented by six orders and 17 families that comprised of 113 quantites. Gastropoda was the second dominant class represented by the families viz., Viviparidae, Ampullaridae, Pachychilidae, Thiaridae, and Planorbidae.

## ANALYSIS OF RESULTS:

**SITE 1, Dihing - Margherita:** The water samples were collected from Digboi Nala. The sample have very high quantity of Oil and Grease present in the sample and also bottom mud and pebbles were also covered by a dark greasy coating. There was evidence of algal growth in the bottom and sides of the stream and Hydrilla could also be observed to be growing in many positons. The

macro-invertebrates present in the sample are mainly of *Physella acuta*, *Bivalvia*, *Hirudinea*, *Oligochaeta* etc, which have very low weightage score such as *Naididae*, *Muscidae* etc, which indicates that the samples from Site 1 is polluted.

**SITE 2, Dihing - Makum.** At Site 2, the sample collected are also from Digboi Nala. The sample after collection have also a oil slick noticed on the surface. The analysis for micro-invertibates shows the presence of some pollution resistant families such as *Hirudinea*, *Odonata*, *Oligochaeta*, *Physella acuta*, *Lumbricidae* etc but failed to reveal the presence of both *Ephemeroptera* and *Trichoptera*. The water was also covered with a few species of vegetation. From the analysis of Macro-invertebrates present in the sample, which are commonly fairly pollution tolerant, so the water samples may be polluted with respect to this study.

**SITE 3, Dihing - Mirika:** In Dihing Mikira point also, the sample collected was found to be turbid and the oily slick also noticed. The macro-invertebrates recorded at this point were representatives of the orders *Physella acuta*, *Oligochaeta*, *Zygoptera*, *Odonata*, *Coleoptera* and *Diptera*, *Nereididae*, *Heteroceridae*, *Chironomus* larvae were abundantly present. No Mayfly or Caddis fly species could be recorded at this point. As most of these Macro invertebrates present are moderately tolerant and fairly tolerant, so according to this study, the sampling point/river is least polluted than site 1 and 2.

**SITE 4, Dihing - Gammon bridge:** In the Gamon bridge point of Dihing river, the water samples were collected for both physico-chemical and Bio-monitoring analysis. The sampling of invertebrate assemblage is dominated by *Oligochaeta*, followed by *Physella acuta*, *Hirudinea*, *odonates*, *Cambarus* sp etc. *Trichopterans*, and also pollution sensitive taxonomical families such as *Corixidae*, *Lustidae*, *Viviparodae*, *Arcidae* etc are well represented while the incidence of *Agriidae* was moderate. No *Ephemeroptera* species can however be recorded. From the Pollution Tolerance Index rating the water from the sampling site was found to be fairly polluted for survival of aquatic life.

**SITE 5, Dihing mukh:** The sample for present study was collected from the point where Dihing river is entered into the Brahmaputra river. The micro-ivertibates *Physella acuta*, and *Bivalvia* were the most common species present in the sample. *Hirudinea*, *Gastropoda*, *Bivalvia*, *Crustacea*, *Insecta* and *Hirudinidae*, *Physidae*, *Caenidae*, *Oligochaeta*, *Cambarus* sp. *Belostomatidae*, *Nepidae*, *Hydrophilidae*, *Chaoboridae*, *Chironomidae* are found in the study. From the study of pollution tolerance index, it is found that, the river water in the sampling site were in the fairly polluted catagories. Animal carcasses were seen floating on water near this point leading to further degradation of the aquatic habitat.



**SITE 6, Digboi river - Kenduguri:** At the Kenduguri point of Digboi River, sampling for benthic macro-invertebrates revealed a good representation of Oligochaeta, Odonata species, with *Cambarus* sp. being less represented. No presence of either Ephemeroptera or Trichoptera could be recorded. The presence of Pollution resistant Taxonomical Families such as *Physella* acuta, Hirudinea, Oligochaeta shows largely polluted condition of river water at this point. The presence of Zygoptera, *Cambarus* sp, Bivalvia was however significant for good condition of river water at this sampling point.

**SITE 7, Digboi river - 15 KM pt:** Samples of river Digboi were also collected for physico chemical and Macro-invertebrate monitoring. at site 7. The macro-invertebrates present in this point were largely fairly tolerant and very tolerant categories. The macro invertebrates present in this study area were *Physella* acuta, Oligochaeta, Hirudinea, planarian, Amphipoda etc., which are pollution resistant and moderately resistant in nature.

**SITE 8, Digboi river - 26 KM pt:** In Digboi river-26 KM point, water samples were collected for both physico-chemical and Macro-invertebrate monitoring. At this sampling site in the Digboi River, the benthic macroinvertebrate assemblage was dominated by moderately intolerant Damselfly (Zygoptera) while Sowbug (Oniscidea) were rarely present. A few organisms of Bivalvia, Coleoptera, Hirudinea, and very tolerant *Physella* acuta were also present in the present site. The representative species of Hemiptera are *Laccotrephes* sp., *Curicta* sp., *Micronecta* sp. and *Notonecta* sp.

**SITE 9, Dihing - before confluence with Digboi river:** From the analysis of macro-invertebrate present in the sample collected from this sampling site it was noticed that it contained very pollution tolerant left handed snail (*Physella* acuta) and aquatic worm (Oligochaeta), which indicate the poor quality of the surface water at that point. But also the species Hirudinea, which are fairly tolerant were also present in the study area.. The macro-invertebrates of which the taxonomical families present are Ancyliidae, Rhyacophilidae, Agriidae, Carabidae, Gammaridae etc, which are moderately pollution sensitive.

**SITE 10, Dihing - after confluence with Digboi river:** At site 10, the water sample contained the micro-invertebrates Hirudinea, Gastropoda, Bivalvia, Crustacea, Insecta and Hirudinidae, Physidae, Gammaridae, Panaetidae, Isotomidae, Caenidae, Gomphidae, Belostomatidae, Nepidae, Hydrophilidae, Chaoboridae, Chironomidae are found in the study. From the analysis of micro-invertebrates present in the present site are mostly fairly and very pollution tolerant species, so the surface water quality of this area is polluted with respect to this present study.

Animal carcasses were seen floating on water near this point leading to further degradation of the aquatic habitat

**Site 11, Digboi Sanitary Park River (Durgapukhuri):** The macro-invertebrates Damselfly (Zygoptera), Scud (Amphipoda), Mussel (Bivalvia), Crayfish (Cambarus sp), Fairly Tolerant Leech (Hirudinea), Planaria are found in this study. As the invertebrates found are Moderately intolerant and Fairly tolerant, the water in the site are found to be moderately polluted.

## DISCUSSION OF THE RESULTS

From the present study for Bio monitoring, the most dominant macro organism present mainly were *Physella acuta*, Hirudinea, Histeridae, Oligochaeta, Bivalvia Odonata Musidae etc., in Digboi and Dihing river. The causes of fluctuations in insect abundance, dominance and distribution include macroclimatic and microclimatic in the availability of food resources.

These kinds of macro-invertebrates are moderately pollution sensitive organisms or somewhat pollution tolerant macro-invertebrates. They can survive in good quality and fair quality of water because their habitat requirements are not as strict as pollution sensitive organisms such as Siphonuridae, Capniidae, Chloroperlidae etc. Hence these macroinvertebrates indicate that the aquatic environment of Digboi and Dihing River is moderately polluted.

