

**IN THE SUPREME COURT OF INDIA
CIVIL APPELLATE JURISDICTION**

CIVIL APPEAL NO.2201 OF 2021

IN THE MATTER OF:

BONANI KAKKAR

...APPELLANT

VERSUS

OIL INDIA LIMITED & ORS.

...RESPONDENTS

**COUNTER AFFIDAVIT ON BEHALF OF OIL INDIA
LIMITED (RESPONDENT NO.1) TO CIVIL APPEAL AND
FINAL REPORT DATED 31.12.2021.**

PAPER BOOK

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M/S TRUST LEGAL

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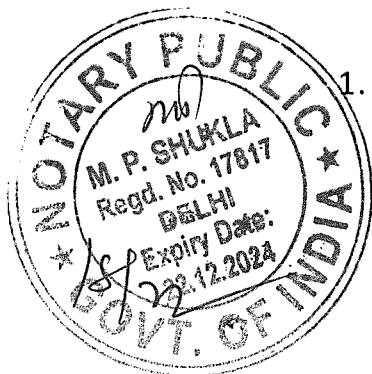
VERSUS

OIL INDIA LIMITED & ORS.

...RESPONDENTS

**COUNTER AFFIDAVIT ON BEHALF OF OIL INDIA LIMITED
(RESPONDENT NO.1) TO CIVIL APPEAL AND FINAL REPORT
DATED 31.12.2021**

I, Dr. Kumudani Sharma, aged 51 years, Dy. General Manager (Legal), the Authorized Signatory of M/s Oil India Limited ("OIL"), the Answering Respondent Company having its Corporate Office at Plot No. 19, Sector 16 A, Film City, Noida – 201301, Uttar Pradesh, presently in Delhi, and duly authorized vide a General Power of Attorney dated 12.09.2021, do hereby solemnly affirm and submit as under:



1. I state that in my Official capacity, I am well acquainted with the facts and circumstances of the present case on the basis of the records maintained by the Answering Respondent thereof and as such I am competent to swear the instant Affidavit on behalf of the Answering Respondent Company.

Dr. Kumudani Sharma
DGM (Legal)
Oil India Limited
Authorized Signatory

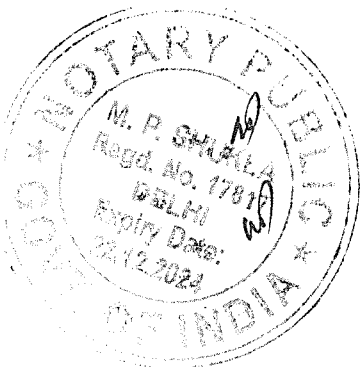
2. I state that I have read and understood the contents of the captioned Civil Appeal and the Final Report dated 31.12.2021 ("**Final Report**") submitted by the Expert Committee constituted *vide* order dated 02.09.2021 passed by this Hon'ble Court and I am filing the instant Counter Affidavit in response to the captioned Appeal and Final Report to bring on record the correct facts and circumstances of the captioned case.
3. I, on behalf of the Answering Respondent Company, hereby deny and dispute all facts stated, contentions raised, and grounds urged in the captioned Appeal and the Final Report, save and except otherwise which are specifically and unequivocally admitted in the instant Counter Affidavit.

I. **BRIEF SUBMISSION ON FACTS**

4. That the present Appeal has been filed by the Appellant solely on the basis of assumptions without any substance being devoid of both merits and law, while failing to appreciate that the blowout and fire incident which occurred at Baghjan Well No.5 was an accident which had occurred. Further, there is no negligence attributable to the manner in which the drilling was approved and being carried out by the Answering Respondent since the year 2006 with the requisite approvals having been applied

Dr. Kumudani Sharma
Oil India Limited
Authorised Signatory

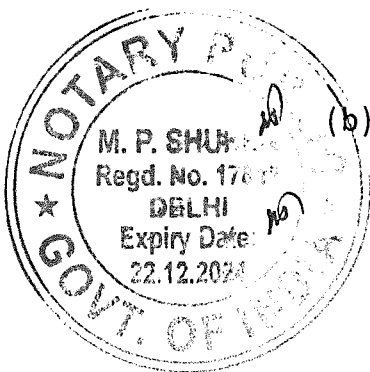
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for in a timely manner. It is in this backdrop that the Answering Respondent seeks to bring on record the true narration of events to understand the manner in which the Answering Respondent was carrying out the drilling operations and various steps taken by the Answering Respondent to ensure the restoration of the environment post the blowout and the fire incident(s);

- (a) That the Answering Respondent, M/s Oil India Ltd. is a Central Government Company under the Ministry of Petroleum and Natural Gas ("MoPNG"), having its registered office at Duliajan, Assam in the district of Dibrugarh and is *inter alia* engaged in the business of exploration, development and production of crude oil and natural gas, transportation of crude oil and extraction and bottling of LPG. It is hereby submitted that the Answering Respondent's operational areas are spread in the States of Assam, Orissa, Rajasthan, Andhra Pradesh, Mizoram, Andaman & Nicobar, Tripura and Arunachal Pradesh.



- (b) That the Baghjan structure was identified by the Answering Respondent way back in the year 1991 followed by exploration work leading to the discovery of oil and gas in Baghjan area in the year 2003, pursuant to which the Answering Respondent was granted the Petroleum Mining Lease ("PML") under the Petroleum and Natural Gas Rules, 1959 under Rule 5(i)(ii) for an

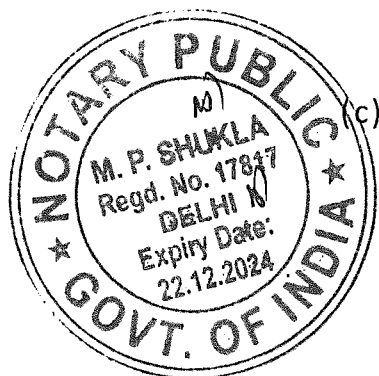
Dr. Kundan Sharma
DGM (Legal)
Oil India Limited
Authorized Signatory

area of 75 sq.km. which follows the boundary of Dibru Saikhowaghat Reserve Forest for carrying out Exploration and Production activities for a period of twenty (20) years *w.e.f.* 14.05.2003 by the State of Assam with prior approval from the Ministry of Petroleum and Natural Gas, Government of India. As per the terms of the PML, the Answering Respondent is permitted to carry out survey for oil exploration in the reserved forest area falling in such leased area without optioning prior clearance of Ministry of Environment, Forests and Climate Change ("**MoEF&CC**"), Government of India the under the Forest (Conservation) Act, 1980 so long as the survey does not involve cutting of trees. A copy of the order dated 15.04.2004 issued by the Ministry of Petroleum and Natural Gas, thereby, granting the Petroleum Mining Lease to the Answering Respondent along with its True Typed is hereby annexed herewith and marked as **Annexure-R1**.

A. ANSWERING RESPONDENT'S STATUTORY COMPLIANCES AND CLEARANCES

(c) That the drilling operations of Baghjan Well No.5 started in the month of November 2006 *i.e.*, just after the Environment Impact Assessment Notification No. S.O. 1533 of 14.09.2006 was published by Ministry of Environment and Forests ("**MoEF**"), however, preparatory works started prior to the aforesaid

Df. Kumudani Sharma
DG (Legal)
Oil India Limited
Authorised Signatory



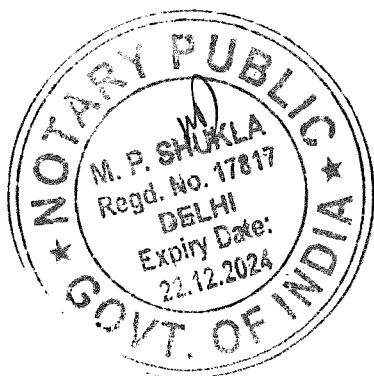
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Notification of 2006. Prior to the drilling operations of the Baghjan Well No.5 on 20.11.2006, the Answering Respondent had applied for the mandatory statutory compliances and clearances as per the requisite applicable laws under the;

- (i) Water (Prevention and Control of Pollution) Act, 1974 ("**Water Act**"),
- (ii) Air (Prevention and Control of Pollution) Act, 1981 ("**Air Act**"); and
- (iii) Hazardous Wastes (Management and Handling) Rules, 1989 ("**Hazardous Waste Management Rules**");

for the purposes of seeking Consent to Establish ("**CTE**") which is applied at the time inception of the establishment and Consent to Operate ("**CTO**") which is applied for and renewed on yearly basis for the purposes of production in the Wells.

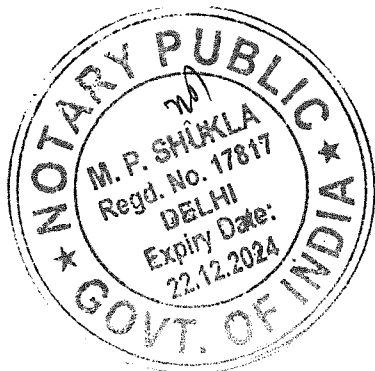
- (d) It is respectfully submitted that a drilling operation is a temporary mobile-setup and after completion of the drilling of the Well, if it becomes a producing well, then the Well becomes part of the Production Installation System. In the instant case, the Baghjan Well No.5 became part of the Baghjan-Early Production System ("**EPS**") since, 13.06.2008, when the Baghjan EPS was put in operation and the Well started production only in the year 2015.



Dr. Kumudani Sharma
 (DGM (Legal))
 Oil India Limited
 Authorised Signatory

CONSENT TO ESTABLISH (CTE)/CONSENT TO OPERATE (CTO)

- (e) That the Answering Respondent has regularly made the requisite applications before the Pollution Control Board of Assam ("PCBA") as per the application format under a Common Application under Water Act, Air Act and authorization under Hazardous Waste Management Rules. Therefore, PCBA has been accepting such Common Application Forms since 2006 without any objection and further, renewing the consents which were granted/ deemed to be granted. However, after implementation of online system, the Answering Respondent has submitted separate applications since the year 2019-2020.
- (f) That it is pertinent to bring to the notice of this Hon'ble Court that under section 25(7) of the Water Act, the consent is deemed to be given unconditionally on the expiry of a period of four (04) months of making an application, if not refused. Although there is no deeming provision in the Air Act, but section 21(4) of the Air Act clearly makes it mandatory to the Pollution Control Board to grant consent within a period of four (04) months from the date of application. Hence, the consent was deemed to have been granted to the Answering Respondent by the PCBA as envisaged in the statutes.

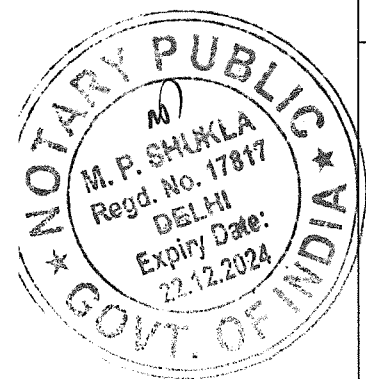


Dr. Kumudani Sharma
 DGM (Legal)
 Dr. India Limited
 Authorized Signatory

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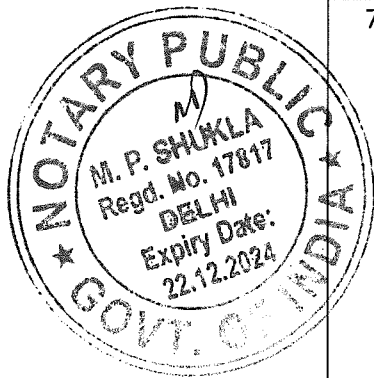
- (g) That the PCBA has not conveyed any information to the Expert Committee regarding any Order rejecting the application/s made by the Answering Respondent with regard to the Consent To Operate.
- (h) That the Consent was Deemed to be granted by PCBA to the Answering Respondent for the following years, viz. 2006-07, 2009-10, 2010-11, 2011-12, 2013-14, 2014-15, 2015-16, 2016-17, 2017-18, 2019-20. The copies of the Consents accorded for the years between 2006-2022 to the Answering Respondent by the PCBA are annexed herewith and marked as **Annexure-R2(Colly.)**. The detailed chart is given below;

S.No.	Application Year	Consent Date and Number	Remarks
1.	For the year 2006-2007 [Annexure-R2/A]	Consent deemed to be granted on 12.11.2006.	Application dated 05.07.2006 bearing reference no. S&E/E/20/723, received by Regional Office of Pollution Control Board on 13.07.2006
2.	For the year 2007-2008 [Annexure-R2/B]	Consent dated 13.02.2008 bearing reference no. WB/Z-I/T-879/94-95/140/991	For production Operations at Digboi Field, where the Baghjan EPS is situated. Granted with Effect from 01.04.2007 to 31.03.2008



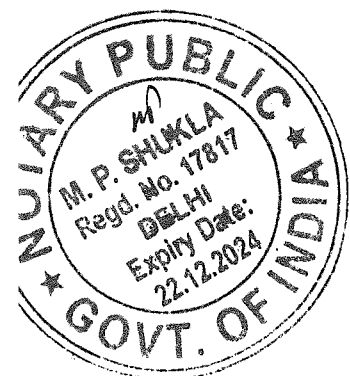
Dr. Kumudanti Sharma
DGM (Legal)
Oil India Limited
Authorised Signatory

3.	For the year 2008-2009 [Annexure-R2/C]	Consent dated 09.03.2009 bearing reference no. WB/Z-I/T-877/94-95/192/854	For production Operations at Digboi Field, where the Baghjan EPS is situated. Granted with Effect from 01.04.2008 to 31.03.2009
4.	For the year 2009-2010 [Annexure-R2/D]	Consent deemed to be granted on 19.11.2009.	Application dated 18.07.2009 bearing Reference No. S&E/E/20/825 received by the Regional Office on 18.07.2009
5.	For the year 2010-2011 [Annexure-R2/E]	Consent deemed to be granted on 16.09.2010.	Application dated 30.04.2010 bearing Reference No. S&E/E/20/499 received by the Regional Office on 17.05.2010
6.	For the year 2011-2012 [Annexure-R2/F]	Consent deemed to be granted on 24.08.2011.	Application dated 20.04.2011 bearing Reference No. S&E/E/20/464 received by the Regional Office on 25.04.2011
7.	For the year 2012-2013 [Annexure-R2/G]	Consent dated 09.11.2012 bearing reference no. WB/Z-I/T-879/94-95/441	For production Operations at Digboi Field, where the Baghjan EPS is situated. Granted with Effect from 01.04.2012 to 31.03.2013.



Dr. Kumudani Sharma
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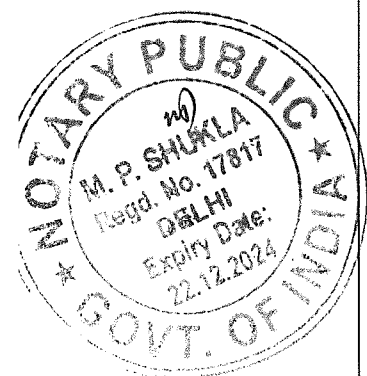
8.	For the year 2013-2014 [Annexure-R2/H]	Consent deemed to be granted on 17.11.2013.	Application dated 11.03.2013 bearing Reference No. S&E/E/20/306 received by the Regional Office on 18.07.2013.
9.	For the year 2014-2015 [Annexure-R2/I]	Consent deemed to be granted on 02.10.2014.	Application dated 14.03.2014 bearing Reference No. S&E/E/20/275 received by the Regional Office on 03.06.2014
10.	For the year 2015-2016 [Annexure-R2/J]	Consent deemed to be granted on 15.09.2015.	Application dated 27.03.2015 bearing Reference No. S&E/E/20/411 received by the Regional Office on 16.05.2015
11.	For the year 2016-2017 [Annexure-R2/K]	Consent deemed to be granted on 24.12.2016.	Application dated 26.02.2016 bearing Reference No. S&E/E/20/473
12.	For the year 2017-2018 [Annexure-R2/L]	Consent deemed to be granted on 27.04.2018.	Common Application dated 14.03.2017 bearing Reference No. S&E/E/20/422 received by the Regional Office on 28.12.2017.
13.	For the year 2018-2019 [Annexure-R2/M]	Consent dated 11.05.2020.	UAIN: PCB/F50/DI/006082/O 1/2019 UBIN: AA29303/AK002352 C/01/2019



Authorised Signatory
DGM (Legal)
Oil India Limited

			The Consent To Operate was valid upto 31.03.2019.
14.	For the year 2019-2020 [Annexure-R2/N]	As per the records of the PCBA, the Application was received by PCBA on 14.10.2019 and query was forwarded to the Head Office of PCBA on 20.03.2020. However, due to the nation-wide lockdown, the financial year 2019-2020 got concluded. Further, an email dated 29.05.2020 was received by the Answering Respondent from PCBA for the purposes of depositing fees for the year 2020-2021.	Application dated 09.10.2019 bearing Unique Application Identification Number: PCB/F50/DI/008318/10/2019.
15.	For the year 2020-2021 [Annexure-R2/O]	Application seeking CTO was made online by the Answering Respondent on 12.01.2021 and Letter dated 18.01.2021 bearing reference no. S&E/E/20/103 was sent to the Pollution Control Board regarding the same filing of online	In view of the non-functioning of the portal, Application through Letter dated 22.06.2020 bearing reference no. S&E/E/121/814 was submitted through offline mode by the Answering Respondent which was received by PCBA on 22.06.2020. PCBA replied to the

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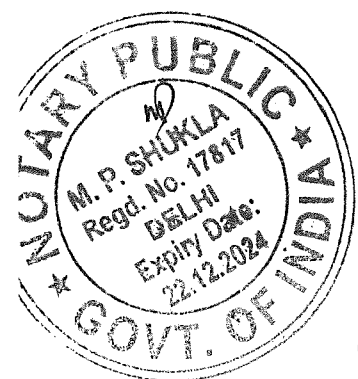
		Application by the Answering Respondent.	Renewal Application vide its Letter dated Nov, 2020 bearing reference no. WB/DIB/T-396-08-09/479/951 thereby to apply through the new online portal of PCBA.
16.	For the year 2021-2022 [Annexure-R2/P]	Consent dated 09.09.2021 bearing reference no. WB/T-282/20-21/170/185	Online application No. 308551. The Consent to Operate granted was valid upto 31.03.2022.
17.	For the year 2022-2026 [Annexure-R2/Q]	Consent dated 10.01.2022 bearing reference no. W/B/T-282/20-21/210/1518	The CTO is valid for a period up to 31.03.2026.

ENVIRONMENTAL CLEARANCES

(i) That the Environment Impact Assessment ("EIA") Gazette Notification No.S.O.60(E) dated 27.01.1994 issued by MoEF was applicable for the project value of INR 50 crores and above. However, since project cost of drilling the well was less than the prescribed limit, Environment Clearance ("EC") was not required prior to the EIA Gazette Notification No.S.O. 1533 dated 14.09.2006.

(j) That the Answering Respondent had applied for the EC by submitting the Form-I and the proposed TOR *vide* Letter dated 19.11.2007 bearing reference no. GM(OD&RS):2/10-200- which was granted

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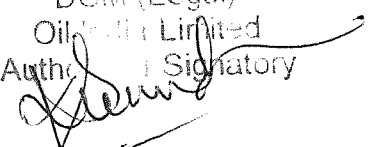


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28.02.2008. Thereafter, on 01.11.2011, MoEF&CC granted the Environmental Clearance to the Answering Respondent for drilling of development and exploratory wells at North-Hapjan-Tinsukia-Dhola in Tinsukia District Assam. It is pertinent to submit that in the said EC, it was *inter alia* observed that no national park/ wildlife sanctuaries/ ecological sensitive area is located within 10km. A copy of the Environment Clearance dated 01.11.2011 bearing file no. J-11011/1255/2007-IAII(I) is annexed herewith and marked as **Annexure-R3**.

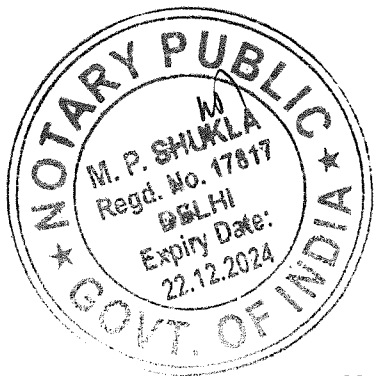
- (k) That, for the purposes of regular ongoing renewal of the valid EC, the Terms of Reference submitted on 12.11.2016 were granted on 08.09.2017 by the MoEF&CC, for onshore oil and gas development drilling and production involving onshore drilling of additional 179 wells, production facilities, and laying of assorted oil and gas flowlines/ delivery lines by the Answering Respondent in District Tinsukia, Assam. It is pertinent to submit that based on the proposal submitted by the Answering Respondent and as per the recommendations of the Expert Appraisal Committee (Industry-3), MoEF&CC had accorded Environment Clearance to the Answering Respondent on 28.12.2020 bearing file no. F.No. J-11011/375/2016-IAII(I). A copy of Environmental Clearance dated 28.12.2020 bearing file No. F.No. J-11011/375/2016-IA II(I) is annexed herewith and marked as **Annexure-R4**.

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- (I) That it is pertinent to submit that the Expert Appraisal Committee while assessing the proposal submitted by the Answering Respondent, *inter alia* observed the following at the time of grant of the EC dated 28.12.2020 at the last para (*unnumbered*) under para 14 on page 5 and 6 of the EC dated 28.12.2020 *inter alia* observed;

"The Committee noted that the EIA/EMP (Environmental Impact Assessment/ Environmental Management Plan) report is in compliance of the ToR (Terms of Reference) issued for the project, reflecting the present environmental concerns and the projected scenario for all the environmental components. The Committee has found the baseline data and incremental GLC (Ground Level Concentration) due to the proposed project within NAAQ standards except PM10 & PM2.5. The Committee has also deliberated on the action plan of pollution mitigation measures and found to be addressing the issues in the study area and public hearing issues. Additional information submitted by the project proponent found to be satisfactory and addressing the concerns of the Committee."



HAZARDOUS WASTE AUTHORISATION

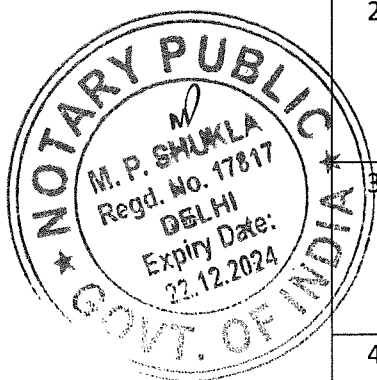
- (m) That it is submitted that the Answering Respondent was granted the Hazardous Waste Authorization by PCBA for a period of five (05) years from 15.06.2017 which was

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valid up to 15.06.2022. It is pertinent to submit that the Answering Respondent has applied for a renewal of the aforementioned Hazardous Waste Authorisation *vide* an Online Application dated 21.05.2022 bearing Application No.1292415 for which payment has also been made by the Answering Respondent *vide* Demand Draft dated 16.05.2022 bearing DD No.007863. The copies of the Hazardous Waste Applications/ Authorisations for the years 2013-2022 are annexed herewith and marked as **Annexure-R5(Colly.)**.

S. No.	Application Date	Particulars and Remarks
1.	Application dated 19.05.2004 bearing reference no. S&E/E/26/466 which was received by PCBA on 19.05.2004. [Annexure-R5/A]	Authorization dated 27.05.2004 bearing reference no. (i) WB/OTWA/HW/- 14/04-05/04-503; (ii) WB/OTWA/HW/- 14/04-05/04-504; (iii) WB/OTWA/HW/- 14/04-05/04-505 [Annexure-R5/B]
2.	Application dated 22.06.2009 bearing reference no. S&E/E/26/748 which was received by PCBA on 23.06.2009. [Annexure-R5/C]	--
3.	Application dated 11.03.2013 bearing reference no. S&E/E/26/328 which was received by PCBA on 10.04.2013. [Annexure-R5/D]	--
4.	Application dated 31.08.2016 bearing reference no. S&E/E/26/1645. [Annexure-R5/E]	Authorization granted on 15.06.2017 for a period of five (05) years which was valid up to 15.06.2022.



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		[Annexure-R5/F]
5.	Online Application dated 21.05.2022 bearing Application No.1292415 made for renewal of the previous Authorisation dated 15.06.2017. Payment made <i>vide</i> Demand Draft dated 16.05.2022 bearing no. 007863. [Annexure-R5/G]	Renewal Application submitted by the Answering Respondent.

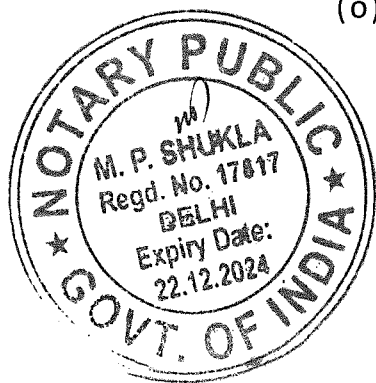
B. THE BLOWOUT INCIDENT

(n) That the Baghjan Well No.5 was successfully drilled by answering Respondent and thereafter, since September, 2015 was producing 88,000 Standard Cubic Meters Per Day (“SCMD”) of gas with 29 Kilo Litre Per Day (“KLPD”) condensate from 3870m langpar sand without any incidents. It was anticipated by the Geology & Reservoir Department that further production may lead to fast depletion of the reservoir pressure of the gas cap of BHN001 Block resulting in lesser recovery.

(o) That accordingly, the workover operations at Baghjan Well No.5 were commenced for the enhancement of production which was contracted to M/s John Energy Limited, rig was deployed to carry out the workover operations as per the terms and conditions of the contract entered into between the Answering Respondent and M/s John Energy Limited.

(p) That the workover operation commenced on 25.04.2020 and the initial objective was completed on 18.05.2020 as

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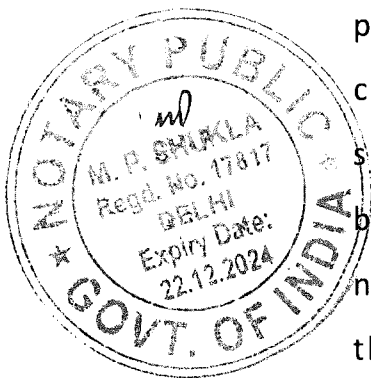


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per the work-over program. But after the perforation when the well was about to divert to Oil Collection Station (“OCS”), pressure rose in the casing side due to leakage from the tubing side. Hence, a decision was taken by the Answering Respondent to kill/subdue the Well on and again recomplete with same tubing.

(q) That while well killing/subduing, a pressure was observed at the outer casing which may have come from inner casing through a spool called Well Finish Spool (“WF Spool”). After the well was subdued/ killed (Sodium Format Solution was infused to cap the well pressure), tubing was being pulled out of the hole. During such process, the WF spool was tested which was found to be leaking and accordingly, it was decided to change the WF Spool.

(r) That prior to changing of WF spool, it was decided to put a secondary barrier as cement plug of 100m in the Well. Accordingly, a program was made to carry out cement plug job on 26.05.2020. On 27.05.2020, the operation for change of WF Spool was undertaken, however, the well suddenly became very active and resulted into a major blowout at around 10:30 am on 27.05.2020. Fortunately, no incident of any fire/injury/casualty, was observed at that given point in time.



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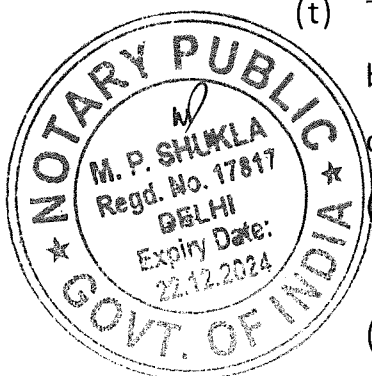
C. IMMEDIATE STEPS TAKEN POST OCCURRENCE OF THE BLOWOUT

(s) That it is pertinent to submit that the District Authority was immediately informed about the incident by the Answering Respondent and were also requested for support including support for addressing any law-and-order situation that could arise. Further, the Crisis Management Team ("CMT") members from Oil and Natural Gas Corporation Ltd. ("ONGC") and an Expert Team from ONGC, Vadodara, approached the Well Head along with the Answering Respondent, while taking all precautionary measures and opened the casing valve and started pumping water through the casing valve. Water was being pumped continuously through the valve into the Well Head. In addition to that 7-8 nos. water monitors were placed for spraying of water through fire pump continuously to cool the Well Head.

(t) That additionally, several arrangements were also made by the Answering Respondent to bring the Well under control such as:

- (i) Creation of facilities for pumping water to the blowing well.
- (ii) Infrastructure arrangement for capping the well.
- (iii) Pumping of sufficient water through the well annulus to make the flowing gas wet, thereby,

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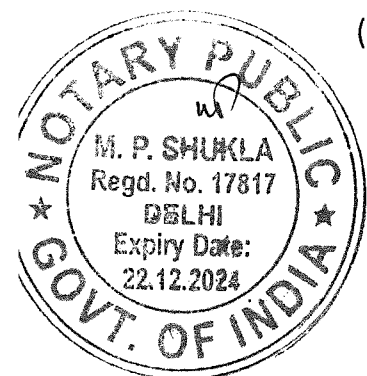
reducing gas condensate spread to the nearby areas.

- (iv) Adequate water spraying through fire service pumps and nozzles/monitors.
 - (v) Taking all adequate Health Safety and Environment ("HSE") related measures.
 - (vi) Continuous gas testing for Lower Explosive Limit ("LEL") level around the well-plinth area.
 - (vii) Fabricate hydraulically operated mechanized structure at the Answering Respondent's workshop for moving/ placing the Blow-Out-Preventer ("BOP") on the Well-Head.
 - (viii) The mock drill of the unit was done on 08.06.2020 at the workshop of the Answering Respondent.
- (u) That the Answering Respondent had also appointed three global experts from M/s Alert Disaster Control (Asia) Pte Ltd, Singapore ("ALERT") who worked on the blowout site since 08.06.2020.

D. THE FIRE INCIDENT

- (v) That despite the above measures, the blowout unfortunately caught fire on 09.06.2020 at 01:14 pm, immediately after which the Experts' team from ALERT assessed the conditions of the well at site in the presence of the Answering Respondent's team led by the Directors and ONGC, and CMT Team. There were violent

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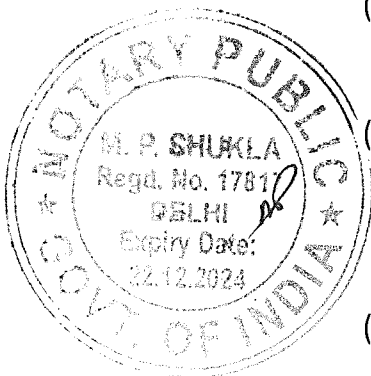


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protests around the well site by the local villagers who also threatened the Operating Personnel at the site along with damaging some vehicles because of which the Deputy Commissioner and Superintendent of Police, Tinsukia District immediately rushed to the site along with police force to control the situation.

(w) That thereafter, the Answering Respondent along with the experts from ONGC and ALERT team, immediately chalked out a new Plan of Action for controlling the well-under-fire under the direct instructions of the ALERT team which included the following measures:

- (i) Heat shielding of the working areas by suitable means.
- (ii) Clearing of all debris and damaged rig package and equipment from site.
- (iii) Arrange water [4,000-5,000 Gallons Per Minute] and pumping infrastructure.
- (iv) Arrange adequate drilling mud and pumping infrastructure.
- (v) Special tools and equipment used for controlling wells-under-fire mobilized from various sources nationally and internationally.
- (vi) Arranging to cap the well-under-fire by placing the BOP with the help of special tools after creating a continuous water umbrella.
- (vii) Subdue the well-under-fire by pumping drilling mud and kill the well immediately.



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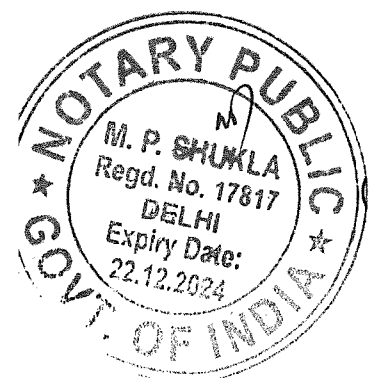
(viii) Bring the well under control.

- (x) That in the said incident, two fire service personnel of the Answering Respondent while on duty, unfortunately lost their lives by drowning in the nearby ponds. The Answering Respondent under its Social Security Scheme has adequately compensated the surviving members of the families of the deceased employees.
- (y) That incremental weather and flooding of the incident site on account of continuous rains for one (01) month, obstructions by local people etc. had severely affected the pace of the well control arrangements. However, the Answering Respondent despite various constraints made all possible efforts to extinguish the fire and control the well-under-fire which was subdued on 15.11.2020 through the process of snubbing and final abandonment of the well on 03.12.2020. The well killing operation was successfully completed.

E. RELIEF EFFORTS BY THE ANSWERING RESPONDENT POST 09.06.2020 TO CONTAIN THE BLOWOUT AND THE FIRE INCIDENT

- (z) That a number of efforts were undertaken by the Answering Respondent to evacuate the families from the nearby affected areas and a number of relief camps were also set up and all necessary supports for stay, food, water, toilets, electricity, medical and veterinary care

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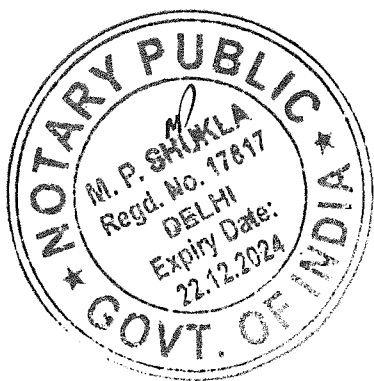
were provided by the Answering Respondent in accordance with the prevalent COVID-19 guidelines, with support from District Administration and local organizations.

(aa) That approximately more than 9000 people from the surrounding areas were accommodated in 12 relief camps set up by the Answering Respondent with the help of the District Administration, and arrangements for food and other basic needs were also made. As the situation was improving and conditions were being stabilized, people who were camping in the relief camps returned to their home in the local areas. Accordingly, the numbers of the relief camps also came down and as on 22.07.2020, approximately 5758 number of occupants were camped in 7 relief camps.

(bb) That the following measures were taken for the affected people by the Answering Respondent:

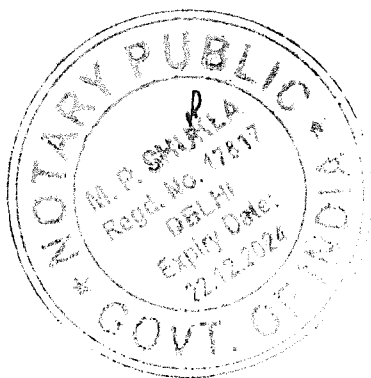
- (i) People in the Relief camps were being provided with food, bottled drinking water, bedding including mosquito nets, toilets and medical facilities.
- (ii) The Answering Respondent had assigned one designated officer for each relief camp to oversee the management of the relief camps.
- (iii) Regular visits with representatives of District Administration were done on a daily basis.

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- (iv) A daily status report was generated, and the compiled report was sent to the MoPNG and the District Authorities on a daily basis.
- (v) All the inmates of the relief camps were provided free medical assistance by the Answering Respondent. Medical cases required specialized treatment were referred to the Answering Respondent's Hospital. Few patients residing in the Relief Camps were also referred to Nursing Home in Dibrugarh for surgery and follow up treatment.
- (vi) A team of two (02) Doctors and about five (05) para-medics from the Answering Respondent were stationed 24/7 at the relief camps of the Answering Respondent with medicines and ambulances.
- (vii) Medical camps were regularly conducted in the relief camps by the Answering Respondent's doctors, local hospitals and army doctors. For example, on 22.07.2020 a total of 142 patients were examined and provided with immediate medical advice/medicines in five (05) camps.
- (viii) Daily Reports were also being submitted to the Deputy Commissioner, Tinsukia, MoPNG and State Authorities in a standard format.
- (ix) Medical cases reported with high fever symptoms of COVID-19 were referred to Assam Medical College Hospital, Dibrugarh for COVID-19 tests.



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- (x) The Answering Respondent provided food free of cost to all the inmates of the relief camps where the designated officers were periodically checking the quality of the food guided by the minimum nutrition to be provided to the inmates.
- (xi) Sanitization of the relief camps were also done on a regular basis.
- (xii) All expenditure towards providing food, health care facilities, animal fodder and baby foods for the occupants of the relief camps were borne by the Answering Respondent.

F. PROCEEDINGS BEFORE THE LD. NATIONAL GREEN TRIBUNAL

- (cc) That on 13.06.2020 an Original Application bearing O.A. No.43/2020/EZ was filed by the Appellant (the then Applicant before the Ld. National Green Tribunal) before the Ld. National Green Tribunal (“NGT”), Kolkata, Eastern Zone (“Application”) alleging failure of the Answering Respondent along with MoPNG, and MoEF&CC in preventing and/or managing the blowout that took place on 27.05.2020 and the resultant fire on 09.06.2020 in the Baghjan Well No.5, both of which had allegedly caused irreparable damage to the entire biodiversity of the Dibru Saikhowa National Park and Biosphere Reserve and prayed before the Ld. NGT to constitute an independent Committee of Experts, to visit the incident site and

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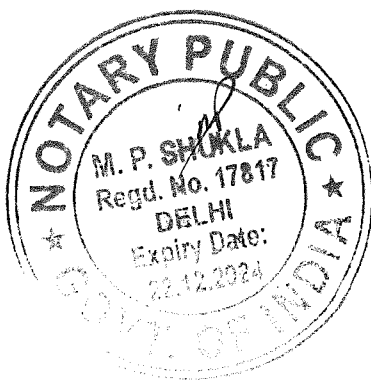
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submit a report to the Ld. NGT on various aspects of the disaster such as the sequence of events, causes of failure etc.

(dd) That the Ld. NGT *vide* its order dated 24.06.2020 constituted an eight-member committee under the Chairmanship of Hon'ble Mr. Justice B.P. Katakey, former Judge of the Guwahati High Court ("**NGT Committee**") to visit the incident site and the area-in-question and examine various aspects relating to the extent of loss and damage allegedly caused to the human life, wildlife and environment and the relating incidental aspects, thereto and submit its Preliminary Report, thereafter.

(ee) That the Answering Respondent was directed to deposit an initial amount of Rs.25 crores with the District Magistrate, Tinsukia District, Assam to meet the cost of remediation of the damage to the environment, bio-diversity, human, wildlife and public health subject to final assessment which was subsequently deferred by the Ld. NGT *vide* its order dated 02.07.2020 while disposing of an I.A. No.30 of 2020 filed by the Answering Respondent *inter alia* seeking modification/ recalling of the order dated 24.06.2020 passed by the Hon'ble Tribunals.

(ff) That a Preliminary Report dated 24.07.2020 was filed by the NGT Committee constituted by the Ld. NGT *vide* its



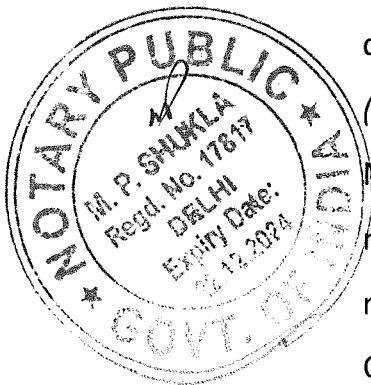
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order dated 24.06.2020 whereby the NGT Committee made various observations relating to the cause of accident, fixation of responsibility, immediate preventive measures to avoid similar blowout and explosions and also suggested *interim* measures including the compensation to the affected families and individuals.

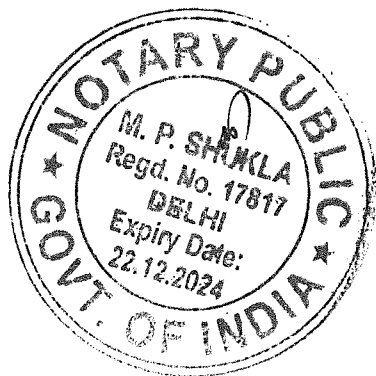
(gg) That the NGT Committee proposed the formulation of three (03) categories of affected families to assess the question of *interim* compensation and suggested the following scale wherein; under **category (i)** whose houses were completely gutted by fire were to be compensated with INR 25 Lakhs (*Rupees Twenty-Five Lakhs only*), for **category (ii)** whose houses were severely damaged were to be compensated with INR 10 Lakhs (*Rupees Ten Lakhs Only*) and; for **category (iii)** whose houses have been moderately/partially damaged or whose standing crops and horticulture were partially damaged were to be compensated with INR 2.5 Lakhs (*Rupees Two Lakhs Fifty Thousand Only*). Further, the NGT Committee proposed the setting up of a multidisciplinary team comprising of community members along with experts who will report to the NGT Committee and be responsible to formulate a restoration plan for the Maguri-Motapung Wetlands and also to ascertain the extent of damages and to fix the compensation for the purpose.



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(hh) That the Answering Respondent submitted its responses, counters and objections with respect to the allegations imputed and incorrect facts being recorded before the Hon'ble Tribunal, *vide* a Preliminary Affidavit on 27.07.2020. Further, the Answering Respondent filed its Objection dated 05.08.2020 to the Preliminary Report ("**Objection**") stating that the observations and findings of the NGT Committee were based on desk research and secondary data made available through reports and documents received from various stakeholders, hence, the data samples collected were needed to be further verified, which were evidently not done by the NGT Committee.

(ii) That as per the Answering Respondent it was premature to recommend compensation to the affected people without ascertaining the actual damage. Further, the Answering Respondent had already paid compensation amounting to Rs. 20 Lakhs (*Rupees Twenty Lakhs Only*) to each of the 11 families who had been identified by the concerned State Authorities under the aforementioned category (i). But as far as category (ii) and (iii) were concerned, identification process had not been undertaken, hence, there was a possibility of ineligible persons making unwarranted claims, which was to be monitored during such a sensitive situation. On-Hand of Sharma

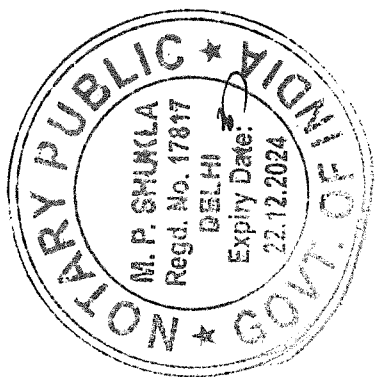


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(jj) That the NGT Committee had submitted its first Interim Report on 01.09.2020, Progress Report I on 31.10.2020 and Progress Report II on 10.12.2020. It is hereby submitted that the Answering Respondent filed its Objection dated 15.12.2020 to the Progress Report dated 31.10.2020 ("**Objection dated 15.12.2020**") submitted by the NGT Committee to the effect that the findings of the NGT Committee were based on secondary data through various stakeholders, deliberations and discussions and the same would require further verification of the collected data samples.

(kk) That it is pertinent to submit that the NGT Committee evidently did not make any site-visit till the filing of the Progress Report. Further, the multi-disciplinary Committee was wrongly constituted by the NGT Committee by delegating its authorities as the same was not notified by the Ld. NGT in the mandate given to the NGT Committee. As per the Answering Respondent, the Interim Report of the NGT Committee was prepared without any assessment and without taking into consideration the submissions of the Answering Respondent.

(ll) That it is hereby submitted that with regard to the assessment of compensation for environment and loss of biodiversity, the Answering Respondent submitted that



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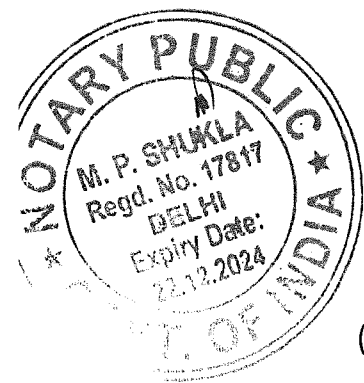
the NGT Committee relied upon unverifiable secondary data and constituted the Multi-Disciplinary Committee to study the impact on the environment which was beyond its mandate. Further, earlier to the Baghjan blowout there is no available comparable data/ research on the flora-fauna of the surrounding area and Maguri-Motapung Beel of the previous years with which the data/statistics presented under the Progress Report can be verified/compared with hence, the statements and data presented by the Multi-Disciplinary Committee were only based on assumptions and hear-say evidence provided from interested stakeholders only.

G. "THE ISSUE OF COMPENSATION STANDS SORTED OUT SUBSTANTIALLY"—IMPUGNED ORDER DATED 19.02.2021

(mm) That it is hereby submitted that the Ld. National Green Tribunal, Principal Bench, New Delhi passed the order dated 19.02.2021 ("**Impugned Order**") on four major aspects, namely, (i) the compensation to victims of the incidents, (ii) accountability for the failure of the Answering Respondent to follow safety protocols, (iii) accountability for non-compliance of statutory norms, and (iv) assessment of damage to the environment and restoration measures.

(nn) That on the question of compensation to the victims of the incident, the Ld. NGT *inter alia* held that the issue of compensation substantially stands satisfied. The

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 Ministry of Environment, Forest and Climate Change
 Government of India



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major part of the issue resolved as per the directives given by the Office of Deputy Commissioner *vide* Letters dated 25.09.2020 and Letter of the Answering Respondent dated 02.12.2020, as well as the recommendations of the Committee of Experts headed by Retired Hon'ble Mr Justice B.P. Katakey.

- (oo) That as per the Impugned Order, the Ld. NGT *inter alia* held that in view of substantial number of victims being compensated upto a reasonable level, the issue will have to be taken as concluded as far as the present proceedings are concerned. Further, the Ld. NGT cannot enter into further adjudication in the absence of victims and authentic data. While floor level compensation can be directed to be paid even on some guesswork, higher compensation claims require adjudication, based on evidence of loss. Therefore, in the absence of relevant data, the Ld. NGT was unable to determine the claims for higher compensation, beyond the amounts already paid or conceded by the Answering Respondent.

ASSESSMENT STUDIES AND ANALYSIS REPORTS POST THE BLOWOUT INCIDENT

5. That pursuant to the blowout incident at Baghjan Well No. 5, several efforts and measures have been undertaken by the Answering Respondent by engaging various organizations of national and international repute, to identify, assess, mitigate the impact of the



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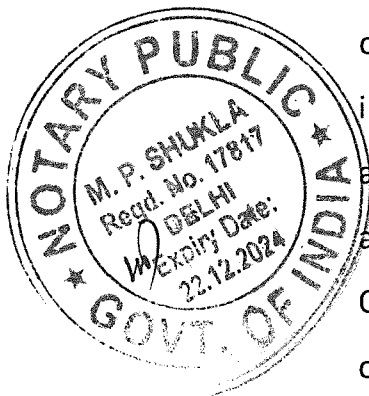
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blowout on the environment through bio-remediation and restoration.

6. That the following assessment studies have been conducted by the Answering Respondent till date by engaging various organisations to analyse the impact of the blowout on the surrounding areas and assess the damage caused to the environment.

A. ASSESSMENT OF AIR QUALITY IN THE VICINITY OF BAGHJAN WELL NO. 5 BY ARIHANT ANALYTICAL LABORATORY PVT. LTD. VIDE REPORTS DATED 29.05.2020 TO 12.06.2020

- (a) That the Answering Respondent had engaged M/s Arihant Analytical Laboratory Pvt. Ltd. *vide* Contract dated 27.11.2019 bearing No. 6113508 for a duration of two (02) years with a provision for extension of one (01) year with the same terms and conditions, for monitoring of Ambient Air Quality, Stack Gas Emission, Mercury (Hg) in Ambient Air, Total Hydrocarbon ("THC") in ambient air, Volatile Organic Compound ("VOC"), in Ambient Air and measurement of illumination and noise levels at OIL's Drilling, Work-Over locations and OIL's installations of Upper Assam and Arunachal Pradesh as per the National Ambient Air Quality Standard ("NAAQS"), Environment Clearance (MoEF, GCI), SPCB and CPCB guidelines. *Reference for the copy of the Test Reports of Ambient Air Quality Monitoring Reports by M/s Arihant*



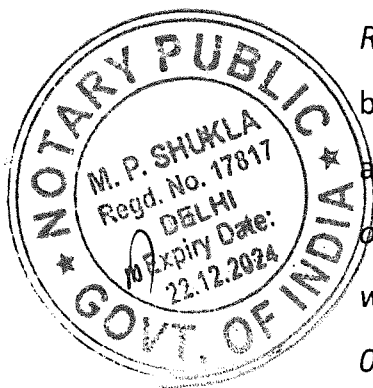
Dr. Kumudani Sharma
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Analytical Laboratory Pvt. Ltd. from 29.05.2020 to 12.06.2020 can be drawn on Page 80-145 of Annexure R2 (Colly.) of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.

B. ASSESSMENT OF AIR QUALITY AND NOISE LEVELS IN THE VICINITY OF BAGHJAN WELL NO. 5 VIDE REPORT DATED 05.08.2020 BY THE ENERGY AND RESOURCES INSTITUTE ("TERI")

- (b) That TERI was engaged by the Answering Respondent *vide* Letter of Award ("LOA") dated 15.06.2020 bearing no. LOA/G/102 for assessment of the air quality in the vicinity of Baghjan Well No.5. The Letter of Award was subsequently amended on 28.07.2020 and 08.12.2020. TERI submitted a Report dated 05.08.2020 comprising of the Air Quality and Noise Levels *inter-alia* recording the observations at various locations around the blowout site for a duration of one and a half (1.5) months. *Reference for the copy of the LOA dated 15.06.2020 bearing no. LOA/G/102 along with the subsequent amendments of 28.07.2020 and 08.12.2020 can be drawn on Page 146 – Annexure R3 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.*



- (c) That as per the noise levels recorded for the period 19.06.2020 to 03.08.2020, the following observations were made by TERI;

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- (i) The equivalent sound pressure levels (Leq) measured at 0.5 km from the well are exceeding the industrial noise level daytime standard of 75 dB (A) in all the monitored days except for few days.
- (ii) However, at other points at a distance of 1 km, 1.5 km and 2 km from the fire point, the levels are within the daytime industrial noise level standard of 75dBA.

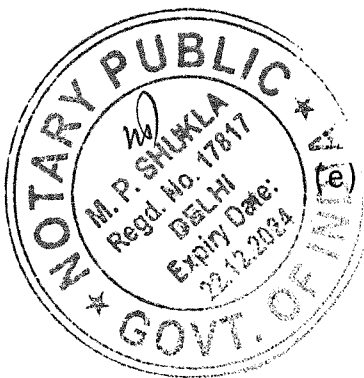
(d) That as per the Report dated 05.08.2020, the results of PM_{2.5}, SO₂, and NO₂, measured at different locations from the fire point of the Baghjan Well No.5 from 19.06.2020 to 29.07.2020 along with the levels of Benzene and Benzo(alpha) pyrene measured at different location on 30.07.2020, were found to be well within the NAAQS prescribed by CPCB.

C. GEOPHYSICAL STUDY CONDUCTED *VIDE* REPORT DATED 21.08.2020 BY THE COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH ("CSIR") – NORTH EAST INSTITUTE OF SCIENCE AND TECHNOLOGY ("NEIST")

That the Answering Respondent had engaged CSIR–NEIST, Jorhat, Assam *vide* LOA dated 24.06.2020 bearing number LOA No. 6208951 for conducting a Geophysical Study in the vicinity of Baghjan Well No.5 of Oil India Limited, Duliajan for a duration of thirty (30) days.

Reference for the copy of the LOA dated 24.06.2020 bearing number LOA No. 6208951 can be drawn on Page

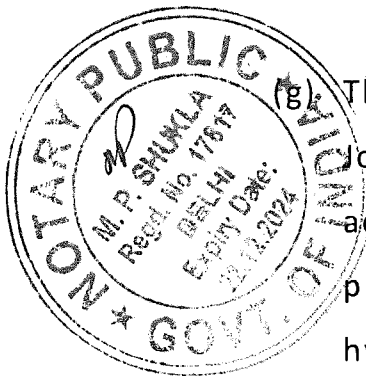
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159 – Annexure R5 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.

- (f) That it is submitted that the seismic data acquisition was done by M/s CSIR-NEIST for a period of one month, *i.e.*, from 18.06.2020 to 21.07.2020. A report was submitted on 21.08.2020 where the project was *inter alia* designed to investigate the reported seismic activities in the neighbouring areas of the incident site and also to conduct a series of other geophysical surveys to detect any observable change near the blowout site including ground deformation, if any, in the vicinity of the blowout site. Reference for the copy of the Report dated 21.08.2020 submitted by CSIR-NEIST Jorhat can be drawn on Page 161 – Annexure R6 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.



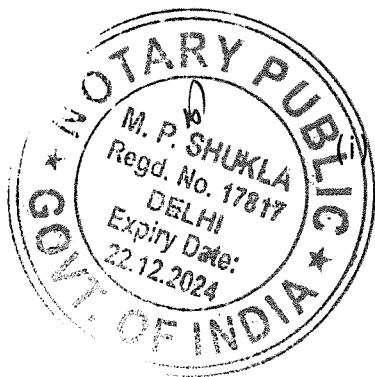
(g) That as per the Report dated 21.08.2020, CSIR – NEIST, Jorhat observed that the shallow micro-earthquake activities which were detected are reported globally near producing hydrocarbon reservoir due to disturbance of hydrostatic balance inside the reservoir during production activities. These micro-earthquakes are very small and are usually not felt unless extremely close to the epicenter. The maximum Peak Ground Acceleration recorded by the accelerometer is 0.0027g, which is also

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quite insignificant from any structural damage potential. InSAR (Interferometric Synthetic Aperture Radar) data analysis does not show any surface deformation at the vicinity of the blowout site.

D. MEASUREMENT OF THERMAL MAPPING OF STRUCTURE AND SONIC BOOM VIDE REPORT DATED 28.08.2020 BY IIT GUWAHATI

- (h) That it is submitted that the Answering Respondent further engaged the Indian Institute of Technology (IIT) Guwahati *vide* Letter of Award dated 06.07.2020 bearing number LOA/G/189 for the Measurement of Thermal Mapping of Structure and Sonic Boom was conducted between 16.07.2020 and 21.07.2020 after the Blowout incident, observations of which were submitted *vide* a Report dated 28.08.2020. *Reference for the copy of the LOA dated 06.07.2020 bearing number LOA/G/189 can be drawn on Page 296 – Annexure R7 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.*

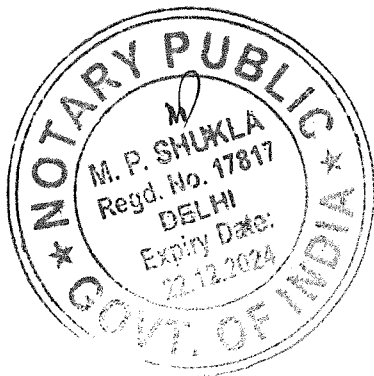


That as per the Report dated 28.08.2020, IIT Guwahati observed that there was no significant effect of fire in blowout well in BGN Well No. 5 on the formation of crack in the structures. *Reference for the copy of the Report dated 28.08.2020 can be drawn on Page 297 – Annexure R8 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.*

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E. CHROMATOGRAPHIC ANALYSIS OF CONDENSATE SAMPLE EXTRACT REPORT DATED 08.06.2020 BY CHEMICAL LABORATORY, CHEMICAL DEPARTMENT, OIL INDIA LIMITED, DULIAJAN, ASSAM

- (j) That it is hereby submitted that pit water sample was collected from nearby pit of Baghjan Well No.5 and the oil sample was extracted from the pit water on 31.05.2020. Since, the oil sample was extracted from the pit water, therefore lighter hydrocarbon may have been lost/evaporated during the extraction process. Further, a chromatographic analysis of the condensate sample as extracted from the water sample from pit near Baghjan Well no.5 was conducted on 06.06.2020 by the Chemical Laboratory, Chemical Department, Oil India Limited, Duliajan, Assam. Such study was conducted by the Answering Respondent to analyse the individual components by separating a mixture of chemical substances into its individual components. *Reference for the copy of the Report dated 08.06.2020 bearing reference no. ChemLab/Gas/Rep/Condensate//01/2020 can be drawn on Page 418 – Annexure R10 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.*

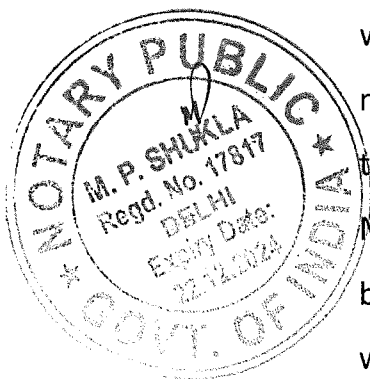


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F. AMBIENT AIR AND WATER QUALITY MONITORING IN AND AROUND THE WELL NO.5 OF OIL, BAGHJAN, TINSUKHIA, ASSAM BY THE CENTRAL POLLUTION CONTROL BOARD VIDE REPORT DATED 29.10.2020

(k) That as directed by the Committee of Experts constituted by the Ld. National Green Tribunal (NGT) in O.A. No. 43/2020/EZ and O.A. No. 44/2020/EZ, the Central Pollution Control Board (CPCB), Regional Directorate North East (RDNE) conducted monitoring/assessment of Ambient Air Quality and Water Quality in and around the Baghjan Well No.5 for the period 09.10.2020 to 13.10.2020. *Reference for the copy of the Report dated 29.10.2020 can be drawn on Page 419 – Annexure R11 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.*

(l) That as per the observations made in the Report dated 29.10.2020, it was observed that the Ambient Air Quality was well within the NAAQS parameters for the monitoring conducted at 4 stations in all directions of the Baghjan Well No.5. With respect to the Water Quality Monitoring, except Lead in the pond adjacent to the blowout site, all other tested parameters were found within the Discharge Standard for “Oil drilling and Gas Extraction Industry”.



Dr. K. Madan Sharma
 Director (Reg. II)
 Oil India Limited
 Autonomous Regulatory

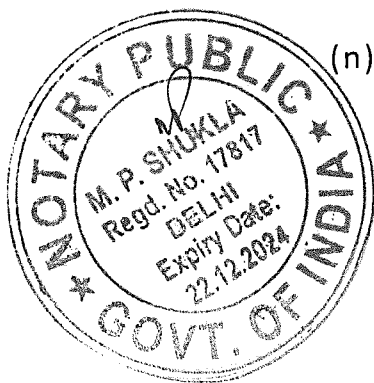
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G. DRINKING WATER ANALYSIS REPORT DATED 03.11.2020 BY THE DISTRICT LABORATORY, TINSUKIA, PUBLIC HEALTH ENGINEERING (PHE) DIVISION, TINSUKIA, ASSAM

(m) That on 03.11.2020 the District Laboratory, Tinsukia, Public Health Engineering (PHE) Division, Tinsukia, Assam, collected samples from 10 different locations of Baghjan Gaon and carried examination of the same from 03.11.2020 – 05.11.2020. Out of the 10 water samples collected on 03.11.2020, 6 out of the 10 locations was found safe for drinking purpose. *Reference for the copy of the Water Analysis Report for 03.11.2020 can be drawn on Page 423 – Annexure R12 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.*

H. REPORT DATED 20.07.2021 OF THE TEAM OF EXPERTS BY ASSAM AGRICULTURE UNIVERSITY VISIT TO BAGHJAN GAS BLOWOUT AREA OF BAGHJAN

(n) That it is humbly submitted that upon the request made by the Answering Respondent to the Director of Research (Agriculture), Assam Agriculture University (“AAU”), Assam on 04.06.2020, a team of experts of AAU visited the site on 08.06.2020 and partially on 09.06.2020, to conduct an assessment of damage to crops/tree/plants (paddy/tea/fruit/vegetation) in the vicinity area of the Baghjan Well No.5, however, the required assessment



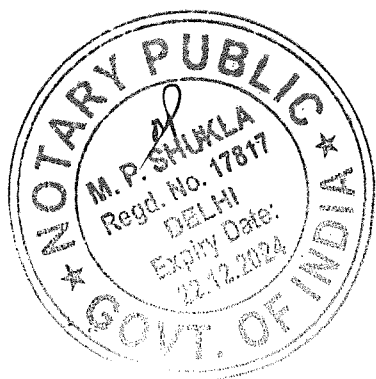
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could not be done due to the outburst of fire on 09.06.2020.

(o) That it is humbly submitted that the Answering Respondent requested the Director of AAU to depute the experts again for the said assessment. However, owing to a series of unfavorable events such as the prevailing condition the area, floods due to heavy rains, etc. the assessment could not be carried out and the experts finally visited the site on 27.01.2021-28.01.2021. *Reference for the copies of the various communication exchanged between the Answering Respondent and the Office of the Director of AAU, Assam can be drawn on Page 424 – Annexure R13 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.*

(p) That therefore, a team of scientists was constituted by the Director of AAU, Jorhat *vide* Letter dated 28.11.2020 bearing reference no.7(15)/13/DRA(T)/Pt/2020-2021/11887-92. Pursuant to the visit of the experts at the site from 27.01.2021 to 28.01.2021. a Report dated 20.07.2021 was submitted on the Assessment of Damage at Gas Blowout Area of Baghjan. *Reference for the copy of the report dated 20.07.2021 of the Team of Experts from Assam Agricultural University, Jorhat can be drawn on Page 430 – Annexure R14 of the Documents annexed*



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with the Affidavit filed by the Answering Respondent on 09.05.2022.

(q) That the following observations were made in the Final Report dated 20.07.2021:

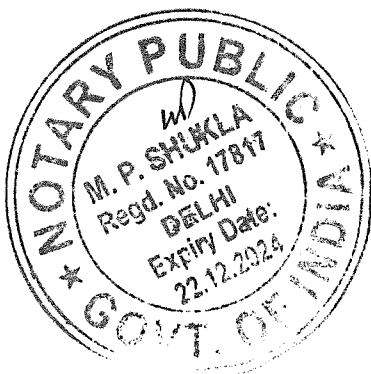
(i) The physio chemical properties such as porosity, alkalinity, pH and electrical conductivity of the soil samples were in the safe limit.

(ii) Soil pH ranged between minimum 5.33 (acidic) and maximum 7.64 (slightly saline). The soil in Assam is normally acidic in nature, thus, the neutral pH or slightly saline pH in the case of some soil samples indicated the after effects due to oil contamination (salt content high) from the blowout incident.

(iii) The soil carbon (WBC) data ranged from 0.97 to 2.27%. The high content of soil carbon might be due to the fact that the soil was affected by the oil contaminants (having high content of hydrocarbons).

(iv) Soil available nitrogen was found to be in the lower range. This indicated wider C:N ratio in the soil which may affect the microbial activity. Data also indicated lower range of available phosphorus and potassium in the soils.

(v) The water analysis report showed safe limit of all the parameters.



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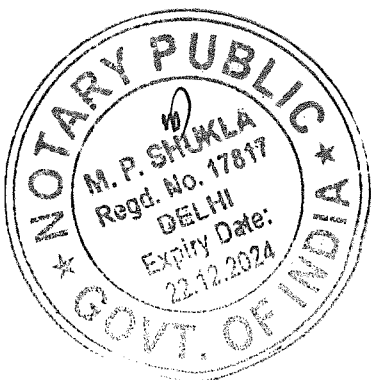
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I. EFFLUENT PIT WATER SAMPLE ANALYSIS REPORT DATED 10.11.2021 BY CHEMICAL LABORATORY, CHEMICAL DEPARTMENT, OIL INDIA LIMITED, DULIAJAN, ASSAM

(r) That it is most respectfully submitted that on 03.11.2021, pit water samples were collected from the Effluent Pits near the Baghjan Well No.5 location from four (04) locations, which within 70m, 100m, 40m and 45m from the well site respectively by the Chemical Laboratory Department of the Answering Respondent and a Report was submitted on 10.11.2021. *Reference for the copy of the Report dated 10.11.2021 of the Effluent Pit Water Sample Analysis can be drawn on Page 450 – Annexure R22 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.*

(s) That the key findings of the Report dated 10.11.2021 are as follows;

- (i) The results for pH, Chloride, Phenolic compounds, Sulphate, Chromium, total dissolved solids, oil and grease were within the tolerance limits prescribed by the State Pollution Control Board of Assam.
- (ii) The suspended solids in the effluent pit water in two (02) samples out of four (04) area within 70m and 100 meters of the Baghjan Well No. 5 were marginally above the acceptable limit.



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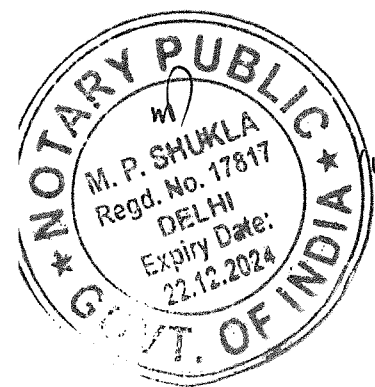
J. LETTER DATED 13.11.2021 FROM THE OFFICE OF THE DISTRICT ANIMAL HUSBANDRY AND VETERINARY OFFICER, TINSUKIA, GOVERNMENT OF ASSAM

- (t) That the District Animal Husbandry and Veterinary Officer, Tinsukia, Government of Assam, vide its Letter dated 13.11.2021 bearing number DVOT/G-9/Baghjan/2021-22/638 to the Answering Respondent observed that post the blowout in Baghjan Oil Field, no unnatural diseases were detected or reported from the area amongst livestock and poultry apart from certain seasonal diseases, viz. worms' infestation etc. *Reference for the copy of the Letter dated 13.11.2021 bearing number DVOT/G-9/Baghjan/2021-22/638 can be drawn on Page 452 – Annexure R24 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.*

K. LETTER DATED 15.11.2021 FROM THE OFFICE OF THE DISTRICT FISHERY DEVELOPMENT OFFICER, TINSUKIA, GOVERNMENT OF ASSAM

- (u) That it is pertinent to mention that the District Fishery Development Officer ("DFDO"), Tinsukia, Government of Assam vide its Letter dated 15.11.2021 bearing no. AFT-9/2021-22/289 to the Answering Respondent made the following observations during the past one (01) year period from 15.11.2020 to 15.11.2021:

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- (i) As per the reports of the concerned field officials, there was no sign of adverse impact and deterioration of water quality due to the said blowout at Maguri-Motapung Beel.
- (ii) There were no reports received of any extinction fish species during the said period from 15.11.2020 to 15.11.2021.
- (iii) No unnatural death of fish species was detected or reported from that area during the said period from 15.11.2020 to 15.11.2021.

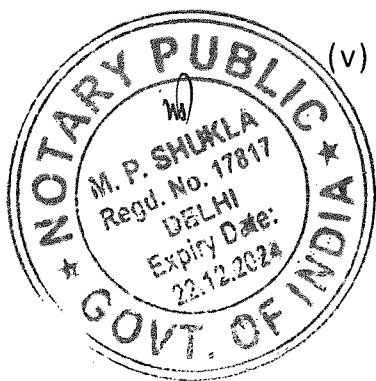
Reference for the copy of the Letter dated 15.11.2021 bearing no. AFT-9/2021-22/289 can be drawn on Page 451 – Annexure R23 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.

L. ASSESSMENT OF ENVIRONMENTAL QUALITY OF SOIL AND VEGETATION FINAL REPORT BY TERI VIDE REPORT DATED 21.02.2022

- (v) It is respectfully submitted that TERI was engaged by the Answering Respondent to undertake the assessment of environmental quality of soil and vegetation in the vicinity of Baghjan Well No.5 *vide* the LOA dated 16.11.2021 bearing no. OIL/62/7/LOA-323. TERI had undertaken environmental assessment and sampling activities during the period 30.11.2021 to 04.12.2021.

The initial reconnaissance survey was conducted on 30.11.2021 along with the officials of the Answering Respondent.

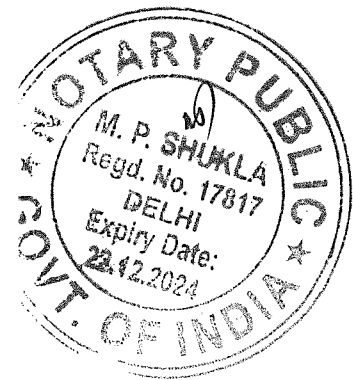
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Respondent to understand the environmental conditions and selection of sampling locations. The soil, sediment, water and vegetation sampling were carried out from 01.12.2021 to 04.12.2021. *Reference for the copy of the LOA dated 16.11.2021 bearing no. OIL/62/7/LOA-323 can be drawn on Page 455 – Annexure R25 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.*

- (w) That it is pertinent to submit that the sampling was done as per the standard sampling guidelines and an analysis was drawn by getting the samples analysed from NABL and MoEF&CC accredited laboratory as per the Indian and International Standard Methods. Accordingly, a Report on Assessment of Environmental Quality of Soil and Vegetation in the vicinity of Baghjan Well No.5, was submitted by TERI on 21.02.2022. A copy of the Report dated 21.02.2022 on Assessment of Environmental Quality of Soil and Vegetation in the vicinity of Baghjan Well No.5 submitted by TERI is annexed herewith and marked as **Annexure-R10**.



- (x) That based upon the sampling and analysis of soil, water and vegetation sample in surround environment including bioreserve, the said study reveals the absence of significant pollutants except traces of TPH content in the soil (which is also within the acceptable limits). The

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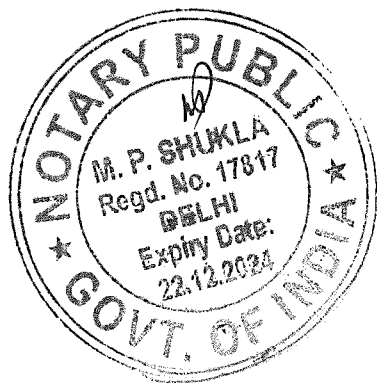
following observations were made in the Report dated 21.02.2022 by TERI:

Soil Quality

- (i) All the collected soil samples showed the TPH (Total Petroleum Hydrocarbon) concentration within the remediation standard guideline range of <5000 mg/kg given by Central Pollution Control Board.
- (ii) Among 17 soil samples collected from different locations, South west zone of Maguri Beel sample showed trace level of Fluoranthene (0.15 mg/kg) and Pyrene (0.11 mg/kg). Remaining all other samples, the PAH level was below detectable limit.
- (iii) The BTEX (Benzene Toluene Ethyl Xylenes) concentration was also below detection limit in all tested soil samples.
- (iv) These results revealed that the surrounding soil environment is free from contamination due to natural process like heavy rainfall during the monsoon.

Water Quality

- (v) The oil & grease, PAH and heavy metals concentration were below the detection limit in all the 13 samples.
- (vi) The pH, electrical conductivity, TDS, TSS, Total hardness, chloride, sulphide and sulphate were within the acceptable limit of IS:10500:2012 drinking water standard.



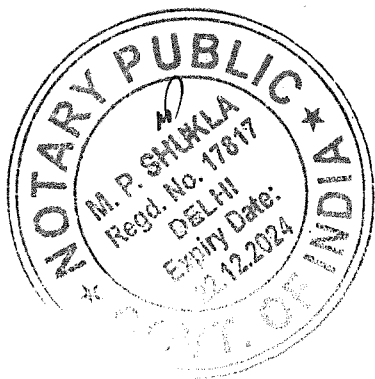
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- (vii) The sampling area was rich in biodiversity and agricultural field with high groundwater table leads to good quality of water table in the region.
- (viii) The metallic salts and heavy metals such as Zinc, Nickle, Chromium, Lead, Cadmium, etc. were found to be below detection limits in all the tested water sample showed that the absence of pollutants plume in the ground water ecosystem.
- (ix) The parameters like total phenolic compounds found to be more than the permissible limit prescribed in IS:10500:2012 which may be due to pecculation from natural sources of phenols to aquatic systems include decomposition of aquatic vegetation.

Vegetation/Plant and Fish Sample

- (x) From the fish sample collected from Maguri-Motapung Beel and analysed for the Heavy metals, PAH and BTEX. The analysis result shows that there is no accumulation of PAH, BTEX and tested heavy metals like cadmium, lead, mercury, nickel and hexavalent chromium. It was further observed TERI during their field visit that there was no fish mortality or any other oil floating material or condensate.
- (xi) There is no accumulation of TPH and total PAH in the analysed plant biomass.



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(xii) It was observed that the affected surrounding environment is free from contamination may be due to post monsoon investigation.

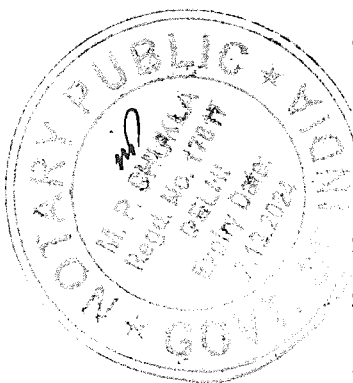
M. INTERIM PROGRESS REPORT ON BIODIVERSITY IMPACT ASSESSMENT STUDY BY INTERNATIONAL UNION FOR CONSERVATION OF NATURE ("IUCN") SUBMITTED TO ASSAM BIODIVERSITY BOARD

(y) It is most humbly submitted that the Answering Respondent by a Tripartite Memorandum of Understanding (MOU) dated 04.05.2021 engaged International Union for Conservation of Nature (IUCN) as per the recommendation of Assam State Biodiversity Board for conducting a biodiversity impact assessment study as well as to develop a comprehensive Biodiversity plan with its implementation strategy & framework.

(z) That the study area is situated in Baghjan village and which includes three main components – ecological assessment, biodiversity impact assessment and ecosystem services review. It is submitted that the baseline data was collected during the monsoon season in August, 2021 and winter season in December, 2021 and that an Interim Progress Report for season 1 and season 2 was submitted on 18.01.2022 by IUCN. *Reference for the copy of the Interim Progress Report dated 18.01.2022 by IUCN can be drawn on Page 496 –*

Annexure R27 of the Documents annexed with the

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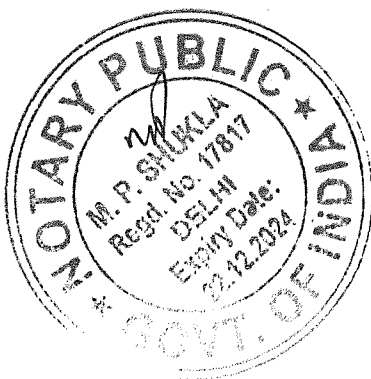


Affidavit filed by the Answering Respondent on 09.05.2022.

(aa) That as per the report various species including those falling under IUCN Red List, a list which categorizes all the species in eight (08) broad categories with varying degrees of conservation importance, and Indian Wildlife (Protection) Act, 1972 Schedules were observed during the primary data collection.

(bb) It is respectfully submitted that 7 birds and one mammal species, falling in the 'Near Threatened' category of IUCN Red List were also observed in the study area, while 2 birds in 'Vulnerable' and 1 in 'Critical Endangered' were also recorded. A number of birds, mammals, butterflies and reptiles protected under the Schedule I and II of the WPA were also observed.

(cc) It is most respectfully submitted that a number of migratory birds arrive at the Maguri-Motapung Wetland during winters and stays there from November till March. It is most humbly submitted that a number of migratory birds were sighted in the Maguri-Motapung Wetland and Dibru Saikhowa National Park during the said period in 2021. In fact, it is pertinent to note that rare Mandarin Duck was also sighted along with other migratory birds in the months of February, 2021 and February, 2022 in the Dibru Saikhowa Biosphere Reserve.



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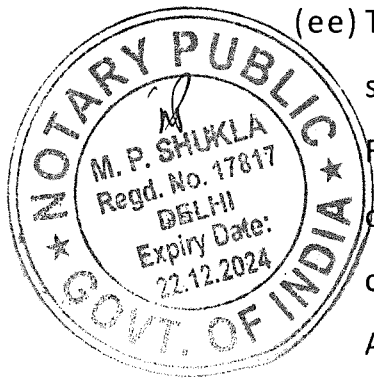
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after a period of almost 118 years. *Reference for the copy of the print-out of various newspaper articles reporting the sighting of the Mandarin Duck after a period of 118 years, can be drawn on Page 590 – Annexure R28 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.*

N. RESTORATION REPORT DATED 06.05.2022 SHOWING THE VISUAL REPRESENTATION OF THE AREAS PREPARED BY THE HSE TEAM OF OIL, THE ANSWERING RESPONDENT

(dd) It is further humbly submitted that in order to carry out a self-assessment, the Answering Respondent carried out an inspection in April, 2022 to map and evaluate the bio-remediation efforts taken by the Answering Respondent. It is humbly submitted that the Answering Respondent was only provided possession of the incident blowout site in August, 2021, thereby providing eight (08) months for the Answering Respondent to carry out the restoration works in an around the blow-out site.

(ee) That from the blowout up till 10.08.2021, the blowout site was not properly handed over to the Answering Respondent due to a variety of local factors and law-and-order situations and the same were beyond the control capacity and command of the official working with the Answering Respondent. During the said 14 months, several attempts were made by the Answering Respondent to get the site in control through peaceful



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means in order to commence the bio-remediation and restoration work of the plinth area.

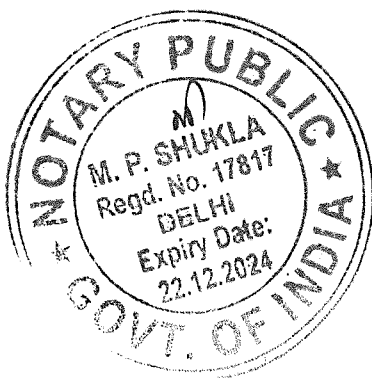
(ff) That it was after the significant support from the Government of Assam only that the law-and-order issue could be settled and the actual peaceful site could come in the possession of the Answering Respondent. Much of the delay on this account was beyond the means and control of the Answering Respondent.

(gg) That the inspection was carried out by the internal Health, Safety and Environment (HSE) Team of the Answering Respondent, wherein it was observed that a significant improvement was visible in the environment including flora, fauna and even in the lives of the locals.

(hh) It is humbly submitted that the HSE Team visited and made observations in primarily four main areas including the main blowout site being Baghjan Well No.5, Maguri-Motapung Wetland, Dibru Saikhowa National Park and the nearby villages of Baghjan and Natun. In all the areas, the common observations made by the HSE team was as under:

- (i) Significant traces of flora which depicts fertility of soil,
- (ii) Agricultural activities indicating quality of water and fertility of soil,

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- (iii) Presence of fauna including birds, butterflies, insects, fishes, cattle and livestock indicating at the quality of ambient air quality and the environment on the whole,
- (iv) Locals leading normal lives and engaged in fishing, agricultural and other local activities,
- (v) Well-built huts and houses indicating at the social impact on the locals in and around Baghjan area; and
- (vi) No trace of oily sludge, condensate on water bodies or foul smell indicating at the restoration of the areas.

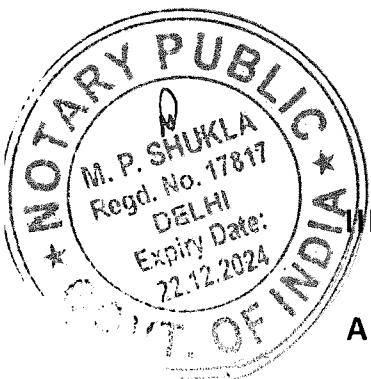
(ii) That in view of the observations made by the HSE team, it is humbly submitted that while the Answering Respondent shall continue with its restoration efforts especially by carrying out an afforestation drive at the Baghjan site, significant restoration impact is being witnessed in and around the Baghjan area indicating at the *bona fide* of the Answering Respondent.

RESTORATION AND BIO-REMEDICATION MEASURES

A. PICKING UP OF SPILLED OIL CONDENSATE MANUALLY AND BY TURBO PUMP

- (a) That after the incident of blowout, several bundhs were constructed around the area of blowout to arrest the spilled oil condensate flowing to the nearby water

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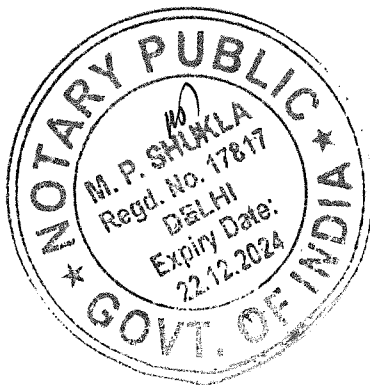


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bodies. The oil arrested inside the bundhs were picked up by manual efforts in drums and transferred to the EPS-Baghjan. Turbo pumps driven by water jet were also used for lifting spilled oil condensate.

- (b) That on 31.05.2020, M/s Deep Construction was engaged by the Answering Respondent *vide* LOA dated 31.05.2020 bearing no. OIL/CONT/LOA/G/98/2020-21 for carrying out the following works:
- (i) Cleaning services of oil spillage from roof, wall, trees, ground surface etc.
 - (ii) Fixing and replacement of roof, painting of roof and wall.
 - (iii) Oil pickup, carriage, transportation, storage etc.
 - (iv) Supply of gravel, spreading, levelling including excavator services.
 - (v) Supply, erection of boundary fencing.
 - (vi) Earth cutting, filling, dressing, levelling etc.
 - (vii) Development of various village roads, sand begging etc.
 - (viii) Cutting, trimming and uprooting of trees.
 - (ix) Service of boat for oil pickup & manpower including supply of diesel, etc.
 - (x) Mitigation of any other contingencies.

Reference for the Copy of LOA dated 31.05.2020, bearing number OIL/CONT/LOA/G/98/2020-21 issued by Answering Respondent to M/s Deep Construction, can be drawn on Page 436 – Annexure R15 of the Documents



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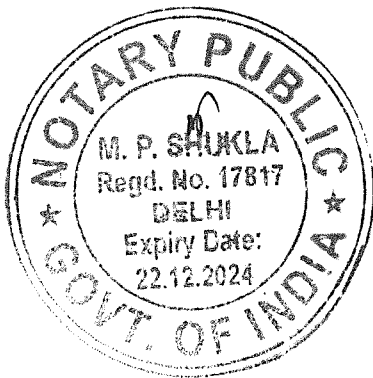
annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.

- (c) It is respectfully submitted that for the purposes of carrying out bioremediation services around Baghjan Well No.5, TERI was engaged by the Answering Respondent, who carried out the work in two phases starting on 21.06.2020; (i) Phase No. I for a total area of 1,60,000 square meters and (ii) Phase No. II for a total area of 69,833 square meters.

B. BIOREMEDIATION WORK BY TERI

PHASE – I: IN-SITU BIOREMEDIATION OF OILY SLUDGE BY TERI FOR AREA AROUND THE BAGHJAN WELL NO.5

- (d) It is humbly submitted that TERI was engaged by the Answering Respondent vide Contract No. 6114478 dated 06.06.2020 for bioremediation of oily soil and water at Baghjan Well No.5 for a total area of 1,60,000 square meters. The total area for remediation was divided in two zones – Land and Water, for the period 21.06.2020 to 07.09.2020. The Bioremediation of the Phase No. I was completed by TERI on 04.12.2020. *Reference for the copy of the joint site recce by Answering Respondent and TERI can be drawn on Page 439 – Annexure R17 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022. A copy of the Report of the Project bearing*



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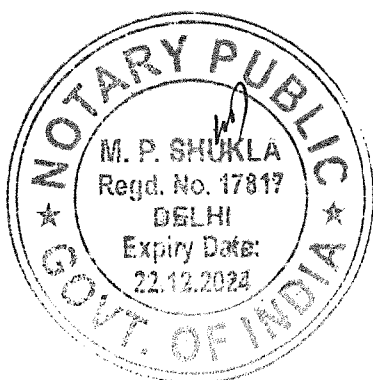
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Project Code 2020BR01 completed on 04.12.2020 by TERI for carrying out bio-remediation services of contaminated soil & water bodies due to oil spillage resulting from blow out of well number BGN#5 is annexed herewith and marked as **Annexure-R11**.

PHASE – II: IN-SITU BIOREMEDIATION OF OILY SOIL AND WATER BY TERI AT THE BAGHJAN WELL NO.5 PLINTH

- (e) That the Answering Respondent most humbly submits that after blowout was controlled and the Baghjan Well No.5 was killed, steps were undertaken to further bioremediate the plinth of the Baghjan Well No.5. However, owing to law-and-order concerns, even the machineries and equipment of the Answering Respondents could not be collected by the Answering Respondent without the due support and assistance of the law enforcement and district administrative authorities. A copy of the Report of the Project bearing Project Code 2021BR03 completed on 14.03.2022 by TERI for carrying out bio-remediation services of contaminated soil & water bodies due to oil spillage resulting from blow out of well number BGN#5 of the plinth area is annexed herewith and marked as **Annexure-R12**.

- (f) That it was only on 10.08.2021 that the Answering Respondent could collect its equipment and machinery



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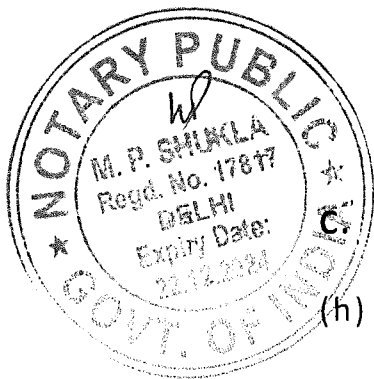
at the Baghjan Well No. 5 site and have the control and possession of the site, due to the reasons cited herein above in the preceding paras of the instant Counter Affidavit. In view of the aforesaid, the bioremediation work at the plinth of Baghjan Well No.5 Site could commence only in the latter half of the year 2021.

- (g) That on 13.10.2021, the Contract dated 13.10.2021 bearing no. 6116306 was executed between the Answering Respondent and TERI *vide* which the services of TERI were further extended for a period of 01 (one) year for In-situ Bioremediation of oily sludge/oil contaminated soil/water of various production Installations, fields and water bodies in Assam and Arunachal Pradesh fields. Thereafter, bioremediation work on the main blowout site plinth for an area of 69,833 square meters was undertaken and completed. *Reference for the copy of the Amendment No.1 dated 23.03.2021 to the Contract No. 6114478/PDNO/2020 can be drawn on Page 446 – Annexure R20 of the Documents annexed with the Affidavit filed by the Answering Respondent on 09.05.2022.*

HANDLING AND PROCESSING OF OILY SLUDGE

- (h) That on 29.09.2020, the Answering Respondent had engaged M/s Balmer Lawrie & Co. Ltd. *vide* Letter of Award dated 29.09.2020 bearing reference no. OIL/CONT/LOA/S/394/2020-21, towards hiring services

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of handling and processing of oily sludge for a duration of twenty-four (24) months.

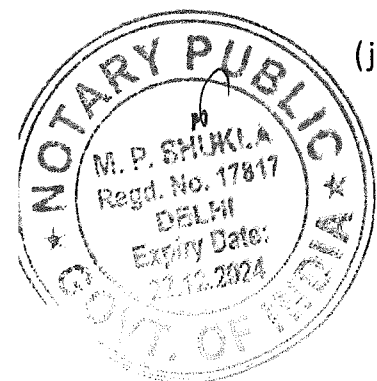
D. AFFORESTATION

- (i) It is respectfully submitted that the Answering Respondent has executed a Memorandum of Understanding dated 21.07.2022 with the Pollution Control Board of Assam for the purposes of planting trees through "Modified Akira Miyawaki" method for carbon sequestration and biological reclamation/restoration of degraded land in Baghjan Well No.5 plinth area in Tinsukia District, Assam. A copy of the Memorandum of Understanding dated 21.07.2022 executed between the Answering Respondent and PCBA is annexed herewith and marked as **Annexure-R13**.

E. EXPENDITURE INCURRED BY THE ANSWERING RESPONDENT ON RESTORATION AND REMEDIATION MEASURES

- (j) It is most respectfully submitted that the Answering Respondent has incurred a total expenditure for an amount of INR 28,68,34,852.12/- (*Rupees Twenty-Eight Crores Sixty-Eight Lakhs Thirty-Four Thousand Eight Hundred Fifty-Two and Twelve Paise Only*) expenditure till date on restoration and bio-remediation measures and various engagements undertaken by the Answering Respondent.