After the analysis of macro-invertebrates, it was noticed that, the sampling site 1 and 2, which are of Digboi Nala, the large abundance of very tolerant and fairly tolerant pollution species like Oligochaeta, *Physella acuta*, Hirudinae, Planaria etc. indicate that the river water was moderately polluted at these sites.

Macro-invertebrates are the most diverse group of organisms inhabiting a variety of habitats. About 3% of them spend a part of their life in aquatic habitats in the form of larva (mosquitoes), pupa (water beetles), or as adults (annelids, molluscs). Most aquatic faunal assemblage participates in ecological processes such as the decomposition of the organic matter, nutrient cycling and sediment bioturbation. They also control the density of other aquatic macro-invertebrates fauna by acting as a predator to them and as a food source for other groups of animals such as fish and to other aquatic groups. In India, about 5,000 insect species are estimated in various inland wetlands that are distributed heterogeneously. Usually, the Coleopterans are found associated with submerged aquatic vegetation and are predacious in nature. Extensive work has been carried out by Vazirani on aquatic beetles of India such as Gyrinidae, Dytiscidae and Haliplidae. In a similar study on the Dytiscidae family, three species viz., *Hydaticus fabricii*,

*Dytiscus verticalis* and *Laccophilus anticatus* have reported from Pushkar Lake, Ajmer. In the present study, the Dytiscidae family is found dominant in the study area.

Assessment of water quality by using Pollution Tolerance Index Rating of macroinvertebrate reveals that except Site 1 and 2, the quality of surface water of River Dihing and Digboi were more or less moderately polluted for aquatic life to survive.

There is a general consensus that the attributes of a good quality stream should include

1. Extensive old natural riparian vegetation.
2. High heterogeneity in channel width and depth
3. Abundant woody debris, extensive aquatic or overhanging vegetation.
4. Relatively high or constant discharge.
5. Relatively clear waters with natural color and odor.
6. Abundant diatoms, insect and fish assemblages.
7. Presence of piscivorous birds and mammals.

The analysis of water and macro-invertebrates in the Digboi Nala and Dihing River revealed moderate pollution levels. However, the observed degradation of the Digboi Nala – Dihing River system may not solely result from point source discharges permitted by the Effluent Treatment Plant (ETP). Bio surveys are effective at detecting water quality issues, but pinpointing the exact sources of impairment can be challenging. In this survey, evidence suggests overall system impairment due to municipal waste dumping, agricultural runoff, silting, and significant seasonal flow variations. To differentiate between point source and non-point source impacts, combining bio survey data with chemical monitoring and lab evaluations is crucial. Currently, the Digboi Nala – Digboi Nadi system requires urgent corrective measures. The Dihing River is largely free from pollution effects and some awareness among the people residing in the areas near the confluence of the Digboi Nadi and Dihing River can take care of the impact noticed in the confluence. Fortunately, the Dihing River remains moderately free from pollution effects, and raising awareness among residents near the Digboi Nadi – Dihing River confluence can help mitigate the observed impact

Certainly! Let's delve into each of these suggestions for restoring the Digboi Nala-Digboi River system:

- 1. Defining Attainable Conditions:**



- Historical data and biological surveys are crucial for understanding the system's baseline conditions. Consider both spatial (different locations within the system) and temporal (seasonal variations) dimensions.
  - By defining attainable conditions, you can set realistic restoration goals and track progress over time.
- 2. Assemblage Selection and Index of Biological Integrity (IBI):**
- Choose an appropriate biological assemblage (e.g., fish, macroinvertebrates) to assess habitat health.
  - Develop an Index of Biological Integrity (IBI) specific to the chosen assemblage. IBI provides a quantitative measure of habitat quality based on biological indicators (e.g., species diversity, pollution tolerance).
- 3. Laboratory Monitoring of Point Source Discharge Effects:**
- Set up controlled experiments in the laboratory to assess the impact of point source discharges on selected species.
  - This step helps differentiate between the effects of target discharges (from the ETP) and other non-point source contributors to degradation.
- 4. Continuous Bio-Monitoring by Field Personnel:**
- Establish a systematic and ongoing bio-monitoring program.
  - Field personnel can collect data on water quality, species composition, and habitat conditions regularly.
  - Monitoring results will guide adaptive management and inform corrective actions.

Remember that collaboration among scientists, policymakers, and local communities is essential for successful restoration efforts

An **Index of Biological Integrity (IBI)** is a valuable tool used by biologists, regulators, and planners to assess the condition of a habitat type or resource based on its biological communities. Specifically, IBIs are commonly applied to aquatic ecosystems, such as lakes, rivers, and wetlands, but there have been efforts to extend their use to terrestrial environments as well:

**1. Purpose and Concept:**

- An IBI associates anthropogenic influences (human activities or alterations) on a water body with biological activity within that water body.
- It is formulated using data collected from biosurveys.

- Biological integrity refers to how “pristine” an environment is and its function relative to its potential or original state before human alterations.
- The decline in ecosystem functions is primarily attributed to human activity or alterations.
- If natural changes occur over time without human influence, the ecosystem’s integrity remains intact.

## **2. Components of an IBI:**

- IBIs consist of metrics or characteristics related to flora or fauna taxa within a predefined system (e.g., floodplain wetland, emergent wetland).
- These metrics respond minimally to natural variation but predictably to human disturbances.
- The development and adoption of IBIs have evolved over the past 30 years, refining geographic regions, habitats, and indicator taxa research.

## **3. Assessment and Validity:**

- Quantitative assessment of biotic communities involves statistical analysis.
- Region-specific IBIs require quality data collected by experienced professionals.
- Identifying robust statistics with acceptable variance is an ongoing area of research.
- IBIs are increasingly used to identify impairment and confirm recovery of impaired waters, especially in the context of the Clean Water Act in the USA.

## **4. Application:**

- Unlike chemical testing, which provides snapshots of chemical concentrations, IBIs capture the integrated net impact on a biological community structure.
- While IBIs do not pinpoint specific causes of impairment, they can indicate systemic impacts on biological system health.

In summary, IBIs play a crucial role in assessing the health and integrity of ecosystems, particularly aquatic ones. By understanding the biological responses to environmental stressors, we can make informed decisions for conservation and management.

## **ASSESSMENT OF PHYSICO-CHEMICAL PARAMETERS:**

To assess the quality of surface water in different parts of the study area, water samples were collected from 17 different locations spread over the study area. The locations of these sampling stations are given in Table A.

Water samples were collected during the pre-monsoon period of January to February 2024. From each site total of three water samples, were collected in three 1 L polythene Bottle and 300mL BOD bottles at a depth of about 10 cm below the surface water. The water samples were then transported to the laboratory and kept in a cool place for further analysis. Altogether 13 physicochemical parameters were analysed as per scope of the survey. The water temperature, TDS and pH were estimated in situ, dissolved oxygen (DO) was fixed at the specific site. All the parameters were analyzed following the standard methods of APHA (2023), The turbidity, alkalinity hardness, nitrate and total phosphorus (TP) were estimated within 48 h after collection. High-quality analytical-grade reagents were utilized during the analytical procedures, and the respective equipment underwent calibration before analysis using CRM and following Standard Operating System.

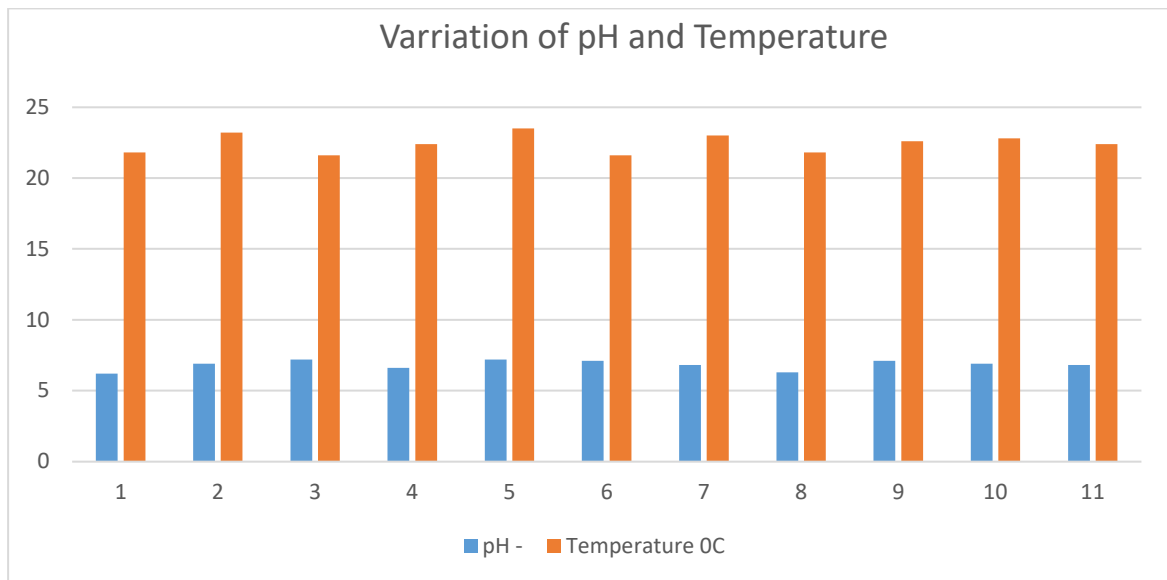
The water quality parameters of the aquatic bodies of the survey area have been presented in Table A.

The results of surface water quality monitoring from 17 different locations are given in Tables 4.6.3 to 4.6.6 with respect to the following parameters:

- Temperature, Turbidity, pH, TDS, Alkalinity, Hardness
- Dissolved Oxygen (DO), BOD, COD, Sulphate, Nitrate and Phosphate,
- Bio-assay

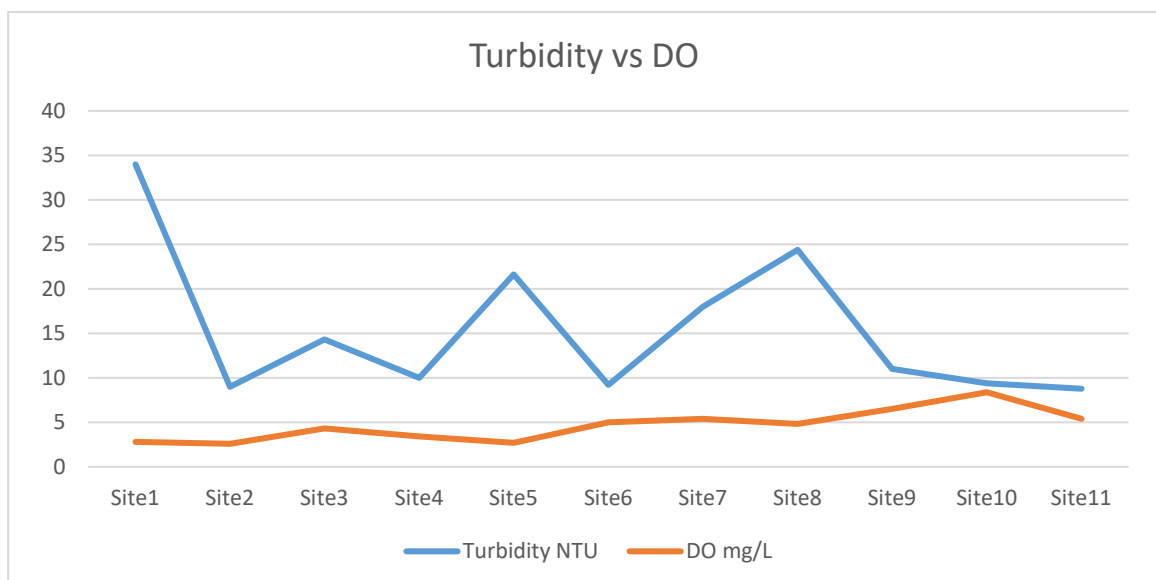
Temperature is an important ecological feature that influences the behavioral characteristics of organisms, solubility of gases and content of salts in water. The fluctuation of temperature usually depends on the season, geographic location, sampling time and content of effluents entering the river system. The Temperature of all the surface sources was not much different from the ambient air temperature.





All the water samples have some amount of turbidity (range: 8 – 42 NTU). which may be largely due to the turbulence created by the entry of storm water runoff. The turbidity values are reflected in the quite appreciable total suspended solid contents of the water sources. The TDS values were in the range 24 – 122 mg/L. The water from the locations Site-1, Site-2, Site-7 and Site-8 had TSS contents of > 300 mg/L.

The pH of all the water samples was within the accepted limit of 6.2 to 7.2. The lowest value of 6.2 appeared at Site-1 where the leachates and runoffs from multiple anthropogenic activities may have contributed to some decrease in the pH level.



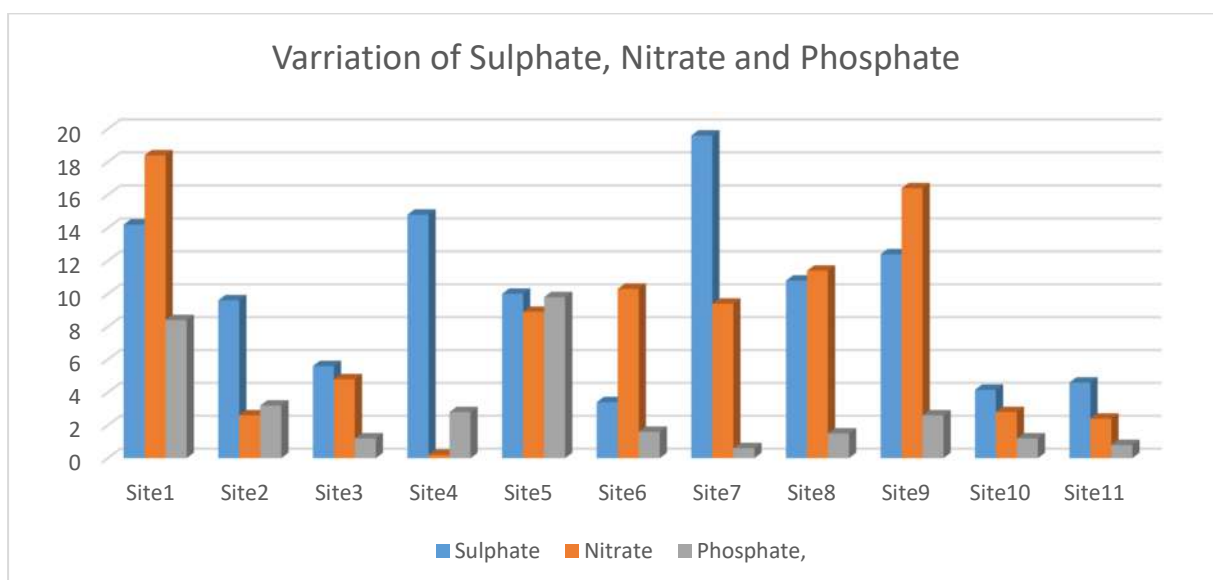
The total dissolved solids values varied in a significantly wide range of 94 to 862 mg/L; the highest values being found at Site-1 and Site-7, indicating the presence of substantial number

of ionic substances in water of these two locations. The TDS values are found in the range: 82 to 362 mg/L) were almost complementary to the electrical conductivity values.