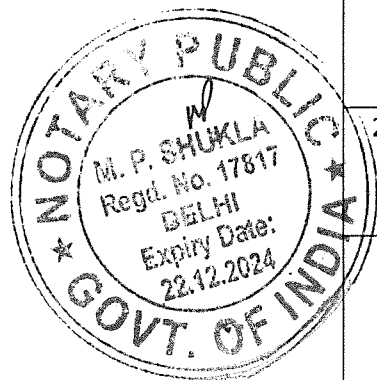
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(k) That the categorisation of expenditure on the basis of timelines and broad heads is enumerated in the table below:

(i) From 27.05.2020 (date of the blowout incident) till 08.12.2021 (date on which the expenditure incurred by the Answering Respondent was submitted to Retired Hon'ble Mr Justice B.P. Katakey):

S. NO.	PARTICULARS	EXPENDITURE INCURRED
1.	Bioremediation of Oily Sludge, Soil, Water, during blowout by TERI	Rs. 2,22,41,820/- (Rupees Two Crores Twenty-Two Lakhs and Forty-One Thousand Eight Hundred and Twenty Only)
	For hiring various services for management to Blowout Control Operations by M/s Deep Constructions	INR 50,14,750/- (Rupees Fifty Lakhs Fourteen Thousand Seven Hundred and Fifty Only)
	Hiring services of Handling and processing of Oily Sludge by M/s Balmer Lawrie & Co. Ltd	INR 24,81,62,260/- (Rupees Twenty-Four Crores Eighty-One Lakhs Sixty-Two Thousand Two Hundred and Sixty Only)
2.	Skimming of oil, pickup, cleaning, carriage, transportation, etc.	INR 64,52,000/- (Rupees Sixty-Four Lakhs Fifty-Two Thousand Only)
	TOTAL	Rs.28,18,70,830/- (Rupees Twenty-Eight Crores Eighteen Lakhs Seventy Thousand and Eight Hundred and Thirty Only)



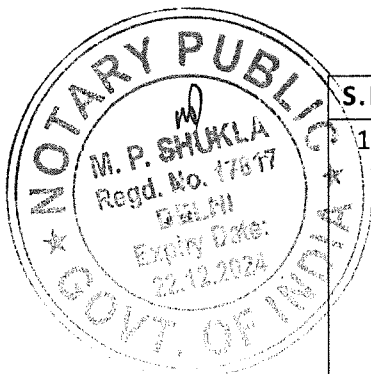
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(j) Expenditure incurred by the Answering Respondent after 08.12.2021 on bio-remediation work:

S.NO.	STEPS UNDERTAKEN BY OIL	COST INCURRED
1.	Third-party bioremediation contractor, TERI carried out the assessment of environmental quality of soil and vegetation in the vicinity of Well Baghjan#5, Assam which has now been successfully completed.	INR 33,81,880/- (Rupees Thirty-Three Lakhs Eighty-One Thousand Eight Hundred and Eighty Only)
2.	Third-party bioremediation contractor, TERI carried out the bio-remediation services of contaminated soil & water bodies due to oil spillage resulting from blow out of well number BGN#5 of the plinth which has now been successfully completed.	INR 15,82,142.12/- (Rupees Fifteen Lakhs Eighty-Two Thousand One Hundred Forty-Two and Twelve Paise Only)
	TOTAL	INR 49,64,022.12/- (Rupees Forty-Nine Lakhs Sixty-Four Thousand Twenty-Two and Twelve Paise Only)

(k) Way forward:

S.NO.	PARTICULARS	EXPENDITURE
1.	Planting of trees through "Modified Akira Miyawaki" method for carbon sequestration and biological reclamation/restoration of degraded land in Baghjan Well No.5 plinth area in Tinsukia District, Assam by the Pollution Control Board of Assam	INR 31,61,500/- (Rupees Thirty-One Lakhs Sixty-One Thousand and Five Hundred Only)



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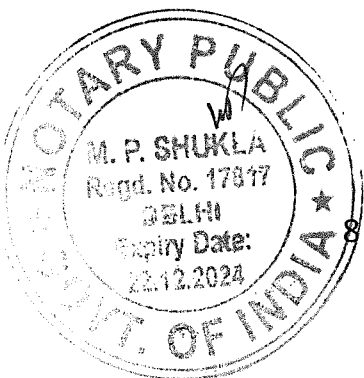
IV. SUBMISSIONS ON THE TECHNICAL ASPECTS OF THE ONE-MAN COMMITTEE REPORT DATED 10.02.2021 BY MR. M.K. YADAVA

7. At the outset, it is pertinent to submit that the Final Report dated 31.12.2021 submitted by the Expert Committee before this Hon'ble Court has heavily relied upon the findings, studies, and inferences drawn by Mr. M.K. Yadava in the One-Man Enquiry Report dated 10.02.2021. Reliance in this regard may be placed upon the relevant excerpt on Page 23 of the Final Report dated 10.02.2021, wherein the Expert Committee has under the head of "*An overview of findings of studies and committees on Baghjan Accident,*" in the Final Report has *inter alia* observed that;

"26. Another report which is in quite detail is of Mr. M.K. Yadava, IFS, Additional Principal Chief Conservator of Forest (Wild Life) & Chief Wildlife Warden; One man Committee constituted by the Govt. of Assam (OMCR). The report is produced in 3 volumes."

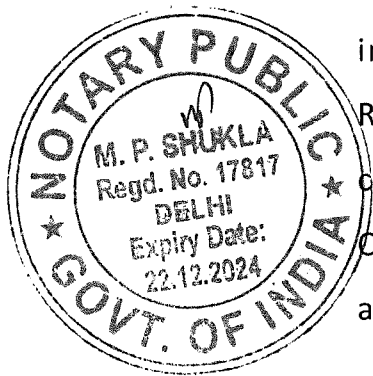
It is humbly submitted that pursuant to the blowout the Office of the Principal Chief Conservator of Forests and Head of Forest Force, Assam, Punjabari, Guwahati *vide* Office Order dated 02.06.2020 bearing No. WL/FG.35/Dibru Saikhowa National Park/Pt and the Secretary to the Government of Assam, Environment and

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Forests Department, Dispur Guwahati-6 *vide* Notification dated 12.06.2020 bearing Memo No. FRW.6/2020/1 constituted a One Man Committee under the chairmanship of Mr. Mahendra Kumar Yadava, I.F.S., Additional Principal Chief Conservator of Forests (Wildlife) & Chief Wildlife Warden, Assam to assess and enquire the on ground situation and submit a report on the damages to the Environment, Biodiversity, Wildlife, Forests and Ecology on account of the blowout at Baghjan Well No.5.

9. It is hereby submitted that on 10.02.2021 a Report on Damages to Environment, Biodiversity, Wildlife, Forests and Ecology ("**One Man Enquiry Report**") was submitted by Mr. M.K. Yadava to the Government of Assam running into three (03) volumes. It is pertinent to submit that various Expert Committees formed by the Ld. National Green Tribunal in their respective Reports as well as the Expert Committee formed by the Hon'ble Supreme Court in their Interim Report dated 20.10.2021 and Final Report dated 31.12.2021 have heavily relied upon the conclusions and findings given by Mr. M.K. Yadava in his One-Man Enquiry Report, without analysing the veracity, authenticity and sanctity of the One-Man Enquiry Report.



10. It is hereby submitted that the One-Man Enquiry Report does not provide a comprehensive scientific assessment and hence, drawing any inference/ conclusion **while**

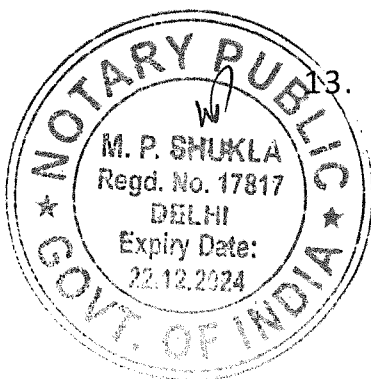
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relying upon the same for the purposes of computing the environmental damage assessment and environment compensation analysis, shall not be free from abnormalities and adversities.

11. It is respectfully submitted that the One-Man Committee has failed to acknowledge, appreciate and take into account the compensatory efforts and the bio-remediation and restoration work of the Answering Respondent and has based their findings in the One-Man Enquiry Report upon estimations, assumptions, and baseless allegations against the Answering Respondent.

12. It is hereby submitted that the methodology adopted by the One-Man Committee is questionable as from a bare perusal of the One-Man Enquiry Report, it is inferred that Mr. M.K. Yadava has prepared a One-Man Enquiry Report based on his own believes, empirical hypothesis, estimations and assumptions by rejecting or accepting a particular data as per his own individual thought process.

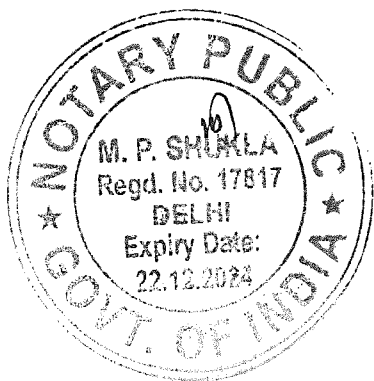
13. It is respectfully submitted that the One-Man Committee did not follow the detailed Terms of Reference as were enshrined in both the Office Orders dated 02.06.2020 and 12.06.2020 and had even worked beyond the mandate given. It is pertinent to submit that the One-Man Committee was to comprise of only the listed Government Officials and scientists whereas the One-



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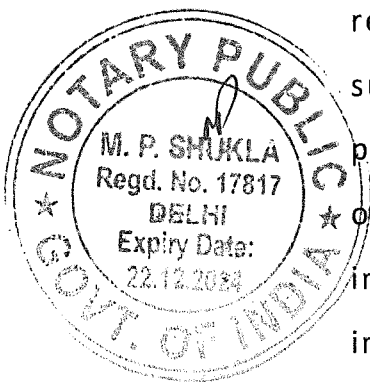
Man Enquiry Report has been articulated by various other independent private individuals and institutes, for which the One-Man Committee did not have the necessary mandate. Further, the Maguri-Motapung Beel was also not a part of the study area and various NGOs and private institutes/ organizations were roped in for the same which was also evidently beyond the mandate given.

14. It is further submitted that it has been opined in the Opinion that the observations made by the One-Man Committee are presumptive and the information provided by the One-Man Committee is self-contradictory, improper and inadequate.
15. It is pertinent to note that the One-Man Committee in its Report has made certain bold statements regarding the biodiversity loss as well as the size of the Baghjan blowout in comparison to other blowouts in the World in the past, wherein the comparison is solely based on the duration until the fire was doused, without taking into consideration other factors like the quantum of damage to the individuals and casualties, quantum of spillage of oil, quantum of compensation amongst other factors. Hence, the entire One-Man Enquiry Report seems to be conjectural in nature based on the surmise of assumptions and presumptions, thus, the same vehemently lacks credence and reliability.



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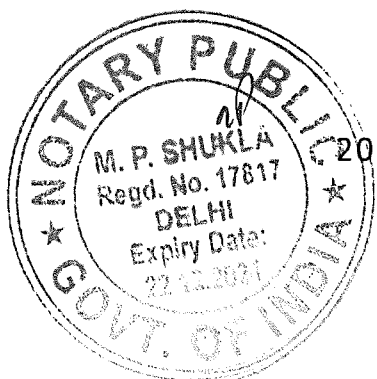
16. Furthermore, the recommendations made by the One-Man Committee are inadequate and generic in nature and the One-Man Committee had failed to provide any short-term or long-term measures for the protection of the habitat, biodiversity in the impacted area.
17. It is respectfully submitted that reliance placed upon the One-Man Enquiry Report prepared by the One-Man Committee shall not be free from any abnormalities and adversities as the One-Man Committee has failed to provide a comprehensive scientific assessment and true account of the impact caused by the Baghjan accident without acknowledging and appreciating the remedial and restoration measures carried out by the Answering Respondent.
18. It is respectfully submitted that since the time of the blowout accident till today the Answering Respondent has undertaken numerous efforts and measures to reduce the impact of the blowout and fire on the surrounding areas and will continue to do so. Therefore, placing extensive reliance upon reports and findings as old as 03.06.2020 and 10.02.2021 would account to injustice in nullifying the steps taken and expenditure incurred by the Answering Respondent thereafter, towards the bio-remediation and restoration of the affected areas.



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V. SUBMISSIONS ON THE TECHNICAL ASPECTS OF THE FINAL REPORT DATED 31.12.2021 SUBMITTED BY THE EXPERT COMMITTEE CONSTITUTED BY THIS HON'BLE COURT VIDE ORDER DATED 02.09.2021

19. It is respectfully submitted that the Committee constituted by the Hon'ble Supreme Court *vide* order dated 02.09.2021 ("**Expert Committee**") had submitted the Final Report dated 31.12.2021 ("**Final Report**") to the Hon'ble Supreme Court for the Damage Assessment and Restoration Plan of Dibru Saikhowa National Park (DSNP) and Maguri-Motapung Wetland (MMW). It is hereby submitted that the Expert Committee through the Final Report has made overlapping allegations as mentioned in the Interim Report dated 20.10.2021 ("**Interim Report**") against the Answering Respondent and has failed to appreciate the bio-remediation and restoration efforts carried out by the Answering Respondent since the time of receiving the possession of the plinth area on 10.08.2021.



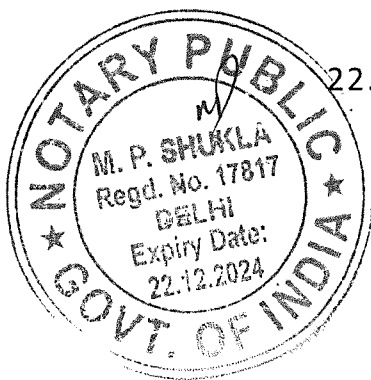
20. It is respectfully submitted that at the outset, the Expert Committee has worked outside the scope of the mandate given to it by the Hon'ble Supreme Court *vide* order dated 02.09.2021. It is hereby submitted that as per the order dated 02.09.2021, the scope of work of the Expert Committee was limited to assessing the extent of

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damages at the incident site and the nearby affected areas and not the entire landscape of the Dibru Saikhowa Biosphere Reserve ("DSBR").

21. It is pertinent to submit that the Committee has blatantly relied upon suggesting restoration and bio-remediation for *the entire* DSBR which is supposedly running into 756 sq.km. whereas as per the own observations and admissions of the Expert Committee, the area of influence is about 3.8 sq.km. Henceforth, such miscomputation of data and the self-contradictory stance adopted by the Expert Committee casts serious aspersion on the analysis and assessment of damages on account of the blowout incident. It is most respectfully submitted that any restoration or bio-remediation obligations of the Answering Respondent should be limited with respect to the incident site and the nearby areas of influence as has been observed by various experts in their various assessment reports.

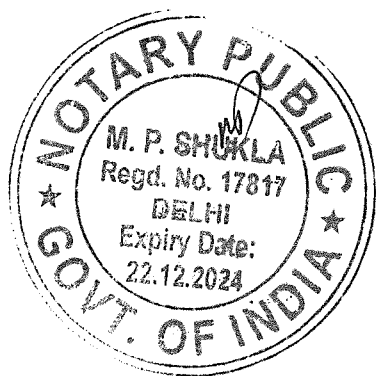
22. The Answering Respondent further vehemently objects to the secondary data sources, approach adopted by the Expert Committee towards the sampling of data and the methodology adopted for the purposes of assessing the damage and computing the compensation for restoring the affected environment. It is most respectfully submitted that there was no comparison made by the Expert Committee between the DSBR and



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the blowout area as there were no boundaries set by the Expert Committee while collecting and assessing the data. Henceforth, with the primary objection of collection of data and assessment of the area of influence, the Answering Respondent casts serious aspersions towards the computation of the compensation as suggested by the Expert Committee in the Final Report.

23. It is respectfully submitted that the Expert Committee has relied upon secondary data sources, and since the time of the blowout in the past (02) two years till date not conducted any assessment or study of its own which could also be beneficial for collection of baseline data. On the contrary, the Answering Respondent has admitted and accepted the urgency involved in the bio-remediation and restoration of the nearby affected areas and has voluntarily taken sincere efforts in bio-remediating and restoring the nearby environment by engaging various specialised agencies of national and international repute. In view of the objections raised hereinabove, it is not plausible to comprehend that it is the right approach to prepare an ecological restoration plan, for being out of bounds from the area of influence.



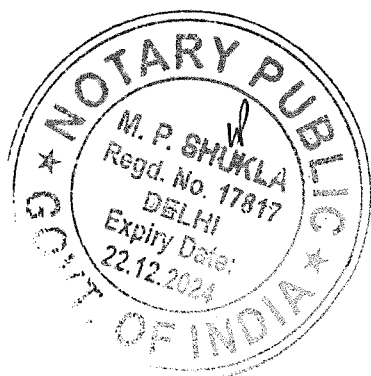
24. It is further submitted that the maps depicted in the Final Report on the basis of which the primary assessment of damage and analysis of loss has been

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determined by the Expert Committee is a secondary source of data which lacks proper sanction and authorization to being consumed by the Expert Committee for its extremely important role and purposes. It is pertinent to submit that the maps and other hand-drawn area demarcations and geographical indications, do not have any basis or legal sanction from being used for any published data source. Henceforth, referring to such documents, is not only outside the scope of the mandate given to the Committee but also casts serious aspersions with respect to the veracity and authenticity of such data collection.

25. It is pertinent to submit that the Expert Committee has also selectively relied upon studies/ reports which are earlier in time, while neglecting the observations in the subsequent studies/reports undertaken by the Answering Respondent, which show improved results in comparison to such earlier studies/reports. It has been observed that the Expert Committee has misplaced the factum that the Reports curated and articulated by the Expert Committee should have comprised of a comparative analysis between the studies relied upon by the Expert Committee and conducted by the Answering Respondent and then subsequently, draw a comparative inference from the same. However, it is pertinent to submit that no trace of any such comparative analysis



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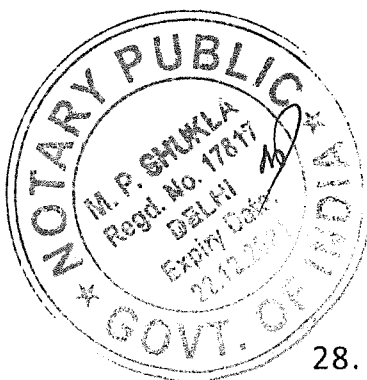
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can be inferred from either the Interim Report or the Final Report submitted by the Expert Committee.

26. That, however, one fact which the Committee has entirely misplaced, misconceived and misinterpreted is that the effect of the blowout and subsequent floods, shall have both downstream and upstream effects. It is therefore, respectfully submitted that the Expert Committee has erroneously suggested all such restoration measures in the Final Report relating to both upstream and downstream areas of the Maguri-Motapung Beel region.

27. It is further submitted that the fundamentals of the ecological restoration and interaction of contaminants with the ecosystem including social system have been discussed and appreciated well by the Expert Committee, however, as admitted by the Expert Committee itself, the impacts of blowout would be only on the immediate area impacted and at the best in the downstream reaches of MMW and DSNP because of the floods which occurred post-blowout and not in the upstream reaches. Therefore, given the fundamentals, the Expert Committee has erred in applying the same logic to DSNP.

28. Furthermore, it is respectfully submitted that the observations, if any, are made by the Expert Committee are visual observations made by the Expert Committee.

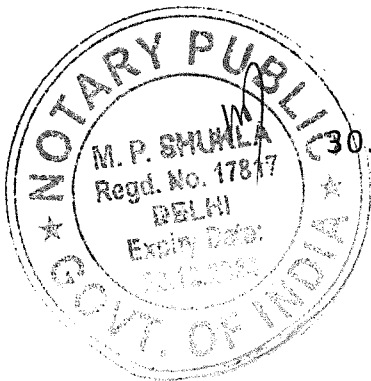


Dr. Kumudani Sharma
 (Legal Consultant)
 Oil India Limited
 Authorized Signatory

during only two (02) visits which are only supported by photographs and no other primary source of data. Similarly, the Expert Committee has further failed to give regard to the fact that the Beel is a low-lying area with stagnant water whereas the Brahmaputra River Basin region has heavy flow, henceforth, the species of fishes which are found in steady current flow and heavy current flow are found to be of different nature.

29. In view of the aforementioned objections *qua* the Final Report dated 31.12.2021, the Committee has erred in computing the compensation of INR 1,196 Crores (*Rupees One Thousand One Hundred and Ninety-Six Crores only*) in view of the restoration and bio-remediation measures taken by the Answering Respondent whereas no realistic basis or sanction is provided by the Committee to corroborate and / or substantiate the said findings.

VI. PARA-WISE REPLY TO GROUNDS AND CORRESPONDING QUESTIONS OF LAW OF THE CAPTIONED APPEAL



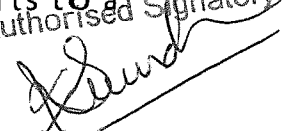
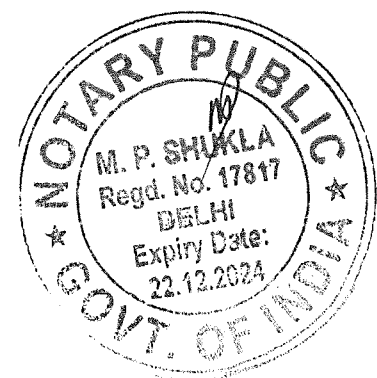
30. That in response to Ground A and I, along with the corresponding Questions of Laws A and E relating to the appointment of the Managing Director of OIL as a member in the ten-member committee with an open-ended directive formed by the Ld. NGT, mentioned in the captioned Appeal, it is most respectfully submitted by

Dr. Kumudani Sharma
 (B.A., LL.B., Legal)
 Oil India Limited
 Authorised Signatory

the Answering Respondent that the aforementioned Grounds/ Questions of Laws at the present stage stands infructuous, as the ten-member committee formed by the Ld. NGT *vide* Impugned Order dated 19.02.2021 has already been substituted by a five-member Committee of Experts *vide* order dated 02.09.2021 passed by this Hon'ble Court.

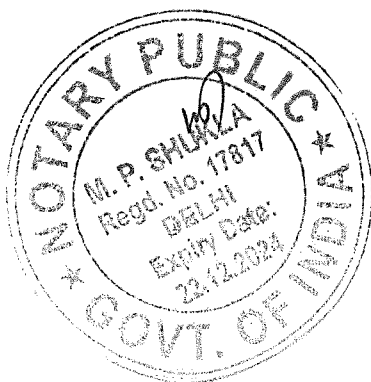
31. That in response to Grounds B, C, D, J, K, L and M, along with the corresponding Questions of Laws B, C, D, F, G, and L relating to the considering the blowout as an environmental emergency, mentioned in the captioned Appeal, it is most respectfully submitted by the Answering Respondent that the Ld. NGT has not erred in failing to appreciate the urgency and immediacy involved in the captioned matter *qua* restoration measures. It is submitted that in fact, the Ld. NGT has given a well-reasoned order which is good in law as it covers all the aspects and submissions made by the then Committee of Experts and objections raised by the Answering Respondent *qua* such allegations. Further, reliance in response to the instant para may be placed upon the aforementioned para/s III(A)-III(E) of the instant Counter Affidavit, wherein the restoration works and measures have been enlisted as has been undertaken by the Answering Respondent till date. It is pertinent to submit that the bio-remediation is a continuous process which has also been regarded by the Committee of Experts to a

Dr. Kumudani Sharma
 (Legal)
 Oil India Limited
 Authorised Signatory

limited extent as because of such remediation works carried out by the Answering Respondent, the cost has now reduced to INR 1,196 crores from INR 2500 crores in the Final Report dated 31.12.2021. It is respectfully submitted that the Answering Respondent further undertakes to comply with the any such further orders passed by this Hon'ble Court, as this Hon'ble Court may deem fit in the interests of justice and equity after considering the submissions made by the Answering Respondent before this Hon'ble Court.

32. That in response to Ground E, along with the corresponding Questions of Law H relating to the urgent need to assess the blowout, mentioned in the captioned Appeal, it is most respectfully submitted by the Answering Respondent that the areas neighbouring around the Baghjan Well No.5 are now well situated, inhabited and cultivation is also going on nearby which is fit and healthy for human consumption as per the studies and reports mentioned by the Answering Respondent in the preceding para II(O) of the instant Affidavit. As far as wildlife is concerned, it is only found in Dibru Saikhowa National Park which is located at a distance from the Baghjan Well No.5. Further, it is most respectfully submitted that even after a passage of two (02) years from the occurrence of the blowout, there is still no conclusive proof to show, if any death in Dibru Saikhowa National Park.



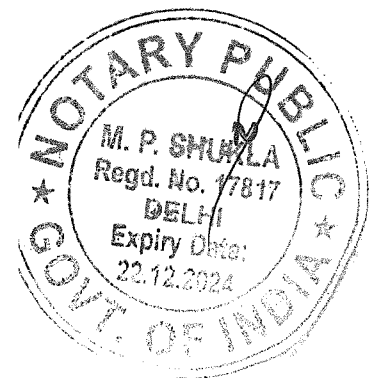
Dr. Dibrudani Sharma
DGM (Legal)
CIL India Limited
Authorised Signatory

Saikhowa National Park is attributable to the blowout caused at Baghjan Well No.5.

33. That in response to Ground F, along with the corresponding Questions of Law I relating to the need for an integrated ecological restoration plan for bio-remediation, mentioned in the captioned Appeal, it is most respectfully submitted by the Answering Respondent that with the commencement of the present series of litigations imputing and alleging the Answering Respondent of not taking any corrective measures, the need for conducting a comprehensive environment impact assessment has been overshadowed while all the concerned experienced agencies and government regulatory bodies are engaged in conducting and reporting individual studies and assessments either to the Committee of Experts or to the Answering Respondent.

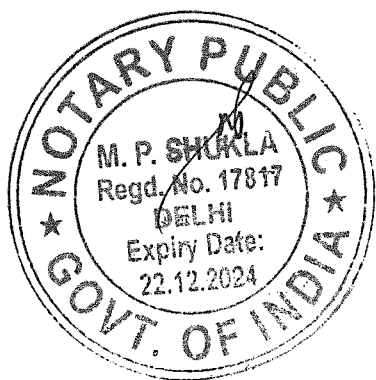
34. That in response to Ground G, along with the corresponding Questions of Law J relating to the allegation of the Answering Respondent escaping from its liability in the event of any future insolvency or merger of the Answering Respondent Company, mentioned in the captioned Appeal, it is most respectfully submitted by the Answering Respondent that Ground G and corresponding Question of Law J under reply is unfounded and unsubstantiated.

Dr. Kumudani Sharma
RGM (Legal)
Oil India Limited
Authorised Signatory



humbly submitted that the Appellant has failed to give regard to the fact that the Answering Respondent is in existence for over six (06) decades now and is a Navratna Central Public Sector Enterprise (CPSE) identified by the Central Government. Therefore, the allegation of evading away from its liability/ responsibility owing to any insolvency or merger of the Answering Respondent, is out of question and consideration, herein. It is further respectfully submitted that the issue regarding compensation and financial liability being imposed upon the Answering Respondent was also duly answered by the Ld. NGT which stood satisfied *vide* the Impugned Order.

35. That in response to Ground H, along with the corresponding Questions of Law K relating to initial corpus of funds being made readily available, mentioned in the captioned Appeal, it is most respectfully submitted by the Answering Respondent that the Appellant under the garb of the instant public interest litigation emphasising upon the need for a corpus of funds for restoration measures, when in fact, the Answering Respondent is not evading from performing and undertaking and relief and/or restoration measures, however, the Answering Respondent only intends to do the same in a manner which prevents any unwanted or unwarranted expenditure which may be incurred while



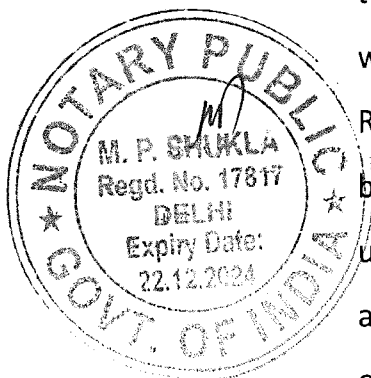
Dr. Kumudani Sharma
 DGM (Legal)
 Oil India Limited
 Authorized Signatory

creation of any such corpus or additional body corporates.

36. It is most respectfully submitted that the '*Questions of Law*' encapsulated by the Appellant in the captioned Appeal are in conjunction with the Grounds mentioned in the captioned Appeal. It is further pertinent to submit that the '*Questions of Law*' are devoid of legal sanctions and a bare perusal to them evinces such fact that the same are established only on the merits of the case and not on law.

37. That there has been gross suppression of material facts in the captioned Appeal, *inter-alia*, pertaining to the measures and efforts taken by the Answering Respondent pursuant to the blowout at Baghjan Well No.5.

38. That the Appellant has also not given regard to any of the submissions made by the Answering Respondent, with respect to the several objections to the numerous Reports of the Committee of Experts. It is pertinent to bring light to the fact that the instant litigation being undertaken by the Appellant herein is of public interest and not in the interest of any private individual or organisation. Hence, in light of the contradictions and criticisms made against the Answering Respondent, the Appellant ought to have given due regard to



Dr. Kumudani Sharma
to OIL (Legal)
Oil India Limited
Authorized Signatory

submissions and objections made by the Answering Respondent, as the same were duly substantiated and corroborated with the requisite documentary proof.

39. That no new grounds which were pleaded before the Ld. NGT (EZ) are being raised here before this Hon'ble Court.

40. In the light of the above it is most respectfully submitted that this Hon'ble Court may be pleased to dismiss the present appeal.

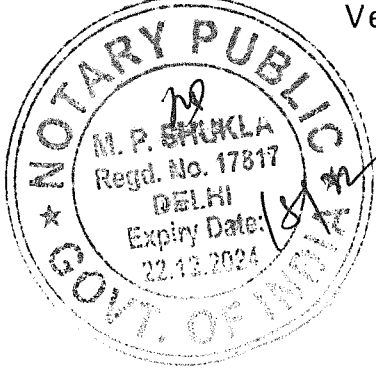
Dr. Kumudani Sharma
DGM (Legal)
Oil India Limited
Authorized Signatory
[Signature]
DEPONENT

VERIFICATION:

I, the above-named Deponent do hereby verify that the averments stated herein above are true to my knowledge and belief, no part of it is false and nothing material has been concealed therefrom.

12 5 JUL 2022

Verified at New Delhi on this 25th day of July, 2022.



CERTIFIED THAT THE DEPONENT has solemnly affirmed before me that the contents of the above which have been read & explained to him are true and correct to his knowledge

[Signature]
Notary Public, Delhi


Dr. Kumudani Sharma
DGM (Legal)
Oil India Limited
Authorized Signatory
[Signature]
DEPONENT

2 5 JUL 2022

[Handwritten]
Identified by
D/2809/2019

4. Royalty on Cru Oil, Condensate and Natural Gas shall be payable by the lessee as per the terms of Production Sharing Contract entered into between the lessee and the Central Government in respect of the said block/area or at such rates as may be fixed, from time to time, by the Central Government in consultation with the State Government. The royalty shall be payable on monthly basis and shall be payable by the last day of the month succeeding the period in respect of which it is payable.
5. Immediately on demand or upon determination or relinquishment of any area covered by this lease, the Lessee shall furnish to the Central Government/DGH, through the State Government confidentially the complete records of data as specified in Rule 19(c) of the P&NG rules, 1959. The Lessee shall submit to Central Government, without fail every six month, the results of all operations, boring and test production.
6. Necessary approval from the Competent Authority should be obtained for the Reserve Forest Area(if any) falling in the leased area. "However, the Lessee may carryout surveys for oil exploration in the Reserved Forest area falling in such leased area without obtaining prior clearance of the Ministry of Environment and Forests, Government of India under the Forest(Conservation) Act, 1980 so long as the surveys do not involve cutting of trees. The Lessee shall, however, in no circumstance carryout such surveys in specially protected area like wildlife sanctuary, national park and preservation or sample plots demarcated by the Forest Department. (Ref. Letter No.11-28/86-FRY(CONS) dated 08.05.1986. Department of Environment, Forest & Wildlife, Government of India)".
7. If International companies or foreigners are entrusted with the task, the lessee may get security-vetting of these companies through the Cabinet Secretariat(Research & Analysis Wing) with help of this Ministry. The lessee shall also seek prior clearance from the Ministry of Home Affairs and Ministry of defence with the full particulars of the foreigner employees under intimation to this Ministry.
8. The lessee shall issue Identity cards to each of the employees. The system of checking identity cards of personnel will have to be strictly enforced.
9. Security to its employees both at the project site and en-route in insurgency-affected areas will be the responsibility of the lessee.

10. The lessee shall allow Government authorities to enter and inspect area for security checkup, if necessary.
11. Lessee shall not employ any foreign nationals surreptitiously in the area along the border.
12. No ground/aerial survey of the Defence VAs/VPs is permitted. Aerial survey, if any would be governed by the provision of Ministry of Defence Letter No. 18(8)82-D-(GS III) dated January 31, 1989.
13. Air Force areas falling within the zones embarked for delineation should be avoided.
14. For works in close vicinity of Indian Air Force units/installations and visit to these installations, if any, specific permission of air Hdqrs. should be obtained.
15. Any work within 500m of the perimeter of Air Force station should be intimated to Air Force authority atleast 10 days before commencement of activities.
16. No obstruction shall be erected higher than 15 mtrs. within 5 kms radius of Air Force Airfields and construction of any high mast/towers shall be carried out in consultation with the Air Force Authority.
17. Lessee shall execute a separate lease deed in respect of such other covenant, terms and conditions as per the prescribed format.


(N.C. Zakhup)

Under Secretary to the Govt. of India
Tel. : 2338 7849

Copy to:

1. Chairman & Managing Director,
Oil India Limited, 5 Sikandara Road, New Delhi.
2. Director General, Directorate General of Hydrocarbons, New Delhi
3. Guard File

Appendix-A

The Co-ordinates of the block are furnished below:

AREA (Sq. Km.)	POINT	LATITUDE			LONGITUDE			
		DEG	MIN	SEC	DEG	MIN	SEC	
75.00	F' (T)	27	34	06	95	17	42	Point F' (T) to B'' follows the boundary of Dibru Saikhowaghat Reserve Forest
	E'	27	36	17	95	23	00	
	D'	27	38	54	95	26	12	
	C'	27	40	54	95	27	42	
	B''	27	37	40	95	32	00	
	V	27	34	24	95	22	33	

ANNEXURE R2

TRUE TYPED

No.0-12012/98/2003-ONG/D-IV
Government of India
Ministry of Petroleum & Natural Gas

New Delhi, 15th April, 2004

To
The Commissioner and Principal Secretary to the Govt.of Assam
Mines and Minerals Department,
Dispur, P.O. Assam Sachivaylaya
Guwahati 781006

Subject: **Grant of Petroleum Mining Lease to Oil India Limited for Baghjan Block measuring an area of 75sq.kms in Upper Assam.**

Sir,

I am directed to refer to Oil India's application No. PLN/1-7/42-621 dated 14th May, 2003 addressed to you and your letter recommending the case to his Ministry vide letter No. PEM.93/03/60 dated 01.08.2003 on the above subject and to convey the approval of central Government for the grant of a [petroleum mining lease (hereinafter referred to as "lease") under rule 5(I)(ii) of the petroleum and natural Gas Rules, 1959 (as amended from time to time) to Oil India Ltd., for the above said block/area bounded by the geographical limit as per appendix 'A' and to say that the lease shall be subject to the following terms and conditions in addition to such other terms and conditions as agreed under the Production Sharing contract and/or Deed/agreement signed, if any, in respect of the said block/area.

1. The Lease shall be respect of Crude Oil and Natural Gas
2. The Lease shall be valid for a period of twenty years from the effective date *i.e.*, 14.05.2003.
3. This Lease shall be subject to the provisions of the Oil Fields (Regulations & Development Act, 1948 (53 of 1948) and the Petroleum & Natural Gas Rules, 1959 made there under as amended from time to time.
4. Royalty on crude Oil Condensate and Natural Gas shall be payable by the lessee as per the terms of Production Sharing Contract entered into between the lessee and the Central Government in respect of the said block/area or at such rates as may be fixed, from time to time, by the Central Government in consultation with the State Government. The royalty shall be payable on monthly basis and shall be payable by the last day of the month succeeding the period in respect of which it is payable.

5. Immediately on demand or upon determination or relinquishment of any area covered by this lease, the Lessee shall furnish to the Central Government/DGH, through the state Government confidentially the complete records of data as specified in Rule 19© of the P&NG rules, 1959. The lessee shall submit to central Government without fail every six months, the result of all operations, boring and test production.
6. Necessary approval from the Competent Authority should be obtained for the Reserve Forest Area (if any) falling in the Leased area. "However, the Lessee may carryout surveys for Oil exploration in the Reserved Forest area falling in such leased area without obtaining prior clearance of the Ministry of Environment & Forests, Government of India under the Forest (Conservation)Act, 1980 so long as the surveys do not involve cutting of trees The Lessee shall, however, in no circumstance carryout such surveys in specially protected area like wildlife sanctuary, national park and preservationor sample plots demarcated by the Forest Department (Ref Letter No. 11-28/56-FRY (CONS) dated 08.05.1986. Department of Environment, Forest & Wildlife, Government of India.)"
7. If International companies or foreigners are entrusted with the task, the lessee may get security vetting of these companies through the cabinet Secretariat (Research & Analysis Wing)with the help of this ministry. The lessee shall also seek prior clearance from the Ministry of Home Affairs and Ministry of defence with the full particulars of the foreigner employees under intimation to this ministry).
8. The lessee shall issue Identity cards to each of the employees. The system of checking identity cards of personnel will have to be strictly enforced.
9. Security to its employees both the project Site and en-route in insurgency affected area will be the responsibility of the lessee.
10. The Lessee shall allow Government authorities to enter and inspect area for security check up, if necessary.
11. Lesse shall not employ any foreign nationals surreptitiously in the area along the border.
12. No ground/aerial survey of the defence VAs/VPs is permitted. Aerial survey, if any would be governed by the provision of Ministry of Defence Letter No. 18 (8)82-D-(GSIII) dated January 31, 1989.
13. Air Force areas falling within the zones embarked for delineationshould be avoided.
14. For works in close vicinity of Indian Air Force units/Installations and visit to these installations if any, specific permission of air Bdqrs should be obtained.
15. Any work within 500m of the perimeter of Air Force Station should be intimated to Air Force authority at least 10 days before commencement of activities.

16. No obstruction shall be erected higher than 15 mtrs. Within 5 kms radius of Air Force Airfields and construction of any high mast/towers shall be carried out in consultation with the Air Force Authority.
17. Lessee shall execute a Separate leases deed in respect of such other covenant, terms and conditions as per the prescribed format.

Sd/-
(N.C. Zakhup)
Under Secretary to the Govt. of India
Tel.: 2338 7849

Copy to:

1. Chairman & Managing Director,
Oil India Limited, 5 Sikandara Road, New Delhi
2. Director General, Directorate General of Hydrocarbons, New Delhi
3. Guard File

Appendix – A

The Co-ordinates of the block are furnished below:

AREA (sq. Km)	POINT	LATITUDE			LONGITUDE			
		DEG	MIN	SEC	DEG	MIN	SEC	
75	F'(T)	27	34	6	95	17	42	Point F'(T) to B'' follows the boundary of Dibru Saikhowaghat Reserve Forest
	E'	27	36	17	95	23	0	
	D'	27	38	54	95	26	12	
	C'	27	40	54	95	27	42	
	B''	27	37	40	95	32	0	
	V	27	34	24	95	22	33	

Ref. No. S&E/E/20/723 of 05.07.2006

Regional Executive Engineer,
Pollution Control Board, Assam,
Back Side of ASTC Bus Station,
Chowkidinghee, Dibrugarh

Sub : Consent to establish and Consent to operate as per Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981 for the year 2006-2007

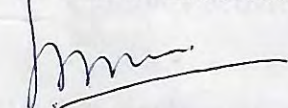
Dear Sir,

We are sending herewith the applications for consent to establish and consent to operate in the prescribed format duly filled in. The necessary application fee will be paid shortly through demand draft.

Please note that the consent fee will be paid against each drilling location projected to be drilled in financial year 2006-2007. The consent to establish & consent to operate for all the drilling locations is applied vide a composite consent application as done earlier. Moreover, in case of the wells as projected and for which consent has already been obtained, but the same could not be drilled in that particular year, the consent to operate these wells will remain valid till those wells are drilled.

Thanking you,

Yours faithfully,
OIL INDIA LIMITED



(S. Bora)
Head - S&E
For Group General Manager

Encl : 1) Application forms (in triplicate)

BNS/trg.

Applications Submitted:

1. Drilling operations
2. Production operations - Moran field.
3. Production operations - Nabarkhatya field
4. Production operations - Digboi field.
5. Production operations - Kathaloni field
6. Production operations - Dikom field.
7. Production operations - other isolated and satellite fields
8. Central Industrial Complex - Dulajjan
9. Central Industrial Complex - Moran



without depreciation till the date of application. The gross capital investment in land, building, plant and machinery without depreciation.



Oil India Limited

(A GOVERNMENT OF INDIA ENTERPRISE)
REGISTERED OFFICE : DULIAJAN, ASSAM

SAFETY & ENVIRONMENT

P.O. DULIAJAN, DIST. DIBRUGARH
ASSAM, PIN – 786 602
Tel : 0374-2800542 / 2803293
Fax : 0374-2804888
E-mail : safety@oilindia.in

Ref. No. S&E/E/20/992 of 12.09.2006

Regional Executive Engineer,
Pollution Control Board, Assam,
Behind ASTC, Chowkidinghee,
Dibrugarh, Assam

Sub : Payment of consent fee for the year 2006-07

Ref : Our letter No. S&E/E/20/723 of 05.07.2006

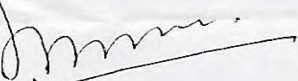
Dear Sir,

Reference our above mentioned letter, we are enclosing herewith a Demand Draft No. 085532 for an amount of Rs. 22,30,000/- (Rupees twenty two lakhs thirty thousand only) towards the fee for consent to establish and consent to operate the OIL installations for the year 2006-07. The details of the field/installations and the corresponding fees paid has been shown in the Annexure attached herewith. The fees have been paid in the increased rate as advised by you vide your Notification No. ENG.26/2003/14 dtd. Dispur the 12th Nov. 2003.

Kindly acknowledge the receipt of the same.

Thanking you,

Yours faithfully,
OIL INDIA LIMITED


(S. Bora)
Head – S&E
For Group General Manager

Encl : 1) DD No. 085532 dtd. 09.08.2006
2) Annexure – I


BNS/trg.





POLLUTION CONTROL BOARD, ASSAM
BAMUNIMAIDAM, GUWAHATI - 21



CE (Sec) E-04
P. note and take action for
2008-2009. We have not
received the consent for

Dated Guwahati, the 27/2/08

The Group General Manager
M/s. Oil India Limited,
Duliajan, Dibrugarh, Assam

Sub: Consent to Operate for the year 2007-08 for the site as Annexure -I.

Ref: Your application No. WB/Z-I/T-879/94-95/140
Recommended by RO: OBR No. RO/OBR/
7-726/95-96/183/873 dt. 6-11-2007.

Sir,
With reference to your application in the name and style as mentioned above, the Board is pleased to grant the renewal of consent under the **Water/Air Act**, for the period from 1st April, 2007 to 31st March, 2008 under the same terms and conditions as laid down in its letter No. as per previous consent order and Appendix (5 Nos.)

You are also requested to apply for "**Consent to Operate**" for the year 2008-09 immediately along with **arrear consent fees** payable to this Board if any as per enhance rate.

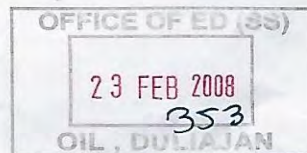
Yours Sincerely,

(Signature)
(J.L. Dutta)
Chairman
Pollution Control Board, Assam
Bamunimaidam, Guwahati-21
Dated Guwahati, the 13/02/08...

Memo No. WB/Z-I/T-879/94-95/140-A
Copy to:

- 1) The Deputy Commissioner, Dibrugarh District, Dibrugarh for information.
- 2) The Regional Officer, Regional Office, Dibrugarh, Pollution Control Board, Assam for information & necessary action.
- 3) Record file/Computer section.

(Signature)
(J.L. Dutta)
Chairman



CE (Sec) E-04
P. inform the
terms & conditions to the
concerned dept.
To
From
27/2
Sir,
P. send copy
to the dept.
or discussed
At
6/3



1. Production installation of Naharkatia, Digboi, Moran, Katholoni, Dikom and other Satellite Field.
2. Central Industrial Complex of Duliajan, Moran of Dibrugarh District.

POLLUTION CONTROL BOARD, ASSAM
BAMUNIMADAM, GUWAHATI - 21



No. WB/2-I/T-877/94-95/197
259

Dated Guwahati, the

To ✓ Head - S & E,
Safety and Environment Deptt.,
Oil India Ltd., Dibrugarh,
Dibrugarh.

Sub: Consent to Operate for the year 2008-09 under Water (Prevention & Control of Pollution) Act, 1974 / Air (Prevention & Control of Pollution) Act, 1981. for Central Industrial Complex at Moran.

Dear Sir,

With reference to your application in the name and style as mentioned above, the Board is pleased to grant the renewal consent under the **Water/ Air Act**, for the period from 1st April, 2008 to 31st March, 2009 under the same terms and conditions as laid down in its letter No. *enclosed Appendices.*

You are also requested to apply for "Consent to Operate" for the year 2009 - 2010 immediately.

Yours faithfully,

kgogoi 09.03.09

kgogoi Member Secretary

Memo No. WB/2-I/T-877/94-95/197-A. Dated Guwahati, the

Copy to:

- 1) The Joint Secretary, Environment & Forests Department, Govt. of Assam, Dispur, Guwahati - 6 for favour of information.
- 2) The Deputy Commissioner, *Dibrugarh* District for favour of information.
- 3) The General Manager, DIC, *Dibrugarh* for favour of information.
- 4) The ~~Sr. Environmental Engineer~~ / Regional Executive Engineer, Regional Office/ ~~Regional Lab-cum-Office~~, *Dibrugarh*, Pollution Control Board, Assam for information & necessary action.

- sd -

Member Secretary

The industry will have to submit the Environmental Statement regularly by 31 March every year.

kgogoi 09.03.09
Member Secretary

POLLUTION CONTROL BOARD, ASSAM
BAMUNIMAIDAM, GUWAHATI - 21



No. WB/X-I/T-877/94-95/196
888

Dated Guwahati, the 09/03/09

To

✓ Head - S & E
Safety and Environment Dept.,
Oil India Ltd., Duliajan,
Dibrugarh

Sub: Consent to Operate for the year 2008-09 under Water (Prevention & Control of Pollution) Act, 1974 / Air (Prevention & Control of Pollution) Act, 1981. for Central Industrial Complex at Duliajan.

Dear Sir,

With reference to your application in the name and style as mentioned above, the Board is pleased to grant the renewal consent under the **Water/ Air Act**, for the period from 1st April, 2008 to 31st March, 2009 under the same terms and conditions as laid down in its letter No. *enclosed Appendices*.

You are also requested to apply for "Consent to Operate" for the year 2009 - 2010 immediately.

Yours faithfully,

Angora 09.03.09
Member Secretary

Memo No. WB/X-I/T-877/94-95/196-A

Dated Guwahati, the

Copy to:

- 1) The Joint Secretary, Environment & Forests Department, Govt. of Assam, Dispur, Guwahati - 6 for favour of information.
- 2) The Deputy Commissioner, *Dibrugarh* District for favour of information.
- 3) The General Manager, DIC, *Dibrugarh* for favour of information.
- 4) The Sr. Environmental Engineer/ Regional Executive Engineer, Regional Office/ Regional Lab-cum-Office, *Dibrugarh*....., Pollution Control Board, Assam for information & necessary action.

Sd/-
Member Secretary

POLLUTION CONTROL BOARD, ASSAM
BAMUNIMAIDAM, GUWAHATI - 21

Dated Guwahati, _____



No. WB/X-I/T-877/94-95/195
257

To

Head - S & E
Safety and Environment Deptt.,
Oil India Ltd., Duliagan,
Dibrugarh.

Sub: Consent to Operate for the year 2008-09 under Water (Prevention & Control of Pollution) Act, 1974 / Air (Prevention & Control of Pollution) Act, 1981. for Production Operations in other isolated and satellite fields.

Dear Sir,

With reference to your application in the name and style as mentioned above, the Board is pleased to grant the renewal consent under the **Water/ Air Act**, for the period from 1st April, 2008 to 31st March, 2009 under the same terms and conditions as laid down in its letter No. *enclosed Appendices*.

You are also requested to apply for "Consent to Operate" for the year 2009 - 2010 immediately.

Yours faithfully,

Ingogoi 09.09.09

Ingogoi
Member Secretary

Memo No. WB/X-I/T-877/94-95/195-A-
Copy to:

Dated Guwahati, the _____

- 1) The Joint Secretary, Environment & Forests Department, Govt. of Assam, Dispur, Guwahati - 6 for favour of information.
- 2) The Deputy Commissioner, *Dibrugarh* District for favour of information.
- 3) The General Manager, DIC, *Dibrugarh* for favour of information.
- 4) The ~~Sr. Environmental Engineer~~/ Regional Executive Engineer, Regional Office/
~~Regional Lab-cum-Office~~, *Dibrugarh*, Pollution Control Board, Assam for information & necessary action.

— *Sd* —
Member Secretary

POLLUTION CONTROL BOARD, ASSAM
BAMUNIMADAM, GUWAHATI - 21



No. WB/Z-I/T-877/94-95/194
856

Dated Guwahati, the 09/03/09

To

Head - S & E,
Safety and Environment Deptt.,
Oil India Ltd, Duliagan,
Dibrugarh.

Sub: Consent to Operate for the year 2008-09 under Water (Prevention & Control of Pollution) Act, 1974 / Air (Prevention & Control of Pollution) Act, 1981. for Production Operations at Sengakhat Fields.

Dear Sir,

With reference to your application in the name and style as mentioned above, the Board is pleased to grant the renewal consent under the **Water/ Air Act**, for the period from 1st April, 2008 to 31st March, 2009 under the same terms and conditions as laid down in ~~its letter No.~~ *enclosed Appendices*

You are also requested to apply for "Consent to Operate" for the year 2009 - 2010 immediately.

Yours faithfully,

[Signature] 09.03.09

Member Secretary

Memo No. WB/Z-I/T-877/94-95/194-A. Dated Guwahati, the

Copy to:

- 1) The Joint Secretary, Environment & Forests Department, Govt. of Assam, Dispur, Guwahati - 6 for favour of information.
- 2) The Deputy Commissioner, *Dibrugarh* District for favour of information.
- 3) The General Manager, DIC, *Dibrugarh* for favour of information.
- 4) The ~~Sr. Environmental Engineer/~~ Regional Executive Engineer, Regional Office/
~~Regional Lab-cum-Office,~~ *Dibrugarh* Pollution Control Board, Assam for information & necessary action.

— S d —

Member Secretary

POLLUTION CONTROL BOARD, ASSAM
BAMUNIMADAM, GUWAHATI - 21



No. WB/2-I/T-877/94-95/193
855

Dated Guwahati, the 09/03/09

To
Head - S & E,
Safety and Environment Deptt.,
Oil India Ltd., Duliajan.
Dibrugarh.

Sub: Consent to Operate for the year 2008-09 under Water (Prevention & Control of Pollution) Act, 1974 / Air (Prevention & Control of Pollution) Act, 1981. for Production Operations at Moran Field.

Dear Sir,

With reference to your application in the name and style as mentioned above, the Board is pleased to grant the renewal consent under the Water/ Air Act, for the period from 1st April, 2008 to 31st March, 2009 under the same terms and conditions as laid down in its letter No. enclosed Appendices.

You are also requested to apply for "Consent to Operate" for the year 2009 - 2010 immediately.

Yours faithfully,

Signature 09.03.09

Member Secretary

Memo No. WB/2-I/T-877/94-95/193-A

Dated Guwahati, the

Copy to:

- 1) The Joint Secretary, Environment & Forests Department, Govt. of Assam, Dispur, Guwahati - 6 for favour of information.
- 2) The Deputy Commissioner, *Dibrugarh* District for favour of information.
- 3) The General Manager, DIC, *Dibrugarh* for favour of information.
- 4) The Sr. Environmental Engineer/ Regional Executive Engineer, Regional Office/ Regional Lab-cum-Office, *Dibrugarh*, Pollution Control Board, Assam for information & necessary action.

—sd—
Member Secretary

POLLUTION CONTROL BOARD, ASSAM
BAMUNIM AidAM, GUWAHATI - 21



No. WB/X-I/T-877/94-95/192
254

Dated Guwahati, the 09/3/09

To Head - S & E,
Safety and Environment Deptt.,
Oil India Ltd., Duliajan,
Dibrugarh.

Sub: Consent to Operate for the year 2008-09 under Water (Prevention & Control of Pollution) Act, 1974 / Air (Prevention & Control of Pollution) Act, 1981. for Production Operations at Digboi Field.

Dear Sir,

With reference to your application in the name and style as mentioned above, the Board is pleased to grant the renewal consent under the Water/ Air Act, for the period from 1st April, 2008 to 31st March, 2009 under the same terms and conditions as laid down in its letter No. enclosed Appendices.

You are also requested to apply for "Consent to Operate" for the year 2009 - 2010 immediately.

Yours faithfully,

Bagge 09.3.09

Member Secretary

Memo No. WB/X-I/T-877/94-95/192-A Dated Guwahati, the

Copy to:

- 1) The Joint Secretary, Environment & Forests Department, Govt. of Assam, Dispur, Guwahati - 6 for favour of information.
- 2) The Deputy Commissioner, *Dibrugarh* District for favour of information.
- 3) The General Manager, DIC, *Dibrugarh* for favour of information.
- 4) The ~~Sr. Environmental Engineer~~ Regional Executive Engineer, Regional Office/ Regional Lab-cum-Office, *Dibrugarh* Pollution Control Board, Assam for information & necessary action.

— Sd —
Member Secretary

POLLUTION CONTROL BOARD, ASSAM
BAMUNIMAIDAM, GUWAHATI - 21



No. WB/Z-I/T-877/94-95/191
853

Dated Guwahati, the

To

Head - S & E,
Safety and Environment Deptt.
Oil India Ltd., Meliajan,
Dibrugarh.

Sub: Consent to Operate for the year 2008-09 under Water (Prevention & Control of Pollution) Act, 1974 / Air (Prevention & Control of Pollution) Act, 1981. for Production Operations at Sikkon Field.

Dear Sir,

With reference to your application in the name and style as mentioned above, the Board is pleased to grant the renewal consent under the **Water/ Air Act**, for the period from 1st April, 2008 to 31st March, 2009 under the same terms and conditions as laid down in its letter No. enclosed Appendices.

You are also requested to apply for "Consent to Operate" for the year 2009 - 2010 immediately.

Yours faithfully,

[Signature] 09.3.09

Member Secretary

Dated Guwahati, the

Memo No. WB/Z-I/T-877/94-95/191-A
Copy to:

- 1) The Joint Secretary, Environment & Forests Department, Govt. of Assam, Dispur, Guwahati - 6 for favour of information.
- 2) The Deputy Commissioner, *Dibrugarh* District for favour of information.
- 3) The General Manager, DIC, *Dibrugarh* for favour of information.
- 4) The ~~Sr. Environmental Engineer~~ Regional Executive Engineer, Regional Office/
~~Regional Lab-cum-Office~~, *Dibrugarh* Pollution Control Board, Assam for information & necessary action.

— Sd —

Member Secretary

POLLUTION CONTROL BOARD, ASSAM
BAMUNIMADAM, GUWAHATI - 21



No. WB/X-I/T-877/94-95/189

Dated Guwahati, the 09/03/09

To Head - S & E,
Safety and Environment Deptt.,
Oil India Ltd., Duliajan,
Dibrugarh.

Sub: Consent to Operate for the year 2008-09 under Water (Prevention & Control of Pollution) Act, 1974 / Air (Prevention & Control of Pollution) Act, 1981. for Production Operations at Naharkatija Field.

Dear Sir,

With reference to your application in the name and style as mentioned above, the Board is pleased to grant the renewal consent under the Water/ Air Act, for the period from 1st April, 2008 to 31st March, 2009 under the same terms and conditions as laid down in its letter No. enclosed Appendices.

You are also requested to apply for "Consent to Operate" for the year 2009 - 2010 immediately.

Yours faithfully,

[Signature] 09.03.09
Member Secretary

Memo No. WB/X-I/T-877/94-95/189 - A Dated Guwahati, the

Copy to:

- 1) The Joint Secretary, Environment & Forests Department, Govt. of Assam, Dispur, Guwahati - 6 for favour of information.
- 2) The Deputy Commissioner, Dibrugarh District for favour of information.
- 3) The General Manager, DIC, Dibrugarh..... for favour of information.
- 4) The Sr. Environmental Engineer/ Regional Executive Engineer, Regional Office/ Regional Lab-cum-Office, Dibrugarh, Pollution Control Board, Assam for information & necessary action.

— Sd —

Member Secretary

POLLUTION CONTROL BOARD, ASSAM
BAMUNIMADAM, GUWAHATI - 21



No. WB/Z-I/T-877/94-95/190

Dated Guwahati, the 09/3/09

To *AD*
Pl. note & file
Di
1/4
85
To *Head* -/S&E,
Safety and Environment Deptt.,
Oil India Ltd, Duliajan,
Dibrugarh.



Sub: Consent to Operate for the year 2008-09 under Water (Prevention & Control of Pollution) Act, 1974 / Air (Prevention & Control of Pollution) Act, 1981. *for Production Operations at Kathaloni Field.*

Dear Sir,

With reference to your application in the name and style as mentioned above, the Board is pleased to grant the renewal consent under the **Water/ Air Act**, for the period from 1st April, 2008 to 31st March, 2009 under the same terms and conditions as laid down in its letter No. *enclosed Appendices.*

You are also requested to apply for "Consent to Operate" for the year 2009 - 2010 immediately.

Yours faithfully,

Signature 09.3.09

Signature Member Secretary

Dated Guwahati, the

Memo No. WB/Z-I/T-877/94-95/190-A

Copy to:

- 1) The Joint Secretary, Environment & Forests Department, Govt. of Assam, Dispur, Guwahati - 6 for favour of information.
- 2) The Deputy Commissioner, *Dibrugarh* District for favour of information.
- 3) The General Manager, DIC, *Dibrugarh* for favour of information.
- 4) The ~~Sr. Environmental Engineer~~/ Regional Executive Engineer, Regional Office/
~~Regional Lab-cum-Office~~, *Dibrugarh*....., Pollution Control Board, Assam for information & necessary action.

- Sd -

Member Secretary



Oil India Limited
SAFETY & ENVIRONMENT DEPT.
 (A GOVERNMENT OF INDIA ENTERPRISE)
 REGISTERED OFFICE : DULIAJAN, ASSAM

Bora
Pl. h.h
20/7/09



P.O. DULIAJAN, DIST. DIBRUGARH
 ASSAM, PIN - 786 602
 Tel : 0374-2800542 / 2803293
 Fax : 0374-2804888
 E-mail : safety@oilindia.in

Ref: No: S&E/E/20/825

Date: 18/07/2009

Regional Executive Engineer
 Pollution Control Board, Assam
 Back Side of ASTC Bus Station
 Chowkidinghee, Dibrugarh

Sub: Consent to operate as per Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981 for the year 2009-10

Dear sir,

We are submitting herewith two sets of duly filled in applications for consent to operate for the year 2009-10 in the prescribed format in respect of production operations under different fields of Assam and Central Industrial Complexes of Duliajan and Moran. The necessary fees as applicable will be paid shortly.

Thanking you.

Yours faithfully,
 OIL INDIA LIMITED

(S BORA)
 HEAD-S&E
 For **RESIDENT CHIEF EXECUTIVE**

- Encl: 1. Applications Submitted (in duplicate)
1. Production operation - Naharkatiya Field
 2. Production operation - Dikom Field
 3. Production operation - Kathaloni Field
 4. Production operation - Digboi Field
 5. Production operation - Moran Field
 6. Production operation - Tengakhat Field
 7. Production operation - Other Satellite Fields
 8. Central Industrial Complex, Duliajan
 9. Central Industrial Complex, Moran



Copy : Member Secretary,
 Pollution Control Board, Assam
 Bamunimaidam, Guwahati-21

Received
 Pl.
 18/07/09

Oil India Limited
SAFETY & ENVIRONMENT DEPT.

(A GOVERNMENT OF INDIA ENTERPRISE)
 REGISTERED OFFICE : DULIAJAN, ASSAM

P.O. DULIAJAN, DIST. DIBRUGARH
 ASSAM, PIN - 786 602
 Tel : 0374-2800542 / 2803293
 Fax : 0374-2804888
 E-mail : safety@oilindia.in

REF: S&E/E/20/880

Date: 01/08/2009

*Regional Executive Engineer
 Pollution Control Board, Assam
 Back Side of ASTC Bus Station
 Chowkidinghee, Dibrugarh*

Sub : Consent to operate as per Water (Prevention and Control of Pollution) Act, 1974
 and Air(Prevention & Control of Pollution) Act, 1981 for the year 2009-10

Ref : Our letter No. S&E/E/20/825 dtd. 18.07.2009

Sir,

Reference above, please find enclosed herewith a demand draft of Rs. 10,25,000.00 (Rupees Ten Lakh Twenty Five Thousand only) bearing no. 177962 dated 18.07.09 towards consent fees to operate in respect of production operations. The details of fees paid has been shown in Annexure - I. It is to be mentioned here that the necessary applications in prescribed format have already been submitted vide our letter referred above.

We request you to issue necessary order of consent as per the above Acts please.

Kindly acknowledge the receipt of the above please.

Thanking you

Yours faithfully,
 OIL INDIA LIMITED

(S BORA)
 General Manager(S&E)
 For Resident Chief Executive

Encl: 1. Demand Draft of SBI Duliajan for Rs. 10,25,000.00

Copy : Member Secretary,
 Pollution Control Board, Assam
 Bamunimaidam, Guwahati-21

SKD/trg.

FIELD-WISE FEES BREAK-UP ON CAPITAL COST
FOR THE YEAR 2009-10

<i>Sl No.</i>	<i>Name of the Field</i>	<i>Gross Capital Cost(Approx.)</i>	<i>Fees to be paid for consent to operate & renewal.</i>
1	<i>Naharkatiya Field</i>	<i>Rs. 46.82 crores</i>	<i>Rs. 1,00,000.00</i>
2	<i>Kathaloni Field</i>	<i>Rs. 15.57 crores</i>	<i>Rs. 1,00,000.00</i>
3	<i>Dikom Field</i>	<i>Rs. 18.85 crores</i>	<i>Rs. 1,00,000.00</i>
4	<i>Digboi Field</i>	<i>Rs. 35.92 crores</i>	<i>Rs. 1,00,000.00</i>
5	<i>Moran Field</i>	<i>Rs. 21.00 crores</i>	<i>Rs. 1,00,000.00</i>
6	<i>Tengakhat Field</i>	<i>Rs. 69.72 crores</i>	<i>Rs. 2,00,000.00</i>
7	<i>Other Satellite Fields</i>	<i>Rs. 04.5 crores</i>	<i>Rs. 25,000.00</i>
8	<i>Central Industrial Complex, Duliqjan</i>	<i>Rs. 59.94 crores</i>	<i>Rs. 2,00,000.00</i>
9	<i>Central Industrial Complex, Moran</i>	<i>Rs. 31.08 crores</i>	<i>Rs. 1,00,000.00</i>
	<i>Total Fees</i>		<i>Rs. 10,25,000.00</i>

(Rupees Ten Lakh Twenty Five Thousand only)



Oil India Limited

SAFETY & ENVIRONMENT DEPT.

(A GOVERNMENT OF INDIA ENTERPRISE)
REGISTERED OFFICE : DULIAJAN, ASSAM



P.O. DULIAJAN, DIST. DIBRUGARH
ASSAM, PIN - 786 602
Tel : 0374-2800542 / 2803293
Fax : 0374-2804888
E-mail : safety@oilindia.in

Ref: No: S&E/E/20/499

Date: 30/04/2010

**Regional Executive Engineer
Pollution Control Board, Assam
Back Side of ASTC Bus Station
Chowkidinghee, Dibrugarh**

Sub: Consent to operate as per Water (Prevention and Control of Pollution) Act, 1974 and Air(Prevention & Control of Pollution) Act, 1981 for the year 2010 - 11

Dear sir,

We are submitting herewith two sets of duly filled in applications for consent to operate for the year 2010 - 11 in the prescribed format in respect of production operations under different fields of Assam and Central Industrial Complexes of Duliajan and Moran. Accordingly, we are enclosing a demand draft of Rs. 10,25,000.00 (Rupees Ten lakh Twenty Five thousand only) vide DD No. 188492 dtd. 05.04.2010 towards application fees for consent to operate.

Thanking you.

Yours faithfully,

OIL INDIA LIMITED

(C. Bose)

HEAD-S&E

For RESIDENT CHIEF EXECUTIVE

- Encl: 1. Applications Submitted(in duplicate)
1. Production operation - Naharkatiya Field
 2. Production operation - Dikom Field
 3. Production operation - Kathaloni Field
 4. Production operation - Digboi Field
 5. Production operation - Moran Field
 6. Production operation - Tengakhath Field
 7. Production operation - Other Satellite Fields
 8. Central Industrial Complex, Duliajan
 9. Central Industrial Complex, Moran

Copy : Member Secretary,
Pollution Control Board, Assam
Bamunimaidam, Guwahati-21

DNS/pkg

Received.

17/05/2010



FIELD-WISE FEES BREAK-UP ON CAPITAL COST
FOR THE YEAR 2010-2011

Sl. No.	Name of the Field	Gross Capital Cost (Approx)	Fees to be paid for consent to operate & renewal.
1	Naharkatiya Field	Rs.46.82 crores	Rs. 1,00,000.00
2	Kathaloni Field	Rs.15.57crores	Rs. 1,00,000.00
3	Dikom Field	Rs. 18.85crores	Rs. 1,00,000.00
4	Digboi Field	Rs.35.92crores	Rs. 1,00,000.00
5	Moran Field	Rs.21.00crores	Rs. 1,00,000.00
6	Tengakhat field	Rs. 69.72 crores	Rs. 2,00,000.00
7	Other Satellite field	Rs.04.5 crores	Rs. 25,000.00
8	Central Industrial Complex, Duliajan	Rs.59.94 crores	Rs. 2,00,000.00
9	Central Industrial Complex, Moran	Rs. 31.08crores	Rs. 1,00,000.00
	Total Fees		Rs.10,25,000.00

(Total Rupees Ten Lakh Twenty five only)



ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

Ref: No: S&E/E/20/464

Date: 20.04.2011

Regional Executive Engineer
Pollution Control Board, Assam
Back Side of ASTC Bus Station
Chowkidinghee, Dibrugarh

Sub: Consent to operate as per Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981 for the year 2011-12

Dear sir,

We are submitting herewith two sets of duly filled in applications for renewal⁴ consent to operate for the year 2011-12 in the prescribed format in respect of production operations under different fields of Assam and Central Industrial Complexes of Duliajan and Moran. The necessary fees as applicable will be paid shortly.

Thanking you.

Yours faithfully,
OIL INDIA LIMITED

(C. Bose)
HEAD-S&E

For **RESIDENT CHIEF EXECUTIVE**

Encl: Applications (in duplicate) for

1. Production operation – Naharkatiya Field
2. Production operation – Dikom Field
3. Production operation – Kathaloni Field
4. Production operation – Eastern Producing Area (Digboi Field)
5. Production operation - Moran Field
6. Production operation - Tengakhat Field
7. Production operation – Other Isolated and Satellite Fields
8. Central Industrial Complex, Duliajan
9. Central Industrial Complex, Moran

Copy : Member Secretary,
Pollution Control Board, Assam
Bamunimaidam, Guwahati-21

✓
BNS/pkg



Enclosure to the letter no. S&E/E/20/1135 dtd. 14.09.2011

**FIELD-WISE FEES BREAK-UP W.R.T. CAPITAL COST
FOR THE YEAR 2011-2012**

Sl. No.	Name of the Field	Gross Capital Cost (Approx)	Fees to be paid for consent to operate & renewal.
1	Naharkatiya Field	₹ 46.82 crores	₹ 1,00,000.00
2	Kathaloni Field	₹ 15.57crores	₹ 1,00,000.00
3	Dikom Field	₹ 18.85crores	₹ 1,00,000.00
4	Digboi Field	₹ 35.92crores	₹ 1,00,000.00
5	Moran Field	₹ 21.00crores	₹ 1,00,000.00
6	Tengakhat field	₹ 69.72 crores	₹ 2,00,000.00
7	Other Satellite field	₹ 04.5 crores	₹ 25,000.00
8	Central Industrial Complex, Duliajan	₹ 59.94 crores	₹ 2,00,000.00
9	Central Industrial Complex, Moran	₹ 31.08crores	₹ 1,00,000.00
	Total Fees		₹10,25,000.00

(Total Rupees Ten Lakh Twenty five Thousand only)





ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

Ref. No: S&E/E/20/1335

Date : 01.11.2011

Member Secretary
Pollution Control Board, Assam.
Bamunimaidam, Guwahati-21

Sub : Payment of fee for consent to establish(NOC) and renewal of consent to operate.

Ref. Our letter No.S&E/E/20/465, dtd.20.04.2011
No.S&E/E/20/464, dtd.20.04.2011

Sir,

Reference above, please find enclosed a demand draft No.936398, dtd. 29.10.2011 amounting to ₹18,60,000.00 (Rupees eighteen lakh sixty thousand only) and demand draft No.936399, dtd. 29.10.2011 amounting to ₹10,25,000.00 (Rupees ten lakh, twenty five thousand only) towards the fee for consent to establish & operate for drilling location and renewal of consent to operate for production installations of OIL payable to Member Secretary, Pollution Control Board, Assam. These fees pertain to Installations in our Duliajan as well as Moran Field.

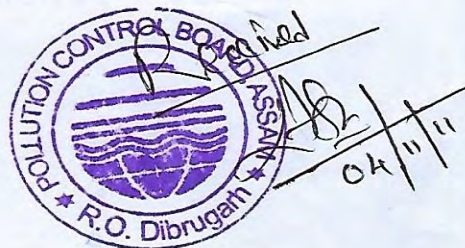
Kindly acknowledge the receipt of the above.

Thanking you.

Yours faithfully,
OIL INDIA LIMITED.

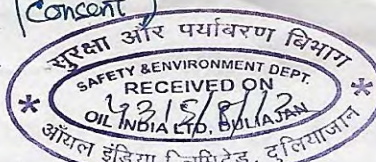
(B N SAHOO)
Chief Engineer-S&E
For Head-S&E
For **Resident Chief Executive.**

Encl : Demand Draft No.936398, dtd.29.10.2011
936399, dtd.29.10.2011



Lab 11/2
 11/2
 11/02/13
 A. Prepare a letter for
 production installation.

file (consent)
 P-20



Pollution Control Board, Assam
Bamunimaidam : Guwahati-21.

No.WB/Z-I/T-879/94-95/441

Dated Guwahati, the 9/11/12

To

The Head – S & E,
 Safety and Environment Deptt.
 M/s. Oil India Limited,
 P.O. Duliyaajan,
 Dist. Dibrugarh(Assam)
 Pin – 786602.

Dr BMS
 13/11/12

Sub: 'Consent to Operate' for the year 2012-13 under Water (Prevention & Control of Pollution) Act, 1974/Air (Prevention & Control of Pollution) Act, 1981, for the sites as per Annexure - I.

Dear Sir,

With reference to your application in the name and style as mentioned above, the Board is pleased to grant the "Consent to Operate" under the Water Act / Air Act, for the period from 01st April, 2012 to 31st March, 2013 under the terms and conditions as per Appendix "A" & "B".

You are also requested to apply for "Consent to Operate" for the year 2013-2014 immediately.

Yours faithfully,

Note :- The amount of arrear fees is under Enquiry and will be communicated to you at an early date.

h. gogoi 09/11/12

Memo No.WB/Z-I/T-879/94-95/441-A,
 Copy to:

Member Secretary
 Dated Guwahati, the

1. The Deputy Secretary, Environment & Forest Department, Govt. of Assam, Dispur, Guwahati- 6 for favour of information.
2. The Deputy Commissioner, Dibrugarh dist. favour of information.
3. The General Manager, DI & C C, Dibrugarh for favour of information.
4. The Regional Executive Engineer, Regional Office, Dibrugarh; Pollution Control Board, Assam for information & necessary action.

Member Secretary

Annexure – I

List of sites

1.	Production operation	Naharkatia field
2.	Production operation	Tengakhat field
3.	Production operation	Kathaloni field
4.	Production operation	Dikom field
5.	Production operation	Eastern Producing Area (Digboi field)
6.	Production operation	Other Isolated and Satellite fields
7.	Production operation	Moran
8	Central Industrial Complex,	Duliajan
9.	Central Industrial Complex	Moran.



ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
A Government of India Enterprise

E-20

File copy

P.O. DULIAJAN-786602,
ASSAM, INDIA
Phone : 0374-2800542
Fax : 0374-2804888

Ref: No: S&E/E/20/306

Date: 11.03.2013

**Regional Executive Engineer
Pollution Control Board, Assam
Back Side of ASTC Bus Station
Chowkidinghee, Dibrugarh**


Sub: Consent to operate as per Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981 for the year 2013-14

Dear Sir,

We are submitting herewith two sets of duly filled in applications for renewal of consent to operate for the year 2013-14 in the prescribed format in respect of production operations under different fields of Assam and Central Industrial Complexes of Duliajan and Moran. The details of the fees to be paid has been shown in Annexure-I. The fees will be paid after obtaining your concurrence regarding the amount to be paid as shown in the said annexure.

Thanking you.

Yours faithfully,
OIL INDIA LIMITED


(Dr. B N Sahoo)
Chief Engineer(S&E)
For HEAD(S&E)
For **RESIDENT CHIEF EXECUTIVE**

- Encl: Applications Submitted (in duplicate) for
1. Production operation – Naharkatiya Field
 2. Production operation – Dikom Field
 3. Production operation – Kathaloni Field
 4. Production operation – EPA, Digboi Field
 5. Production operation - Moran Field
 6. Production operation – Tengakhat Field
 7. Production operation – Other Isolated and Satellite Fields
 8. Central Industrial Complex, Duliajan
 9. Central Industrial Complex, Moran

Copy : Member Secretary,
Pollution Control Board, Assam
Bamunimaidam, Guwahati-21

Pkg/jg

Annexure-I

Reference to the letter No. S&E/E/20/306, Dated:11.03.2013

**FIELD-WISE FEES BREAK-UP W.R.T. CAPITAL COST
FOR THE YEAR 2013-2014**

Sl. No.	Name of the Field	Gross Capital Cost (Approx)	Fees to be paid Water(Prevention & control of Poll.) Act,1974	Fees to be paid Air(Prevention & control of Poll.) Act,1981
1	Naharkatiya Field	₹ 46.82 crores	₹ 1,00,000.00	₹ 1,00,000.00
2	Dikom Field	₹ 18.85crores	₹ 1,00,000.00	₹ 1,00,000.00
3	Kathaloni Field	₹ 15.57crores	₹ 1,00,000.00	₹ 1,00,000.00
4	EPA,Digboi Field	₹ 35.92crores	₹ 1,00,000.00	₹ 1,00,000.00
5	Moran Field	₹ 21.00crores	₹ 1,00,000.00	₹ 1,00,000.00
6	Tengakhat field	₹ 69.72 crores	₹ 2,00,000.00	₹ 2,00,000.00
7	Other Satellite field	₹ 04.5 crores	₹ 25,000.00	₹ 25,000.00
8	Central Industrial Complex, Duliajan	₹ 59.94 crores	₹ 2,00,000.00	₹ 2,00,000.00
9	Central Industrial Complex, Moran	₹ 31.08crores	₹ 1,00,000.00	₹ 1,00,000.00
			₹10,25,000.00	₹10,25,000.00

Total ₹ 10,25,000.00 + ₹10,25,000.00 = ₹20,50,000.00

(Total Rupees twenty lakh fifty thousand only)

REGIONAL OFFICE
POLLUTION CONTROL BOARD:ASSAM
P.O. & DIST:DIBRUGARH
BEHIND ASTC:CHOWKIDINGHEE

NO:RO/DBR/T-2115/02-03/106

To

The Head S& E,
Oil India Ltd.
P.O- Duliajan-786002
Dist-Dibrugarh

Dated Dib,the 20th May 2013



Sub: Renewal Consent to operate fees for the production operation of OIL, Duliajan for the year 2013-2014.

Ref:Your Letter No. S&E/E/20/306, dated-11/03/ 2013.

Sir,

This office is in receipt of renewal consent for the grant of consent for the year 2013-2014.

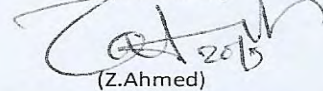
The fees to be paid based on the Gross Capital investment of the installation and is shown in the above referred letter.

S.L NO	NAME OF THE FIELD	GROSS CAPITAL COST (APPROX)	FEES TO BE PAID	
			WATER ACT	AIR ACT
1	NAHARKATIYA	RS.46.82CR	RS. 100000.00	RS.100000.00
2	DIKOM	RS.18.85CR	RS. 100000.00	RS.100000.00
3	KATHALONI	RS.15.57CR	RS. 100000.00	RS.100000.00
4	EPA,DIGBOI	RS.35.92CR	RS. 100000.00	RS.100000.00
5	MORAN	RS.21.00CR	RS. 100000.00	RS.100000.00
6	TENGAKHAT	RS.69.72CR	RS. 200000.00	RS.200000.00
7	OTHER SATELLITE FIELD	RS.04.5CR	RS. 25,000.00	RS. 25,000.00
8	CENTRAL INDUSTRIAL COMPLE,DULIAJAN	RS.59.94CR	RS. 200000.00	RS. 200000.00
9	CENTRAL INDUSTRIAL COMPLE,MORAN	RS.31.08CR	RS. 100000.00	RS. 100000.00
			RS.10,25000.00	RS.10,25000.00

Grand Total Rupees: 20,50,000.00 (Rupees Twenty Lakh Fifty thousand only)

The fees to be paid in the form of Bank Draft in favour of "Pollution Control Board, Assam" payable at Dibrugarh.

Yours faithfully


(Z.Ahmed)

REGIONAL EXECUTIVE ENGINEER
Dated Dib the 20th May 2013

MEMO:NO:RO/DBR/T-2115/02-03/

Copy to: I) The Member Secretary ,Pollution Control Board, Assam, Ghy-21 for favour of information

(Z.Ahmed)

REGIONAL EXECUTIVE ENGINEER
DIBRUGARH



ऑयल इंडिया लिमिटेड

(भारत सरकार का उद्यम)

Oil India Limited

(A Government of India Enterprise)

Safety & Environment Department

P.O. DULIAJAN-786602,

ASSAM, INDIA

Phone : 0374-2800542

Fax : 0374-2804888

Email : safety@oilindia.in

Ref: No: S&E/E/20/942

Date: 11.07.2013

**Regional Executive Engineer
Pollution Control Board, Assam
Back Side of ASTC Bus Station
Chowkidinghee, Dibrugarh**

Sub: Payment of fee for renewal of Consent to Operate.

Ref.- Our letter No. S&E/E/20/306 dtd. 11.03.2013

Sir,

Reference above, please find enclosed a demand draft No.943375 dtd.27.06.2013 amounting to ₹20,50,000.00 (Rupees twenty lakh fifty thousand only) towards the renewal of consent to operate for production installations of OIL payable to Pollution Control Board, Assam, Dibrugarh. These fees pertain to installations in our Duliajan as well as Moran Field.

Kindly acknowledge the receipt of the above.

Thanking you.

Yours faithfully,
OIL INDIA LIMITED.

(Dr. B N SAHOO)
Chief Engineer (S&E)
For Head(S&E)
For **Resident Chief Executive.**

Received
18/7



Encl : Demand Draft No.943375,dtd.27.06.2013

File copy



ऑयल इंडिया लिमिटेड

(भारत सरकार का उद्यम)

Oil India Limited

(A Government of India Enterprise)

Sales & Environmental Division

P.O. DULIAJAN-786602,

ASSAM, INDIA

Phone : 0374-2800542

Fax : 0374-2804888

Ref: No: S&E/E/20/275

Date: 14.03.2014

**Regional Executive Engineer
Pollution Control Board, Assam
Back Side of ASTC Bus Station
Chowkidinghee, Dibrugarh**

Sub: Consent to operate as per Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981 for the year 2014-15

Dear Sir,

We are submitting herewith two sets of duly filled in applications for consent to operate for the year 2014-15 in the prescribed format in respect of production operations under different fields of Assam and Central Industrial Complexes of Duliajan and Moran. The details of the fees to be paid has been shown in Annexure - I. The fees will be paid after obtaining your concurrence regarding the amount to be paid as shown in the said Annexure.

Thanking you.

Yours faithfully,
OIL INDIA LIMITED


14.3.14

(Dr. B. N. Sahoo)
Chief Engineer-S&E
For **RESIDENT CHIEF EXECUTIVE**

- Encl: Applications Submitted (in duplicate)
1. Production operation - Naharkatiya Field
 2. Production operation - Dikom Field
 3. Production operation - Kathaloni Field
 4. Production operation - Eastern Producing Center (Digboi Field)
 5. Production operation - Moran Field
 6. Production operation - Tengakhat Field
 7. Production operation - Other Satellite Fields
 8. Central Industrial Complex, Duliajan
 9. Central Industrial Complex, Moran

Copy : Member Secretary,
Pollution Control Board, Assam
Bamunimaidam,
Guwahati-21

Annexure-I

**FIELD-WISE FEES BREAK-UP W.R.T. CAPITAL COST
FOR THE YEAR 2014-2015**

Sl. No.	Name of the Field	Gross Capital Cost (Approx)	Fees to be paid Water (Prevention & control of Poll.) Act, 1974	Fees to be paid Air (Prevention & control of Poll.) Act, 1981
1	Naharkatiya Field	₹ 190.82 crores	₹ 3,00,000.00	₹ 3,00,000.00
2	Dikom Field	₹ 18.85 crores	₹ 1,00,000.00	₹ 1,00,000.00
3	Kathaloni Field	₹ 15.57 crores	₹ 1,00,000.00	₹ 1,00,000.00
4	EPA, Digboi Field	₹ 41.77 crores	₹ 1,00,000.00	₹ 1,00,000.00
5	Moran Field	₹ 21.00 crores	₹ 1,00,000.00	₹ 1,00,000.00
6	Tengakhat field	₹ 69.72 crores	₹ 2,00,000.00	₹ 2,00,000.00
7	Other Satellite field	₹ 04.5 crores	₹ 25,000.00	₹ 25,000.00
8	Central Industrial Complex, Duliajan	₹ 275.54 crores	₹ 5,00,000.00	₹ 5,00,000.00
9	Central Industrial Complex, Moran	₹ 31.08 crores	₹ 1,00,000.00	₹ 1,00,000.00
			₹15,25,000.00	₹15,25,000.00

Total = ₹ 15,25,000.00 + ₹ 15,25,000.00 = ₹ 30,50,000.00

(Total Rupees thirty lakh fifty thousand only)

REGIONAL OFFICE
POLLUTION CONTROL BOARD:ASSAM
P.O. & DIST:DIBRUGARH
BEHIND ASTC:CHOWKIDINGHEE

NO:RO/DBR/T-2115/02-03/123

Dated Dib,the 1st April,2014

To

The Head S& E,
Oil India Ltd. P.O- Duliajan,
Dist-Dibrugarh, Assam, Pin -786002

*Do BMS
PP-deal
AT4*

Sub: Renewal Consent to operate fees for the production operation of OIL, Duliajan for the year 2014-2015.

Ref: Your Letter No. S&E/E/20/275, dated-14/03/ 2014.

Sir,

This office is in receipt of renewal consent for the grant of consent for the year 2014-2015.

The fees to be paid based on the Gross Capital investment of the installation and are shown below:-

S.L NO	NAME OF THE FIELD	GROSS CAPITAL COST (APPROX)	FEES TO BE PAID	
			WATER ACT	AIR ACT
1	NAHARKATIYA	RS.190.82CR	RS. 300000.00	RS.300000.00
2	DIKOM	RS.18.85CR	RS. 100000.00	RS.100000.00
3	KATHALONI	RS.15.57CR	RS. 100000.00	RS.100000.00
4	EPA,DIGBOI	RS.41.77CR	RS. 100000.00	RS.100000.00
5	MORAN	RS.21.00CR	RS. 100000.00	RS.100000.00
6	TENGAKHAT	RS.69.72CR	RS. 200000.00	RS.200000.00
7	OTHER SATELLITE FIELD	RS.04.5CR	RS. 25,000.00	RS. 25,000.00
8	CENTRAL INDUSTRIAL COMPLE,DULIAJAN	RS.275.54CR	RS. 500000.00	RS. 500000.00
9	CENTRAL INDUSTRIAL COMPLE,MORAN	RS.31.08CR	RS. 100000.00	RS. 100000.00
			RS.15,25000.00	RS.15,25000.00

Grand Total Rupees: 30,50,000.00 (Rupees Thirty Lakh Fifty thousand only)

The fees to be paid in the form of Bank Draft in favour of "Pollution Control Board, Assam" payable at Dibrugarh.

Yours faithfully

(Signature)

(Z. Ahmed)

REGIONAL EXECUTIVE ENGINEER

Dated Dib the 1st April 2014

MEMO NO- RO/DBR/T-2115/02-03/

Copy to: I) The Member Secretary pollution Control Board, Assam, Ghy-21 for favour of information

(Z. Ahmed)
REGIONAL EXECUTIVE ENGINEER
Dibrugarh

*Done 09/04/2014
flb
PP. process for payment.
Su
05/4/2014*



ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

Safety & Environment Department
P.O. DULIAJAN-786602,
ASSAM, INDIA
Phone : 0374-2800542
Fax : 0374-2801796
Email : safety@oilindia.in

Ref: No: S&E/E/20/732

Date: 29.05.2014

Regional Executive Engineer
Pollution Control Board, Assam
Back Side of ASTC Bus Station
Chowkidinghee, Dibrugarh

Sub: Payment of fee for renewal of Consent to Operate.

Ref.- Our letter No. S&E/E/20/275 dtd. 14.03.2014,

Your letter No. RO/DBR/T-2115/02-03/123/24, dtd 1st April, 2014.

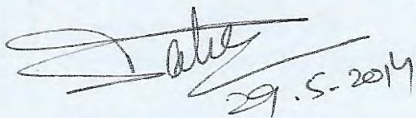
Sir,

Reference above, please find enclosed a demand draft No.409730 dtd.17.05.2014 amounting to ₹ 30,50,000.00 (Rupees thirty lakh fifty thousand only) towards the renewal of consent to operate for production installations of OIL payable to Member Secretary, Pollution Control Board, Assam, Dibrugarh. These fees pertain to installations in our Duliajan as well as Moran Field.

Kindly acknowledge the receipt of the above.

Thanking you.

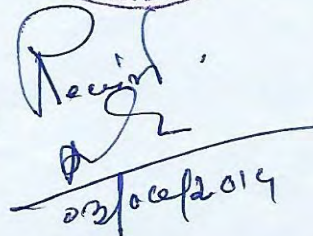
Yours faithfully,
OIL INDIA LIMITED.


29.5.2014

(Dr. B N SAHOO)
Chief Engineer (S&E)
For Head (S&E)
For Resident Chief Executive.

Encl : Demand Draft No. 409730 dtd.17.05.2014




29/05/2014



ऑयल इंडिया लिमिटेड

(भारत सरकार का उद्यम)

Oil India Limited

(A Government of India Enterprise)

Safety & Environment Department

P.O. DULIAJAN-786602,

ASSAM, INDIA

Phone : 0374-2800542

Fax : 0374-2804888

Email : safety@oilindia.in

Ref: No: S&E/E/20/411

Date: 27.03.2015

**Regional Executive Engineer
Pollution Control Board, Assam
Back Side of ASTC Bus Station
Chowkidinghee, Dibrugarh**

Sub: Consent to operate as per Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981 for the year 2015-16

Dear Sir,

We are submitting herewith two sets of duly filled in applications for consent to operate for the year 2015-16 in the prescribed format in respect of production operations under different fields of Assam and Central Industrial Complexes of Duliajan and Moran. The details of the fees to be paid has been shown in Annexure - 1. The fees will be paid after obtaining your concurrence regarding the amount to be paid as shown in the said Annexure.

Thanking you.

Yours faithfully,
OIL INDIA LIMITED

(Jayanta Bordoloi)
HEAD-S&E
For **RESIDENT CHIEF EXECUTIVE**

Encl: Applications Submitted (in duplicate)

1. Production operation - Naharkatiya Field
2. Production operation - Dikom Field
3. Production operation - Kathaloni Field
4. Production operation - Eastern Producing Center (Digboi Field)
5. Production operation - Moran Field
6. Production operation - Other Satellite Fields
7. Production operation - Tengakhat Field
8. Central Industrial Complex, Duliajan
9. Central Industrial Complex, Moran

Copy : Member Secretary,
Pollution Control Board, Assam
Bamunimaidam, Guwahati-21



Received
31/03/15

bd

Annexure-I

**FIELD-WISE FEES BREAK-UP W.R.T. CAPITAL COST
FOR THE YEAR 2015-2016**

Sl. No.	Name of the Field	Gross Capital Cost (Approx)	Fees to be paid Water (Prevention & control of Poll.) Act, 1974	Fees to be paid Air (Prevention & control of Poll.) Act, 1981
1	Naharkatiya Field	₹ 190.82 crores	₹ 3,00,000.00	₹ 3,00,000.00
2	Dikom Field	₹ 18.85 crores	₹ 1,00,000.00	₹ 1,00,000.00
3	Kathaloni Field	₹ 15.57 crores	₹ 1,00,000.00	₹ 1,00,000.00
4	EPA, Digboi Field	₹ 41.77 crores	₹ 1,00,000.00	₹ 1,00,000.00
5	Moran Field	₹ 21.00 crores	₹ 1,00,000.00	₹ 1,00,000.00
6	Tengakhat field	₹ 69.72 crores	₹ 2,00,000.00	₹ 2,00,000.00
7	Other Satellite field	₹ 04.5 crores	₹ 25,000.00	₹ 25,000.00
8	Central Industrial Complex, Duliajan	₹ 275.54 crores	₹ 5,00,000.00	₹ 5,00,000.00
9	Central Industrial Complex, Moran	₹ 31.08 crores	₹ 1,00,000.00	₹ 1,00,000.00
			₹15,25,000.00	₹15,25,000.00

Total = ₹ 15,25,000.00 + ₹ 15,25,000.00 = ₹ 30,50,000.00

(Total Rupees thirty lakh fifty thousand only)

Annexure-I

REGIONAL OFFICE
POLLUTION CONTROL BOARD:ASSAM
P.O. & DIST:DIBRUGARH
BEHIND ASTC:CHOWKIDINGHEE

NO:RO/DBR/T-2115/02-03/Pt-I/02
28

Dated Dib the 06th April,2015

To

✓ The Head S& E,
Oil India Ltd. P.O- Duliajan,
Dist-Dibrugarh, Assam, Pin -786002



12/11
8/4/15
SRSB
Pt. Bolek
8/4

Sub: Renewal Consent to operate fees for the production operation of OIL, Duliajan for the year 2015-2016.

Ref: Your Letter No. S&E/E/20/411, dated-27/03/ 2015.

Sir,

This office is in receipt of renewal consent for the grant of consent for the year 2015-2016.

The fees to be paid based on the Gross Capital investment of the installation and are shown below:-

S.L NO	NAME OF THE FIELD	GROSS CAPITAL COST (APPROX)	FEES TO BE PAID	
			WATER ACT	AIR ACT
1	NAHARKATIYA	RS.190.82CR	RS. 3,00,000.00	RS.3,00,000.00
2	DIKOM	RS.18.85CR	RS. 1,00,000.00	RS.1,00,000.00
3	KATHALONI	RS.15.57CR	RS. 1,00,000.00	RS.1,00,000.00
4	EPA,DIGBOI	RS.41.77CR	RS. 1,00,000.00	RS.1,00,000.00
5	MORAN	RS.21.00CR	RS. 1,00,000.00	RS.1,00,000.00
6	TENGAKHAT	RS.69.72CR	RS. 2,00,000.00	RS.2,00,000.00
7	OTHER SATELLITE FIELD	RS.04.5CR	RS. 25,000.00	RS. 25,000.00
8	CENTRAL INDUSTRIAL COMPLEX,DULIAJAN	RS.275.54CR	RS. 5,00,000.00	RS. 5,00,000.00
9	CENTRAL INDUSTRIAL COMPLEX,MORAN	RS.31.08CR	RS. 1,00,000.00	RS. 1,00,000.00
			RS.15,25000.00	RS.15,25000.00

Grand Total Rupees: 30, 50,000.00 (Rupees Thirty Lakh Fifty thousand only)

The fees to be paid in the form of Bank Draft in favour of "Pollution Control Board, Assam" payable at Dibrugarh.

Yours faithfully

(H.R. PHUKAN)

REGIONAL EXECUTIVE ENGINEER

Dated Dib the 06th April 2015

MEMO NO- RO/DBR/T-2115/02-03/Pt-I/02-A

Copy to: 1) The Member Secretary pollution Control Board, Assam, Ghy-21 for favour of your information

(H.R. PHUKAN)
REGIONAL EXECUTIVE ENGINEER
Dibrugarh

BD
Pt. Bolek
12/4

file E20

21/5



ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

Safety & Environment Department
P.O. DULIAJAN-786602,
ASSAM, INDIA
Phone : 0374-2800542
Fax : 0374-2804888
Email : safety@oilindia.in

Ref No. S&E/E/20/712

Date: 16.05.2015

**Regional Executive Engineer
Pollution Control Board, Assam
Back Side of ASTC Bus Station
Chowkidinghee, Dibrugarh**

Sub: Payment of fee for Consent to Establish and Consent to Operate
Ref: Our letter No.S&E/E/20/411 dated 27.03.2015
Your Letter No. RO/DBR/T-2115/02-03/Pt-1/02/28 dated 06.04.2015

Sir,

Reference above, please find enclosed a demand draft No. 663015 dtd 11.05.2015 amounting to 30,50,000 (Rupees.Thirty lakhs and fifty thousand) only towards renewal of Consent to Operate for drilling production installations of OIL payable to Member Secretary, Pollution Control Board, Assam, Dibrugarh. These fee pertain to installations in Duliajan as well as Moran field.

Kindly acknowledge the receipt of the above.

Thanking you,

Yours faithfully,
OIL INDIA LIMITED

(Jayanta Bordoloi)
Chief Engineer (S&E)
For **Head (S&E)**

Encl: Demand Draft No. 663015 dtd 11.05.2015

Copy: **The Member Secretary**, Pollution Control Board, Assam, Bamunimaidam,
Guwahati - 781021

Receipt
R
16/5/2015



File Copy



ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

Safety & Environment Department
P.O. DULIAJAN-786602,
ASSAM, INDIA
Phone : 0374-2800542
Fax : 0374-2801796
Email : safety@oilindia.in

Ref No: S&E/E/20/473

Date: 26.02.2016

**Regional Executive Engineer
Pollution Control Board, Assam
Back Side of ASTC Bus Station
Chowkidinghee, Dibrugarh**

Sub: Consent to operate as per Water (Prevention and Control of Pollution) Act, 1974 and Air(Prevention & Control of Pollution) Act, 1981 for the year 2016-17

Dear Sir,

We are submitting herewith two sets of duly filled in applications for consent to operate for the year 2016-17 in the prescribed format in respect of production operations under different fields of Assam and Central Industrial Complexes of Duliajan and Moran. The necessary fees as applicable will be paid shortly.

Thanking you.

Yours faithfully,
OIL INDIA LIMITED

(Signature)
27/2/16
(A K Acharya)
GM (HSE)

For **RESIDENT CHIEF EXECUTIVE**

Encl: Applications Submitted (in duplicate)

1. Production operation - Naharkatiya Field
2. Production operation - Tengakhat Field
3. Production operation - Kathaloni Field
4. Production operation - Dikom Field
5. Production operation - Moran Field
6. Production operation - Eastern Producing Center (Digboi Field)
7. Production operation - Other Satellite Fields
8. Central Industrial Complex, Duliajan
9. Central Industrial Complex, Moran

Copy : Member Secretary,
Pollution Control Board, Assam
Bamunimaidam, Guwahati-21

G

Annexure-I

**FIELD-WISE FEES BREAK-UP W.R.T. CAPITAL COST
FOR THE YEAR 2016-2017**

Sl. No.	Name of the Field	Gross Capital Cost (Approx)	Fees to be paid Water (Prevention & control of Poll.) Act, 1974	Fees to be paid Air (Prevention & control of Poll.) Act, 1981
1	Naharkatiya Field	₹ 190.82 crores	₹ 3,00,000.00	₹ 3,00,000.00
2	Dikom Field	₹ 18.85 crores	₹ 1,00,000.00	₹ 1,00,000.00
3	Kathaloni Field	₹ 15.57 crores	₹ 1,00,000.00	₹ 1,00,000.00
4	EPA, Digboi Field	₹ 41.77 crores	₹ 1,00,000.00	₹ 1,00,000.00
5	Moran Field	₹ 21.00 crores	₹ 1,00,000.00	₹ 1,00,000.00
6	Tengakhat field	₹ 69.72 crores	₹ 2,00,000.00	₹ 2,00,000.00
7	Other Satellite field	₹ 04.5 crores	₹ 25,000.00	₹ 25,000.00
8	Central Industrial Complex, Duliagan	₹ 275.54 crores	₹ 5,00,000.00	₹ 5,00,000.00
9	Central Industrial Complex, Moran	₹ 31.08 crores	₹ 1,00,000.00	₹ 1,00,000.00
			₹15,25,000.00	₹15,25,000.00

Total = ₹ 15,25,000.00 + ₹ 15,25,000.00 = ₹ 30,50,000.00

(Total Rupees thirty lakh fifty thousand only)

*JG
Pl. Discs
AS
Pl. Process
26/6/16*

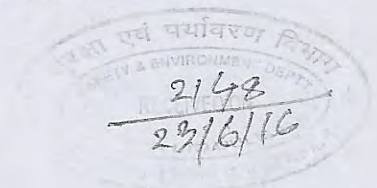
REGIONAL OFFICE
POLLUTION CONTROL BOARD: ASSAM
P.O. & DIST: DIBRUGARH
BEHIND ASTC: CHOWKIDINGHEE

NO: RO/DBR/T-2115/02-03/58

Dated Dib, the 17th June, 2016

To
The Head S&E,
Oil India Ltd.
P.O- Duliajan-786002
Dist-Dibrugarh

*APPS
Pl. Process
23/6*



Sub: Renewal Consent to operate for the production installation of M/S OIL, Duliajan for the year 2016-2017.

Ref: Your Letter No. S&E/E/20/473, dated-26/02/ 2016.

Sir,

With reference to the above subject, you are requested to deposit the renewal consent to operate fees for the year 2016-17 as tabulated below:

The fees to be paid based on the Gross Capital investment of the installation and is shown below:-

S.L NO	NAME OF THE FIELD	GROSS CAPITAL COST (APPROX)	FEES TO BE PAID	
			WATER ACT	AIR ACT
1	NAHARKATIYA	RS.190.82 Cr.	RS. 300000.00	RS.300000.00
2	DIKOM	RS.18.85Cr	RS. 100000.00	RS.100000.00
3	KATHALONI	RS.15.57Cr	RS. 100000.00	RS.100000.00
4	EPA,DIGBOI	RS.41.77Cr	RS. 100000.00	RS.100000.00
5	MORAN	RS.21.00CR	RS. 100000.00	RS.100000.00
6	TENGAKHAT	RS.69.72CR	RS. 200000.00	RS.200000.00
7	OTHER SATELLITE FIELD	RS.04.5CR	RS. 25,000.00	RS. 25,000.00
8	CENTRAL INDUSTRIAL COMPLE,DULIAJAN	RS.275.54CR	RS. 500000.00	RS. 500000.00
9	CENTRAL INDUSTRIAL COMPLE,MORAN	RS.31.08CR	RS. 100000.00	RS. 100000.00
			RS.15,25000.00	RS.15,25000.00

Grand Total Rupees: 30,50,000.00 (Rupees Thirty Lakh Fifty thousand only)

The fees to be paid in the form of Bank Draft in favour of "Pollution Control Board, Assam" payable at Dibrugarh.

Yours faithfully

Zahmed
(Z.AHMED)
REGIONAL EXECUTIVE ENGINEER
DIBRUGARH



ऑयल इंडिया लिमिटेड

(भारत सरकार का उद्यम)

Oil India Limited

(A Government of India Enterprise)

Safety & Environment Department

P.O. DULIAJAN-786602,

ASSAM, INDIA

Phone : 0374-2800542

Fax : 0374-2801796

Email : safety@oilindia.in

Ref.No.S&E/E/20/1623

Date:25.08.2016

**Regional Executive Engineer
Pollution Control Board, Assam
Back Side of ASTC Bus Station
Chowkidinghee, Dibrugarh**

Sub: Payment of fee for renewal of Consent to Operate(For Production Installations).
Ref : Our letter No. S&E/E/20/473 dtd.26.02.2016
Your letter No. RO/DBR/T-2115/02-03/53/507 dated 17.06.2016

Sir,

Reference above, please find enclosed a demand draft No.604464 dtd.17.08.2016 amounting to ₹30,50,000.00 (Rupees Thirty lakh fifty thousand only) towards the renewal of consent to operate for production installations of OIL payable to Pollution Control Board, Assam. These fees pertain to installations in our Duliajan, Moran Field as well as Eastern Producing Area, Digboi.

Kindly acknowledge the receipt of the above.

Thanking you.

Yours faithfully,
OIL INDIA LIMITED.

(M.B. Sarma)

Chief Engineer (S&E)

For General Manager(HSE)

For **Resident Chief Executive.**

Encl: Demand Draft No.604464 dtd 17.08.2016

Copy: Member Secretary,
Pollution Control Board, Assam
Bamunimaidam, Guwahati-21



ऑयल इंडिया लिमिटेड

(भारत सरकार का उद्यम)

Oil India Limited

(A Government of India Enterprise)

Safety & Environment Department

P.O. DULIAJAN-786602,

ASSAM, INDIA

Phone : 0374-2800542

Fax : 0374-2801796

Email : safety@oilindia.in

Ref:No: SE/E/20/422

Date:14.03.2017

**Regional Executive Engineer
Pollution Control Board, Assam
Back Side of ASTC Bus Station
Chowkidinghee, Dibrugarh**

Sub: Consent to operate as per Water (Prevention and Control of Pollution) Act, 1974 and Air(Prevention & Control of Pollution) Act, 1981 for the year 2017-18

Ref. Your letter No.:RO/DBR/2115/02-03/Pt-I/95/1796 dtd.03.03.2017

Dear Sir,

Reference above, we are submitting herewith two sets of duly filled in applications for consent to operate for the year 2017-18 in the prescribed format in respect of production operations under different fields of Assam and Central Industrial Complexes of Duliajan and Moran. The necessary fees as applicable will be paid after obtaining your concurrence regarding the amount to be paid as shown in the Annexure-I.

Thanking you.

Yours faithfully,
OIL INDIA LIMITED

(A K Acharya)

General Manager (HSE)

For **RESIDENT CHIEF EXECUTIVE**

Encl: Applications Submitted (in duplicate)

1. Production operation – Naharkatiya Field
2. Production operation – Tengakhat Field
3. Production operation – Kathaloni Field
4. Production operation – Dikom Field
5. Production operation - Moran Field
6. Production operation - Eastern Producing Center (Digboi Field)
7. Production operation - Other Satellite Fields
8. Central Industrial Complex, Duliajan
9. Central Industrial Complex, Moran

Copy : Member Secretary,
Pollution Control Board, Assam
Bamunimaidam, Guwahati-21



AKA/pkg

Annexure-IFIELD-WISE FEES BREAK-UP ON CAPITAL COST FOR THE YEAR 2017-2018

Sl. No.	Name of the field	Gross Capital Cost(Approx.)	Fees to be paid Water(Prevention & Control of Poll.)Act,1974	Fees to be paid Air(Prevention & Control of Poll.)Act,1981
1	Naharkatiya Field	₹190.82Crores	₹3,00,000.00	₹3,00,000.00
2	Tengakhat Field	₹ 69.72crores	₹2,00,000.00	₹2,00,000.00
3	Kathaloni Field	₹ 15.57crores	₹1,00,000.00	₹1,00,000.00
4	Dikom Field	₹ 59.94crores	₹2,00,000.00	₹2,00,000.00
5	Moran Field	₹ 21.00crores	₹1,00,000.00	₹1,00,000.00
6	EPA, Digboi Field.	₹ 41.77crores	₹1,00,000.00	₹1,00,000.00
7	Other Satellite Fields	₹ 04.50crores	₹ 25,000.00	₹ 25,000.00
8	Central Industrial Complex,Duliajan	₹275.54crores	₹5,00,000.00	₹5,00,000.00
9	Central Industrial Complex,Moran	₹31.08crores	₹1,00,000.00	₹1,00,000.00
	Total		₹16,25,000.00	₹16,25,000.00
	Grand Total		₹ 32,50,000.00	

(Total Rupees thirty two lakh fifty thousand only)

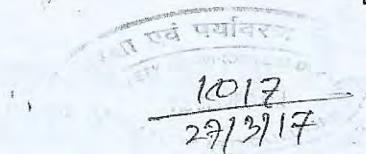
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REGIONAL OFFICE
POLLUTION CONTROL BOARD: ASSAM
P.O. & DIST: DIBRUGARH
BEHIND ASTC: CHOWKIDINGHEE

Dated Dib, the 23rd March, 2017

NO:RO/DBR/T-2115/02-03/Pt-II/98
1666

To
The General Manager (HSE),
Oil India Ltd.
P.O- Duliajan-786002
Dist-Dibrugarh, Assam



Sub: Consent to operate as per Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981 for the year 2017-18

Ref: Your Letter No. SE/E/20/422, dated-14/03/ 2017.

Sir,

With reference to the above subject, you are requested to deposit the renewal consent to operate for the year 2017-18 as tabulated below:

The fees to be paid based on the field wise break up on capital cost for the year 2017-18 as submitted by the letter under reference:

S.L NO	NAME OF THE FIELD	GROSS CAPITAL COST (APPROX)	FEES TO BE PAID	
			WATER ACT	AIR ACT
1	NAHARKATIYA	RS.190.82 Cr.	RS. 300000.00	RS.300000.00
2	DIKOM	RS.59.94Cr	RS. 200000.00	RS.200000.00
3	KATHALONI	RS.15.57Cr	RS. 100000.00	RS.100000.00
4	EPA,DIGBOI	RS.41.77Cr	RS. 100000.00	RS.100000.00
5	MORAN	RS.21.00CR	RS. 100000.00	RS.100000.00
6	TENGAKHAT	RS.69.72CR	RS. 200000.00	RS.200000.00
7	OTHER SATELLITE FIELD	RS.04.5CR	RS. 25,000.00	RS. 25,000.00
8	CENTRAL INDUSTRIAL COMPLE,DULIAJAN	RS.275.54CR	RS. 500000.00	RS. 500000.00
9	CENTRAL INDUSTRIAL COMPLE,MORAN	RS.31.08CR	RS. 100000.00	RS. 100000.00
			RS.16,25000.00	RS.16,25000.00

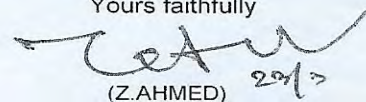
Grand Total Rupees: 32,50,000.00 (Rupees Thirty Two Lakh Fifty thousand only)

It is for your kind information that in pursuant to the Sec 8 read with Sec. 7 of Assam Ease of Doing Business Act 2016, the Pollution Control Board, Assam decides to accept the application only in on line mode with immediate effect.

All the concerned industries/ entrepreneurship are requested to submit their application for granting consent certificate from Pollution Control Board, Assam i.e consent to establish/consent to operate required as per the provision of Sec-25 of Water (Prevention and Control of Pollution) Act, 1974 and Sec-21 of Air (Prevention & Control of Pollution) Act, 1981, Authorization certificate under Hazardous and Other Wastes (Management & Trans- boundary Movement) Rules, 2016 and Bio Medical Waste Management Rules, 2016.

For applying on line application applicant can apply by log into the website of Ease of Doing Business viz, www.easeofdoingbusinessinassam.in along with online payment facility. To start with this system, necessary guidelines for filling up of application is available in above portal and the concerned are requested to make available the soft copies of all the requisite documents before filling up the application form.

Yours faithfully



(Z.AHMED)

REGIONAL EXECUTIVE ENGINEER
DIBRUGARH



ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

Safety & Environment Department
P.O. DULIAJAN-786602,
ASSAM, INDIA
Phone : 0374-2800542
Fax : 0374-2801796
Email : safety@oilindia.in

Ref.No.S&E/E/20/1955

Date:07.12.2017

Regional Executive Engineer
Pollution Control Board, Assam
Back Side of ASTC Bus Station
Chowkidinghee, Dibrugarh

Sub: Payment of fee for renewal of Consent to Operate.

Ref. Our letter No. S&E/E/20/422 dtd.14.03.2017

Your Letter No. RO/DBR/T-2115/02-03/Pt-I/98/1666 dtd.23.03.2017

Sir,

Reference above, please find enclosed a demand draft No.824065 dtd.02.12.2017 amounting to ₹32, 50,000.00 (Rupees Thirty two lakhs fifty thousand only) towards the renewal of consent to operate for production installations of OIL payable to Pollution Control Board, Assam, Dibrugarh. These fees pertain to installations in Duliajan as well as Moran Field of OIL.

Kindly acknowledge the receipt of the above.

Thanking you:

Yours faithfully,
OIL INDIA LIMITED.


07.12.2017

(Dr. B N Sahoo)
General Manager(S&E)
For, Chief General Manager(HSE)
For, **Resident Chief Executive.**

Encl: Demand Draft No.824065 dtd 02.12.2017

Copy: Member Secretary,
Pollution Control Board, Assam
Bamunimaidam, Guwahati-21

PKG



10/13/21, 10:19 AM

Ease of doing business | Govt. of Assam

Pollution Control Board**Assam**

UBIN : AA29303/AAACO2352C/01/2019

UAIN : PCB/F50/DI/006082/01/2019

Fees : Rs. .00

"CONSENT TO OPERATE"

"CONSENT TO OPERATE" is hereby granted to
OIL INDIA LIMITED - EASTERN ASSET (A unit of OIL INDIA LTD)
for setting up a

unit with production capacity of **Crude oil: 108000KI/M and Natural Gas: 12000000T/m**
to be located at **DULIAJAN , DIBRUGARH DISTRICT , DIBRUGARH**
under section
as amended under the concerned terms & conditions according to type of industry.

This Consent to Operate is valid upto 31-03-2019 subject to terms and conditions annexed herewith.

Place : Guwahati
Date : 11-05-2020

B K BARUAH
Authorized Signatory

Details of Fees Paid

1. Regular Fees for the year -1 - : Rs. .00
2. Arrear Fees for the year 0 - 0 to 0 - 0 : Rs. 0.00
3. Penalty/other charges : Rs. 0.00

Pollution Control Board



ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

Safety & Environment Department
P.O. DULIAJAN-786602,
ASSAM, INDIA
Phone : 0374-2800542
Fax : 0374-2801796
Email : safety@oilindia.in

Ref. No.: S&E/E/20/1587

Date: 09/10/2019

Regional Executive Engineer
Pollution Control Board, Assam
Backside of ASTC Bus station
Chowkidingee, Dibrugarh

Sub: Payment of fee for Consent to Operate (CTO) renewal for the year 2019-2020.

Sir,

Reference above, please find enclosed herewith the Demand Draft (No. 450958 dated. 24.09.2019) amounting ₹ 3800000.00 (Rupees Thirty Eight Lakhs) only towards fee for renewal of CTO for production installations in different assets of Assam and for Central Industrial Complexes at Duliajan and Moran for the year 2019-2020. The details of the applications of renewal of CTO submitted through EODB portal are as follows:

Asset/ Complex	UAIN	Amount
Central Industrial Complex, Duliajan	PCB/ F50/ DI/ 008163/10/2019	₹ 1000000.00
Central Asset	PCB/ F50/ DI/ 007827/10/2019	₹ 1000000.00
Eastern Asset	PCB/ F50/ DI/ 008318/10/2019	₹ 1000000.00
Western Asset	PCB/ F50/ DI/ 000079/01/2019	₹ 600000.00
Central Industrial Complex, Moran	PCB/ F50/ SV/006309/02/2019	₹ 200000.00
Total		₹ 3800000.00

The copies of online applications are also enclosed herewith. Kindly acknowledge the receipt of the above.

Yours faithfully,
OIL INDIA LIMITED


09.10.2019

(Dr. B. N. Sahoo)
General Manager (S&E)
For **GM (FS)-HoD (S&E)**
For **Resident Chief Executive**

Encl. (i) Demand Draft (No. 450958 dtd. 24.09.2019)
(ii) Hard copies of online applications.

UAIN: PCB/F50/DI/008318/10/2019

Application for Renewal for Consent to Operate (under Water Act, 1974 and Air Act, 1981)

From :	SURANJAN MAJUMDER OIL INDIA LIMITED, SAFETY & ENVIRONMENT DEPART PERCY EVANS ROAD, DULIAJAN DIBRUGARH, 786602
Sir,	I / We hereby apply for * (i) Consent to Operate under section 25 and 26 of the Water (Prevention and Control of Pollution) Act, 1974, as amended. (ii) Consent to Operate under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981, as amended. (iii) Authorisation under rule 5 of the Hazardous Wastes (Management and Handling) Rules, 1989, as amended in connection with my / our existing / proposed / altered / additional manufacturing / processing activity from the premises as per the details given below.

Part A : General

For the year	From 2019 To 2020	
1. Name, designation, office address with telephone, e-mail of the Applicant	Name	SURANJAN MAJUMDER
	Designation	GENERAL MANAGER
	Street Name 1	OIL INDIA LIMITED, SAFETY & ENVIRONMENT DEPART
	Street Name 2	PERCY EVANS ROAD
	Village/Town	DULIAJAN
	District	DIBRUGARH
	Pincode	786602
	Mobile	+91 - 9435039020
	Phone Number	0374 - 2800542
	Email-id	safety@oilindia.in
2. (a) Name and location of the industrial unit / premises for which the application is made. (Give revenue Survey Number /plot number, name of Taluka and District also telephone)	Name	OIL INDIA LIMITED - EASTERN ASSET (A UNIT OF OIL INDIA LTD)
	Street Name 1	DULIAJAN
	Street Name 2	DIBRUGARH DISTRICT
	Village/Town	DULIAJAN
	District	DIBRUGARH
	Pincode	786602
	Revenue Survey Number / Plot Number	0.00
	Mobile Number	+91 - 9435039020
	Phone Number	0374 - 2800542
(b) Details of the planning permission obtained from the local body / Town and Country Planning authority / metropolitan development authority / designate authority	Permission Reference No.	EASTERN ASSET (OIL INDIA LIMITED)
	Date	01-01-1970
	Issuing Authority	
	Document is attached	

(c) Name of the local body under whose jurisdiction the unit is located and name of the licence issuing authority	Local Body Name : Licence Issuing Authority :	
3. Names, addresses with telephone of Managing Director/Managing Partner and officer responsible for matters connected with pollution control and / or hazardous waste disposal.	Name	SRI S.C MISHRA
	Designation	CMD
	Street Name 1	DULIAJAN
	Street Name 2	
	Village/Town	DULIAJAN
	District	DIBRUGARH
	Pincode	786602
	Mobile	+91
	Phone Number	03742800503
	Email ID	bnsahoo@oilindia.in
4. (a) Are you registered as a small-scale industrial unit ?	NO	
(b) If yes, give the number and date of registration.	Reg. No. : N/A Date of Registration : N/A	
5. Gross capital investment of the unit without depreciation till the date of application (Cost of building, land, plant and machinery)	2901248466	
(To be supported by an affidavit, Annual Report or certificate from a Chartered Accountant. For proposed unit(s), give estimated figure)	Document is attached	
6. If the site is located near sea-shore / river bank / other water bodies; indicate the distance and the name of the water body, if any	Distance : 25000 meters Name of the water body : RIVER BURI DIHING	
7. Does the location satisfy the requirements under relevant Central / State Govt. notifications such as Coastal Regulation Zone, Notification on Ecologically Fragile Area, Industrial location policy, etc. If so, give details.	NOT APPLICABLE	
8. If the site is situated in notified industrial estate	NO	
(a) whether effluent collection, treatment and disposal system has been provided by the authority	NO	
(b) will the applicant utilise the system, if provided	N/A	
(c) if not provided, details of proposed arrangement.	Document is attached	
9. Total plot area, built-up area and area available for the use of treated sewage / trade effluent	Plot Area : 60000.00 sq. meters Build-up Area : 400000.00 sq. meters Area for Treated Sewage : sq. meters	
10. Month and year of proposed commissioning of the unit	Month : May Year : 2005	
11. Number of workers and office staff.	10	
12.(a) Do you have a residential colony within the premises in respect of which the present application is made ?	NO	
(b) If yes, please state population staying	N/A	
(c) Indicate its location and distance with reference to plant site.	Location : N/A Distance : N/A	
13. List of products and by-products manufactured in tonnes / month,kl / month or numbers / month (Give figure corresponding to maximum installed production capacity)		

SI No.	Name	Type	Quantity	Units
1	CRUDE OIL	PRODUCT	161083 TONNES PER MONTH	in tonnes / month
2	NATURAL GAS	PRODUCT	59913 TONNES PER MONTH	in tonnes / month
14. List of raw materials and process chemicals with annual consumption corresponding to above stated production figures, in tonnes / month or kl / month or numbers / month.				
SI No.	Name	Type	Quantity	Units
1	PROCESS CHEMICAL	PROCESS CHEMICAL		in numbers / month
15. Description of process of manufacture for each of the products showing input, output, quality and quantity of solid, liquid and gaseous wastes, if any from each unit process. (To be supported by flow sheet and / or material balance and water balance sheet).		Document is attached		
Part B : Waste water aspects				
16. Water consumption for different uses (in m3 / day)				
(i) Industrial cooling, spraying - in mine pits or boiler feeds.		2892.00		
(ii) Domestic purpose		1614.00		
(iii) Processing whereby water gets polluted and the pollutants are easily biodegradable		0.00		
(iv) Processing whereby water gets polluted and the pollutants are not easily bio-degradable and are toxic		0.00		
(v) Others such as agriculture, gardening etc. (specify)		0.00		
Total		4506.00		
17. Source of water supply. Name of authority granting permission if applicable and quantity permitted				
Source of water supply		TUBE WELL		
Name of authority granting permission if applicable				
Quantity permitted (in m3/day)				
18. Quantity of waste water (effluent) generated (in m3 / day)				
(i) Domestic		(v) Boiler Blowdown		
(ii) Industrial		(vi) Cooling water blowdown		
(iii) Process		(vii) DM Plant / Softening Plant washings		
(iv) Washings				
19. Water budget calculations accounting for difference between water consumption and effluent generated. :		Document is attached		
20. Present treatment of sewage / canteen effluent (Give sizes / capacities of treatment units).				
21. Present treatment of trade effluent (Give sizes / capacities of treatment units). (A schematic diagram of the treatment scheme with inlet / outlet characteristics of each unit operation / process is to be provided. Include details of residue management system (ETP sludges))		Document is attached		
22. (a) Are sewage and trade effluents mixed together ?		NO		
(b) If yes , state at which stage whether before, intermittently or after treatment.		N/A		
23. Capacity of treated effluent sump. Guard Pond if any.		N/A		
24. Mode of disposal of treated effluents, with respective quantity, in m3 / day				
(i) into stream / river (Name of river : NA)				

(ii) into creek / estuary (Name of creek/estuary : NA)	
(iii) into sea (Name of sea: NA)	
(iv) into drain / sewer (Owner of sewer : NA)	
(v) On land for irrigation on owned land / lease land. Specify cropped area.	NA
(vi) Quantity of treated effluent reused / recycled, m ³ / day Provide a location map of disposal arrangement indicating the outlet (s) for sampling	NIL
(vii) Provide a location map of disposal arrangement indicating the outlet (s) for sampling	Document is attached
25. (a) Quality of untreated / treated effluents (Specify pH and concentration of SS, BOD, COD and specific pollutants relevant to the industry. TDS to be reported	
pH : 7.5	Concentration of Suspended Solid : 80
Biochemical Oxygen Demand : 4.9	Chemical Oxygen Demand : 4
Specific Pollutants : 3.0	Total Dissolved Solids : 720
(b) Enclose a copy of the latest report of analysis from the laboratory approved by State Board / Committee / Central Board / Central Government in the Ministry of Environment & Forests. For proposed unit furnish expected characteristics of the untreated / treated effluent.	Document is attached

Part - C : Air emission aspects

26. Fuel consumption :

	Coal	LSHS	Furnace Oil	Natural gas	Others(Specify)
Fuel consumption (TPD / KLD)	00.00	00.00	00.00	1000.00	
Calorific value				8000.00	
Ash content %				00.00	
Sulphur content %				00.00	
Other (specify) :				00.00	

27. (A) Details of stack (process & fuel stacks):

Stack number (s)	1	2	3	4
Attached to				
Capacity				
Fuel type				
Fuel quantity (TPD / KLD)				
Material of construction				
Shape (round / rectangular)				
Height, m (above ground level)				
Diameter / size, in meters				
Gas quantity, Nm ³ / hr				
Gas temperature, °C				
Exit gas velocity, m / sec				
Control equipment preceding the stack	AUTO SHUT FOR HIGH TEMPERATURE			

Attach specifications including residue management systems of each of the control equipment indicating inlet / outlet concentrations of relevant pollutants)	Document is attached
27.(B) Whether any release of odoriferous compounds such as Mercaptans, Phorate etc. are coming out	NO
28. Do you have adequate facility for collection of samples of emissions in the form of port holes, platform, ladder etc. as per Central Board Publication "Emission Regulations Part-III" December 1985)	YES
29. Quality of treated flue gas emissions and process emissions.(Specify concentration of criteria pollutants and industry / process-specific pollutants stack-wise. Enclose a copy of the latest report of analysis from the approved laboratory by State Board / Central Board / Central Government in the Ministry of Environment and Forests. For proposed units furnish the expected characteristics of the emission	Document is attached

Part - D : Hazardous waste aspects

30. (a) Whether the unit is generating hazardous waste as defined in the Hazardous Waste (Management and handling) Rules, 1989, as amended.	YES
(b) If so, the category No.:	20 (AS PER HWM-2016)PREVIOUSLY IT WAS 5.1 & 2.2 (OILY SLUDGE)
31. Authorization required for *	COLLECTION RECEPTION TREATMENT TRANSPORT STORAGE DISPOSAL OF THE HAZARDOUS WASTE
32. Quantity of hazardous waste generated (in kg / day) or (in mt / month)	APPROX 2 MT/MONTH (USED/WASTE OIL CAT 20) & APPROX 540 MT/MONTH(OILY SLUDGE CAT 2.2)
33. Characteristics of the hazardous waste(s).Specify concentration of relevant pollutants. Enclose a copy of the latest report of analysis from the laboratory approved by State Board/Central Board/ Central Government in the Ministry of Environment and Forests). For proposed units furnish expected characteristics.	Document is attached
34. Mode of storage (intermediate or final) (describe area, location and methodology).	OILY SLUDGE IS STORED IN FENCED HDPE LINED CONCRETE PITS WITHIN OIL PREMISES & USED OIL IN DRUMS
35. Present treatment of hazardous waste, if any (give type and capacity of treatment units)	THROUGH REGISTERED RECYCLERS
36. Quantity . of hazardous waste disposed	
(i) Within the factory	NOT APPLICABLE
(ii) Outside the factory (Specify location and enclose copies of agreement)	NOT APPLICABLE
(iii) Through sale (Enclose documentary proof and copies of agreement)	Document is attached
(iv) Outside State / Union Territory , if yes particulars of (i) & (iii) above	NOT APPLICABLE
(v) Other (specify)	NOT APPLICABLE

Part - E : Additional information

37. (a) Do you have any proposals to upgrade the present system for treatment and disposal of effluent/ emission and / or hazardous waste	NO
37. (b) If yes, give the details with time-schedule for the implementation and approximate expenditure to be incurred on it.	N/A
38. Capital and recurring (O & M) expenditure on various aspects of environment protection such as effluent, emission, hazardous waste, solid waste, tree plantation, monitoring, date acquisition etc. (give figures separately for items implemented / to be implemented).	Document is attached
39. To which of the pollution control equipment, separate meters for recording consumption of electric energy are installed ?	
Pollution Control Equipment	Emission/Effluent Type
	Seperate Meters are installed ?
	NO
	NO
	NO
	NO
40. Which of the pollution control items are connected to D.G. set (captive power source) to ensure their running in the event of normal power failure ?	NOT APPLICABLE
41. Nature, quantity and method of disposal of non-hazardous solid waste generated separately from the process of manufacture and waste treatment. (Give details of area / capacity available in applicants land)	NOT APPLICABLE
42. Hazardous Chemicals - Give details of chemicals and quantities handled and stored.	NOT APPLICABLE
(i) Is the unit a Major Accident Hazard unit as per MSIHC Rules ?	NO
(ii) Is the unit an isolated storage as defined under the MSIHC Rules ?	NO
(iii) Indicate status of compliance of Rules 5, 7, 10, 11, 12, 13 and 18 of the MSIHC Rules.	NOT APPLICABLE
(iv) Has approval of site been obtained from the concerned authority ?	YES
(v) Has the unit prepared an Off-site Emergency Plan ?	YES Is it updated ? YES
(vi) Has information on imports of chemicals been provided to the concerned authority ?	NO
(vii) Does the unit possess a policy under the PLI Act?	YES
43. Brief details of tree plantation / green belt development within applicants premises (in hectares).	Document is attached
44. Information of schemes for waste minimisation, resource recovery and recycling - implemented and to be implemented, separately.	Document is attached
45. (a) The applicant shall indicate whether industry comes under Public Hearing, if so, the relevant documents such as EIA, EMP, Risk Analysis etc. shall be submitted, if so, the relevant documents enclosed shall be indicated accordingly	N

(b) Any other additional information that the applicant desires to give.									
46. Do You Have DG Set?					YES				
SI No.	Name	Product ID	Maker's Name	Capacity	Investment	Fuel Quantity per Annum	Stack Height	Control Equipment	Acoustic enclosure
1	GAS DRIVEN GENERATOR SET		CUMMINS INDIA LTD	125 KV	0	146000 SCM	6.0 MTS	YES	ACOUSTIC ENCLOSURE
47. I / We further declare that the information furnished above is correct to the best of my / our knowledge.									
48. I / We hereby submit that in case of any change from what is stated in this application in respect of raw materials, products, process of manufacture and treatment and / or disposal of effluent, emissions, hazardous wastes etc. in quality and quantity; a fresh application for Consent / Authorisation shall be made and until the grant of fresh Consent / Authorisation no change shall be made.									
49. I / We undertake to furnish any other information within one month of its being called by the Board / Committee.									
50. I / We agree to submit to the Board an application for renewal of consent / authorisation in two months in advance before the date of expiry of the consent / authorisation validity period:									
List of documents to be enclosed/submitted :									
Proposed steps in order to comply to the terms & conditions Stipulated in Environmental Clearance Certificate issued to the applicant (if EC is applicable.)						Not Applicable			
Point wise evidence based Compliance Report of Previous CTE/CTO including production details etc.						Not Applicable			
CA's Certificate regarding updated capital investment in the project including land, Ambient Air Quality monitoring report in case of Consent under Water and Air Act.						CA certificate Eastern asset1			
Effluent Analysis report in case of Consent under Water Act and Source Emission and Ambient Air Quality monitoring report in case of Consent under Water and Air Act.						Not Uploaded			
Copy of details of the planning permission obtained from the local body / Town and Country Planning authority / metropolitan development authority / designate authority.						Not Applicable			
If the site is situated in notified industrial estate, copy of details of proposed arrangement.						Not Applicable			
Description of process of manufacture for each of the products showing input, output, quality and quantity of solid, liquid and gaseous wastes, if any from each unit process. (To be supported by flow sheet and / or material balance and water balance sheet).						Not Uploaded			
Copy of water budget calculations accounting for difference between water consumption and effluent generated						Not Applicable			
A schematic diagram of the treatment scheme of trade effluent with inlet / outlet characteristics of each unit operation / process including details of residue management system (ETP sludges)						Not Applicable			
Attach specifications including residue management systems of each of the control equipment indicating inlet / outlet concentrations of relevant pollutants.						Not Applicable			

Analysis report of treated effluent gas emissions and process emissions from the approved laboratory by State Board / Central Board / Central Government in the Ministry of Environment and Forests.	Not Applicable
Analysis report of characteristics of the hazardous waste(s) and concentration of relevant pollutants from the approved laboratory by State Board / Central Board / Central Government in the Ministry of Environment and Forests.	Not Applicable
Enclose documentary proof and copies of agreement of quantity of hazardous waste disposed	Not Applicable
Capital and recurring (O & M) expenditure on various aspects of environment protection such as effluent, emission, hazardous waste, solid waste, tree plantation, monitoring, date acquisition etc. (give figures separately for items implemented / to be implemented).	Not Applicable
Brief details of tree plantation / green belt development within applicant	Not Applicable
Information of schemes for waste minimisation, resource recovery and recycling - implemented and to be implemented, separately.	Not Applicable
If the industry comes under Public Hearing, enclose relevant documents such as EIA, EMP, Risk Analysis etc.	Not Applicable
A location map of disposal arrangement of treated effluents indicating the outlet(s) for sampling.	Not Applicable
Payment Details :	
Payment Mode :	OFFLINE
Demand Draft/Payment Receipt :	Download Challan/DD
	Demand Draft Details : Amount (Rs.) : 1000000 Ref/DD No. : 450958 Date : 24-09-2019 Name of the Bank : UNION BANK OF INDIA
Place: DIBRUGARH Date : 05-10-2019	Yours faithfully, Name: SURANJAN MAJUMDER Designation: GENERAL MANAGER

Acknowledgement

Your APPLICATION FOR RENEWAL FOR CONSENT TO OPERATE (UNDER WATER ACT, 1974 AND AIR ACT, 1981) has been submitted successfully to POLLUTION CONTROL BOARD ASSAM, Assam.

Your Unique Application Identification Number (UAIN) is PCB/F50/DI/008318/10/2019

You may track your application by entering this UAIN in the **Track Your Application** search box or clicking on **My Applications** in the dashboard. For any further query or help, you may contact us on our helpline number +91 7086044425 / +91 7086044424 and/or email us at eodb.assam@gmail.com.

Disclaimer : This is a computed generated acknowledgement, which is subject to granting of the final approval from the concerned authority. This acknowledgement should not be treated as the approval or its substitute for the purpose of any other application and/or approval. The concerned authority holds no responsibility if any other approvals are granted based on this acknowledgement.

From: EODB <info@easeofdoingbusinessinassam.in>
Sent: Friday, May 29, 2020 11:14 AM
To: Safety Environment Department
Subject: Query : AA29303/AAACO2352C/01/2019

CAUTION:Mail originated from outside of OIL mailing system(oilindia.in). Do not open attachments or click links unless you recognize the sender and are aware that the content is safe.

Dear SURANJAN MAJUMDER,

With reference to your Application for Renewal for Consent to Operate (under Water Act, 1974 and Air Act, 1981) with Unique Application Identification Number :

PCB/F50/DI/008318/10/2019 , the **Regional Head , Pollution Control Board Assam** , after validation of your form, has sent the following query.

Subject : General Query

Message : Pl. deposit fees and latest required documents for consideration of CTO up to 31-3-2021..

Please take necessary action and reply to the query at the earliest to allow further processing of your application form.

You may check the status and/or track your Application for Renewal for Consent to Operate (under Water Act, 1974 and Air Act, 1981) under "My Applications"™, by logging onto easeofdoingbusinessinassam.in with your registered username and password.

You can respond to the query by following the steps stated below:

1. Step 1: Log onto easeofdoingbusinessinassam.in with your registered username and password.
2. Step 2: Click on "My Inbox"™ section on the top-right corner of your dashboard.
3. Step 3: Locate the query received from the departmental officer amongst other communication that you may have done. (Note: Unread Mails/Queries will be displayed in bold letters). Click on the particular query string to open it.
4. Step 4: You can reply to the query by clicking on "Reply"™. Please note that, if the officer has requested for an additional document upload, you may upload a scanned copy of the required document alongwith your reply, in the slot provided.

Note: Your Application for Renewal for Consent to Operate (under Water Act, 1974 and Air Act, 1981) will not be processed further, until a reply is received from your end, with the clarifications / documents as sought by the **Regional Head , Pollution Control Board Assam**.

You may check the status and/or track your application form under "My Applications"™, by logging onto easeofdoingbusinessinassam.in with your registered username and password.

This is an auto generated response kindly to do not send an email to it.

This email and any attached files with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you are not the addressee you may not copy, forward, disclose or use any part of it. Please notify the web information manager, about the error. Internet communications cannot be guaranteed to be timely, secure, error or virus-free. The sender does not accept liability for any errors or omissions. We maintain strict security standards and procedures to prevent unauthorized access to information about you. The information contained in this mail is propriety and strictly confidential.

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Pollution Control Board:: Assam
Bamunimaidam; Guwahati-21
 (Department of Environment & Forests :: Government of Assam)
 Phone: 0361-2652774 & 2550258; Fax: 0361-2550259
 Website: www.pcbassam.org



No. WB/T-282/20-21/170

Dated Guwahati the 09.09.2021

To

851
 ✓ M/s. Oil India Ltd.
 Duliajan, Pin-786602
 Dist.: Dibrugarh (Assam).

Sub: "Consent to Operate" upto 31st March, 2022 under Water (Prevention & Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981 for Baghjan EPS, Doomdooma, Tinsukia.

Ref: Your online application vide No. 308551

Dear Sir,

With reference to your application in the name and style as mentioned above, the Pollution Control Board, Assam is pleased to grant the "Consent to Operate" under the Water Act and Air Act upto 31st March, 2022 for Baghjan EPS, Doomdooma, Tinsukia subject to pollution control measures taken by the unit throughout the period and the compliance of all necessary guidelines notified from time to time and strictly follow the Hon'ble Court Orders for such type of units, if any and under the terms & conditions as per **Appendix – A & B**. The grant of Consent to Operate will be automatically withdrawn if the above conditions are not fulfilled and if any genuine complaint against your unit is received by this office.

You are also requested to apply for "Consent to Operate" for the year 2022-2023 within **November, 2021**.

Yours faithfully,

Member Secretary (i/c)

Memo No. WB/T-282/20-21/170-A,

Dated Guwahati the 09.09.2021

Copy to:

The Regional Executive Engineer, Regional Office, Dibrugarh, Pollution Control Board, Assam for information & necessary action.

Member Secretary (i/c)



**Pollution Control Board:: Assam
Bamunimaidam; Guwahati-21**

(Department of Environment & Forests :: Government of Assam)
Phone: 0361-2652774 & 2550258; Website: www.pcbassam.org



No. WB/T-282/20-21/210
T 518

Dated Guwahati, the 10/11th Jan
Dec, 2021

"CONSENT TO OPERATE"

"CONSENT TO OPERATE" (CTO) under Section 25 of Water (Prevention & Control of Pollution) Act, 1974 and Section 21 of Air (Prevention & Control of Pollution) Act, 1981 as amended and Rules Framed thereunder is granted to:

- | | |
|--|--|
| i) Name of Industry | : M/s. OIL INDIA LIMITED |
| ii) Name of the Occupier / Applicant and Designation | : Shri JPP DAS, Asset Manager |
| iii) Address of the unit | : Baghjan EPS, Doomdooma, Tinsukia, 786147, Assam |
| iv) Cost of the project | : 9937.0 Lakh |
| v) Details of Project | : Early Production Setup (Capacity: 37148.8 Kilo litres per month of Crude Oil & 45.60 cubic metre per month of Natural Gas) |

TERMS AND CONDITIONS

1. The **Consent to Operate (CTO)** has been accorded based on the particulars furnished by the applicant vide Application ID **308551** and subject to addition of further more conditions if so, warranted by subsequent developments. The CTO will automatically become invalid if there is any changes, modification, alteration, expansion or deviation is made in actual practice.
2. The CTO is valid for a period up to **31/03/2026** unless otherwise suspended or revoked.
3. The unit should follow all the specific & general conditions as laid down in the Environment Clearance (EC) accorded by MoEF&CC.
4. The CTO may be modified, suspended or revoked by the Board in whole or in part during its term for cause including, but not limited to the following: -
 - a) Violation of any Terms and Conditions of this CTO;
 - b) Obtaining the CTO by misrepresentation or failure to disclose fully all relevant facts;
 - c) A change in any condition that require temporary or permanent reduction or elimination of the authorized discharge/emission.
5. This CTO doesn't authorize any addition, alternation, modification, modernization of process or products without prior permission of the Board.
6. The unit shall comply with all the specific & general conditions as laid down in the CTE as accorded by PCBA.
7. Proper housekeeping shall be maintained within unit premises.
8. **The project proponent must develop a greenbelt/plantation area with native trees covering at least 33% of the total plot area to develop Green Belt and Carbon Sink.**
9. Occupational health surveillance of the workers shall be carried out as per the prevailing Acts and Rules.
10. The project authority should install a Display Board as per the Boards notification no. **PCBA/LGL-95/2021/Notification/01 dtd.11.11.2021**. (Copy enclosed as **Annexure-A**).
11. The unit should reuse the waste material as far as possible.

Contd...p/2

১১/১১/২১

12. If any mud pit, waste pit etc. exist in the premises which is/are kept un-reclaimed for the purpose of future drilling and the portion of the site not used for well operation shall be reclaimed to its near original condition.

13. Permission of the Central Ground Water Authority shall be obtained for extraction of Ground Water, if applicable.

14. The company shall follow various provisions of the **Manufacture, storage & Import of Hazardous Chemicals Rule, 1989; the Chemical Accidents (Emergency, Planning, Preparedness and Response) Rule 1996, Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016 and relevant statues notified under the Environment (Protection) Act, 1986.**
15. As per the provision of the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981 as amended that any Officer empowered by the Board on its behalf shall have without interruption, the right at any time to enter the well site for inspection, collection of samples for analysis and may call for any information as deemed necessary. Denial of this right will cause withdrawal of the Consent Order.
16. The unit shall comply with the specific standards and guidelines for oil drilling and gas extraction industry as specified in The Environment (Protection) Rules, 1986 (Copy enclosed as **Annexure-B**).
17. Environmental Statement in prescribed **Form-V** should be submitted on or before the 30th September every year.
18. The unit shall have to apply for renewal of the CTO before its expiry .

Specific Conditions:

A) Air Aspect:

1. The industry shall take adequate measures for control of noise from its own source so as to comply with the Standards as specified in accordance with the **Noise Pollution (Regulation and Control Rule), 2000.**
2. The unit shall strictly follow the **Standards and Guidelines for control of Noise Pollution from Stationary Diesel Generator Sets** as per EPA, 1996 [GSR7, dtd. Dec. 22, 1998] (copy enclosed as **Annexure-C**).
3. The Ambient Air Quality within the Plant premises and surrounding areas should be maintained within the National Ambient Air Quality Standards as prescribed vide **G.S.R.826 (E) dtd.18.11.2009** (copy enclosed as **Annexure-D**).
4. Provision should be made for maintaining of plantation along the internal roads to reduce dust retention in the air.

B) Water Aspect:

1. The unit shall install ETP to achieve zero liquid discharge. Treated Effluent shall be reused in process /utilities. Sewage shall be disposed of through septic tank/soak pit system.
2. The unit shall comply with standards of liquid effluents as mentioned in the Environment (Protection) Rules, 1986 for Oil drilling and gas extraction included in **Annexure-B**
3. Storm water drains should be segregated from the industrial drains.
4. Rain water harvesting facility shall be installed and maintained.

C) Solid Waste Aspect:

1. Adequate facility should be created for collection, storage, transportation, treatment & disposal of non-hazardous industrial solid waste generated from the Industry.
2. Adequate system should be adopted for reduction of waste generation and enhancement of re-utilization & recycling of waste materials.
3. Solid waste generated in the unit shall be disposed of as per the provision of **Solid Waste Management Rules, 2016.**

Contd...p/3

purpose of its near

D) **Plastic Waste Aspect:**

1. All the plastic waste generated in the facility shall be channelized to recyclers. The details of plastic waste generated and disposed of should be submitted to PCBA before **30th June every year**.
2. Plastic waste generated in the unit shall be disposed of as per the provision of **Plastic Waste Management Rules, 2016**.



E) **Hazardous Waste Aspect:**

1. Appropriate facility should be created and maintained for handling, storage, treatment & disposal of Hazardous waste generate from the industry in accordance to the provisions of the **Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016**.
2. Adequate facility should be provided for storage of any hazardous substance/chemicals in accordance to the provisions of the **Manufacture, Import & Storage of Hazardous Chemical Rules, 1989**.
3. The proponent should apply and obtain Authorization under provisions of the **Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016**.

The unit shall submit compliance report of the mandated conditions by April 15 of every year to Member Secretary, PCBA as well as to concerned Regional Office of the Board. The Board will have the liberty to withdraw the CTO if adequate pollution control and safety measures are not taken.

Shantanu Kr. Dutta
 (Shantanu Kr. Dutta)
 Member Secretary

Memo No. WB/T-282/20-21/210 ,
 Copy to:

Dated Guwahati, the Dec, 2021

1. Shri JPP Das, Asset Manager, M/s. Oil India Limited, Eastern Asset, Oil India Limited, Digboi – 786171, Assam for information & necessary action.

Shantanu Kr. Dutta
 (Shantanu Kr. Dutta)
 Member Secretary

ANNEXURE R3

Drilling of Development Well (26 Nos.) and Exploratory Well (15 Nos.) at N. Hapjan-Tinsukia-Dhola Area in District Tinsukia Assam by M/s Oil India Limited – Environmental Clearance reg.

This message has been scanned by the InterScan for CSC SSM and found to be free of known security risks.

F. No. J-11011/1255/2007 - IA II (I)
Government of India
Ministry of Environment and Forests
(I.A. Division)

Paryavaran Bhawan
CGO Complex, Lodhi Road
New Delhi – 110 003

E-mail : pb.rastogi@nic.in

Telefax : 011: 2436 7668

Dated 1st November, 2011

To,

The Group General Manager (SB)
M/s Oil India Limited.
Duliajan District Dibrugarh- 768 602, Assam

E-mail: drilling@oilindia.in ;

Fax No.: 0374-2803 296

Subject: Drilling of Development Well (26 Nos.) and Exploratory Well (15 Nos.) at N. Hapjan-Tinsukia-Dhola Area in District Tinsukia Assam by M/s Oil India Limited – Environmental Clearance reg.

Ref. : Your letter no. DRLG/DS/A.19-192/10 dated 28th December, 2010.

Sir,

Kindly refer your letter dated 28th December, 2010 alongwith project documents including Form I, Terms of References, Pre-feasibility Report, EIA/EMP Report and subsequent communications vide your letter dated 25th June, 2011 on the above mentioned subject.

2.0 The Ministry of Environment & Forests has examined your application. It is noted that proposal is for drilling of development well (26 Nos.) and exploratory well (15 Nos.) at N. Hapjan-Tinsukia-Dhola Area in District Tinsukia Assam by M/s Oil India Limited. Block Coordinate is between Longitude 95^o 20' -- 95^o 32' and Latitude 27^o 27' -- 27^o 37'. Block area is 650 sq KM. Project cost is Rs. 15.00 Crores for each well. Borajan reserve forest (RF), Bherjan RF, Padumani RF, Dibru RF, Upper Dihing (west) RF complex including Lakhpathar RF are

located within 10 Km. No national park/wildlife sanctuary/eco-sensitive area are located within 10 km.

3.0 Stack of adequate height will be provided to DG set. Flaring will be done in a controlled manner through scientifically designed flaring system. Water requirement will be 40 m³ per well/day for drilling purpose and 2 m³ per well/day for domestic use. Effluent generation will be 20 m³ (approx) per well/day during drilling phase. Effluent will be stored in HDPE lined pit and treated as per CPCB/SPCB norms and recycled. Water based mud will be used in drilling. Drill cuttings generation will be 200 m³/well. Drill cuttings will be stored in HDPE lined pit for safe disposal.

4.0 The proposal was considered by the Expert Appraisal Committee (Industry-2) in its 77th, 21st and 26th meetings held during 21st-24th January, 2008, 23rd-24th March, 2011 and 17th-18th August, 2011 respectively.

5.0 All the projects related to offshore and onshore Oil and Gas exploration, development and production are listed in para 1(b) of schedule of EIA Notification, 2006 covered under category 'A' and appraised at centre level.

6.0 Public hearing was exempted as per Para 7 (II) of EIA Notification 2006.

7.0 The Ministry of Environment and Forests hereby accords environmental clearance to the above project under the provisions of EIA Notification dated 14th September, 2006 subject to strict compliance of the following specific and general conditions:

A. SPECIFIC CONDITIONS :

- i. As proposed, only development well (26 Nos.) and exploratory well (15 Nos.) shall be drilled. No additional wells shall be drilled without prior permission from this Ministry.
- ii. As proposed, no drilling of well and any construction work shall be carried out in forest land.
- iii. Permission shall be obtained from the State Forest Department regarding the impact of the proposed drilling on the surrounding reserve forest viz. Borajan RF, Bherjan RF, Padumani RF, Dibru RF, Upper Dihing (west) RF complex including Lakhpathar RF.
- iv. Drilling site shall not be close to villages, schools etc.
- v. Ambient air quality shall be monitored near the closest human settlements as per the National Ambient Air Quality Emission Standards issued by the Ministry vide G.S.R. No. 826(E) dated 16th November, 2009 for PM₁₀, PM_{2.5}, SO₂, NO_x, CO, CH₄, HC, Non-methane HC etc.

- vi. The flare system shall be designed as per good oil field practices and Oil Industry Safety Directorate (OISD) guidelines. The stack height shall be provided as per the regulatory requirements and emissions from stacks will meet the MOEF/CPCB guidelines.
- vii. The company shall make the arrangement for control of noise from the drilling activity. Acoustic enclosure shall be provided to DG sets and proper stack height shall be provided as per CPCB guidelines.
- viii. Mercury shall also be analyzed in air, water and drill cuttings twice during drilling period.
- ix. Approach road shall be made pucca to minimize generation of suspended dust.
- x. Total fresh water requirement shall not exceed 42 m³/day/well and prior permission shall be obtained from the concerned agency.
- xi. The company shall construct the garland drain all around the drilling site to prevent runoff of any oil containing waste into the nearby water bodies. Separate drainage system shall be created for oil contaminated and non-oil contaminated. Effluent shall be properly treated and treated wastewater shall conform to CPCB standards.
- xii. Drilling wastewater including drill cuttings wash water shall be collected in disposal pit lined with HDPE lining evaporated or treated and shall comply with the notified standards for on-shore disposal. The membership of common TSDF should be obtained for the disposal of drill cuttings and hazardous waste. Otherwise, secured land fill shall be created at the site as per the design approved by the CPCB and obtain authorization from the SPCB. Copy of authorization or membership of TSDF shall be submitted to Ministry's Regional Office at Shillong.
- xiii. Good sanitation facility shall be provided at the drilling site. Domestic sewage shall be disposed off through septic tank/ soak pit.
- xiv. Oil spillage prevention and mitigation scheme shall be prepared. In case of oil spillage/contamination, action plan shall be prepared to clean the site by adopting proven technology. The recyclable waste (oily sludge) and spent oil shall be disposed of to the authorized recyclers.
- xv. The company shall comply with the guidelines for disposal of solid waste, drill cutting and drilling fluids for onshore drilling operation notified vide GSR.546(E) dated 30th August, 2005.

- xvi. The Company shall take necessary measures to prevent fire hazards, containing oil spill and soil remediation as needed. Possibility of using ground flare shall be explored. At the place of ground flaring, the overhead flaring stack with knockout drums shall be installed to minimize gaseous emissions during operation.
- xvii. The company shall develop a contingency plan for H₂S release including all necessary aspects from evacuation to resumption of normal operations. The workers shall be provided with personal H₂S detectors in locations of high risk of exposure along with self containing breathing apparatus.
- xviii. The Company should carry out long term subsidence study by collecting base line data before initiating drilling operation till the project lasts. The data so collected should be submitted six monthly to the Ministry and its Regional Office at Shillong.
- xix. Blow Out Preventor (BOP) system shall be installed to prevent well blowouts during drilling operations. BOP measures during drilling shall focus on maintaining well bore hydrostatic pressure by proper pre-well planning and drilling fluid logging etc.
- xx. Emergency Response Plan (ERP) shall be based on the guidelines prepared by OISD, DGMS and Govt. of India.
- xxi. The company shall take measures after completion of drilling process by well plugging and secured enclosures, decommissioning of rig upon abandonment of the well and drilling site shall be restored the area in original condition. In the event that no economic quantity of hydrocarbon is found a full abandonment plan shall be implemented for the drilling site in accordance with the applicable Indian Petroleum Regulations.
- xxii. Occupational health surveillance of the workers shall be carried out as per the prevailing Acts and Rules.
- xxiii. In case the commercial viability of the project is established, the Company shall prepare a detailed plan for development of oil and gas fields and obtain fresh environmental clearance from the Ministry.
- xxiv. Restoration of the project site shall be carried out satisfactorily and report shall be sent to the Ministry's Regional Office at Shillong.
- xxv. Oil content in the drill cuttings shall be monitored by some Authorized agency and report shall be sent to the Ministry's Regional Office at Shilong.
- xxvi. Company shall prepare and circulate the environmental policy.

- xxvii. Company shall prepare operating manual in respect of all activities. It shall cover all safety & environment related issues and system. Measures to be taken for protection. One set of environmental manual shall be made available at the drilling site/ project site. Awareness shall be created at each level of the management. All the schedules and results of environmental monitoring shall be available at the project site office.
- xxviii. Base and side of Drill cutting storage pits and supernatant storage pit shall be provided with HDPE lining. Overflow channel and oil grease trap facility shall be provided.
- xxix. Chemical characteristics and toxicity in respect of amine and all other chemicals should be found out and monitoring arrangement should be made. A copy of report should be sent to the Ministry's Regional Office at Shilong.
- xxx. Company shall ensure good housekeeping at the drilling site.
- xxxi. Company shall have own Environment Management Cell having qualified persons with proper background. Full fledged laboratory facilities must be set up to carry out the environmental management and monitoring functions.

B. GENERAL CONDITIONS:

- i. The project authorities must strictly adhere to the stipulations made by the Assam Pollution Control Board (APCB), State Government and any other statutory authority.
- ii. No further expansion or modification in the project shall be carried out without prior approval of the Ministry of Environment & Forests. 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 to assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any.
- iii. The project authorities must strictly comply with the rules and regulations under Manufacture, Storage and Import of Hazardous Chemicals Rules, 2000 as amended subsequently. Prior approvals from Chief Inspectorate of Factories, Chief Controller of Explosives, Fire Safety Inspectorate etc. must be obtained, wherever applicable.
- iv. 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 EPA Rules, 1989 viz. 75 dBA (daytime) and 70 dBA (nighttime).
- v. A copy of clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad / Municipal Corporation, Urban Local Body and the local NGO, if any, from whom suggestions / representations, if any, were received while processing the proposal. The clearance letter shall also be put on the web site of the company by the proponent.
 - vi. The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the MOEF, the respective Zonal Office of CPCB and the APCB. The criteria pollutant levels namely; PM₁₀, SO₂, NO_x, HC (Methane & Non-methane), VOCs (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the projects shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.
 - vii. The project proponent shall also submit six monthly reports on the status of the compliance of the stipulated environmental conditions including results of monitored data (both in hard copies as well as by e-mail) to the Regional Office of MOEF, the respective Zonal Office of CPCB and the APCB. The Regional Office of this Ministry / CPCB / APCB shall monitor the stipulated conditions.
 - viii. The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent 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 alongwith the status of compliance of environmental conditions and shall also be sent to the respective Regional Offices of the MOEF by e-mail.
 - ix. 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 APCB and may also be seen at Website of the Ministry of Environment and Forests at <http://envfor.nic.in>. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same shall be forwarded to the Regional office.

- x. 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 commencing the land development work.

8.0 The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.

9.0 The Ministry reserves the right to stipulate additional conditions if found necessary. The Company in a time bound manner shall implement these conditions.

10.0 The above conditions shall be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986, Hazardous Wastes (Management and Handling) Rules, 2003 and the Public (Insurance) Liability Act, 1991 along with their amendments and rules.

(Dr. P. B. Rastogi)
Director

Copy to:

1. Principal Secretary, Department of Environment & Forest, Govt. of Assam, Guwahati, Assam.
2. The Chief Conservator of Forests, Regional Office (North-East Zone, Shillong) Upland Road, Laitumhran Shillong-793003.
3. The Chairman, Central Pollution Control Board Parivesh Bhavan, CBD-cum-Office Complex, East Arjun Nagar, New Delhi - 110 032.
4. The Chairman, Assam Pollution Control Board, Bamunimaidam, Guwahati – 21 Assam.
5. Adviser, IA II(I), Ministry of Environment and Forests, Paryavaran Bhavan, CGO Complex, New Delhi.
6. Monitoring Cell, Ministry of Environment and Forests, Paryavaran Bhavan, CGO Complex, New Delhi.
7. Guard File/Monitoring File/Record File.

(Dr. P. B. Rastogi)

Director

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ANNEXURE R4



F. No. J-11011/375/2016-IA II (I)
Government of India
Ministry of Environment, Forest and Climate Change
Impact Assessment Division

By Speed Post/Online

Indira Paryavaran Bhawan,
 Vayu Wing, 3rd Floor, Aliganj,
 Jor Bagh Road, New Delhi-110 003

Dated: 28th December, 2020

To,

M/s Oil India Limited
 Safety & Environment Department,
 Oil India Limited, Duliajan,
 Naharkathiya, Dibrugarh,
 Assam-786602

Email: safety@oilindia.in

Sub.: Onshore Oil and Gas Development Drilling and Production Involving Onshore drilling of additional 179 wells, production facilities and laying of assorted oil & gas flowlines/delivery lines by M/s OIL INDIA LIMITED in District Tinsukia, Assam - Environmental Clearance regarding.

Sir,

This has reference to your online proposal No IA/AS/IND2/165606/2007 dated 07th August, 2020 for environmental clearance to the above mentioned project.

2. The Ministry of Environment, Forest and Climate Change has examined the proposal for environmental clearance to the project for Onshore Oil and Gas Development Drilling and Production Involving Onshore drilling of additional 179 wells, production facilities and laying of assorted oil & gas flowlines/delivery lines by M/s OIL INDIA LIMITED in District Tinsukia, Assam.

3. The details of products and capacity as under:

S. No	Details of Wells	Existing Wells	Proposed Wells	Total Number of Wells
1.	179 wells and 9 production installations	41 wells	179 wells	220 wells

4. The Ministry had issued EC earlier vide letter no. J-11011/1255/2007 - IA II (I); dated 1st November, 2011 to the existing project Drilling of Development Well (26 Nos.) and Exploratory Well (15 Nos.) at N. Hapjan-Tinsukia-Dhola Area in District Tinsukia Assam by M/s Oil India Limited in favour of M/s Oil India Ltd. Certified compliance report issued

by Shillong Regional Office vide letter No. RO-E/E/IA/AS/MI/59/169-71. RO, MoEF&CC, Shillong planned during 9-12 December 2019, but was cancelled due to Citizenship Amendment Act (CAA) protests and later due to COVID-19 pandemic. Undertaking of self-certified compliance of EC conditions submitted to MoEF&CC. The Committee deliberated the same.

5. Additional 6000000 m² land will be used for proposed expansion. Industry will develop greenbelt in an area of 157500 m² out of total area of the project. The estimated project cost is Rs.3500 crores. Total capital cost earmarked towards environmental pollution control measures is Rs.4.41 crore and the Recurring cost (operation and maintenance) will be about Rs.5.01 crore per annum. Total Employment will be 60 persons as direct & 120 persons indirect after expansion. OIL proposes to allocate Rs.877 lakhs @ of 0.25% of the total project cost towards Corporate Environmental Responsibility. The Dibru Saikhowa National Park and Bherjan Segment of Bherjan Borjan Podumoni Wildlife Sanctuary within 10 km of the well locations. Brahmaputra River is flowing at a distance of 0.9 km in north-west direction.

6. Ambient air quality monitoring was carried out at 8 locations during 5.10.2017 to 30.12.2017 and the baseline data indicates the ranges of concentrations as: PM10 (52-136 µg/m³), PM2.5 (25-74 µg/m³), SO₂ (4.2-8.6 µg/m³) and NO₂ (12.2-29.6 µg/m³). AAQ modelling study for point source emissions indicates that the maximum incremental GLCs after the proposed project would be 12.3 µg/m³, 0.43 µg/m³, 0.06 µg/m³ and 0.08 µg/m³ with respect to NO_x, SO₂, PM10 and HC. The resultant concentrations are within the National Ambient Air Quality Standards (NAAQS) except PM10 and PM2.5. PP justified that the higher GLCs values are due to the interference of erstwhile local conditions.

7. Total water requirement is 50 m³/day of which fresh water requirement of 39 m³/day which will be met from groundwater. Effluent of 21.8 KLD quantity will be treated through ETP and Septic tank. The project will be based on Zero Liquid discharge system. It is anticipated that two DG sets with a power rating of 1250 kVA each will be required for drilling purposes of which one will be kept standby. Stack height of 7 m will be provided as per CPCB norms to the proposed DG sets.

8. **Details of Process emissions generation and its management:** The operation of DG sets, movement of vehicles and machineries during construction and drilling, flaring of natural gas will result in the generation of air pollutants, if gas reserves are encountered during drilling operations. Stacks will be used with DG sets and flare system as per CPCB norms.

9. **Details of Solid waste/ Hazardous waste generation and its management:** Drill cuttings and spent drilling mud will be disposed to HDPE lined pit within the drill site. The kitchen waste will be disposed in nearest municipal/village dumping site on a daily basis through approved waste handling contractors. Recyclable wastes will be periodically sold to local waste recyclers. Hazardous waste (waste and used oil) will be managed in accordance with Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2016.

10. It was also informed that there are various court cases against the instant proposal and various other proposal of M/s Oil India Limited in the nearby area as under:

S. No	Case No. & Parties	Court/ Tribunal	Details of court case	Current Status
1.	PIL No. 35/2020, Mrinmoy Khataniar Vs. The Union of India and 13 Ors	Hon'ble Gauhati High Court	The Petitioners have filed the Public Interest Litigation of the environmental clearance dated 11.05.2020 granted to OIL by Union Ministry of Environment, Forest and Climate Change for Extension Drilling and testing of Hydrocarbons at 7 (seven) locations under the Dibru-Saikhowa National Park.	As directed by Court, OIL has filed Addl. Affidavit.
2.	PIL No. 39/2020, Gautam Uzir Vs The Union of India and 5 Ors	Hon'ble Gauhati High Court	The Public Interest Litigation has been filed by one Senior Advocate of Gauhati High Court as Petitioner-in-Person.	The Court has fixed the new date for hearing.
3.	O.A. no. 43/2020/EZ, Bonani Kakkar Vs OIL & Ors	Hon'ble National Green Tribunal, Kolkata (Eastern Zone Bench)	An application has been filed before the Hon'ble NGT by an environmentalist i.e. Bonani Kakkar.	The Tribunal has deferred the hearing as the committee could not submit the final Report and fixed the next dated for hearing on 15.12.2020.
4.	O.A. No. 44/2020/EZ, Wildlife and Environment Conservation Organisation Vs. Union of India & Ors	Hon'ble National Green Tribunal, Kolkata (Eastern Zone Bench)	An application has been filed before the Hon'ble NGT by a Non-Governmental Organisation (NGO). i.e. Wildlife & Environment Conservation Organisation against the OIL.	The Tribunal has deferred the hearing as the committee could not submit the final Report and fixed the next dated for hearing on 15.12.2020.
5.	O.A. no. 41/2020/EZ, Sayyan Banerjee Vs. OIL & Ors	Hon'ble National Green Tribunal, Kolkata (Eastern Zone Bench)	An Application has been filed before the Hon'ble NGT by Sri Sayyan Banerjee pertaining to blowout at the Baghjan Oil Well no. 5.	The case tagged along with O.A. No. 43/2020/EZ, O.A. No. 44/2020/EZ, O.A. No. 50/2020/EZ)
6.	O.A. 50/2020/EZ,	Hon'ble National	An Application has been filed before the Hon'ble	The case is tagged along with O.A. No.

	SoneswarNarah & Ors vs. OIL &Ors	Green Tribunal, Kolkata (Eastern Zone Bench)	NGT by Soneswar Narah and others pertaining to blowout at the Baghjan Oil Well no. 5.	41/2020/EZ, O.A. No. 43/2020/EZ, O.A. No. 44/2020/EZ)
7.	Appeal No. 04/2020/EZ ,(I.A. No. 34/2020) Bimal Gogoi & Anr. Vs. Union of India & Ors.	Hon'ble National Green Tribunal, Kolkata (Eastern Zone Bench)	An Appeal has been filed by the Appellant i.e. Sri Bimal Gogoi before the Hon'ble NGT to challenge the Environmental Clearance (EC) dated 11.05.2020 granted by Ministry of Environment, Forest & Climate Change in favour of OIL for drilling seven wells for Hydrocarbon exploration under the Dibru-Sikhowa National Park.	Court has fixed the next dated for hearing on 15.12.2020.
8.	W.P. no. (Civil) 835/2020, Rituraj Phukan Vs. Union of India & ors.	Hon'ble Supreme Court of India	PIL was filed before the Hon'ble Supreme Court by the Petitioner i.e. Rituraj Phukan	The Hon'ble Supreme Court vide its order dated 16.09.2020 issued notice and tag this Writ Petition with W.P. (Civil) no. 625/2020.

11. PP informed that in Baghjan Well No. 5 cement plug job was being carried out as per the program on 26.05.2020. The Well suddenly became very active and has resulted into a blowout at around 10.30 AM on 27.05.2020. Consequent upon incident of blowout and subsequent fire, various Govt. Authorities have constituted various committees to enquire into the cause of the Blowout. OIL is yet to receive Committee's report, except the Report of Oil Industry Safety Directorate (OISD). It is pertinent to mention that the Hon'ble HC in PIL No. 93/2020 (Gautam Uzir) has directed the Committee constituted by Govt. of Assam and MoPNG as well as OIL India Ltd. to submit their respective reports before the Court in sealed cover as the Court was of the opinion that the findings of these Committee's may be overlapping. Nevertheless, OIL shall implement recommendations of the Committee's unless recommendations are overlapping or contradictory. The Committee deliberated the details and is of the view that there may be condition that this instant EC is subject of Order of Hon'ble Court.

12. PP informed that Application for NBWL clearance submitted for 138 Nos of well & 7 Nos of Production installation falling within in 10 KM of ESZ of BBP. However, Eco-Sensitive Zone proposed by the State Govt. of Assam for Borjan Bherjan and Podumoni(BBP) ESZ boundary is 0 km from the boundary of the Wildlife Sanctuary, around each of the three distinct entities namely Bherjan, Borjan and Podumoni(BBP). OIL's proposed drilling locations are located outside of the State Govt. of Assam's proposed

BorjanBherjan and Podumoni ESZ boundary. OIL will drill the locations only after finalisation of the ESZ of Bherjan Borjan Podumoni(BBP) WLS or obtaining Wildlife Clearance from Standing Committee of NBWL whichever is earlier. It is submitted that Wildlife Conservation Plan is submitted to Chief Wildlife Warden, Assam. EMP cost has been earmarked. Budget will be utilized after receiving of approved Wildlife management plan from State forest department. Detailed conservation plan is prepared for 35 No of Schedule I species reported/recorded within the Block.

13. The proposal was considered by the Expert Appraisal Committee (Industry-3) in its 1st meeting held during **17-19 November, 2020** in the Ministry, wherein the project proponent and their accredited consultant M/s ERM India Pvt. Ltd. presented the EIA/EMP report as per the ToR.

14. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the EIA/EMP report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee noted that Baghjan Well, adjacent to the proposed well location/area had a blow out and has caused severe impact on the environment and biodiversity of the region. subsequently Govt. Authorities have constituted various committees to enquire into the cause of the Blowout and has resulted into court cases. The committee has deliberated the action plan for safety measures and Emergency contingency plan.

The Committee observed that the block area is falling within 10 km of the National Park and Wildlife sanctuary and such requires permission/clearance on Forest/Wildlife angle. The project proponent has in turn informed that none of the wells are falling within 10 km of the protected areas. The Committee was of the view that, if any blow out/leakage, happens as that happened in Baghjan, it shall lead to disastrous effect on the environment, people and associated biodiversity. The project proponent has informed that lessons have been learned from the blowout and assured that all the safety and precautionary measures shall be taken to avoid any such disaster.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with EIA/EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent.

The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the EIA/EMP report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee noted that the EIA/EMP report is in compliance of the ToR issued for the project, reflecting the present environmental concerns and the projected scenario for all the environmental components. The Committee has found the baseline data and

incremental GLC due to the proposed project within NAAQ standards except PM10 & PM2.5. The Committee has also deliberated on the action plan of pollution mitigation measures and found to be addressing the issues in the study area and public hearing issues. Additional information submitted by the project proponent found to be satisfactory and addressing the concerns of the Committee.

The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have recommended for grant of environmental clearance.

15. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. **The Experts Members of the EAC have found the proposal in order and have recommended for grant of environmental clearance.**

16. Based on the proposal submitted by the project proponent and recommendations of the EAC (Industry-3), Ministry of Environment, Forest and Climate Change hereby accords environmental clearance to the project for **Onshore Oil and Gas Development Drilling and Production Involving Onshore drilling of additional 179 wells, production facilities and laying of assorted oil & gas flowlines/delivery lines by M/s OIL INDIA LIMITED in District Tinsukia, Assam**, under the provisions of the EIA Notification, 2006, and the amendments therein, subject to compliance of the terms and conditions as under:-

A. Specific Condition

- (i). **Project Proponent reported that in Baghjan Well suddenly became very active and has resulted into a blowout at around 10.30 AM on 27.05.2020. Consequent upon incident of blowout and subsequent fire, various Govt. Authorities have constituted Committees to enquire into the cause of the Blowout. OIL is yet to receive Committee's report, except the Report of Oil Industry Safety Directorate (OISD). Hon'ble HC in PIL No. 93/2020 (Gautam Uzir) has directed the Committee constituted by Govt. of Assam and MoPNG as well as OIL India Ltd. to submit their respective reports before the Court in sealed cover as the Court was of the opinion that the findings of these Committee's may be overlapping. OIL shall implement recommendations of the Committees.**
- (ii). **This Environmental Clearance (EC) is subject to orders/ judgment of Hon'ble Supreme Court of India, Hon'ble High Court, Hon'ble NGT and any other Court of Law, as may be applicable to this project.**
- (iii). 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.

- (iv). The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.
- (v). 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.
- (vi). The activities and the action plan proposed by the project proponent to address the public hearing and socio-economic issues in the study area, shall be completed as per the schedule presented before the Committee and as described in the EMP report in letter and spirit. All the commitments made during public hearing shall be satisfactorily implemented.
- (vii). No pipelines or its part shall be laid in the Forest land/Protected Area without prior permission/approval from the Competent Authority.
- (viii). Forest Clearance/ Wild Life Clearance/ ESZ Clearance shall be obtained from the concerned regulatory authority, if applicable to the project. Drilling in the forest area and area beneath it shall not be carried out without prior permission.
- (ix). As proposed by the project proponent, Zero Liquid Discharge shall be ensured and no waste/treated water shall be discharged to any surface water body, sea and/or on land. Mobile ETP along with RO plant shall be installed to treat the waste water.
- (x). During exploration, production, storage and handling, the fugitive emission of methane, if any, shall be monitored using Infra-red camera/ appropriate technology.
- (xi). The project proponent also to ensure trapping/storing of the CO₂ generated, if any, during the process and handling.
- (xii). Approach road shall be made pucca to minimize generation of suspended dust.
- (xiii). The project proponent shall make all arrangements for control of noise from the drilling activity. Acoustic enclosure shall be provided for the DG sets along with the adequate stack height as per CPCB guidelines.
- (xiv). Total fresh water requirement shall not exceed 39 m³/day. Prior permission shall be obtained from the concerned regulatory authority. Mobile ETP coupled with RO shall be installed to reuse the treated water in drilling system. Size of the waste shall be equal to the hole volume+ volume of drill cutting and volume of discarded mud if any. Two feet free board may be left to accommodate rain water. There shall be separate storm water channel and rain water shall not be allowed to mix with waste water. Alternatively, if possible pit less drilling be practiced instead of above.
- (xv). The company shall construct the garland drain to prevent runoff of any oil containing waste into the nearby water bodies. Separate drainage system shall be created for oil contaminated and non-oil contaminated.

- (xvi). Drill cuttings separated from drilling fluid shall be adequately washed and disposed in HDPE lined pit. Waste mud shall be tested for hazardous contaminants and disposed according to HWMH Rules, 2016. No effluent/drilling mud shall be discharged/disposed off into nearby surface water bodies. The company shall comply with the guidelines for disposal of solid waste, drill cutting and drilling fluids for onshore drilling operation notified vide GSR.546(E) dated 30th August, 2005.
- (xvii). Oil spillage prevention and mitigation scheme shall be prepared. In case of oil spillage/ contamination, action plan shall be prepared to clean the site by adopting proven technology. The recyclable waste (oily sludge) and spent oil shall be disposed of to the authorized recyclers.
- (xviii). The project proponent shall take necessary measures to prevent fire hazards, containing oil spill and soil remediation as needed. At fixed installations or plants use of ground flare shall be explored. At the place of ground flaring, the overhead flaring stack with knockout drums shall be installed to minimize gaseous emissions during operation.
- (xix). The project proponent shall develop a contingency plan for H₂S release including all necessary aspects from evacuation to resumption of normal operations. The workers shall be provided with personal H₂S detectors in locations of high risk of exposure along with self-containing breathing apparatus.
- (xx). Blow Out Preventer system shall be installed to prevent well blowouts during drilling operations.
- (xxi). On completion of the project, necessary measures shall be taken for safe plugging of wells with secured enclosures to restore the drilling site to the original condition. The same shall be confirmed by the concerned regulatory authority from environment safety angle. In case of hydrocarbon not found economically viable, a full abandonment plan shall be implemented for the drilling site in accordance with the applicable DGH / Indian Petroleum Regulations.
- (xxii). No lead acid batteries shall be utilized in the project/site.
- (xxiii). Occupational health surveillance of the workers shall be carried out as per the prevailing Acts and Rules. All workers & employees shall be provided with required safety kits/mask for personal protection.
- (xxiv). Oil content in the drill cuttings shall be monitored and report & shall sent to the Ministry's Regional Office.
- (xxv). The project proponent shall prepare operating manual in respect of all activities, which would cover all safety & environment related issues and measures to be taken for protection. One set of environmental manual shall be made available at the drilling site/ project site. Awareness shall be created at each level of the management. All the schedules and results of environmental monitoring shall be available at the project site office. Remote monitoring of site should be done.

B. : General Condition:

- (i) 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.

- (ii) The energy source for lighting purpose shall be preferably LED based, or advanced having preference in energy conservation and environment betterment.
- (iii) 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).
- (iv) 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.
- (v) 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.
- (vi) 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.
- (vii) 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.
- (viii) 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.
- (ix) The project proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the SPCB/Committee and may also be seen at Website of the Ministry and at <https://parivesh.nic.in/>. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the

locality concerned and a copy of the same shall be forwarded to the concerned Regional Office of the Ministry.

- (x) 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.
- (xi) 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.

17. The Ministry reserves the right to stipulate additional conditions, if found necessary at subsequent stages and the project proponent shall implement all the said conditions in a time bound manner. The Ministry may revoke or suspend the environmental clearance, if implementation of any of the above conditions is not found satisfactory.

18. Concealing factual data or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of Environment (Protection) Act, 1986.

19. Any appeal against this environmental clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.

20. The above conditions will be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986, the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2016 and the Public Liability Insurance Act, 1991 read with subsequent amendments therein.

21. This issues with the approval of the competent authority.

28/12/2020

(Dr. R. B. Lal)

Scientist 'E'/Additional Director

Email: rb.lal@nic.in

Tele fax: +91 11-24695362

(Dr. R. B. LAL)

वैज्ञानिक 'ई'/Scientist 'E'

पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
Min. of Environment, Forest and Climate Change
भारत सरकार, नई दिल्ली
Govt. of India, New Delhi

Copy To:

1. The Secretary, Ministry of Petroleum & Natural Gas
Shastri Bhavan, New Delhi - 110001.
2. The Principal Secretary, Environment and Forests Department Secretariat, Government of Assam, Secretariat, Dispur-781001
3. Deputy Director General of Forests (C), Ministry of Environment, Forest and Climate Change, Regional Office (NEZ), Law-U-Sib, Lumbatngen, Near MTC Workshop, Shillong

4. The Member Secretary, Central Pollution Control Board Parivesh Bhavan, CBD-cum-Office Complex, East Arjun Nagar, Delhi -32
5. The Member Secretary, Assam Pollution Control Board, Milanpur, West Jyotinagar, Bamunimaidan, Guwahati, Assam 781004
6. District Magistrate, Dibrugarh
7. The Joint Secretary, Monitoring Cell, Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, Jor Bagh road, New Delhi
8. The Joint Secretary, HSM Division, Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, Jor Bagh road, New Delhi
9. Guard File/Monitoring File/website/Record File/Parivesh Portal


(Dr. R. B. Lal)
Scientist 'E'/Additional Director



Oil India Limited

(A Government of India Enterprise)

P. O. DULIAJAN
DIST. DIBRUGARH
ASSAM - 786 602

TEL : 0374 - 2800587, 2800303

FAX : 2801676, 2800522, 2800533, 2800544,
2800433, 2800290

CABLE : OIL INDIA

E-mail : oilindia@oil.asm.nic.in

Ref. No. S&E/E/26/466

Date : 19.05.2004

Regional Executive Engineer,
Pollution Control Board, Assam,
Back Side of ASTC Bus Station,
Chowkidinghee, Dibrugarh,
Assam

Sub : Application for authorization for Hazardous Waste

Dear Sir,

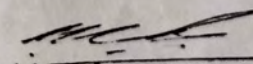
Reference our discussion, we are forwarding the applications duly filled in alongwith the necessary fees for granting us authorisation for Hazardous Waste for our following fields.

- (1) Duliajan field
- (2) Moran field
- (3) Digboi field

We request you to grant us authorisation at the earliest please.

Thanking you,

Yours faithfully,
OIL INDIA LIMITED


(A. K. Baruah)
Dy. General Manager (S&E) /IC
For GROUP GENERAL MANAGER

Copy : Member Secretary,
Pollution Control Board, Assam,
Bamunimaidam, Guwahati-21

Received
19/5/04

Executive Engineer
Pollution Control Board, Assam
Dibrugarh

Encl : DD No. 744770 dtd. 19.05.2004
of Rs. 22,500/- (Rupees twenty two thousand five hundred only).



Book No: 66

Receipt NO: 6502

POLLUTION CONTROL BOARD, ASSAM

Bamunimaidam, Guwahati-21

Date: 19.5.04

On behalf of *Pollution Control Board, Assam* received with thanks from:
 M/s. *Oil India Ltd.*
 a sum of Rs. *22,500.00* (Rupees *Twenty two*
thousand five hundred only
 on account of *Authorisation fee for the year 2004 - 2005*
 by *Cheque/Draft No. 1770* Date *19.5.04* of Rs. *22,500.00*



Office Asstt. / Accounts clerk

Cheque/Draft subject to realisation

Regional
 Executive Engineer
 Pollution Control Board, Assam
 Dibrugarh

PAYMENT VOUCHER
OIL INDIA LIMITED, DULIAJAN
(A Govt. of India Enterprise)

Main Section

05/1418

Pay To MEMBER SECRETARY POLLUTION CONTROL BOARD, ASSAM.