**Table 8: Physico-chemical analysis of surface water**

| Parameter                   | Unit | Site1 | Site2 | Site3 | Site4 | Site5 | Site6 | Site7 | Site8 | Site9 | Site10 | Site11 |
|-----------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| pH                          | -    | 6.2   | 6.9   | 7.2   | 6.6   | 7.2   | 7.1   | 6.8   | 6.3   | 7.1   | 6.9    | 6.8    |
| Temperature                 | °C   | 21.8  | 23.2  | 21.6  | 22.4  | 23.5  | 21.6  | 23.0  | 21.8  | 22.6  | 22.8   | 22.4   |
| Turbidity                   | NTU  | 34.0  | 9.0   | 14.3  | 10.0  | 21.6  | 9.2   | 18.0  | 24.4  | 11.0  | 9.4    | 8.8    |
| DO                          | mg/L | 2.8   | 2.6   | 4.3   | 3.4   | 2.7   | 5.0   | 5.4   | 4.8   | 6.5   | 8.4    | 5.4    |
| BOD                         | mg/L | 8.0   | 5.6   | 9.6   | 6.0   | 3.5   | 3.6   | 5.2   | 3.4   | 2.0   | 4.2    | 2.0    |
| COD                         | mg/L | 22.0  | 24.0  | 42.0  | 26.0  | 22.0  | 8.4   | 6.5   | 10.0  | 9.4   | 18.0   | 6.0    |
| TDS                         | mg/L | 862   | 330   | 209   | 226   | 119   | 146   | 539   | 321   | 228   | 94     | 168    |
| Sulphate                    | mg/L | 14.2  | 9.6   | 5.6   | 14.8  | 10.0  | 3.4   | 19.6  | 10.8  | 12.4  | 4.16   | 4.6    |
| Nitrate                     | mg/L | 18.4  | 2.6   | 4.8   | 0.2   | 8.9   | 10.3  | 9.4   | 11.4  | 16.4  | 2.8    | 2.4    |
| Phosphate,                  | mg/L | 8.4   | 3.2   | 1.2   | 2.8   | 9.8   | 1.6   | 0.6   | 1.5   | 2.6   | 1.2    | 0.8    |
| Total Hardness              | mg/L | 112.0 | 46.4  | 68.9  | 58.0  | 80.0  | 49.8  | 64.4  | 78.6  | 50.6  | 69.8   | 56.0   |
| Total Alkalinity            | mg/L | 98.0  | 43.4  | 71.0  | 52.4  | 84.2  | 47.0  | 62.3  | 72.0  | 43.4  | 61.2   | 54.8   |
| Bio-Assay<br>(for 96 hours) | %    | 90    | 90    | 100   | 100   | 90    | 100   | 100   | 100   | 100   | 100    | 100    |

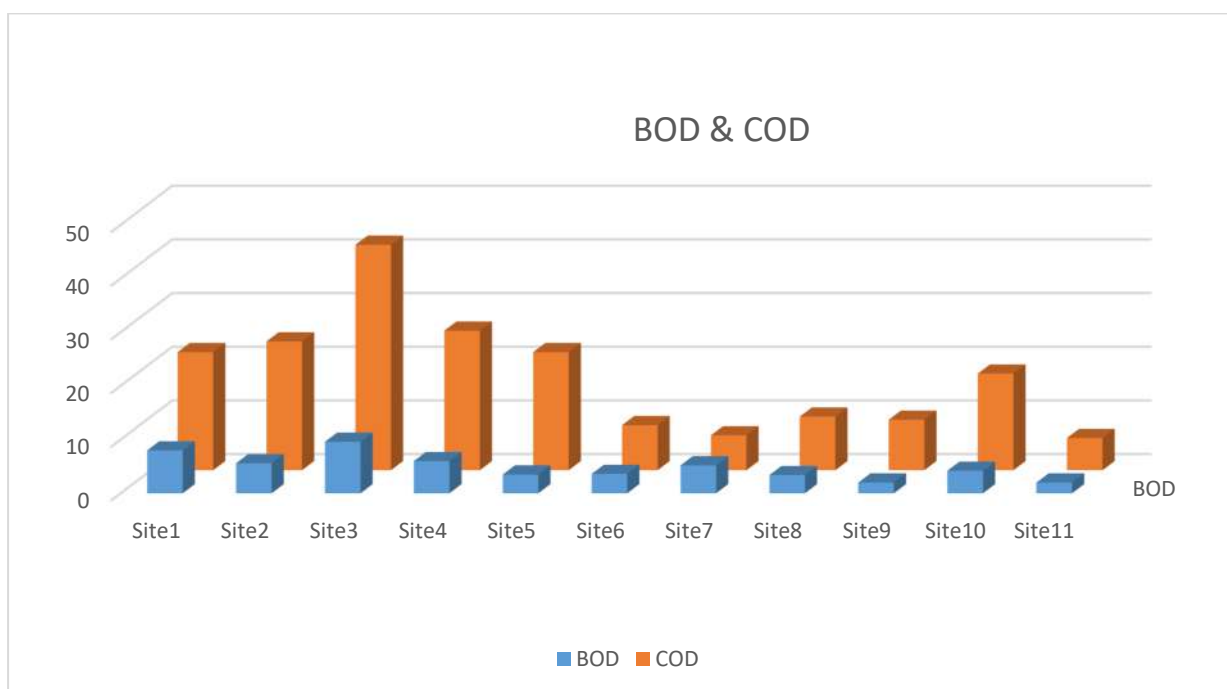
Total hardness values fluctuate in the range: 46.4 to 112 mg/L were almost similar to that of total alkalinity values, which are found in the range 43.8 to 98 mg/L.



Dissolved oxygen (DO) content has a vital role for maintaining aquatic life and is susceptible to slight environment changes. In the present investigation, minimum DO value was found to be 2.8 mg/L at site-1 whereas dissolved oxygen value was found maximum at site-10 ( 8.4 mg/L) . The increased DO in some of the study area might be due to stable water conditions.

The value of Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD) in river water collected during the study period do not show any indicative value except in one site. The variation this two parameters in the specific water bodies are depicted with the help of graphs (Fig-8).





The overall water quality of the water bodies from these two parameters based on pollution index values may be categorized as mild contamination. A bioassay is an analytical method to determine the potency or effect of a substance by its effect on living animals or plants. Bioassay studies did not evaluate any relevant toxic effects on the aquatic environment.

## CONCLUSION:

The findings of present study indicate that the status of water quality of Digboi and Dihing River is not very clean because its aquatic environment is moderately to largely polluted.

### Digboi River:

The Digboi River is a small sub-tributary of the Burhi Dihing River. It flows through the Dihing Reserve Forest. The assessment of water quality in Digboi River considers parameters such as pH, Biochemical Oxygen Demand (BOD), Dissolved Oxygen (DO), and Fecal Coliform.

The river's water quality is moderately to largely polluted due to urban agglomerations and industrial clusters along its course<sup>1</sup>. Long-term monitoring and socio-economic reviews are recommended to identify pollution sources and raise environmental awareness. Neglecting monitoring efforts could lead to health hazards for local inhabitants who rely on the river for daily activities.