Bank :

Address :

The sum of Rupees Twenty Two Thousand Five Hundred Only.

Advice No : 01/04/05/0219

Date : 18/05/2004

Credit A/c :

Cheque No. :

Pay Mode : DD

Payable At : GUWAHATI

Bill/PJ No/Order No.	Details	Dr A/C	CC	Amount (Rs)	Amount (Rs)
	Payment of application fee for obtaining authorisation for handling of Hazardous Wastes.	17/0752	59	22500.00	
				Total Rs.	22,500.00

Passed for payment

Received payment with thanks

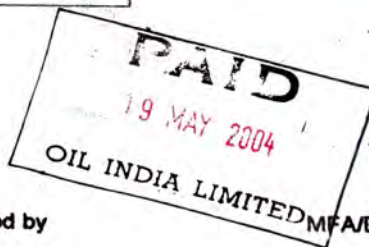
OIL INDIA LIMITED
for RESIDENT CHIEF EXECUTIVE

Type 1

Audited by

Prepared by

Checked by



Passed for payment

[Signature]
MFA/DMFA/Sr. Accounts officer

VALID ONLY IF COMPUTER PRINTED
VALID FOR SIX MONTHS ONLY

की सं. कोड नं.

₹. 50,000/- एवं अधिक के निशान से अधिकारियों द्वारा हस्ताक्षरित होने पर ही वैध है।
INSTRUMENT FOR ₹S. 50,000/- AND OVER IS VALID ONLY WHEN SIGNED BY TWO OFFICERS

आवेदन शाखा कलकत्ता

Tel No.: 03742801660 KEY : TUCMIZ 0 2053

DATE
19/05/2004

आवेदन शाखा कलकत्ता
की सं. कोड नं. 0 2053
की सं. कोड नं. 0 0078
की सं. कोड नं. 1203744770
की सं. कोड नं. 1203

या उनके आदेश पर OR ORDER

NE/TT
NE/OL
NE/TL

TWO	TWO	FIVE	ZERO	ZERO
T'TSD	THSDS	HNDRS	TENS	UNITS

₹. Rs. 22500 Ps00

PAISE ZERO-ONLY
St. No.: 04/008768
KEY: TUCMIZ

AMOUNT BELOW 22500 (22500) RECEIVED

भारतीय स्टेट बैंक
STATE BANK OF INDIA

की सं. कोड नं.

प्राधिकृत हस्ताक्षरकर्ता AUTHORIZED SIGNATORY
(हस्ताक्षर नमूना क्र० / S.S. NO.)

शाखा प्रबंधक / BRANCH MANAGER

(हस्ताक्षर नमूना क्र० / S.S. NO.)

1203

आवेदन शाखा / BRANCH: 0 0078

1203744770

Sanjib Kr. Sarkar
S-9292

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CF(S&E)/SE(S&E) by
pl. keep a record.

SKM
for entry a
record

ज्ञापन / Memorandum

सेवा में / To

Resident Chief Executive
DULIAJAN

से / From

ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्योग)
OIL INDIA LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)
डाक : उदयन विहार / P.O. UDAYAN VIHAR
गुवाहाटी - 781 171 / GUWAHATI - 781 171

ध्यान में / Attention :

Dy. General Manager(S&E)

संदर्भ संख्या/Ref.No..PL/S&E/HWM/133

Date: 31.05.2004

Sub: Authorisation under HWM Rule, 1989

Enclosed please find the following collected from PCBA's Office, Bamunimaidam, Guwahati on the above subject.

01. Authorisation No. WB/OTWA/HW-14/01-02/19-503 of 27.05.2004 for Duliajan field.
02. Authorisation No. WB/OTWA/HW-14/04-05/04-504 of 27.05.2004 for Digboi field
03. Authorisation No. WB/OTWA/HW-14/04-05/04-505 of 27.05.2004 for Moran field

Kindly acknowledge receipt.

(C. C. Bordoloi)
Addl. CEPL(S&E)
For: DGM(PL)

Encl: As stated





POLLUTION CONTROL BOARD

অসম

পলিউশন নিয়ন্ত্রণ বোর্ড

পলিউশন নিয়ন্ত্রণ বোর্ড অসম

ASSAM

No. WB/OTWA/HW-14/01-02/19

Dated Guwahati, the 27th May, 2004

To

The Deputy Commissioner,
Dibrugarh District,
Dibrugarh, Assam



Sub : Grant of Authorisation under Hazardous Wastes (Management & Handling) Rules, 1989 as Amended for Collection, Reception, Treatment, Transport, Storage and Disposal of Hazardous Waste.

Sir,

With reference to above, I have the honour to inform you that under the provisions of Hazardous Waste (Management & Handling) Amended Rules, 1989, Pollution Control Board, Assam has granted authorisation to M/s. Oil India Ltd., Duliajan Oil Field to operate a facility for Collection, Reception, Treatment, Transport, Storage and Disposal of Hazardous Waste.

A copy of authorisation with terms and conditions is enclosed herewith for your kind perusal.

Yours faithfully,

(P.C. BARUAH)

MEMBER SECRETARY

Memo No. WB/OTWA/HW-14/04-05/19-A

Dated Guwahati, the 27th May, 2004

Copy to:

1. Deputy General Manager (Safety & Environment), M/s. Oil India Ltd., Duliajan, Assam - 786602 for information & necessary action. The grant of authorization is valid subject to fulfillment of terms and conditions imposed in the Form 2.
2. Regional Executive Engineer, Regional Office, Dibrugarh for information & necessary action.

(P.C. BARUAH)

MEMBER SECRETARY



POLLUTION CONTROL BOARD, ASSAM

(Department of Environment & Forests - Government of Assam)

অসম প্ৰদূষণ নিয়ন্ত্ৰণ পৰিষদ

(অসম চৰকাৰৰ পৰিবেশ আৰু বন বিভাগ)

No. WB/OTWA/HW-41/04-05/04

Dated Guwahati, the 27th May, 2004

To

The Deputy Commissioner,
Tinsukia District,
Tinsukia, Assam

Sub : Grant of Authorisation under Hazardous Wastes (Management & Handling) Rules, 1989 as Amended for Collection, Reception, Treatment, Transport, Storage and Disposal of Hazardous Waste.

Sir,

With reference to above, I have the honour to inform you that under the provisions of Hazardous Waste (Management & Handling) Amended Rules, 1989, Pollution Control Board, Assam has granted authorisation to M/s. Oil India Ltd., Digboi Oil Field to operate a facility for Collection, Reception, Treatment, Transport, Storage and Disposal of Hazardous Waste.

A copy of authorisation with terms and conditions is enclosed herewith for your kind perusal.



Yours faithfully,

(P.C. BARUAH)
MEMBER SECRETARY

Memo No. WB/OTWA/HW-41/04-05/04-A

Dated Guwahati, the 27th May, 2004

Copy to:

1. Deputy General Manager (Safety & Environment), M/s. Oil India Ltd., Duliagan, Assam - 786602 for information & necessary action. The grant of authorization is valid subject to fulfillment of terms and conditions imposed in the Form 2.
2. Regional Executive Engineer, Regional Office, Dibrugarh for information & necessary action.

(P.C. BARUAH)
MEMBER SECRETARY



POLLUTION CONTROL BOARD, ASSAM

(Department of Environment & Forests - Government of Assam)

অসম প্ৰদূষণ নিয়ন্ত্ৰণ পৰিষদ

(অসম চৰকাৰৰ পৰিবেশ আৰু বন বিভাগ)

No WB/OTWA/HW-42/04-05/04

Dated Guwahati, the 27th May, 2004

To

The Deputy Commissioner,
Dibrugarh District,
Dibrugarh, Assam



Sub : Grant of Authorisation under Hazardous Wastes (Management & Handling) Rules 1989 as Amended for Collection, Reception, Treatment, Transport, Storage and Disposal of Hazardous Waste.

Sir,

With reference to above, I have the honour to inform you that under the provisions of Hazardous Waste (Management & Handling) Amended Rules, 1989, Pollution Control Board, Assam has granted authorisation to M/s. Oil India Ltd., Moran Oil Field to operate a facility for Collection, Reception, Treatment, Transport, Storage and Disposal of Hazardous Waste.

A copy of authorisation with terms and conditions is enclosed herewith for your kind perusal.

Yours faithfully,

(P.C. BARUAH)

MEMBER SECRETARY

Memo No. WB/OTWA/HW-42/04-05/04-A

Dated Guwahati, the 27th May, 2004

Copy to:

1. Deputy General Manager (Safety & Environment), M/s. Oil India Ltd., Duliajan, Assam - 786602 for information & necessary action. The grant of authorization is valid subject to fulfillment of terms and conditions imposed in the Form 2.
2. Regional Executive Engineer, Regional Office, Dibrugarh for information & necessary action.

(P.C. BARUAH)

MEMBER SECRETARY

Oil India Limited

SAFETY & ENVIRONMENT

(A GOVERNMENT OF INDIA ENTERPRISE)
REGISTERED OFFICE : DULIAJAN, ASSAM



P.O. DULIAJAN, DIST. DIBRUGARH
ASSAM, PIN - 786 602
Tel : 0374-2800542 / 2803293
Fax : 0374-2804888
E-mail : safety@oilindia.in

Ref. No. S&E/E/26/748

Date : 22.06.2009

*Regional Executive Engineer,
Regional Office,
Pollution Control Board, Assam
P.O. & Dist. Dibrugarh
Behind ASTC : Chowkidinghee,
Dibrugarh, Assam*

Sub : Application for renewal of authorization for Hazardous Wastes

Dear Sir,

Reference our discussion, we are forwarding the applications duly filled in for renewal of authorization for Hazardous Waste for our following fields.

- (1) Duliajan Field.
- (2) Digboi Field.
- (3) Moran Field.

We request you to renew the authorization for OIL INDIA LTD. at the earliest please.

Thanking you,

Yours faithfully,
OIL INDIA LIMITED

(S. Bora)
Head - S&E
For Resident Chief Executive

Encl : As above.

Copy : Member Secretary,
Pollution Control Board, Assam,
Bamunimaidam, Guwahati-21



BNS/trg.



ऑयल इंडिया लिमिटेड

(भारत सरकार का उद्यम)

Oil India Limited

(A Government of India Enterprise)

Safety & Environment Dept. Head

P.O. DULIAJAN-786602,

ASSAM, INDIA

Phone : 0374-2800542

Fax : 0374-2804888

Email : safety@oilindia.co

Ref. No. S&E/E/ 26/328

Date: 11.03.2013

Regional Executive Engineer,
Regional Office,
Pollution Control Board, Assam
P.O. & Dist. Dibrugarh
Behind ASTC: Chowkidinghee
Dibrugarh, Assam

Sub: Application for renewal of authorization for Hazardous Wastes

Dear Sir,

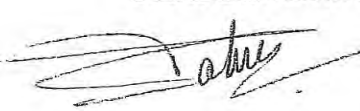
We are forwarding the application duly filled in for renewal of authorization for Hazardous Waste for the following fields.

1. Duliajan Field
2. Digha Field
3. Moran Field

We request you to review the authorization for OIL INDIA LTD. at the earliest please.

Thanking you,


Yours faithfully,
OIL INDIA LIMITED


(Dr. B. N. Sahoo)
Chief Engineer (S&E)
For Head (S&E)
For **Resident Chief Executive**

Encl: As above

Copy: Member Secretary
Pollution Control board, Assam,
Bomunimadian, Guwahati-21

PKG/BD


Received
[Signature]
10/4



ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

Safety & Environment Department
P.O. DULIAJAN-786602,
ASSAM, INDIA
Phone : 0374-2800542
Fax : 0374-2801796
Email : safety@oilindia.in

Ref.No. S&E/E/26/1645

Dated 31.08.2016

Regional Executive Engineer
Pollution Control Board, Assam
Back side of Chowkidinghee Bus Stand,
Dibrugarh.

Sub: Renewal order of Harzardous Waste.

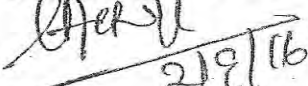
Dear Sir,

Application for renewal of authorization of hazardous waste was submitted in the year 2013, vide our letter No. S&E/E/26/328 dated 11.03.2013 (COPY ENCLOSED).

In this regard, we request you to kindly provide us the said authorization order of hazardous waste at the earliest please so that a copy of the same can be forwarded to the office of MOEF & CC, Regional Office, Shillong required in connection with issue of compliance report pertaining to EC blocks.

Thanking you,

Yours faithfully,
OIL INDIA LIMITED


21/8/16

(A.K.Acharya)
General Manager (HSE)
For Resident Chief Executive

Mbs/pkg

DIGBOI FIELD**SCHEDULE - I**

[See rule 4]

**Common Application for Consent under
Water (Prevention and Control of Pollution) Act, 1974,
Air (Prevention and Control of Pollution) Act, 1981) and Authorization under
Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, as
amended (Renewal)**

No..... Accompanying form in triplicate to be submitted by the applicant. One copy may be retained by the applicant

**Explanatory note for filling in application form for
Consent / Authorization**

- (1) Any applicant knowingly giving incorrect information or suppressing any information pertaining to any of the items of the application shall be liable for punishment as per provisions under the relevant Act.
- (2) The application form shall be submitted at the head-quarter office of the Board at the address given on the first page of the application form or to the respective Zonal or Regional or Sub-Regional office or District Office of the Board/Pollution Control Committee under whose jurisdiction the applicants activity falls.
- (3) The application shall be accompanied by the consent fee in the form of Demand Draft in favour of State Pollution Control Board/Pollution Control Committee.
- (4) For the items marked strike out which is not relevant.
- (5) If any of the items is not relevant to the activity of the applicant, please state 'Not Applicable'
- (6) If the space for reply provided for any item is inadequate, use additional sheets, duly referenced.
- (7) Item 1: Give the name of the person who is authorized by the applicant to transact their business.
- (8) Item 2: Also state the concerned institutions under whose administrative area the unit falls.
- (9) The form shall be accompanied by the relevant documents specified on the last page of the application form.
- (10) Capital Investment - Consent fee is to be paid based on gross fixed capital investment of the unit without depreciation till the date of application. The gross capital investment shall include cost of land, building, plant and machinery without depreciation.

Application form for Consent/Authorization (Renewal)

From:

**HEAD (SAFETY & ENVIRONMENT)
OIL INDIA LIMITED
DULIAJAN, ASSAM, 786602**

To

**MEMBER SECRETARY
POLLUTION CONTROL BOARD, ASSAM
GUWAHATI**

Sir,

We hereby apply for *

(i) Consent to Establish/ Operate/ Renewal of consent under section 25 and 26 of the Water (Prevention and Control of Pollution) Act, 19 74, as amended.

(ii) Consent -to establish/ operate/ renewal of consent under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981, as amended.

(iii) Authorization/ renewal of authorization under rule 5 of the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, as amended (Renewal) as amended in connection with my/our existing/proposed/altered/additional manufacturing/processing activity from the premises as per the details given below.

Part A: General

1.	Name, designation, office address with telephone and fax number of the applicant/ occupier/Industry/ Institution/ Local Body.	:	OIL INDIA LIMITED, DULIAJAN, ASSAM, 786602, FAX: 0374-2800522
2.	(a) Name and location of the industrial unit/ premises for which the application is made. (Give revenue Survey Number/plot number, name of Taluka and District, also telephone and fax number) (b) Details of the planning permission obtained from the local body/Town and Country Planning authority/ metropolitan development authority.	:	Digboi Oil Field which includes all the installations in Digboi area, Hapjan, Makum, Barekuri, Baghjan, Bogapani and other peripheral fields around Digboi oil field. (Disposal pits, OCS, GCS, Drilling activities etc.)

	(c) Name of the local body under whose jurisdiction the unit is located and name of the license issuing authority.	:	
3.	Names, addresses with telephone and fax number of Managing Director/ Managing Partner and officer responsible for matters connected with pollution control and/or hazardous waste disposal.	:	
4.	(a) Are you registered as a small-scale industrial unit ? (b) If yes, give the number and date of registration.	:	
5.	Gross capital investment of the unit without depreciation till the date of application (Cost of building, land, plant and machinery). (To be supported by an affidavit, Annual Report or certificate from a Chartered Accountant. For proposed unit(s), give estimated figure)	:	
6.	If the site is located near sea-shore/river bank/other water bodies; indicate the distance and the name of the water body, if any.	:	
7.	Does the location satisfy the requirements under relevant Central/State Govt. notifications such as Coastal Regulation Zone, Notification on Ecologically Fragile Area, Industrial location policy, etc. If so, give details.	:	
8.	If the site is situated in notified industrial estate, (a) whether effluent collection, treatment and disposal system has been provided by the authority (b) will the applicant utilize the system, if provided (c) if not provided, details of proposed arrangement.	:	
9.	Total plot area, built-up area and area available for the use of treated sewage/trade effluent	:	
10.	Month and year of proposed commissioning of the unit	:	
11.	Number of workers and office staff.	:	
12.	(a) Do you have a residential colony within the premises in respect of which the present application is made? (b) If yes, please state population staying. (c) Indicate its location and distance with reference to plant site.	:	

13.	List of products and by-products manufactured in tonnes/month, kl/month or numbers/month (Give figure corresponding to maximum installed production capacity)	:	/
14.	List of raw materials and process chemicals with annual consumption corresponding to above stated production figures, in tonnes/ month or kl/month or numbers/month.	:	
15.	Description of process of manufacture for each of the products showing input, output, quality and quantity of solid, liquid and gaseous wastes, if any from each unit process. (To be supported by flow sheet and/or material balance).	:	
16.	Water consumption for different uses (ml/day) (i) Industrial cooling, spraying in mine pits or boiler feeds (ii) Domestic purpose (iii) Processing whereby water gets polluted and the pollutants are easily biodegradable and are toxic (iv) Processing whereby water gets polluted and the pollutants are not easily bio-degradable and are toxic (v) Others such as agriculture, gardening etc. (specify) Total	:	/
17.	Source of water supply. Name of authority granting permission if applicable and quantity permitted	:	
18.	Quantity of waste water (effluent) generated (ml/day) (i) Domestic (ii) Industrial	:	
19.	Water budget calculations accounting for difference between water consumption and effluent generated.	:	
20.	Present treatment of sewage/canteen effluent (Give sizes/ capacities of treatment units).	:	
21.	Present treatment of trade effluent (Give sizes/ capacities of treatment units). (A schematic diagram of the treatment	:	

	scheme with inlet/outlet characteristics of each unit operation/process is to be provided. Include details of residue management system (sludges))	:	
22.	(a) Are sewage and trade effluents mixed together? (b) If yes, state at which stage - Whether before, intermittently or after treatment.	:	
23.	Capacity of treated effluents ump, Guard Pond if any.	:	
24.	Mode of disposal of treated effluents, with respective quantity, m ³ /day i) (i) into stream/river (name of river) (ii) into creek/estuary (name of creek/estuary) (iii) into sea (iv) into drain/sewer (owner of sewer) (v) On land for irrigation on owned land/ lease land. Specify cropped area (To be supported by relevant documents) (vi) Quantity of treated effluent reused/ recycled Provide a location map of disposal arrangement indicating the outlet(s) for Sampling	:	
25.	Quality of untreated/treated effluents (Specify pH and concentration of SS, BOD COD and specific pollutants relevant to the industry, TDS to be reported for disposal on land of into stream/river) Enclose a copy of the latest report of analysis from the laboratory approved by State Board/Committee/Central Board/Central Government in the Ministry of Environment & Forests. For proposed unit furnish expected characteristics of the untreated / treated effluent.	:	
26.	Fuel consumption: (a) fuel consumption (TPD) (b) Calorific value (c) Ash content %	:	

	(d) Sulphur content % (e) Other (specify)		
27.	(A) Details of stack(process & fuel): (a) Stack number(s) (b) Attached to (c) Fuel type (d) Fuel quantity (e) Material of construction (f) Shape (round/rectangular) (g) Height (above ground level) (h) Diameter/size, in meters (i) Gas quantity, Nm ³ /hr. (j) Gas temperature, °C (k) Exit gas velocity, m/sec. (l) Control equipment preceding the stack(Attach specifications including residue management systems of each of the control equipment indicating inlet/ outlet concentrations of relevant pollutants) (B) Whether any release of odoriferous compounds such as Mercaptans, Phorate etc. are coming out	:	
28.	Do you have adequate facility for collection of samples of emissions in the form of port holes, platform, ladder etc. as per Central Board Publication "Emission Regulations Part-III" (December 1985).	:	
29.	Quality of treated flue gas emissions and process emissions. (Specify concentration of criteria pollutants and industry/process-specific pollutants stack-wise. Enclose a copy of the latest report of analysis from the approved	:	

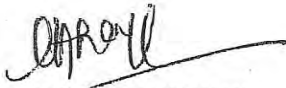
	laboratory by State Board/Central Board/ Central Government in the Ministry of Environment and Forests. For proposed units furnish the expected characteristics of the emission	
30.	(a) Whether the unit is generating hazardous waste as defined in the Hazardous Waste (Management and handling) Rules, 1989, as amended. (b) If so, the category No.	: Yes 2.1, 2.2, 2.3, 3.1, 3.3, 5.1, 5.2, 33.1, 33.2, 33.3 etc
31.	Authorization required for* (i) Collection ✓ (ii) Reception ✓ (iii) Treatment ✓ (iv) Transport ✓ (v) Storage ✓ (vi) Disposal of the hazardous waste ✓	: Earlier authorization No: 1. WB/OTWA/HW-14/04-05/04-504 of 27.05.2004 2. Our application vide letter No. S&E/E/26/748 dated 22.06.2009
32.	Quantity of hazardous waste generated (kg/day) or (mt/month).	: About 500 MT per annum from all above mentioned installations.
33.	Characteristics of the hazardous waste(s). Specify concentration of relevant pollutants. Enclose a copy of the latest report of analysis from the laboratory approved by State Board/Central Board/Central Government in the Ministry of Environment and Forests). For proposed units furnish expected characteristics.	: The hazardous waste consists of waste oil, oily sludge, tank bottom sludge, oil soaked debris etc.
34.	Mode of storage (intermediate or final) (describe area, location and methodology).	: Solid wastes generated from drilling activities are used for land filling. Waste oil is recycled through registered recyclers. Oily sludge is sold to registered parties or subjected to bioremediation. The oily sludge is contained in HDPE lined pits made specifically for the purpose in OIL premises temporarily.
35.	Present treatment of hazardous waste, if any (give type and capacity of treatment units)	:

36.	<p>Quantity of hazardous waste disposed</p> <p>(i) Within the factory</p> <p>(ii) Outside the factory (Specify location and enclose copies of agreement)</p> <p>(iii) Through sale (Enclose documentary proof and copies of agreement)</p> <p>(iv) Outside State/Union Territory, if yes particulars of (i) & (ii) above</p> <p>(v) Other (specify)</p>	:	Residual oily sludge is subjected to bioremediation.
37.	<p>(a) Do you have any proposals to upgrade the present system for treatment and disposal of effluent/ emissions and/or hazardous waste</p> <p>(b) If yes, give the details with time-schedule for the implementation and approximate expenditure to be incurred on it.</p>	:	
38.	Capital and recurring (O&M) expenditure on various aspects of environment protection such as effluent, emission, hazardous waste, solid waste, tree plantation, monitoring, data acquisition etc. (give figures separately for items implemented/to be implemented).	:	
39.	To which of the pollution control equipment, separate meters for recording consumption of electric energy are installed?	:	
40.	Which of the pollution control items are connected to D.G. set (captive power source) to ensue their running in the event of normal power failure?	:	
41.	Nature, quantity and method of disposal of non-hazardous solid waste generated separately from the process of manufacture and waste treatment. (Give details of area/capacity available in applicant's land)	:	
42.	Hazardous chemicals as defined under the Manufacture, Storage and Import of Hazardous Chemicals, Rules, 1989 (a) T :St of HC stored (imported & indigenous) (b) Details of isolated storage, if any (c) Details of emergency preparedness	:	

	plans (on- site/ off- site) prepared.		
43.	Brief details of tree plantation/ green belt development within applicant's premises.	:	
44.	Information of schemes for waste minimization, resource recovery and recycling - implemented and to be implemented, separately.	:	
45.	Any other additional information that the applicant desires to give.	:	

- 51 We further declare that the information furnished above is correct to the best of my/our knowledge.
- 52 We hereby submit that in case of any change from what is stated in this application in respect of raw materials, products, process of manufacture and treatment and/or disposal of effluent, emissions, hazardous wastes etc. in quality and quantity; a fresh application for Consent/Authorization shall be made and until the grant of fresh Consent/Authorization no change shall be made.
- 53 We undertake to furnish any other information within one month of its being called by the Board/ Committee.
- 54 We agree to submit to the Board an application for renewal of consent/authorization in two months in advance before the date of expiry of the consent/authorization validity period.
- 55 The necessary fee for consent/authorization as applicable will be paid shortly.

Yours faithfully,

Signature 

Name : SRI A. K. ACHARYA
Designation : HEAD - S&E
For RESIDENT CHIEF EXECUTIVE
OIL INDIA LIMITED

BNS/pkg



Pollution Control Board

Assam

AUTHORISATION BY STATE POLLUTION CONTROL BOARD TO THE OCCUPIERS, RECYCLERS, REPROCESSORS, REUSERS, USER AND OPERATIONS OF DISPOSAL FACILITIES

UBIN : AA01603/AAACO2352C/05/2017

UAIN : PCB/F24/DI/000002/06/2017

Number of authorisation : NA

Date of Issue : 15-06-2017

AJAYA KUMAR ACHARYA of OIL INDIA LTD is hereby granted an authorisation based on the enclosed signed inspection report for generation, collection, reception, storage, transport, reuse, recycling, recovery, pre-processing, co-processing, utilisation, treatment, disposal or any other use of hazardous or other wastes or both on the premises situated at OIL INDIA LIMITED, SAFETY & ENVIRONMENT DEPARTMENT , PERCY EVANS ROAD , DIBRUGARH .

Details of Authorisation

Sl No	Category of Hazardous Waste as per the Schedules I, II and III of these rules	Authorised mode of disposal or recycling or utilisation or co-processing, etc.	Quantity(ton/annum)
1	NA	NA	NA
2	NA	NA	NA
3	NA	NA	NA

The authorisation shall be valid for a period of 5(five) years from the date of issue of this certificate.

Place : Guwahati
Date : 15-06-2017

Authorized Signatory



Pollution Control Board

Assam

A. General conditions of authorisation :

- The authorised person shall comply with the provisions of the Environment (Protection) Act,1986, and the rules made there under.
- The authorisation or its renewal shall be produced for inspection at the request of an officer authorised by the State Pollution Control Board.
- The person authorised shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this authorisation.
- Any unauthorised change in personnel, equipment or working conditions as mentioned in the application by the person authorised shall constitute a breach of his authorisation.
- The person authorised shall implement Emergency Response Procedure (ERP) for which this authorisation is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc, and their possible impacts and also carry out mock drill in this regard at regular interval of time.
- The person authorised shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty".
- It is the duty of the authorised person to take prior permission of the State Pollution Control Board to close down the facility.
- The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
- The record of consumption and fate of the imported hazardous and other wastes shall be maintained.
- The hazardous and other waste which gets generated during recycling or reuse or recovery or pre-processing or utilisation of imported hazardous or other wastes shall be treated disposed of as per specific conditions of authorisation.
- The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
- An application for the renewal of an authorisation shall be made as laid down under these Rules.
- Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
- Annual return shall be filed by June 30th for the period ensuring 31st March of the year.

B. Specific Conditions (Industry Specific) :

- NA



ऑयल इंडिया लिमिटेड

(भारत सरकार का उद्यम)

Oil India Limited

(A Government of India Enterprise)

Safety & Environment Department

P.O. DULIAJAN-786602,

ASSAM, INDIA

Phone : 0374-2800542

Fax : 0374-2801796

Email: safety@oilindia.in

Ref No. S&E/E/20/663

Date: 24.05.2022

**Regional Executive Engineer
Pollution Control Board, Assam
Back Side of ASTC Bus Station
Chowkidinghee, Dibrugarh**

Sub: Submission of Demand Draft (DD) against Renewal application for Authorization of Generation, Collection, Storage, Transportation, Recycling, Recovery, Utilization, Treatment, Disposal, Incineration of Hazardous Waste under HWM rules-2016.

Sir,

Reference to the above subject, we are herewith submitting the Original demand draft (01 No.) against the Renewal of Authorization for Generation, Collection, Storage, Transportation, Recycling, Recovery, Utilization, Treatment, Disposal of Hazardous Waste under Hazardous and Other waste (Management and Transboundary Movement) Rule-2016 for the below mentioned online application. The details of demand draft submitted against the online application is given as under.

S.No	Name of Facility	Online Application No.	Fee paid (Rupees)	D.D No	D.D date
01	Oil India Limited	App. No. 1292415	Rs 50000.00	007863	16.05.2022

Kindly acknowledge the receipt of the above.

Thanking you,

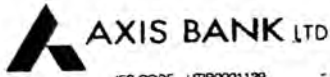


Yours faithfully
Oil India Limited

(G.G Rasu)
DGM (HSE)

For Chief General Manager (HSE)
For **Resident Chief Executive**

Encl: Original Demand Draft.
Copy: File



IFS CODE - UTBI0001129

ISSUING BRANCH

VALID FOR THREE MONTHS FROM THE DATE OF ISSUE

DATE 16 05 20 22
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or order / या उनके आदेश पर

On Demand Pay

A/C PAYEE ONLY

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मार्गे जाने पर

Rupees

MEMBER SECRETARY POLLUTION CONTROL BOARD ASSAM

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अदा करें



50000.00

Fifty Thousand Only

DD.
Sr.No.

7863

Purchaser: OIL INDIA LTD

1129012100105 Payable at Par (B2K)
DRAWEE BANK AND BRANCH CODE NO

Dutta
GITANJALI DUTTA
OPERATIONS HEAD

SS NO - 20385
EMP - 97932
AXIS BANK LTD.

*****50,000.00
FOR VALUE RECEIVED

Manoj Paul
Manojit Paul
AVP & Branch Head
SS No.: 18909
Emp 185940
Axis Bank Ltd.
Dullajan Branch

Please sign books

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Member Technologies Limited - New Mumbai / CTR-2016-28-05-2021

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APPLICATION NO: 1292415

FORM 1
[See Rules 6(1)]

Application Required For Grant/Renewal Of Authorisation For Generation Or Collection Or Storage Or Transport Or Reception Or Recycling Or Reuse Or Recovery Or Pre Processing Or Co- Processing Or Utilisation Or Treatment Or Disposal Of Hazardous And Other Waste

Part A: General(to be filled by all)

1. (a)	Name and address of the unit and location of facility:	OIL INDIA LIMITED Percy Evans Road
(b)	Name of the Occupier of the facility or operator of disposal facility with designation, Tel, Fax and e-mail:	SARBESWAR BASUMATARY/Chief General Manager HSE/9435038155/safety@oilindia.in
(c)	Authorisation required for(Please tick mark appropriate activity or activities:)	Generation,Collection,Storage,Transportation,Recycling,Recovery,Utilisation,Treatment,Disposal,Incineration
(d)	In case of renewal of authorization previous authorization numbers and dates and provide copies of annual returns of last three including the compliance reports with respect to the conditions of Prior Environmental Clearance, wherever applicable:)	Attached
2	Nature and quantity of Hazardous waste handled in T/Annum (or) KL/Annum	

	Name of Process	Name of Hazardous Waste (Category No)	Quantity	Waste Type	Waste Storage	Waste Disposal	Source of generation of waste	Physical status	Quantity stored at any time	Quantity accumulated as on 31st March
	2. Crude oil and natural gas production	2.2 Sludge containing oil	4000 T/Annunum	Recyclable	MS Drums	Recovery and Reuse-Captive	Tank Bottom Sludge	Oily	2000	4000 T
	5. Industrial operations using mineral or synthetic oil as lubricant in hydraulic systems or other applications	5.1 Used or spent oil	500 KL/Annunum	Recyclable	MS Drums	Recovery and Reuse-Authorized recyclers	Machines & Equipments	Oily	250	500 KL
	33. Handling of hazardous chemicals and wastes	33.1 Empty barrels/c containers /liners contaminated with hazardous chemicals/wastes	15000 Number	Recyclable	Stored under shed with concrete floor.	Disposed through sale with registered recycler.	Empty discarded containers of used chemicals and engine oils.	Solid	7000	15000 Number
	33. Handling of hazardous chemicals and wastes	33.2 Contaminated cotton rags or other cleaning materials	300 T/Annunum	Incinerable	Concrete sump under shed and MS Drums	Bioremediation	Cleaning activities	Solid	150	300 T
	Purification and treatment of exhaust air, water & waste water from the treatment plants (CETP's)	Chemical sludge from waste water treatment	7000 T/Annunum	Landfillable	Concrete sump with shed.	Captive Landfilling	ETP	Semi solid	3000	7000 T
3 a)	Year of commissioning and commencement of Production?									
b)	Whether the industry works 1 shift/2 shifts/round the clock?					one shifts				

4	<p>Provide copy of the Emergency Response Plan (ERP) which should address procedures for dealing with emergency situations (viz. Spillage or release or fire) as specified in the guidelines of Central Pollution Control Board. Such ERP shall comprise the following, but not limited to:</p> <ul style="list-style-type: none"> • Containing and controlling incidents so as to minimise the effects and to limit danger to the persons, environment and property; • Implementing the measures necessary to protect persons and the environment; • Description of the actions which should be taken to control the conditions at events and to limit their consequences, including a description of the safety equipment and resources available; • Arrangements for training staff in the duties which they are expected to perform; • Arrangements for informing concerned authorities and emergency services; and • Arrangements for providing assistance with off-site mitigatory action. <p>(To be attached separately)</p>	Attached
5	<p>Provide undertaking or declaration to comply with all provisions including the scope of submitting bank guarantee in the event of spillage, leakage or fire while handling the hazardous and other waste (To be attached separately)</p>	Attached

Part B: To be filled by hazardous waste generators

a	Products and by-products manufactured (names and product wise quantity per annum):	Crude Oil, Natural Gas and LPG
b	Process description including process flow sheet indicating Inputs and Outputs (raw materials, chemicals, products, by-products,wastes, emissions, wastewater etc.) Please attach separate sheets:)	Attached
c)	Characterstics(waste-wise) and Quantic of waste generation per annum:	

Schedule	Name of Process	Name of Hazardous Waste (Category No)	Quantity	Characteristics of each waste	The details of utilization with in the plants such as Reuse/ Recycling/ Recovery/ Reprocessing etc	If not utilised within the plant, provide details of what is done with this waste	Details of arrangements for transportation to actual users/ TSDF	Details of the environmental safeguards and environmental facilities provided for safe handling
Schedule I	2. Crude oil and natural gas production	2.2 Sludge containing oil	4000 T/Annunum	Oily and hazardous in nature	Recover and Recycled	NA	Through Tankers and Bowsers	Handled with PPE and stored in MS Drums
Schedule I	5. Industrial operations using mineral or synthetic oil as lubricant in hydraulic systems or other applications	5.1 Used or spent oil	500 KL/Annunum	Oily and hazardous in nature	NA	Sent to registered recycler	Through Tankers	Handled with PPE and stored in MS Drums
Schedule I	33. Handling of hazardous chemicals and wastes	33.1 Empty barrels/c ontainers /liners contaminated with hazardous chemicals/wastes	15000 Number	Solid and hazardous in nature	NA	Sent to registered recycler	Through Trucks	Handled with PPE
Schedule I	33. Handling of hazardous chemicals and wastes	33.2 Contaminated cotton rags or other cleaning materials	300 T/Annunum	Solid and hazardous in nature	NA	Bioremediated through Authorized party	Through Trucks	Handled with PPE and stored in MS Drums

	Schedule I	Purification and treatment of exhaust air, water & waste water from the treatment plants (CETP's)	Chemical sludge from waste water treatment	7000 T/Annum	Semi solid and hazardous in nature	Captive landfilling	NA	NA	Handled with PPE and stored in polybags	
d)	Hazardous and other wastes generated from storage of hazardous chemicals as defined under the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989.						NA			

Part C: To be filled by Treatment, storage and disposal facility operators

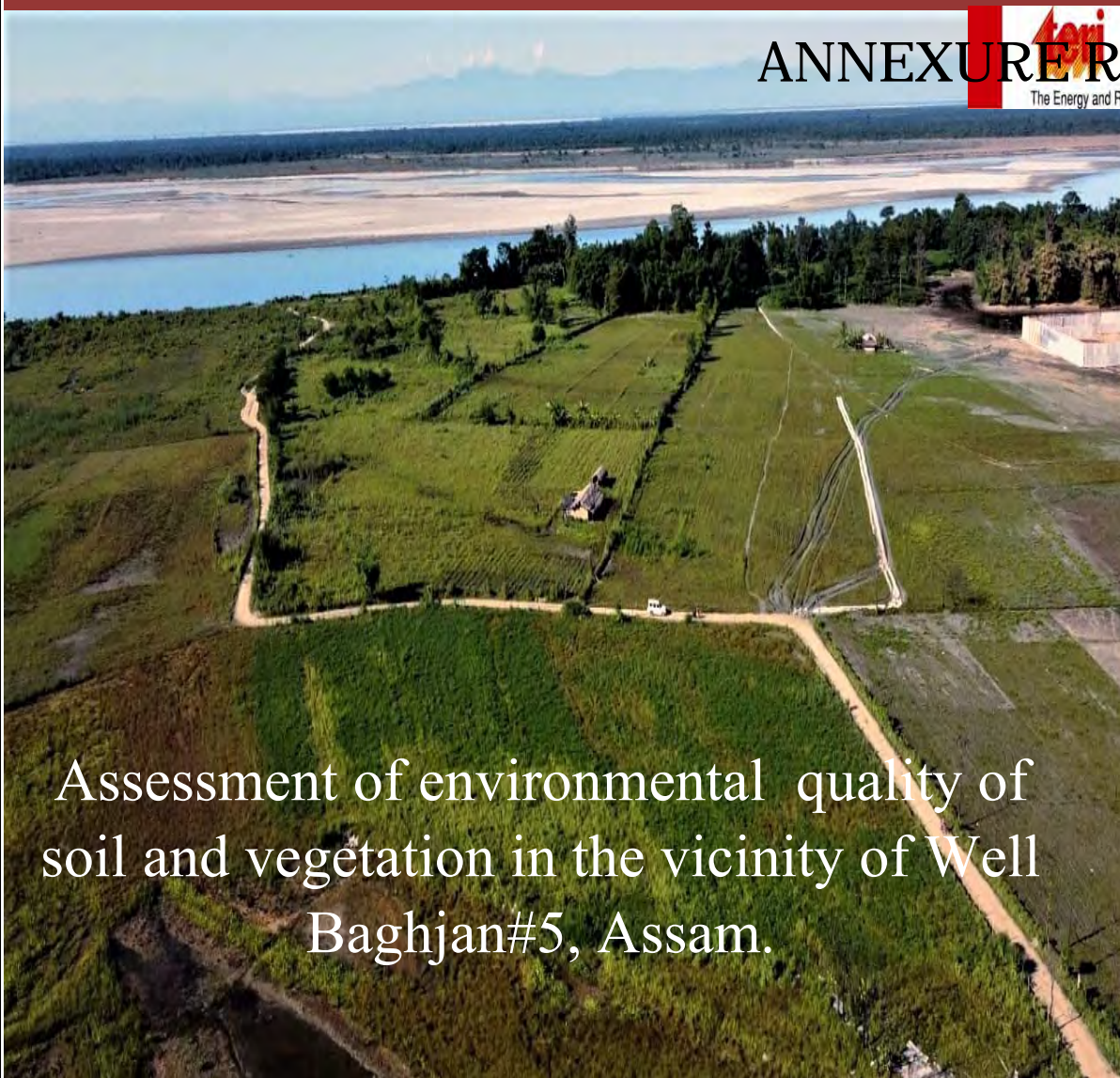
1)	Provide details of the facility including:		
i)	Location of site with layout map:	Percy Evans Road	
ii)	Safe storage of the waste and storage capacity		
iii)	Detail of Safe storage of the waste and storage capacity:		
	Particulars of Waste	Capacity	Unit
iv)	The treatment processes and their capacities		
v)	Secured Landfills		
vi)	Incineration, if any		
vii)	Leachate Collection and Treatment System		
viii)	Fire Fighting Systems		
ix)	Environmental management plan including monitoring		
ix)	Arrangement for transportation of waste from generators		
2)	Provide details of Any other activities undertaken at the Treatment, storage and disposal facility site.	Not Attached	
3)	Attach a Copy of prior Environmental Clearance	Not Attached	

Part D: To be filled by recyclers or pre-processors or co-processors or users of hazardous or other wastes

1.	Nature and quantity of different wastes received per annum from domestic sources or imported or both:		
	Hazardous Wastes Type	Quantity	Source (Domestic/Imported)

2.	Installed capacity as per registration issued by the District Industries Centre or any other authorised Government agency. Provide copy:	Not Attached
3.	Provide details of secured storage of wastes including the storage capacity	Not Attached
4.	Process description including process flow sheet indicating equipment details, inputs and outputs (input wastes, chemicals, products, by-products, waste generated, emissions, waste water, etc.) Attach separate sheets:	Not Attached
5.	Provide details of end users of products or by-products	Not Attached
6.	Provide details of pollution control systems such as Effluent Treatment Plant, scrubbers, etc. including mode of disposal of waste	Not Attached
7.	Provide details of occupational health and safety measures	
8.	Has the facility been set up as per Central Pollution Control Board guidelines? If yes, provide a report on the compliance with the guidelines:	,,, Not Attached
9.	Arrangements for transportation of waste to the facility	

Place :Percy Evans Road Date :21/05/2022	Yours faithfully, Name :SARBESWAR BASUMATARY Designation :Chief General Manager HSE
---	---



Assessment of environmental quality of soil and vegetation in the vicinity of Well Baghjan#5, Assam.

2022



Prepared for
Oil India Limited, Duliajan, Assam.





Report No. 2021BR04

February 21
2022

FINAL REPORT


Assessment of Environmental quality of soil and vegetation in the vicinity of well Baghjan 5, Oil India Ltd., Duliajan, Assam

Prepared for

Oil India Ltd., Duliajan, Assam

Prepared by

TERI, Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi 110 003, India
Tel.: +91 11 2468 2100 or 2468 2111 | Fax: +91 11 2468 2144 or 2468 2145
Email: veerac@teri.res.in | Web: www.teriin.org

 Assessment of Environmental quality of soil & vegetation in the vicinity of well Baghjan 5, Oil India Ltd., Duliajan, Assam

THE TEAM TERI

Dr. Banwari Lal
Dr. Suneel Pandey
Dr. Veeranna Channashettar
Dr. K. Nanthakumar
Mr. Tarun Sharma
Mr. Vinod Kumar

FOR CONTACT

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Abbreviation

BDL	- Below Detection Limit
BLQ	- Below Limit of Quantification
BOD	- Biological Oxygen Demand
BTEX	- Benzene, Toluene, Ethylbenzene and Xylene
CCME	- Canadian Council of Ministers of the Environment
CEC	- Cation exchange capacity
COD	- Chemical Oxygen Demand
CPCB	- Central Pollution Control Board
DL	- Detection Limit
DSNP	- Dibru Saikhowa National Park
DSRC	- Dutch Soil Remediation Circular
IS	- Indian Standards
LOQ	- Limit of Quantification
Mg/Kg	- Milligram/Killogram
MMB	- Maguri Motapung Beel
MMSCM	- Million Standard Cubic Meter
MoEF &CC	- Ministry of Environment, Forest and Climate Change
NABL	- National Accreditation Board for Testing and Calibration Laboratories
NW	- North West
PAH	- Polycyclic Aromatic Hydrocarbons
SAR	- Sodium adsorption ratio
SE	- South East
SW	- South West
TDS	- Total Dissolved Solids
TOC	- Total organic carbon
TPH	- Total Petroleum Hydrocarbon
TSS	- Total Suspended Solids
USEPA	- U.S. Environmental Protection Agency
VOC	- Volatile Organic Carbon

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1. Executive Summary

Oil India Limited (OIL) is engaged in the business of exploration, development and production of crude oil and natural gas, transportation of crude oil and production of LPG. The Baghjan Oil & Gas field of Oil India Limited is located in Tinsukia district, Assam. The Baghjan BGN natural gas Well No. 5 is located south-west of Baghjan village and north-west of Dhakuwal in Barekuri where drilling was done up to 4,045 metres for natural gas production. The Baghjan Well-5 (BGN-5) was drilled in the year 2006 and completed in 2007 and actual production of gas and condensate started in September 2015. The work over operation was carried out on BGN-5 to enhance the natural gas production by the drilling subcontractor M/s John Energy Ltd. On 27th May 2020, the gas well blowout was reported with leakage of condensate followed by raging firestorm in gas well no.5 of Baghjan oilfield. Spread of natural gas (NG) and natural gas condensate (NGC) in the surrounding environment was reported after blowout incident. TERI has been invited to undertake the assessment of environmental quality of soil and vegetation in the vicinity of Baghjan well #5, Oil India Ltd., Duliajan.

TERI has undertaken environmental assessment and sampling activities during the period 30th November, 2021 to 4th December, 2021. The initial reconnaissance survey has been conducted on 30th November, 2021 along with Oil India officials to understand the environmental conditions and selection of sampling locations. The soil, sediment, water and vegetation sampling was carried out from 01st December, 2021 to 4th December, 2021.

The standard field log sheet has been used to record the location coordinates and other field conditions. The field survey consists of interaction with stakeholders, farmers and officials to know the physical impact due to BGN gas well blowout incident. The field survey includes information on observation of visible contaminations, type of vegetation, agricultural farming practice, cattle grazing, stagnant, ground water sources sampling, vegetation sampling, soil profile and distance from BGN well#5. The detailed sampling has been carried out from 2 km radius covering BGN well #5, agricultural field, biodiversity hot spots, wet land and National Park. The unique biodiversity hotspot called Dibru Saikhowa National Park (DSNP) and Maguri Motapung Beel are also included in this study. TERI has carry out the detailed mapping of environmental impact including impact on vegetation, water and soil environment due to Baghjan#5 incident. The type of samples include soil, sediment, water (surface water and ground water), plant/vegetation biomass and fish. All the sampling process has been carried out as per the standard sampling guidelines and analyzed as per the Indian and international standard methods. The soil samples have been collected from 0-30 cm depth using hand augurs. The surface litter at the sampling spot has been removed and soil auger is used to plough the soil up to 30 cm. Each composite sample is a mixture of 8 random grab subsamples at every site selected for sample collection. The collected samples has been preserved and transported to NABL and MOEF & CC accredited laboratory for the analysis. Similarly the representative plant samples are collected from different locations within 2 km radius which includes grass land, agricultural field, aquatic plant species, food crops and vegetables. One representative fish sample also collected and analyzed to assess the accumulation of TPH, heavy metals and PAHs. This report is based on the findings from field visit, sample analysis, baseline details on contaminant of concern, any visible hazardous waste/material and suggest measures to

manage the contamination due to fire event at Baghjan Well #5. As a quality control, the sampling activities and sampling pits have been tagged with photos and videos.

The field survey, sample analysis of soil, sediment, water (groundwater and surface water), vegetation/plant and fish revealed following outcomes. The maximum TPH concentration of 2425.6 mg/kg was reported in the soil sample collected near BGN#5 within 550 m distance. The minimum TPH concentration of 173.2 mg/kg was reported in southeast side, Maguri Motapung Beel located 2.56 km away from the BGN well#5. TPH Concentration Limit for waste to be hazardous is 5,000 mg/kg as per Hazardous waste management rules, 2016, CPCB and Dutch Soil Remediation Circular, 2013). All the collected soil samples showed the TPH concentration within the remediation standard guideline range of <5000 mg/kg. Among 17 soil samples collected from different locations, South west zone of Maguri Beel sample showed trace level of PAH Fluoranthene (0.15 mg/kg) and Pyrene (0.11 mg/kg). Remaining all other samples, the PAH level was below detectable limit. The BTEX concentration was also below detection limit in all tested soil samples.

The **surface and ground water** quality of water samples from selected location within 2 km radius was assessed to know the impact of BGN#5 blowout. The parameters includes colour, odour, pH, Turbidity, Electrical conductivity, total dissolved solids, Total suspended solids, dissolved oxygen, BOD, COD, total hardness, total alkalinity, oil and grease, ammoniacal nitrogen, chloride, calcium, magnesium, fluoride, phenolic compounds, copper, zinc, nickel, iron, total chromium, chromium (as Cr⁶⁺), lead, sulphide, sulphate, cadmium and polycyclic aromatic hydrocarbons (as PAH). The oil & grease, PAH and heavy metals concentration were below the detection limit. The pH, electrical conductivity, TDS, TSS, Total hardness, chloride, sulphide and sulphate were within the acceptable limit of IS: 10500, 2012 drinking water standard. The sampling area was rich biodiversity and agricultural field with high groundwater table leads to good quality of water table in the region. The metallic salts and heavy metals such as Zn, Ni, Cr, Cr (⁶⁺), Pb and Cr were found to be below detection limits in all the tested water sample showed that the absence of pollutants plume in the ground water ecosystem. The parameters like total phenolic compounds found to be more than the permissible limit prescribed in IS 10500:2012 which may be due to pecculation from natural sources of phenols to aquatic systems include decomposition of aquatic vegetation.

One representative **fish sample** has been collected from Maguri Motapung Beel and analyzed for the Heavy metals, PAH and BTEX. The analysis results shows that there is no accumulation of PAH, BTEX and tested heavy metals like cadmium, lead, mercury, nickel and hexavalent chromium. There is no accumulation of TPH and total PAH in the analyzed **plant biomass**.

2. INTRODUCTION

2.1 Background

Oil India Limited (OIL) is a premier Indian Oil Company engaged in the business of exploration, development and production of crude oil and natural. The Greater Chandmari Fields, located approximately 25 kilometres northeast of the Naharkatia field covering an aggregate area of 20 square kilometres, the Baghjan oil field along with the Berekuri and South Chandmari fields have been engaged in active oil production. The Baghjan Oil and natural gas field of Oil India Limited is located in Itakhuli Revenue Blocks of Doomdooma sub-district, Tinsukia district, Assam. The Baghjan BGR natural gas Well No. 5 is located south-west of Baghjan village and north-west of Dhakuwal in Berekuri where drilling was done up to 4,045 metres for natural gas. The cumulative production of BGN-5 up to March 2020 was 191.83 million standard cubic meter (MMSCM) of gas and 44,180 m³ of condensate. On April 19, 2020 Oil has carried out the work over to enhance the gas production and during the operation the blowout occurred. On 27th May 2020, the gas well blowout was reported with leakage of condensate followed by raging firestorm at gas well no.5 of Baghjan oilfield (Fig.1). The blowout well has been capped and blowout was controlled in December, 2020.

The spread of natural gas, condensate and gaseous pollutants has been released in surrounding environment around BGN#5. Gas well accidents may lead to loss of vegetation and soil health. Hence, it is important to study the impact of gas well blowout on the land including crop fields, grasslands and swamps vegetation of surrounding vicinity area. The unique biodiversity hotspot called Dibru Saikhowa National Park (DSNP) and Maguri Motapung Beel also located with 1.0 km of Baghjan incident point.



Fig.1 Satellite imagery of oil well site before and after the blow out. The impact area is in red square. Source: Wildlife Institute of India

The present study was undertaken by TERI to assess the Environmental damage caused by OIL's Baghjan#5 Blowout incident. The environmental assessment and monitoring study was focused to study the severity of pollutants release in and around vicinity area of blowout incident site including Dibru Saikhowa National Park and Maguri-Motapung Wetland.

The initial reconnaissance survey was conducted by the study team to understand the study area and sampling requirements. The detailed land, water and biodiversity components has been assessed and analyzed to identify the area of impact and required mitigation measures after blowout and capping of BGN#5. After reconnaissance field visit and discussion with OIL team, the field level assessment and sample collection was carried out during November 30, 2021 to December 4, 2021.

2.2 BGN well # 5

The Baghjan Well # 5 (BGN-5) is located in Baghjan Gaon, Hapjan Block, Doomdooma Sub-District, in Tinsukia District of Assam. The geographical coordinate of the well site is 27°35'46.01"N; 95°22'52.0"E. The region remained more agrarian with higher share of agriculture in domestic product.

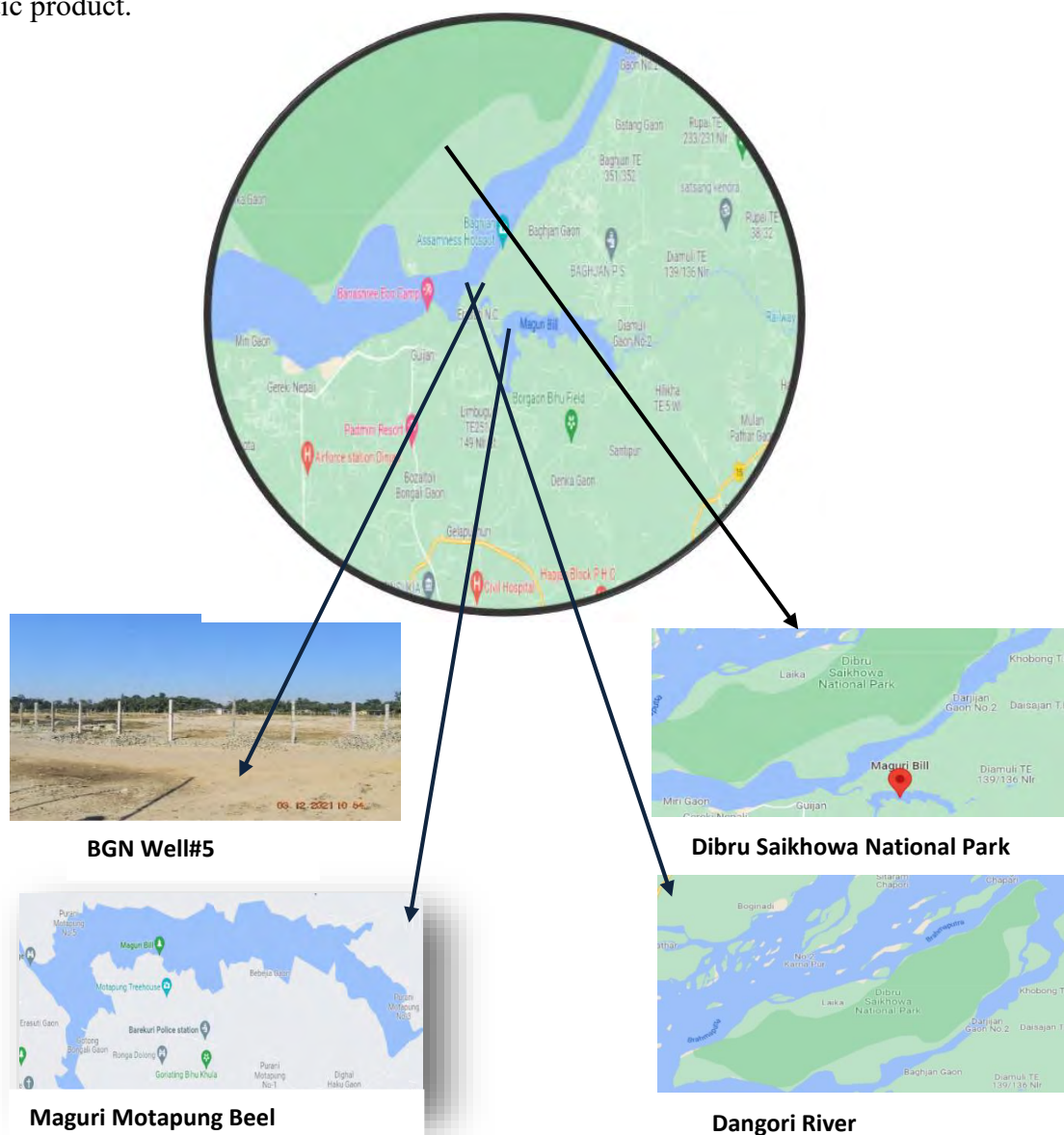


Fig 2: Study area description

2.3 Surrounding area

Abundance of monsoon precipitation in the region and the mountains surrounding enabled the intensive farming activities in the fertile river valleys. The Baghjan oil and gas field is located in the Upper Brahmaputra flood plains covering flood plains, river, wetland including important biodiversity reserve called Dibru-Saikhowa National Park and Biosphere Reserve situated within 1 km radius. The Maguri-Motapung Beel, another important wetland and lake located near Dibru-Saikhowa National Park which serve as natural home to wildlife. The Dangori River which is a habitat for the Gangetic River Dolphin. The tributaries of Bramabuthra rivers including Dangori River and Dibru River situated within 2 km radius. The Baghjan natural gas well surroundings also covered with numerous rich grasslands, tea estates, agricultural fields, homestead tea garden and settlement area. The other ecological habitats Bherjan Borjan Podumoni Wildlife Sanctuary (BBPWLS) is located outside the 5 km radius area of BGN-5.

2.3.1 Dibru-Saikhowa National Park (DSNP)

The Dibru-Saikhowa National Park is designated as Biosphere Reserve in July 1997 with an area of 765 km² (295 sq mi), including a core area of 340 km² (130 sq mi) and a buffer zone of 425 km² (164 sq mi). The BGN-5 well is located within 5.0 km from DSNP and there are 38 revenue villages in the buffer zone. The park is bounded by the Brahmaputra and Lohit Rivers in the north and Dibru River in the south. It mainly consists of moist mixed semi-evergreen forests, mixed deciduous forests, canebrakes and alluvial grasslands. It is the largest salix swamp forest in north-eastern India. Dangori river also part of DSNP which is habitat for Gangetic River Dolphin. The national park is about 35.84% moist mixed forest, 9.50% degraded forest and 21.25% grassland. The DSNP also conserve the habitat of the rare white-winged wood duck, the park is also home to other rare creatures such as water buffalo, black-breasted parrotbill, tiger and capped langur.

2.3.2 Maguri-Motapung Beel (MMB)

Maguri Motapung Beel is 2.0 km from the BGN well #5 on the southern side. MMB is located near Dibru National Park formed from Dibru river from the eastern side. Maguri Motapung Beel is located in the south bank of the Dibru River and it connects Dibru River through a small channel and finally meets Brahmaputra River. There are six villages around the beel such as Baghjan Gaon, Natun Gaon, Gotong Gaon, Purani Motapung, Nya-Motapung Gaon and Dhelakhat Gaon. The MMB consist of a wetland ecosystem and grassland area. Maguri Motapung Beel is a natural habitat to many varieties of birds. The lake is an important habitat for over 110 resident and migratory bird species. The Beel is rich wetland and grassland ecosystem in the region. The wetland is ecologically important with grassland mammals, 283 species of birds⁸ and 48 species⁹ of fish¹⁰. This is an important habitat for migratory birds including eight listed as threatened on the IUCN Red List, such as the Swamp grass babbler, the ferruginous duck, the white-winged wood duck and the falcated duck.

2.3.3. Agricultural area

Tea is the most important crop in Assam and around 2000 hectares under tea cultivation in Tinsukia circle. Many of the tea estates and homestead tea gardens located near BGN well # 5. There are few tea processing units in the region. Other agricultural crops include batches of Paddy, vegetable and Betel nut trees were planted in the homestead tea garden areas. Kharif crops like paddy usually sown at the beginning of the first rains during south-west monsoon season, and they are harvested at the end of monsoon season during November. The batches of vegetables are also grown in surrounding area.

2.3.4 Aquatic Environment in the surrounding system

River Brahmaputra is main source of water for irrigation in the region. The tributary Dangori River Dibru River are important water body in this area. Doomdooma river meets with Dibru near Doomdooma town and proceeds further towards west. Created a beel named Maguri Beel at the low lying area of Tinsukia district and then falls to Lohit River, which ultimately formed Brahmaputra. The study area is comes under high rainfall region with heavy monsoon leads to overflowing and flood in every year. Climate and Micro-meteorology of study area experiences a humid and warm sub-tropical climate throughout the year except for cold winter in December to February. The rivers and wetland support a rich biodiversity and agricultural activities. Soil of Brahmaputra valley of which the Field is a part, is characterized by the presence of fertile alluvial soil.

3. Literature Review

Effect of gas well fire accident on Environmental quality of soil, water, vegetation and animals/humans. Oil and Gas contamination from drilling processes creates problems that disrupt the lives of people living in close proximity to oil camps, wells, pumping stations, and pipelines. In addition, oil contamination creates hazards to the local environment. People living on oil-rich sites around the world are subjected to contamination of drinking water, top soil, and livestock due to toxic pollution that can result from the oil extraction process. In some contaminated sites, serious illnesses resulting from exposure have been documented. Before the introduction of petrochemical industries, environments around the world that sat upon large oil reserves supported healthy human life and vibrant ecosystems. Oil contamination from drilling processes, however, has adversely affected the people living in these areas by polluting the environment around them. The water, soil and air have been severely tainted by petroleum pollutants. As a result, wildlife, livestock, and humans have been sickened. Oil exploitation can lead to contamination of environments, which can have effects on human/animal health (Whitman, Thyden and Olivia Carol Shepherd, 2010).

In addition to physical effects, economic stress affects the psychological health of the individuals living in polluted areas. A number of investigations have focused on specific ailments noted in particular contaminated sites (Jernelov, San Sebastian *et al.*, UNDP). There are many incidents in the past which clearly effects humans/animals and environments surrounding oil and gas wells. Some of the major oil and gas fires are: Deepwater Horizon, Ecuador, Exxon-Valdez, Kuwait, Nigeria and Assam oil gas fire.

The effects of the Kuwaiti oil well fires

At the end of the Gulf War, more than 600 Kuwaiti oil wells and several pools of spilled oil were left burning after being ignited by retreating Iraqi troops. Huge, dramatic plumes of billowing smoke from these fires rose high into the atmosphere.

The health effects believed to be associated with petrochemicals in Kuwait varied greatly due to the wide range in possible exposure (Abramson *et al.*, 2004). The oil contamination, occurring in the water, on land, and in air, affected different aspects of people's health. As the crude oil wells burned, they released a host of toxic chemicals into the atmosphere. High levels of particulate matter were found in air samples. Husain, (1994), reveals that chronic and probably irreversible respiratory disorders result from long-term exposure to these contaminants. Kuwait's oil is characterized as sour crude, containing high levels of sulfur. As a result, when ignited, the oil is much more toxic than its low sulfur containing counterpart known as sweet crude. Human health and the vegetation of the area were potentially affected as reported by Husain, (1998), who says that the burning wells produced large amounts of toxic gases including sulfur dioxide (SO₂), carbon monoxide (CO), hydrogen sulfide (H₂S), carbon dioxide (CO₂), along with the oxides of nitrogen (NO(x)) as well as particulates containing partially burned hydrocarbons and metals.

Deepwater Horizon oil spill, environmental disaster, Gulf of Mexico (2010)

Deepwater Horizon oil spill, also called Gulf of Mexico oil spill, largest marine oil spill in history, caused by an April 20, 2010, explosion on the Deepwater Horizon oil rig—located in the Gulf of Mexico, approximately 41 miles (66 km) off the coast of Louisiana—and its subsequent sinking on April 22.

Thousands of birds, mammals, and sea turtles were plastered with leaked oil. There was speculation that a spike in cetacean strandings and deaths that was recorded by NOAA beginning in February

2010 was further exacerbated by the spill. Typical causes of such widespread fatalities, including morbillivirus and toxins from red tides, were ruled out, and there was an unusual incidence of Brucella infection in stranded dolphins, leading researchers to suspect that contaminants from the spill had made cetaceans more vulnerable to other environmental dangers. A December 2013 study of living dolphins in Barataria Bay, Louisiana, found that roughly half were extremely sick; many suffered from lung and adrenal disorders known to be linked to oil exposure. Some 1,400 whales and dolphins had been found stranded by the end of 2015, a figure representing only a tiny percentage of the animals affected. Though the number of dead animals had begun to taper off, substantial decreases in dolphin fertility persisted. It was thought that the strandings represented the largest mortality event to occur in the Gulf of Mexico.

Birds were particularly vulnerable to the oil's effects, and many perished—from ingesting oil as they tried to clean themselves or because the substance interfered with their ability to regulate their body temperatures. The brown pelican, recently delisted as an endangered species, was among the species most affected. A 2014 study projected that perhaps 12 percent of the brown pelicans and more than 30 percent of the laughing gulls in the area hit by the spill had been wiped out. According to another 2014 study, up to 800,000 birds were thought to have died. Even individuals not directly contaminated by oil were affected. A 2012 study determined that white pelicans that had migrated from the gulf to Minnesota to breed were producing eggs that contained discernible amounts of compounds that were traceable to the BP spill. Eggs containing traces of contaminants were found in Iowa and Illinois as well.

Concerns about the offspring of sea turtles that nested on the gulf coasts of Alabama and Florida led wildlife officials to dig up thousands of eggs and hatch them in a warehouse for later release on the Atlantic coast. By late 2012 some 1,700 turtles had been found dead. A long-term satellite tracking study released in May 2013 showed that the endangered Kemp's ridley sea turtle was likely severely affected, as its preferred foraging territory was within the area damaged by the spill. It was estimated that up to 65,000 imperiled turtles had died during 2010 alone, mostly as a result of oil contamination.

The impacts on smaller species were more difficult to determine. Numerous species of fish and invertebrates spawned in the gulf, and it was thought likely that some would succumb to the toxic effects of the oil. A 2014 study showed that the larvae of commercially important fish species, including tuna, likely developed heart defects after exposure to polycyclic aromatic hydrocarbons (PAHs) from the oil. Areas of the seabed that had been coated by by-products of bacteria were essentially dead zones; many sedentary organisms had suffocated or been sickened by the material, and most mobile organisms had fled.

A number of witnesses and reports say that at many locations, contaminated liquids were dumped into rivers and streams without proper sampling and treatment. "Waste pits containing high levels of petroleum were backfilled without removing or treating the oil; crude oil that was removed from waste pits, and contaminated soils and vegetation, were buried in unlined holes in the ground and dumped in the environment, including at locations in nearby forests; crude oil and contaminated vegetation were burned in open fires; toxic chemicals were thrown into waters, polluting water, killing fish; and hazardous for human. Decades later, little has changed for the area's residents. They still suffer from high rates of respiratory illnesses, diabetes, and other oil-related health conditions, which lately have made them particularly vulnerable to the Covid-19 pandemic.

Six studies assessed the association between cancer and oil extraction, the majority of which were based in the Amazon region of Ecuador. Comparing cancer incidence in a small Ecuadorian community in the Amazon basin impacted by oil extraction to a reference population, San Sebastián and colleagues found an excess of incidence and mortality for all types of cancer (San Sebastián et al. 2001). A subsequent study of 4 counties with at least 20 years of oil extraction also showed excess risk for cancer incidence, including an increase in childhood hematopoietic (blood stem cell) cancer (Hurtig and San Sebastián 2002). The same authors also identified a significantly elevated relative risk for leukemia (RR 3.48, 95% CI 1.25-9.67) among Ecuadorian children less than 14 years of age who lived in an oil extraction region compared to those who did not (Hurtig and San Sebastián 2004).

Several studies identified multiple acute and chronic non-cancer health effects elevated in communities living near oil extraction, typically relying on a cross-sectional design. A study of a New Mexico community near an oil drilling site and an oil waste pit identified elevated prevalence of rheumatic disease, lupus, neurological and respiratory symptoms, and cardiovascular problems compared to a community farther away (Dahlgren et al. 2007). Multiple studies have found suggested evidence of alteration of immunological function in communities near oil extraction which may explain higher rates of lupus (Dahlgren et al. 2007), liver abnormality (Dey et al. 2015) and allergic disease (Yermukhanova et al. 2017). Adults living within 5 km of an oil field had significantly lower levels of 3 liver enzymes—alanine transaminase, aspartate transaminase, and alkaline phosphatase—as measured in blood when compared to adults living in a non-industrial region without oil drilling sites (Dey et al. 2015). School-age children (ages 7-11) in the oil-producing region in Kazakhstan found significant enlargement of thyroid volume in children living in the oil-producing regions, compared to those living in agricultural regions (Kudabayeva et al. 2014) and presence of allergic disease decreased with distance from the oil fields (Yermukhanova et al. 2017). All studies suggest that exposure to oil-related air pollutants may be adversely impacting immunological functions and driving the observed health differences.

4. Study Approach and Objectives

The important environmental components like soil, water (surface and ground water) and vegetation is studied to assess the environmental damage caused by OIL's Baghjan#5 blowout accident. The soil and vegetation health was investigated in the vicinity area. Specific objectives of the study is

- To assess the vegetation stress and soil health in and around fire gas well (up to 2 km radius) from the impacted well head in all the four directions on a rotational basis.
- Collection and analysis of soil and plant samples within 2 km radius of affected area including bioremediation sites
- To submit a report on the vegetation and soil quality status

TERI has undertaken environmental assessment and sampling activities during the period 30th November, 2021 to 4th December, 2021 in-order to assess the impact of BGN well#5 blowout incidents followed by release of pollutants on surrounding environment. The impact on soil, water and vegetation has been investigated through field visit, sampling and analysis. The initial reconnaissance survey has been conducted on 30th November, 2021 to understand the environmental conditions and selection of sampling locations.

5. Methodology

5.1. Site description

Location of the each assessment site was designated with GPS coordinates, identification numbers/name and detailed site location. The following section explains water, sediment and soil sampling procedures.

5.2 Field survey

The field survey consists of interaction with stakeholders, farmers and other public peoples followed to know the impact due to BGN gas well blowout incident. The field survey includes observation of visible contaminations, type of vegetation, agricultural farming practice, cattle grazing, stagnant, ground water sources, soil profile and distance from BGN well#5.

5.3 Sampling locations

The selection of sampling points in the affected area are generally coordinated with sampling points of vegetation to provide a comparable and systematic assessment of the total deposition of pollutants. Soil, sediment, water and plant samples has been collected in and around BGN#5 from 2 km radius covering North, South, West and East from the gas well head. The selection of sampling grid was also based on the specific land cover features of the contaminated environment. In this present study the soil and plant samples has been collected within 2 km radius (North, South, West and East) from the gas well head. Soil samples was collected from 0-30 cm depth using hand augurs. The surface litter at the sampling spot was removed before collecting the sample. The soil auger was used to plough the soil up to 30 cm. Each composite sample is a mixture of 8 random grab subsamples at every site selected for sample collection. The soil sampling location was specifically identified in consultation with public, stakeholders and officials from OIL.

Total 13 water samples consisting of groundwater and surface water, 16 plant/vegetation, 17 soil and 4 sediment samples were collected. The standard soil sampling using grid sampling and zone sampling was carried out. Considering the gas well incident#5, the each field contains different soils with unique soil properties and crop characteristics, and therefore the representative zone has been selected for the random collection of soil and plant samples to assess the environmental impact. The ground water and surface water samples have been collected from different location within the vicinity area. The representative water (surface and ground), soil, sediment and plant/vegetation samples was collected from surrounding area including in and around BGN well#5, tea garden, settlements, agricultural crop fields and biodiversity parks covering Dibru-Saikhowa National Park and Maguri Motapung Beel.

The summary of soil, sediment, water sampling locations and analysis details were given in following part.

5.3.1 Soil and Sediment Sampling

Soil and sediment samples have been collected in and around vicinity area of BGN well #5. Total 17 soil and 4 sediment samples were collected from representative zones with specific characteristics consist wet lands, agricultural fields, Residential zones and Dibru National Park. In each selected zones, one composite soil sample consist of 8 grab sub soil samples has been collected

from 0 to 30 cm depth and uniformly mixed and designated as one composite sample. The sediment samples have been collected from Maguri Motapung Beel from the South East, North West and South East location of BGN well #5. The GPS coordinates of the each sub-soil location has been recorded in the field data sheet. The soil type, colour, agricultural crop and visible contamination have been recorded. Figure 1 depicts the soil and sediments sampling locations. The each composite sample is mixture of 8 random grab subsamples (Figure 2) at every site selected for sample collection with in single characteristics field. Total 17 composite soil samples and 4 sediment samples have been collected. The soil and sediment sampling has been done in Dibru Saikhowa National Park (DSNP) and Maguri Motapung Beel which located around 2.3 km and 2.5 km distance from BGN well#5 respectively. The sample ID, location latitude, longitude, distance from BGN well #5 has been presented in table 1 and analysis parameters and method has been highlighted in table 2.

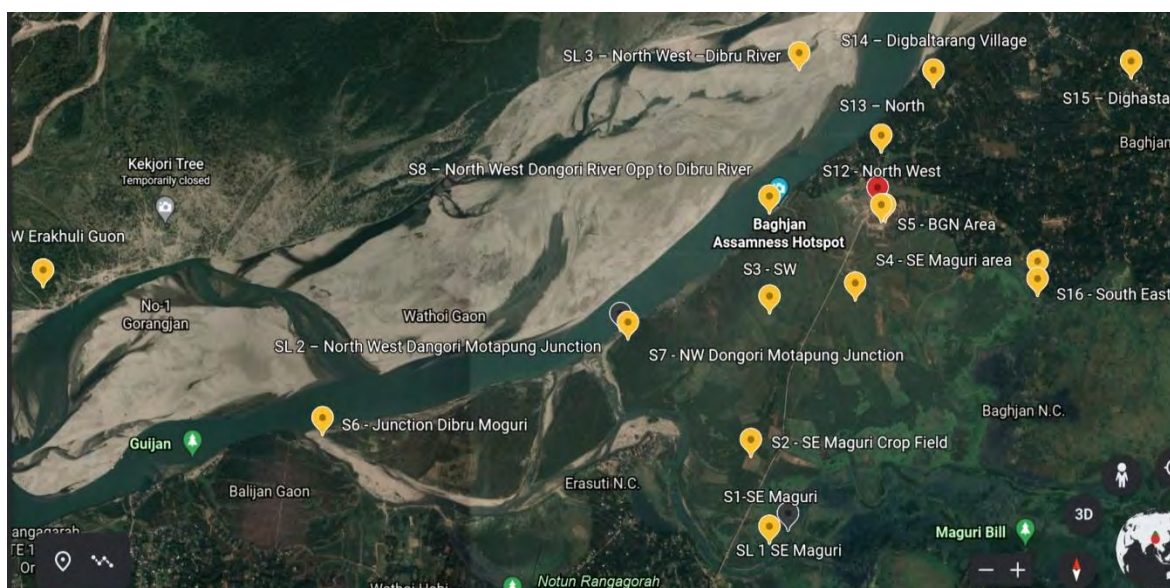


Figure 3. Soil and sediments sampling locations

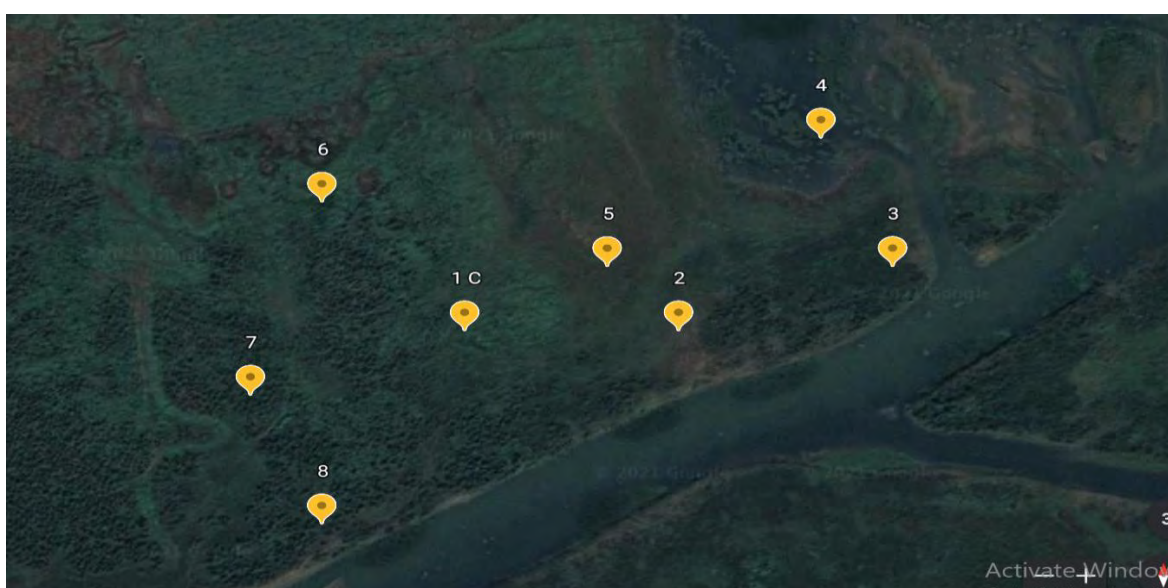


Figure 4. One Composite soil sample: Consist of 8 Grab sample (1 to 8)

Table 1 Soil and Sediment sample location details

S.No.	Sampling Location	GPS Coordinates of sampling Location (Lat, Long)	Distance from BGN#5	Sample ID	Date of sampling
1	SE, Maguri Motapung Beel	27°34'28.0"N 95°22'21.0"E	2.56 km	BSE-S01-34282221	01.12.2021
2	SW, Maguri Crop Field	27°34'48.0"N 95°22'16.0"E	1.98 km	BSW-S02-34472215	01.12.2021
3	SW, Maguri Motapung	27°35'21.0"N 95°22'21.0"E	1.16 km	BSW-S03-35212221	01.12.2021
4	SE, Maguri Motapung area	27°35'24.0"N 95°22'44.0"E	694 m	BSE-S04-35242244	01.12.2021
5	In and around BGN#5 well	27°35'46.0"N 95°22'50.0"E	BGN#5	BGN-S05-35462250	01.12.2021
6	NW, Dibru river-Maguri Motapung Junction	27°34'53.0"N 95°20'21.0"E	4.28 km	BNW-S06-34532021	02.12.2021
7	NW, Dongri River and Motapung Junction	27°35'15.0"N 95°21'43.0"E	2.5 km	BNW-S07-35152143	02.12.2021
8	NW, BNW-S08-35452221	27°35'44.0"N 95°22'21.0"E	800 M	BNW-S08-35452221	02.12.2021
9	North-Dibru National Park	27°36'58.0"N 95°22'57.0"E	2.2	BN-S09-36582257	02.12.2021
10	North-Dibru National Park	27°37'01.0"N 95°23'00.0"E	2.3 km	BN-S010-37012300	02.12.2021
11	East-Near BGN#5	27°35'42.0"N 95°22'52.0"E	125 m	BE-S011-35422252	03.12.2021
12	NW, 250 M from BGN#5	27°35'42.0"N 95°22'51.0"E	140 m	BNW-S012-35422251	03.12.2021
13	North, Baghjan, 540 m from BGN#5	27°35'58.0"N 95°22'51.0"E	373 m	BN-S013-35582251	03.12.2021
14	NW-1KM from BGN#5	27°36'13.0"N 95°23'05.0"E	1.0 km	BNE-S014-36112307	03.12.2021
15	NE, Dighastarang, Baghjan Gaon	27°36'15.0"N 95°23'58.0"E	2.07 km	BNE-S015-36152355	03.12.2021
16	SW, Baghjan, End of Maguri Beel	27°35'29.0"N 95°23'33.0"E	1.28 km	BNE-S016-35292333	03.12.2021
17	NW, Erakhuli Gaon	27°35'27.0"N 95°19'06.0"E	6.17 km	BNW-S017-35271906	04.12.2021
18	SE, Maguri Motapung Beel	27°34'31.0"N 95°22'26.0"E	2.4 km	BSE-SL01-34312226	01.12.2021
19	NW, Dangri Motapung River Junction	27°35'17.0"N 95°21'41.0"E	2.1 km	BNW-SL02-35172141	02.12.2021
20	NW, Dibru River	27°36'17.0"N 95°22'29.0"E	1.1 km	BNW-SL03-36172229	02.12.2021
21	SW, Maguri Motapung Beel	27°35'25.0"N 95°23'33.0"E	1.36 km	BSE-SL04-35252333	03.12.2021

Table 2. Soil and Sediment quality analysis parameters in NABL accredited laboratory

S. No.	Test Parameters	Test Methods
1	pH, Chloride, Sulphate, Alkalinity, Total Organic carbon, Total Nitrogen, Available Nitrogen, Available Phosphorus, Available Potassium, Available Sodium, Specific gravity, Texture, Electrical conductivity, Sodium Adsorption Ratio, Cation Exchange Capacity, Moisture, Acidity, Cadmium, Lead, Mercury, Nickel, Hexavalent Chromium, Zinc, Copper, Permeability, Porosity.	USEPA/IS methods/APHA/Relevant SOP
2	Polynuclear Aromatic Hydrocarbons: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Anthracene, Phenanthrene, Fluoranthene, Pyrene, Benz[A]Anthracene, Chrysene, Benzo[K]Fluoranthene, Benzo[A]Pyrene, Benzo[ghi]Perylene, Dibenz[ah]Anthracene, Indeno[1,2,3-cd]Pyrene and Benzo[B]Fluoranthene.	
3	Total Petroleum Hydrocarbon	
4	BTEX	

5.3. 2 Vegetation/Plant and fish sampling

Analysis of plant quality is important as it show the bioindicator of pollution accumulation. Hence different representative plant samples has been collected from South East, South West, North West and North East direction from BGN well#5 covering 2 km radius. The plant sampling also collected from Dibru Saikhowa National Park (DSNP) and Maguri Motapung Beel which located around 2.3 km and 2.5 km distance from BGN well#5 respectively. One plant sample also collected from North West village Erakhuli Gaon which is located from 6.17 km from BGN#5. The single sampling representative zone location is selected based on the specific characteristics consist agricultural fields, wet lands, residential zones and accidental zone BGN#5. Figure 3 shows the plant and fish sampling locations. The sample ID, location latitude, longitude, distance from BGN well #5 has been presented in table 3 and analysis parameters and method has been highlighted in table 4. The analysis reports are enclosed as annexure 1B.



Figure 5. Plant/Vegetation and fish sampling location

Table 3. Plant/Vegetation and fish sample location details

S.No.	Sampling Location	GPS Coordinates of sampling Location (Lat, Long)	Distance from BGN#5	Sample ID	Date of sampling
1	P1 – South East Maguri Motapung	27°34'30.0"N 95°22'26.0"E	2.5 km	BSE-P01-34302226	01.12.2021
2	P2 – South West Maguri Motapung Crop field	27°34'46.0"N 95°22'15.0"E	2.1 km	BSW-P02-34462215	01.12.2021
3	P3 – South West –Maguri Motapung Grass land	27°35'19.0"N 95°22'24.0"E	2.2 km	BSW-P03-35192224	01.12.2021
4	P4 – South West –Maguri Motapung	27°35'25.0"N 95°22'41.0"E	776 m	BSE-P04-35252241	01.12.2021
5	P5 – Near BGN#5 (Within Fencing area)	27°35'47.0"N 95°22'54.0"E	40 m	BGN-P05-35472254	01.12.2021
6	P6 – North West Dibru and Maguri Junction	27°34'53.0"N 95°20'21.0"E	4.5 km	BNW-P06-34532021	02.12.2021
7	North West - Dibru and Maguri Junction	27°35'13.0"N 95°21'45.0"E	2.1 km	BNW-P07-35132145	02.12.2021
8	P8 – North – Dibru National Park	27°36'57.0"N 95°22'57.0"E	2.1km	BN-P08-36572257	02.12.2021
9	P9 – North – Dibru National Park	27°37'01.0"N 95°22'59.0"E	2.3 km	BN-P09-37012259	02.12.2021
10	P10 – East –250 m from BGN#5	27°35'42.0"N 95°22'52.0"E	190 m	BE-P010-35422252	03.12.2021
11	P11 – North West- 250 m from BGN #5	27°35'50.0"N 95°22'38.0"E	460 m	BNW-P011-35502238	03.12.2021
12	P12 – North 540 m from BGN#5, Baghjan	27°35'57.0"N 95°22'49.0"E	377 m	BN-P012-35572249	03.12.2021
13	P13 – North East, 1 km from BGN#5	27°36'10.0"N 95°23'08.0"E	819 m	BNE-P013-36092308	03.12.2021
14	P14 – North East – Dighastarang	27°36'18.0"N 95°23'57.0"E	1.9 km	BNE-P014-36192355	03.12.2021
15	P15 – South East – Magori Bell	27°35'29.0"N 95°23'35.0"E	1.2 km	BSE-P015-35262335	03.12.2021
16	P16- North West – Erakhuli Gaon	27°35'28.0"N 95°19'05.0"E	6.17 km	BNW-P016-35281904	04.12.2021
17	F-1 – South East Magori Bell	27°35'26.0"N 95°23'34.0"E	1.3 km	BSE-F01-35262334	03.12.2021

Table 4. Vegetation/Plant and fish quality testing in NABL accredited Laboratory

S.No.	Test Parameters	Test Methods
1	Copper, Cadmium, Lead, Mercury, Nickel, Hexavalent Chromium, Zinc	USEPA/IS/AOAC/Relevant SOP
2	Polynuclear Aromatic Hydrocarbons: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Anthracene, Phenanthrene, Fluoranthene, Pyrene, Benz[A]Anthracene, Chrysene, Benzo[K]Fluoranthene, Benzo[A]Pyrene, Benzo[ghi]Perylene, Dibenz[ah]Anthracene, Indeno[1,2,3-cd]Pyrene, Benzo[B]Fluoranthene,	
3	Total Petroleum Hydrocarbon	
4	BTEX	

5.3.3 Water sample

The water samples were collected in and around Bhghjan gas well blowout site. The representative water samples has been collected from South East, South West, North West and North East direction from BGN well#5 covering 2 km radius. Two (2) surface water samples, ten (10) ground water samples and one (1) control sample has been collected. The field level testing parameters such as pH and dissolved oxygen was recorded on-site. In order to compare the quality of groundwater from contaminated area with non-contaminated control site, one ground water sample have been collected from Plastic park, Tinsukia which is 5 km away from gas blowout BGN well#5. The sample ID, location latitude, longitude, distance from BGN well #5 has been presented in table 5 and analysis parameters and method has been highlighted in table 6.

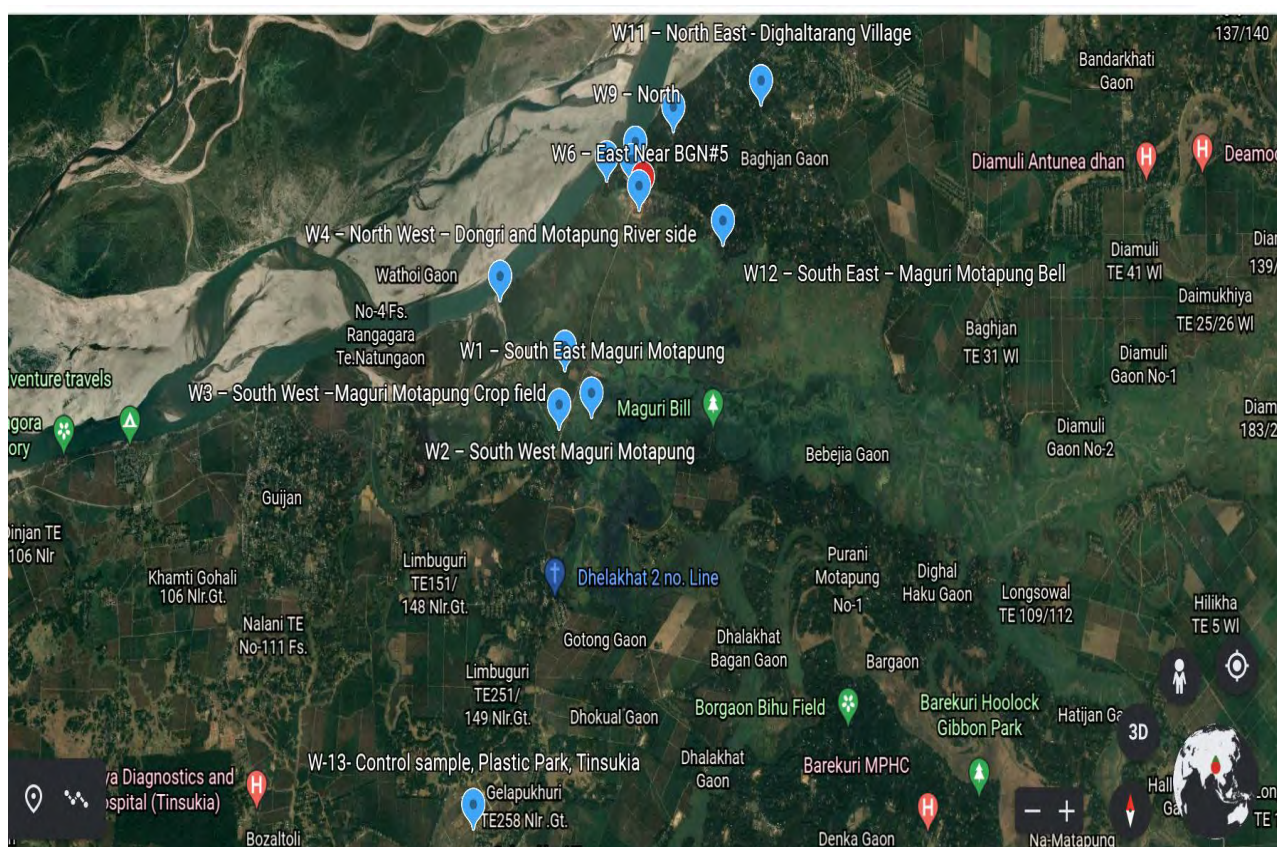


Figure 6. Water sampling locations

Table 5. Water sample location details

S.No	Sampling Location	GPS Coordinates of sampling Location (Lat, Long)	Distance from BGN#5	Sample ID	Date of sampling
1	South East, Maguri Motapung Beel	27°34'31.0"N 95°22'26.0"E	2.6 km	BSE-W01-34312226	01.12.2021
2	South West, Maguri Motapung Crop field	27°34'27.0"N 95°22'09.0"E	2.6 km	BNW-W02-34272209	01.12.2021
3	South West, Maguri Motapung Crop field	27°34'47.0"N 95°22'12.0"E	2.1 km	BSW-W03-34472215	02.12.2021
4	North West, Dongri and Motapung River side	27°35'11.0"N 95°21'38.0"E	2.3 km	BNW-W04-35112138	02.12.2021
5	East, Near BGN#5 (100 m from BGN#5)	27°35'45.0"N 95°22'53.0"E	270 m	BE-W05-35452253	03.12.2021
6	East, Ritu Moran House Near BGN#5 (100 m)	27°35'42.0"N 95°22'51.0"E	120 m	BE-W06-35422251	03.12.2021
7	Near West, BGN#5 (450 m)	27°35'52.0"N 95°22'34.0"E	575 m	BNW-W07-35522234	03.12.2021
8	North West 130 m from BGN#5	27°35'51.0"N 95°22'47.0"E	264 m	BNW-W08-35512247	03.12.2021
9	W9 – North, Baghjan (600 m from BGN#5)	27°35'57.0"N 95°22'49.0"E	392 m	BN-W09-35572249	03.12.2021
10	W10 – North East (1 km from BGN#5)	27°36'09.0"N 95°23'09.0"E	873 m	BNE-W010-36092309	03.12.2021
11	W11 – North East - Dighaltarang Village	27°36'18.0"N 95°23'55.0"E	1.9 km	BNE-W011-36182355	03.12.2021
12	W12 – South East – Maguri Motapung Beel	27°35'30.0"N 95°23'35.0"E	1.2 km	BSE-W012-35302335	03.12.2021
13	W-13- Control sample, Plastic Park, Tinsukia	27°32'10.0"N 95°21'24.0"E	5 km	BC-W013-32102124	05.12.2021

Table 6. Water sample analysis parameters analysis in NABL accredited laboratory

S.No.	Analysis parameters (IS 10500:2012) IS 3025 guidelines
1	Colour and Odour
2	pH
3	Turbidity
4	Electrical conductivity
5	Total dissolved solids
6	Total suspended solids
7	Dissolved oxygen
8	BOD
9	COD
10	Total hardness
11	Total alkalinity
12	Oil and Grease
13	Ammoniacal Nitrogen
14	Chloride
15	Calcium
16	Magnesium
17	Fluoride
18	Phenolic compounds
19	Copper
20	Zinc
21	Nickel
22	Iron
23	Total Chromium
24	Chromium (as Cr ⁶⁺)
25	Lead
26	Sulphide
27	Sulphate
28	Cadmium
29	Polynuclear aromatic hydrocarbons (as PAH)

5.3.4 Quality Assurance and Quality Control

The Quality Assurance and Control Sampling (QA/QC) was followed. Every sample has been collected and analyzed in NABL labs as described. The soil samples was collected in individual cotton bags and placed in an ice cooler in the field immediately. The each soil grab samples from the 8 location (sub-sample) and then later pooled, homogenised and placed in a cloth bag. At the end of the sampling day the soils was placed in a freezer and used for the analysis. For the Polynuclear Aromatic Hydrocarbons (PAH) and Total Petroleum Hydrocarbon (TPH) analysis, soil and plant samples was collected in 250 ml wide mouth glass container with PTFE-lined lid separately. For the BTEX analysis, soil and plant sample was collected in VOC vials separately. All the plant samples was collected, dried and powdered into a homogenized mixture for the analysis. For the PAH, TPH and BTEX analysis all the soil and plant samples was stored under $< 6^{\circ}\text{C}$. All the sampling and photographs of the sampling location was taken and documented. Appropriate test pit logs with photos, videos had been recorded as a part of quality standard requirement.

6. RESULTS AND DISCUSSION

6.1 Field survey

Field inventory was carried out in and around BGN#5 and surrounding 2 km radius covering terrestrial and aquatic environment. The field observation was made and field data sheet has been documented by collecting information from local people and farmers. The farmer's knowledge is instrumental in selection of sampling sites. The other information like the visible contamination, crop cultivation, water level, changes in water quality to assess the long term changes in soil, vegetation and water quality. The field survey log sheets are enclosed as Annexure 2.

6.2 Terrestrial Environment

The environmental quality of terrestrial ecosystem including soil and vegetation status has been assessed through soil and vegetation/plant sampling and analysis. The soil and vegetation sampling has been done within 2 km radius from BGN well#5 and all physico-chemical quality of the sample has been analyzed. The samples were also collected from important biodiversity reserve such as Maguri Beel and Dibru-Saikhowa National Park. The vegetation samples such as accumulating aquatic plant samples, grass, tea garden, agricultural crops, creepers, climbers and edible part of the vegetables has been collected from each representative zones around BGN well #5.

Table 7. Summary of field observation from surrounding terrestrial environment (Soil)

S.No.	Sampling Location	Sample ID	Soil Type/Cultivation	Observation
1	SE, Maguri Motapung Beel	BSE-S01-34282221	Gray, Sand mixed with sand	No visible contamination
2	SW, Maguri Crop Field	BSW-S02-34472215	Clay mixed sand soil, Loose soil, Paddy, vegetable cultivation near Beel area	No visible contamination
3	SW, Maguri Motapung	BSW-S03-35212221	Batches of Paddy cultivation	No visible contamination
4	SE, Maguri Motapung area	BSE-S04-35242244	Mixed clay and sand type, Rich grass land, paddy and vegetable cultivation	No visible contamination
5	In and around BGN#5 well	BGN-S05-35462250	Brown gray soil,	Few batches of oily lumps seen
6	NW, Dibru river-Maguri Motapung Junction	BNW-S06-34532021	Sand sediments within junction point, Junction point of Dibru and Mogori River	No visible contamination
7	NW, Dongri River and Motapung Junction	BNW-S07-35152143	Gray sand silt type soil	No visible contamination
8	NW, Dangori River, Opp. to Dibru National Park	BNW-S08-35452221	Gray and sandy type of soil, Near wild grass growth	No visible contamination
9	North-Dibru National Park	BN-S09-36582257	Rich wild grass and tress	No visible contamination
10	North-Dibru National Park	BN-S010-37012300	Gray sand type soil, Grass land, wild grass	
11	East-Near BGN#5	BE-S011-35422252	Sandy clay type, Vegetable cultivation	No visible contamination
12	NW, 250 M from BGN#5	BNW-S012-35422251	Clay sandy soil, Cattle grazing, Bampoo and Tea cultivation	No visible contamination
13	North, Baghjan, 540 m from BGN#5	BN-S013-35582251	Clay and sand mixture soil, Rich biodiversity and cultivations	No visible contamination
14	NW-1KM from BGN#5	BNE-S014-36112307	Alluvial soil type, Bamboo, vegetable cultivation	No visible contamination

15	NE, Dighastarang, Baghjan Gaon	BNE-S015-36152355	Clay mixed soil, batches of cultivation	No visible contamination
16	SW, Baghjan, End of Maguri Beel	BNE-S016-35292333	Clay mixed sandy soil, Agricultural area, Tea garden	No visible contamination
17	NW, Erakhuli Gaon	BNW-S017-35271906	Sandy soil type, Agricultural area	No visible contamination

The field data sheets and sampling activities photos have been listed in **annexure – I**.

6.2.1 Soil quality of surrounding environment

The soil samples were collected from 17 different locations around vicinity area of Baghjan BGN well # 5 including grassland, agricultural area, tea garden, homestead teagarden, wetland, residential area, within fencing area of BGN#5, bioremediation area including Maguri Montapung Beel and Dibru National Park. The soil quality indicators such as physico-chemical, nutrient content of soil was tested. As India has no specific standards for assessing soil contamination, the internationally accepted and widely used pollutants standards like CCME's (Canadian Council of Ministers of the Environment) and Dutch Soil Remediation Circular for the protection of environmental and human health was used to interpret the severity of contamination level.

Physico-chemical characteristics of surrounding soil

The major soil sample showed neutral to slightly alkaline pH range of 7.16 to 8.32 which is in the optimum range. The soil collected from teagarden and homestead tea garden and agricultural area showed the acidic soil type with critical pH range of 4.65 to 5.26 due to increase in longtime fertilizer application. As per the Dutch remediation circular the electrical conductivity (EC) of <2000 $\mu\text{S}/\text{cm}$ and Sodium adsorption ratio (SAR) of <5 is a screening levels Soil Quality Guidelines for the Protection of Environmental and Human Health. The soil analysis results showed ideal EC and SAR range of 101.5 to 416 $\mu\text{S}/\text{cm}$ and 0.398 to 1.27 respectively. The soil sample collected within BGN well #5 fencing area showed alkaline pH (9.1) with higher SAR value (6.71) showed that the fencing area is slightly alkaline in nature due to presence of contaminated condensate from the blowout incident. This saline area is covered under bioremediation area.

There is no specific reference values the soil physical quality as a general requirement to support the productive soil system, the 45% mineral matter, 5% organic matter, 25% soil moisture and 50 % soil porosity is required depends on the type of soil. The soil analysis results showed the optimum porosity range of 33.48 to 45.69 %. The texture of all collected soil shows silt loam type contains combination of sand, sand, silt and clay particles to support the growth of all type of plant. It showed slit concentration of 52 to 62.8 % and clay 9.2 to 18.2 % sand 21.8 to 37.2 %. The low to optimum moisture level of 1.67 to 21.93% was observed in the soil samples collected from different locations. Specific gravity of a soil is the ratio of the weight of a soil to the weight of an equal volume of water at constant temperature. Specific gravity of samples ranges from 2.03 - 2.41. Several factors affect the soil properties including soil porosity. Loose and porous soils generally have lower bulk densities and greater porosities than tightly packed soils. Porosity varies depending on particle size and aggregation. Generally the loam soil contain the permeability of 0.0003611 cm/sec (www.fao.org). The present soil analysis shows the permeability range of 0.0012 to 0.00086 cm/sec. This is optimum to higher permeability due to silt loam type of soil.

Soil Nutrients: The available phosphorus in the samples were in the range of 38.8 mg/kg to 58.7 mg/kg which is higher than the required level described in the soil health chart. The total organic carbon (TOC) was recorded in the range of 0.23 % to 1.37 % shows fertile top land soil. The higher total nitrogen concentration of 635.2 to 1139.35 mg/kg and available nitrogen in the range of 84.62 mg/kg to 172.9 mg/kg was recorded. The Cation exchange capacity (CEC) is an important indicator of soil fertility because it shows the soil's ability to supply important plant nutrients. The CEC was recorded in the range of 17.6 to 24.8 meq/100 ml due to its moderate organic content in the soil and it found within the required optimum concentration (15-30 meq/100 ml).

There is no specified guidelines established for the concentration of sulphate and chloride in soil ecosystem. In many cases the literature documented varying range of sulphate concentration and reported that the soil with <3000 mg/kg has low risk and present soil analysis results showed safe level of sulphate content in the range of 196.2 to 285.63 mg/kg. Similarly the low concentration of chloride in the range of 19.71 to 156.78 mg/kg was reported. The maximum sodium concentration was 507.01 mg/kg and minimum was 23.47 mg/kg and sodium absorption ratio in the range of 0.39 to 1.27 shows the non-alkaline nature of the soil. Higher concentration of potassium is reported in the range of 184.73 mg/kg to 1203 mg/kg.

Metals: Among different heavy metals analyzed, Mercury and Hexavalent Chromium were not detectable in the soil sample whereas low concentration of copper (0.03 to 11.3 mg/kg), Lead (0.04 to 3.5 mg/kg), Zinc (0.23 mg/kg), Nickel (0.05 to 1.5 mg/kg) and Cadmium (0.018 mg/kg) was recorded in the sample. The detected metal concentration were less than the soil remediation intervention values specified in Dutch Soil Remediation standards.

Total Petroleum hydrocarbon content (TPH): The TPH is a total concentration of fractional composition consist of alkane and aromatic C13 to C30 compounds. The maximum TPH concentration of 2425.6 mg/kg was reported in the sample collected from Tea garden area which is located 550 m distance from BGN#5. The minimum TPC concentration of 165.8 mg/kg was found in the sample collected from Maguri Motapung Beel. The TPH concentration of 721.1 mg/kg of TPH was reported in northwest side of Erakhuil Goan located 6 km away from the BGN well#5. This specific Erakhuil Goan sampling location was selected based on the honorable Supreme Court committee suggestion as the committee received compliant of contamination issue due to BGN#5 incident. The TPH analysis results in all collected soil samples are within the CPCB remediation regulation guideline and Dutch Soil Remediation Circular, 2013 limit of <5000 mg/kg for TPH remediation regulation. This TPH traces may be required to be regularly to know the fate of TPH contamination in the surrounding BGN well#5.

PAH and BTEX: Among 17 soil samples collected from different locations, South west zone of Maguri Beel sample showed trace level of Fluoranthene (0.15 mg/kg) and Pyrene (0.11 mg/kg) was recorded. This is little higher than the CCME screening level guidelines (Fluoranthene 0.1 mg/kg and Pyrene 0.1 mg/kg) for the Protection of Environmental and Human Health (Table 8-11). In same sample all other PAH fractions showed below detectable limit. This trace level of Pyrene and Fluoranthene may be due to anthropogenic sources of pollutants. The laboratory analysis report of soil samples is enclosed as Annexure 1A. From the field observation and sample analysis results, the within fencing area of BGN well No#5 has slightly alkaline soil due to contamination and the site is under bioremediation. The TPH contamination was reported in all the collected soil sample within 2 km radius as well as Erakhuil Goan located 6 km away from BGNwell#5 but the contamination level was within Dutch guideline limit.

Table 8. Chemical properties of soil collected from surrounding soil environment

Sample No.	Sample ID	pH	EC, $\mu\text{S/cm}$	Avilable Phosphorous mg/kg	Potassium mg/kg	Sodium mg/kg	Total Organic Carbon %	Cation Exchange Capacity (ECE) meq/100ml	Alkalinity mg/kg	Total Nitrogen mg/kg	Avilable Nitrogen mg/kg	Acidity mg/kg	Choride mg/kg	Sulphate mg/kg	Sodium Absorption Ratio
1	BSE-S01-34282221	7.96	416	56.1	706.85	96.86	1.05	19.6	212.6	964.23	136.2	8.5	118.26	285.63	1.21
2	BSW-S02-34472215	8.2	233	45.8	963.17	56.93	0.67	23.5	198.4	716.24	102.4	6.6	19.71	229.73	0.67
3	BSW-S03-35212221	8.32	251	48.6	736.3	74.36	0.83	24.8	245.4	723.83	105.07	6.2	78.84	209.8	0.78
4	BSE-S04-35242244	8.14	196.4	46.85	805.63	63.05	0.7	23.8	184.2	762.42	108.2	6.4	39.42	246.97	0.68
5	BGN-S05-35462250	9.1	167.6	42.68	1203	507.01	0.47	20.5	202.8	750.24	96.2	8.5	98.55	198.65	6.71
6	BNW-S06-34532021	8.14	208	51.2	710.16	80.05	0.45	21.6	180.4	762.8	84.62	6.7	98.32	241.04	0.93
7	BNW-S07-35152143	7.16	240	55.2	585.44	48.62	0.55	22.4	192.4	841.6	117.5	12.4	78.48	202.2	0.58
8	BNW-S08-35452221	8.04	249	58.7	517.54	70.5	0.52	20.2	176.5	798.64	103.42	14.7	78.49	224.86	0.84
9	BN-S09-36582257	8.25	216	56.4	809.88	34.64	0.31	20.4	190.4	724.15	96.7	12.8	97.71	212.8	0.42
10	BN-S010-37012300	8.26	294	46.8	565.19	37.66	0.23	23.4	192.5	942.3	132.8	12.4	116.09	216.8	0.398
11	BE-S011-35422252	7.6	222	57.2	629.8	69.13	0.96	22.5	73.6	635.2	88.5	22.1	39.23	238.7	1.27
12	BNW-S012-35422251	8.06	327	50.64	700.93	53.74	0.86	22.8	202.4	826.4	113.64	8.8	98.14	224.6	0.65
13	BN-S013-35582251	4.96	180	45.4	262.38	23.68	0.99	18.6	12.4	1096.45	150.6	126.4	156.18	198.8	0.57
14	BNE-S014-36112307	5.02	101.5	39.8	224.78	23.47	0.85	18.8	10.8	1139.65	172.9	128.8	96.76	201.5	0.62
15	BNE-S015-36152355	4.65	154.4	38.8	295.36	23.63	1.37	19.2	13.2	1012.4	138.8	124.2	98.39	204.9	0.58
16	BNE-S016-35292333	5.26	125.3	39.7	184.73	25.54	0.86	17.6	10.4	986.67	141.62	120.2	156.78	196.2	0.59
17	BNW-S017-35271906	8.17	297	48.95	723.35	83.91	0.55	21.6	210.6	795.24	106.41	18.7	96.16	240.5	0.83
Guidelines Standard Level		6-8***	2000** *	NA	40-125 **	NA	0.5 - 0.75	15-30*	NA	125-250**	NA	NA	NA	NA	5***

***Dutch Remediation Circular; NA - Not Available; **Methods Manual - Soil Testing in India, 2011; *Methods of analysis of soils, plants, waters, fertilisers & organic manures. Tandon, H.L.S., 2005

Table 9. Physical properties of soil collected from surrounding soil environment

Sample No.	Sample ID	Moisture%	Spec.Gravity	Porosity %	Permeability cm/sec	Sand %	Clay %	Slit %
1	BSE-S01-34282221	18.71	2.28	44.3	0.00115	22.8	16.8	60.4
2	BSW-S02-34472215	18.44	2.28	44.74	0.00086	22.8	15.6	61.6
3	BSW-S03-35212221	19.6	2.2	44.1	0.00095	23.5	18.2	58.3
4	BSE-S04-35242244	20.82	2.14	42.8	0.0012	22.6	16.7	60.7
5	BGN-S05-35462250	4.86	2.2	34.5	0.00153	33.6	11.6	54.8
6	BNW-S06-34532021	6.15	2.41	42.3	0.00134	28.6	9.2	62.2
7	BNW-S07-35152143	6.23	2.38	42.86	0.00122	26.9	10.3	62.8
8	BNW-S08-35452221	4.79	2.24	33.48	0.00124	27.5	10.8	61.7
9	BN-S09-36582257	1.67	2.22	35.6	0.00165	36.5	10.2	53.3
10	BN-S010-37012300	8.57	2.28	37.72	0.00182	37.2	10.8	52
11	BE-S011-35422252	9.22	2.24	36.16	0.00141	32.6	12.6	54.8
12	BNW-S012-35422251	17.62	2.32	45.69	0.00097	21.8	17.8	60.4
13	BN-S013-35582251	21.93	2.13	40.38	0.00154	32.8	12.6	54.6
14	BNE-S014-36112307	10.09	2.21	38.01	0.00146	31.2	13.8	55
15	BNE-S015-36152355	8.5	2.03	35.46	0.00155	32.1	12.4	55.5
16	BNE-S016-35292333	9.04	2.14	38.32	0.00162	33.5	12.2	54.3
17	BNW-S017-35271906	18.87	2.28	45.62	0.00121	24.3	15.2	60.5

Table 10. Heavy metal content soil collected from surrounding soil environment

Sample No.	Sample ID	Cadmium mg/kg	Mercury	Zinc mg/kg	Lead mg/kg	Copper mg/kg	Hexavalent Chromium mg/kg	Nickel mg/kg
1	BSE-S01-34282221	0.04	BLQ	2.36	1.18	7.38	BDL	1.2
2	BSW-S02-34472215	0.04	BLQ	1.5	3.5	11.3	BDL	2.5
3	BSW-S03-35212221	0.03	BLQ	5.07	1.08	0.33	BDL	3.2
4	BSE-S04-35242244	0.04	BLQ	2.5	0.04	0.37	BDL	1.6
5	BGN-S05-35462250	0.03	BLQ	0.9	2.69	0.11	BDL	1.4
6	BNW-S06-34532021	0.03	BLQ	0.44	0.47	1.5	BDL	4.5
7	BNW-S07-35152143	0.02	BLQ	1.25	BLQ	3.2	BDL	2.2
8	BNW-S08-35452221	0.02	BLQ	1.95	1.34	0.17	BDL	4.2
9	BN-S09-36582257	0.018	BLQ	2	5.8	1.5	BDL	1.4
10	BN-S010-37012300	BLQ	BLQ	0.23	0.04	0.06	BDL	0.05
11	BE-S011-35422252	0.02	BLQ	0.24	0.04	0.6	BDL	2.7
12	BNW-S012-35422251	BLQ	BLQ	1	0.53	0.03	BDL	1.96
13	BN-S013-35582251	BLQ	BLQ	1.3	0.4	1.92	BDL	1.41
14	BNE-S014-36112307	BLQ	BLQ	1.17	0.33	1.65	BDL	1.16
15	BNE-S015-36152355	BLQ	BLQ	BLQ	0.27	1.4	BDL	0.98
16	BNE-S016-35292333	BLQ	BLQ	BLQ	BLQ	1.32	BDL	0.93
17	BNW-S017-35271906	0.043	BLQ	BLQ	1.42	0.4	BDL	1.5

	Dutch Soil Remediation Circular, 2013	1.4***	6.6***	200***	530***	63***	0.6***	50***
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*** Dutch Remediation Circular, Screening levels Soil Quality Guidelines for the Protection of Environmental and Human Health

Table 11. PAH content in soil collected from surrounding soil environment

Sample No.	Sample ID	Naphthalene mg/kg	Acenaphthalene mg/kg	Acenanthane mg/kg	Fluorene mg/kg	Phenanthrene , mg/kg	Anthracene mg/kg	Fluoranthene mg/kg	Pyrene mg/kg	Benz[A] Anthracene mg/kg	Chrysene mg/kg	Benzo beta fluranthone, mg/kg	Benzo[K]Fluoranthone, mg/kg
1	BSE-S01-34282221	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	BSW-S02-34472215	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
3	BSW-S03-35212221	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
4	BSE-S04-35242244	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
5	BGN-S05-35462250	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
6	BNW-S06-34532021	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
7	BNW-S07-35152143	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
8	BNW-S08-35452221	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
9	BN-S09-36582257	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
10	BN-S010-37012300	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
11	BE-S011-35422252	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
12	BNW-S012-35422251	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
13	BN-S013-35582251	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
14	BNE-S014-36112307	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	BNE-S015-36152355	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	BNE-S016-35292333	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	0.15	0.11	BLQ	BLQ	BLQ	BLQ
17	BNW-S017-35271906	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
CCME guidelines for Agricultural Soil		0.1*	0.1*	0.1*	0.1*	0.1*	0.1*	0.1*	0.1*	0.1*	0.1*	0.1*	0.1*

Table 12. PAH, TPH and BTEX content in soil collected from surrounding soil environment

Sample No.	Sample ID	Benzo alpha Pyrene, mg/kg	Indino 1,2,3 - cd pyrene	Dibenzo (a,h) anthracene	Dibenzo (a,h,i) Perylene	Texture	TPH mg/kg	Benzene	Toluene	Ethylbenzene	Xylene
1	BSE-S01-34282221	BLQ	BLQ	BLQ	BLQ	Silt Loam	165.8	BLQ	BLQ	BLQ	BLQ
2	BSW-S02-34472215	BLQ	BLQ	BLQ	BLQ	Silt Loam	470.5	BLQ	BLQ	BLQ	BLQ
3	BSW-S03-35212221	BLQ	BLQ	BLQ	BLQ	Silt Loam	865	BLQ	BLQ	BLQ	BLQ
4	BSE-S04-35242244	BLQ	BLQ	BLQ	BLQ	Silt Loam	427.1	BLQ	BLQ	BLQ	BLQ
5	BGN-S05-35462250	BLQ	BLQ	BLQ	BLQ	Silt Loam	1534.1	BLQ	BLQ	BLQ	BLQ
6	BNW-S06-34532021	BLQ	BLQ	BLQ	BLQ	Silt Loam	686.1	BLQ	BLQ	BLQ	BLQ
7	BNW-S07-35152143	BLQ	BLQ	BLQ	BLQ	Silt Loam	734.3	BLQ	BLQ	BLQ	BLQ
8	BNW-S08-35452221	BLQ	BLQ	BLQ	BLQ	Silt Loam	460.1	BLQ	BLQ	BLQ	BLQ
9	BN-S09-36582257	BLQ	BLQ	BLQ	BLQ	Silt Loam	372.5	BLQ	BLQ	BLQ	BLQ
10	BN-S010-37012300	BLQ	BLQ	BLQ	BLQ	Silt Loam	207.7	BLQ	BLQ	BLQ	BLQ
11	BE-S011-35422252	BLQ	BLQ	BLQ	BLQ	Silt Loam	2097.5	BLQ	BLQ	BLQ	BLQ
12	BNW-S012-35422251	BLQ	BLQ	BLQ	BLQ	Silt Loam	1540	BLQ	BLQ	BLQ	BLQ
13	BN-S013-35582251	BLQ	BLQ	BLQ	BLQ	Silt Loam	2425.6	BLQ	BLQ	BLQ	BLQ
14	BNE-S014-36112307	BLQ	BLQ	BLQ	BLQ	Silt Loam	282	BLQ	BLQ	BLQ	BLQ
15	BNE-S015-36152355	BLQ	BLQ	BLQ	BLQ	Silt Loam	173.2	BLQ	BLQ	BLQ	BLQ
16	BNE-S016-35292333	BLQ	BLQ	BLQ	BLQ	Silt Loam	856.8	BLQ	BLQ	BLQ	BLQ
17	BNW-S017-35271906	BLQ	BLQ	BLQ	BLQ	Silt Loam	721.1	BLQ	BLQ	BLQ	BLQ
		0.1*	0.1*	0.1*	0.1*		5000**	0.05*	0.1*	0.1*	0.1*

* CCMEsoil quality Guidline for the protection of Environmental and Human Health (2007); ** CPCB guidelines for TPH remediation regulation value

6.3 Vegetation/Plant Health status

Impact of BGN well blowout on surrounding vegetation was monitored and it was observed that there is a re-growth of grasslands and small trees. The fire event occurred during June, 2020 and after monsoon the pollutants may be washed out from the contaminated zones. It was also further evident from the field observation as well as from the sample analysis outcome. There is no visible condensate were observed in any of the sampling site. Within in 2 km radius the plan/vegetation samples including food crops were collected. The plant materials include as grass biomass, bamboo, jackfruit, tea, banana, Betel nut, paddy, different vegetables, Fig, Pepper, Kamul, Termaric was collected and analyzed for the various metals, TPH and PAH content (Table 13). The laboratory analysis report of plant/vegetation is enclosed as Annexure 1B.

Table 13. Summary of field observation from surrounding Vegetation

S.No.	Sampling Location	Distance from BGN#5	Crop/Plant Type	Other observation
1	P1 – South East Maguri Motapung	2.5 km	Healthy plants	No visible contamination
2	P2 – South West Maguri Motapung Crop field	2.1 km	Food crops: Paddy, sweet potato, Arbi Root collected	No visible contamination
3	P3 – South West –Maguri Motapung Grass	2.2 km	Grass land area, Creepers, climbers growth	No visible contamination
4	P4 – South West –Maguri Motapung	776 m	Grass land area, Creepers, climbers growth	No visible contamination
5	P5 – Near BGN#5 (Within Fencing area)	40 m	Small batch of grass	Visible contamination batches seen
6	P6 – North West Dibru and Maguri Junction	4.5 km	Shrubs trees creepers and climbers	No visible contamination
7	P7 – North West - Dibru and Maguri Junction	2.1 km	Batches of vegetable cultivation, batches of grass land	No visible contamination
8	P8 – North – Dibru National Park	2.1km	Wild grass land, creepers growth (Location near Dibru national park junction)	No visible contamination
9	P9 – North – Dibru National Park	2.3 km	Junction point of Subh nala and Dibru River, grass land	No Visible contamination
10	P10 – East –250 m from BGN#5	190 m	Cattle grazing seen, vegetable cultivation, grass land, Near bioremediation area	No visible contamination Oily odour has been noticed
11	P11 – North West- 250 m from BGN #5	460 m	Tea Garden, Banana plantation, vegetable cultivation	No visible contamination
12	P12 – North 540 m from BGN#5, Baghjan	377 m	Tea garden, Fig, Pepper, Kamul, Termaric, Banana, Bagu Zooran cultivation	No visible contamination
13	P13 – North East, 1 km from BGN#5	819 m	Opp. Side of Subh Nala, Rich agricultural land, Vegetable cultivation	Farmers reported some batches of damage in tea after BGN# accident. Re-growth of tea plantation seen, Damaged Few batches has been removed.
14	P14 – North East – Dighastarang	1.9 km	Tea garden, Tambul cultivation	No Visible contamination
15	P15 – South East – Magori Bell	1.2 km	Near tea plantation, Water hyacinth-Eichhornia, Creepers and climbers	No visible contamination
16	P16- North West – Erakhuli Gaon	6.17 km	Vegetable cultivation	No visible contamination

17	F-1 – South East Magori Bell	1.3 km	6 variety of fish has been collected	Point were some domestic garbage and wastewater mixing with wet land area
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There is no accumulation of TPH and total PAH including Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Anthracene, Phenanthrene, Fluoranthene, Pyrene, Benz[A]Anthracene, Chrysene, Benzo[K]Fluoranthene, Benzo[A]Pyrene, Benzo[ghi]Perylene, Dibenz[ah]Anthracene, Indeno[1,2,3-cd]Pyrene, Benzo[B]Fluoranthene in the analyzed plant biomass. Trace elements are required in lesser amount for the biological system, which include iron (Fe), copper (Cu), manganese (Mn) and zinc (Zn), but their high levels leads to toxic. Among 16 plant samples including grass, plant parts and vegetables collected for the analysis of heavy metals.

Among various heavy metals tested, mercury and hexavalent chromium showed the below detection limit. The copper (0.09 to 3.45 mg/kg), lead (maximum 1.28 mg/kg) and nickel (0.3 to 2.62 mg/kg) were found within the WHO limit of 10 mg/kg (copper), 2 mg/kg (Lead) and Nickel (10 mg/kg).

The heavy metal cadmium found in the range of 0.04 to 0.08 mg/kg which was exceeded the permissible value (0.02 mg/kg) of plant prescribed by WHO. Similarly Zinc concentration (0.3 to 5.35 mg/kg) was also exceeded the WHO permissible limit (0.6 mg/kg). Interestingly blowout associated pollutants like TPH, BTEX and PAH was found below the detection limit shows that these low level of heavy metal accumulation in plant may be due to anthropogenic activities including heavy metals occurrence in soil system leads to accumulation in vegetation/plant biomass (Table 14 & 15).

Table 14. Heavy metal, TPH and BTEX content in vegetation samples collected from surrounding environment

S.No.	Sample ID	Sampling Location	Copper, mg/kg	Cadmium, mg/kg	Lead, mg/kg	Mercury, mg/kg	Nickel, mg/kg	Hexavalent Chromium, mg/kg	Zinc, mg/kg	TPH %	BTEX
1	BSE-P01-34302226	SE, Maguri Motapung Beel	1.98	0.05	0.32	BLQ	1.18	BDL	1.49	BLQ	BLQ
2	BSW-P02-34462215	SW, Maguri Crop field	1.4	BLQ	0.19	BLQ	0.67	BDL	2.17	BLQ	BLQ
3	BSW-P03-35192224	SW, Maguri Motapung Beel	1.74	BLQ	0.56	BLQ	0.7	BDL	2.54	BLQ	BLQ
4	BSE-P04-35252241	SW, Maguri Motapung area	1.2	0.02	0.41	BDL	1.12	BDL	2.8	BLQ	BLQ
5	BGN-P05-35472254	In and around BGN#5	0.99	0.02	0.52	BLQ	2.62	BLQ	3.3	BLQ	BLQ
6	BNW-P06-34532021	Junction point Dibru and Maguri	2.39	0.08	1.28	BLQ	1.28	BLQ	0.82	BLQ	BLQ
7	BNW-P07-35132145	NW, Dangori and Motapung River junction	1.64	0.04	1.14	BLQ	1.23	BLQ	2.31	BLQ	BLQ
8	BN-P08-36572257	North, Dibru National Park	1.1	0.05	0.8	BLQ	2.36	BLQ	5.35	BLQ	BLQ
9	BN-P09-37012259	North, Dibru National Park	0.5	0.05	0.6	BLQ	0.63	BLQ	2.2	BLQ	BLQ

10	BE-P010-35422252	East, 250 m from BGN+5	2.39	0.04	0.95	BLQ	1.87	BLQ	1.5	BLQ	BLQ
11	BNW-P011-35502238	NW, 250 m from BGN#5	1.22	BLQ	BQL	BLQ	BDL	BLQ	0.3	BLQ	BLQ
12	BN-P012-35572249	North, 540 m from BGN#5, Baghjan	0.09	0.05	0.82	BLQ	0.5	BLQ	1.76	BLQ	BLQ
13	BNE-P013-36092308	NE, 1 km from BGN#5	0.57	0.06	0.99	BLQ	0.35	BLQ	1.57	BLQ	BLQ
14	BNE-P014-36192355	NE, Dighastarang, Baghjan	3.45	0.06	0.17	BLQ	1.19	BLQ	2.33	BLQ	BLQ
15	BSE-P015-35262335	SE, Maguri Beel, Baghjan	0.66	0.04	0.4	BLQ	1.55	BLQ	2.65	BLQ	BLQ
16	BNW-P016-35281904	NW, Erakhuli Gaon	1.09	0.05	0.3	BLQ	0.75	BLQ	0.3	BLQ	BLQ
WHO limit, 1996			10	0.02	2	-	10	-	0.6	-	-

Table 15. PAH content in vegetation samples collected from surrounding environment

S.No	Sample ID	Napht halene , mg/kg	Acenaph thylene mg/kg	Acenaph thene, mg/kg	Fluorene , mg/kg	Anthrac ene , mg/kg	Phenant hrene, mg/kg	Fluorant hene, mg/kg	Pyrene, mg/kg	Benz[A]Anthrac ene, mg/kg	Chrysene	Benzo[K] Fluoranthene	Benzo[A]P yrene	Benzo[gh]Pe ryrene	Dibenz[ah] Anthrac ene	Indeno[1 ,2,3- cd]Pyren e	Benzo[B]Fluoran thene
1	BSE-P01-34302226	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	BSW-P02-34462215	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
3	BSW-P03-35192224	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
4	BSE-P04-35252241	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
5	BGN-P05-35472254	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
6	BNW-P06-34532021	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
7	BNW-P07-35132145	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
8	BN-P08-36572257	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
9	BN-P09-37012259	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
10	BE-P010-35422252	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
11	BNW-P011-35502238	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
12	BN-P012-35572249	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
13	BNE-P013-36092308	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
14	BNE-P014-36192355	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	BSE-P015-35262335	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	BNW-P016-35281904	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ

6.4 Aquatic Environment

The surface and ground water quality of water samples from selected location within 2 km radius was assessed to know the impact of BGN#5 blowout. The representative water samples has been collected from South East, South West, North West and North East direction from BGN well#5 covering 2 km radius. Among 13 water samples, two (2) surface water samples, ten (10) ground water samples and one (1) control ground sample has been collected (Table 16). The laboratory analysis report of water samples is enclosed as Annexure 1C.

The parameters such as Colour and Odour, pH, Turbidity, Electrical conductivity, Total dissolved solids, Total suspended solids, Dissolved oxygen, BOD, COD, Total hardness, Total alkalinity, Oil and Grease, Ammoniacal Nitrogen, Chloride, Calcium, Magnesium, Fluoride, Phenolic compounds, Copper, Zinc, Nickel, Iron, Total Chromium, Chromium (as Cr⁶⁺), Lead, Sulphide, Sulphate, Cadmium and Polynuclear aromatic hydrocarbons (as PHA). The sampling locations were selected randomly to cover all the surrounding direction and distribute throughout the area in the distance of 120 m, 264 m, 270 m, 392 m, 575 m, 873 m, 1.2 km, 1.9 km, 2.1 km, 2.3 km, 2.6 km and 5 km (control sample) from BGN well#5 (Table 16, 17 &18).

Table 16. Summary of field observation from surrounding aquatic environment

S.No	Sampling Location	Distance from BGN#5	Type of water sample	Depth of Ground water	Other observations
1	South East, Maguri Motapung Beel	2.6 km	Wet land surface water	20 foot	Clear water
2	South West, Maguri Motapung Crop field	2.6 km	Ground water	30 foot	Clear water
3	South West, Maguri Motapung Crop field	2.1 km	Ground water	70 foot	Clear water, Iron taste
4	North West, Dongri and Motapung River side	2.3 km	Ground water	45 foot	Clear water, Iron taste
5	East, Near BGN#5 (100 m from BGN#5)	270 m	Ground water	40 foot	Hand pump
6	East, Ritu Moran House Near BGN#5 (100 m)	120 m	Ground water	40 foot	Iron and oily odor, Precipitate in first pumping
7	Near West, BGN#5 (450 m)	575 m	Ground water	40 foot	Near Dibru river, Drinking water source,
8	North West 130 m from BGN#5	264 m	Surface water	Stagnant rain water	Near wet land , grass land area
9	North, Baghjan (600 m from BGN#5)	392 m	Ground water	40 foot	Clear water, Iron odor, Soar taste
10	North East (1 km from BGN#5)	873 m	Ground water	50 foot	Clear water, Iron taste water
11	North East - Dighaltarang Village	1.9 km	Ground water	46 foot	Within Tea garden

12	W12 – South East – Maguri Motapung Beel	1.2 km	Ground water	40 foot	Clear water, Iron odor
13	W-13- Control sample, Plastic Park, Tinsukia	5 km	Ground water	40 foot	Considered as control sample

Table 17. Physico-chemical quality of ground water samples

S.No.	Sample ID	Odour	Colour	pH	Turbidity, NTU	Electrical conductivity, $\mu\text{S}/\text{cm}$	TDS, mg/L	TSS, mg/L	DO, mg/L	BOD, mg/L
1	BSE-W01-34312226	Agreeable	Colourless	8.19	<1	162	98	10	8.4	3.4
2	BSW-W03-34472215	Agreeable	Light yellow	7.29	13	216	132	13	7.8	BDL
3	BNW-W04-35112138	Agreeable	Dark Yellow	6.88	80.6	756	469	11.6	6.4	11.6
4	BE-W05-35452253	Agreeable	Colourless	6.04	<1	210	129	8	7.5	4.4
5	BE-W06-35422251	Agreeable	colourless	6.7	<1	679	415	1	7.4	3.4
6	BNW-W07-35522234	Agreeable	colourless	7.19	<1	221	134	BDL	7.4	BDL
7	BN-W09-35572249	Agreeable	Colourless	6.97	<1	136	86	BDL	8.4	BDL
8	BNE-W010- 36092309	Agreeable	Colourless	6.7	<1	112	69	BDL	8.4	BDL
9	BNE-W011- 36182355	Agreeable	Colourless	5.76	<1	310	188	BDL	8	BDL
10	BSE-W012- 35302335	Agreeable	Colourless	5.58	<1	136	84	2	6.4	BDL
11	BC-W013-32102124	Agreeable	Colourless	6.88	<1	230	142	2	8.3	16.47
	Requirment as per drinking water specification IS 10500:2012	Agreeable	-	6.5 - 8.5	1	-	500	-	-	-

Table 18. Chemical characteristics of ground water samples

S.No.	Sample ID	COD, mg/L	Total Hardness, mg/L	Total alkalinity, mg/L	Oil and grease, mg/L	Ammoniacal Nitrogen, mg/L	Chloride, mg/L	Phenolic compounds, mg/L	Sulphi de, mg/L	Sulphat e, mg/L
1	BSE-W01- 34312226	12	66	68	BDL	BDL	3.94	0.0125	BDL	3.64
2	BSW-W03- 34472215	8	84	104	BDL	BDL	BDL	0.028	BDL	2.86
3	BNW-W04- 35112138	40	364	426	BDL	4.5	2.96	0.0036	BDL	1.9
4	BE-W05- 35452253	16	74	50	BDL	0.95	8.87	0.0399	BDL	32.29
5	BE-W06- 35422251	12	244	286	BDL	BDL	26.61	0.0146	BDL	31.63
6	BNW-W07- 35522234	8	94	100	BDL	BDL	3.94	0.0293	BDL	4.29
7	BN-W09- 35572249	BDL	38	38	BDL	BDL	9.86	0.0186	BDL	8.85
8	BNE-W010- 36092309	8	36	32	BDL	BDL	9.86	0.0235	BDL	BDL
9	BNE-W011- 36182355	8	80	12	BDL	BDL	44.35	0.0199	BDL	2.32
10	BSE-W012- 35302335	8	38	16	BDL	BDL	14.78	0.02	BDL	5.68
11	BC-W013- 32102124	52	70	62	BDL	BDL	21.68	0.0119	BDL	12.6

Requirement as per drinking water specification IS 10500:2012	-	200	200	-	0.5	250	0.001	0.05	200
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In order to find put the movement of pollution plume in and around BGN#5 blowout incident area, the detailed sampling and analysis was carried out carried. The finger print of major pollutant such as oil & grease, PAH and metallic compounds including other physic-chemical parameters was analyzed. As results shown in the table 2 & 3, the oil & grease, PAH and heavy metals were below the detection limit. The pH, electrical conductivity, TDS, TSS, Total hardness, chloride, sulphide and sulphate were within the acceptable limit of IS: 10500, 2012 drinking water standard. The sampling area was rich biodiversity and agricultural field with high groundwater-table. The sampling has been carried out covering agricultural fields, Maguri Motapung Beel and residential area (Table 19).

Table 19. Heavy metal and PHA content of ground water samples

S.No	Sample Location	Zinc, mg/L	Nickel, mg/L	Iron, mg/L	Chromium, mg/L	Chromium (as Cr ⁶⁺), mg/L	Lead, mg/L	Cadmium, mg/L	Polynuclear aromatic hydrocarbons (as PAH), mg/L	Copper, mg/L	Fluoride, mg/L	Calcium, mg/L	Magnesium, mg/L
1	BSE-W01-34312226	BLQ	BLQ	BLQ	BLQ	BDL	BLQ	BLQ	BLQ	BLQ	BDL	12.45	7.59
2	BSW-W03-34472215	BLQ	BLQ	BLQ	BLQ	BDL	BLQ	BLQ	BLQ	BLQ	0.08	29.11	13.96
3	BNW-W04-35112138	BLQ	BLQ	BLQ	BLQ	BDL	BLQ	BLQ	BLQ	BLQ	BDL	97.8	45.65
4	BE-W05-35452253	BLQ	BLQ	BLQ	BLQ	BDL	BLQ	BLQ	BLQ	BLQ	BDL	56.25	26.87
5	BE-W06-35422251	BLQ	BLQ	BLQ	BLQ	BDL	BLQ	BLQ	BLQ	BLQ	BDL	52.05	25.15
6	BNW-W07-35522234	BLQ	BLQ	0.3	BLQ	BDL	BLQ	BLQ	BLQ	BLQ	BDL	33.75	13.78
7	BN-W09-35572249	BLQ	BLQ	BLQ	BLQ	BDL	BLQ	BLQ	BLQ	BLQ	BDL	13.55	4.63
8	BNE-W010-36092309	BLQ	BLQ	BLQ	BLQ	BDL	BLQ	BLQ	BLQ	BLQ	BDL	19.15	6.15
9	BNE-W011-36182355	BLQ	BLQ	BLQ	BLQ	BDL	BLQ	BLQ	BLQ	BLQ	BDL	25.36	11.52
10	BSE-W012-35302335	BLQ	BLQ	BLQ	BLQ	BDL	BLQ	BLQ	BLQ	BLQ	BDL	12.6	4.12
11	BC-W013-32102124	BLQ	BLQ	BDL	BLQ	BDL	BLQ	BLQ	BLQ	BLQ	BDL	18.31	14.38
	Requirement as per drinking water specification IS 10500:2012	5	0.02	0.3	0.05	-	0.01	0.003	0.0001	0.05	1	75	30

The metallic salts and heavy metals such as Zn, Ni, Cr, Cr (⁶⁺), Pb and Cr were found to be below detection limits in all the tested water sample showed that the absence of pollutants plume in the ground water ecosystem. The parameters like total phenolic compounds found to be more than the permissible limit prescribed in IS 10500:2012 which may be due to pecculation from natural sources of phenols to aquatic systems include decomposition of aquatic vegetation.

As presented in below table the two surface water was collected around wet land locations of South East, Maguri Motapung Beel and stagnant surface water from North West 130 m from BGN#5 to know the impact of BGN wellblowout incident. The surface water analysis results were compared with standard water quality requirement given under class D for the water for propagation of wild life and fisheries, CPCB. The parameters such as pH and Dissolved oxygen (DO) were within the limit (pH 6.5 to 8.5; DO: 4 mg/L or more). The BOD content was higher than the CPCB guidelines given under water for Propagation of Wild life and Fisheries. This shows the surface water is loaded with organic loads. But the surface water is free from oil and grease, PAH and heavy metal contamination. This results reveals that during the sampling period the surface is free from contamination from BGN blowout incident (Table 20, 21 & 22).

Table 20 . Physico-chemical quality of surface water samples

S.No.	Sample ID	Odour	Colour	pH	Turbidity, NTU	Electrical conductivity, $\mu\text{S/cm}$	TDS, mg/L	TSS, mg/L	DO, mg/L	BOD, mg/L
1	BSE-W01-34312226	Agreeable	Colourless	8.19	<1	162	98	10	8.4	3.4
8	BNW-W08-35512247	Agreeable	Light yellow	7.12	<1	256	158	6	7.6	8
	Class D, CPCB requirement under Propagation of Wild life and Fisheries	-	-	6.5 - 8.5	-	-	-	-	4 mg/l or more	2 mg/l or less

Table 21. Chemical quality of surface water samples

S.No.	Sample ID	COD, mg/L	Total Hardness, mg/L	Total alkalinity, mg/L	Oil and grease, mg/L	Ammoniacal Nitrogen, mg/L	Chloride, mg/L	Phenolic compounds, mg/L	Sulphide, mg/L	Sulphate, mg/L
1	BSE-W01-34312226	12	66	68	BDL	BDL	3.94	0.0125	BDL	3.64
8	BNW-W08-35512247	24	74	114	BDL	BDL	6.9	0.0193	BDL	3.24

Table 22. Heavy metals and PAHs content of surface water samples

S.No.	Sample Location	Zinc, mg/L	Nickel, mg/L	Iron, mg/L	Chromium, mg/L	Chromium (as Cr6+), mg/L	Lead, mg/L	Cadmium, mg/L	Polynuclear aromatic hydrocarbons (as PHA), mg/L	Copper, mg/L	Fluoride, mg/L	Calcium, mg/L	Magnesium, mg/L
1	BSE-W01-34312226	BLQ	BLQ	BLQ	BLQ	BDL	BLQ	BLQ	BLQ	BLQ	BDL	12.45	7.59
8	BNW-W08-35512247	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	0.09	23.94	7.49

6.4.1 Fish sample analysis

Maguri Motapung beel is home to 84 species of fish and one of important wetland system situated in the periphery of BGNweel #5. One representative fish sample has been collected from Maguri Motapung Beel and analyzed for the Heavy metals, PAH and BTEX. The analysis results shows there no accumulation of PAH, BTEX and tested heavy metals like cadmium, lead, mercury, nickel and hexavalent chromium. The trace level of zinc 0.3 mg/kg has been recorded in the homogenized mixture. As per the WHO/FAO 1989 guidelines, the permissible limit for the zinc in the fish and fish product is 40 mg/kg (Table 23 & 24).

The present analysis imply that the aquatic organism is not contaminated with TPH and its associated pollutants from BGN blowout incident. The laboratory analysis report of fish samples is enclosed as Annexure 1D.



Fig. 6 Different species of fish samples collected as representative sample for the analysis of pollutants

During the field visit there is no fish mortality or any other oil floating material or condensate was observed.

Table 23. Heavy metals, PAHs and BTEX content in fish sample

Sample ID	Location	Copper, mg/kg	Cadmium, mg/kg	Lead, mg/kg	Mercury, mg/kg	Nickel, mg/kg	Hexavalent Chromium, mg/kg	Zinc, mg/kg	TPH %	BTEX
BSE-F01-35262334	SE, Maguri Motapung Beel	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	0.3	BLQ	BLQ

Table 24. PAHs content in fish sample

Sample ID	Location	Naphthalene, mg/kg	Acenaphthylene	Acenaphthene,	Fluorene, mg/kg	Anthracene, mg/kg	Phenanthrene, mg/kg	Fluoranthene, mg/kg	Pyrene, mg/kg	Benz[a]Anthr	Chrysene	Benzo[k]Fluo	Benzo[a]pyrene	Benzo[ghi]perylene	Dibenz[ah]An	Indeno[1,2,3-cd]Pyrene	Benzo[b]Fluoranthene
BSE-F01-35262334	SE, Maguri Motapung Beel	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ

6.4.2 Sediment sample

In order find out the extent of pollution due to BGN incident on aquatic system, the sediment samples from Maguri Motapung beel and Dangri Motapung River junction and Dibru river was assessed (Table 25). Total Petroleum Hydrocarbon: The TPH concentration range from 117.8 mg/kg to 1597.7 mg/kg was observed in all the four sediment sample.

The presence of TPH in the sediment sample may be due to contribution from anthropogenic sources. Even though the Maguri Motapung sediment showed traces of TPH but the water sample doesn't contain any TPH contamination revealed that the source of TPH in sediment is from various anthropogenic origin including discharge of local domestic water entry to the wetland area.

Among 16 PAH compounds tested, only chrysene was found in the concentration of 0.099 mg/kg which higher than the CCME guideline value of 0.057 mg/kg. All other PAH type was found within the limit given by CCME guideline for protection of freshwater aquatic life. The occurrence of chrysene is not directly linked with BGN blowout incident as chrysene is generally released from smoking process of coal and gasoline. The heavy metal such as Mercury and hexavalent Chromium was below detection limit. Other tested heavy metals such as Cadmium, Zinc, Lead and Copper were found within the guideline limit of CCME for protection of freshwater aquatic life (Table 26 -30).

Other physic-chemical components of sediment samples were in the optimum level. The very low to moderate concentration of TOC was recorded in the sediment samples collected from Maguri Motapung beel (0.4 % & 7.04 %), Dangori Motapung River Junction (0.03%) and Dibru River (0.04%) due to sandy soil nature in river side. The CEC content in the sediment is in the range of 18.2 % to 20.6% shows the high heavy clay content in the sediments. The laboratory analysis report of sediment samples is enclosed as Annexure 1E.

Table 25. Field survey and observations in wetland environment (Sediments)

S.No.	Sampling Location	Sample ID	Soil Type/Cultivation	Observation
1	SE, Maguri Motapung Beel	BSE-SL01-34312226	Gray sediment, sediment from Maguri Beel	No visible contamination
2	NW, Dangri- Motapung River Junction	BNW-SL02-35172141	Redish green batches, Surrounding area of Dibru river	Redish green algal growth looks like oily layer. No odour, This sample collected separately and tested
3	NW, Dibru River	BNW-SL03-36172229	Sediment inside Dibru river	No visible contamination
4	SW, Maguri Motapung Beel	BSE-SL04-35252333	Sediment gray black type, Sediment inside wet land	No visible contamination

Table 26. Physico-chemical characteristic of sediment samples

Sample No.	Sample ID	pH	EC, $\mu\text{S}/\text{cm}$	Avilable Phosphorous mg/kg	Potassium mg/kg	Sodium mg/kg	Total Organic Carbon %	Cation Exchange Capacity	Alkalinity mg/kg	Total Nitrogen mg/kg	Avilable Nitrogen mg/kg	Acidity mg/kg	Choride mg/kg	Sulphate mg/kg	Sodium Absorption Ratio
1	BSE-SL01-34312226	7.91	244	29.6	582.7	107.2	0.4	20.6	124.6	204.87	71.86	15.8	98.05	261.8	2.08
2	BNW-SL02-35172141	8.12	196.4	20.4	538.03	40.32	0.03	18.4	142.6	521.15	136.7	12.6	76.89	174.5	0.92
3	BNW-SL03-36172229	7.29	95.9	24.62	328.97	30.02	0.04	18.2	87.2	156.35	13.67	14.5	58.83	146.2	0.99
4	BSE-SL04-35252333	5.54	535	56.5	358.68	118.74	7.04	19.2	84.6	634.18	775.6	98.7	175.76	452.6	3.86

Table 27. Physical properties of sediment samples

Sample No.	Sample ID	Moisture%	Spec.Gravity	Porosity %	Permeability cm/sec	Sand %	Clay %	Slit %	Texture
1	BSE-SL01-34312226	0.86	2.31	43.6	0.0011	27.8	16.2	56	Slit Loam
2	BNW-SL02-35172141	0.3	2.62	36.64	0.0086	82.2	5	12.8	Sandy Loam
3	BNW-SL03-36172229	0.2	2.67	39.85	0.013	88.6	2.4	9	Sand
4	BSE-SL04-35252333	31.26	1.7	57.4	0.0094	18.6	30.1	51.3	Silt Clay Loam

Table 28. Heavy metal concentration in sediment samples

Sample No.	Sample ID	Cadmium mg/kg	Mercury	Zinc mg/kg	Lead mg/kg	Copper mg/kg	Hexavalent Chromium, mg/kg	Nickel mg/kg
1	BSE-SL01-34312226	0.03	BLQ	0.01	1.1	18.6	BDL	13.7
2	BNW-SL02-35172141	0.016	BLQ	0.02	0.33	0.22	BDL	12.4
3	BNW-SL03-36172229	0.01	BLQ	BLQ	0.06	1.3	BDL	5.1
4	BSE-SL04-35252333	0.06	BLQ	BLQ	1.2	0.05	BDL	4.3

Table 29. PAHs concentrations in sediment samples

Sample No.	Sample ID	Naphthalene mg/kg	Acenaphthalene mg/kg	Acenanthrene mg/kg	Fluorene mg/kg	Phenanthrene mg/kg	Anthracene mg/kg	Fluoranthene mg/kg	Pyrene mg/kg	Benzo [A] anthracene	Chrysene mg/kg	Benzo beta fluranthone, mg/kg	Benzo [K] Fluoranthone, mg/kg
1	BSE-SL01-34312226	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	BNW-SL02-35172141	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ

3	BNW-SL03-36172229	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
4	BSE-SL04-35252333	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	0.099	BLQ	BLQ

Table 30. TPH and PAHs concentrations in sediment samples

Sample No.	Sample ID	Benzo alpha Pyrene, mg/kg	Indino 1,2,3 -cd pyrene	Dibenzo (a,h) anthracene	Dibenzo (a,h,i) Perylene	TPH mg/kg	Benzene	Toluene	Ethylbenzene	Xylene
1	BSE-SL01-34312226	BLQ	BLQ	BLQ	BLQ	229.1	BLQ	BLQ	BLQ	BLQ
2	BNW-SL02-35172141	BLQ	BLQ	BLQ	BLQ	163.7	BLQ	BLQ	BLQ	BLQ
3	BNW-SL03-36172229	BLQ	BLQ	BLQ	BLQ	117.8	BLQ	BLQ	BLQ	BLQ
4	BSE-SL04-35252333	BLQ	BLQ	BLQ	BLQ	1597.7	BLQ	BLQ	BLQ	BLQ

7 MAJOR FINDINGS AND CONCLUSION

The quality of accidental zone is mainly assessed through health of the surrounding terrestrial and aquatic system consisting of soil, vegetation, water and wetland sediments. The soil and water and its capacity to functions are generally evaluated through inherent and dynamic soil properties.

The major outcomes of the present study are

- The soil, water, vegetation and sediment samples were collected from different locations around vicinity area of Baghjan BGN well # 5 including grassland, agricultural area, tea garden, homestead teagarden, wetland, residential area, within fencing area of BGN#5, bioremediation area including Maguri Montapung Beel and Dibru National Park.
- From the field observation and sample analysis results, the within fencing area of BGN well No#5 has slightly alkaline soil due to contamination and the site is under bioremediation. The TPH contamination was reported in all the collected soil sample within 2 km radius as well as Erakhuil Goan located 6 km away from BGNwell#5 but the contamination level was within Dutch guideline limit (<5000 mg/kg).
- Among 17 **soil samples** collected from different locations, South west zone of Maguri Beel sample showed trace level of Fluoranthene (0.15 mg/kg) and Pyrene (0.11 mg/kg) PAHs was recorded. This is not significantly higher than the CCME screening level guidelines (Fluoranthene 0.1 mg/kg and Pyrene 0.1 mg/kg) for the Protection of Environmental and Human Health (Table 8-11). In same sample (collected from homestead tea garden and agricultural area) all other PAH fractions showed below detectable limit. This trace level of Pyrene and Fluoranthene may be due to anthropogenic sources of pollutants. The BTEX concentration was also below detection limit in all tested soil samples. This showed that the BGN blowout incident is not influenced the occurrence of pollutants like heavy metals, PAH and BTEX. The other physico-chemical properties analysis results showed that the soil is comparable with normal soil type. This TPH level need to be monitored regularly to take decision on its mitigation measures.
- Among various heavy metals tested in **plant/vegetation samples**, mercury and hexavalent chromium showed the below detection limit. The copper (0.09 to 3.45 mg/kg), lead (maximum 1.28 mg/kg) and nickel (0.3 to 2.62 mg/kg) were found within the WHO limit of 10 mg/kg (copper), 2 mg/kg (Lead) and Nickel (10 mg/kg). The heavy metal cadmium found in the range of 0.04 to 0.08 mg/kg which was exceeded the permissible value (0.02 mg/kg) of plant prescribed by WHO. Similarly Zinc concentration (0.3 to 5.35 mg/kg) was also exceeded the WHO permissible limit (0.6 mg/kg). Interestingly blowout associated pollutants like TPH, BTEX and PAH was found below the detection limit shows that these

low level of heavy metal accumulation in plant may be due to anthropogenic activities including heavy metals occurrence in soil system leads to accumulation in vegetation/plant biomass. These trace level of few heavy metal accumulation in the plant and vegetation sample is not relate with BGN blowout incident.

- Among 13 water samples, two (2) **surface water samples**, ten (10) **ground water samples** and one (1) control ground water sample has been collected to know the impact of BGN blowout accident on the water ecosystem.
- In order to find put the movement of pollution plume in surrounding **groundwater environment**, the detailed sampling and analysis was carried out carried. The finger print of major pollutant such as oil & grease, PAH and metallic compounds including other physic-chemical parameters was analyzed. The sampling has been carried out covering agricultural fields, Maguri Motapung Beel and residential area. The metallic salts and heavy metals such as Zn, Ni, Cr, Cr (⁶⁺), Pb and Cr were found to be below detection limits as per IS 10500:2012 drinking water standards. In all the tested water sample showed that the absence of pollutants plume in the ground water ecosystem. The parameters like total phenolic compounds found to be more than the permissible limit prescribed in IS 10500:2012 which may be due to pecculation from natural sources of phenols to aquatic systems include decomposition of vegetation.
- The **surface water analysis** results were compared with standard water quality requirement given under class D for the water for propagation of wild life and fisheries, CPCB. The parameters such as pH and Dissolved oxygen (DO) were within the limit (pH 6.5 to 8.5; DO: 4 mg/L or more). The BOD content was higher than the CPCB guidelines given under water for Propagation of Wild life and Fisheries. This shows the surface water is loaded with organic loads. But the surface water is free from oil and grease, PAH and heavy metal contamination. This results reveals that during the sampling period the surface is free from contamination from BGN blowout incident
- The representative **fish sample** has been collected from Maguri Motapung Beel and analyzed for the Heavy metals, PAH and BTEX. The analysis results shows there no accumulation of PAH, BTEX and tested heavy metals like cadmium, lead, mercury, nickel and hexavalent chromium. The trace level of zinc 0.3 mg/kg has been recorded in the homogenized mixture. As per the WHO/FAO 1989 guidelines, the permissible limit for the zinc in the fish and fish product (40 mg/kg).
- In order find out the extent of pollution due to BGN incident on aquatic system, the sediment samples from Maguri Motapunf beel and Dangri Motapung River junction and Dibru river was assessed. Total Petroleum Hydrocarbon: The TPH concentration range from 117.8 mg/kg to 1597.7 mg/kg was observed in all the four sediment sample. The presence of TPH in the sediment sample may be due to contribution from anthropogenic sources. Even though the Maguri Motapung sediment showed traces of TPH but the water sample doesn't contain any TPH contamination revealed that the source of TPH in sediment is from various anthropogenic origin including discharge of local domestic water entry to the wetland area.

- Based on the sampling and analysis of soil, water and vegetation sample in surround environment including bioreserve, the present study analysis reveal the absence of significant pollutants except traces of TPH content in the soil and sediment (within the acceptable limit) may require further monitoring and intervention.

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A unique developing country institution, TERI is deeply committed to every aspect of sustainable development. From providing environment-friendly solutions to rural energy problems to helping shape the development of the Indian oil and gas sector; from tackling global climate change issues across many continents to enhancing forest conservation efforts among local communities ; from advancing solutions to growing urban transport and air pollution problems to promoting energy efficiency in the Indian Industry, the emphasis has always been on finding innovative solutions to make the world a better place to live in. However, while TERI's vision is global, its roots are firmly entrenched in Indian soil. All activities in TERI move from formulating local and national-level strategies to suggesting global solutions to critical energy and environment-related issues. TERI has grown to establish a presence in not only different corners and regions of India, but is perhaps the only developing country institution to have established a presence in North America and Europe and on the Asian continent in Japan, Malaysia, and the Gulf.

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The Energy and Resources Institute

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**IN THE SUPREME COURT OF INDIA
CIVIL APPELLATE JURISDICTION**

CIVIL APPEAL NO.2201 OF 2021

IN THE MATTER OF:

BONANI KAKKAR

...APPELLANT

VERSUS

OIL INDIA LIMITED & ORS.

...RESPONDENTS

**COUNTER AFFIDAVIT ON BEHALF OF OIL INDIA
LIMITED (RESPONDENT NO.1) TO CIVIL APPEAL AND
FINAL REPORT DATED 31.12.2021.**

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ANNEXURE R7 Bioremediation services of contaminated soil & water bodies due to oil spillage resulting from blow out of well number BGN#5



Prepared for



Oil India Limited, Duliajan, Assam.

T E R I. 2020

Bioremediation of oily Soil & water at BGN#5, Oil India Limited, Duliajan, Assam.

New Delhi: The Energy and Resources Institute.

[Project Report No. 2020BR01]

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We express gratitude to Oil India Limited, Duliajan, Assam for the enthusiastic support since the beginning till the now.

Dr. Banwari Lal
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04.12.2020

Project Summary

Bioremediation of oily soil & water at BGN #5, Oil India Limited, Duliajan, Assam.	
Work order Number for contract no 6114478/Date	8123642
Project Code by TERI	2020BR01
Total quantity as per work order :	12000 M ³
Quantity of oily soil provided for bioremediation	12000 M ³
Project started on	6 th June, 2020
Project completed on	4 th Dec, 2020
Duration of the project	6 Months
Microbes used for Bioremediation	Developed by R&D,OIL

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CHAPTER 1.— Introduction.

Oil India Limited (OIL), Duliajan Assam occupies a key role in the economy of our country. It unavoidably generates some quantity of oily sludge, oil soaked soil and water bodies contamination resulting of accidental spillage which constitutes a major challenge for hazardous waste management as well as environment protection. Management of oily sludge, soil and oily water is one of the major problems being faced by the many countries.

Oily sludge, soil and oily contaminated water are hazardous waste which causes enormous environmental pollution. According to the existing classification of hazardous waste, the petroleum oily sludge, oily soil and water resulting of oil spillage fall under Hazardous Waste Category. Due to stringent norms by regulatory authority and corporate responsibility of oil refinery to protect environment, new techniques are continuously in demand in India to manage oily sludge. However, in developed countries, new technologies are continuously being invented and implemented for treatment of this type of oily waste. Several technologies, which were considered emerging a few years back, are now well accepted in the field of hazardous waste treatment. One of the new technologies is bioremediation of oily sludge using specialised bacteria. These specialised bacteria have the capability to breakdown and digest oily sludge and convert them into harmless products like carbon dioxide, water and fatty acids.

As a timely response to the increasing importance of such microorganisms that can biodegrade and detoxify oily sludge, R&D, Oil India Limited, Duliajan, Assam has developed a microbial consortium (a mixture of five bacterial strains), which can biodegrade all the fractions of oily sludge.

With the application of this microbial consortium developed by R&D Oil India Limited, Duliajan, Assam, oily soil and contaminated water bodies resulting from blow out of well number BGN#5 near Baghjan village have been treated. Approximate 12000 M³ of oily soil along with water was under treatment at well number BGN#5, Baghjan.

The present project deals with bioremediation of 12000 M³ of oily soil/oily water vide work order no. 8123642.

Bioremediation: What is Bioremediation?

Bioremediation is a process that uses naturally occurring microorganisms to transform harmful substances to nontoxic compounds. There are innumerable strains of microbes under basic categories of bacteria, yeast or fungi, which degrade oily sludge and waste water effluent sludge through digestion of harmful chemicals and compounds present in oily sludge and waste water effluent sludge into simpler, less toxic or non-toxic substances. Microorganisms, like all living organisms, need nutrients (such as nitrogen, phosphate, and trace metals), carbon and energy to survive. These beneficial microbes break down a wide variety of organic (carbon-containing) compounds found in oily sludge and waste water effluent sludge to obtain energy for their growth. Many species of soil bacteria, for example, use petroleum hydrocarbons as a food/energy source, transforming them into harmless substances consisting mainly of carbon dioxide, water and fatty acids. Bioremediation exploits this natural process by promoting the growth of microbes that can effectively degrade specific contaminants and convert them to nontoxic bi-products. There are two basic types of bioremediation: "Biostimulation" provides nutrients to the indigenous microbial populations. This promotes growth and increases metabolic activity that is used to degrade contaminants. "Bioaugmentation" introduces specific blends of microorganisms into a contaminated environment or into a bioreactor to initiate the bioremediation process, which increases the population of the fit to handle the biodegradation process in the contaminated area.

CHAPTER 2. — Methods

Selection of site for bioremediation and joint assessment.

Bioremediation of oily soil and oil contaminated water bodies at Oil India Limited, Duliajan, Assam near well number BGN#5, Baghjan were undertaken by TERI, New Delhi. The bioremediation was initiated in the month of June 2020. Total 12000 M³ of oily soil along with oily water bodies was undertaken for bioremediation.

At Oil India Limited, Duliajan, Assam near Baghjan village a gas well number BGN#5 blowed out accidentally during its maintenance service. Resulting of this blow out surrounding area and water bodies became contaminated from oil. Looking as a major environmental hazard emergency this site has been undertaken on priority basis for Bioremediation of oily contamination.

To determine oily contaminated area and oil contaminated soil/ water quantity in surrounding of well number BGN#5, a joint (TERI and Oil India Ltd) assessment operation was carried out physically on 19/06/2020 and also with the help of fly drone.

For assessment purpose fire incident area around well number BGN#5 was physically visited by joint team members from TERI and Oil India Ltd, during assessment, it was observed that in land area oily contamination was sporadic and depth of contamination was between 10cm-20cm. In water bodies also contamination was sporadic and depth of contamination varying between 2-4 cm. During the assessment 150m area around flame head of blown out well was not considered, because this area was heat zone area and restricted from free entry to avoid likely health damages or casualties. For assessment purpose area surrounding flame head was divided into zones (Zone-1, Zone-2, Zone-3 and Zone-4).

In this joint (TERI and Oil India Ltd) assessment it had been found that approximately 25,000 M² area in Zone-1, approximately 40,000 M² area in Zone-2, approximately 35,000 M² area in zone-3 and approximately 60,000 M² area in zone 4, thus total 1,60,000 M² area included water bodies were contaminated with oil. Contamination depth in land area was up to average 10cm and in water bodies oily layer thickness was 3cm. So approximately 12000 M³ soil along with water bodies was affected and contaminated by oil resulting from this blow out (Fig.-3). Oily contamination has spread around of well in circular/ elliptical pattern with different and irregular dimensions. For calculating the oily contaminated area including water bodies, whole affected area was divided into four zones, Zone 1, Zone 2, Zone3 and Zone4 as shown in Fig.- 1 &2.

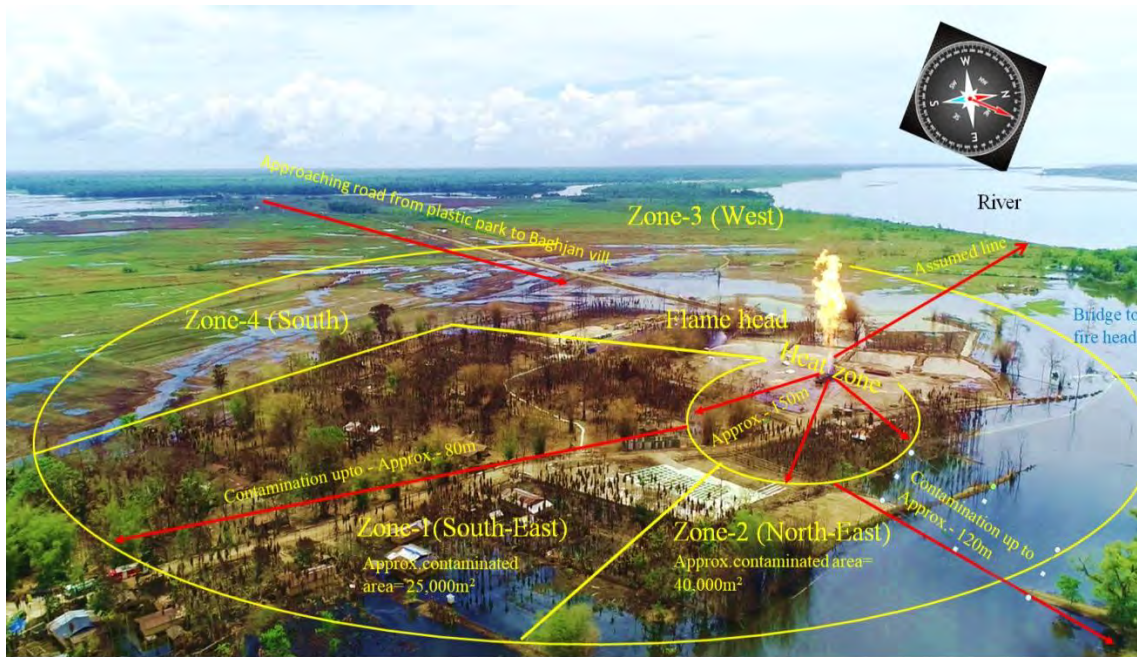


Fig.-1, Photograph of the bioremediation site, Zone -1 and Zone- 2 with dimensions and direction at well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam

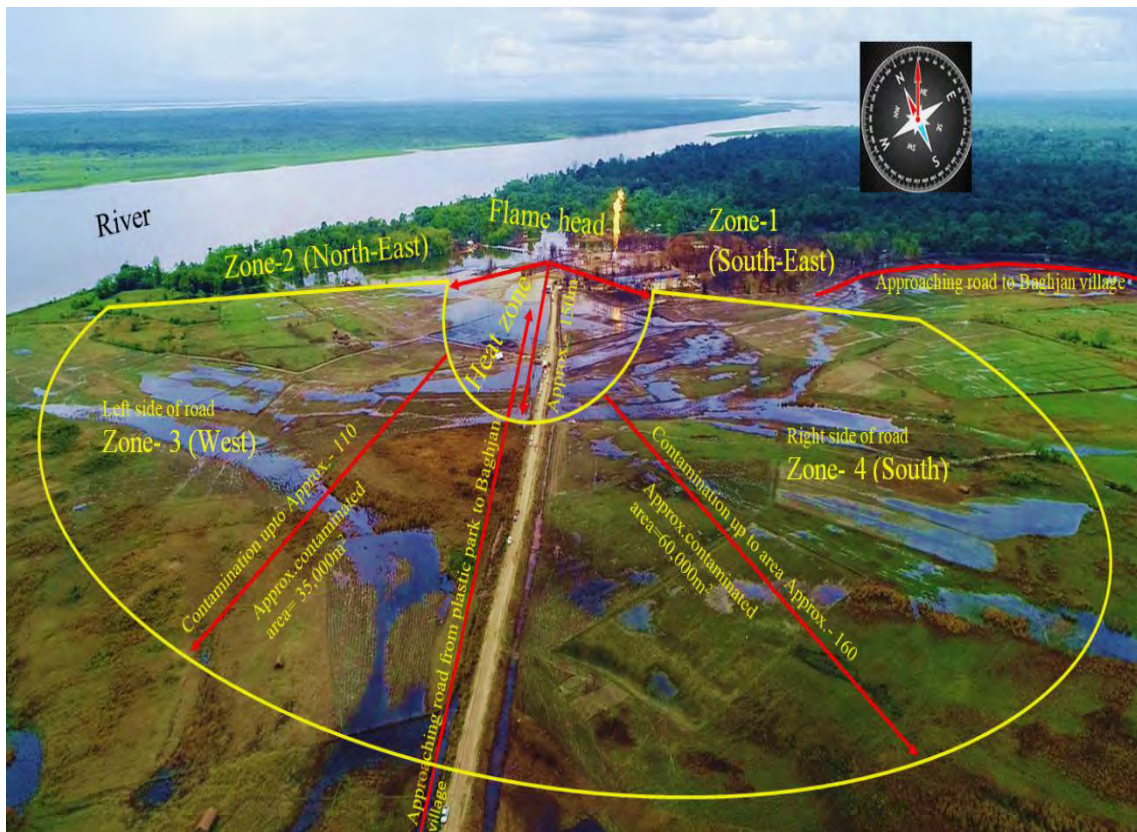


Fig.-2, Photograph of the bioremediation site, Zone -3 and Zone- 4 with dimensions and direction at well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam



Contamination area calculation details:

- Total area divided into 2 zones- Land & Water.
- Based on observation average depth of contamination for Land :10cm
- Based on observation average depth of contamination considered for Water including exposed lands:03cm

Sl No	Area Detail	Area in m ² (Approx)	Average Depth of contamination	Quantity of contamination (m ³)
*	Total Area as provided by M/s. TERI	1, 60,0000	-	-
1	Water Part	70000	03 cm (0.03m)	70000 X 0.03=2100
2	Land Part	90000	10 cm (0.1m)	90000 X 0.10= 9000
Total				11, 100 m3

Now considering the Maguri Beel patches of spillage if traced as indicated by M/s. TERI and additional job involvement during the physical job execution and additional tentative volume (+8.2%) of 900m³, the total volume may be estimated to 12,000.00m³ turnkey (spillage area/s from well BGN#05-source to the Maguri-Motapung Bridge-Baghjan EPS both land and water bodies).

OIL's Representative(s)
Representative(s)

M/s. TERI

Fig.-3. Both parties signed the joint volume assessment of contaminated area.

Sampling Methods:

Soil and water samples were collected from each zone, numbers of samples taken were depending on the physical assessment of contamination observed during the joint assessment. Contaminated soil sample/water sample has been collected from oil contaminated land and oily water bodies area which was identified by the joint team of TERI and OIL during assessment.

These Contaminated soil/water samples were taken from different layer depends on the level of contamination from each sample point and samples were collected in sterilized container. The surface litter at the sampling spot has been removed; hand scoop/ trowel was used to plough the soil up to 15-30 cm. Sample were stored at refrigerated condition before dispatch for analysis. Samples were collected from the recorded coordinate 3 times, i.e., at zero time, intermediate time (second time) and final time.

Codification of samples:

Each sample has been identified with its zone , followed type of samples (soil /water),sample no., time of sampling and village name.

For Example: Zone-1, Soil sample, Second time sampling, Baghjan

The soil sampling has been carried out as per the guidelines of methods manual - Soil testing in India, Department of agriculture and cooperation, Ministry of agriculture, Govt. of India, 2011 and water samples were collected by following method IS 3025 (Part 1) – 1987 (Reaff. 2003).

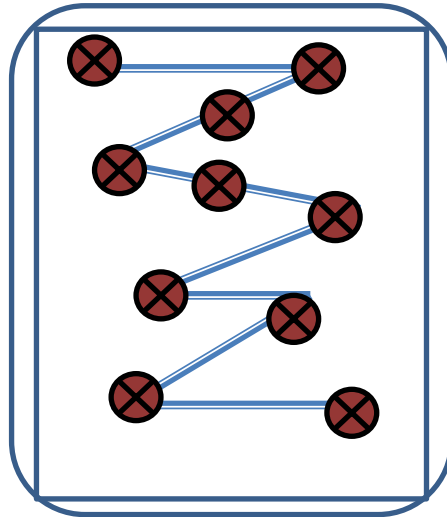
From Zone-1 total 5 samples were collected (2 no. of Soil Samples and 3no. of Water Samples) with coordinates as shown Fig.5. From Zone-2 total 5 samples were collected (4 no. of Soil Samples and 1no. of Water Samples) with coordinates as shown Fig.6. From Zone-3 total 10 samples collected (9 no. of Soil Samples and 1no. of Water Samples) with coordinates as shown Fig.7. From Zone-4 total 10 were samples collected (8 no. of Soil Samples and 2no. of Water Samples) with coordinates as shown Fig.8. All samples with coordinates are presented in Fig.9. Each sample was prepared by the mixing of 10 grab samples. For each sample point coordinates were recorded using hand GPS/mobile android GPS application and coding was mentioned and send to third party NABL accredited laboratory for total petroleum hydrocarbon (TPH). All the time samples were collected from the coordinate

recorded and samples were collected in duplicate by joint team of TERI and Oil India Ltd. One set of sample was handed over to Oil India Ltd to ensure the quality.

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Sampling tools and accessories

Manual pits have been used for collecting soil samples using hand scoop/trowel and samples were collected in sterilized plastic containers/jars. Water samples also were collected in sterilized jars.



One single composite sample consist of 10 sub-samples (Grab samples)

Fig.-4 Illustration of soil sampling (contaminated site), each single sample has been marked in to 10 units of one single composite location (1 to 10). One soil sample from each segment (1-10) and then pooled together to make a one representative composite sample



Fig.-5 Map showing Sample coordinates of Zone-1



Fig.-6 Map showing Sample coordinates of Zone-2



Fig.-7 Map showing Sample coordinates of Zone-3



Fig.-8 Map showing Sample coordinates of Zone-4

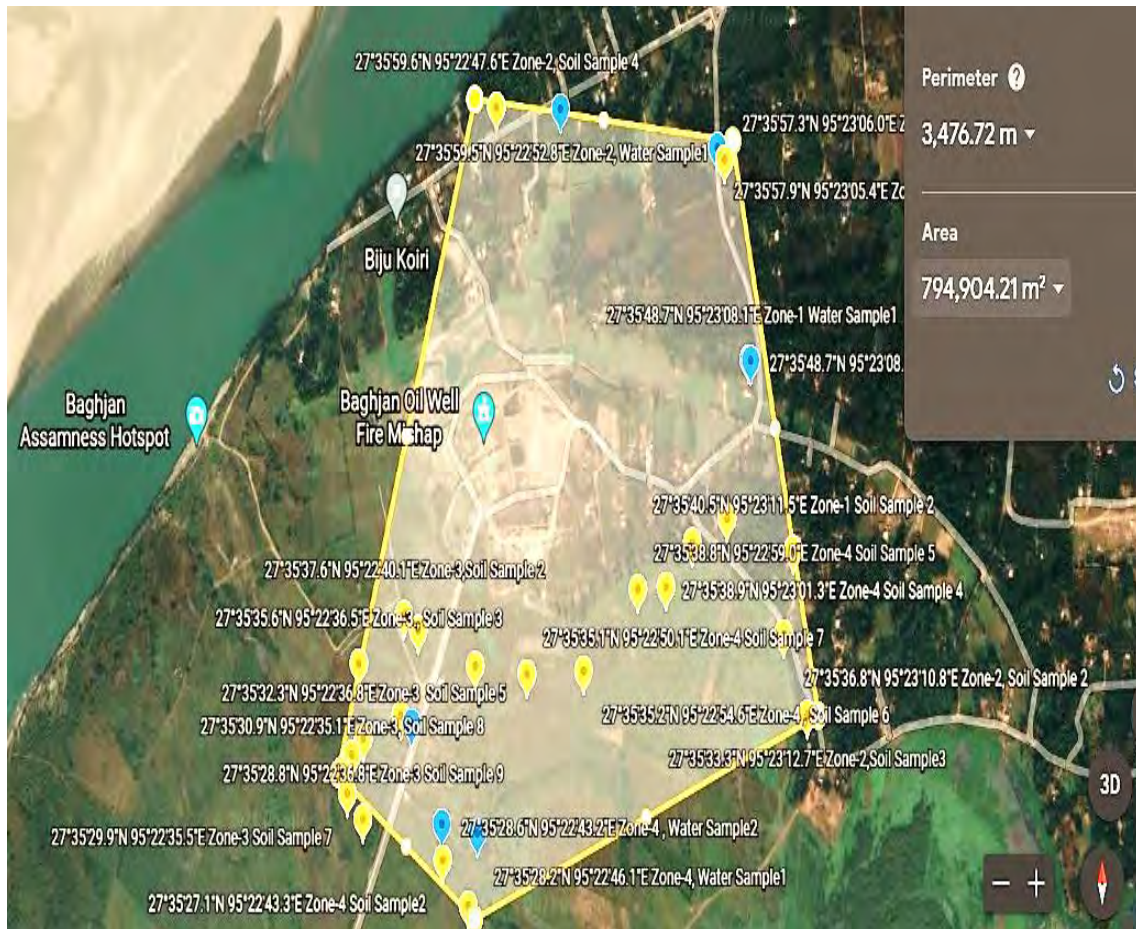


Fig.-9 Map showing Sample coordinates of all Zones (1,2,3,4)

Quality Assurance and Quality Control:

The Quality Assurance and Control Sampling (QA/QC) has been followed as mentioned above. It includes codification of samples, use of standard sampling and analysis procedures and duplicate sample. The soil samples has been collected in individual plastic containers/jars and placed in an ice cooler in the field immediately after soil sample collection. The grab samples from the 10 location (sub-sample) has been later pooled in a large plastic bag, and gently mixed into one composite sample. The composite samples were immediately logged and jarred.

River water survey: For assessing water contamination in Maguri Bill , survey was conducted from Maguri bill bridge (near Natun gaon) upto one kilometre far distance both side by using local boat. In this survey no significant contamination was observed at the time of survey.(Date of assessment 18.06.2020).

Soil collection for refilling: Soil was collected from near Natun gaon.

Based on nature of bioremediation site and ground level circumstances it has been decided that whole oily contaminated area would be bio-remediated through *In-situ* bioremediation method so HDPE lined bioremediation pit construction was not required to carry out bioremediation.

Calculated quantity of microbes (consortium of oil degrading microbes) was applied on oily soil at bioremediation site. First application of microbes on oily soil was started on 31st July, 2020.

Work Schedule of bioremediation of Oily soil at well number **262** BGN#5, Baghjan, Oil India Limited, Duliajan, Assam.

Table 1. Schedule for bioremediation of Oily soil along with oily water bodies at well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam.

S.No.	Work description	Tentative date	Completion date	Work status
1.	Joint assessment of bioremediation site	19/06/2020	19/06/2020	Done
2.	Drone survey of bioremediation site	01/07/2020	06/07/2020 to 07/07/2020	Done
3.	Removing of indigenous vegetation, shrubs and small plants from bioremediation site	20/06/2020 to 20/07/2020	10/08/2020	Done
4.	Base line or zero time line sampling	25/07/2020 to 27/07/2020	25/07/2020 to 30/07/2020	Done
5.	Oil removing from all water bodies and transferring to in-situ bioremediation area	01/08/2020 to 10/08/2020	10.08.2020	Done
6.	First phase microbes application and tilling in whole bioremediation site	31.07.2020 to 10/08/2020	13/08/2020	Done
7.	Second phase microbes application and tilling in whole bioremediation site	02/09/2020 to 07/09/2020	07/09/2020 to 23/09/2020	Done
8.	Intermediate sampling during bioremediation	15/09/2020	08/10/2020 to 09/10/2020	Done
9.	Third phase microbes application and tilling in whole bioremediation site	27/09/2020 to 02/10/2020	17/10/2020 to 20/10/2020	Done
10.	Final sampling of bioremediation site	07/10/2020	26/11/2020	Done
11.	Refilling and reclamation	10/10/2020	27/11/2020	Done

Characterisation of oily soil and oily water undertaken for the bioremediation at well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam. 263

Total 12000 M³ of oily soil along with water bodies was undertaken for bioremediation at well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam. The whole bioremediation site was divided into four zones, zone-1,2,3 and 4. Total 23 samples of oily soil, 7 samples of oily contaminated water bodies and one bore well water sample were collected from all four zones before initiating the bioremediation as zero time samples or base line samples along with coordinates between date 25/07/20 to 30/07/20. These samples were mixed separate properly to get homogenous samples. Randomly some samples of 31 samples were collected in duplicate also for Oil India Limited, Duliajan, Assam and all 31 samples set for TERI, New Delhi has been sent to get third party laboratory analysis. The third party laboratory analysis reports of all 31 zero time or base time line samples attached as annexure number-07. To determine bioremediation rate intermediate samples also collected on 08/10/20 and 09/10/2020 from same coordinates and third time sample as final samples also were collected in same way from same coordinates on 26/11/2020.

Production of microbes to transport at well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam and its application on oily soil at bioremediation site:

The R&D, Oil India Limited, Duliajan, Assam has developed a new bacterial culture by assemble of five bacterial species which could biodegrade all fractions of TPH of oily sludge/ soil. This bacterial culture handed over to TERI by Oil India Limited, R&D dept. Duliajan on 10th June 2020 with non-disclosure agreement. Microbes (oil degrading bacterial culture) was produced in bioreactors of different capacity at TERI laboratory (Figure 12). Microbes culture was mixed with a carrier material and carrier based culture was filled in sterilized polybags (Figure 12). Carrier based material contains 10¹⁰ cfu/g microbes in carrier material. Carrier based microbes material was transported to well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam for its application on oily soil. Microbes culture (live oil degrading bacteria) was applied on oily soil. Nutrient mixture was also applied on oily soil. After application of microbes, oily soil was mixed and tilled by tractor with plough disc or harrow.