### Dihing River:

The Dihing River is a tributary of the Brahmaputra River, covering about 6,000 square kilometers. It has created several oxbow lakes in the area. Water quality assessments indicate

that parameters are mostly within permissible limits according to the Bureau of Indian Standards (BIS, 1983). In summary, both rivers face pollution challenges, and monitoring efforts are crucial for maintaining water quality and safeguarding public health. The adoption of biological indicators can aid authorities in assessing the condition of these rivers

Long term bio-monitoring of water quality of the stream coupled with socio economic reviews might provide clues for identifying the sources of stress and subsequently environment awareness can be disseminated. Failure to monitor the studied stream may result in health hazards to local inhabitants who use it for day-to-day domestic activities. Therefore, this study recommends that the relevant authorities should regularly monitor and control the source of pollutants. Further, the study recommends the adoption of biological indicators and their indices by pertinent authorities while assessing the condition of selected river.

Monitoring is indeed the foundation for effective ecosystem management and sustainable resource use. By understanding the current state of our environment, we can make informed decisions and take necessary actions. Cooperation among stakeholders—whether at the local, national, or global level—is crucial for successful conservation efforts.

Empowering the current generation with knowledge, tools, and a conservation mindset is essential. Education and awareness play a pivotal role in shaping responsible behaviors and fostering a sense of stewardship. As you rightly pointed out, climate change adds urgency to our efforts. It affects water resources, biodiversity, and entire ecosystems, emphasizing the need for collective action.

Let's continue working together to protect our natural heritage and ensure a healthier planet for generations to come.

### **Conclusion of Physico-chemical analysis of the collected samples:**

Each freshwater body has an individual pattern of physical and chemical characteristics, which are determined largely by the climatic, geomorphological and geochemical conditions prevailing in the drainage basin. The chemical quality of the aquatic environment varies according to local geology, the climate, the amount of soil cover, etc. Physicochemical characteristics, such as total dissolved solids, conductivity and redox potential, provide a general classification of water bodies of a similar nature.

The present study, which is of its kind on the for Bio-monitoring survey of aquatic life in lotic and lentic water bodies in and around Digboi, has been based on a limited number of samples with the main objective of find out the overall health of aquatic environment on the basis of the aquatic organisms that live in streams and rivers.

The pH of the water is neutral to slightly acidic in nature (average pH = 6.82) like all other major Indian rivers. The variation of pH in the river water is very less with respect to space.

The values of the physico-chemical parameters (pH, TDS, DO, Total alkalinity, Hardness, etc.) are almost within the WHO tolerance limits. total dissolved solids present, is an essential feature of the quality of any water body resulting from the balance between dissolution and precipitation. Oxygen content is another vital feature of any water body because it greatly influences the solubility of metals and is essential for all forms of biological life. To ascertain suitability for specific utilization, analysis of water quality in a particular river system is very much essential. The amount of dissolved oxygen is an important parameter of water quality. There are four processes, which affect the amount of oxygen in water: recreation, photosynthesis, respiration and oxidation of wastes. In this study, dissolved oxygen (DO) were found ranges from 2.6 mg/L to 8.4 mg/L Total dissolved solids show maximum values at site S1 and S7 and the values within normalized range in all other stations. The large values are due to the input from the feeder stream or may be due to the anthropogenic influence. From the results of the value of Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD) in the water bodies indicate the moderate degree of pollution and no drastic depletion was noticed during the period of study.



# Biological Monitoring Data Sheet

Date: 06/02/2024

Sampler ID: \_\_\_\_\_

Site ID: Site-1

Stream Name: \_\_\_\_\_

Time 09:30 AM / PM

Time Sampling: 1 hrs

Air Temp.: 22.4 °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)

☐ Undercut Banks

☐ Rifles

☐ Leaf Packs

☐ Snags/Vegetation

☐ Sediment

Check Habitats Sampled:

## 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 |                       | Group 4 - Very Tolerant  |                            |
|--------------------------|------------------------------|---------------------------------|-----------------------|---------------------------|-----------------------|--------------------------|----------------------------|
| <input type="checkbox"/> | Stonefly nymph               | <input type="checkbox"/>        | Damselfly nymph       | <input type="checkbox"/>  | Leech                 | <input type="checkbox"/> | Aquatic worm               |
| <input type="checkbox"/> | Mayfly nymph                 | <input type="checkbox"/>        | Dragonfly nymph       | <input type="checkbox"/>  | Midge larva           | <input type="checkbox"/> | Blood midge larva (red)    |
| <input type="checkbox"/> | Caddisfly larva              | <input type="checkbox"/>        | Scud                  | <input type="checkbox"/>  | Planaria/Flatworm     | <input type="checkbox"/> | Rat-tailed Maggot          |
| <input type="checkbox"/> | Riffle Beetle                | <input type="checkbox"/>        | Sowbug                | <input type="checkbox"/>  | Black fly larva       | <input type="checkbox"/> | Left-Handed or Pouch snail |
| <input type="checkbox"/> | Dobsonfly Larva              | <input type="checkbox"/>        | Cranefly larva        | <input type="checkbox"/>  |                       | <input type="checkbox"/> |                            |
| <input type="checkbox"/> | Right-Handed or Gilled snail | <input type="checkbox"/>        | Clam/Mussel           | <input type="checkbox"/>  |                       | <input type="checkbox"/> |                            |
| <input type="checkbox"/> | Water Penny                  | <input type="checkbox"/>        | Crayfish              | <input type="checkbox"/>  |                       | <input type="checkbox"/> |                            |
| <input type="checkbox"/> | # of TAXA represented        | <input type="checkbox"/>        | # of TAXA represented | <input type="checkbox"/>  | # of TAXA represented | <input type="checkbox"/> | # of TAXA represented      |
| <input type="checkbox"/> | Weighting Factor (x4)        | <input type="checkbox"/>        | Weighting Factor (x3) | <input type="checkbox"/>  | Weighting Factor (x2) | <input type="checkbox"/> | Weighting Factor (x1)      |

## Pollution Tolerance Index Rating

(Add the final index values for each group)

9

| PTI Ratings |            |
|-------------|------------|
| Excellent   | 23 or More |
| Good        | 17 - 22    |
| Fair        | 11 - 16    |
| Poor        | 10 or Less |

*[Handwritten signature]*

# Biological Monitoring Data Sheet

Date: 06 / 02 / 2024

Sampler ID: \_\_\_\_\_

Site ID: SITE-2

Stream Name: \_\_\_\_\_

Time 12 15 AM / PM ☒

Time Sampling: 1:15 hrs

Air Temp.: 24.7 °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

☐ Riffling

☐ Leaf Packs

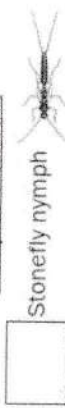
☐ Snags/Vegetation

☐ 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



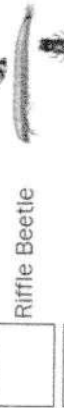
Stonefly nymph



Mayfly nymph



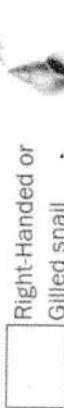
Caddisfly larva



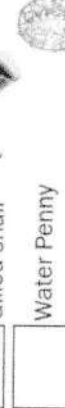
Riffle Beetle



Dobsonfly Larva



Right-Handed or Gilled snail

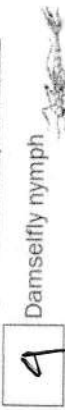


Water Penny

# of TAXA represented

Weighting Factor (x4)