Fig.-10 Bacterial culture tubes at Oil India Limited, R&D dept. Duliajan, Assam



Fig.-11 Bacterial culture handed over to TERI by Oil India Limited, R&D dept. Duliajan, Assam.



Fig.-12 : Microbes (Oil degrading bacterial culture) and its production at TERI state-of-the-art facility laboratory.



Fig. -13: Microbes transported to Baghjan, Assam and stored in shaded store.

Quantity of microbes and nutrient applied at the bioremediation site.

In the first phase application of bioremediation of 12000 M3 oily soil, 10,000 kg of microbes along with nutrient was applied. Hence to enhance bioremediation process further 10,000 kg microbes along with nutrient applied as second phase microbes application in the bioremediation site to degrade the oily soil. The quantity of microbes required for degradation of oily soil or sludge varies depending on edaphic factors of contaminated soil/sludge. Again 10,000 kg microbes applied along with nutrient as third phase microbes application.

Ground water monitoring at bioremediation site:

Ground water sample was taken from the bore well present near the bioremediation site in Zone-1 before initiating the bioremediation job on 27/07/2020. For reassessment of ground water during bioremediation final bore well water sample has been collected 26/11/2020. Water from the bore well was flushed out before sampling. After flushing of water from bore well, water sample was collected in bottle. Water sample was fixed by concentrated HNO_3 and transported to the at TERI, New Delhi for the analysis from third party laboratory.

Analysis of selected heavy metals in ground water sample collected from bore well near bioremediation site at well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam.

Ground water samples of bore well situated at downstream of bioremediation sites was collected and analysed for. Ground water sample was collected before and after bioremediation. Water from bore well was flushed out before collection of sample. Water sample was collected in polypropylene bottle. Water samples in polypropylene bottles were fixed with HNO_3 (1N). Samples were transported to TERI for testing by third party NABL accredited lab. Selected heavy metals analysed in water sample.

CHAPTER 3. — Results

Solvent extractable total petroleum hydrocarbon (TPH) of oily soil and water undertaken for the bioremediation at well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam.

At well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam total 12000 M³ of oily soil along with water bodies was undertaken for bioremediation. The whole bioremediation site was divided into four zones, zone-1,2,3 and 4. Total 23 samples of oily soil, 7 samples of oily water bodies and one bore well water sample were collected from all four zones before initiating the bioremediation job as zero time samples or base line samples. Then all the representative samples were mixed thoroughly separate to get the homogenous samples. The solvent extractable total petroleum hydrocarbon (TPH) of oily soil and oily water were estimated by the analysis methods USEPA9071B and APHA-3052. As per contract the analysis of all samples has been gotten from NABL accredited third party laboratory. The third party laboratory NABL accreditation certificate and other certificate are attached as annexure number-3-6, and reports attached as annexure 7-20. The all oily soil, oily water and bore well water samples details with solvent extractable total petroleum hydrocarbon (TPH) content are presented in following table no. 2, 3 & 4. Details TPH and depth of contamination is presented in figures 10-13 and all coordinates with area covered presented in figure14.

Table 2. Base line or Zero time Oily soil and oily water samples details at well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam.

S.NO.	Name of Area or Zone	Type and number of samples	Samples coordinates	Sampling date	TPH	Unit
1.	Zone- 1	Soil sample No.- 1	N- 27°35'41.82871, E- 95°23'6.19836	27/07/2020	51,600	mg/kg
2.	Zone- 1	Soil sample No.-2	N- 27°35'40.43699, E- 95°23'11.543	27/07/2020	66,100	mg/kg
3.	Zone- 1	Water sample No.- 1	N- 27°35'48.66403, E- 95°23'8.11363	27/07/2020	27,300	PPM
4.	Zone- 1	Water sample No.-2	N- 27°35'48.69571, E- 95°23'7.96996	27/07/2020	28,200	PPM
5.	Zone- 1	Water sample No.- 3	N- 27°35'57.8864, E- 95°23'5.43462	27/07/2020	39,900	PPM
6.	Zone- 2.	Soil sample No.-1	N- 27°35'57.32221, E- 95°23'5.98434	27/07/2020	71,500	mg/kg
7.	Zone- 2	Soil sample No.- 2	N- 27°35'36.81276, E- 95°23'10.79124	27/07/2020	66,800	mg/kg

8.	Zone- 2	Soil sample No.-3	N- 27°35'34.63771, E- 95°23'12.70702	27/07/2020	64,100	mg/kg
9.	Zone- 2	Soil sample No.- 4	N- 27°35'59.61826, E- 95°22'47.56148	27/07/2020	39,700	mg/kg
10.	Zone- 2	Water sample No.-1	N- 27°35'59.5279, E- 95°22'52.75315	27/07/2020	38,500	PPM
11.	Zone- 3	Soil sample No.- 1	N- 27°35'36.99874, E- 95°22'41.27621	25/07/2020	37,100	mg/kg
S.NO.	Name of Area or Zone	Type and number of samples	Samples coordinates	Sampling date	TPH	Unit
12.	Zone- 3	Soil sample No.-2	N- 27°35'37.65246, E- 95°22'40.12482	25/07/2020	66,100	mg/kg
13.	Zone- 3	Soil sample No.- 3	N- 27°35'35.5456, E- 95°22'36.49332	25/07/2020	66,900	mg/kg
14.	Zone- 3	Soil sample No.-4	N- 27°35'33.28516, E- 95°22'39.84996	29/07/2020	68,200	mg/kg
15.	Zone- 3	Soil sample No.- 5	N- 27°35'32.30243, E- 95°22'37.11065	29/07/2020	49,700	mg/kg
16.	Zone- 3	Soil sample No.-6	N- 27°35'31.57966, E- 95°22'35.90036	29/07/2020	71,400	mg/kg
17.	Zone- 3	Soil sample No.- 7	N- 27°35'29.94605, E- 95°22'35.54677	29/07/2020	43,200	mg/kg
18.	Zone- 3	Soil sample No.- 8	N- 27°35'30.89123, E- 95°22'35.05969	29/07/2020	68,500	mg/kg
19.	Zone- 3	Soil sample No.- 9	N- 27°35'28.82674, E- 95°22'36.81516	29/07/2020	45,600	mg/kg
20.	Zone- 3	Water sample No.-1	N- 27°35'32.95266, E- 95°22'40.72908	29/07/2020	52,700	PPM
21.	Zone- 4	Soil sample No.- 1	N- 27°35'25.06542, E- 95°22'45.30958	25/07/2020	64,900	mg/kg
22.	Zone- 4	Soil sample No.-2	N- 27°35'27.0434, E- 95°22'43.2435	25/07/2020	54,700	mg/kg
23.	Zone- 4	Soil sample No.- 3	N- 27°35'40.78666, E- 95°23'3.41848	30/07/2020	63,500	mg/kg
24.	Zone- 4	Soil sample No.-4	N- 27°35'38.85688, E- 95°23'1.27619	30/07/2020	43,100	mg/kg
25.	Zone- 4	Soil sample No.- 5	N- 27°35'38.75845, E- 95°22'59.01467	30/07/2020	82,900	mg/kg
26.	Zone- 4	Soil sample No.-6	N- 27°35'35.2432, E- 95°22'54.60913	30/07/2020	35,200	mg/kg
27.	Zone- 4	Soil sample No.- 7	N- 27°35'35.10596, E- 95°22'50.04948	30/07/2020	64,100	mg/kg
28.	Zone- 4	Soil sample No.-8	N- 27°35'35.46006, E- 95°22'45.87827	30/07/2020	68,400	mg/kg
29.	Zone- 4	Water sample No.- 1	N- 27°35'28.21524, E- 95°22'46.05211	25/07/2020	49,200	PPM
30.	Zone- 4	Water sample No.-2	N- 27°35'28.6012, E- 95°22'43.18331	25/07/2020	63,700	PPM

Table 3. Intermediate (second time) oily soil and oily water samples details at well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam.

S.NO.	Name of Area or Zone	Type and number of samples	Samples coordinates	Sampling date	TPH	Unit
1.	Zone- 1	Soil sample No.- 1	N- 27°35'41.82871, E- 95°23'6.19836	09/10/2020	5,000	mg/kg
2.	Zone- 1	Soil sample No.-2	N- 27°35'40.43699, E- 95°23'11.543	09/10/2020	6,200	mg/kg
3.	Zone- 1	Water sample No.- 1	N- 27°35'48.66403, E- 95°23'8.11363	09/10/2020	58	PPM
4.	Zone- 1	Water sample No.-2	N- 27°35'48.69571, E- 95°23'7.96996	09/10/2020	60	PPM
5.	Zone- 1	Water sample No.- 3	N- 27°35'57.8864, E- 95°23'5.43462	09/10/2020	76	PPM
6.	Zone- 2.	Soil sample No.-1	N- 27°35'57.32221, E- 95°23'5.98434	09/10/2020	6,500	mg/kg
7.	Zone- 2	Soil sample No.- 2	N- 27°35'36.81276, E- 95°23'10.79124	09/10/2020	5,400	mg/kg
8.	Zone- 2	Soil sample No.-3	N- 27°35'34.63771, E- 95°23'12.70702	09/10/2020	4,800	mg/kg
9.	Zone- 2	Soil sample No.- 4	N- 27°35'59.61826, E- 95°22'47.56148	09/10/2020	3,600	mg/kg
10.	Zone- 2	Water sample No.-1	N- 27°35'59.5279, E- 95°22'52.75315	09/10/2020	53	PPM
11.	Zone- 3	Soil sample No.- 1	N- 27°35'36.99874, E- 95°22'41.27621	08/10/2020	4,400	mg/kg
12.	Zone- 3	Soil sample No.-2	N- 27°35'37.65246, E- 95°22'40.12482	08/10/2020	5,800	mg/kg
13.	Zone- 3	Soil sample No.- 3	N- 27°35'35.5456, E- 95°22'36.49332	08/10/2020	6,100	mg/kg
14.	Zone- 3	Soil sample No.-4	N- 27°35'33.28516, E- 95°22'39.84996	08/10/2020	5,900	mg/kg
15.	Zone- 3	Soil sample No.- 5	N- 27°35'32.30243, E- 95°22'37.11065	08/10/2020	5,200	mg/kg
16.	Zone- 3	Soil sample No.-6	N- 27°35'31.57966, E- 95°22'35.90036	08/10/2020	6,400	mg/kg
17.	Zone- 3	Soil sample No.- 7	N- 27°35'29.94605, E- 95°22'35.54677	08/10/2020	3,800	mg/kg
18.	Zone- 3	Soil sample No.- 8	N- 27°35'30.89123, E- 95°22'35.05969	08/10/2020	5,700	mg/kg
19.	Zone- 3	Soil sample No.- 9	N- 27°35'28.82674, E- 95°22'36.81516	08/10/2020	4,100	mg/kg
20.	Zone- 3	Water sample No.-1	N- 27°35'32.95266, E- 95°22'40.72908	08/10/2020	74	PPM

S.NO.	Name of Area or Zone	Type and number of samples	Samples coordinates	Sampling date	TPH	Unit
21.	Zone- 4	Soil sample No.- 1	N- 27°35'25.06542, E- 95°22'45.30958	08/10/2020	5,600	mg/kg
22.	Zone- 4	Soil sample No.-2	N- 27°35'27.0434, E- 95°22'43.2435	08/10/2020	4,200	mg/kg
23.	Zone- 4	Soil sample No.- 3	N- 27°35'40.78666, E- 95°23'3.41848	08/10/2020	4,900	mg/kg
24.	Zone- 4	Soil sample No.-4	N- 27°35'38.85688, E- 95°23'1.27619	08/10/2020	4,000	mg/kg
25.	Zone- 4	Soil sample No.- 5	N- 27°35'38.75845, E- 95°22'59.01467	08/10/2020	6,800	mg/kg
26.	Zone- 4	Soil sample No.-6	N- 27°35'35.2432, E- 95°22'54.60913	08/10/2020	4,200	mg/kg
27.	Zone- 4	Soil sample No.- 7	N- 27°35'35.10596, E- 95°22'50.04948	08/10/2020	5,100	mg/kg
28.	Zone- 4	Soil sample No.-8	N- 27°35'35.46006, E- 95°22'45.87827	08/10/2020	5,700	mg/kg
29.	Zone- 4	Water sample No.- 1	N- 27°35'28.21524, E- 95°22'46.05211	08/10/2020	62	PPM
30.	Zone- 4	Water sample No.-2	N- 27°35'28.6012, E- 95°22'43.18331	08/10/2020	57	PPM

Table 4. Third time (Final) Oily soil and oily water samples details at well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam.**270**

S.N0.	Name of Area or Zone	Type and number of samples	Samples coordinates	Sampling date	TPH	Unit
1.	Zone- 1	Soil sample No.- 1	N- 27°35'41.82871, E- 95°23'6.19836	26/11/2020	3000	mg/kg
2.	Zone- 1	Soil sample No.-2	N- 27°35'40.43699, E- 95°23'11.543	26/11/2020	3300	mg/kg
3.	Zone- 1	Water sample No.- 1	N- 27°35'48.66403, E- 95°23'8.11363	26/11/2020	50	PPM
4.	Zone- 1	Water sample No.-2	N- 27°35'48.69571, E- 95°23'7.96996	26/11/2020	54	PPM
5.	Zone- 1	Water sample No.- 3	N- 27°35'57.8864, E- 95°23'5.43462	26/11/2020	67	PPM
6.	Zone- 2.	Soil sample No.-1	N- 27°35'57.32221, E- 95°23'5.98434	26/11/2020	3800	mg/kg
7.	Zone- 2	Soil sample No.- 2	N- 27°35'36.81276, E- 95°23'10.79124	26/11/2020	3300	mg/kg
8.	Zone- 2	Soil sample No.-3	N- 27°35'34.63771, E- 95°23'12.70702	26/11/2020	2700	mg/kg
9.	Zone- 2	Soil sample No.- 4	N- 27°35'59.61826, E- 95°22'47.56148	26/11/2020	2400	mg/kg
10.	Zone- 2	Water sample No.-1	N- 27°35'59.5279, E- 95°22'52.75315	26/11/2020	48	PPM
11.	Zone- 3	Soil sample No.- 1	N- 27°35'36.99874, E- 95°22'41.27621	26/11/2020	1800	mg/kg
12.	Zone- 3	Soil sample No.-2	N- 27°35'37.65246, E- 95°22'40.12482	26/11/2020	2200	mg/kg
13.	Zone- 3	Soil sample No.- 3	N- 27°35'35.5456, E- 95°22'36.49332	26/11/2020	3400	mg/kg
14.	Zone- 3	Soil sample No.-4	N- 27°35'33.28516, E- 95°22'39.84996	26/11/2020	3000	mg/kg
15.	Zone- 3	Soil sample No.- 5	N- 27°35'32.30243, E- 95°22'37.11065	26/11/2020	3200	mg/kg
16.	Zone- 3	Soil sample No.-6	N- 27°35'31.57966, E- 95°22'35.90036	26/11/2020	3200	mg/kg
17.	Zone- 3	Soil sample No.- 7	N- 27°35'29.94605, E- 95°22'35.54677	26/11/2020	1600	mg/kg
18.	Zone- 3	Soil sample No.- 8	N- 27°35'30.89123, E- 95°22'35.05969	26/11/2020	2900	mg/kg
19.	Zone- 3	Soil sample No.- 9	N- 27°35'28.82674, E- 95°22'36.81516	26/11/2020	2600	mg/kg
20.	Zone- 3	Water sample No.-1	N- 27°35'32.95266, E- 95°22'40.72908	26/11/2020	64	PPM
21.	Zone- 4	Soil sample No.- 1	N- 27°35'25.06542, E- 95°22'45.30958	26/11/2020	3200	mg/kg
22.	Zone- 4	Soil sample No.-2	N- 27°35'27.0434, E- 95°22'43.2435	26/11/2020	2300	mg/kg

S.NO.	Name of Area or Zone	Type and number of samples	Samples coordinates	Sampling date	TPH	Unit
23.	Zone- 4	Soil sample No.- 3	N- 27°35'40.78666, E- 95°23'3.41848	26/11/2020	2500	mg/kg
24.	Zone- 4	Soil sample No.-4	N- 27°35'38.85688, E- 95°23'1.27619	26/11/2020	2000	mg/kg
25.	Zone- 4	Soil sample No.- 5	N- 27°35'38.75845, E- 95°22'59.01467	26/11/2020	3400	mg/kg
26.	Zone- 4	Soil sample No.-6	N- 27°35'35.2432, E- 95°22'54.60913	26/11/2020	2200	mg/kg
27.	Zone- 4	Soil sample No.- 7	N- 27°35'35.10596, E- 95°22'50.04948	26/11/2020	3000	mg/kg
28.	Zone- 4	Soil sample No.-8	N- 27°35'35.46006, E- 95°22'45.87827	26/11/2020	3300	mg/kg
29.	Zone- 4	Water sample No.- 1	N- 27°35'28.21524, E- 95°22'46.05211	26/11/2020	56	PPM
30.	Zone- 4	Water sample No.-2	N- 27°35'28.6012, E- 95°22'43.18331	26/11/2020	50	PPM

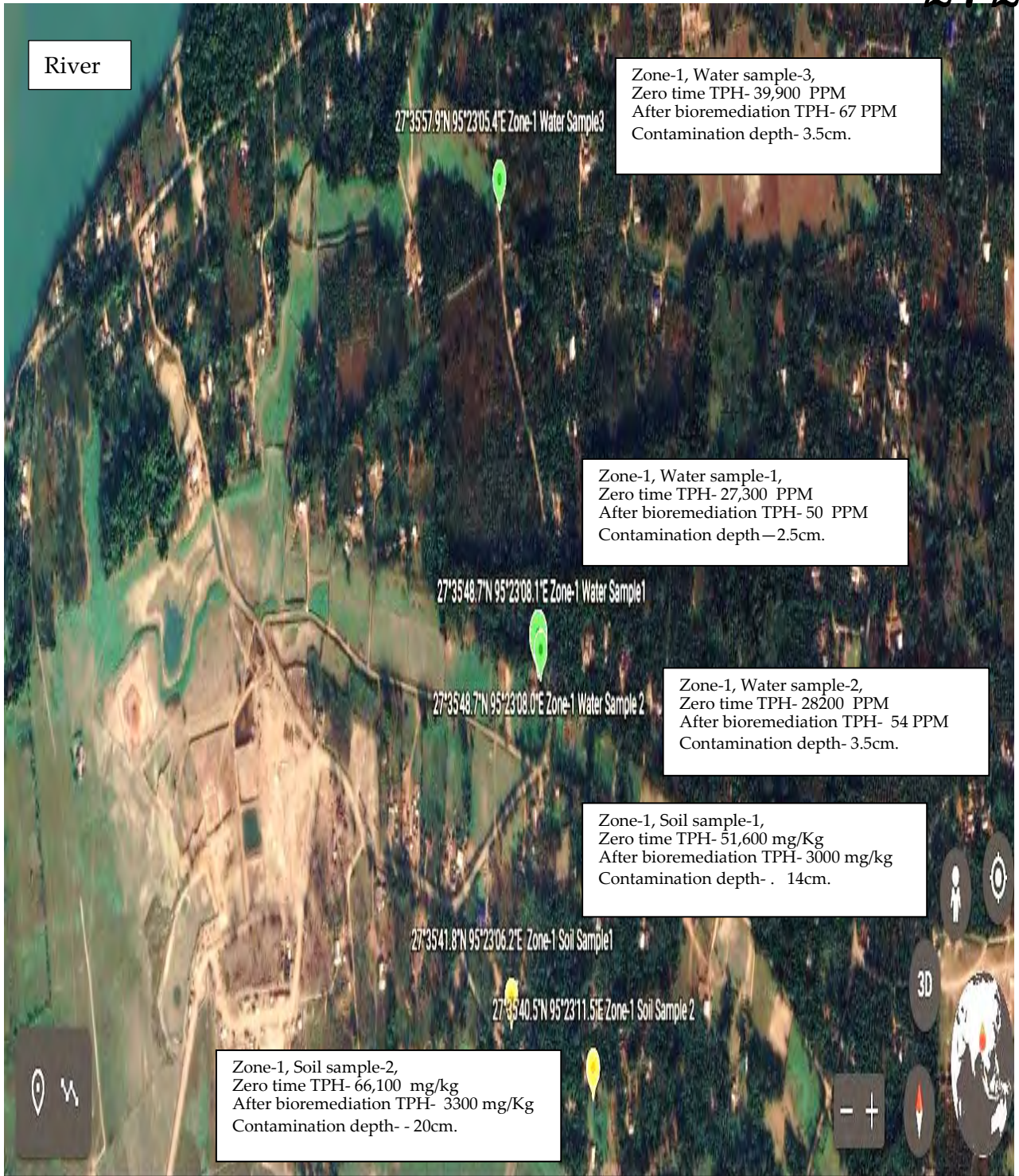


Fig.-14. Google map view of Zone-1 of bioremediation site with sample coordinates, TPH (Total Petroleum Hydrocarbon) content before and after bioremediation and depth of contamination.

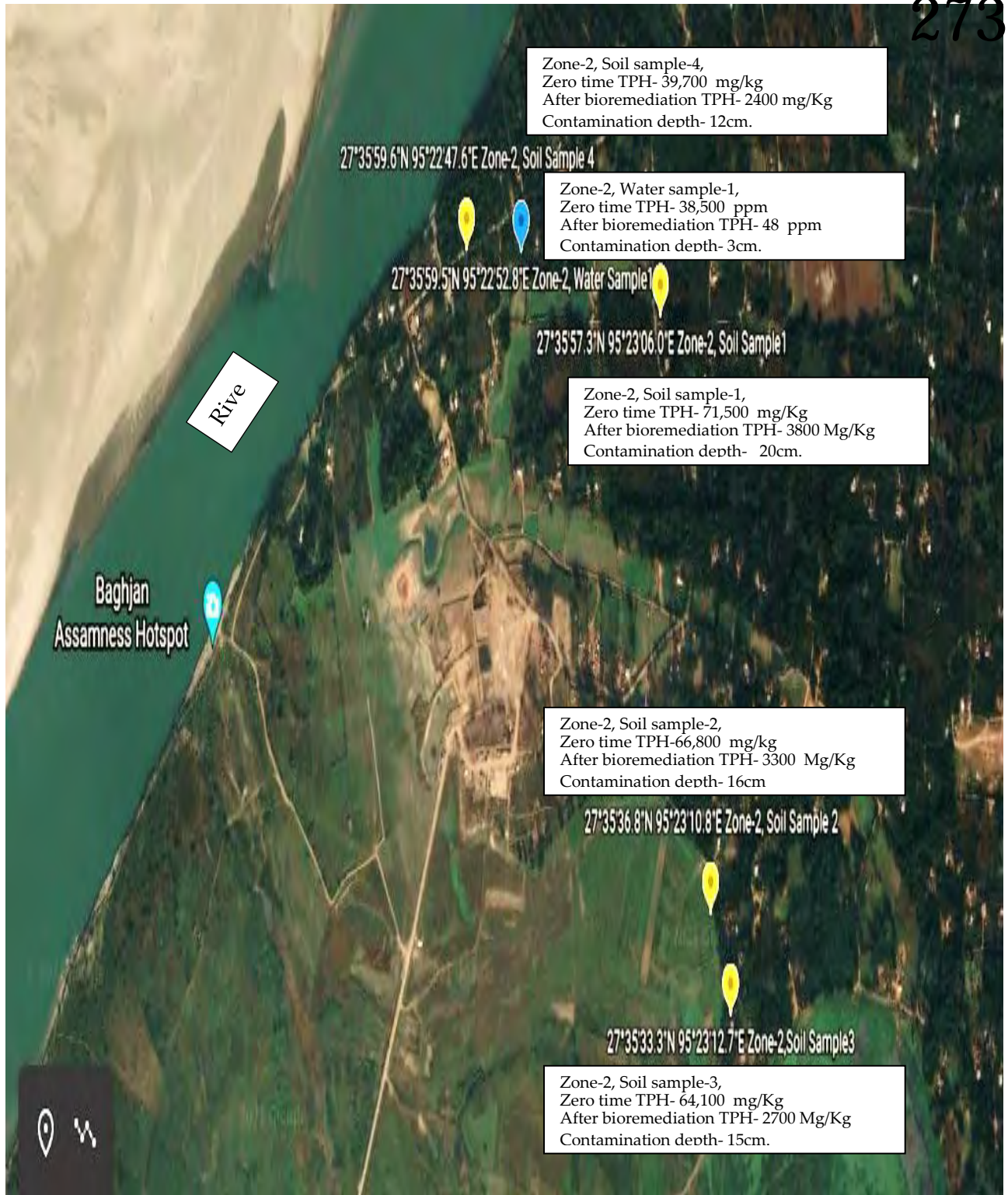


Fig.-15. Google map view of Zone-2 of bioremediation site with sample coordinates, TPH (Total Petroleum Hydrocarbon) content before and after bioremediation and depth of contamination.

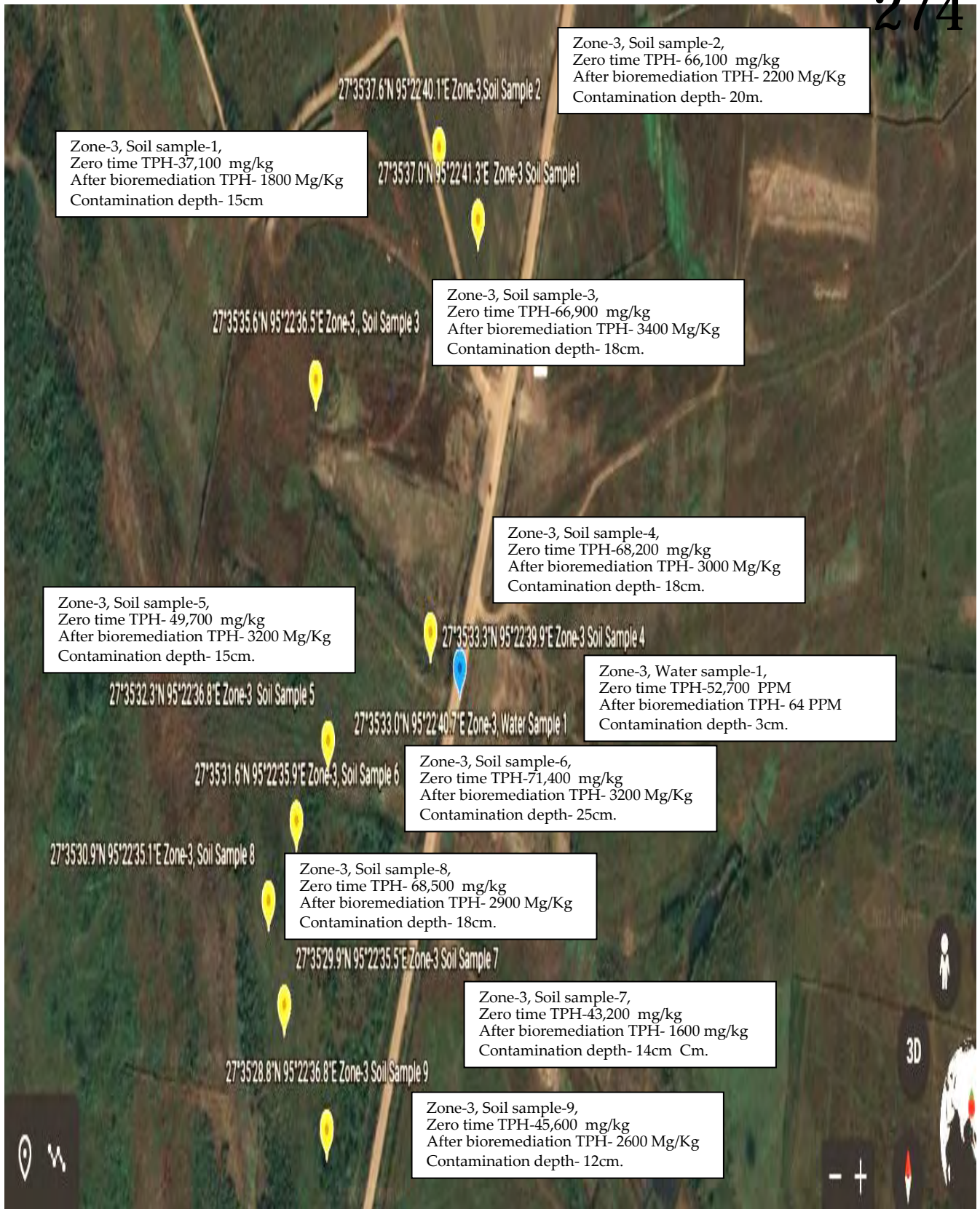


Fig.-16. Google map view of Zone-3 of bioremediation site with sample coordinates, TPH (Total Petroleum Hydrocarbon) content before and after bioremediation and depth of contamination.

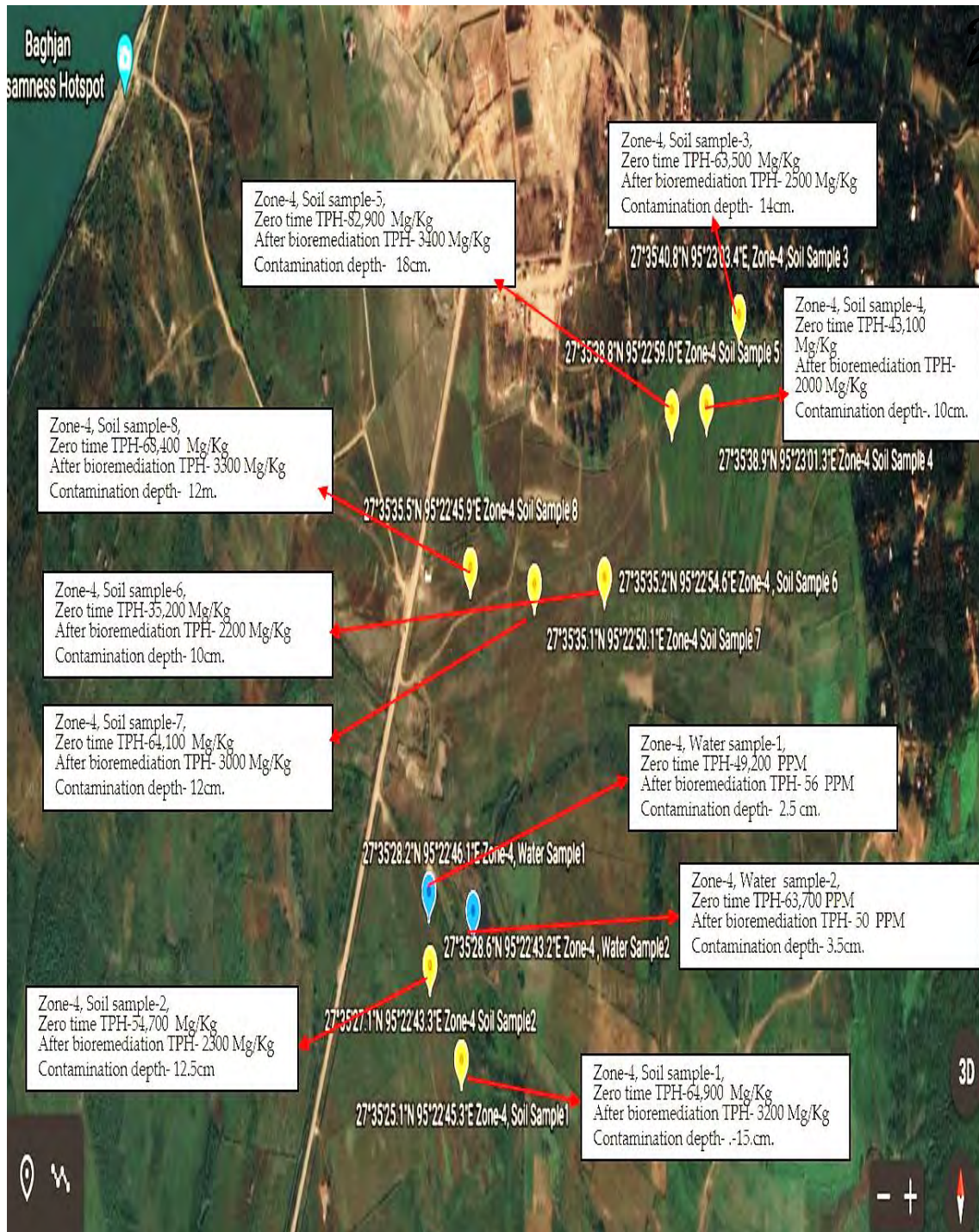


Fig.-17. Google map view of Zone-4 of bioremediation site with sample coordinates, TPH (Total Petroleum Hydrocarbon) content before and after bioremediation and depth of contamination

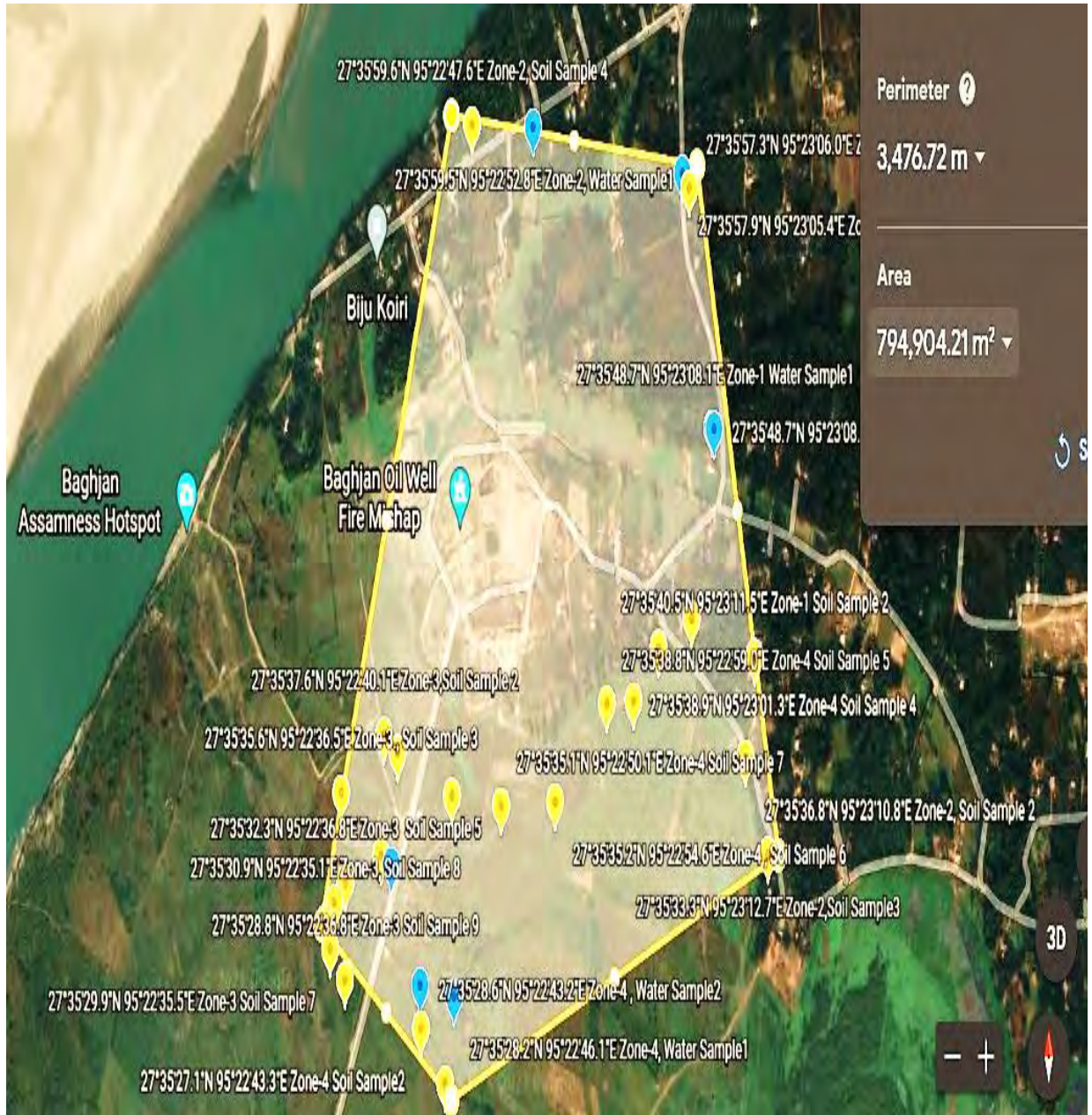
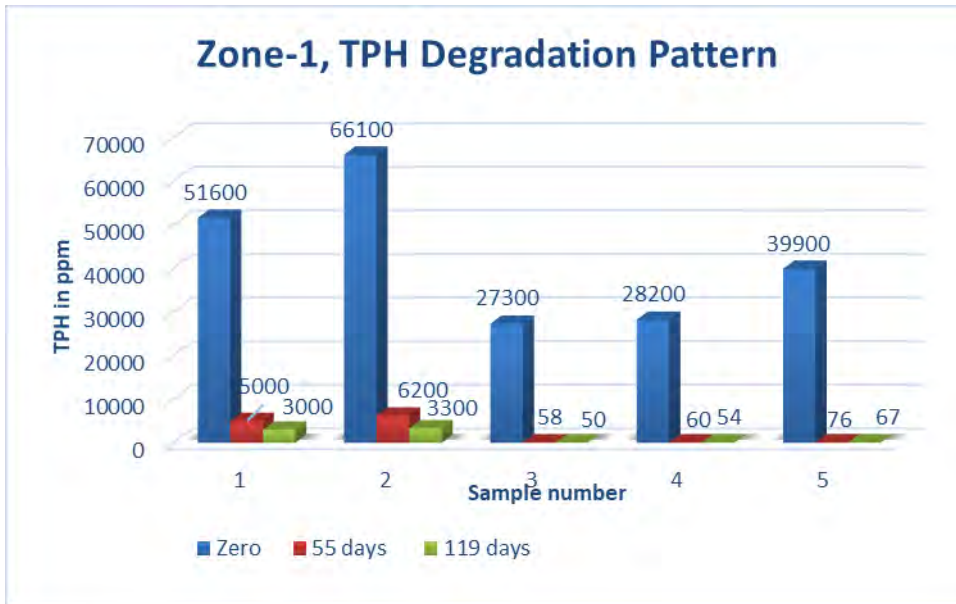


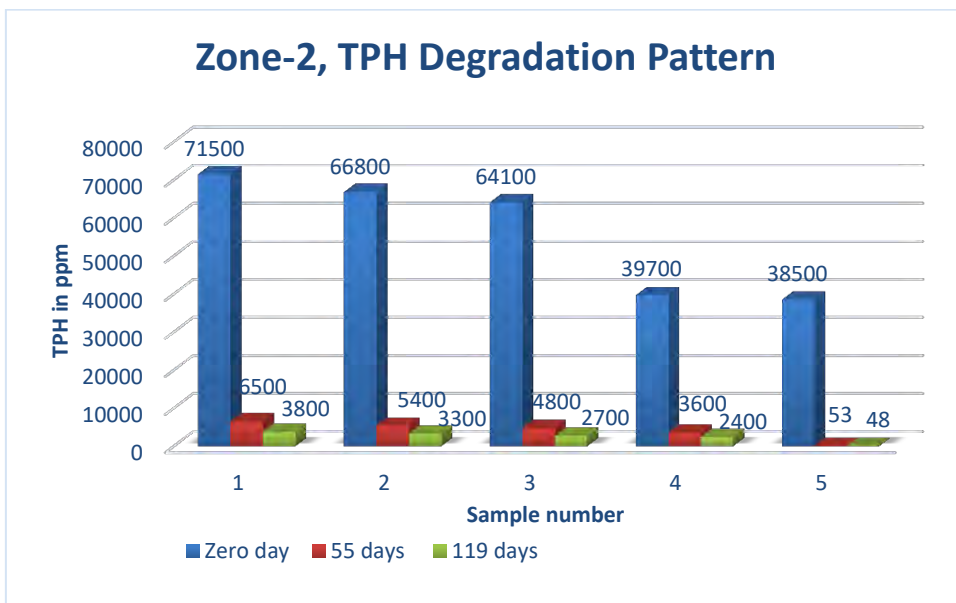
Fig.-18 Map showing Sample coordinates of all Zones (1,2,3,4) with area

Fig.-19 TPH (Total Petroleum Hydrocarbons) degradation graph Zone-1,2,3 and 4

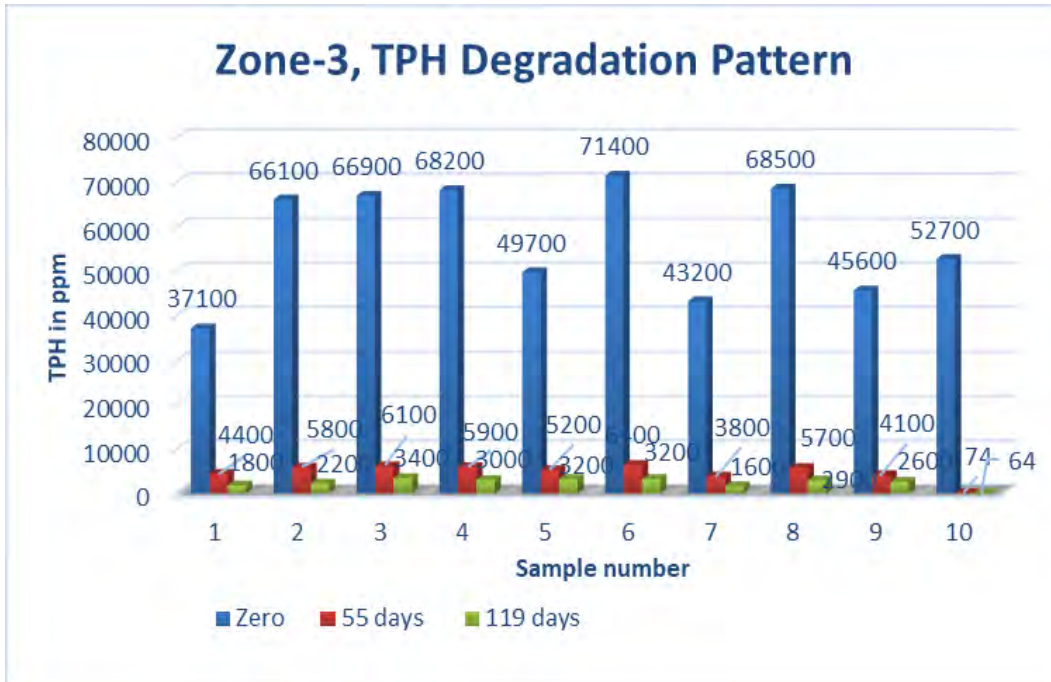
TPH (Total Petroleum Hydrocarbons) degradation graph Zone-1



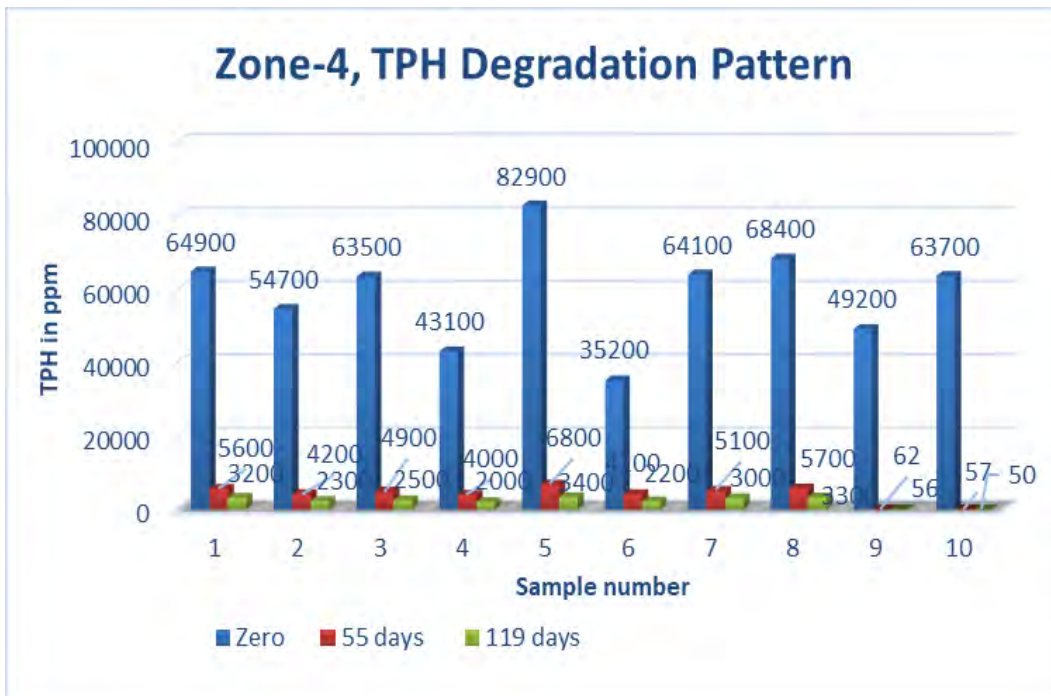
TPH (Total Petroleum Hydrocarbons) degradation graph Zone-2



TPH (Total Petroleum Hydrocarbons) degradation graph Zone-3



TPH (Total Petroleum Hydrocarbons) degradation graph Zone-4



Ground water monitoring before and after bioremediation at site

Bore well at the bioremediation site was selected to monitor ground water quality at the bioremediation site of well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam. At zero day (before bioremediation, the water sample was collected after flushing out of water from bore well. Various parameters were analysed in ground water at bioremediation site. (Table 4) and third party lab report attached as annexure-

Table 5. At zero day, characteristics of ground water at bioremediation site of well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam.

Heavy metals	Permissible limits		Concentration in ground water (ppm)
	BSI/WHO	EPA (LIE)	
Fe	5 ppm	1 ppm	0.067 mg/l
Mn	0.1 ppm	1.5 ppm	BD(<0.01)
Zn	1 ppm	1 ppm	0.588 mg/l
Ni	5 ppb	1 ppm	BD(<0.03)
Cd	5 ppb	0.5 ppm	BD(<0.01)
Pb	5 ppb	---	BD(<0.05)
Ni	5 ppb	0.5 ppm	BD(<0.01)
As	1 ppb	0.01 ppm	BD(<0.004)
Cr (Total)	5 ppb	1 ppm	BD(<0.01)
Hg	0.5 ppb	0.5 ppm	BD(<0.005)
Cu	1ppm	1ppm	0.028 mg/l

Note: BDL – Below detection of AAS. Detection limit of AAS is 1 ppb. LIE – Liquid Industrial Effluent.

Table 6. After bioremediation, characteristics of ground water at bioremediation site of well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam.

Heavy metals	Permissible limits		Concentration in ground water (ppm)
	BSI/WHO	EPA (LIE)	
Fe	5 ppm	1 ppm	0.071 mg/l
Mn	0.1 ppm	1.5 ppm	BD(<0.01)
Zn	1 ppm	1 ppm	0.584 mg/l
Ni	5 ppb	1 ppm	BD(<0.03)
Cd	5 ppb	0.5 ppm	BD(<0.01)
Pb	5 ppb	---	BD(<0.05)
Ni	5 ppb	0.5 ppm	BD(<0.01)
As	1 ppb	0.01 ppm	BD(<0.004)
Cr (Total)	5 ppb	1 ppm	BD(<0.01)
Hg	0.5 ppb	0.5 ppm	BD(<0.005)
Cu	1ppm	1ppm	0.031 mg/l

CHAPTER 4 Summary

- At well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam bioremediation of oily soil along with water bodies was initiated in the month of June, 2020. Total 1200 M³ of oily soil along with water bodies was undertaken for bioremediation of this project. First oil was recovered from water bodies and transported to put on land area with in 25km where in-situ bioremediation is going on.
- The first phase microbes application was started on 31.07.2020 and completed on 13.08.2020. Hence the bioremediation was started on 31.07.2020.
- The oily soil samples, oily water samples and bore well water sample had been collected from the bioremediation site, were checked for solvent extractable total petroleum hydrocarbon (TPH) and other necessary parameters.
- **Biodegradation:** In the Zone 1 of bioremediation site the solvent extractable highest total petroleum hydrocarbon (TPH) in oily sludge soil was found to be degraded from 66100ppm at zero day to 3300ppm after 119 days . Similarly highest total petroleum hydrocarbon (TPH) in oily water was found to be degraded from 39900 ppm at zero day to 67ppm after 119 days. This indicates that results conform with statutory norms.
- In the Zone 2 of bioremediation site the solvent extractable highest total petroleum hydrocarbon (TPH) in oily sludge soil was found to be degraded from 71500 ppm at zero day to 2400 ppm after 119 days. Similarly highest total petroleum hydrocarbon (TPH) in oily water was found to be degraded from 38500 ppm at zero day to 48 ppm after 119 days. This indicates that results conform with statutory norms.
- In the Zone 3 of bioremediation site the solvent extractable highest total petroleum hydrocarbon (TPH) in oily sludge soil was found to be degraded from 71400 ppm at zero day to 3200 ppm after 119 days . Similarly highest total petroleum hydrocarbon (TPH) in oily water was found to be degraded from 52700 ppm at zero day to 64 ppm after 119 days. This indicates that results conform with statutory norms.
- In the Zone 4 of bioremediation site the solvent extractable highest total petroleum hydrocarbon (TPH) in oily sludge soil was found to be degraded from 82900 ppm at zero day to 3400 ppm after 119 days. Similarly highest total petroleum hydrocarbon (TPH) in oily water was found to be degraded from 63700 ppm at zero day to 50 ppm after 119 days. This indicates that results conform with statutory norms.
- It was found that after completion of the bioremediation job, the TPH content in the soil/Treatment on land was less than 0.5 % or 5000 ppm and TPH in water was less than 100 ppm, which is in conform with statutory norms.

Water characteristics:

- The ground water was monitored at the bioremediation site. It was found that the ground water quality is as per the BIS/WHO as well as EPA(LIE) limits.

Annexures

- Annexure – 1:** Work order from Oil India limited, Duliajan, Assam.
- Annexure – 2:** Joint assessment of bioremediation site.
- Annexure – 3:** NABL certificate of third part laboratory.
- Annexure – 4:** MEFC certificate of third part laboratory.
- Annexure – 5:** ISO 9001:2015 certificate of third part laboratory.
- Annexure – 6:** ISO 45001: 2018 certificate of third part laboratory.
- Annexure – 7 to 20:** TPH analysis reports of third party laboratory.
- Annexure – 21:** Photos of joint sampling of bioremediation site.
- Annexure -22:** Photos of removing of indigenous vegetation, shrubs and Small plants.
- Annexure –23:** Photos of tilling and mixing of microbes at site.
- Annexure24:** Photos of tilling and mixing of microbes at site
- Annexure25:** Photos of site after bioremediation at site

Annexure-1: Work order from Oil India limited, Duliajan, Assam

Oil India Limited
(A Govt. of India Enterprise)
P.O. DULIAJAN, DIST. DIBRUGARH,
ASSAM, INDIA, PIN-786 602

CONTRACTS DEPARTMENT
TEL: (91) 374-2800548
E-mail: contracts@oilindia.in
Website: www.oil-india.com
FAX: (91) 374-2803549

Ref. No. OIL/CONT/LOA/G/321/2020-21

Date: 19.08.2020

M/s THE ENERGY AND RESOURCES INSTITUTE [402439]
DARBARI SETH BLOCK, IHC COMPLEX,
LODHI ROAD, NEW DELHI-110003
Email: krajag@teri.res.in

Sub: Letter of Award (LOA) for Hiring of services for Bioremediation Services of Contaminated Soil/ water bodies due to Oil Spillage resulting from Blowout of well no. BGN#05.

Dear Sir,

With reference to your Letter Ref. BR-OIL-TERI/09 dated 18.06.2020, Joint Site Recce dated 19.06.2020 and OIL's Contract No. 6113987, we have the pleasure in awarding you our LOA/Work Order no. 6114478/PDNO/2020 for "Hiring of services for Bioremediation Services of Contaminated Soil/ water bodies due to Oil Spillage resulting from Blowout of well no. BGN#05".

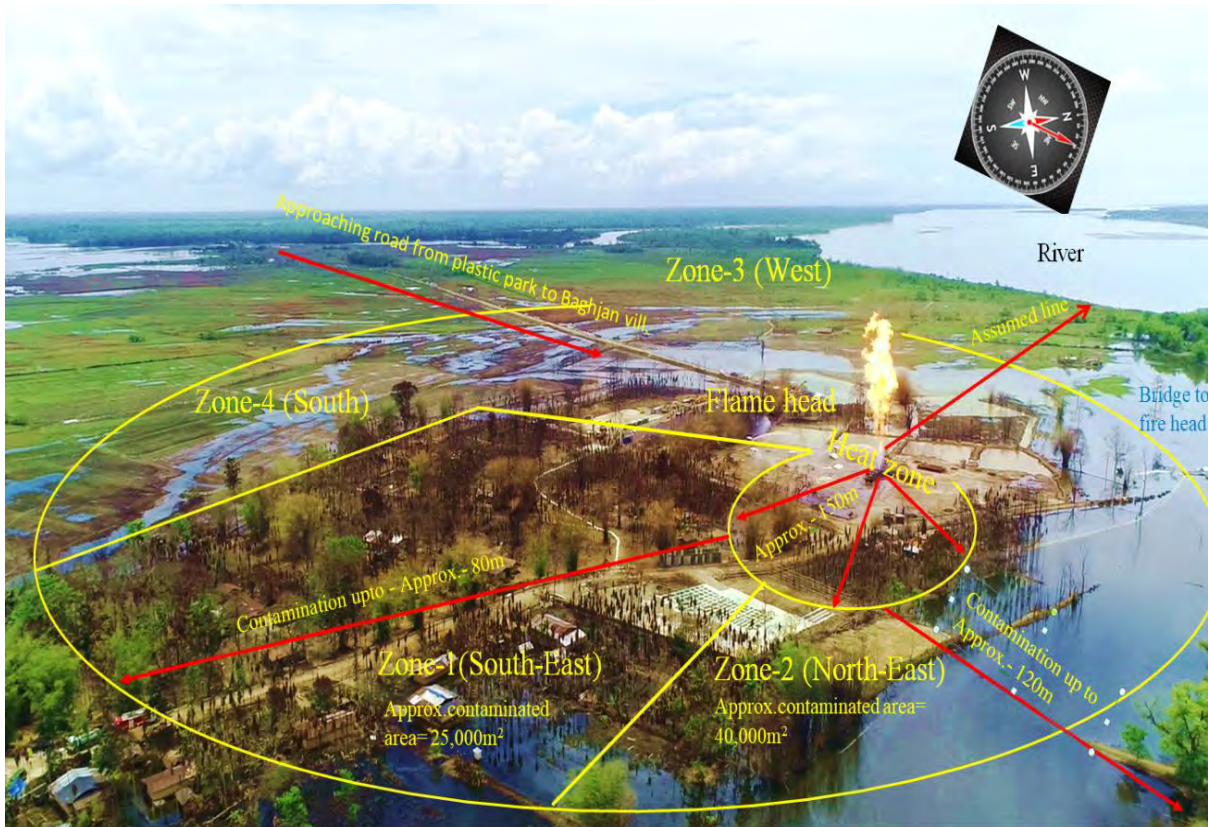
2.0 Bioremediation Services are to be completed on urgent basis so as to reach the Well Site. Towards the services, the rates applicable are as under:

Item no.	Description of Services	UOM	Est. Qty.	Rate as per earlier Contract	Total Amount
10	In-Situ Bioremediation	M3	9000	1479	1,33,11,000.00
20	Ex-Situ Bioremediation	M3	3000	1479	44,37,000.00
30	HDPL Lined Bioremediation Pits	NO	1	7,00,000.00	7,00,000.00
40	Collection of Oily Sludge	M3	3000	140	4,20,000.00
50	Transportation of Contaminated Sludge within 25 km	M3	1000	95	95,000.00
60	Transportation of Contaminated Sludge beyond 25 km	M3	1000	121	1,21,000.00
70	Refilling & Reclamation	M3	2000	132	2,64,000.00
Total estimated Value for the Services					1,93,48,000.00
GST @18%					34,82,640.00
Total estimated Value for the Services incl. GST @18%					2,28,30,640.00

Other Terms:

- GST @18% extra.
- Payment term: Payment will be released at actuals based on schedule quantity.

Annexure-2: Joint assessment of bioremediation site



Annexure-3: NABL certificate of third part laboratory



**National Accreditation Board for
Testing and Calibration Laboratories**

NABL

CERTIFICATE OF ACCREDITATION

NOIDA TESTING LABORATORIES

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

**"General Requirements for the Competence of Testing &
Calibration Laboratories"**

for its facilities at

GT - 20, SECTOR - 117, NOIDA, GAUTAM BUDDH NAGAR, UTTAR PRADESH, INDIA

in the field of

TESTING

Certificate Number: TC-6814

Issue Date: 05/12/2019

Valid Until: 02/12/2021

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Signed for and on behalf of NABL.



N. Venkateswaran
Chief Executive Officer

Annexure-4: MEFC certificate of third part laboratory.

रजिस्ट्री सं० डी० एल०-33004/99

REGD. NO. D. L.-33004/99



भारत का राजपत्र The Gazette of India

असाधारण

EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (ii)

PART II—Section 3—Sub-section (ii)

प्राधिकार से प्रकाशित

PUBLISHED BY AUTHORITY

सं. 2487/ नई दिल्ली, बुधस्वतिवार, अगस्त 31, 2017/भाद्र 9, 1939
No. 2487/ NEW DELHI, THURSDAY, AUGUST 31, 2017/BHADRA 9, 1939

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 30th August, 2017

S.O. 2836(E).—In exercise of the powers conferred by clause (b) of sub-section (1) of section 12 and section 13 of the Environment (Protection) Act, 1986 (29 of 1986), read with rule 10 of the Environment (Protection) Rules, 1986, the Central Government hereby makes the following further amendments in the notification of the Government of India in the erstwhile Ministry of Environment and Forests, number S.O. 1174(E), dated the 18th July, 2007, namely :—

In the said notification, in the Table, after serial number 156 and the entries relating thereto, the following serial numbers and entries shall be inserted, namely:—

(1)	(2)	(3)	(4)
157	M/s. Devansh Testing & Research Laboratory Pvt. Ltd. 94, Shiv Ganga Industrial Estate, Lakeshari, Bhagwanpur-247661, Roorkee, Dist-Haridwar, Uttarakhnad.	(i) Ms. Archana Singh (ii) Shri. Arvind Kharkwal (iii) Dr. H.S. Chauhan.	09.08.2017 to 08.08.2022
158	M/s. NOIDA Testing Laboratories, GT-20, Sector-117, NOIDA-201304, Uttar Pradesh.	(i) Shri. Gopal Das Verma (ii) Shri. Pankaj Kumar Sharma (iii) Shri. Rajesh Kumar Singh.	09.08.2017 to 08.08.2022
159	M/s. Sai Universal Mining Services Plot No. 15-DP2, KIADB, Sankalapura Industrial Area, Near Water Tank, Bellary Main Road, Hospet-583201, Dist. Bellary, Karnataka.	(i) Shri. Pavan Kumar GVK (ii) Shri. D. Sudharshan Reddy (iii) Shri. A. Nagaraju.	09.08.2017 to 08.08.2022
160	M/s. B.S. Envi-Tech Pvt. Ltd. 12-13 1270/71/73, Amity Ville, 4 th Floor, St. Ann's Road, Tarnaka, Secunderabad-500017, Telangana.	(i) Shri. A.V. Hanumantha Rao (ii) Ms. CH. V. Tulasi (iii) Shri. B.S. Chandra Murthy.	09.08.2017 to 08.08.2022
161	M/s. Nichrome Testing Laboratory and Research Pvt. Ltd. 170, Judges Bunglow Road, Narayanpur, Dharwad-580008, Karnataka.	(i) Shri Krishna Narayan Kulkarni (ii) Shri Ambarish S. Sindagi (iii) Dr. Manjula S. Patil.	09.08.2017 to 08.08.2022
162	M/s. Go Green Mechanisms Pvt. Ltd. Dayal Estate, National Highway No. 8, Opp. APMC Market, Gate-1 (Deen Dayal Grain Market), Bareja Road, Jetalpur, Dist-Ahmedabad-382426, Gujarat.	(i) Shri Amit Badlani (ii) Shri Khambata Cyrus Hosang (iii) Ms. Trupti Padhya.	09.08.2017 to 08.08.2022.

[F. No. Q. 15018/21/2017-CPW]

DR. MANORANJAN HOTA, Advisor

Note.—The principal notification was published in the Gazette of India, Extraordinary vide number S.O. 1174 (E), dated the 18th July, 2007 and subsequently amended vide notification numbers S.O. 1539 (E), dated the 13th September, 2007, S.O. 1811(E), dated the 24th October, 2007, S.O. 55(E), dated the 9th January, 2008, S.O. 428(E), dated the 4th March, 2008, S.O. No. 865(E), dated the 11th April, 2008, S.O. No. 1894(E), dated the 31st July, 2008, S.O. No. 2728(E), dated the 25th November, 2008, S.O. 1356(E), dated the 27th May, 2009, S.O.No. 1802(E), dated the 22nd July, 2009, S.O. No.2399(E), dated the 18th September, 2009, S.O. No.3122(E), dated the 7th December, 2009, S.O. No. 3123(E), dated the 7th December, 2009, S.O. No. 142(E), dated the 21st January, 2010, S.O. 619 (E), dated the 19th March, 2010, S.O. No.1662(E), dated the 13th July, 2010, S.O. No. 2390(E), dated the 30th September, 2010, S.O. No. 2904 (E), dated the 8th December, 2010, S.O. No. 181(E), dated the 28th January, 2011, S.O.No. 692(E) dated the 5th April, 2011, S.O. No. 1754 (E), dated the 28th July, 2011, S.O. No. 2609, dated the 22nd November, 2011, S.O. No. 264(E), dated the 13th February, 2012, S.O. No. 1150 (E) dated the 22nd May, 2012, S.O. No. 1295(E), dated the 6th June, 2012, S.O. No. 2039 (E), dated the 5th September, 2012, S.O. No. 2850 (E), dated the 7th December, 2012, S.O. No. 592 (E), dated the 8th March, 2013, S.O. No. 945(E), dated the 8th April, 2013, S.O. No. 2287 (E), dated the 26th July, 2013, S.O. No. 3489(E) dated the 26th November, 2013, S.O. No. 21(E), dated the 3rd January, 2014, S.O. No. 561 (E), dated the 26th February, 2014, S.O. No. 1190(E), dated the 1st June, 2014, S.O. No. 2003(E), dated the 9th August, 2014, S.O. No. 137 (E), dated the 12th January, 2015, S.O. No. 1783(E), dated the 30th June, 2015, S.O. No. 2453(E), dated the 7th September, 2015, S.O. No. 1953(E), dated the 2nd June, 2016 and S.O. No. 388(E), dated the 10th February, 2017.


Annexure-5: ISO 9001:2015 certificate of third part laboratory



Annexure-6: ISO 45001: 2018 certificate of third part laboratory



Annexure-7: TPH analysis reports of third party laboratory of zero time samples Zone-1



NOIDA TESTING LABORATORIES

(An ISO : 9001 : 2015, ISO 14001:2015 & ISO 45001:2018 & NABL Accredited Laboratory)
MoEF & CC (Ministry of Environment, Forest & Climate Change), UPPCB & HSPCB Recognized Laboratory

+91-9313611642, 8510081921, 7503031145, 8527870572, 7503031146, 9999794369

TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
TPH EXTRACT	MS-010920-01	10/09/2020

Issued To: THE ENERGY AND RESOURCES INSTITUTE(TerI))
DADARI SETH BLOCK, I H C COMPLEX, LODHI ROAD, NEW DELHI-110003


SAMPLING & ANALYSIS DATA

Sample Received On	: 01/09/2020
Sample Description	: Soil/Water
Protocol Used for testing	: US EPA-846-9071B
Parameters to be Checked	: Total Petroleum Hydrocarbon (TPH) Content
Analysis Duration	: 01/09/2020 to 10/09/2020
Sample Received by	: Courier

Oily sludge					
Name of Area	Sample Identification Code	Sample Coordinates	Sampling Date	Result	Unit
Zone-1	Soil Sample-01(Zero time Sample, Village- Baghjan) on Dry Basis	N-27°35'41.82871, E-95°23'6.19836	27/07/2020	51,600	Mg/kg
Zone-1	Soil Sample-02 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'40.43699, E-95°23'11.543	27/07/2020	66,100	Mg/kg
Zone-1	Water Sample-01 (Zero time Sample, village- Baghjan)	N-27°35'48.66403, E-95°23'8.11363	27/07/2020	27,300	PPM
Zone-1	Water Sample-02 (Zero time Sample, village- Baghjan)	N-27°35'48.69571, E-95°23'7.96996	27/07/2020	28200	PPM
Zone-1	Water Sample-03 (Zero time Sample, village- Baghjan)	N-27°35'57.8864, E-95°23'5.43462	27/07/2020	39,900	PPM

Notes:

- The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
- Responsibility of the Laboratory is limited to the invoiced amount only.
- This test report will not be generated again, either wholly or in part, without prior written permission of the laboratory.
- This test report will not be used for any publicity/legal purpose.
- The test samples will be disposed off after two weeks from the date of issue of test report, unless until specified by the customer.



CHECKED BY



AUTHORIZED SIGNATORY

Laboratory : GT-20, Sector-117, Noida, Gautam Budh Nagar - 201301
E. : noida.laboratory@gmail.com, info@noidalabs.com W.: www.noidalabs.com

Annexure-8: TPH analysis reports of third party laboratory of zero time samples Zone-2



NOIDA TESTING LABORATORIES

(An ISO : 9001 : 2015, ISO 14001:2015 & ISO 45001:2018 & NABL Accredited Laboratory)
MoEF & CC (Ministry of Environment, Forest & Climate Change), UPPCB & HSPCB Recognized Laboratory
+91-9313611642, 8510081921, 7503031145, 8527870572, 7503031146, 9999794369

TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
TPH EXTRACT	MS-010920-02	10/09/2020

Issued To: THE ENERGY AND RESOURCES INSTITUTE(Teri)
DADARI SETH BLOCK, I H C COMPLEX, LODHI ROAD, NEW DELHI-110003


SAMPLING & ANALYSIS DATA

Sample Received On : 01/09/2020
 Sample Description : Soil/Water
 Protocol Used for testing : US EPA-846-9071B
 Parameters to be Checked : Total Petroleum Hydrocarbon (TPH) Content
 Analysis Duration : 01/09/2020 to 10/09/2020
 Sample Received by : Courier

Oily sludge					
Name of Area	Sample Identification	Sample Coordinates	Sampling Date	Result	Unit
Zone-2	Soil Sample-01(Zero time Sample, Village- Baghjan) on Dry Basis	N-27°35'57.32221, E-95°23'5.98434	27/07/2020	71,500	Mg/kg
Zone-2	Soil Sample-02 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'36.81276, E-95°23'10.79124	27/07/2020	66,800	Mg/kg
Zone-2	Soil Sample-03 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'34.63771, E-95°23'12.70702	27/07/2020	64,100	Mg/kg
Zone-2	Soil Sample-04 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'59.61826, E-95°22'47.56148	27/07/2020	39,700	Mg/kg
Zone-2	Water Sample-01 (Zero time Sample, village- Baghjan)	N-27°35'59.5279, E-95°22'52.75315	27/07/2020	38,500	PPM

Notes:

1. The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
2. Responsibility of the Laboratory is limited to the invoiced amount only.
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Annexure-9: TPH analysis reports of third party laboratory of zero time samples Zone3



NOIDA TESTING LABORATORIES

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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
TPH EXTRACT	MS-010920-03	10/09/2020

Issued To: THE ENERGY AND RESOURCES INSTITUTE(Teri)
DADARI SETH BLOCK, I H C COMPLEX, LODHI ROAD, NEW DELHI-110003

SAMPLING & ANALYSIS DATA


Sample Received On	: 01/09/2020
Sample Description	: Soil/Water
Protocol Used for testing	: US EPA-846-9071B
Parameters to be Checked	: Total Petroleum Hydrocarbon (TPH) Content
Analysis Duration	: 01/09/2020 to 10/09/2020
Sample Received by	: Courier

Oily sludge					
Name of Area	Sample Identification	Sample Coordinates	Sampling Date	Result	Unit
Zone-3	Soil Sample-01(Zero time Sample, Village- Baghjan) on Dry Basis	N-27°35'36.99874, E-95°22'41.27621	25/07/2020	37,100	Mg/kg
Zone-3	Soil Sample-02 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'37.65246, E-95°22'40.12482	25/07/2020	66,100	Mg/kg
Zone-3	Soil Sample-03 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'35.5456, E-95°22'36.49332	25/07/2020	66,900	Mg/kg
Zone-3	Soil Sample-04 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'33.28516, E-95°22'39.84996	29/07/2020	68,200	Mg/kg
Zone-3	Soil Sample -05 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'32.30243, E-95°22'37.11065	29/07/2020	49,700	Mg/kg
Zone-3	Soil Sample -06 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'31.57966, E-95°22'35.90036	29/07/2020	71,400	Mg/kg
Zone-3	Soil Sample -07 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'29.94605, E-95°22'35.54677	29/07/2020	43,200	Mg/kg
Zone-3	Soil Sample -08 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'30.89123, E-95°22'35.05969	29/07/2020	68,500	Mg/kg
Zone-3	Soil Sample -09 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'28.82674, E-95°22'36.81516	29/07/2020	45,600	Mg/kg
Zone-3	Water Sample-01 (Zero time Sample, village- Baghjan)	N-27°32'95266, E-95°22'40.72908	29/07/2020	52,700	PPM


Notes:

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Annexure-10: TPH analysis reports of third party laboratory of zero time samples Zone-4



NOIDA TESTING LABORATORIES

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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
TPH EXTRACT	MS-010920-04	10/09/2020

Issued To: THE ENERGY AND RESOURCES INSTITUTE(Teri)
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SAMPLING & ANALYSIS DATA

Sample Received On	: 01/09/2020
Sample Description	: Soil/Water
Protocol Used for testing	: US EPA-846-9071B
Parameters to be Checked	: Total Petroleum Hydrocarbon (TPH) Content
Analysis Duration	: 01/09/2020 to 10/09/2020
Sample Received by	: Courier


Oily sludge					
Name of Area	Sample Identification	Sample Coordinates	Sampling Date	Result	Unit
Zone-4	Soil Sample-01 (Zero time Sample, Village- Baghjan) on Dry Basis	N-27°35'25.0.6542, E-95°22'45.30958	25/07/2020	64,900	Mg/kg
Zone-4	Soil Sample-02 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'27.0434, E-95°22'43.2435	25/07/2020	54,700	Mg/kg
Zone-4	Soil Sample-03 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'40.78666, E-95°23'3.41848	30/07/2020	63,500	Mg/kg
Zone-4	Soil Sample-04 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'38.85688, E-95°23'1.27619	30/07/2020	43,100	Mg/kg
Zone-4	Soil Sample -05 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'38.75845, E-95°22'59.01467	30/07/2020	82,900	Mg/kg
Zone-4	Soil Sample -06 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'35.2432, E-95°22'54.60913	30/07/2020	35,200	Mg/kg
Zone-4	Soil Sample -07 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'35.10596, E-95°22'50.04948	30/07/2020	64,100	Mg/kg
Zone-4	Soil Sample -08 (Zero time Sample, village- Baghjan) on Dry Basis	N-27°35'35.46006, E-95°22'45.87827	30/07/2020	68,400	Mg/kg
Zone-4	Water Sample -01 (Zero time Sample, village- Baghjan)	N-27°35'28.21524, E-95°22'46.05211	25/07/2020	49,200	PPM
Zone-4	Water Sample-02 (Zero time Sample, village- Baghjan)	N-27°35'28.6012, E-95°22'43.18331	25/07/2020	63,700	PPM

Notes:

1. The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
2. Responsibility of the Laboratory is limited to the invoiced amount only.
3. This test report will not be generated again, either wholly or in part, without prior written permission of the laboratory.
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5. The test samples will be disposed off after two weeks from the date of issue of test report, unless until specified by the customer.

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Annexure-11: Heavy metal analysis reports of third party laboratory of zero time bore well water samples Zone-1



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
Water	Water-091020-03	13/10/2020

Issued To: THE ENERGY AND RESOURCES INSTITUTE(Teri)
 DADARI SETH BLOCK, I H C COMPLEX, LODHI ROAD, NEW DELHI-110003

SAMPLING & ANALYSIS DATA

Sample Received On : 09/10/2020
 Sample Description : Bore well water
 Protocol Used for testing : APHA-3052
 Parameters to be Checked : Metal Content
 Analysis Duration : 09/10/2020 to 13/10/2020
 Sample Received by : Courier


Bore well Water					
Name of Area	Sample Identification Code	Sample Coordinates	Sampling Date	Result	Unit
Zone-1	Water Sample-01 (Zero time Sample, Village- Baghjan)	N-27°35'48.66403, E-95°23'8.11363	27/07/2020		
S. No.	Test Parameter				
1.	Iron (as Fe)			0.067	mg/l
2.	Manganese (as Mn)			BDL	mg/l
3.	Zinc (as Zn)			0.588	mg/l
4.	Cadmium (as Cd)			BDL	mg/l
5.	Lead (asPb)			BDL	mg/l
6.	Nickel (as Ni)			BDL	mg/l
7.	Arsenic (as As)			BDL	mg/l
8.	Total Chromium (as Cr)			BDL	mg/l
9.	Mercury (as Hg)			BDL	mg/l
10.	Copper (as Cu)			0.028	mg/l

BDL: Below Detection limit.
APHA-American Public Health Association


Notes:

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Annexure-12: TPH analysis reports of third party laboratory of intermediate samples Zone-1



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Test Report of	Report Code	Date of Issue
TPH EXTRACT	MS-091020-01	22/10/2020

**Issued To: THE ENERGY AND RESOURCES INSTITUTE (Teri)
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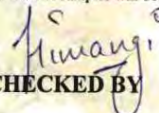
SAMPLING & ANALYSIS DATA

Sample Received On : 17/10/2020
 Sample Description : Soil/Water
 Protocol Used for testing : US EPA-846-9071B
 Parameters to be Checked : Total Petroleum Hydrocarbon (TPH) Content
 Analysis Duration : 17/10/2020 to 21/10/2020
 Sample Received by : Courier


Oily sludge					
Name of Area	Sample Identification Code	Sample Coordinates	Sampling Date	Result	Unit
Zone-1	Soil Sample-01 (Second time or Inter Mediate Sample, Village- Baghjan) on Dry Basis	N-27°35'41.82871, E-95°23'6.19836	09/10/2020	5,000	Mg/Kg
Zone-1	Soil Sample-02 (Second time or Inter Mediate Sample, Village- Baghjan) on Dry Basis	N-27°35'40.43699, E-95°23'11.543	09/10/2020	6,200	Mg/Kg
Zone-1	Water Sample-(Second time or Inter Mediate Sample, Village- Baghjan)	N-27°35'48.66403, E-95°23'8.11363	09/10/2020	58	PPM
Zone-1	Water Sample-02 (Second time or Inter Mediate Sample, Village- Baghjan)	N-27°35'48.69571, E-95°23'7.96996	09/10/2020	60	PPM
Zone-1	Water Sample-03 (Second time or Inter Mediate Sample, Village- Baghjan)	N-27°35'57.8864, E-95°23'5.43462	09/10/2020	76	PPM

Notes:

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Annexure-13: TPH analysis reports of third party laboratory of intermediate samples Zone-2



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TEST CERTIFICATE

Test Report of TPH EXTRACT	Report Code MS-091020-02	Date of Issue 22/10/2020
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Issued To: THE ENERGY AND RESOURCES INSTITUTE (Teri)
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SAMPLING & ANALYSIS DATA

Sample Received On : 17/10/2020
 Sample Description : Soil/Water
 Protocol Used for testing : US EPA-846-9071B
 Parameters to be Checked : Total Petroleum Hydrocarbon (TPH) Content
 Analysis Duration : 17/10/2020 to 21/10/2020
 Sample Received by : Courier

Oily sludge					
Name of Area	Sample Identification Code	Sample Coordinates	Sampling Date	Result	Unit
Zone-2	Soil Sample-01 (Second time or Inter Mediate Sample, Village-Baghjan) on Dry Basis	N-27°35'57.32221, E-95°23'5.98434	09/10/2020	6,500	Mg/Kg
Zone-2	Soil Sample-02 (Second time or Inter Mediate Sample, Village-Baghjan) on Dry Basis	N-27°35'36.81276, E-95°23'10.79124	09/10/2020	5,400	Mg/Kg
Zone-2	Soil Sample-03 (Second time or Inter Mediate Sample, Village-Baghjan) on Dry Basis	N-27°35'34.63771, E-95°23'12.70702	09/10/2020	4,800	Mg/Kg
Zone-2	Soil Sample-04 (Second time or Inter Mediate Sample, Village-Baghjan) on Dry Basis	N-27°35'59.61826, E-95°22'47.56148	09/10/2020	3,600	Mg/Kg
Zone-2	Water Sample-01 (Second time or Inter Mediate Sample, Village-Baghjan)	N-27°35'59.5279, E-95°22'52.75315	09/10/2020	53	PPM

Notes:


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- The test samples will be disposed off after two weeks from the date of issue of test report, unless until specified by the customer.

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Annexure-14: TPH analysis reports of third party laboratory of intermediate samples Zone-3



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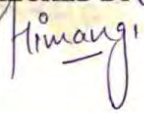
TEST CERTIFICATE

Test Report of TPH EXTRACT	Report Code MS-081020-01	Date of Issue 22/10/2020
Issued To: THE ENERGY AND RESOURCES INSTITUTE (Teri) DADARI SETH BLOCK, I H C COMPLEX, LODHI ROAD, NEW DELHI-110003		
SAMPLING & ANALYSIS DATA		
Sample Received On	:	17/10/2020
Sample Description	:	Soil/Water
Protocol Used for testing	:	US EPA-846-9071B
Parameters to be Checked	:	Total Petroleum Hydrocarbon (TPH) Content
Analysis Duration	:	17/10/2020 to 21/10/2020
Sample Received by	:	Courier


Oily sludge					
Name of Area	Sample Identification code	Sample Coordinates	Sampling Date	Result	Unit
Zone-3	Soil Sample-01 (Second time or Inter Mediate Sample, Village- Baghjan) on Dry Basis	N-27°35'36.99874, E-95°22'41.27621	08/10/2020	4,400	Mg/Kg
Zone-3	Soil Sample-02 ((Second time or Inter Mediate Sample, Village- Baghjan) on Dry Basis	N-27°35'37.65246, E-95°22'40.12482	08/10/2020	5,800	Mg/Kg
Zone-3	Soil Sample-03 ((Second time or Inter Mediate Sample, Village- Baghjan) on Dry Basis	N-27°35'35.5456, E-95°22'36.49332	08/10/2020	6,100	Mg/Kg
Zone-3	Soil Sample-04 ((Second time or Inter Mediate Sample, Village- Baghjan) on Dry Basis	N-27°35'33.28516, E-95°22'39.84996	08/10/2020	5,900	Mg/Kg
Zone-3	Soil Sample -05 ((Second time or Inter Mediate Sample, Village- Baghjan) on Dry Basis	N-27°35'32.30243, E-95°22'37.11065	08/10/2020	5,200	Mg/Kg
Zone-3	Soil Sample -06 ((Second time or Inter Mediate Sample, Village- Baghjan) on Dry Basis	N-27°35'31.57966, E-95°22'35.90036	08/10/2020	6,400	Mg/Kg
Zone-3	Soil Sample -07 ((Second time or Inter Mediate Sample, Village- Baghjan) on Dry Basis	N-27°35'29.94605, E-95°22'35.54677	08/10/2020	3,800	Mg/Kg
Zone-3	Soil Sample -08 ((Second time or Inter Mediate Sample, Village- Baghjan) on Dry Basis	N-27°35'30.89123, E-95°22'35.05969	08/10/2020	5,700	Mg/Kg
Zone-3	Soil Sample -09 ((Second time or Inter Mediate Sample, Village- Baghjan) on Dry Basis	N-27°35'28.82674, E-95°22'36.81516	08/10/2020	4,100	Mg/Kg
Zone-3	Water Sample-01 (Second time or Inter Mediate Sample, Village- Baghjan)	N-27°35'32.95266, E-95°22'40.72908	08/10/2020	74	PPM

Notes: 1. The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
 2. Responsibility of the Laboratory is limited to the invoiced amount only.
 3. This test report will not be generated again, either wholly or in part, without prior written permission of the laboratory.

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Annexure-15: TPH analysis reports of third party laboratory of intermediate samples Zone-4



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
TPH EXTRACT	MS-081020-02	22/10/2020

Issued To: THE ENERGY AND RESOURCES INSTITUTE (Teri)
DADARI SETH BLOCK, I H C COMPLEX, LODHI ROAD, NEW DELHI-110003

SAMPLING & ANALYSIS DATA

Sample Received On : 17/10/2020
 Sample Description : Soil/Water
 Protocol Used for testing : US EPA-846-9071B
 Parameters to be Checked : Total Petroleum Hydrocarbon (TPH) Content
 Analysis Duration : 17/10/2020 to 21/10/2020
 Sample Received by : Courier


Oily sludge					
Name of Area	Sample Identification Code	Sample Coordinates	Sampling Date	Result	Unit
Zone-4	Soil Sample-01 (Second time or Intermediate Sample, Village- Baghjan) on Dry Basis	N-27°35'25.06542, E-95°22'45.30958	08/10/2020	5,600	Mg/Kg
Zone-4	Soil Sample-02 ((Second time or Intermediate Sample, Village- Baghjan) on Dry Basis	N-27°35'27.0434, E-95°22'43.2435	08/10/2020	4,200	Mg/Kg
Zone-4	Soil Sample-03 ((Second time or Intermediate Sample, Village- Baghjan) on Dry Basis	N-27°35'40.78666, E-95°23'3.41848	08/10/2020	4,900	Mg/Kg
Zone-4	Soil Sample-04 ((Second time or Intermediate Sample, Village- Baghjan) on Dry Basis	N-27°35'38.85688, E-95°23'1.27619	08/10/2020	4,000	Mg/Kg
Zone-4	Soil Sample -05 ((Second time or Intermediate Sample, Village- Baghjan) on Dry Basis	N-27°35'38.75845, E-95°22'59.01467	08/10/2020	6,800	Mg/Kg
Zone-4	Soil Sample -06 ((Second time or Intermediate Sample, Village- Baghjan) on Dry Basis	N-27°35'35.2432, E-95°22'54.60913	08/10/2020	4,200	Mg/Kg
Zone-4	Soil Sample -07 ((Second time or Intermediate Sample, Village- Baghjan) on Dry Basis	N-27°35'35.10596, E-95°22'50.04948	08/10/2020	5,100	Mg/Kg
Zone-4	Soil Sample -08 ((Second time or Intermediate Sample, Village- Baghjan) on Dry Basis	N-27°35'35.46006, E-95°22'45.87827	08/10/2020	5,700	Mg/Kg
Zone-4	Water Sample -01 (Second time or Intermediate Sample, Village- Baghjan)	N-27°35'28.21524, E-95°22'46.05211	08/10/2020	62	PPM
Zone-4	Water Sample-02 (Second time or Intermediate Sample, Village- Baghjan)	N-27°35'28.6012, E-95°22'43.18331	08/10/2020	57	PPM

Notes:

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- This test report will not be generated again, either wholly or in part, without prior written permission of the laboratory.


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Annexure-16: TPH analysis reports of third party laboratory of third time samples Zone-1



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TEST CERTIFICATE

Test Report of TPH EXTRACT	Report Code MS-091020-01	Date of Issue 04/12/2020
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Issued To: THE ENERGY AND RESOURCES INSTITUTE (Teri)
DADARI SETH BLOCK, I H C COMPLEX, LODHI ROAD, NEW DELHI- 110003


SAMPLING & ANALYSIS DATA

Sample Received On : 01/12/2020
 Sample Description : Soil/Water
 Protocol Used for testing : US EPA-846-9071B
 Parameters to be Checked : Total Petroleum Hydrocarbon (TPH) Content
 Analysis Duration : 01/12/2020 to 03/12/2020
 Sample Received by : By report


Oily sludge					
Name of Area	Sample Identification Code	Sample Coordinates	Sampling Date	Result	Unit
Zone-1	Soil Sample-01(Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'41.82871, E-95°23'6.19836	26/11/2020	3000	Mg/Kg
Zone-1	Soil Sample-02 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'40.43699, E-95°23'11.543	26/11/2020	3300	Mg/Kg
Zone-1	Water Sample-(Third time Sample, Village- Baghjan)	N-27°35'48.66403, E-95°23'8.11363	26/11/2020	50	PPM
Zone-1	Water Sample 02,converted in to soil sample (Third time Sample, Village- Baghjan)	N-27°35'48.69571, E-95°23'7.96996	26/11/2020	54	PPM
Zone-1	Water Sample-03 Third time Sample, Village- Baghjan)	N-27°35'57.8864, E-95°23'5.43462	26/11/2020	67	PPM

Notes:

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Annexure-17: TPH analysis reports of third party laboratory of third samples Zone-2



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
TPH EXTRACT	MS-091020-02	04/12/2020

Issued To: THE ENERGY AND RESOURCES INSTITUTE (Teri)
DADARI SETH BLOCK, I H C COMPLEX, LODHI ROAD, NEW DELHI-110003


SAMPLING & ANALYSIS DATA

Sample Received On : 01/12/2020
 Sample Description : Soil/Water
 Protocol Used for testing : US EPA-846-9071B
 Parameters to be Checked : Total Petroleum Hydrocarbon (TPH) Content
 Analysis Duration : 01/12/2020 to 3/12/2020
 Sample Received by : By hand


Oily sludge					
Name of Area	Sample Identification Code	Sample Coordinates	Sampling Date	Result	Unit
Zone-2	Soil Sample-01(Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'57.32221, E-95°23'5.98434	26/11/2020	3800	Mg/Kg
Zone-2	Soil Sample-02 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'36.81276, E-95°23'10.79124	26/11/2020	3300	Mg/Kg
Zone-2	Soil Sample-03 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'34.63771, E-95°23'12.70702	26/11/2020	2700	Mg/Kg
Zone-2	Soil Sample-04 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'59.61826, E-95°22'47.56148	26/11/2020	2400	Mg/Kg
Zone-2	Water Sample- Third time Sample, Village- Baghjan)	N-27°35'59.5279, E-95°22'52.75315	26/11/2020	48	PPM

Notes:

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Annexure-18: TPH analysis reports of third party laboratory of third samples Zone-3



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
TPH EXTRACT	MS-081020-01	04/12/2020

Issued To: THE ENERGY AND RESOURCES INSTITUTE (Teri)
DADARI SETH BLOCK, I H C COMPLEX, LODHI ROAD, NEW DELHI-110003

SAMPLING & ANALYSIS DATA


Sample Received On : 01/12/2020
 Sample Description : Soil/Water
 Protocol Used for testing : US EPA-846-9071B
 Parameters to be Checked : Total Petroleum Hydrocarbon (TPH) Content
 Analysis Duration : 01/12/2020 to 03/12/2020
 Sample Received by : By hand

Oily sludge					
Name of Area	Sample Identification Code	Sample Coordinates	Sampling Date	Result	Unit
Zone-3	Soil Sample-01(Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'36.99874, E-95°22'41.27621	26/11/2020	1800	Mg/Kg
Zone-3	Soil Sample-02 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'37.65246, E-95°22'40.12482	26/11/2020	2200	Mg/Kg
Zone-3	Soil Sample-03 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'35.5456, E-95°22'36.49332	26/11/2020	3400	Mg/Kg
Zone-3	Soil Sample-04 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'33.28516, E-95°22'39.84996	26/11/2020	3000	Mg/Kg
Zone-3	Soil Sample -05 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'32.30243, E-95°22'37.11065	26/11/2020	3200	Mg/Kg
Zone-3	Soil Sample -06 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'31.57966, E-95°22'35.90036	26/11/2020	3200	Mg/Kg
Zone-3	Soil Sample -07 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'29.94605, E-95°22'35.54677	26/11/2020	1600	Mg/Kg
Zone-3	Soil Sample -08 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'30.89123, E-95°22'35.05969	26/11/2020	2900	Mg/Kg
Zone-3	Soil Sample -09 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'28.82674, E-95°22'36.81516	26/11/2020	2600	Mg/Kg
Zone-3	Water Sample-01 (Third time Sample, Village- Baghjan)	N-27°35'32.95266, E-95°22'40.72908	26/11/2020	64	PPM

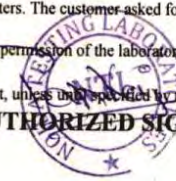
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Annexure-19: TPH analysis reports of third party laboratory of third time samples Zone-4



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
TPH EXTRACT	MS-081020-02	04/12/2020

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SAMPLING & ANALYSIS DATA

Sample Received On : 01/12/2020
 Sample Description : Soil/Water
 Protocol Used for testing : US EPA-846-9071B
 Parameters to be Checked : Total Petroleum Hydrocarbon (TPH) Content
 Analysis Duration : 01/12/2020 to 03/12/2020
 Sample Received by : By hand


Oily sludge					
Name of Area	Sample Identification Code	Sample Coordinates	Sampling Date	Result	Unit
Zone-4	Soil Sample-01 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'25.06542, E-95°22'45.30958	26/11/2020	3200	Mg/Kg
Zone-4	Soil Sample-02 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'27.0434, E-95°22'43.2435	26/11/2020	2300	Mg/Kg
Zone-4	Soil Sample-03 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'40.78666, E-95°23'3.41848	26/11/2020	2500	Mg/Kg
Zone-4	Soil Sample-04 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'38.85688, E-95°23'1.27619	26/11/2020	2000	Mg/Kg
Zone-4	Soil Sample -05 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'38.75845, E-95°22'59.01467	26/11/2020	3400	Mg/Kg
Zone-4	Soil Sample -06 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'35.2432, E-95°22'54.60913	26/11/2020	2200	Mg/Kg
Zone-4	Soil Sample -07 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'35.10596, E-95°22'50.04948	26/11/2020	3000	Mg/Kg
Zone-4	Soil Sample -08 (Third time Sample, Village- Baghjan) on Dry Basis	N-27°35'35.46006, E-95°22'45.87827	26/11/2020	3300	Mg/Kg
Zone-4	Water Sample -01 Third time Sample, Village- Baghjan)	N-27°35'28.21524, E-95°22'46.05211	26/11/2020	56	PPM
Zone-4	Water Sample-02 (Third time Sample, Village- Baghjan)	N-27°35'28.6012, E-95°22'43.18331	26/11/2020	50	PPM

Notes:

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Annexure- 20: TPH analysis reports of third party laboratory of zero time bore well water samples Zone-1



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Test Report of	Report Code	Date of Issue
Water	Water-01120-01	04/11/2020

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SAMPLING & ANALYSIS DATA


Sample Received On : 01/12/2020
 Sample Description : Bore well water
 Protocol Used for testing : APHA-3052
 Parameters to be Checked : Metal Content
 Analysis Duration : 01/12/2020 to 04/12/2020
 Sample Received by : Courier

Bore well Water					
Name of Area	Sample Identification Code	Sample Coordinates	Sampling Date	Result	Unit
Zone-1	Bore Bell Water Sample-01(After bioremediation Village- Baghjan)	N-27°35'48.66403, E-95°23'8.11363	26/11/2020		
S. No.	Test Parameter			Result	Unit
1.	Iron (as Fe)			0.071	mg/l
2.	Manganese (as Mn)			BDL	mg/l
3.	Zinc (as Zn)			0.584	mg/l
4.	Cadmium (as Cd)			BDL	mg/l
5.	Lead (asPb)			BDL	mg/l
6.	Nickel (as Ni)			BDL	mg/l
7.	Arsenic (as As)			BDL	mg/l
8.	Total Chromium (as Cr)			BDL	mg/l
9.	Mercury (as Hg)			BDL	mg/l
10.	Copper (as Cu)			0.031	mg/l


BDL: Below Detection limit.
APHA-American Public Health Association

Notes:

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Annexure- 21: Photos of joint sampling of bioremediation site.



Annexure-22: Photos of removing of indigenous vegetation, shrubs and small plants.



Annexure-23: Photos of tilling and mixing of microbes at site_microbes application.



Annexure-24: Photos of tilling and mixing of microbes at site.



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2020

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[Project Report No. 2020BR01]



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Bioremediation services of oily contaminated soil & water bodies at well number BGN#5, Baghjan bioremediation site, Assam.

2022



Prepared for

Oil India Limited, Duliajan, Assam.



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Bioremediation of oily Soil & water at BGN#5, Oil India Limited, Duliajan, Assam.

New Delhi: The Energy and Resources Institute.

[Project Report No. 2021BR03]

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The Energy and Resources Institute new delhi

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Acknowledgement

Firstly, we would like to thank Oil India Limited, Duliajan, Assam for entrusting TERI by granting the project, **“Hiring of services for In-Situ and Ex-Situ Bioremediation of oily sludge/oil contaminated soil/water of various production Installations, fields and water bodies in Assam and Arunachal Pradesh Fields”** The TERI and Oil India Limited, Duliajan, Assam could achieve the goal of the project within the expected time period due to consistent and dedicated efforts of the team members. The total quantity of 6983.33 M³ of oily soil and water bodies have been bio-remediated in the current project to attain TPH level of less than 0.5% with application of bacterial consortium developed by R&D, Oil India Limited, Duliajan, Assam.

We express gratitude to Oil India Limited, Duliajan, Assam for the enthusiastic support since the beginning till the now.

Dr. Banwari Lal
Senior Director
Environmental and Industrial Biotechnology Division
The Energy and Resources Institute
New Delhi

Bioremediation of oily soil & water at BGN #5, Oil India Limited, Duliajan, Assam.	
Work order Number for contract no 6116306 /Dated- 18.10.2021.	8125641
Project Code by TERI	2021BR03
Quantity of oily soil provided for bioremediation	6983.33M ³
Project started on	18 th Oct, 2021
Project completed on	14 th March, 2022
Duration of the project	147 days
Average TPH contamination in soil at initial day.	6720 mg/kg
Average TPH concentration in soil after bioremediation.	2145 mg/kg
Microbes used for Bioremediation	Developed by R&D,OIL

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1. Introduction

Oil India Limited (OIL), Duliajan Assam occupies a key role in the economy of India. It unavoidably generates some quantity of oily sludge, oil soaked soil and water bodies contamination resulting of oil supplying pipe line leakage, accidental oil spillage, and unwanted incident during maintenance or operations which constitutes a major challenge for hazardous waste management as well as environment protection. Management of oily sludge, oil soaked soil and oily water is one of the major problems being faced by the many countries.

Oily sludge, oil soaked soil and oily contaminated water are hazardous waste which causes enormous environmental pollution. According to the existing classification of hazardous waste, the petroleum oily sludge, oily soil and water resulting of oil spillage fall under Hazardous Waste Category. Due to stringent norms by regulatory authority and corporate responsibility of oil refinery to protect environment, new techniques are continuously in demand in India to manage oily sludge. However, in developed countries, new technologies are continuously being invented and implemented for treatment of this type of oily waste. Several technologies, which were considered emerging a few years back, are now well accepted in the field of hazardous waste treatment. One of the new technologies is bioremediation of oily sludge using specialised bacteria. These specialised bacteria have the capability to breakdown and digest oil components and convert them into harmless products like carbon dioxide, water and fatty acids.

As a timely response to the increasing importance of such microorganisms that can biodegrade and detoxify oily sludge, R&D, Oil India Limited, Duliajan, Assam has developed a microbial consortium (a mixture of five bacterial strains), which can biodegrade all the fractions of oil in sludge and water bodies.

The objective of this project is to assess, characterize, quantify and remediate impacted area around the blown out gas well no. 5 (BGN#5), Baghjan. The land and water bodies area were contaminated because of well blown out incident.

The gas producing well no. 5 (BGN#5), Baghjan is located in south-west of Baghjan village and north-west of Dhakuwal Barekuri. At fire incident site approximately 150m area around flame head of blown out well no. 5 (BGN#5) was earlier declared as heat zone and restricted from free entry to avoid likely health damages or casualties. This area around well was visited for assessment of contamination in land area and water bodies.

With the application of this microbial consortium developed by R&D Oil India Limited, Duliajan, Assam, oily soil and contaminated water bodies resulting of blown out of gas producing well no. 5 (BGN#5), Baghjan have been treated. The total estimated volume of 6983.33 M³ of oily soil along with water bodies was under taken for bioremediation at well no. 5 (BGN#5), Baghjan. The present project deals with bioremediation of 6983.33M³ of oily soil/oily water bodies vide work order no. 8125641, contract no. 6116306.

1.1 Bioremediation- What is Bioremediation?

Bioremediation is a process that uses naturally occurring microorganisms to transform harmful substances to nontoxic compounds. There are innumerable strains of microbes under basic categories of bacteria, yeast or fungi, which degrade oily sludge and waste water effluent sludge through digestion of harmful chemicals and compounds present in oily sludge and waste water effluent sludge into simpler, less toxic or non-toxic substances. Microorganisms, like all living organisms, need nutrients (such as nitrogen, phosphate, and trace metals), carbon and energy to survive. These beneficial microbes break down a wide variety of organic (carbon-containing) compounds found in oily sludge and waste water effluent sludge to obtain energy for their growth. Many species of soil bacteria use petroleum hydrocarbons as a food/energy source, transforming them into harmless substances consisting mainly of carbon dioxide, water and fatty acids. Bioremediation exploits this natural process by promoting the growth of microbes that can effectively degrade specific contaminants and convert them to nontoxic bi-products. There are two basic types of bioremediation, "Biostimulation" provides nutrients to the indigenous microbial populations. This promotes growth and increases metabolic activity that is used to degrade contaminants. "Bioaugmentation" introduces specific blends of microorganisms into a contaminated environment or into a bioreactor to initiate the bioremediation process, which increases the population of the fit to handle the biodegradation process in the contaminated area.

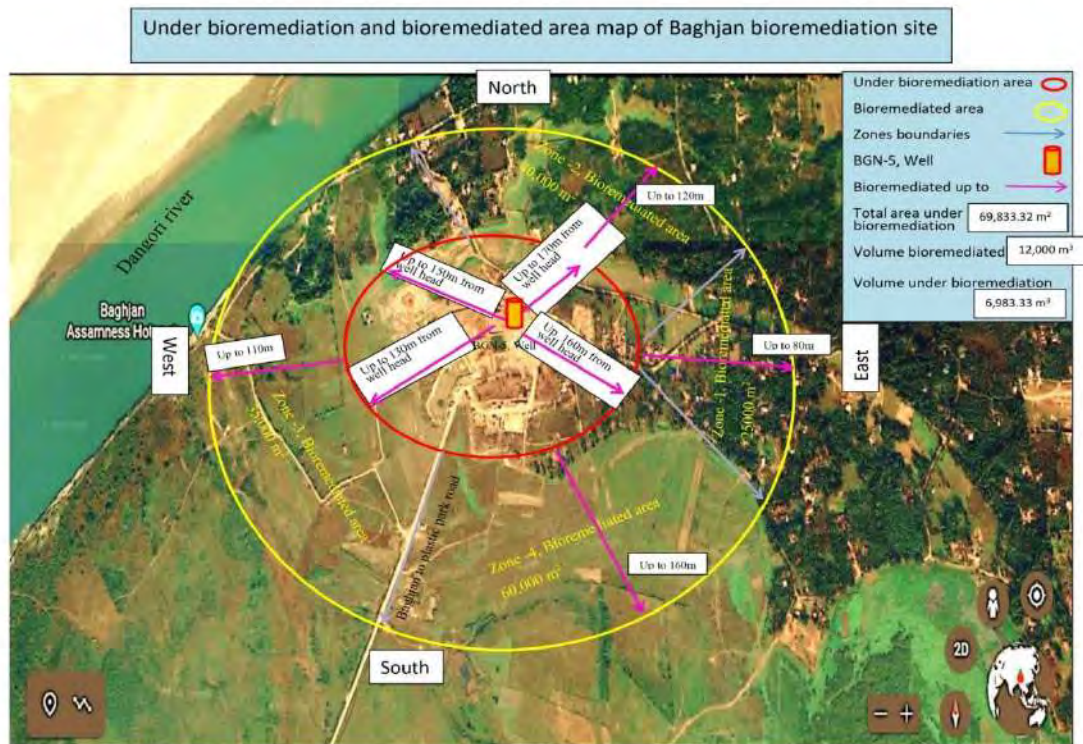
2. Methods

2.1 Selection of site for bioremediation

The gas producing well no. 5 (BGN#5), Baghjan is located in south-west of Baghjan village and north-west of Dhakuwal Barekuri, Hapjan Block, Doomdooma Sub-division in Tinsukia District of Assam which is govern by Oil India Limited, Duliajan, Assam. The geographical coordinate of the well site is 27°35'46.01"N, 95°22'52.0"E. The well no. 5 (BGN#5), Baghjan was blown out accidentally during its maintenance service. Resulting of this blown out surrounding land area and water bodies became contaminated from condensate oil. Looking it as a major environmental and health hazard emergency this site has been undertaken on priority for bioremediation of condensate oil contamination.

At fire incident site approximately 150m area around flame head of blown out well number BGN#5 was earlier declared as heat zone and restricted from free entry to avoid likely health damages or casualties. This area around well BGN#5 was visited after capping of flame head for assessment of contamination in land area and water bodies. Approximately 150m area (land area and water bodies) around flame head of blown out well no. 5 (BGN#5), Baghjan was undertaken by TERI, New Delhi for bioremediation vide Work order No.: 8125641 for contract no. 6116306 /Dated.- 18.10.2021.

Figure 1. Under bioremediation and bioremediated area map of bioremediation site, well no. 5 (BGN#5) Baghjan, Oil India Limited, Duliajan, Assam.



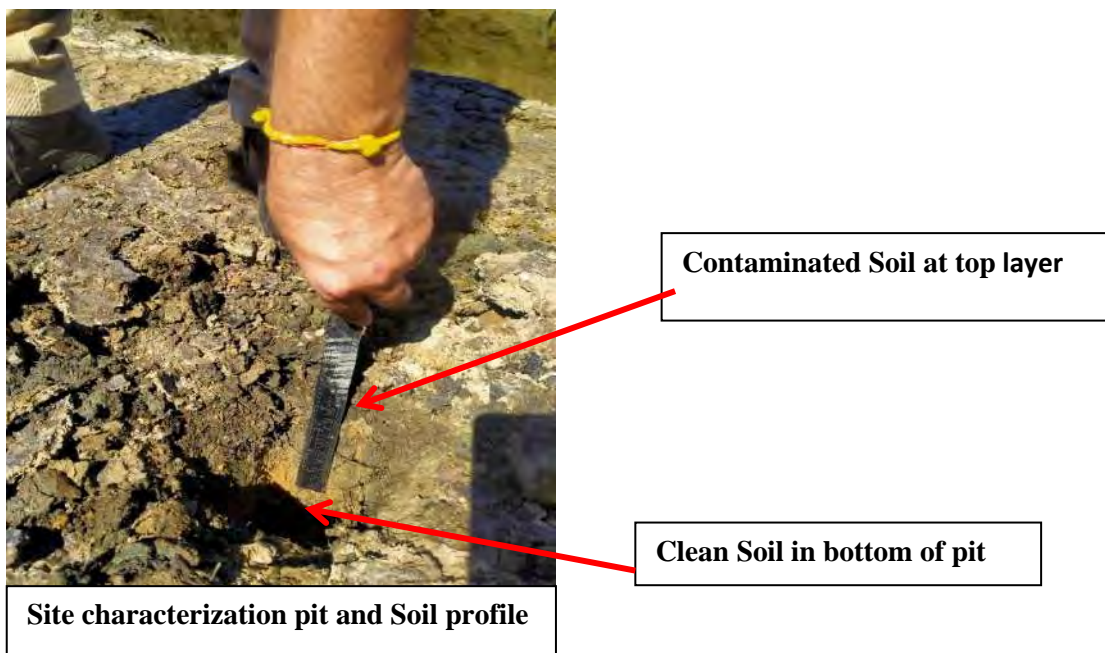
2.2 Bioremediation site characterization

Site investigation activities were carried out in surrounding area of blown out gas well no. 5 (BGN#5), Baghjan on 18.10.2021. In general, the site investigation activities described in the subsequent sections were conducted in the following sequence.

Site Walkthrough	October 18th 2021
Identified waste material laying at site	October 18th 2021
Soil/Water sampling for characterization	October 18th 2021

After initial site wide observations, site was characterized based on visual and odour levels for contamination by digging site characterizing pits and collected the samples randomly. The pits at random locations were dug with the help of trowel at site to expose the contamination level up to the depth where clean soil was observed. The depth of contamination was visually observed by joint team of TERI and Oil India Ltd and depth was recorded using the measuring scale. Site characterizing pits and samples locations coordinates were recorded and photos taken also as evidence.

Figure 2. Site characterization Methodology illustration as below.



The depth of contamination was recorded from soil profile at excavated locations and also odour of soil samples was assessed by joint team. Based on these observations average depth of contamination was calculated for estimating the volume of contamination. The average depth of contamination for volume estimation is 10cm and decided that bioremediation shall be carried out to the actual depth of contamination. The area for the quantifying of volume was calculated based

on the zero time sampling (initial sampling) data and date of zero time sampling was proposed as 22.10.2021.

Table 1. Details of site characterization pits soil profile samples with coordinates, depth of contamination observed.

S.No.	Sample Number	Coordinates	Site Characterization sampling date	Depth (cm) of contamination
1.	Soil Sample No.1	27°35'49.4"N 95°22'50.0"E	18/10/2021	8
2.	Soil Sample No.2	27°35'49.3"N 95°22'49.6"E	18/10/2021	12
3.	Soil Sample No.3	27°35'47.8"N 95°22'49.3"E	18/10/2021	12
4.	Soil Sample No.4	27°35'46.9"N 95°22'48.3"E	18/10/2021	8
5.	Soil Sample No.5	27°35'46.1"N 95°22'46.6"E	18/10/2021	13
6.	Soil Sample No.6	27°35'44.6"N 95°22'45.3"E	18/10/2021	8
7.	Soil Sample No.7	27°35'43.2"N 95°22'47.0"E	18/10/2021	12
8.	Soil Sample No.8	27°35'44.1"N 95°22'53.2"E	18/10/2021	13
9.	Soil Sample No.9	27°35'47.6"N 95°22'54.5"E	18/10/2021	8
		Average Depth		10.44
10.	Water Sample 01	27°35'49.3"N 95°22'49.8"E	18/10/2021	Thin Layer

2.3 Base time line or Zero time sampling.

Base line sampling was carried out on 22nd Oct, 2021. Approximately 150m to 170m around of well no. 5 (BGN#5), Baghjan was covered for sampling. Soil samples locations were identified with coordinates and sampled in accordance with the Site Characterization Plan. The soil in the area was sampled at 20 locations (each location sample composed of 10 grab samples) and four soil samples beyond 150m were collected as control. The standard sampling method and sample nomenclature used for sample submission to analyse at NABL accredited third part lab.

Soil samples were collected from 20 locations and water samples were collected from four locations, numbers of samples taken were depending on the physical assessment of contamination observed during the joint assessment. Contaminated soil samples/water samples have been collected from oil contaminated land and water bodies area which was identified by the joint team of TERI and OIL during assessment. For sampling purpose, samples were collected from 10 grab samples locations and thoroughly mixed to get one composite sample. All details were recorded in field logs.

These contaminated soil samples were taken from core sample taken by Core cutter or sampler. Core samples were visually observed for contamination. Based on visual observation of contamination samples were collected in sterilized container. The surface litter at the sampling spot has been removed, soil core sampler was used to dig the soil up to 10-20 cm. Sample were stored in ice box at field and stored at refrigerated condition before dispatching to analysis. Photos and videos were taken as evidence.

2.3.1 Codification of samples

Each sample has been identified with type of samples (soil /water), sample no., and village name. For Example: Soil sample No.xx, Date, Village name

The soil sampling has been carried out as per the guidelines of methods manual - Soil testing in India, Department of agriculture and cooperation, Ministry of agriculture, Govt. of India, 2011 and water samples were collected by following method IS 3025 (Part 1) – 1987 (Reaff. 2003).

All samples details with coordinates are presented in Table 2. Each sample was prepared by the mixing of 10 grab samples. For each sample point coordinates were recorded using hand GPS/mobile android GPS application, coding was mentioned and sent to third party NABL accredited laboratory for total petroleum hydrocarbon (TPH) test. Each time samples were collected from the coordinate recorded and samples were collected in duplicate by joint team of TERI and Oil India Ltd. One set of sample was handed over to Oil India Ltd to ensure the quality.

2.3.2 Sampling tools and accessories

Soil Core has been used for collecting soil samples using hand core sampler and samples were collected in sterilized plastic containers/jars. Water samples also were collected in sterilized jars.

Figure 3. One single composite sample consist of 10 sub-samples (Grab samples)

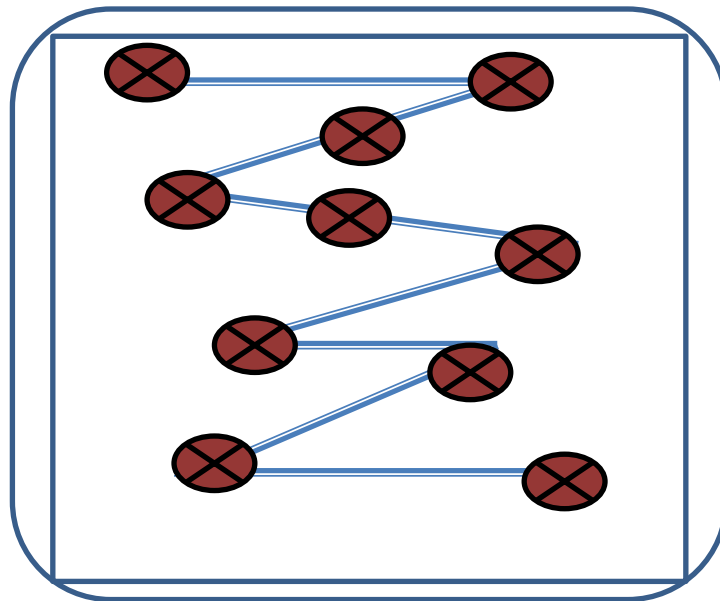


Illustration of soil sampling (contaminated site), each single sample has been marked in to 10 units grab locations (1 to 10). Soil sample from each grab location (1-10) pooled together to make a one representative composite sample.

2.3.3 Quality Assurance and Quality Control.

The Quality Assurance and Control Sampling (QA/QC) has been followed as mentioned above, it includes codification of samples, use of standard sampling, analysis procedures and duplicate sample. The soil samples have been collected in individual plastic containers/jars and placed in ice cooler in the field immediately after soil sample collection. The grab samples from the 10 locations (sub-sample) have been pooled in a large plastic bag, and gently mixed into one composite sample. The composite sample was immediately logged and jarred.

2.4 Ground water monitoring and analysis of selected heavy metals in ground water, water sample collected from bore well near bioremediation site at well no. 5 (BGN#5), Baghjan Oil India Limited, Duliajan, Assam.

Ground water sample was taken from the bore well present near the bioremediation site before initiating the bioremediation job on 22/10/2021. For reassessment of ground water quality after bioremediation final bore well water sample has been collected on 14/03/2022 after completion the bioremediation. Water from the bore well was flushed out before sampling, after flushing of water from bore well the water sample was collected in bottle/plastic jar by following method IS 3025 (Part 1) – 1987 (Reaff. 2003). Water sample was fixed by concentrated HNO₃ acid and transported to the TERI, New Delhi for the analysis from NABL accredited third party laboratory.

Table 2. Details of zero time line or base line soil samples with contamination depth

S. No.	Sample Details	Coordinates	Sampling date	Vertical depth of core sample (cm)	Depth of contamination observed in soil core (cm)
1	Soil sample no.1	27°35'46.5"N 95°22'50.1"E	22/10/2021	20	12
2	Soil sample no.2	27°35'50.5"N 95°22'47.9"E	22/10/2021	15	8
3	Soil sample no.3	27°35'51.1"N 95°22'46.8"E	22/10/2021	16	10
4	Soil sample no.4	27°35'49.4"N 95°22'49.6"E	22/10/2021	18	10
5	Soil sample no.5	27°35'46.9"N 95°22'47.8"E	22/10/2021	15	9
6	Soil sample no.6	27°35'44.1"N 95°22'46.9"E	22/10/2021	20	13
7	Soil sample no.7	27°35'45.9"N 95°22'51.4"E	22/10/2021	17	12
8	Soil sample no.8	27°35'48.8"N 95°22'52.8"E	22/10/2021	17	11
9	Soil sample no.9	27°35'49.7"N 95°22'54.1"E	22/10/2021	18	10
10	Soil sample no.10	27°35'49.7"N 95°22'55.8"E	22/10/2021	16	12
11	Soil sample no.11	27°35'46.1"N 95°22'53.2"E	22/10/2021	16	9
12	Soil sample no.12	27°35'47.2"N 95°22'54.5"E	22/10/2021	18	10
13	Soil sample no.13	27°35'45.4"N 95°22'54.1"E	22/10/2021	12	7
14	Soil sample no.14	27°35'45.1"N 95°22'54.1"E	22/10/2021	14	10
15	Soil sample no.15	27°35'44.7"N 95°22'56.2"E	22/10/2021	12	7
16	Soil sample no.16	27°35'43.7"N 95°22'52.9"E	22/10/2021	15	8
17	Soil sample no.17	27°35'43.6"N 95°22'49.9"E	22/10/2021	18	10
18	Soil sample no.18	27°35'43.2"N 95°22'49.9"E	22/10/2021	17	11
19	Soil sample no.19	27°35'42.4"N 95°22'49.5"E	22/10/2021	16	12
20	Soil sample no.20	27°35'43.4"N 95°22'47.8"E	22/10/2021	15	10

Table 3. Details of zero time line or base line water samples (outside fenced area) with coordinates and contamination layer thickness

S. No.	Sample Details	Coordinates	Sampling date	Depth (cm)
1	Water sample no.1	27°35'50.5"N 95°22'47.9"E	22/10/2021	< 1cm
2	Water sample no.2	27°35'45.4"N 95°22'46.3"E	22/10/2021	< 1cm
3	Water sample no.3	27°35'49.3"N 95°22'52.9"E	22/10/2021	< 1cm
4	Water sample no.4	27°35'50.0"N 95°22'51.9"E	22/10/2021	< 1cm
5.	Bore well water sample	27°35'42.0"N 95°22'51.0"E	22/10/2021	40 feet

Table 4. Details of zero time line or base line pond water (inside fenced area) and pond sediments samples inside fenced plinth BGN#5 area

S. No.	Sample Details	Location	Sampling date	Depth (cm)
1	Pond -1, Water sample no.1	Inside fenced area of plinth BGN # 5, Baghjan	16/11/2021	< 1cm
2	Pond-2, Water sample no.2	Inside fenced area of plinth BGN # 5, Baghjan	16/11/2021	< 1cm
3	Pond-3, Water sample no.3	Inside fenced area of plinth BGN # 5, Baghjan	16/11/2021	< 1cm
4	Pond-4, Water sample no.4	Inside fenced area of plinth BGN # 5	16/11/2021	< 1cm
5	Pond -1, Sediment soil sample no.1	Inside fenced area of plinth BGN # 5	16/11/2021	4cm
6	Pond -2, Sediment soil sample no.2	Inside fenced area of plinth BGN # 5	16/11/2021	4cm
7	Pond -3, Sediment soil sample no.3	Inside fenced area of plinth BGN # 5	16/11/2021	4cm
8	Pond -4, Sediment soil sample no.4	Inside fenced area of plinth BGN # 5	16/11/2021	4cm

Table 5. Details of zero time line or base line soil control samples with coordinates and depth

S. No.	Sample Details	Coordinates	Sampling date	Depth (cm)
1	Control Sample no.1	27°35'44.6"N 95°22'44.2"E	22/10/2021	18
2	Control Sample no.2	27°35'50.5"N 95°22'54.9"E	22/10/2021	16
3	Control Sample no.3	27°35'44.8"N 95°22'56.1"E	22/10/2021	15
4	Control Sample no.4	27°35'42.4"N 95°22'45.4"E	22/10/2021	15

Figure 4. Samples coordinates details and marked on google earth map

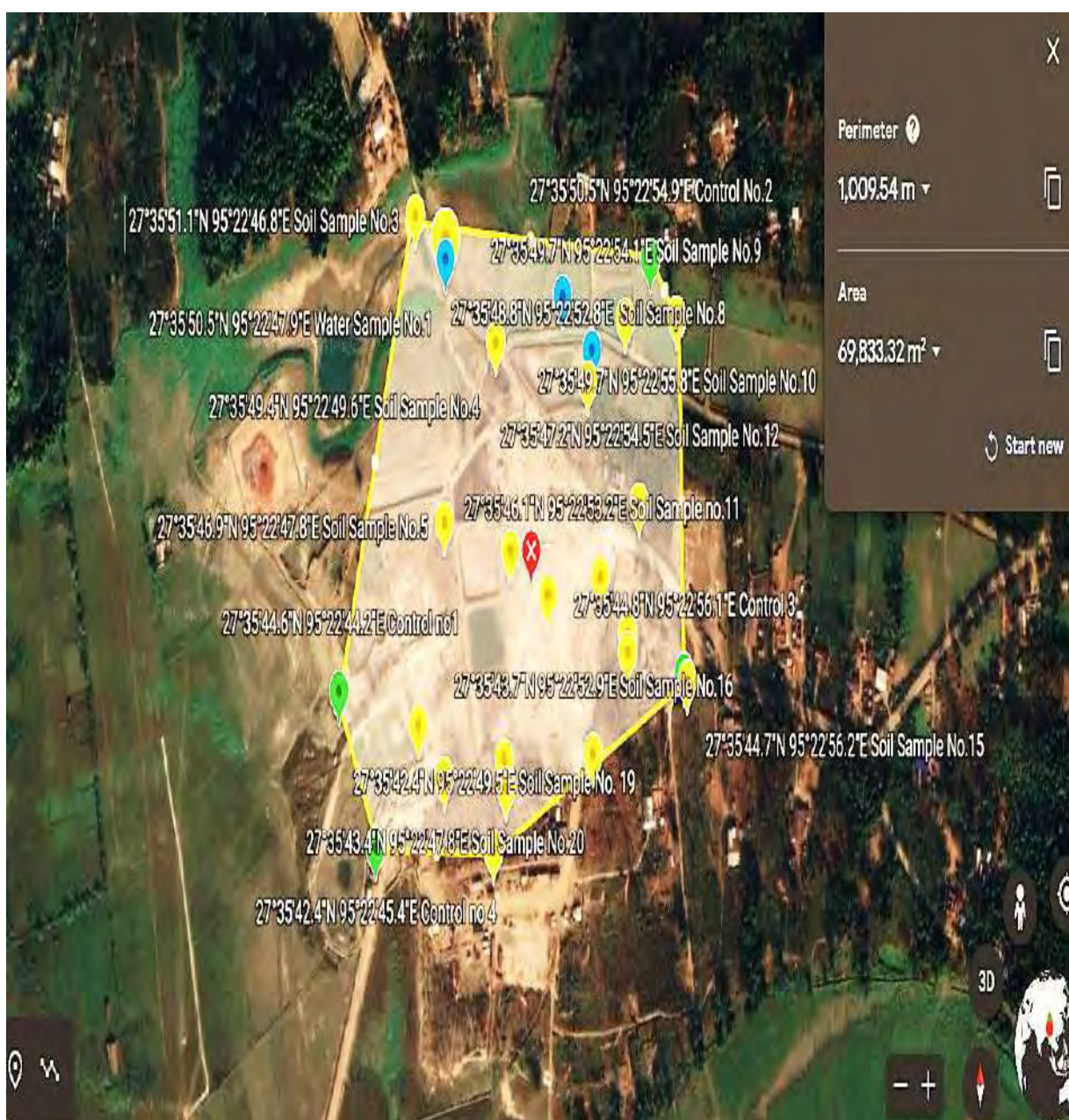
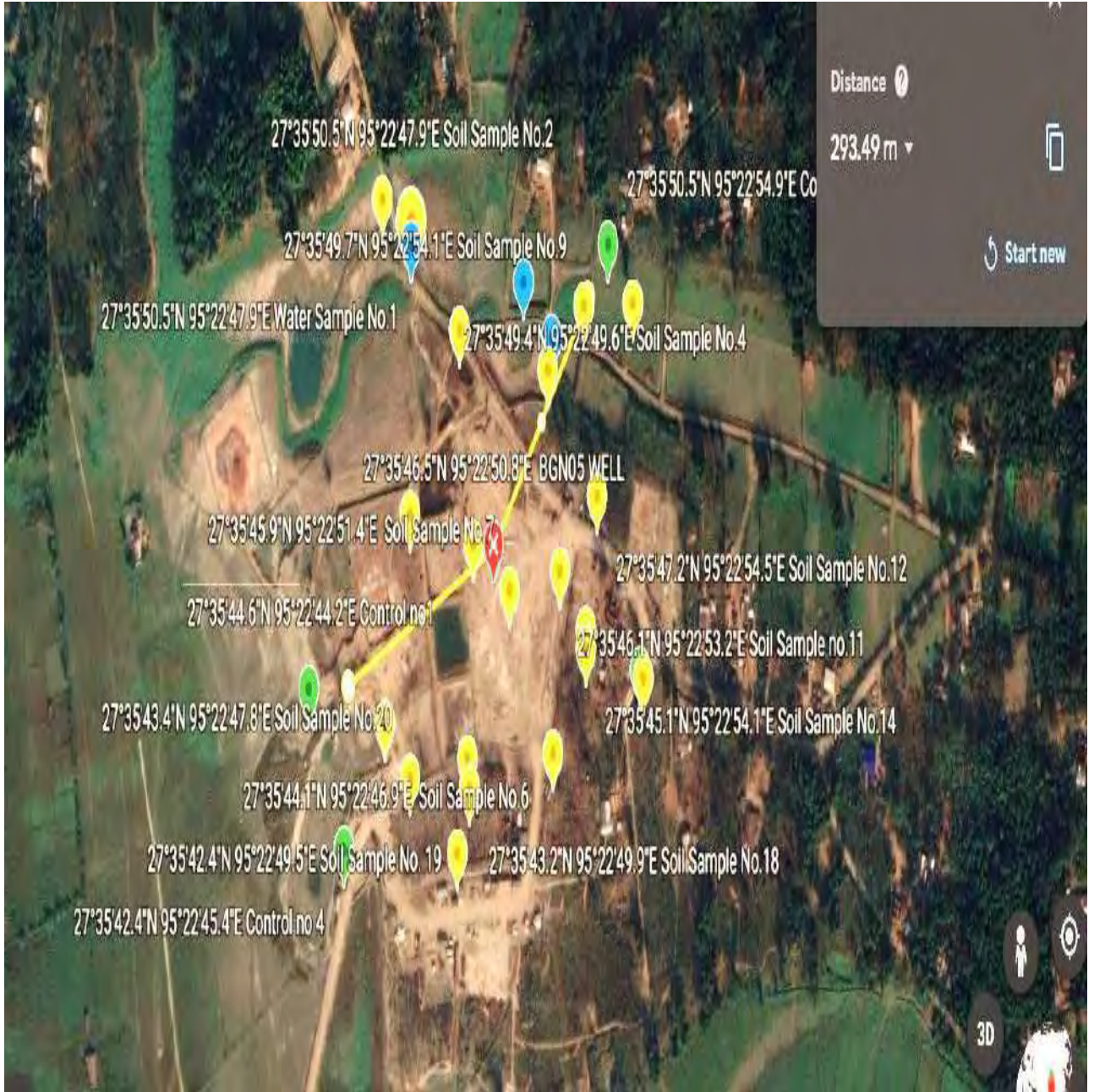


Figure 5. Average distance covered from BGN-05 well to distal point of sample.



Figure 6. Average distance covered from BGN-05 well to distal point of sample.



2.5 Work schedule of bioremediation of oily soil and water bodies at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Table 6. Schedule for bioremediation of oily soil and water bodies at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

S.No.	Work description	Start date	Completion date	Work status
1.	Site Walkthrough and Joint assessment of bioremediation site.	18/10/2021	18/10/2021	Done
2.	Identifying waste material laying at site and site characterization.	18/10/2021	18/10/2021	Done
3.	Base line or zero time line sampling.	22/10/2021	22/10/2021	Done
5.	Water removing manually from natural, temporary occurring low lying area to adjacent land area for bioremediation.	10/11/2021	21/11/2021	Done
6.	Identified waste material removing from whole bioremediation site.	15/11/2021	20/11/2021	Done
7.	First phase microbes application and tilling in whole bioremediation site.	10/11/2021	21/11/2021	Done
8.	Second phase microbes application and tilling in whole bioremediation site.	20/12/2021	24/12/2021	Done
8.	Intermediate sampling during bioremediation.	24/01/2022	29/01/2022	Done
9.	Third phase microbes application and tilling in whole bioremediation site.	08/02/2022	08/02/2022	Done
10.	Third time sampling of bioremediation site.	14/03/2022	14/03/2022	Done

2.6 Production of microbes to transport at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam and its application on oily soil at bioremediation site.

The R&D, Oil India Limited, Duliajan, Assam has developed a new bacterial culture by assemble of five bacterial species which could biodegrade all fractions of TPH of oily sludge/ soil. This bacterial culture handed over to TERI by Oil India Limited, R&D dept. Duliajan on 10th June 2020 with non-disclosure agreement. Microbes (oil degrading bacterial culture) was produced in bioreactors of different capacity at TERI laboratory (Figure 9). Microbes culture was mixed with a carrier material and carrier based culture was filled in sterilized polybags (Figure 9). Carrier based material contains 10⁹ to 10¹⁰ cfu/g (colony forming unit) microbes in carrier material. Carrier based microbes material was transported to well number BGN#5, Baghjan, Oil India Limited, Duliajan, Assam for its application on oily soil. Microbes culture (live oil degrading bacteria) was applied on oily soil. Nutrient mixture was also applied on oily soil. After application of microbes, oily soil was mixed and tilled by manually, tractor with plough disc or harrow and JCB machine.

Figure 7. Bacterial culture tubes at Oil India Limited, R&D dept. Duliajan, Assam



Figure 8. Bacterial culture handed over to TERI by Oil India Limited, R&D dept. Duliajan, Assam.



Figure 9. Microbes (Oil degrading bacterial culture) and its production at TERI state-of-the-art facility laboratory.



2.7 Quantity of microbes and nutrient applied at the bioremediation site, well no. 5 (BGN#5), Baghjan.

In the first phase microbe application of bioremediation of 6983.33M³ oily soil at well no. 5 (BGN#5), Baghjan bioremediation site, the 70% of total calculated microbes quantity of all three application 'i.e.' 5000 kg has been applied along with nutrient. In the second phase application 20% microbes of total calculated quantity i.e.' 1500 kg along with nutrient was applied as second phase microbes application. The remaining 10% quantity of microbes i.e.' 720 kg was applied along with nutrient as third phase microbes application.

3. Results

3.1 Solvent extractable total petroleum hydrocarbon (TPH) in soil and water undertaken for the bioremediation at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

At well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam, total 6983.33M3 of oil contaminated soil along with water bodies was undertaken for bioremediation. From whole bioremediation site total 20 soil samples, 4 water samples from water bodies situated outside fenced area, one bore well water sample, 4 water samples from ponds situated inside fenced area and 4 sediment samples from same ponds situated inside fenced area and 4 control soil samples were collected before initiating the bioremediation job as zero time samples or base line samples. After second phase microbe application, same numbers (as zero time) of intermediate (during bioremediation) soil and water samples were collected from same location and coordinates to know bioremediation impact. To determine the completion of oil bioremediation, after third phase microbe application same numbers (as zero time) of soil and water samples were collected from same location and coordinates as third time's samples. The solvent extractable total petroleum hydrocarbon (TPH) in soil and water samples were estimated by the analysis methods USEPA9071B and EPA1664A respectively. As per contract the analysis reports of all samples have been done by NABL accredited third party laboratory. The third party laboratory's NABL accreditation certificate and other certificate are attached along with this report as annexure number-03 to 06. The TPH reports of zero time samples, intermediate samples and third's time samples are attached as annexure 11 to 27. The all soil, water and bore well water samples details with solvent extractable total petroleum hydrocarbon (TPH) content of zero time samples, intermediate samples and third's time samples are presented in following table no. 7 to 20.

Table 7. Solvent extractable total petroleum hydrocarbon (TPH) content in base time line or zero time soil samples of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

S. No.	Sample Details	Coordinates	Sampling date	Total Petroleum Hydrocarbon (TPH)	Unit
1	Soil sample no.1	27°35'46.5"N 95°22'50.1"E	22/10/2021	8200	mg/kg
2	Soil sample no.2	27°35'50.5"N 95°22'47.9"E	22/10/2021	7000	mg/kg
3	Soil sample no.3	27°35'51.1"N 95°22'46.8"E	22/10/2021	5200	mg/kg
4	Soil sample no.4	27°35'49.4"N 95°22'49.6"E	22/10/2021	8900	mg/kg
5	Soil sample no.5	27°35'46.9"N 95°22'47.8"E	22/10/2021	8700	mg/kg

S. No.	Sample Details	Coordinates	Sampling date	Total Petroleum Hydrocarbon (TPH)	Unit
6	Soil sample no.6	27°35'44.1"N 95°22'46.9"E	22/10/2021	10100	mg/kg
7	Soil sample no.7	27°35'45.9"N 95°22'51.4"E	22/10/2021	9000	mg/kg
8	Soil sample no.8	27°35'48.8"N 95°22'52.8"E	22/10/2021	6300	mg/kg
9	Soil sample no.9	27°35'49.7"N 95°22'54.1"E	22/10/2021	6300	mg/kg
10	Soil sample no.10	27°35'49.7"N 95°22'55.8"E	22/10/2021	5300	mg/kg
11	Soil sample no.11	27°35'46.1"N 95°22'53.2"E	22/10/2021	7200	mg/kg
12	Soil sample no.12	27°35'47.2"N 95°22'54.5"E	22/10/2021	5200	mg/kg
13	Soil sample no.13	27°35'45.4"N 95°22'54.1"E	22/10/2021	5200	mg/kg
14	Soil sample no.14	27°35'45.1"N 95°22'54.1"E	22/10/2021	5100	mg/kg
15	Soil sample no.15	27°35'44.7"N 95°22'56.2"E	22/10/2021	5200	mg/kg
16	Soil sample no.16	27°35'43.7"N 95°22'52.9"E	22/10/2021	5500	mg/kg
17	Soil sample no.17	27°35'43.6"N 95°22'49.9"E	22/10/2021	7500	mg/kg
18	Soil sample no.18	27°35'43.2"N 95°22'49.9"E	22/10/2021	7200	mg/kg
19	Soil sample no.19	27°35'42.4"N 95°22'49.5"E	22/10/2021	5300	mg/kg
20	Soil sample no.20	27°35'43.4"N 95°22'47.8"E	22/10/2021	6000	mg/kg

Table 8. Solvent extractable total petroleum hydrocarbon (TPH) content in base time line or zero time water samples (outside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

S. No.	Sample Details	Coordinates	Sampling date	TPH	Unit
1	Water sample no.1	27°35'50.5"N 95°22'47.9"E	22/10/2021	110	ppm
2	Water sample no.2	27°35'45.4"N 95°22'46.3"E	22/10/2021	140	ppm
3	Water sample no.3	27°35'49.3"N 95°22'52.9"E	22/10/2021	120	ppm
4	Water sample no.4	27°35'50.0"N 95°22'51.9"E	22/10/2021	120	ppm

Table 9. Solvent extractable total petroleum hydrocarbon (TPH) content in base time line or zero time pond water and pond sediment samples (inside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

S. No.	Sample Details	Location	Sampling date	TPH	Unit
1	Pond -1, Water sample no.1	Inside fenced area of plinth BGN # 5, Baghjan	16/11/2021	85	ppm
2	Pond-2, Water sample no.2	Inside fenced area of plinth BGN # 5, Baghjan	16/11/2021	67	ppm
3	Pond-3, Water sample no.3	Inside fenced area of plinth BGN # 5, Baghjan	16/11/2021	72	ppm
4	Pond-4, Water sample no.4	Inside fenced area of plinth BGN # 5	16/11/2021	60	ppm
5	Pond -1, Sediment soil sample no.1	Inside fenced area of plinth BGN # 5	16/11/2021	3800	mg/kg
6	Pond -2, Sediment soil sample no.2	Inside fenced area of plinth BGN # 5	16/11/2021	2200	mg/kg
7	Pond -3, Sediment soil sample no.3	Inside fenced area of plinth BGN # 5	16/11/2021	2600	mg/kg
8	Pond -4, Sediment soil sample no.4	Inside fenced area of plinth BGN # 5	16/11/2021	2400	mg/kg

Table 10. At zero day, characteristics of ground water of bioremediation site of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Sample- Bore well water sample (after bioremediation), BGN-5, Baghjan. Sampling date- 22.10.2021 Location coordinate- 27°35'42.0"N, 95°22'51.0"E				
Heavy metals	Permissible limits		Used method	Concentration in ground water (ppm)
	BSI/WHO	EPA (LIE)		
Fe	5 ppm	1 ppm	IS 3025 (Part-65)	BDL(DL<0.01)
Mn	0.1 ppm	1.5 ppm	IS 3025 (Part-65)	BDL(DL<0.01)
Zn	1 ppm	1 ppm	IS 3025 (Part-65)	BDL(DL<0.01)
Ni	5 ppb	1 ppm	IS 3025 (Part-65)	BDL(DL<0.001)
Cd	5 ppb	0.5 ppm	IS 3025 (Part-65)	BDL(DL<0.001)
Pb	5 ppb	---	IS 3025 (Part-65)	BDL(DL<0.001)
As	1 ppb	0.01 ppm	IS 3025 (Part-65)	BDL(DL<0.001)
Cr (Total)	5 ppb	1 ppm	IS 3025 (Part-65)	BDL(DL<0.001)
Hg	0.5 ppb	0.5 ppm	IS 3025 (Part-65)	BDL(DL<0.001)
Cu	1ppm	1ppm	IS 3025 (Part-65)	BDL(DL<0.01)
TPH	<100PPM (CPCB)		EPA1664A	BDL(DL<5.00)

Table 11. Solvent extractable total petroleum hydrocarbon (TPH) content in base time line or zero time soil control samples (outside of 150 meters) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

S. No.	Sample Details	Coordinates	Sampling date	TPH	Unit
1	Control soil Sample no.1	27°35'44.6"N 95°22'44.2"E	22/10/2021	BDL(DL<200)	mg/kg
2	Control soil Sample no.2	27°35'50.5"N 95°22'54.9"E	22/10/2021	BDL(DL<200)	mg/kg
3	Control soil Sample no.3	27°35'44.8"N 95°22'56.1"E	22/10/2021	BDL(DL<200)	mg/kg
4	Control soil Sample no.4	27°35'42.4"N 95°22'45.4"E	22/10/2021	BDL(DL<200)	mg/kg

Table 12. Solvent extractable total petroleum hydrocarbon (TPH) content in intermediate soil samples of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

S. No.	Sample Details	Coordinates	Sampling date	Total Petroleum Hydrocarbon (TPH)	Unit
1	Soil sample no.1	27°35'46.5"N 95°22'50.14"E	24/01/2022	4300	mg/kg
2	Soil sample no.2	27°35'50.52"N 95°22'47.9"E	24/01/2022	3900	mg/kg
3	Soil sample no.3	27°35'51.12"N 95°22'46.84"E	25/01/2022	3100	mg/kg
4	Soil sample no.4	27°35'49.43"N 95°22'49.60"E	24/01/2022	3600	mg/kg
5	Soil sample no.5	27°35'46.94"N 95°22'47.81"E	24/01/2022	3300	mg/kg
6	Soil sample no.6	27°35'44.12"N 95°22'46.92"E	24/01/2022	5100	mg/kg
7	Soil sample no.7	27°35'45.90"N 95°22'51.42"E	24/01/2022	4300	mg/kg
8	Soil sample no.8	27°35'48.81"N 95°22'52.80"E	24/01/2022	3900	mg/kg
9	Soil sample no.9	27°35'49.74"N 95°22'54.10"E	24/01/2022	3400	mg/kg
10	Soil sample no.10	27°35'49.71"N 95°22'55.83"E	29/01/2022	3100	mg/kg
11	Soil sample no.11	27°35'46.11"N 95°22'53.20"E	24/01/2022	3800	mg/kg
12	Soil sample no.12	27°35'47.22"N 95°22'54.53"E	29/01/2022	3000	mg/kg
13	Soil sample no.13	27°35'45.44"N 95°22'54.10"E	29/01/2022	2900	mg/kg
14	Soil sample no.14	27°35'45.10"N 95°22'54.16"E	29/01/2022	3000	mg/kg
15	Soil sample no.15	27°35'44.73"N 95°22'56.20"E	29/01/2022	3400	mg/kg
16	Soil sample no.16	27°35'43.70"N 95°22'52.90"E	29/01/2022	3200	mg/kg
17	Soil sample no.17	27°35'43.64"N 95°22'49.92"E	29/01/2022	4000	mg/kg
18	Soil sample no.18	27°35'43.22"N 95°22'49.91"E	29/01/2022	3900	mg/kg
19	Soil sample no.19	27°35'42.40"N 95°22'49.56"E	29/01/2022	3100	mg/kg
20	Soil sample no.20	27°35'43.42"N 95°22'47.84"E	29/01/2022	4300	mg/kg

Table 13. Solvent extractable total petroleum hydrocarbon (TPH) content in intermediate water samples (outside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

S. No.	Sample Details	Coordinates	Sampling date	TPH	Unit
1	Water body sediment sample no.1 (water evaporated naturally)	27°35'50.5"N 95°22'47.9"E	29/01/2022	1000	mg/kg
2	Water body sediment sample no.2 (water evaporated naturally)	27°35'45.4"N 95°22'46.3"E	29/01/2022	1300	mg/kg
3	Water body sediment sample no.3 (water evaporated naturally).3	27°35'49.3"N 95°22'52.9"E	29/01/2022	1100	mg/kg
4	Water body sediment sample no.4 (water evaporated naturally)	27°35'50.0"N 95°22'51.9"E	29/01/2022	1000	mg/kg

Table 14. Solvent extractable total petroleum hydrocarbon (TPH) content in intermediate water and pond sediment samples (inside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

S. No.	Sample Details	Location	Sampling date	TPH	Unit
1	Pond -1, Water sample no.1	Inside fenced area of plinth BGN # 5, Baghjan	24/01/2022	75	ppm
2	Pond-2, Water sample no.2	Inside fenced area of plinth BGN # 5, Baghjan	24/01/2022	54	ppm
3	Pond-3, Water sample no.3	Inside fenced area of plinth BGN # 5, Baghjan	24/01/2022	58	ppm
4	Pond -1, Sediment soil sample no.1	Inside fenced area of plinth BGN # 5	24/01/2022	2000	mg/kg
5	Pond -2, Sediment soil sample no.2	Inside fenced area of plinth BGN # 5	24/01/2022	1700	mg/kg
6	Pond -3, Sediment soil sample no.3	Inside fenced area of plinth BGN # 5	24/01/2022	1900	mg/kg
7	Pond -4, Sediment soil sample no.4	Inside fenced area of plinth BGN # 5	24/01/2022	1700	mg/kg

Table 15. Solvent extractable total petroleum hydrocarbon (TPH) content in intermediate control samples (outside of 150 meters) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

S. No.	Sample Details	Coordinates	Sampling date	TPH	Unit
1	Control soil Sample no.1	27°35'44.6"N 95°22'44.2"E	29/01/2022	BDL(DL<200)	mg/kg
2	Control soil Sample no.2	27°35'50.5"N 95°22'54.9"E	29/01/2022	BDL(DL<200)	mg/kg
3	Control soil Sample no.3	27°35'44.8"N 95°22'56.1"E	29/01/2022	BDL(DL<200)	mg/kg
4	Control soil Sample no.4	27°35'42.4"N 95°22'45.4"E	29/01/2022	BDL(DL<200)	mg/kg

Table 16. Solvent extractable total petroleum hydrocarbon (TPH) content in third time's soil samples of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

S. No.	Sample Details	Coordinates	Sampling date	Total Petroleum Hydrocarbon (TPH)	Unit
1	Soil sample no.1	27°35'46.53"N 95°22'50.11"E	14/03/2022	2500	mg/kg
2	Soil sample no.2	27°35'50.50"N 95°22'47.93"E	14/03/2022	2200	mg/kg
3	Soil sample no.3	27°35'51.15"N 95°22'46.86"E	14/03/2022	2000	mg/kg
4	Soil sample no.4	27°35'49.41"N 95°22'49.58"E	14/03/2022	2000	mg/kg
5	Soil sample no.5	27°35'46.90"N 95°22'47.89"E	14/03/2022	1800	mg/kg
6	Soil sample no.6	27°35'44.11"N 95°22'46.97"E	14/03/2022	2700	mg/kg
7	Soil sample no.7	27°35'45.90"N 95°22'51.47"E	14/03/2022	2400	mg/kg
8	Soil sample no.8	27°35'48.83"N 95°22'52.80"E	14/03/2022	2600	mg/kg
9	Soil sample no.9	27°35'49.72"N 95°22'54.14"E	14/03/2022	2000	mg/kg
10	Soil sample no.10	27°35'49.71"N 95°22'55.91"E	14/03/2022	1600	mg/kg
11	Soil sample no.11	27°35'46.12"N 95°22'53.35"E	14/03/2022	2100	mg/kg
12	Soil sample no.12	27°35'47.20"N 95°22'54.51"E	14/03/2022	1800	mg/kg
13	Soil sample no.13	27°35'45.44"N 95°22'54.13"E	14/03/2022	1500	mg/kg
14	Soil sample no.14	27°35'45.12"N 95°22'54.14"E	14/03/2022	2000	mg/kg
15	Soil sample no.15	27°35'44.70"N	14/03/2022	2300	mg/kg

S. No.	Sample Details	Coordinates	Sampling date	Total Petroleum Hydrocarbon (TPH)	Unit
		95°22'56.23"E			
16	Soil sample no.16	27°35'43.73"N 95°22'52.89"E	14/03/2022	1900	mg/kg
17	Soil sample no.17	27°35'43.61"N 95°22'49.42"E	14/03/2022	2800	mg/kg
18	Soil sample no.18	27°35'43.20"N 95°22'49.93"E	14/03/2022	2200	mg/kg
19	Soil sample no.19	27°35'42.42"N 95°22'49.55"E	14/03/2022	1900	mg/kg
20	Soil sample no.20	27°35'43.40"N 95°22'47.85"E	14/03/2022	2600	mg/kg

Table 17. Solvent extractable total petroleum hydrocarbon (TPH) content in third time's water samples (outside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

S. No.	Sample Details	Coordinates	Sampling date	TPH	Unit
1	Water body sediment sample no.1 (water evaporated naturally)	27°35'50.5"N 95°22'47.9"E	14/03/2022	BDL(DL<200)	mg/kg
2	Water body sediment sample no.2 (water evaporated naturally).	27°35'45.4"N 95°22'46.3"E	14/03/2022	500	mg/kg
3	Water body sediment sample no.3 (water evaporated naturally)	27°35'49.3"N 95°22'52.9"E	14/03/2022	BDL(DL<200)	mg/kg
4	Water body sediment sample no.4 (water evaporated naturally)	27°35'50.0"N 95°22'51.9"E	14/03/2022	BDL(DL<200)	mg/kg

Table 18. Solvent extractable total petroleum hydrocarbon (TPH) content in third time's pond water and pond sediment samples (inside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

S. No.	Sample Details	Location	Sampling date	TPH	Unit
1	Pond -1, Water sample no.1	Inside fenced area of plinth BGN # 5, Baghjan	14/03/2022	64	ppm
2	Pond-2, Water sample no.2	Inside fenced area of plinth BGN # 5, Baghjan	14/03/2022	50	ppm
3	Pond-3, Water sample no.3	Inside fenced area of plinth BGN # 5, Baghjan	14/03/2022	52	ppm
4	Pond -1, Sediment soil sample no.1	Inside fenced area of plinth BGN # 5	14/03/2022	1500	mg/kg
5	Pond -2, Sediment soil sample no.2	Inside fenced area of plinth BGN # 5	14/03/2022	1000	mg/kg
6	Pond -3, Sediment soil sample no.3	Inside fenced area of plinth BGN # 5	14/03/2022	1300	mg/kg
7	Pond -4, Sediment soil sample no.4	Inside fenced area of plinth BGN # 5	14/03/2022	1100	mg/kg

Table 19. After completion of bioremediation, characteristics of ground water of bioremediation site at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Sample- Bore well water sample (after bioremediation), BGN-5, Baghjan. Sampling date- 14.03.2022 Location coordinate- 27°35'42.0"N, 95°22'51.0"E				
Heavy metals	Permissible limits		Used method	Concentration in ground water (ppm)
	BSI/WHO	EPA (LIE)		
Fe	5 ppm	1 ppm	IS 3025 (Part-65)	BDL(DL<0.01)
Mn	0.1 ppm	1.5 ppm	IS 3025 (Part-65)	BDL(DL<0.01)
Zn	1 ppm	1 ppm	IS 3025 (Part-65)	BDL(DL<0.01)
Ni	5 ppb	1 ppm	IS 3025 (Part-65)	BDL(DL<0.001)
Cd	5 ppb	0.5 ppm	IS 3025 (Part-65)	BDL(DL<0.001)
Pb	5 ppb	---	IS 3025 (Part-65)	BDL(DL<0.001)
As	1 ppb	0.01 ppm	IS 3025 (Part-65)	BDL(DL<0.001)
Cr (Total)	5 ppb	1 ppm	IS 3025 (Part-65)	BDL(DL<0.001)
Hg	0.5 ppb	0.5 ppm	IS 3025 (Part-65)	BDL(DL<0.001)
Cu	1ppm	1ppm	IS 3025 (Part-65)	BDL(DL<0.01)
TPH	<100PPM (CPCB)		EPA1664A	BDL(DL<5.00)

Table 20. Solvent extractable total petroleum hydrocarbon (TPH) content in third time's control samples (outside of 150 meters) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

S. No.	Sample Details	Coordinates	Sampling date	TPH	Unit
1	Control soil Sample no.1	27°35'44.6"N 95°22'44.2"E	14/03/2022	BDL(DL<200)	mg/kg
2	Control soil Sample no.2	27°35'50.5"N 95°22'54.9"E	14/03/2022	BDL(DL<200)	mg/kg
3	Control soil Sample no.3	27°35'44.8"N 95°22'56.1"E	14/03/2022	BDL(DL<200)	mg/kg
4	Control soil Sample no.4	27°35'42.4"N 95°22'45.4"E	14/03/2022	BDL(DL<200)	mg/kg

Figure 10. TPH (Total Petroleum Hydrocarbons) degradation graph in land area or soil at well No.-5, BGN-5, Baghjan

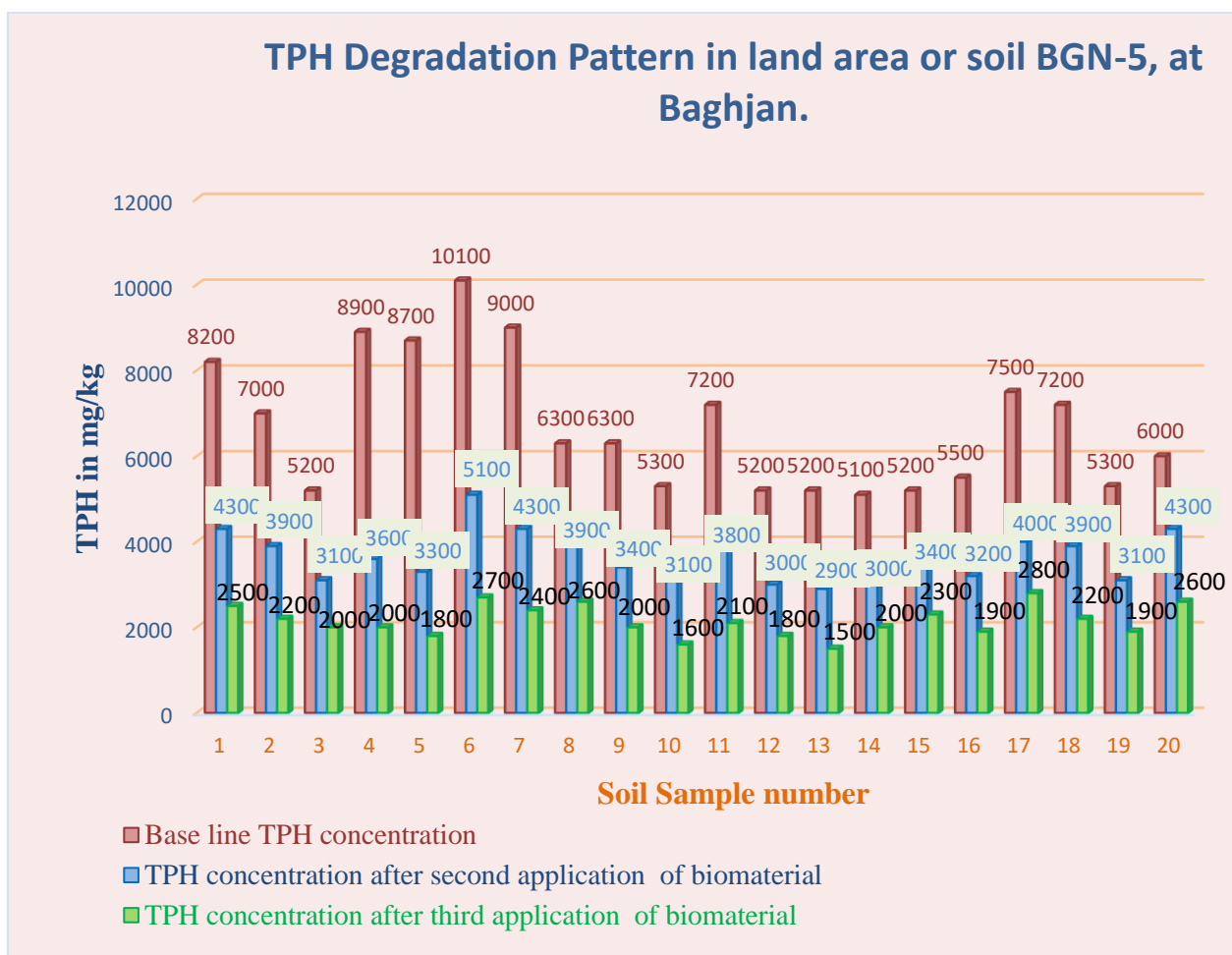


Figure 11. TPH (Total Petroleum Hydrocarbons) degradation graph in water bodies (outside of fenced area) at well No.-5, BGN-5, Baghjan.

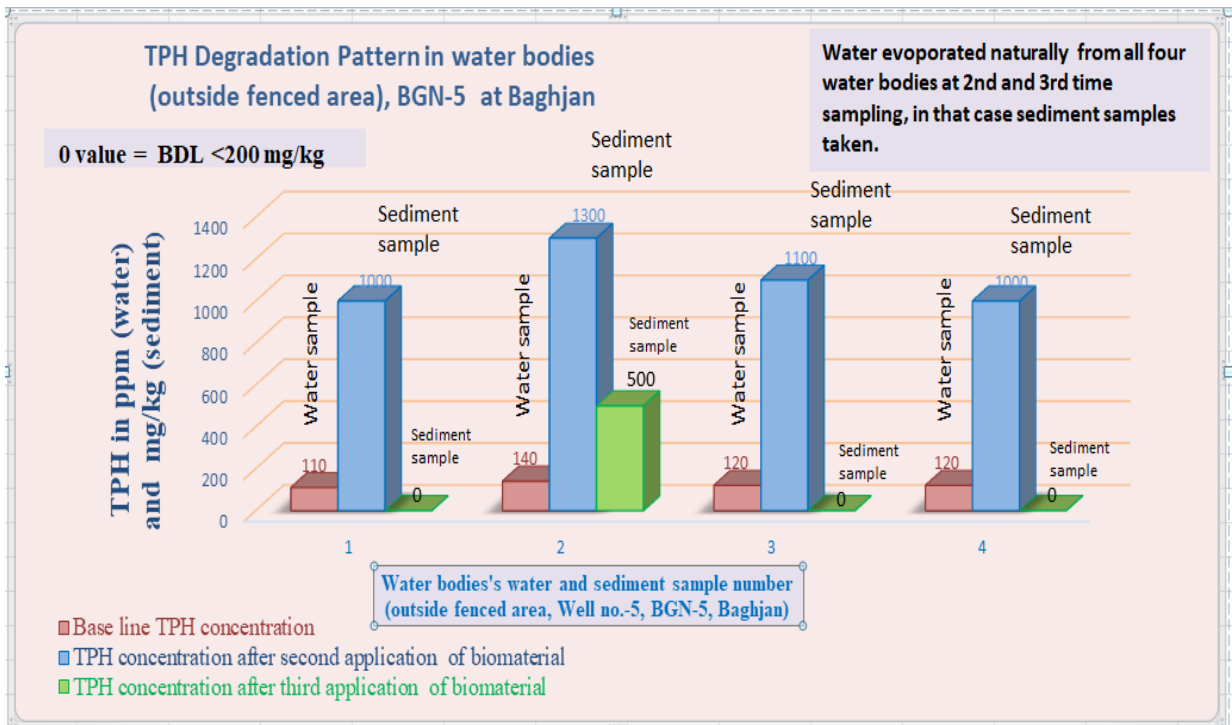


Figure 12 TPH (Total Petroleum Hydrocarbons) degradation graph in pond water (inside of fenced area) at well No.-5, BGN-5, Baghjan.

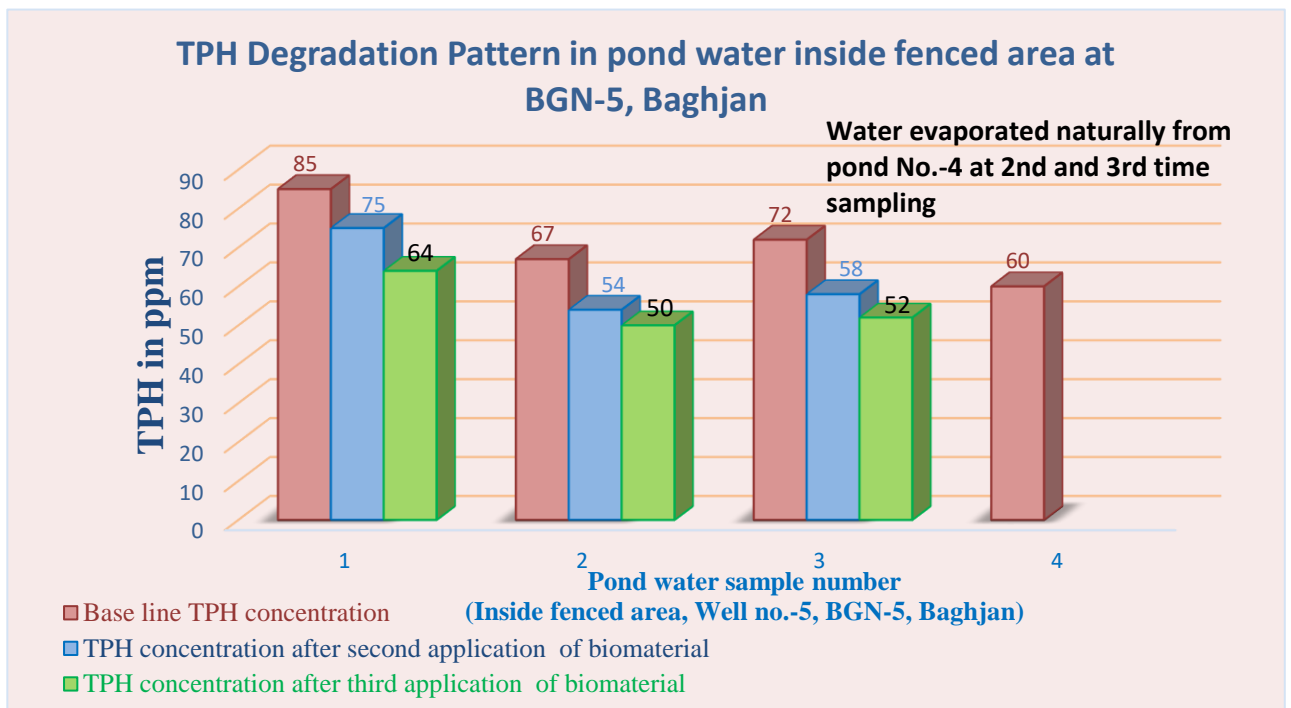
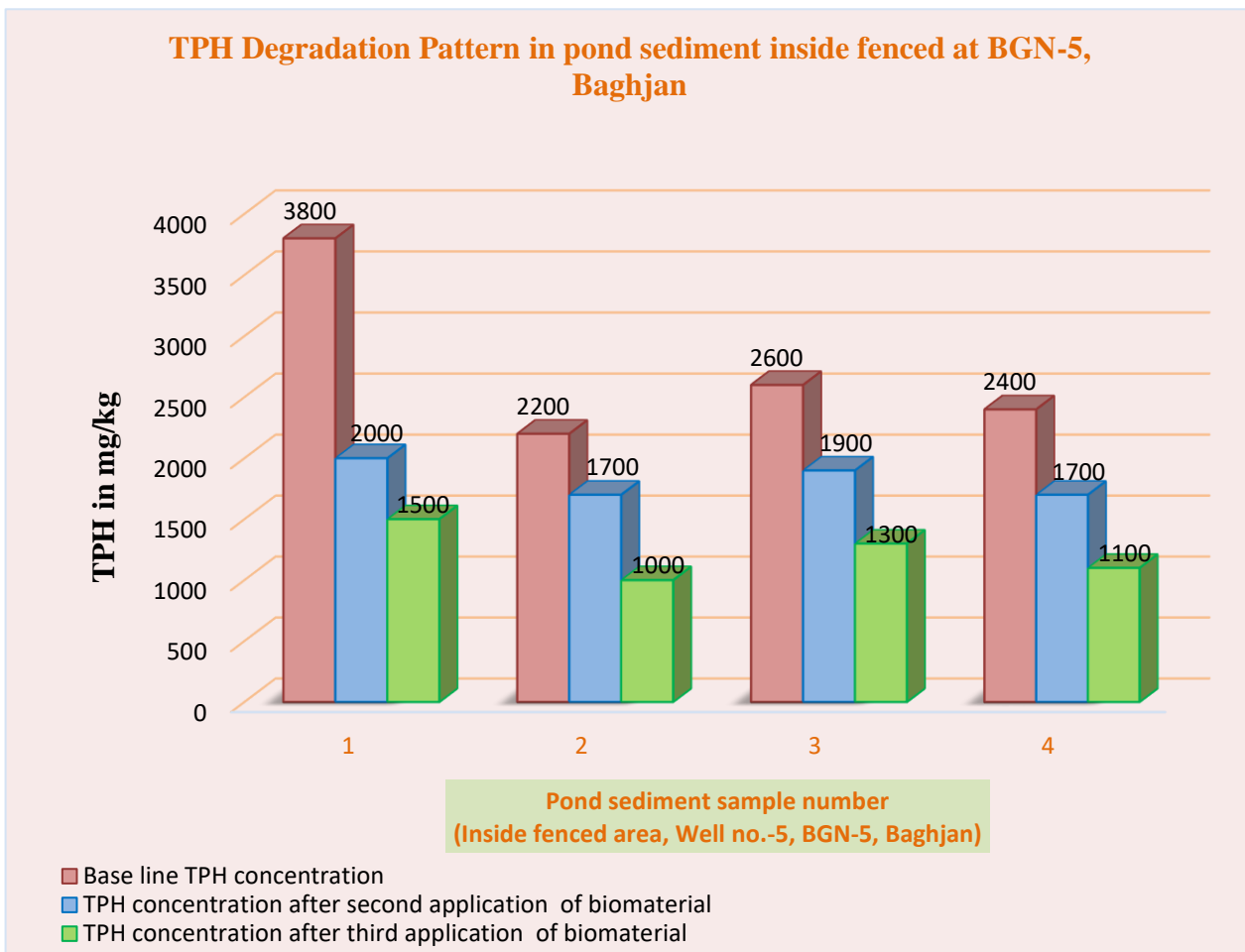


Figure 13. TPH (Total Petroleum Hydrocarbons) degradation graph in pond sediment (inside of fenced area) at well No.-5, BGN-5, Baghjan



4. Summary

- At well number-5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam, bioremediation of oily soil along with water bodies was initiated on 10th Oct, 2021. The total 6983.33 M³ of oily soil including water bodies was undertaken for bioremediation of this project. The average 150m distance area around of well No.-5, BGN-5, Baghjan has been treated under this project.
- The first phase microbe application was started on date 10.11.2021 and completed on date 21.11.2021. Hence the bioremediation starting date is 10.11.2021.
- The TPH concentration found within permissible limit “i.e.” <5000 mg/ kg in soil and <100ppm in water of third time’s samples which were carried out on date 14/03/2022 so bioremediation completed on 14.03. 2022.
- Total 20 soil samples from land area or soil, 4 water samples from water bodies (outside fenced area), 4 pond water samples from ponds (inside fenced area), 4 pond sediment samples from ponds (inside fenced area), 4 control soil samples from land area or soil (outside 150m from well No. -5, BGN-5) and one bore well water sample, (Total 37 soil and water samples) have been collected from the bioremediation site, were analysed for solvent extractable total petroleum hydrocarbon (TPH) and other necessary parameters by NABL accredited third party laboratory.
- **TPH concentration in soil:** In case of land area or soil, at zero day the highest TPH (solvent extractable total petroleum hydrocarbon) concentration 10100 mg/ kg was found in soil sample No.-6 (27°35'44.1"N 95°22'46.9"E) and lowest TPH concentration 5100 mg/ kg in soil sample No.- 14 (27°35'45.1"N 95°22'54.1"E) . The average TPH concentration 6720 mg/kg was found in soil at bioremediation site.
- **TPH concentration in water :** In case of water bodies (outside fenced area) and ponds (inside fenced area), at zero day the highest TPH (solvent extractable total petroleum hydrocarbon) concentration 140ppm was found in water sample No.- 2 of water body (27°35'45.4"N 95°22'46.3"E) and lowest TPH concentration 60ppm in pond water sample No.- 4 (inside fenced area). The average TPH concentration 96.75 ppm was found in water of pond and water bodies at bioremediation site.
- **TPH concentration in sediment of water bodies (outside fenced area):** At the zero time sampling, water samples have been collected from water bodies (outside fenced area) but at the time of second time and third time sampling water was evaporated naturally therefore water bodies’s sediment samples were collected. The highest TPH (solvent extractable total petroleum hydrocarbon) concentration 1300 mg/kg was found in sediment sample No. 2 of water body (outside fenced area) and lowest TPH concentration 1000 ppm in sediment sample No.- 1 and 4 of water bodies (outside fenced area)
- **TPH concentration in sediment of ponds (inside fenced area):** In case of pond’s sediment (inside fenced area), at zero day the highest TPH (solvent extractable total petroleum hydrocarbon) concentration 3800 mg/kg was found in pond sediment sample

No.- 1 of pond no 1 and lowest TPH concentration 2200 mg/kg in pond sediment sample No.- 2 (inside fenced area).

- In case of land area or soil, after bioremediation the highest TPH (solvent extractable total petroleum hydrocarbon) concentration 2800 mg/ kg was found in soil sample No.-17 (27°35'43.61"N 95°22'49.42"E) and lowest TPH concentration 1500 mg/ kg in soil sample No.- 13 (27°35'45.44"N 95°22'54.13"E). The average TPH concentration 2145 mg/kg was found in soil at bioremediation site.
- In case of water bodies (outside fenced area) and ponds (inside fenced area), after bioremediation the highest TPH (solvent extractable total petroleum hydrocarbon) concentration 64 ppm was found in water sample No.- 1 of pond no-1 (inside fenced area) and lowest TPH concentration 50 ppm in water sample No.- 2 of pond no-2 (inside fenced area) The average TPH concentration 55.3 ppm was found in water of pond (inside fenced area).
- In case of water bodies (outside fenced area) and ponds (inside fenced area) sediment, after bioremediation the highest TPH (solvent extractable total petroleum hydrocarbon) concentration 1500 mg/kg was found in sediment sample No.- 1 of pond (inside fenced area) and lowest TPH concentration BDL <200ppm in sediment sample No.- 1, 3 and 4 of water bodies (outside fenced area)
- **Control soil samples:** In all four control soil samples, the TPH ((solvent extractable total petroleum hydrocarbon) concentration was under permissible limit that is <5000 mg/kg from initial day to final day.
- It was found that after completion of the bioremediation job, the TPH content in the soil/Treatment on land was less than 0.5 % or 5000 ppm and TPH in water was less than 100 ppm, which is in conform with statutory norms.

5. Annexures

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Annexure – 1: Singed work order from Oil India limited, Duliajan, Assam.

OIL INDIA LIMITED
(A GOVT. OF INDIA ENTERPRISE)
DULIAJAN
Work Order NO. 8125641 for Contract No. 6116306

To,
Vendor Code : 402439
THE ENERGY AND RESOURCES INSTI
DARBARI SETH BLOCK, HABITAL PLACE
DARBARI SETH BLOCK, HABITAL PLACE
LODHI ROAD ,NEW DELHI 110003
LODHI ROAD
LODHI ROAD
NEW DELHI
NEW DELHI
110003
Delhi
IN

1. You are hereby ordered to commence the under noted work on 18.10.2021

WORK :
Work Order Value : Please refer Contract No.6116306
Location :

2. Should you fail to make a start on the work to our satisfaction within 0 days of the above date (Vide Part 1), this Contract will become invalid.

3. As per Clause 8 of the Contract, the target date of completion will be 17.10.2024. If, in the course of execution of work, you feel that you are entitled to the grant of extension of time such application must be submitted at least one week before the expiry of this original target date.

4. Please note the following special instructions:
(a) A programme of work to be furnished within 0 days of receipt of this work order for our approval.
(b) The name of your authorised representative of supervision of work etc. is to be furnished immediately.
(c) Every person engaged by you for the above work must comply with Standing Rules of the Company in respect of Security and Safety as applicable.

Signature : *[Signature]*
Full Name : *Tarun Sharma*
Date : *18/10/21*
CONTRACTOR

Signature : *[Signature]*
Full Name : *[Name]*
Date : *[Date]*
COMPANY ENGINEER

Work _____ % Finished Advance Bill No. _____ Date _____ Rs. _____
Work _____ % Finished Advance Bill No. _____ Date _____ Rs. _____
Work _____ % Finished Advance Bill No. _____ Date _____ Rs. _____
Work _____ % Finished Advance Bill No. _____ Date _____ Rs. _____
Work _____ % Finished Advance Bill No. _____ Date _____ Rs. _____
Work _____ % Finished Advance Bill No. _____ Date _____ Rs. _____
Work _____ % Finished Advance Bill No. _____ Date _____ Rs. _____

Copy to : DGM(F&A) / Head (Contract) / CIRM / CM(V) / Contract file of User Department.

Annexure – 2: Joint assessment of bioremediation site.

Date 18/10/21

Joint assessment at BGN#5 well pit
between Reps TERI & Oil India Limited

- ① Physical survey was carried out surrounding well # 05.
- ② Collected 9 nos. (soil) sample & 1 no (water) sample.
- ③ Based on observation 100m^(approx) contaminant depth has been visualized.
- ④ Area will be finalized based on coordinates taken.
- ⑤ All scrap and waste material viz. wood, acrobator shub, HD pipe etc. to be removed.
- ⑥ Zero form sampling to be done before start of bio-remediation job and demarcation of the bioremediation area.

N. Borkatoky
 (MINTU BORKATOKY)
 SRS-R2D

P. I. Chakraborty
 Dy. CE (HSE-E)

Sr. Engg (E&S)

(A. N. Das)
 SENSE

TERI, Team
 1. Dr. Veeranna C
 2. Mr. Sunil Kumar
 3. Mr. Tarun Sharma
 4. Mr. Pranjeet Baruah

Annexure – 2: Joint assessment of bioremediation site.

www.teri.in.org

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Western Regional Centre
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 E-mail terimumbai@teri.res.in
 Fax (22) 2758 0022

Himalayan Centre
 Mukteshwar
 Tel. (5942) 286 433
 E-mail praveen.sharma@teri.res.in
 Fax (5942) 286 460/433

TERI Japan
 Tokyo
 Tel. (+81 3) 3519 8970
 E-mail teri@iges.or.jp
 Fax +81 33 5195 1084

In-Situ and Ex-Situ Bioremediation of oily sludge/oil contaminated soil/water of various production Installations, fields and water bodies in Assam and Arunachal Pradesh Fields (contract no. 6116306)

Zero time sampling details Date 22/10/2021 Place: Baghjan

S. No.	Sample Details	Coordinates	Vertical depth of core sample (cm)	Depth of contamination observed in soil core (cm)
	BGN 05	27°35'46.5"N 95°22'50.8"E		
1	Soil sample no.1	27°35'46.5"N 95°22'50.1"E	20	12
2	Soil sample no.2	27°35'50.5"N 95°22'47.9"E	15	8
3	Soil sample no.3	27°35'51.1"N 95°22'46.8"E	16	10
4	Soil sample no.4	27°35'49.4"N 95°22'49.6"E	18	10
5	Soil sample no.5	27°35'46.9"N 95°22'47.8"E	15	9
6	Soil sample no.6	27°35'44.1"N 95°22'46.9"E	20	13
7	Soil sample no.7	27°35'45.9"N 95°22'51.4"E	17	12
8	Soil sample no.8	27°35'48.8"N 95°22'52.8"E	17	11
9	Soil sample no.9	27°35'49.7"N 95°22'54.1"E	18	10
10	Soil sample no.10	27°35'49.7"N 95°22'55.8"E	16	12
11	Soil sample no.11	27°35'46.1"N 95°22'53.2"E	16	9
12	Soil sample no.12	27°35'47.2"N 95°22'54.5"E	18	10
13	Soil sample no.13	27°35'45.4"N 95°22'54.1"E	12	7
14	Soil sample no.14	27°35'45.1"N 95°22'54.1"E	14	10
15	Soil sample no.15	27°35'44.7"N 95°22'56.2"E	12	7
16	Soil sample no.16	27°35'43.7"N 95°22'52.9"E	15	8
17	Soil sample no.17	27°35'43.6"N 95°22'49.9"E	18	10
18	Soil sample no.18	27°35'43.2"N 95°22'49.9"E	17	11
19	Soil sample no.19	27°35'42.4"N 95°22'49.5"E	16	12
20	Soil sample no.20	27°35'43.4"N 95°22'47.8"E	15	10
Average depth of contamination observed is 10cm				

In-62407 2013 certified organization

Annexure – 2: Joint assessment of bioremediation site.

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Fax 2468 2144 or 2468 2145
India +91 • Delhi (0) 11

S. No.	Sample Details	Coordinates	Depth (cm)
1	Water sample no.1	27°35'50.5"N 95°22'47.9"E	< 1cm
2	Water sample no.2	27°35'45.4"N 95°22'46.3"E	< 1cm
3	Water sample no.3	27°35'49.3"N 95°22'52.9"E	< 1cm
4	Water sample no.4	27°35'50.0"N 95°22'51.9"E	< 1cm

Sl No.	Sample Details	Coordinates	Depth (cm)
1	Control Sample no.1	27°35'44.6"N 95°22'44.2"E	18
2	Control Sample no.2	27°35'50.5"N 95°22'54.9"E	16
3	Control Sample no.3	27°35'44.8"N 95°22'56.1"E	15
4	Control Sample no.4	27°35'42.4"N 95°22'45.4"E	15

Veeranna Chammashettar
Senior Fellow
Bioremediation Technology
The Energy and Resources Institute
Darbari Seth Block, India Habitat Centre
Lodhi Road, New Delhi-110 003

TERI/2018/018/018/018/018/018

Annexure – 2: Joint assessment of bioremediation site.

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VOLUME ESTIMATION BASED ON SAMPLING COORDINATE



Volume of contamination: Area × Depth of contamination

Average depth of contamination: 10cm (0.10m)

Area of contamination: 69833.32m²,

Total Volume of contaminated Soil -

: 69833.32 m² × 0.10m = 6983.33 m³

Olona
CCP (S&C)

M. Lakshmy
ORS-RDS

Anj
S&C-RDS

Ramesh Chandra
S&C-RDS

(OR)

OP
S&C-RDS

ADJ
Deposits (S&C)

Dr. Chandra
(S&C-RDS)

Oil India Limited
Duliajan
Assam

Annexure – 2: Joint assessment of bioremediation site.

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Average distance covered from BGN05 well:

The figure consists of three satellite maps showing the distribution of 19 soil samples and 4 control points around the BGN05 well. The maps show the average distance from the well to the samples, with values of 307.36 m, 293.49 m, and 294.23 m.