### Group 2 - Moderately Intolerant



Damselfly nymph



Dragonfly nymph



Scud



Sowbug



Cranefly larva



Clam/Mussel



Crayfish

# of TAXA represented

Weighting Factor (x3)

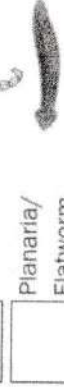
### Group 3 - Fairly Tolerant



Leech



Midge larva



Planaria/Flatworm



Black fly larva

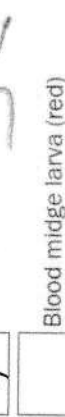
# of TAXA represented

Weighting Factor (x2)

### Groups 4 - Very Tolerant



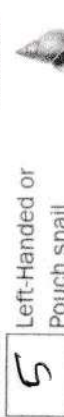
Aquatic worm



Blood midge larva (red)



Rat-tailed Maggot



Left-Handed or Pouch snail

# of TAXA represented

Weighting Factor (x1)

## Pollution Tolerance Index Rating

(Add the final index values for each group)

| PTI Ratings          |
|----------------------|
| Excellent 23 or More |
| Good 17 - 22         |
| Fair 11 - 16         |
| Poor 10 or Less      |

10



# Biological Monitoring Data Sheet

Date: 06/02/2024 Site ID: Site-3

Stream Name: \_\_\_\_\_

Time Sampling: 1 hrs Air Temp.: 21.9 °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           |                       | Group 4 - Very Tolerant             |                            |
|-------------------------------------|------------------------------|-------------------------------------|-----------------------|-------------------------------------|-----------------------|-------------------------------------|----------------------------|
| <input type="checkbox"/>            | Stonefly nymph               | <input checked="" type="checkbox"/> | Damselfly nymph       | <input checked="" type="checkbox"/> | Leech                 | <input checked="" type="checkbox"/> | Aquatic worm               |
| <input type="checkbox"/>            | Mayfly nymph                 | <input type="checkbox"/>            | Dragonfly nymph       | <input type="checkbox"/>            | Midge larva           | <input type="checkbox"/>            | Blood midge larva (red)    |
| <input type="checkbox"/>            | Caddisfly larva              | <input type="checkbox"/>            | Scud                  | <input checked="" type="checkbox"/> | Planaria/Flatworm     | <input type="checkbox"/>            | Rat-tailed Maggot          |
| <input type="checkbox"/>            | Riffle Beetle                | <input type="checkbox"/>            | Sowbug                | <input type="checkbox"/>            | Black fly larva       | <input checked="" type="checkbox"/> | Left-Handed or Pouch snail |
| <input type="checkbox"/>            | Dobsonfly Larva              | <input type="checkbox"/>            | Cranefly larva        | <input type="checkbox"/>            |                       |                                     |                            |
| <input type="checkbox"/>            | Right-Handed or Gilled snail | <input checked="" type="checkbox"/> | Clam/Mussel           | <input type="checkbox"/>            |                       |                                     |                            |
| <input type="checkbox"/>            | Water Penny                  | <input type="checkbox"/>            | Crayfish              | <input type="checkbox"/>            |                       |                                     |                            |
| <input checked="" type="checkbox"/> | # of TAXA represented        | <input checked="" type="checkbox"/> | # of TAXA represented | <input checked="" type="checkbox"/> | # of TAXA represented | <input checked="" type="checkbox"/> | # of TAXA represented      |
| <input type="checkbox"/>            | Weighting Factor (x4)        | <input checked="" type="checkbox"/> | Weighting Factor (x3) | <input checked="" type="checkbox"/> | Weighting Factor (x2) | <input checked="" type="checkbox"/> | Weighting Factor (x1)      |

| PTI Ratings |            |
|-------------|------------|
| Excellent   | 23 or More |
| Good        | 17 - 22    |
| Fair        | 11 - 16    |
| Poor        | 10 or Less |

**12**

**Pollution Tolerance Index Rating**  
(Add the final index values for each group)

*[Handwritten signature]*



# Biological Monitoring Data Sheet

Date: 07 / 02 / 2024

Sampler ID: \_\_\_\_\_

Site ID: Site-4

Stream Name: \_\_\_\_\_

Time 9:30 AM / PM

Time Sampling: 1:30 hrs

Air Temp.: 22.5 °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)

☐ Snags/Vegetation

☐ Sediment

Check Habitats Sampled:

☐ Undercut Banks

☐ Leaf Packs

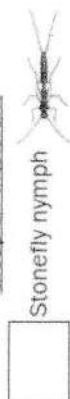
☐ Snags/Vegetation

☐ 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



☐



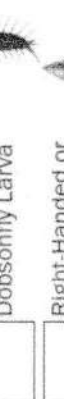
☐



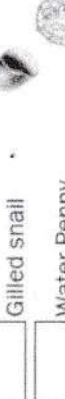
☐



☐



☐



☐



☐

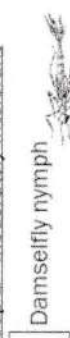
# of TAXA represented

☐

Weighting Factor (x4)

☐

### Group 2 - Moderately Intolerant



☐



☐



☐



☐



☐



☐



☐

# of TAXA represented

☐

Weighting Factor (x3)

☐

### Group 3 - Fairly Tolerant



☐



☐



☐



☐

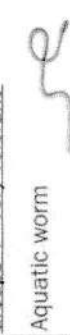
# of TAXA represented

☐

Weighting Factor (x2)

☐

### Groups 4 - Very Tolerant



☐



☐



☐



☐

# of TAXA represented

☐

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

*[Handwritten signature]*

# Biological Monitoring Data Sheet

Date: 07 / 02 / 2024

Sampler ID: \_\_\_\_\_

Site ID: Site-5

Stream Name: \_\_\_\_\_

Time 11 : 45 AM / PM

Time Sampling: 1:15 hrs

Air Temp.: 23.7 °C

Current Weather:

☒ Clear/Sunny

☐ Overcast

☐ Showers

☐ Storm ( Heavy)

Worst Weather (past 48 hours):

☒ Clear/Sunny

☐ Overcast

☐ Showers

☐ Storm ( Heavy)

Check Methods Used:

☐ Kick Seine Net (3 times)

☐ Dip Net (20 jabs or scoops)

Check Habitats Sampled:

☐ Undercut Banks

☐ 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                        |  | Group 4 - Very Tolerant                             |   |
|--|--|--|--|--|--|---|---|
| <input type="checkbox"/> Stonefly nymph        | <input type="checkbox"/> Damselfly nymph       | <input type="checkbox"/> Leech                 | <input type="checkbox"/> Aquatic worm          | <input type="checkbox"/> Blood midge larva (red) | <input type="checkbox"/> Rat-tailed Maggot     | <input type="checkbox"/> Left-Handed or Pouch snail | <input type="checkbox"/> Right-Handed or Gilled snail |
| <input type="checkbox"/> Mayfly nymph          | <input type="checkbox"/> Dragonfly nymph       | <input type="checkbox"/> Midge larva           | <input type="checkbox"/> Planaria/Flatworm     | <input type="checkbox"/> Black fly larva         |  |   |   |
| <input type="checkbox"/> Caddisfly larva       | <input type="checkbox"/> Scud                  | <input type="checkbox"/> Sowbug                |  |  |  |   |   |
| <input type="checkbox"/> Riffle Beetle         | <input type="checkbox"/> Crane fly larva       | <input type="checkbox"/> Clam/Mussel           |  |  |  |   |   |
| <input type="checkbox"/> Dobsonfly Larva       | <input type="checkbox"/> Crayfish              | <input type="checkbox"/> Crayfish              |  |  |  |   |   |
| <input type="checkbox"/> # of TAXA represented | <input type="checkbox"/> # of TAXA represented | <input type="checkbox"/> # of TAXA represented | <input type="checkbox"/> # of TAXA represented | <input type="checkbox"/> # of TAXA represented   | <input type="checkbox"/> # of TAXA represented | <input type="checkbox"/> # of TAXA represented      | <input type="checkbox"/> # of TAXA represented        |
| <input type="checkbox"/> Weighting Factor (x4) | <input type="checkbox"/> Weighting Factor (x3) | <input type="checkbox"/> Weighting Factor (x2) | <input type="checkbox"/> Weighting Factor (x1) | <input type="checkbox"/> Weighting Factor (x1)   | <input type="checkbox"/> Weighting Factor (x1) | <input type="checkbox"/> Weighting Factor (x1)      | <input type="checkbox"/> Weighting Factor (x1)        |

## Pollution Tolerance Index Rating

(Add the final index values for each group)

14

| PTI Ratings |            |
|-------------|------------|
| Excellent   | 23 or More |
| Good        | 17 - 22    |
| Fair        | 11 - 16    |
| Poor        | 10 or Less |

*[Handwritten signature]*



Site ID: Site-6

Stream Name:

Time 09:00 AM / PMTime Sampling: 1.30 hrs

Air Temp.: 21.9 °C

Current Weather:

☒ Clear/Sunny

Overcast ☐

☐ Rain (steady) ☐ Storm ( Heavy)

Worst Weather (past 48 hours):

☒ Clear/Sunny☐ Overcast☐ Rain (steady) ☐ Storm ( Heavy)

Check Methods Used:

☐ Kick Seine Net (3 times)

20 jabs or scoops)

Check Habitats Sampled:




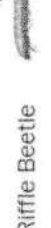

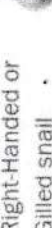









☐ Undercut Banks

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                     |  |  |  |  |                           |  |  |  |  | 13  |   |   |   |  |  |  |
| # of TAXA represented   |   |   |   |   |   |   | # of TAXA represented |  |  |  |  |                           | # of TAXA represented  |  |  |  | # of TAXA represented   |   |   |   |  |  |  |
| Weighting Factor (x4)   |   |   |   |   |   |   | Weighting Factor (x3) |  |  |  |  |                           | Weighting Factor (x2)  |  |  |  | Weighting Factor (x1)   |   |   |   |  |  |  |
|   |   |   |   |   |   |   | 9                     |  |  |  |  |                           | 4  |  |  |  | 2   |   |   |   |  |  |  |

## Pollution Tolerance Index Rating

(Add the final index values for each group)

51

|                      |
|----------------------|
| <b>PTI Ratings</b>   |
| Excellent 23 or More |
| Good 17 - 22         |
| Fair 11 - 16         |
| Poor 10 or Less      |

|                      |  |
|----------------------|--|
| Excellent 23 or more |  |
| Good 17-22           |  |

|      |       |
|------|-------|
| Fair | 11-16 |
|------|-------|

|      |            |
|------|------------|
| Poor | 10 or Less |
|------|------------|



# Biological Monitoring Data Sheet

Date: 08 / 02 / 2024 Sampler ID: \_\_\_\_\_ Site ID: Site-7

Stream Name: \_\_\_\_\_

Time 12:00 AM / PM ✓

Time Sampling: 1:30 hrs

Air Temp.: 23.8 °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 |                       | Group 4 - Very Tolerant  |                            |
|--------------------------|------------------------------|---------------------------------|-----------------------|---------------------------|-----------------------|--------------------------|----------------------------|
| <input type="checkbox"/> | Stonefly nymph               | <input type="checkbox"/>        | Damselfly nymph       | <input type="checkbox"/>  | Leech                 | <input type="checkbox"/> | Aquatic worm               |
| <input type="checkbox"/> | Mayfly nymph                 | <input type="checkbox"/>        | Dragonfly nymph       | <input type="checkbox"/>  | Midge larva           | <input type="checkbox"/> | Blood midge larva (red)    |
| <input type="checkbox"/> | Caddisfly larva              | <input type="checkbox"/>        | Scud                  | <input type="checkbox"/>  | Planaria/Flatworm     | <input type="checkbox"/> | Rat-tailed Maggot          |
| <input type="checkbox"/> | Riffle Beetle                | <input type="checkbox"/>        | Sowbug                | <input type="checkbox"/>  | Black fly larva       | <input type="checkbox"/> | Left-Handed or Pouch snail |
| <input type="checkbox"/> | Dobsonfly Larva              | <input type="checkbox"/>        | Cranefly larva        | <input type="checkbox"/>  |                       | <input type="checkbox"/> |                            |
| <input type="checkbox"/> | Right-Handed or Gilled snail | <input type="checkbox"/>        | Clam/Mussel           | <input type="checkbox"/>  |                       | <input type="checkbox"/> |                            |
| <input type="checkbox"/> | Water Penny                  | <input type="checkbox"/>        | Crayfish              | <input type="checkbox"/>  |                       | <input type="checkbox"/> |                            |
| <input type="checkbox"/> | # of TAXA represented        | <input type="checkbox"/>        | # of TAXA represented | <input type="checkbox"/>  | # of TAXA represented | <input type="checkbox"/> | # of TAXA represented      |
| <input type="checkbox"/> | Weighting Factor (x4)        | <input type="checkbox"/>        | Weighting Factor (x3) | <input type="checkbox"/>  | Weighting Factor (x2) | <input type="checkbox"/> | 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 |