Map 1: Average distance covered from BGN05 well: 307.36 m

Map 2: Average distance covered from BGN05 well: 293.49 m

Map 3: Average distance covered from BGN05 well: 294.23 m

All © 2012 Mapbox.org

Annexure – 3: NABL certificate of third party laboratory



Annexure – 4: MEFC certificate of third part laboratory

रजिस्ट्री सं० डी० एल०-33004/99

REGD. NO. D. L.-33004/99



भारत का राजपत्र
The Gazette of India

असाधारण
EXTRAORDINARY
भाग II—खण्ड 3—उप-खण्ड (ii)
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No. 2487] NEW DELHI, THURSDAY, AUGUST 31, 2017/BHADRA 9, 1939

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 30th August, 2017

S.O. 2836(E).—In exercise of the powers conferred by clause (b) of sub-section (1) of section 12 and section 13 of the Environment (Protection) Act, 1986 (29 of 1986), read with rule 10 of the Environment (Protection) Rules, 1986, the Central Government hereby makes the following further amendments in the notification of the Government of India in the erstwhile Ministry of Environment and Forests, number S.O. 1174(E), dated the 18th July, 2007, namely:—

In the said notification, in the Table, after serial number 156 and the entries relating thereto, the following serial numbers and entries shall be inserted, namely:—

(1)	(2)	(3)	(4)
157	M/s. Devansh Testing & Research Laboratory Pvt. Ltd.-94, Shiv Ganga Industrial Estate, Lakeshari, Bhagwanpur-247661, Roorkee, Dist-Haridwar, Uttarakhand,	(i) Ms. Archana Singh (ii) Shri. Arvind Kharkwal (iii) Dr. H.S. Chauhan	09.08.2017 to 08.08.2022
158	M/s. NOIDA Testing Laboratories, GT-20, Sector-117, NOIDA-201304, Uttar Pradesh.	(i) Shri. Gopal Das Verma (ii) Shri. Pankaj Kumar Sharma (iii) Shri. Rajesh Kumar Singh	09.08.2017 to 08.08.2022
159	M/s. Sai Universal Mining Services Plot No. 15-DP2, KIADB, Sankalapura Industrial Area, Near Water Tank, Bellary Main Road, Hospet-583201, Dist. Bellary, Karnataka.	(i) Shri. Pavan Kumar GVK (ii) Shri. D. Sudharshan Reddy (iii) Shri. A. Nagaraju.	09.08.2017 to 08.08.2022
160	M/s. B.S. Envi-Tech Pvt. Ltd. 12-13 1270/71/73, Amity Ville, 4 th Floor, St. Ann's Road, Tarnaka, Secunderabad-500017, Telangana.	(i) Shri. A.V. Hanumantha Rao (ii) Ms. CH. V. Tulasi (iii) Shri. B.S. Chandra Murthy	09.08.2017 to 08.08.2022
161	M/s. Nichrome Testing Laboratory and Research Pvt. Ltd. 170, Judges Bungalow Road, Narayanpur, Dharwad-580008, Karnataka	(i) Shri Krishna Narayan Kulkarni (ii) Shri Ambarish S. Sindagi (iii) Dr. Manjula S. Pauli	09.08.2017 to 08.08.2022
162	M/s. Go Green Mechanisms Pvt. Ltd. Dayal Estate, National Highway No. 8, Opp. APMC Market Gate-1 (Deen Dayal Grain Market), Bareja Road, Jetalpur, Dist.-Ahmedabad-382426, Gujarat.	(i) Shri Amit Badlani (ii) Shri Khambata Cyrus Hosang (iii) Ms. Trupti Padhya.	09.08.2017 to 08.08.2022

[F. No. Q. 15018/21/2017-CPW]
DR. MANORANJAN HOTA, Adviser

Note.—The principal notification was published in the Gazette of India, Extraordinary vide number S.O. 1174 (E), dated the 18th July, 2007 and subsequently amended vide notification numbers S.O. 1539 (E), dated the 13th September, 2007, S.O. 1811(E), dated the 24th October, 2007, S.O. 55(E), dated the 9th January, 2008, S.O. 428(E), dated the 4th March, 2008, S.O. No. 865(E), dated the 11th April, 2008, S.O. No. 1894(E), dated the 31st July, 2008, S.O. No. 2728(E), dated the 25th November, 2008, S.O. 1356(E), dated the 27th May, 2009, S.O.No. 1802(E), dated the 22nd July, 2009, S.O. No.2399(E), dated the 18th September, 2009, S.O. No.3122(E), dated the 7th December, 2009, S.O. No. 3123(E), dated the 7th December, 2009, S.O. No. 142(E), dated the 21st January, 2010, S.O. 619 (E), dated the 19th March, 2010, S.O. No.1662(E), dated the 13th July,2010, S.O. No. 2390(E), dated the 30th September, 2010, S.O. No. 2904 (E), dated the 8th December, 2010, S.O. No. 181(E), dated the 28th January, 2011, S.O.No. 692(E) dated the 5th April, 2011, S.O. No. 1754 (E), dated the 28th July, 2011, S.O. No. 2609, dated the 22nd November, 2011, S.O. No. 264(E), dated the 13th February, 2012, S.O. No. 1150 (E) dated the 22nd May, 2012, S.O. No. 1295(E), dated the 6th June, 2012, S.O. No. 2039 (E), dated the 5th September, 2012, S.O. No. 2850 (E), dated the 7th December, 2012, S.O. No. 592 (E), dated the 8th March, 2013, S.O. No. 945(E), dated the 8th April, 2013, S.O. No. 2287 (E), dated the 26th July,2013, S.O. No. 3489(E) dated the 26th November, 2013, S.O. No. 21(E), dated the 3rd January, 2014, S.O. No. 56) (E), dated the 26th February, 2014, S.O. No. 1190(E), dated the 1st June, 2014, S.O. No. 2003(E), dated the 9th August,2014, S.O. No. 137 (E), dated the 12th January, 2015, S.O. No. 1783(E), dated the 30th June, 2015, S.O. No. 2453(E), dated the 7th September, 2015, S.O. No. 1953(E), dated the 2nd June,2016 and S.O. No. 388(E), dated the 10th February, 2017.

Annexure – 5: ISO 9001:2015 certificate of third part laboratory.



Annexure – 6: ISO 45001: 2018 certificate of third part laboratory.



Annexure – 7: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of base time line or zero time soil samples (Soil sample No. 1 to 6) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



NOIDA TESTING LABORATORIES

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☎ +91-9313611642, 8510081921, 7503031145, 8527870572, 7503031146, 9999794369

TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
TPH EXTRACT	MS-251021-011	14/12/2021

Issued to: The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data

Sample Received on : 25/10/2021
 Sample Description : Soil
 Protocol Used for testing : USEPA9071B
 Parameter to be Checked : Total Petroleum Hydrocarbons (TPH)
 Analysis duration : 26/10/2021 to 10/11/2021

S.No.	Sample identification code	Sample Coordinates	Sampling date	Result	Unit
1	Soil sample no.01 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'46.5"N 95°22'50.1"E	22/10/2021	8200	mg/kg
2	Soil sample no. 02 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'50.5"N 95°22'47.9"E	22/10/2021	7000	mg/kg
3	Soil sample no. 03 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'51.1"N 95°22'46.8"E	22/10/2021	5200	mg/kg
4	Soil sample no. 04 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'49.4"N 95°22'49.6"E	22/10/2021	8900	mg/kg
5	Soil sample no. 05 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'46.9"N 95°22'47.8"E	22/10/2021	8700	mg/kg
6	Soil sample no. 06 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'44.1"N 95°22'46.9"E	22/10/2021	10100	mg/kg

Notes:

1. The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
2. Responsibility of the Laboratory is limited to the invoiced amount only.
3. This test report will not be generated again, either wholly or in part, without prior written permission of the laboratory.
4. This test report will not be used for any publicity/legal purpose.
5. The test samples will be disposed off after two weeks from the date of issue of test report, unless until specified by the customer.


CHECKED BY


AUTHORIZED SIGNATORY

Laboratory : GT-20, Sector-117, Noida Gautam Budh Nagar - 201301
 Branch Office :
 HARIDWAR | RUDRAPUR | CHANDIGARH | DEHRADUN | PUNE
 E. : noida.laboratory@gmail.com, info@noidalabs.com W.: www.noidalabs.com

Annexure – 8: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of base time line or zero time soil samples (Soil sample No. 7 to 12) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
TPH EXTRACT	MS-251021-012	14/12/2021

Issued to: The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data

Sample Received on : 25/10/2021
 Sample Description : Soil
 Protocol Used for testing : USEPA9071B
 Parameter to be Checked : Total Petroleum Hydrocarbons (TPH)
 Analysis Duration : 26/10//2021 to 10/11/2021

S.No.	Sample Identification code	Sample Coordinates	Sampling date	Result	Unit
1	Soil sample no. 07 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'45.9"N 95°22'51.4"E	22/10/2021	9000	mg/kg
2	Soil sample no. 08 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'48.8"N 95°22'52.8"E	22/10/2021	6300	mg/kg
3	Soil sample no. 09 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'49.7"N 95°22'54.1"E	22/10/2021	6300	mg/kg
4	Soil sample no. 10 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'49.7"N 95°22'55.8"E	22/10/2021	5300	mg/kg
5	Soil sample no. 11 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'46.1"N 95°22'53.2"E	22/10/2021	7200	mg/kg
6	Soil sample no. 12 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'47.2"N 95°22'54.5"E	22/10/2021	5200	mg/kg

Notes:

1. The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
2. Responsibility of the Laboratory is limited to the invoiced amount only.
3. This test report will not be generated again, either wholly or in part, without prior written permission of the laboratory.
4. This test report will not be used for any publicity/legal purpose.
5. The test samples will be disposed off after two weeks from the date of issue of test report, unless until specified by the customer.

CHECKED BY



AUTHORIZED SIGNATORY



Laboratory : GT-20, Sector-117, Noida Gautam Budh Nagar - 201301
 Branch Office :
 HARIDWAR | RUDRAPUR | CHANDIGARH | DEHRADUN | PUNE
 E. : noida.laboratory@gmail.com, info@noidalabs.com W.: www.noidalabs.com

Annexure – 9: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of base time line or zero time soil samples (Soil sample No. 13 to 20) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of TPH EXTRACT	Report Code MS-251021-013	Date of Issue 14/12/2021
--------------------------------------	-------------------------------------	------------------------------------

Issued to: The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data

Sample Received on : 25/10/2021
 Sample Description : Soil
 Protocol Used for testing : USEPA9071B
 Parameter to be Checked : Total Petroleum Hydrocarbons (TPH)
 Analysis Duration : 26/10//2021 to 10/11/2021

S.No.	Sample Identification code	Sample Coordinates	Sampling date	Result	Unit
1	Soil sample no. 13 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'45.4"N 95°22'54.1"E	22/10/2021	5200	mg/kg
2	Soil sample no. 14 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'45.1"N 95°22'54.1"E	22/10/2021	5100	mg/kg
3	Soil sample no. 15 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'44.7"N 95°22'56.2"E	22/10/2021	5200	mg/kg
4	Soil sample no. 16 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'43.7"N 95°22'52.9"E	22/10/2021	5500	mg/kg
5	Soil sample no. 17 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'43.6"N 95°22'49.9"E	22/10/2021	7500	mg/kg
6	Soil sample no. 18 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'43.2"N 95°22'49.9"E	22/10/2021	7200	mg/kg
7	Soil sample no. 19 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'42.4"N 95°22'49.5"E	22/10/2021	5300	mg/kg
8	Soil sample no. 20 (Base line sample, BGN-5, Baghjan) On dry basis	27°35'43.4"N 95°22'47.8"E	22/10/2021	6000	mg/kg

Notes:

- The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
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Annexure – 10: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of base time line or zero time water samples (outside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
Water	W-251021-014	14/12/2021

Issued to: The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data

Sample Received on : 25/10/2021
 Sample Description : Water
 Protocol Used for testing : EPA1664A
 Parameter to be Checked : Total Petroleum Hydrocarbons (TPH)
 Analysis Duration : 26/10/2021 to 10/11/2021

S. No.	Sample Details	Coordinates	Sampling date	Result	Unit
1	Water sample no.1 (Base line sample, BGN-5, Baghjan)	27°35'50.5"N 95°22'47.9"E	22/10/2021	110	ppm
2	Water sample no.2 (Base line sample, BGN-5, Baghjan)	27°35'45.4"N 95°22'46.3"E	22/10/2021	140	ppm
3	Water sample no.3 (Base line sample, BGN-5, Baghjan)	27°35'49.3"N 95°22'52.9"E	22/10/2021	120	ppm
4	Water sample no.4 (Base line sample, BGN-5, Baghjan)	27°35'50.0"N 95°22'51.9"E	22/10/2021	120	ppm

Notes:

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Annexure – 11: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of base time line or zero time pond water samples (inside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
Water sample	W-231121-01	03/12/2021

Issued to: **The Energy and Resources institute (TERI)**
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data

Sample received on : 23/11/2021
 Sample collected on : 16/11/2021
 Sample description : Water
 Protocol used for testing : EPA1664A
 Parameter to be checked : Total Petroleum Hydrocarbons (TPH)
 Analysis duration : 23/11/2021 TO 03/12/2021


S. No.	Sample identification code	TEST METHOD	TPH in PPM
1	Base line sample,pond no. 1 ,pond water sample ,inside plinth fence ,BGN-5	EPA1664A	85
2	Base line sample,pond no. 2 ,pond water sample ,inside plinth fence ,BGN-5	EPA1664A	67
3	Base line sample,pond no. 3 ,pond water sample ,inside plinth fence ,BGN-5	EPA1664A	72
4	Base line sample,pond no. 4 ,pond water sample ,inside plinth fence ,BGN-5	EPA1664A	60

End of Report


Notes:

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Annexure – 12: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of base time line or zero time pond sediment samples (inside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
Soil Sample	S-231121-02	03/12/2021

Issued to: The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data


Sample received on : 23/11/2021
 Sample collected on : 16/11/2021
 Sample description : Soil
 Protocol used for testing : USEPA9071B
 Parameter to be checked : Total Petroleum Hydrocarbons (TPH)
 Analysis duration : 23/11/2021 TO 03/12/2021


S. No.	Sample identification code	TEST METHOD	TPH in mg/kg (on dry basis)
1	Base line sample,pond no. 1 ,pond sediment soil sample ,inside plinth fence ,BGN-5	USEPA9071B	3800
2	Base line sample,pond no. 2 ,pond sediment soil sample ,inside plinth fence ,BGN-5	USEPA9071B	2200
3	Base line sample,pond no. 3 ,pond sediment soil sample ,inside plinth fence ,BGN-5	USEPA9071B	2600
4	Base line sample,pond no. 4 ,pond sediment soil sample ,inside plinth fence ,BGN-5	USEPA9071B	2400

End of Report

Notes:


1. The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
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Annexure – 13: Third party lab report of zero day bore well water sample, characteristics of ground water at bioremediation site of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
Water Sample	S-251021-01	14/12/2021

Issued to:
The Energy and Resources institute (TERI)
 Darbari Seth Block, IIC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data

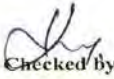
Sample received on : 25/10/2021
 Sample description : Water (Bore well water sample), Zero day, well No. 5, BGN-5, Baghjan, Assam. (Location coordinates- 27°35'42.0"N, 95°22'51.0"E)
 Analysis duration : 26/10/2021 to 10/11/2021
 Report issued on : 14/12/2021

Heavy metals	Method used	Permissible limits		Concentration in Ground water (ppm)
		BSI/WHO	EPA (LIE)	
Iron (Fe)	IS:3025 (P-65)	5 ppm	1 ppm	BDL(DL <0.01)
Manganese (Mn)	IS:3025 (P-65)	0.1 ppm	1.5 ppm	BDL(DL <0.01)
Zinc (Zn)	IS:3025 (P-65)	1 ppm	1 ppm	BDL(DL <0.01)
Cadmium (Cd)	IS:3025 (P-65)	5 ppb	0.5 ppm	BDL(DL <0.001)
Lead (Pb)	IS:3025 (P-65)	5 ppb	---	BDL(DL <0.001)
Nickel (Ni)	IS:3025 (P-65)	5 ppb	0.5 ppm	BDL(DL <0.001)
Arsenic (As)	IS:3025 (P-65)	1 ppb	0.01 ppm	BDL(DL <0.001)
Total Chromium (Cr)	IS:3025 (P-65)	5 ppb	1 ppm	BDL(DL <0.001)
Mercury (Hg)	IS:3025 (P-65)	0.5 ppb	0.5 ppm	BDL(DL <0.001)
Copper (Cu)	IS:3025 (P-65)	1 ppm	1 ppm	BDL(DL <0.01)
TPH	EPA 1664A	---	---	BDL(DL <5.0)


BDL-Below Detection Limit (DL-Detection Limit) **End of Report**

Notes:

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Annexure – 14: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of base time line or zero time soil control samples (outside 150 meters) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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Test Report of	Report Code	Date of Issue
Soil Sample	S-251021-02	14/12/2021

Issued to:

The Energy and Resources institute (TERI)
 Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data

Sample received on : 25/10/2021
 Sample description : Soil
 Protocol used for testing : USEPA9071B
 Parameter to be checked : Total Petroleum Hydrocarbons (TPH)
 Analysis duration : 26/10/2021 to 10/11/2021
 Report issued on : 14/12/2021

S. No.	Sample Details	coordinates	Sampling date	Result	Unit
1	Control soil Sample no.1 Base line or zero time sample BGN # 5, Baghjan (Outside 150m from well BGN-5)	27°35'44.6"N 95°22'44.2"E	22/10/2021	BDL(DL<200)	mg/kg (On dry basis)
2	Control soil Sample no.2 Base line or zero time sample BGN # 5, Baghjan (Outside 150m from well BGN-5)	27°35'50.5"N 95°22'54.9"E	22/10/2021	BDL(DL<200)	mg/kg (On dry basis)
3	Control soil Sample no.3 Base line or zero time sample BGN # 5, Baghjan (Outside 150m from well BGN-5)	27°35'44.8"N 95°22'56.1"E	22/10/2021	BDL(DL<200)	mg/kg (On dry basis)
4	Control soil Sample no.4 Base line or zero time sample BGN # 5, Baghjan (Outside 150m from well BGN-5)	27°35'42.4"N 95°22'45.4"E	22/10/2021	BDL(DL<200)	mg/kg (On dry basis)


BDL-Below Detection Limit (DL-Detection Limit) **End of Report**

Notes:

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Annexure – 15: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of intermediate soil samples (Soil sample No. 1 to 10) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

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TEST CERTIFICATE

Test Report of Soil Sample	Report Code S-080222-10	Date of Issue 25/02/2022
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**Issued to: The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.**
Sampling & Analysis data

Sample received on : 08/02/2022
 Sample description : Soil
 Protocol used for testing : USEPA9071B
 Parameter to be checked : Total Petroleum Hydrocarbons (TPH)
 Analysis duration : 09/02//2022 to 24/02/2022

S. No.	Sample identification code	Sample Coordinates	Sampling date	Result	Unit
1	Soil sample no.01(Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'46.5"N 95°22'50.14"E	24/01/2022	4300	mg/kg
2	Soil sample no. 02(Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'50.52"N 95°22'47.9"E	24/01/2022	3900	mg/kg
3	Soil sample no. 03 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'51.12"N 95°22'46.84"E	25/01/2022	3100	mg/kg
4	Soil sample no. 04 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'49.43"N 95°22'49.60"E	24/01/2022	3600	mg/kg
5	Soil sample no. 05 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'46.94"N 95°22'47.81"E	24/01/2022	3300	mg/kg
6	Soil sample no. 06(Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'44.12"N 95°22'46.92"E	24/01/2022	5100	mg/kg
7	Soil sample no. 07 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'45.90"N 95°22'51.42"E	24/01/2022	4300	mg/kg
8	Soil sample no. 08(Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'48.81"N 95°22'52.80"E	24/01/2022	3900	mg/kg
9	Soil sample no. 09 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'49.74"N 95°22'54.10"E	24/01/2022	3400	mg/kg
10	Soil sample no. 10 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'49.71"N 95°22'55.83"E	29/01/2022	3100	mg/kg

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Annexure – 16: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of intermediate soil samples (Soil sample No. 11 to 20) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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11	Soil sample no. 11 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'46.11"N 95°22'53.20"E	24/01/2022	3800	mg/kg
12	Soil sample no. 12 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'47.22"N 95°22'54.53"E	29/01/2022	3000	mg/kg
13	Soil sample no. 13 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'45.44"N 95°22'54.10"E	29/01/2022	2900	mg/kg
14	Soil sample no. 14 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'45.10"N 95°22'54.16"E	29/01/2022	3000	mg/kg
15	Soil sample no. 15 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'44.73"N 95°22'56.20"E	29/01/2022	3400	mg/kg
16	Soil sample no. 16 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'43.70"N 95°22'52.90"E	29/01/2022	3200	mg/kg
17	Soil sample no. 17 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'43.64"N 95°22'49.92"E	29/01/2022	4000	mg/kg
18	Soil sample no. 18 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'43.22"N 95°22'49.91"E	29/01/2022	3900	mg/kg
19	Soil sample no. 19 (Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'42.40"N 95°22'49.56"E	29/01/2022	3100	mg/kg
20	Soil sample no. 20(Intermediate sample, BGN-5, Baghjan) On dry basis	27°35'43.42"N 95°22'47.84"E	29/01/2022	4300	mg/kg

End of Report S-080222-10

Notes:

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Annexure – 17: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of intermediate water samples (outside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
Soil Sample	S-080222-03	25/02/2022

Issued to:

The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data


Sample received on : 08/02/2022
 Sample description : Soil
 Protocol used for testing : USEPA9071B
 Parameter to be checked : Total Petroleum Hydrocarbons (TPH)
 Analysis duration : 09/02//2022 to 24/02/2022
 Report issued on : 25/02/2022

S. No.	Sample Details	Coordinates	Sampling date	Result	Unit
1	Water body sediment soil sample No.-1, (Intermediate sample, outside fenced area, , BGN-5, Baghjan) Water evaporated naturally	27°35'50.5"N 95°22'47.9"E	29/01/2022	1000	mg/kg (On dry basis)
2	Water body sediment soil sample No.-2, (Intermediate sample, outside fenced area, , BGN-5, Baghjan) Water evaporated naturally	27°35'45.4"N 95°22'46.3"E	29/01/2022	1300	mg/kg (On dry basis)
3	Water body sediment soil sample No.-3, (Intermediate sample, outside fenced area, , BGN-5, Baghjan) Water evaporated naturally	27°35'49.3"N 95°22'52.9"E	29/01/2022	1100	mg/kg (On dry basis)
4	Water body sediment soil sample No.-4, (Intermediate sample, outside fenced area, , BGN-5, Baghjan) Water evaporated naturally	27°35'50.0"N 95°22'51.9"E	29/01/2022	1000	mg/kg (On dry basis)


Notes:

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Annexure – 18: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of intermediate pond water samples (inside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
Water Sample	W-080222-01	25/02/2022

Issued to:

The Energy and Resources institute (TERI)
 Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data

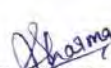
Sample received on : 08/02/2022
 Sample description : Water
 Protocol used for testing : EPA1664A
 Parameter to be checked : Total Petroleum Hydrocarbons (TPH)
 Analysis duration : 09/02//2022 to 24/02/2022
 Report issued on : 25/02/2022


S. No.	Sample Details	Location	Sampling date	Result	Unit
1	Pond -1, Water sample no.1 (Intermediate sample)	Inside fenced area of plinth BGN # 5, Baghjan	24/01/22	75	ppm
2	Pond -2, Water sample no.2 (Intermediate sample)	Inside fenced area of plinth BGN # 5, Baghjan	24/01/22	54	ppm
3	Pond -3, Water sample no.3 (Intermediate sample)	Inside fenced area of plinth BGN # 5, Baghjan	24/01/22	58	ppm

End of Report

Notes:

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Annexure – 19: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of intermediate pond sediment samples (inside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of Soil Sample	Report Code W-080222-02	Date of Issue 25/02/2022
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Issued to:

The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data


Sample received on : 08/02/2022
 Sample description : Soil
 Protocol used for testing : USEPA9071B
 Parameter to be checked : Total Petroleum Hydrocarbons (TPH)
 Analysis duration : 09/02/2022 to 24/02/2022
 Report issued on : 25/02/2022

S. No.	Sample Details	Location	Sampling date	Result	Unit
1	Pond -1, Sediment soil sample no.1 (Intermediate sample).	Inside fenced area of plinth BGN # 5, Baghjan.	24/01/22	2000	mg/kg (On dry basis)
2	Pond -2, Sediment soil sample no.2 (Intermediate sample).	Inside fenced area of plinth BGN # 5, Baghjan.	24/01/22	1700	mg/kg (On dry basis)
3	Pond -3, Sediment soil sample no.3 (Intermediate sample).	Inside fenced area of plinth BGN # 5, Baghjan.	24/01/22	1900	mg/kg (On dry basis)
4	Pond -4, Sediment soil sample no.4 (Intermediate sample).	Inside fenced area of plinth BGN # 5, Baghjan.	24/01/22	1700	mg/kg (On dry basis)

End of Report

Notes:

1. The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
2. Responsibility of the Laboratory is limited to the invoiced amount only.
3. This test report will not be generated again, either wholly or in part, without prior written permission of the laboratory.
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5. The test samples will be disposed off after two weeks from the date of issue of test report, unless until specified by the customer.


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Annexure – 20: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of intermediate soil control samples (outside 150 meters) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
Soil Sample	S-080222-06	25/02/2022

Issued to:

The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data

Sample received on : 08/02/2022
 Sample description : Soil
 Protocol used for testing : USEPA9071B
 Parameter to be checked : Total Petroleum Hydrocarbons (TPH)
 Analysis duration : 09/02/2022 to 24/02/2022
 Report issued on : 25/02/2022

S. No.	Sample Details	coordinates	Sampling date	Result	Unit
1.	Control soil Sample no.1 Intermediate sample BGN # 5, Baghjan(Outside 150m from well BGN-5)	27°35'44.6"N 95°22'44.2"E	29/01/2022	BDL(DL<200)	mg/kg (On drybasis)
2.	Control soil Sample no.2 Intermediate sample BGN # 5, Baghjan(Outside 150m from well BGN-5)	27°35'50.5"N 95°22'54.9"E	29/01/2022	BDL(DL<200)	mg/kg (On drybasis)
3.	Control soil Sample no.3 Intermediate sample BGN # 5, Baghjan (Outside 150m from well BGN-5)	27°35'44.8"N 95°22'56.1"E	29/01/2022	BDL(DL<200)	mg/kg (On drybasis)
4.	Control soil Sample no.4 Intermediate sample BGN # 5, Baghjan (Outside 150m from well BGN-5)	27°35'42.4"N 95°22'45.4"E	29/01/2022	BDL(DL<200)	mg/kg(On dry basis)

End of Report

Notes:

1. The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
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Annexure – 21: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of third time soil samples (Soil sample No. 1 to 10) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of Soil Sample	Report Code S-210322-01	Date of Issue 05/04/2022
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Issued to: The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data

Sample received on : 21/03/2022
 Sample description : Soil
 Protocol used for testing : USEPA9071B
 Parameter to be checked : Total Petroleum Hydrocarbons (TPH)
 Analysis duration : 22/03/2022 to 05/04/2022

S. No.	Sample identification code	Sample Coordinates	Sampling date	Result	Unit
1	Soil sample no.01 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'46.53"N 95°22'50.11"E	14/03/2022	2500	mg/kg
2	Soil sample no. 02 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'50.50"N 95°22'47.93"E	14/03/2022	2200	mg/kg
3	Soil sample no. 03 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'51.15"N 95°22'46.86"E	14/03/2022	2000	mg/kg
4	Soil sample no. 04 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'49.41"N 95°22'49.58"E	14/03/2022	2000	mg/kg
5	Soil sample no. 05 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'46.90"N 95°22'47.89"E	14/03/2022	1800	mg/kg
6	Soil sample no. 06 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'44.11"N 95°22'46.97"E	14/03/2022	2700	mg/kg
7	Soil sample no. 07 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'45.90"N 95°22'51.47"E	14/03/2022	2400	mg/kg
8	Soil sample no. 08 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'48.83"N 95°22'52.80"E	14/03/2022	2600	mg/kg
9	Soil sample no. 09 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'49.72"N 95°22'54.14"E	14/03/2022	2000	mg/kg
10	Soil sample no. 10 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'49.71"N 95°22'55.91"E	14/03/2022	1600	mg/kg

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Annexure – 22: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of third time soil samples (Soil sample No. 11 to 20) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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11	Soil sample no. 11 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'46.12"N 95°22'53.35"E	14/03/2022	2100	mg/kg
12	Soil sample no. 12 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'47.20"N 95°22'54.51"E	14/03/2022	1800	mg/kg
13	Soil sample no. 13 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'45.44"N 95°22'54.13"E	14/03/2022	1500	mg/kg
14	Soil sample no. 14 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'45.12"N 95°22'54.14"E	14/03/2022	2000	mg/kg
15	Soil sample no. 15 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'44.70"N 95°22'56.23"E	14/03/2022	2300	mg/kg
16	Soil sample no. 16 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'43.73"N 95°22'52.89"E	14/03/2022	1900	mg/kg
17	Soil sample no. 17 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'43.61"N 95°22'49.42"E	14/03/2022	2800	mg/kg
18	Soil sample no. 18 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'43.20"N 95°22'49.93"E	14/03/2022	2200	mg/kg
19	Soil sample no. 19 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'42.42"N 95°22'49.55"E	14/03/2022	1900	mg/kg
20	Soil sample no. 20 (Third time's sample, BGN-5, Baghjan) On dry basis	27°35'43.40"N 95°22'47.85"E	14/03/2022	2600	mg/kg

End of Report S-210322-01

Notes:

- The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
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Annexure – 23: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of third time water samples (outside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
Soil Sample	W-210322-03	05/04/2022

Issued to:

The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data

Sample received on : 21/03/2022
 Sample description : Soil
 Protocol used for testing : USEPA9071B
 Parameter to be checked : Total Petroleum Hydrocarbons (TPH)
 Analysis duration : 22/03//2022 to 05/04/2022
 Report issued on : 05/04/2022


S. No.	Sample Details	Coordinates	Sampling date	Result	Unit
1	Water body sediment soil sample No.-1, (Third time's sample, outside fenced area, , BGN-5, Baghjan) Water evaporated naturally	27°35'50.5"N 95°22'47.9"E	14/03/2022	BDL	mg/kg (On dry basis)
2	Water body sediment soil sample No.-2, (Third time's sample, outside fenced area, , BGN-5, Baghjan) Water evaporated naturally	27°35'45.4"N 95°22'46.3"E	14/03/2022	500	mg/kg (On dry basis)
3	Water body sediment soil sample No.-3, (Third time's sample, outside fenced area, , BGN-5, Baghjan) Water evaporated naturally	27°35'49.3"N 95°22'52.9"E	14/03/2022	BDL	mg/kg (On dry basis)
4	Water body sediment soil sample No.-4, (Third time's sample, outside fenced area, , BGN-5, Baghjan) Water evaporated naturally	27°35'50.0"N 95°22'51.9"E	14/03/2022	BDL	mg/kg (On dry basis)

Notes:

1. The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
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Annexure – 24: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of third time pond water samples (inside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
Water Sample	W-210322-02	05/04/2022

Issued to:

The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

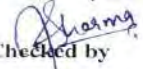
Sampling & Analysis data

Sample received on : 21/03/2022
 Sample description : Water
 Protocol used for testing : EPA1664A
 Parameter to be checked : Total Petroleum Hydrocarbons (TPH)
 Analysis duration : 22/03/2022 to 05/04/2022
 Report issued on : 05/04/2022


S. No.	Sample Details	Location	Sampling date	Result	Unit
1	Pond -1, Water sample no.1 (Third's time sample)	Inside fenced area of plinth BGN # 5, Baghjan	14/03/2022	64	ppm
2	Pond -1, Water sample no.2 (Third's time sample)	Inside fenced area of plinth BGN # 5, Baghjan	14/03/2022	50	ppm
3	Pond -1, Water sample no.3 (Third's time sample)	Inside fenced area of plinth BGN # 5, Baghjan	14/03/2022	52	ppm

Notes:

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Annexure – 25: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of third time pond sediment samples (inside fenced area) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
Soil Sample	S-210322-01	05/04/2022

Issued to:

The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data

Sample received on : 21/03/2022
 Sample description : Soil
 Protocol used for testing : USEPA9071B
 Parameter to be checked : Total Petroleum Hydrocarbons (TPH)
 Analysis duration : 22/03/2022 to 05/04/2022
 Report issued on : 05/04/2022

S. No.	Sample Details	Location	Sampling date	Result	Unit
1	Pond -1, Sediment soil sample no.1 (Third's time sample)	Inside fenced area of plinth BGN # 5, Baghjan	14/03/2022	1500	mg/kg (On dry basis)
2	Pond -2, Sediment soil sample no.2 (Third's time sample)	Inside fenced area of plinth BGN # 5, Baghjan	14/03/2022	1000	mg/kg (On dry basis)
3	Pond -3, Sediment soil sample no.3 (Third's time sample)	Inside fenced area of plinth BGN # 5, Baghjan	14/03/2022	1300	mg/kg (On dry basis)
4	Pond -4, Sediment soil sample no.4 (Third's time sample)	Inside fenced area of plinth BGN # 5, Baghjan	14/03/2022	1100	mg/kg (On dry basis)

Notes:


1. The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
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Annexure – 26: Third party lab report of after bioremediation bore well water sample, characteristics of ground water at bioremediation site of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
Water Sample	W-210322-03	05/04/2022

Issued to:

The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data

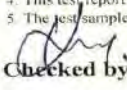
Sample received on : 21/03/2022
 Sample description : Water (Bore well water sample), after bioremediation, well No. 5, BGN-5, Baghjan, Assam.
 (Location coordinates- 27°35'42.0"N, 95°22'51.0"E)
 Sampling date : 14/03/2022
 Analysis duration : 22/03//2022 to 05/04/2022
 Report issued on : 05/04/2022

Heavy metals	Method used	Permissible limits		Concentration in Ground water (ppm)
		BSI/WHO	EPA (LIE)	
Iron (Fe)	IS:3025 (P-65)	5 ppm	1 ppm	BDL(DL <0.01)
Manganese (Mn)	IS:3025 (P-65)	0.1 ppm	1.5 ppm	BDL(DL <0.01)
Zinc (Zn)	IS:3025 (P-65)	1 ppm	1 ppm	BDL(DL <0.01)
Cadmium (Cd)	IS:3025 (P-65)	5 ppb	0.5 ppm	BDL(DL <0.001)
Lead (Pb)	IS:3025 (P-65)	5 ppb	---	BDL(DL <0.001)
Nickel (Ni)	IS:3025 (P-65)	5 ppb	0.5 ppm	BDL(DL <0.001)
Arsenic (As)	IS:3025 (P-65)	1 ppb	0.01 ppm	BDL(DL <0.001)
Total Chromium (Cr)	IS:3025 (P-65)	5 ppb	1 ppm	BDL(DL <0.001)
Mercury (Hg)	IS:3025 (P-65)	0.5 ppb	0.5 ppm	BDL(DL <0.001)
Copper (Cu)	IS:3025 (P-65)	1ppm	1ppm	BDL(DL <0.01)
TPH	EPA 1664A	---	---	BDL(DL <5.0)


BDL-Below Detection Limit (DL-Detection Limit) **End of Report**

Notes:

1. The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
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Annexure – 27: Solvent extractable total petroleum hydrocarbon (TPH) content third party lab report of third time soil control samples (outside 150 meters) of well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



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TEST CERTIFICATE

Test Report of	Report Code	Date of Issue
Soil Sample	S-210322-09	05/04/2022

Issued to:

The Energy and Resources institute (TERI)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110003.

Sampling & Analysis data


Sample received on : 21/03/2022
 Sample description : Soil
 Protocol used for testing : USEPA9071B
 Parameter to be checked : Total Petroleum Hydrocarbons (TPH)
 Analysis duration : 22/03//2022 to 05/04/2022
 Report issued on : 05/04/2022

S. No.	Sample Details	coordinates	Sampling date	Result	Unit
1	Control soil Sample no.1 Third time's sample BGN # 5, Baghjan(Outside 150m from well BGN-5)	27°35'44.6"N 95°22'44.2"E	14/03/2022	BDL(DL 200)	mg/kg (On drybasis)
2	Control soil Sample no.2 Third time's time sample BGN # 5, Baghjan(Outside 150m from well BGN-5)	27°35'50.5"N 95°22'54.9"E	14/03/2022	BDL(DL 200)	mg/kg (On dry basis)
3	Control soil Sample no.3 Third time's time sample BGN # 5, Baghjan(Outside 150m from well BGN-5)	27°35'44.8"N 95°22'56.1"E	14/03/2022	BDL(DL 200)	mg/kg (On drybasis)
4	Control soil Sample no.4 Third time's time sample BGN # 5, Baghjan(Outside 150m from well BGN-5)	27°35'42.4"N 95°22'45.4"E	14/03/2022	BDL(DL 200)	mg/kg (On drybasis)


BDL-Below Detection Limit (DL-Detection Limit) **End of Report**

Notes:

- The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
- Responsibility of the Laboratory is limited to the invoiced amount only.
- This test report will not be generated again, either wholly or in part, without prior written permission of the laboratory.
- This test report will not be used for any publicity/legal purpose.
- The test samples will be disposed off after two weeks from the date of issue of test report, unless until specified by the customer.



Checked by



Authorized Signatory

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 E. : noida.laboratory@gmail.com, info@noidalabs.com W. : www.noidalabs.com

Annexure – 28: photos of site characterization and sampling by joint team on 18/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Annexure – 29: photos of site characterization and sampling by joint team on 18/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Joint measurement of depth of soil contamination at site, observation of contamination in water bodies and odour assessment of soil sample by TERI and OIL. team members

Annexure – 30: photos of site characterization and sampling by joint team on 18/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Annexure – 31: photos of base time line or zero time sampling by joint team on 22/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Soil sample No. 1 (GPS Coordinate data 27°35'46.5"N 95°22'50.1"E)



Soil sample No. 1



Soil sample No. 1



Soil Sample No. 2 (GPS Coordinate data 27°35'50.5"N 95°22'47.9"E)



Soil Sample No. 2



Soil Sample No. 2

Annexure – 32: photos of base time line or zero time sampling by joint team on 22/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Soil Sample No. 2



Soil sample No. 3 (GPS Coordinate data- 27°35'51.1"N 95°22'46.8"E



Soil sample No. 3



Soil sample No. 3



Soil Sample No. 4 (GPS Coordinate data 27°35'49.4"N 95°22'49.6"E



Soil sample No. 4

Annexure – 33: photos of base time line or zero time sampling by joint team on 22/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Soil sample No. 4



Soil sample No. 4



Soil sample No. 5 (GPS Coordinate data 27°35'46.9"N 95°22'47.8"E)



Soil sample No. 5



Soil sample No. 5



Soil sample No. 6 (GPS Coordinate data 27°35'44.1"N 95°22'46.9"E)

Annexure – 34: photos of base time line or zero time sampling by joint team on 22/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Soil sample No. 6



Soil sample No. 6



Soil sample No. 6



Soil sample No. 7 (GPS Coordinate data 27°35'45.9"N 95°22'51.4"E)



Soil sample No. 7



Soil sample No. 7

Annexure – 35: photos of base time line or zero time sampling by joint team on 22/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Soil Sample No. 8 (GPS Coordinate data 27°35'48.8"N 95°22'52.8"E)



Soil Sample No. 8



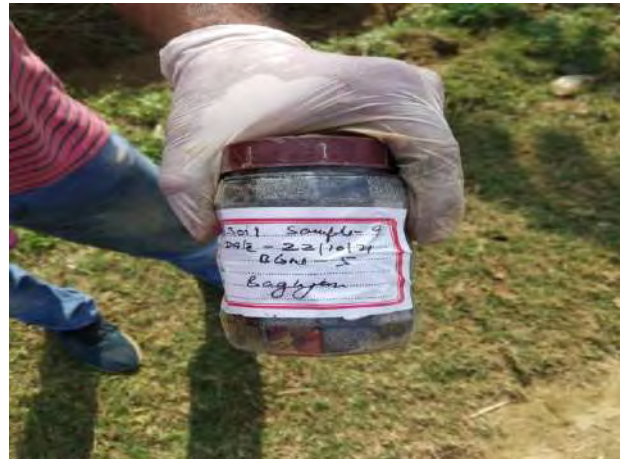
Soil Sample No. 8



Soil Sample No. 8



Soil Sample No. 9 (GPS Coordinate data- 27°35'49.7"N 95°22'54.1"E)



Soil Sample No. 9

Annexure – 36: photos of base time line or zero time sampling by joint team on 22/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



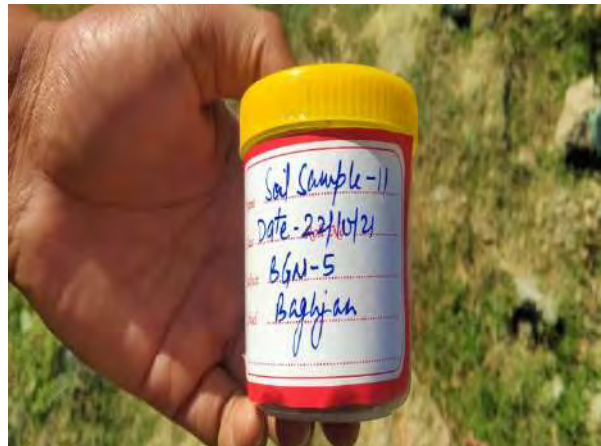
Soil Sample No. 10 (GPS Coordinate data 27°35'49.7"N 95°22'55.8"E



Soil Sample No. 10



Soil Sample No. 11 (GPS Coordinate data 27°35'46.1"N 95°22'53.2"E



Soil Sample No. 11



Sample No. 12 (GPS Coordinate data 27°35'47.2"N 95°22'54.5"E



Soil Sample No. 12

Annexure – 37: photos of base time line or zero time sampling by joint team on 22/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Sample No. 13 (GPS Coordinate data 27°35'45.4"N 95°22'54.1"E



Sample No. 13



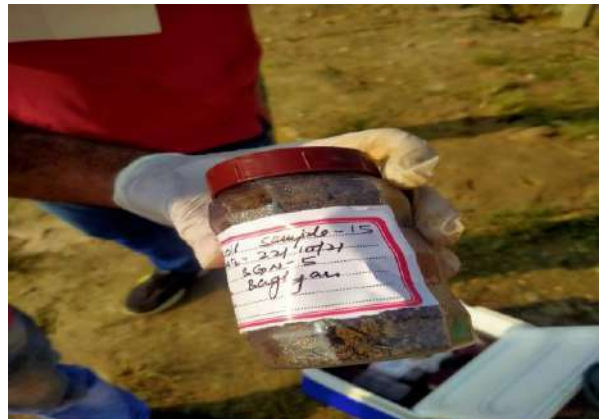
Soil Sample No. 14 (GPS Coordinate data 27°35'45.1"N 95°22'54.1"E



Sample No. 14

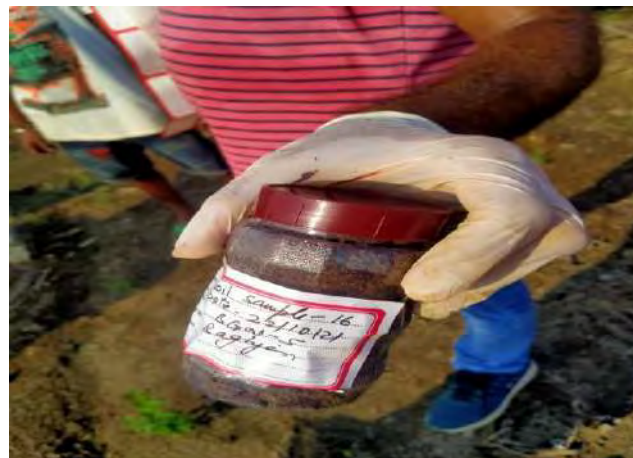


Soil sample No. 15 (GPS Coordinate data 27°35'44.7"N 95°22'56.2"E



Sample No. 15

Annexure – 38: photos of base time line or zero time sampling by joint team on 22/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Soil sample No. 16 (GPS Coordinate data 27°35'43.7"N 95°22'52.9"E)

Soil sample No. 16



Soil sample No. 17 (GPS Coordinate data 27°35'43.6"N 95°22'49.9"E)

Soil sample No. 17



Soil sample No. 18 (GPS Coordinate data 27°35'43.2"N 95°22'49.9"E)

Soil sample No. 18

Annexure – 39: photos of base time line or zero time sampling by joint team on 22/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Soil sample No. 19 (GPS Coordinate data 27°35'42.4"N 95°22'49.5"E)



Soil sample No. 19



Soil sample No. 20 (GPS Coordinate data 27°35'43.4"N 95°22'47.8"E)



Soil sample No. 20

Annexure – 40: photos of base time line or zero time sampling of soil control by joint team on 22/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Control soil sample No. 1



Control soil sample No. 1



Control soil sample No. 2



Control soil sample No. 2

Annexure – 41: photos of base time line or zero time sampling of soil control by joint team on 22/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Control soil sample No. 3



Control soil sample No. 3



Control soil sample No. 4



Control soil sample No. 4

Annexure – 42: photos of base time line or zero time sampling of water bodies (outside fenced area) by joint team on 22/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



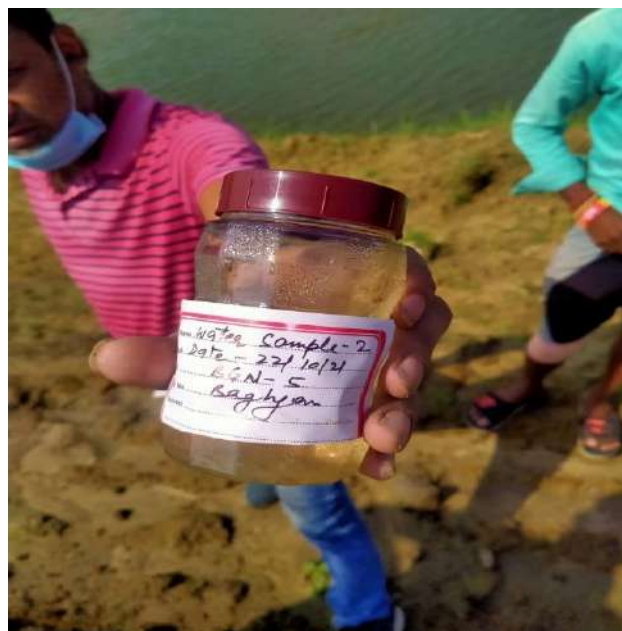
Water sample No. 1



Water sample No. 1



Water sample No. 2



Water sample No. 2

Annexure – 43: photos of base time line or zero time sampling of water bodies (outside fenced area) by joint team on 22/10/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Water sample No. 3



Water sample No. 3



Water sample No. 4

Annexure – 44: photos of base time line or zero time sampling of water bodies (inside fenced area) by joint team on 16/11/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Water sample No. 1, Pond No. 1, Inside fenced area



Water sample No. 2, Pond No. 2, Inside fenced area



Water sample No. 3, Pond No. 3, Inside fenced area



Water sample No. 4, Pond No. 4, Inside fenced area

Annexure – 45: photos of base time line or zero time sampling of water bodies’ sediment (inside fenced area) by joint team on 16/11/2021, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Sediment sample No. 1, Pond No. 1, Inside fenced area.



Sediment sample No. 2, Pond No. 2, Inside fenced area.



Sediment sample No. 3, Pond No. 3, Inside fenced area.



Sediment sample No. 4, Pond No. 4, Inside fenced area.

Annexure – 46: photos of First phase microbes application from 10.11.2021 to 21.11.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Microbes transported at BGN #5 bioremediation site.



Removing of oily contaminated water from low lying areas into adjacent land area.

Annexure – 47: photos of First phase microbes application from 10.11.2021 to 21.11.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Microbes application at surrounding area of plinth BGN-5



Manual tilling after microbes application.

Annexure – 48: photos of First phase microbes application from 10.11.2021 to 21.11.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



First phase microbes application and manual tilling continued in surrounding area of plinth BGN-5 at Baghjan bioremediation site.

Annexure – 49: photos of First phase microbes application from 10.11.2021 to 21.11.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Low lying area levelling after removing water.



First phase microbes application and manual tilling continued in surrounding area of plinth BGN-5 at Baghjan bioremediation site.

Annexure – 50: photos of First phase microbes application from 10.11.2021 to 21.11.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Cleaning of site and tilling by tractor and plough disc after microbe application



First phase microbes application and tractor tilling continued in surrounding area of plinth BGN-5 at Baghjan bioremediation site.

Annexure – 51: photos of First phase microbes application from 10.11.2021 to 21.11.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



First phase microbes application and tractor tilling continued in surrounding area of plinth BGN-5 at Baghjan bioremediation site.



Site cleaning work carried out in surrounding area of plinth BGN-5 at Baghjan bioremediation site.

Annexure – 52: photos of First phase microbes application from 10.11.2021 to 21.11.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Bioremediation site cleaning work carried out in surrounding of plinth area of BGN-5



Cleaned bioremediation site in surrounding of plinth area of BGN-5

Annexure – 53: photos of First phase microbes application from 10.11.2021 to 21.11.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



First phase microbes application in cleaned area of bioremediation site at BGN-5



First phase microbes application and JCB machine tilling continued in surrounding area of plinth BGN-5 at Baghjan bioremediation site.

Annexure – 54: photos of First phase microbes application from 10.11.2021 to 21.11.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



First phase microbes application and JCB machine tilling continued in surrounding area of plinth BGN-5 at Baghjan bioremediation site.



Removing of oily contaminated water from low lying areas into adjacent land area and treating.

Annexure – 55: photos of First phase microbes application from 10.11.2021 to 21.11.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



First phase microbes application inside plinth fenced area at BGN-5, Baghjan.



First phase microbes application inside plinth fenced area at BGN-5, Baghjan.



Tilling and mixing of microbes in soil by JCB machine inside plinth fenced area at BGN-5, Baghjan.

Annexure – 56: photos of First phase microbes application from 10.11.2021 to 21.11.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Bioremediation site after first phase microbe application and tilling, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Annexure – 57: photos of Second phase microbes application from 20.12.2021 to 24.12.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Second phase microbes application inside fenced area by manually sprinkling method and manual tilling inside plinth area, BGN-5.Baghjan

Annexure – 58: photos of Second phase microbes application from 20.12.2021 to 24.12.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Cleaning of water bodies and microbe application inside fenced area, plinth at well no. 5 (BGN#5).



Second phase microbe application and manual tilling in surrounding of fenced area, plinth at well no. 5 (BGN#5).

Annexure – 59: photos of Second phase microbes application from 20.12.2021 to 24.12.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Second phase microbe application and manual tilling in surrounding of fenced area, plinth at well no. 5 (BGN#5).

Annexure – 60: photos of Second phase microbes application from 20.12.2021 to 24.12.2021 in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Second phase microbe application in water bodies inside fenced area at well no. 5 (BGN#5),



Second phase microbe application and tilling by tractor and plough disc in surrounding area of fenced area at well no. 5 (BGN#5),

Annexure – 61: photos of inter mediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Intermediate soil sample No.-1



Intermediate soil sample No.-2



Annexure – 62: photos of inter mediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Intermediate soil sample No.-3



Intermediate soil sample No.-4



Annexure – 63: photos of inter mediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Intermediate soil sample No.-5



Intermediate soil sample No.-6



Annexure – 64: photos of flagging for soil sample No.-7, inside fenced plinth area at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.



Grab sample No.-1 of soil sample No.-7.



Grab sample No.-2 of soil sample No.-7.



Grab sample No.-3 of soil sample No.-7.



Grab sample No.-4 of soil sample No.-7.



Grab sample No.-5 of soil sample No.-7.

Annexure – 65: photos of inter mediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Intermediate soil sample No.-7



Intermediate soil sample No.-8



Annexure – 66: photos of inter mediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Intermediate soil sample No.-9



Intermediate soil sample No.-10



Annexure – 67: photos of inter mediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Intermediate soil sample No.-11

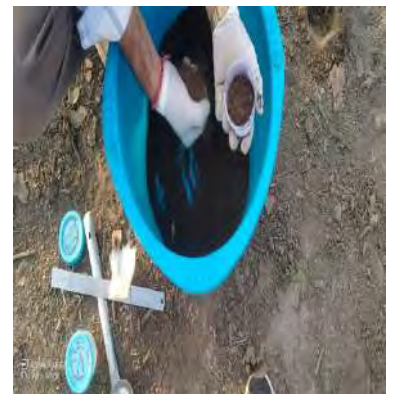


Intermediate soil sample No.-12



Annexure – 68: photos of inter mediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Intermediate soil sample No.-13



Intermediate soil sample No.-14



Annexure – 69: photos of inter mediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Intermediate soil sample No.-15



Intermediate soil sample No.-16



Annexure – 70: photos of intermediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Intermediate soil sample No.-17



Intermediate soil sample No.-18



Annexure – 71: photos of intermediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Intermediate soil sample No.-19



Intermediate soil sample No.-20



Annexure – 72: photos of intermediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Intermediate water body sediment sample No.-1
(outside of fenced area)
Water vaporized naturally



Intermediate water body sediment sample No.-2
(outside of fenced area)
Water vaporized naturally



Annexure – 73: photos of intermediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Intermediate water body sediment sample No.-3
(outside of fenced area)
Water vaporized naturally



Intermediate water body sediment sample No.- 4
(outside of fenced area)
Water vaporized naturally



Annexure – 74: photos of intermediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Intermediate water and sediment sample No.- 1, pond -1, inside of fenced area)



Intermediate water and sediment sample No.- 2, pond -2, (inside of fenced area)



Annexure – 75: photos of intermediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Intermediate water and sediment sample No.- 3, pond -3, (inside of fenced area)



Intermediate sediment sample No.- 4, pond -4, (inside of fenced area)

Water vaporized naturally



Annexure – 76: photos of intermediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Intermediate soil control sample No.- 1



Intermediate soil control sample No.- 2



Annexure – 77: photos of intermediate sampling during bioremediation from 24.01.2022 to 29.01.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Intermediate soil control sample No.- 3



Intermediate soil control sample No.- 4



Annexure – 78: photos of third phase microbes application carried out on 08.02.2022, in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Microbes has been transported from store to BGN#5 Baghjan, bioremediation site for Third phase microbe application. Transported microbes quantity is 10% of total calculated microbes quantity of all three application ‘i.e.’ 720 kg.



Third phase microbe application by manually sprinkling method, manual and JCB tilling inside fence area at BGN#5, Baghjan.

Annexure – 79: photos of third phase microbes application carried out on 08.02.2022, in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Third phase microbe application by manually sprinkling method, manual tilling inside fence area at BGN#5, Baghjan.

Annexure – 80: photos of third phase microbes application carried out on 08.02.2022, in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Third phase microbe application by manually sprinkling method, manual and JCB tilling inside fence area at BGN#5, Baghjan.

Annexure – 81: photos of third phase microbes application carried out on 08.02.2022, in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Third phase microbe application by manually sprinkling method, manual tilling in surrounding area of well No.-5, BGN#5, Baghjan.

Annexure – 82: photos of third phase microbes application carried out on 08.02.2022, in surrounding of plinth BGN-5 and inside plinth at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Third phase microbe application by manually sprinkling method, manual tilling in surrounding area of well No.-5, BGN#5, Baghjan.

Annexure – 83: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Third time soil sample No.-1



Third time soil sample No.-2



Annexure – 84: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Third time soil sample
No.-3



Third time soil sample
No.-4



Annexure – 85: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Third time soil sample No.-5



Third time soil sample No.-6



Annexure – 86: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam.

Third time soil sample No.-7

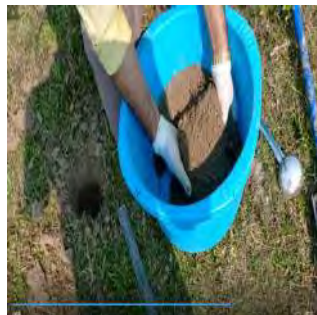


Third time soil sample No.-8



Annexure – 87: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Third time soil sample No.-9



Third time soil sample No.-10



Annexure – 88: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Third time soil sample No.-11



Third time soil sample No.-12



Annexure – 89: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Third time soil sample No.-13



Third time soil sample No.-14



Annexure – 90: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Third time soil sample No.-15



Third time soil sample No.-16



Annexure – 91: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Third time soil sample No.-17



Third time soil sample No.-18



Annexure – 92: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Third time soil sample No.-19



Third time soil sample No.-20



Annexure – 93: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Third time water body sediment sample No.-1,
(outside fenced area)
Water evaporated naturally



Third time water body sediment sample No.-2,
(outside fenced area)
Water evaporated naturally



Annexure – 94: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Third time water body sediment sample No.-3,
(outside fenced area)
Water evaporated naturally



Third time water body sediment sample No.-4,
(outside fenced area)
Water evaporated naturally



Annexure – 95: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Third time water and sediment sample No.-1, Pond No-1
(inside fenced area)

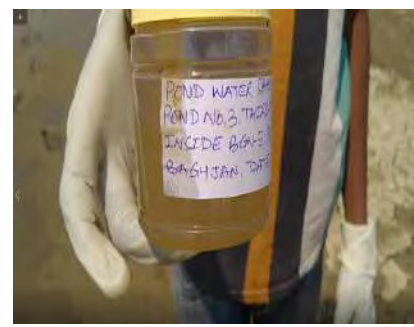


Third time water and sediment sample No.-2, Pond No-2
(inside fenced area)



Annexure – 96: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Third time water and sediment sample No.-3, Pond No-3 (inside fenced area)



Third time sediment sample No.-4, Pond No-4 (inside fenced area)
Water evaporated naturally



Annexure – 97: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Bore well water or underground water sampling at bioremediation site, BGN-5, Baghjan.

Annexure – 98: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Third time soil control sample No.-1

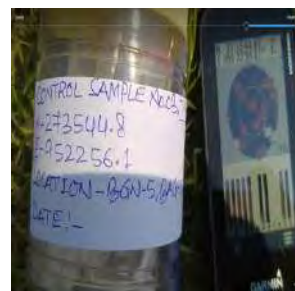


Third time soil control sample No.-2



Annexure – 99: photos of third time sampling carried out on 14.03.2022 at well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam

Third time soil control sample No.-3



Third time soil control sample No.-4



Annexure – 100: photos of bioremediation site after completion of bioremediation, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Before bioremediation, site –BGN-5



After bioremediation, site –BGN-5



Before bioremediation, site –BGN-5



After bioremediation, site –BGN-5

Annexure – 101: photos of bioremediation site after completion of bioremediation, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Before bioremediation, site –BGN-5



After bioremediation, site –BGN-5



Before bioremediation, site –BGN-5



After bioremediation, site –BGN-5

Annexure – 102: photos of bioremediation site after completion of bioremediation, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Before bioremediation, site –BGN-5



After bioremediation, site –BGN-5



Before bioremediation, site –BGN-5



After bioremediation, site –BGN-5

Annexure – 103: photos of bioremediation site after completion of bioremediation, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Before bioremediation, site –BGN-5



After bioremediation, site –BGN-5



Before bioremediation, site –BGN-5



After bioremediation, site –BGN-5

Annexure – 104: photos of bioremediation site after completion of bioremediation, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam



Before bioremediation, site –BGN-5



After bioremediation, site –BGN-5



Before bioremediation, site –BGN-5



After bioremediation, site –BGN-5

Annexure – 105: photos of bioremediation site, well no. 5 (BGN#5), Baghjan, Oil India Limited, Duliajan, Assam





We are an independent, multi-dimensional organization, with capabilities in research, policy, consultancy and implementation.

We are innovators and agents of change in the energy, environment, climate change and sustainability space, having pioneered conversations and action in these areas for over four decades.

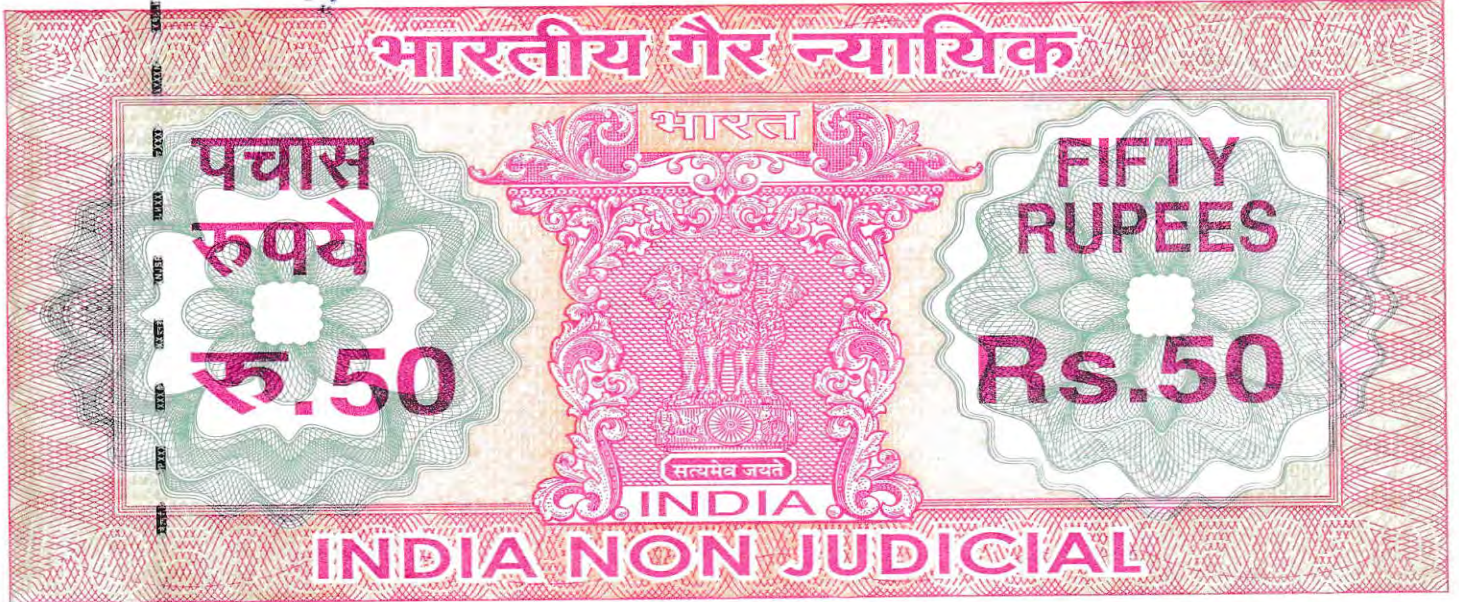
We believe that resource efficiency and waste management are the keys to smart, sustainable and inclusive development. Our work across sectors is focused on

- Promoting efficient use of resources
- Increasing access and uptake of sustainable inputs and practices
 - Reducing the impact on environment and climate

Headquartered in New Delhi, we have regional centres and campuses in Gurugram, Bengaluru, Guwahati, Mumbai, Panaji , and Nainital. Our 1000-plus team of scientists, sociologists, economists and engineers delivers insightful, high quality action-oriented research and transformative solutions supported by state- of-the-art infrastructure.



ANNEXURE R9



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MEMORANDUM OF UNDERSTANDING (MoU)
Between
Oil India Ltd., Duliajan, Assam
And
Pollution Control Board, Assam

1.0. GENERAL: -

The **Memorandum of Understanding (MoU)** made and executed at the office of the **Pollution Control Board, Assam, Guwahati** on the **21st day of July, 2022**

BETWEEN

Oil India Ltd., a Navratna Company, Government of India Enterprise under the aegis of **Ministry of Petroleum & Natural Gas**, registered under the Companies Act and having its Field Headquarter and Registered office at Duliajan, Assam (here-in-after called **OIL**), represented through **Chief General Manager (FHQ-A) OIL, Duliajan**, which expression shall unless repugnant to the context or meaning thereof shall mean & include its Head Administrator, Executor Successors & permitted assigns of the **ONE PART**;

AND

Pollution Control Board

Oil India Ltd.

21 JUL 2022

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Priyanka Banikya
District & Sessions Judge Campus
Guwahati Kamrup (Metro)
L. No. KPE 14/2021/As3
Dt. 23/09/2021
Sl. No. VU1544

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Pollution Control Board, Assam, represented by Member Secretary, PCBA (hereinafter referred to as "PCBA") which expression shall, unless excluded by any repugnant to the context or meaning thereof, be deemed to mean and include its successors-in-office, administrator and assignees of the **OTHER PART**

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This MoU being signed between OIL and PCBA for successful execution / completion of the following work with the financial assistance of Oil India Ltd, Duliajan to be executed by PCBA, Guwahati.

Name of Work: Carbon sequestration and biological reclamation/restoration of degraded land in Baghjan well No.5 plinth area in Tinsukia District, Assam by planting trees through "Modified AKIRA MIYAWAKI" method.

The Terms and Conditions as mutually agreed for execution of said works under PCBA, Govt. of Assam against OIL Deposit Fund are given in the succeeding paragraphs.

2.0 PREAMBLE: -

2.1. OIL India Ltd (OIL), a public sector undertaking, is a premiere National OIL Company, engaged in the business of Exploration, Production and Transportation of crude oil and natural gas and manufacturer of LPG with its field Head Quarter at Duliajan is desirous to take up biological reclamation of Baghjan well No.5 plinth area by planting trees through "Modified AKIRA MIYAWAKI" method for carbon sequestration and biological reclamation/restoration of drill sites. The reclamation/restoration of Baghjan Well No.05 plinth area is mandated from the Supreme Court constituted Committee under the Chairperson Hon'ble Justice BP Katakey, former Judge, Gauhati High Court during his site visit to Baghjan 5.

The main objective is to improve productive capability of degraded lands and enhancing for conservation values of landscapes through:

- (i) Rehabilitation of degraded land through ecological restoration intervention.
- (ii) Restoration/regeneration of degraded lands by creating Environmental Protection Forest (EPF).
- (iii) Securing people's participation in planning and restoration efforts in the surrounding villages.

Planting Procedure with Miyawaki Method:

The scope of Miyawaki model of dense plantation includes choosing the various dominant species from potential natural vegetation of the area and planting them mixed and densely with as many as companion species as possible to develop a multi-strata forest. The following steps are involved in the process of 'dense natural plantation'.

Part of the work is

EPF

SL No	Name of the activity	Works to be accomplished
Step 1	Site Preparation	It is required to create a soil bed before planting. Tilling of soil is done until sufficiently soft in a flat area and then hog-back ridge (a small mound) of soil is formed with slopes, wherever possible. Dressing the top soil with rich organic material and decomposer shall help in plant growth.
Step 2	Seedlings selection	Selection of seedlings of assorted types of high trees, sub-high trees and shrubs that is compatible with the potential natural vegetation . Planting saplings (02 to 03 years old) but not grown up trees is required.
Step 3	Planting techniques	3 to 4 seedlings are planted per square meter of land in a random manner; high density planting help seedlings compete with each other, which enhances growth of each of the plants.
Step 4	Mulching	To cover the planted area with rice straw, dried grass, etc. Mulching is beneficial for seedling protections against soil erosion, extreme temperatures, insects and weeds. Thick rice straw mulching is very useful.
Step 5	Maintenance	Initially weeding is required for 02 years after planting, after which no maintenance is needed.

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2.2 It has been agreed by OIL that financial assistance will be provided for the above mentioned works as per Plan / Estimate & specifications proposed by PCBA under OIL Deposit Fund.

The detail scope of work of PCBA including the estimate furnished by the PCBA and approved by OIL are as below: -

Sl No	Items of works	Rate(₹)	Amount(₹)	Remarks
A. Cost involved against various works				
i.	Soil bed final preparation		100,000.00	Entire soil bed is prepared by loosening the surface on the day of plantation.
	Addition of organic fertilizer		200,000.00	
ii.	Procurement of tools (spade, khurpi etc.)	100@200.00	20,000.00	
iii.	Procurement of saplings	25,000 saplings @25.00/ sapling	6,25,000.00	Approx. 50 species of saplings of native species shall be procured by CPCB from identified nurseries.
iv.	Mulching material: Rice Straw/ husk		100,000.00	To be procured from local villages / residents.
v.	Manpower requirement for plantation including spreading of mulching materials	100@500.00/ day	50,000.00	
vi.	Subsequent refilling of saplings (after 2-3 weeks of plantation) in the 1 st year	1000 nos.	25,000.00	
vii.	Vacancy filling in mortality areas in the 2 nd Year	1,000 saplings	25,000.00	Since the degraded soil has poor nutrient content, mortality may higher than other normal plantation.
viii.	Wages of labour (refilling & weeding) in the 2 nd Year	50 man days @ 500.00/ day	25,000.00	As per state plantation norm
ix.	Sign boards		15,000.00	One permanent sign board
x.	(Transportation charges for 27,000 nos of saplings)	27,000 nos	90,000.00	Transportation of saplings from Udali village, Lanka, Nagaon. Minimum 3 trips of a Truck Lanka to Tinsukia shall be required.
	Total cost/hectare		12,75,000.00	
	Total Cost for Baghjan Well No. 5 (1.46 hectare) *** Pit to be filled		18,61,500.00	

Saplings to be procured

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	up with native soil and Akira Miyawaki Plantation will be done there (One pit to be left unfilled as per the advice of MS, PCBA to meet with the water source for sapling growing.			
B.	Institutional payment to PCBA Salary of one (1) JRF for 2 years for execution and supervision of the project, travelling expenditures, meeting expenditures, planning and execution of the overall projects and other institutional expenditures. Maintenance Charge for 2 years after completion of plantation work		15,00,000.00	
	Total Project Cost (A+B)		33,61,500.00	

2.2.1 Scope of Oil India Ltd.

1. Preparation of surface for plantation at Well No. 5, Baghjan.
 - a. Loosening of top surface by excavator.
 - b. Addition of top soil of 8 to 10 cm thickness over the loosened surface.
 - c. Arrangement of a power tiller for the day/previous day of plantation (1 day).
 - d. Arrangement of plantation festival for the plantation day (including a meeting with nearby village people, authorities of tea gardens, school children, etc.). A small tent may be provided for the purpose of the meeting as well as for providing shed to the saplings before plantations.
 - e. Arrangement of a public address system for the plantation festival.
 - f. OIL employees from different levels and different sections shall participate in the plantation festival.
 - g. Fencing of the plinth area to restrict entry of cows/goats.
2. A proper record of the project with video/still photography/satellite imagery of its prior, progressive stage and post project implementation shall be maintained by OIL.

2.3 That, OIL has already conveyed its approval to bear the cost up to a maximum of **Rs.33,61,500.00** (Rupees **Thirty Three Lakh Sixty One Thousand and Five Hundred**) only vide letter no.S&E/E/121/928 dated 14.07.2022, received from CGM – HSE, Oil India Ltd, Duliajan. However, notwithstanding the aforesaid approved amount, OIL shall release the amount subject to conditions as stipulated in the **Clauses 4.0 & 5.0** herein below

2.4 As the OIL Management has approved the said proposal for an amount of **Rs. 33,61,500.00** (Rupees **Thirty Three Lakh Sixty One Thousand and Five Hundred**) only intimated vide letter no. S&E/E/121/928 Dated 14.07.2022 and sanctioned the

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necessary Fund required for the work, this MoU is being signed between the OIL and PCBA for successful execution / completion of the project which has to be executed by PCBA, Guwahati.

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2.5 Specifications of work: The specifications shall be as per detail estimate submitted by Member Secretary, PCBA, Guwahati with relevant methods.

3.0 Methodology for Entrustment of Works and Cost acceptance: -

PCBA will initiate the steps for execution of the work as per norms and specifications of PCBA and will complete the job within Sixty (60) days from the date of signing of the MoU. In no case, cost escalation whatsoever shall be entertained / allowed / paid.

4.0. Payment terms regarding release of Fund by OIL, Duliajan to PCBA: -

Funds towards the execution of the aforesaid work upto a maximum of **Rs. 33,61,500.00** (Rupees **Thirty Three Lakh Sixty One Thousand and Five Hundred**) only will be released to an bank account of PCBA, especially opened for the purpose for plantation in three (3) instalments as mentioned below:

1st installment: - 50% (Fifty) percent advance over sanctioned cost of plantation work defined in part A of the estimate Cl. 2.2 will be released within 15 (Fifteen) days of execution of the MoU on placement of demand for release of advance fund.

2nd installment: - Maximum upto 100% (Hundred) percent (i. e 1st instalment 50% + 2nd instalment 50%) of sanctioned cost of plantation work defined in part A of the estimate Cl. 2.2 will be released within 15 (fifteen) days of joint inspection on completion of the 100% of plantation work defined in part A of the estimate Cl. 2.2 & submission of utilization certificate of the 1st instalment and report of physical Joint verification by PCBA officials & representatives of OIL.

3rd installment: - Maximum upto 50% (fifty) percent of Maintenance Charge for 2 years after completion of 1st year of plantation work defined in part B of the estimate Cl. 2.2 & submission of utilization certificate of the 2nd instalment and report of physical Joint verification by PCBA officials & representatives of OIL.

4th installment: - Maximum upto 100% (hundred) percent (3rd instalment 50% and 4th instalment 50%) of Maintenance Charge for 2 years after completion of 2nd year of plantation work defined in part B of the estimate Cl. 2.2 & submission of utilization certificate of the 2nd instalment and report of physical Joint verification by PCBA officials & representatives of OIL.

The total released of fund up to 4th instalment shall be limited to 100% (Hundred) percent of sanctioned cost.

(a) For a particular installment to become eligible for release, all the items mentioned under that installment needs to be 100% complete and PCBA shall not forward any demand requesting for release of pro-rata payment, whatsoever, under any circumstance.

(b) The fund as and when released by OIL shall not be diverted by PCBA under any circumstances whatsoever and shall be exclusively used for construction of said work.

Release from an

in 15 days

(c) OIL will not bear any additional cost for any other job that may be required for successful completion of the project during execution.

(d) Cost to be incurred to complete the job by OIL, as reflected under the scope of OIL in Section 2.2.1 shall be made by OIL directly and not included in the project cost mentioned under the scope of PCBA.

5.0 PROJECT MONITORING: -

- 5.1 PCBA will execute, maintain and monitor the plantation work for a period of two (2) years.
- 5.2 PCBA shall exercise strict supervision, to maintain quality specifications of the plantation work, shall ensure no time and cost overrun and attain timely completion of the project. OIL shall not bear any cost overrun of the said road project, caused due to delay in execution of the project beyond the schedule time limit except otherwise provided in Clauses- 6(d) and 6(e).
- 5.3 For monitoring of works, PCBA will monitor the work regularly.
- 5.4 A joint verification team comprising of PCBA Officials, representative of OIL shall jointly inspect the work from time to time. The Member Secretary, PCBA will initiate action for joint inspection.
- 5.5 That, in the event the implementation of the Project is not as per the scope of work and targets, OIL shall reserve the right to withhold or reduce or stop the amount of installment amount applied for by the SECOND PARTY. Release of the installments shall be made upon remedying of the unsatisfactory work and on resolution of the outstanding queries by the SECOND PARTY to the satisfaction of OIL.
- 5.6 That, in case the cumulative disbursements made to the SECOND PARTY towards the Project are in excess of the expenditure actually incurred in terms of the Project Implementation Plan, OIL shall deduct the excess amount from the subsequent installments to be disbursed to the SECOND PARTY.
- 5.7 OIL shall not bear any additional amount over and above the sanctioned project cost as mentioned in the clause 4.0.

6.0 OTHER TERMS AND CONDITIONS:

- 6.1 PCBA shall carry out the plantation according to the plantation norms.
- 6.2 PCBA shall prepare the list of saplings to be planted considering the soil condition of the proposed plantation site.

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Oil Bill

- 6.3 PCBA shall arrange all required resources to implement the said project of their own as per planning given in their estimate.
- 6.4 OIL shall have the right to engage a plantation expert in entire project period to have a close monitoring of the project at their own cost.
- 6.5 PCBA will submit interim project report of the progress of the project to OIL in half yearly interval.
- 6.6 At the closure of the project, PCBA shall submit a detailed report, duly certifying number and varieties of trees that have survived at the end of the project. Minimum 80% survival rate of the trees must be there at the end of the project.
- 6.7 A proper record of the project with video/still photography/satellite imagery of its prior, progressive stage and post project implementation shall be maintained and reported by PCBA.

7.0 TERMINATION:

- 7.1 That, in the event, the FIRST PARTY has reason to believe that the financial assistance being provided to the SECOND PARTY is not being utilized for the intended purpose, the assistance may be stopped immediately and the assistance provided earlier shall be recovered from the SECOND PARTY.
- 7.2 That, In the event of any unsatisfactory performance of the Project by the SECOND PARTY, OIL may, on its sole discretion and at any time, terminate the MoU and inform the SECOND PARTY of its decision in writing, which shall be final and binding on both the parties. The MoU shall stand terminated on the date as mentioned in the written communication. Unsatisfactory performance would include:
- 7.2.1 An incomplete work done/ no progress in the work found/ work not being implemented as specified under this MoU or non-performance of any obligation under this MoU.
- 7.2.2 If the SECOND PARTY is found to be involved in any manner or form of corrupt practices or misappropriation of funds / assets, which belongs to, or has been marked for the Project activities and The FIRST PARTY has sufficient grounds to believe so.
- 7.2.3 Violations of any of the provisions specified in various clauses of this MoU and Terms of Reference, which may lead to a conflict and, may affect the objectives of the program, at any time of the MoU period.
- 7.3 That, It is hereby expressly agreed that this MoU shall be valid for the duration mentioned at Clause 2.0, unless extended by the Parties by written mutual

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consent, with such additions and modified terms and conditions, as may be mutually agreed to between both the parties.

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- 7.4 That, It is agreed that this MoU may be terminated due to breach of the terms of MoU by either of the two parties provided that due notice of breach is given by the aggrieved party to the other party and the other party fails to rectify the breach within sixty (60) days. Both parties will provide reasonable assistance in the transfer of responsibilities. Upon termination of the MoU, before the valid duration OR before the completion of the Project, the SECOND PARTY shall transfer the unutilized funds released to the FIRST PARTY.
- 7.5 That, the SECOND PARTY shall not be entitled to payment of any amount or by way of compensation for termination of the MoU for the causes mentioned under clause 5.2.
- 7.6 That, the SECOND PARTY shall submit full accounts of the Project in writing, taking into account all receipts and payments and commitments for the purpose of the Project and till the time of termination. OIL or its authorized representative may carry out an audit of the Project along with the expenditure of accounts.
- 7.7 That, the OIL shall reimburse funds to the SECOND PARTY to the meet approved or agreed expenses of the programme and commitments related to the said PROJECT up to date of termination (the relevant date).
- 7.8 That, In the event of excess disbursement to the SECOND PARTY, OIL shall have the right to demand and recover from the SECOND PARTY such excess disbursements and the SECOND PARTY would be liable to refund the excess disbursements within a period of 60 days of ascertainment of the final amount.

8.0 MISCELLANEOUS:

- 8.1 That, Nothing contained in this MoU shall be construed or have effect as constituting a relationship of employer and employee or principal and agent between the FIRST PARTY and the SECOND PARTY.
- 8.2 That, The SECOND PARTY shall be responsible for all acts and omissions of its staff and any person, association, institution engaged by the SECOND PARTY whether or not in the course of implementing the Project and for the health, safety and security of such persons or entities and their property.
- 8.3 That, The SECOND PARTY shall be exclusively liable for payment of any and all applicable taxes now in force or hereafter imposed, increased or modified in respect of any work done and/or materials supplied for the Project and for payment of all contributions and taxes in lieu of staff/ employee deployed by the SECOND PARTY and the execution agency/ contractor now and hereinafter imposed by any governmental authority and doth hereby indemnify and keep indemnified OIL from and against the same and all claims, actions, risks, losses, demands and payments whatsoever against OIL howsoever arising therefrom or in connection therewith.

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8.4 That, The SECOND PARTY shall comply with and ensure strict compliance by her/his/its agents of all applicable Central, State, Municipal and local laws and regulations and undertakes to indemnify The FIRST PARTY from and against all levies, damages, penalties, any payments whatsoever as may be imposed by reason of any breach or violation of any law, rule or regulation and against all actions, proceedings, claims and demands arising therefrom and/or relative thereto.

8.5 That, The SECOND PARTY shall be responsible for and shall ensure strict compliance by its employees, staff and agents of all laws, rules or regulations having the force of law affecting the relationship of employer and employee between the SECOND PARTY and their respective employees and/or otherwise concerning labour, social welfare and provident fund, pension, bonus, gratuity and other benefits to employees. The SECOND PARTY shall be responsible for compliance of safety measures as applicable at their own cost.

8.6 That, The SECOND PARTY will be fully responsible for ensuring that the Project shall be implemented in accordance with the relevant norms.

8.7 That, FIRST PARTY will not be responsible, either directly or indirectly, in any manner for any damage or negligence committed by the personnel engaged in the Project by the Second Party.

8.8 That, The SECOND PARTY shall keep in confidence proprietary information received from the FIRST PARTY along with the MoU and its various annexures as well as all the data/information generated, records collected/generated during the course of implementation of the Project and shall not disclose it to any third party, except their authorized agents or representatives unless such disclosure of use is specifically authorized in writing by the First Party. The SECOND PARTY shall not use proprietary information received from the FIRST PARTY for any purpose other than the objective and task agreed between the Parties.

8.9 That, Any change in official address / or e-mail address shall be intimated by both the Parties. The SECOND PARTY shall facilitate the visits of FIRST PARTY'S management or its representative/s to review implementation of the Project with prior information and keep the records in well maintained conditions.

8.10 That, In the event of any one or more of the provisions contained in this deed of MoU being waived, modified or altered, none of the other provisions hereof shall in any way be affected or impaired thereby. If any of the provisions of this deed of MoU become invalid, illegal or unenforceable in any respect under any applicable law, the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired.

9.0 AMENDMENT:

9.1 That, this MoU may be amended by the mutual consent of both the Parties and the SECOND PARTY shall implement/ perform the same in the **field**. The MoU shall be amended by written mutual consent of the parties to the MoU. The amendment

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Sh. K. Singh

shall be documented and allotted a distinctive number <Amendment> ; < Date> 473 and shall become binding on both the Parties from the date of MoU to such amendment unless otherwise agreed to.

10.0 GENERAL PROVISIONS:

- 10.1 **Notice:** That, Any notice required or permitted by this MoU shall be in writing and shall be properly **addressed** to each party at the addresses stated herein or to such other address as may be provided in writing by either party from time to time, shall be sent by any recognized commercial courier, or certified mail, postage prepaid, return receipt requested, and shall be concurrently sent by facsimile/email. Notice will be deemed effective when actually received by the other party.
- 10.2 **Assignment.** That, THE SECOND PARTY shall not transfer, assign, subcontract or delegate in whole or in part any of its rights or obligations under this deed of MoU without the prior written consent of the FIRST PARTY.
- 10.3 **Sole MoU:** That, This MoU including recitals sets forth the entire MOU and MoU of the parties relating to the scope of work mentioned in this deed of MoU and supersedes all prior and contemporaneous MOUs, negotiations and MOUs between the parties, both oral and written. No party shall be bound by any oral MOU or representation irrespective of by whom or when made. No change or modification to this MOU will be binding unless it is in writing and signed by an authorized representative of both parties.
- 10.4 **Severability.** That, In the event that any provision of the MoU is determined by a court of competent jurisdiction to be illegal, invalid or otherwise unenforceable under the applicable laws and/or regulations, either such provision shall be deemed amended to conform to such laws and/or regulations without materially altering the intention of the parties or shall be deleted and the parties agree to negotiate in good faith to replace such provision while the remainder of this MoU shall continue in full force and effect.
- 10.5 **Waiver:** That, Any waiver of any right or default hereunder shall be effective only in the instance given and shall not operate as or imply a waiver of any similar right or default on any other occasion. Any party may elect to continue to perform notwithstanding such breach by any other party, but such performance shall not constitute a waiver of such breach nor otherwise limit the non-breaching party's remedies. No waiver of any provision of this MoU shall be effective unless in writing and signed by the party against whom it is sought to be enforced.
- 10.6 **Indemnity:** That, THE SECOND PARTY agree to indemnify and keep indemnified and hold harmless, the FIRST PARTY and its directors, trustee, employees and representatives against all liabilities, demands and/or claims whatsoever, including claims for not being in compliance with the provisions of applicable laws, rules,

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regulations and guidelines, and also against any losses, damages or expenses suffered or incurred or that may be suffered or incurred by the FIRST PARTY or any reason whatsoever in relation to the CSR Project and post commissioning of its operation and maintenance, including legal cases. THE SECOND PARTY shall also indemnify the FIRST PARTY and its employees from any eventualities including but not limited to compensation out of loss, damage or unforeseen circumstances, etc. THE SECOND PARTY shall indemnify and keep indemnified the FIRST PARTY from any liability, financial or otherwise, that may arise from a third party as a result of the services covered under the scope.

Staff for implementation of the Project and for all activities related to operation or for any other activity shall be employed / engaged by THE SECOND PARTY and THE SECOND PARTY shall be solely responsible for any matter concerning their employment/engagement. THE SECOND PARTY shall keep OIL indemnified against any claims and legal expenses arising out of any employment dispute raised by those engaged in relation to the Project.

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10.7 **Evaluation:** That, OIL shall, at its sole discretion, undertake or cause to be undertaken, evaluation of the impact and cost effectiveness of the Project. Such evaluation shall be carried out during the tenure of the MoU. The SECOND PARTY shall, when required, give OIL or its representative reasonable cooperation and access to its records in connection with the MoU.

10.8 **Conflict of Interest:** That, Neither the SECOND PARTY, its personnel nor its agent shall engage in any personal business or professional activities, either during the course of or after the termination of this MoU, which conflict with or could potentially conflict with the object of the Project. Subject to above, the SECOND PARTY shall notify OIL immediately of any such conflict and suggest / take immediate remedial measures under information to OIL to ensure that the Project is completed as per the terms and conditions agreed upon.

10.9 **Confidentiality of Information and Secrecy:** That, The SECOND PARTY shall keep in confidence proprietary information received from the FIRST PARTY as well as information/records generated or collected during the course of implementation of the Project and after termination and shall not disclose it to any third party, unless such disclosure of use is specifically authorized in writing by the FIRST PARTY.

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11.0 FORCE MAJEURE

That, Neither Party shall be liable or responsible for any failure to perform or delay in performance of their respective obligations hereunder if such failure or delay is due or attributable to or arises out of any Force Majeure event, provided written notice of occurrence of any Force Majeure event is given by the affected Party to the other Party within a period of 72 hours of such occurrence and such notice includes reasonably satisfactory evidence of the Force Majeure event.

For the purposes of this MOU, a Force Majeure event shall mean an event that is unforeseen, unanticipated and not within the reasonable control of the Party, whose performance under this MOU is affected thereby and without prejudice to the generality of the foregoing, shall include the following events; i) Civil disturbance, ii) Breach of peace, iii) Declared or undeclared war, iv) Act of interference or action by military authorities, v) Terrorist acts, vi) Sabotage, vii) damage by the elements, viii) Riot or disorder, ix) Act of God (i.e. fire, frost, flood, earthquake, storm, lightning or epidemic); x) Quarantine xii) Change in law rendering the performance of a Party's obligations impossible (excluding any change in taxation laws). Xiii) Revocation of applicable government licenses acts or omissions of competent government authorities or its authorized security operatives (xiv) epidemic or pandemic.

12.0 GOVERNING LAW

This MoU shall be governed and construed in accordance with the Laws of India including without limitation, the relevant Central and State Acts and the rules, regulations and notifications issued and amended there under from time to time.

13.0 SETTLEMENT OF DISPUTES

That, If any dispute or difference of any kind whatsoever shall arise between the Parties in connection with or arising out of this MOU (and whether before or after the termination) Parties hereto shall promptly and in good faith negotiate with a view to its amicable resolution and settlement. In the event no amicable resolution or settlement is reached within a period of thirty (30) days from the date on which the dispute or difference arose, such dispute or difference shall be resolved through arbitration as per the procedure mentioned herein below. However, existence of any dispute or difference or the initiation or continuation of the arbitration proceedings shall not postpone or delay the performance by the Parties of their respective obligations pursuant to this MOU

- 13.1 The dispute or the difference shall be referred to a mutually acceptable sole Arbitrator to be appointed by the FIRST PARTY.
- 13.2 The Arbitration and Conciliation Act 1996 and The Arbitration and Conciliation (Amendment) Act 2015 or any statutory modification or re-enactment thereof or the rules made there under for the time being in force shall apply to the arbitration proceedings under this clause.
- 13.3 The seat of the arbitration shall be at Dibrugarh.
- 13.4 The proceedings shall be conducted in English language.
- 13.5 The cost of proceedings shall be equally borne by the parties, unless otherwise directed by the sole arbitrator.
- 13.6 The following shall not be referred to arbitration:

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S. J. B. B. B.

"Disputes having financial claims less than Rs.5 lakhs. These disputes shall be mutually resolved by the Management of the parties to the MoU"

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13.7 The outcome of the Arbitration shall be binding upon all parties involved.

14.0 The Courts of Dibrugarh, Assam shall have the sole and exclusive jurisdiction.

In witness thereof, the parties hereto have caused this Deed of MoU to be signed in their respective names:

For and behalf of OIL INDIA LTD	For and behalf of POLLUTION CONTROL BOARD, ASSAM
Name: Shri Pallab Barman	Name: Dr. Shantanu Kumar Dutta
Designation: Chief General Manager, FHQ Affairs	Designation: Member Secretary, Pollution Control Board, Assam
Signature: <i>Pallab Barman</i>	Signature: <i>Shantanu Kumar Dutta</i>
Date: 21/07/2022	Date: 21/7/2022
<small>PALLAB BARMAN CGM (FHQ Affairs) OIL INDIA LIMITED DULIAJAN</small>	<small>Member Secretary Pollution Control Board Assam, Guwahati-21</small>

In the presence of witnesses

Sarbeswar Basumatary
Name: SARBESWAR BASUMATARY
Address: CGM (HSE)
 Oil India Ltd.
 Duliagan

In the presence of witnesses

Bidhan Kumar Das
Name: BIDHAN KUMAR DAS
 Chief Env. Engineer
Address: PCB