*Handwritten signature*

# Biological Monitoring Data Sheet

Date: 08 / 02 / 2024 Stream Name: \_\_\_\_\_

Sampler ID: \_\_\_\_\_

Site ID: Site-8

Time: 3:15 AM / PM

Time Sampling: 1:0 hrs

Air Temp.: 22.9 °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 ☐ Riffls ☐ 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                        |  | Group 4 - Very Tolerant                             |  |
|---|--|--|--|--|--|---|--|
| <input type="checkbox"/> Stonefly nymph               | <input type="checkbox"/> Damselfly nymph       | <input type="checkbox"/> Leech                 | <input type="checkbox"/> Aquatic worm          | <input type="checkbox"/> Blood midge larva (red) | <input type="checkbox"/> Rat-tailed Maggot     | <input type="checkbox"/> Left-Handed or Pouch snail | <input type="checkbox"/>                       |
| <input type="checkbox"/> Mayfly nymph                 | <input type="checkbox"/> Dragonfly nymph       | <input type="checkbox"/> Midge larva           | <input type="checkbox"/>                       | <input type="checkbox"/>                         | <input type="checkbox"/>                       | <input type="checkbox"/>                            | <input type="checkbox"/>                       |
| <input type="checkbox"/> Caddisfly larva              | <input type="checkbox"/> Scud                  | <input type="checkbox"/> Planaria/Flatworm     | <input type="checkbox"/>                       | <input type="checkbox"/>                         | <input type="checkbox"/>                       | <input type="checkbox"/>                            | <input type="checkbox"/>                       |
| <input type="checkbox"/> Riffle Beetle                | <input type="checkbox"/> Sowbug                | <input type="checkbox"/> Black fly larva       | <input type="checkbox"/>                       | <input type="checkbox"/>                         | <input type="checkbox"/>                       | <input type="checkbox"/>                            | <input type="checkbox"/>                       |
| <input type="checkbox"/> Dobsonfly Larva              | <input type="checkbox"/> Crane fly larva       | <input type="checkbox"/>                       | <input type="checkbox"/>                       | <input type="checkbox"/>                         | <input type="checkbox"/>                       | <input type="checkbox"/>                            | <input type="checkbox"/>                       |
| <input type="checkbox"/> Right-Handed or Gilled snail | <input type="checkbox"/> Clam/Mussel           | <input type="checkbox"/>                       | <input type="checkbox"/>                       | <input type="checkbox"/>                         | <input type="checkbox"/>                       | <input type="checkbox"/>                            | <input type="checkbox"/>                       |
| <input type="checkbox"/> Water Penny                  | <input type="checkbox"/> Crayfish              | <input type="checkbox"/>                       | <input type="checkbox"/>                       | <input type="checkbox"/>                         | <input type="checkbox"/>                       | <input type="checkbox"/>                            | <input type="checkbox"/>                       |
| <input type="checkbox"/> # of TAXA represented        | <input type="checkbox"/> # of TAXA represented | <input type="checkbox"/> # of TAXA represented | <input type="checkbox"/> # of TAXA represented | <input type="checkbox"/> # of TAXA represented   | <input type="checkbox"/> # of TAXA represented | <input type="checkbox"/> # of TAXA represented      | <input type="checkbox"/> # of TAXA represented |
| <input type="checkbox"/> Weighting Factor (x4)        | <input type="checkbox"/> Weighting Factor (x3) | <input type="checkbox"/> Weighting Factor (x2) | <input type="checkbox"/> Weighting Factor (x1) | <input type="checkbox"/> Weighting Factor (x1)   | <input type="checkbox"/> Weighting Factor (x1) | <input type="checkbox"/> Weighting Factor (x1)      | <input type="checkbox"/> 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 |

*[Handwritten signature]*



# Biological Monitoring Data Sheet

Date: 09 / 02 / 2024 Stream Name: \_\_\_\_\_  
 Sampler ID: \_\_\_\_\_ Site ID: Site-9

Time Sampling: 1:30 hrs Air Temp.: 23.1 °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 |                       | Group 4 - Very Tolerant  |                            |
|--------------------------|------------------------------|---------------------------------|-----------------------|---------------------------|-----------------------|--------------------------|----------------------------|
| <input type="checkbox"/> | Stonefly nymph               | <input type="checkbox"/>        | Damselfly nymph       | <input type="checkbox"/>  | Leech                 | <input type="checkbox"/> | Aquatic worm               |
| <input type="checkbox"/> | Mayfly nymph                 | <input type="checkbox"/>        | Dragonfly nymph       | <input type="checkbox"/>  | Midge larva           | <input type="checkbox"/> | Blood midge larva (red)    |
| <input type="checkbox"/> | Caddisfly larva              | <input type="checkbox"/>        | Scud                  | <input type="checkbox"/>  | Planaria/Flatworm     | <input type="checkbox"/> | Rat-tailed Maggot          |
| <input type="checkbox"/> | Riffle Beetle                | <input type="checkbox"/>        | Sowbug                | <input type="checkbox"/>  | Black fly larva       | <input type="checkbox"/> | Left-Handed or Pouch snail |
| <input type="checkbox"/> | Dobsonfly Larva              | <input type="checkbox"/>        | Cranefly larva        | <input type="checkbox"/>  |                       | <input type="checkbox"/> |                            |
| <input type="checkbox"/> | Right-Handed or Gilled snail | <input type="checkbox"/>        | Clam/Mussel           | <input type="checkbox"/>  |                       | <input type="checkbox"/> |                            |
| <input type="checkbox"/> | Water Penny                  | <input type="checkbox"/>        | Crayfish              | <input type="checkbox"/>  |                       | <input type="checkbox"/> |                            |
| <input type="checkbox"/> | # of TAXA represented        | <input type="checkbox"/>        | # of TAXA represented | <input type="checkbox"/>  | # of TAXA represented | <input type="checkbox"/> | # of TAXA represented      |
| <input type="checkbox"/> | Weighting Factor (x4)        | <input type="checkbox"/>        | Weighting Factor (x3) | <input type="checkbox"/>  | Weighting Factor (x2) | <input type="checkbox"/> | Weighting Factor (x1)      |

## Pollution Tolerance Index Rating

(Add the final index values for each group)

16

| PTI Ratings |            |
|-------------|------------|
| Excellent   | 23 or More |
| Good        | 17 - 22    |
| Fair        | 11 - 16    |
| Poor        | 10 or Less |

*Don*





# Biological Monitoring Data Sheet

Date: 09/02/2024 Site ID: Sire-11

Sampler ID: \_\_\_\_\_

Stream Name: \_\_\_\_\_

Time 2:30 AM / PM

Time Sampling: 1:15 hrs

Air Temp.: 23.2 °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 |                       | Group 4 - Very Tolerant  |                            |
|--------------------------|------------------------------|---------------------------------|-----------------------|---------------------------|-----------------------|--------------------------|----------------------------|
| <input type="checkbox"/> | Stonefly nymph               | <input type="checkbox"/>        | Damselfly nymph       | <input type="checkbox"/>  | Leech                 | <input type="checkbox"/> | Aquatic worm               |
| <input type="checkbox"/> | Mayfly nymph                 | <input type="checkbox"/>        | Dragonfly nymph       | <input type="checkbox"/>  | Midge larva           | <input type="checkbox"/> | Blood midge larva (red)    |
| <input type="checkbox"/> | Caddisfly larva              | <input type="checkbox"/>        | Scud                  | <input type="checkbox"/>  | Planaria/Flatworm     | <input type="checkbox"/> | Rat-tailed Maggot          |
| <input type="checkbox"/> | Riffle Beetle                | <input type="checkbox"/>        | Sowbug                | <input type="checkbox"/>  | Black fly larva       | <input type="checkbox"/> | Left-Handed or Pouch snail |
| <input type="checkbox"/> | Dobsonfly Larva              | <input type="checkbox"/>        | Cranefly larva        | <input type="checkbox"/>  |                       | <input type="checkbox"/> |                            |
| <input type="checkbox"/> | Right-Handed or Gilled snail | <input type="checkbox"/>        | Clam/Mussel           | <input type="checkbox"/>  |                       | <input type="checkbox"/> |                            |
| <input type="checkbox"/> | Water Penny                  | <input type="checkbox"/>        | Crayfish              | <input type="checkbox"/>  |                       | <input type="checkbox"/> |                            |
| <input type="checkbox"/> | # of TAXA represented        | <input type="checkbox"/>        | # of TAXA represented | <input type="checkbox"/>  | # of TAXA represented | <input type="checkbox"/> | # of TAXA represented      |
| <input type="checkbox"/> | Weighting Factor (x4)        | <input type="checkbox"/>        | Weighting Factor (x3) | <input type="checkbox"/>  | Weighting Factor (x2) | <input type="checkbox"/> | Weighting Factor (x1)      |

| PTI Ratings |            |
|-------------|------------|
| Excellent   | 23 or More |
| Good        | 17 - 22    |
| Fair        | 11 - 16    |
| Poor        | 10 or Less |

## Pollution Tolerance Index Rating

(Add the final index values for each group)

16

*ACE*