

Environmental Impact Assessment
(EIA) Study

For

Exploratory Drilling of Hydrocarbon

In the – AMGURI Block : AA-ONN-2004/1

ASSAM

By

OIL INDIA LIMITED (OIL)
(A Government of India Enterprise)

EXECUTIVE SUMMARY

APRIL 2008

SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT
(EIA) STUDY

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1. **PROJECT DESCRIPTION**

- Ø In the VIth round of NELP Bidding the Block: AA-ONN-2004/1 has been awarded jointly to M/s. Oil India Limited (PI-85%) and M/s. Shiv-Vani Oil & Gas Exploration Services Limited (PI-15%) by Government of India (GOI) and a Production Sharing Contract (PSC) has been signed. Further, Assam Hydrocarbon & Energy Company Limited (AHECL), Govt. of Assam, has entered into an agreement with OIL for 10% PI in the block.
- Ø The block area of AA-ONN-2004/1 is 144 sq. km. and has the following coordinates.

POINTS	LATITUDE (N)	LONGITUDE (E)
A	26°56'16.29"	94°26'49.25"
B	26°59'56.46"	94°30'18.10"
C	27°00'00.00"	94°34'11.16"
D	26°59'13.36"	94°34'59.74"
E	26°58'25.00"	94°31'10.10"
F	26°56'10.00"	94°31'12.50"
G	26°56'19.17"	94°37'25.48"
H	26°54'18.48"	94°36'22.45"
I	26°54'53.18"	94°35'18.18"
J	26°52'30.00"	94°33'42.72"
K	26°51'45.94"	94°35'02.78"
L	26°50'51.65"	94°34'34.43"
M	26°49'46.23"	94°33'51.66"
N	26°49'24.15"	94°33'42.75"
O	26°49'13.63"	94°32'52.72"
P	26°50'51.81"	94°31'30.90"
Q	26°51'20.45"	94°32'57.27"
R	26°52'05.45"	94°30'59.09"
S	26°50'10.90"	94°29'37.27"
T	26°50'01.77"	94°29'23.61"
A	26°56'16.29"	94°26'49.25"

- Ø OIL is the Operator of the onshore block AA-ONN-2004/1 located in Sibsagar & Jorhat districts of Assam for exploration and production of hydrocarbons.
- Ø The prognosticated Geological reserves are estimated to be - Original Oil in Place (OOIP) - 34 MMT (approx) and Gross Ultimate Recovery (GUR) -10.2 MMT (approx).
- Ø As per Minimum Work Programme (MWP) the PSC envisages completion of Exploratory Drilling and Testing of 4 wells during next 6 years in addition to various Geophysical & Geological surveys and studies.
- Ø All the four Exploratory Drilling wells at Locations AMG-1, AMG-2 and AMG-3 & AMG-4 are expected to be vertical with a target depth of about 4200 M.
- Ø Exploratory drilling and testing of each well will require nearly 120 days. Sequential drilling of about six (6) wells is planned by OIL.
- Ø In order to meet the requirements of PSC, OIL is required to carry out an Environmental Impact Assessment (EIA) study in the block and adjoining area to establish present baseline environmental scenario and the likely impact on the same as a result of proposed exploratory drilling and testing of 4(four) wells.

- Ø OIL appointed M/s Envirotech Consultants Pvt. Ltd., New Delhi, to carry out EIA study in the block and adjoining area prior to exploratory drilling and testing of 6(six)wells.
- Ø EIA report has been prepared using primary baseline data collected at the site for nearly 5 weeks in winter season (January 12 to February 19, 2008) and secondary data collected from various sources in public domain as well as the project information provided by OIL.
- Ø Conventional rotary drilling rig and associated system will be used for drilling of 6(six) exploratory wells and Water Based Mud (WBM) will be used as drilling fluid which is intrinsically safe and causes minimum environmental disturbances. Facilities for production testing will be created within each exploratory well site.

2. PROJECT BENEFITS:

- Ø Commercially viable, discovery of Oil/Gas, from the block will result in additional revenue generation for State of Assam and Central Government and will enhance energy security of the country. It will also generate some temporary employment potential and lead to infrastructure development of the block area. Industrialization & business opportunity is also likely to increase.

3. BASELINE ENVIRONMENTAL CONDITIONS

Physiography and Topography:

- Ø The block area is a flat plain with paddy fields and thinly populated villages and does not have Forest land, National park, Wild life sanctuary or Eco sensitive area.

Soils:

- Ø Area has mostly deep loamy to sandy loam alluvium derived soils having good water holding capacity with moderate fertility and suitable for cultivation of paddy, maize, etc.

Water Resources and Water Quality

- Ø Surface water is a perennial source of fresh water supply for domestic use and also for supply as tap water in the study area. Dikhow and Jhanji rivers along with their tributaries flow through the block area. Water from well, handpump and tubewell is also used for drinking and domestic purpose.
- Ø The monitored water quality indicates that surface water (river and pond) and ground water (handpump and tubewell) meet desirable limits for potable water and is fit for drinking.

Climatology and Meteorology:

- Ø Sibsagar meteorology observatory is the closest IMD station located at about 5.5 km in NNE direction from eastern boundary of the block.
- Ø August is the hottest month and January is the coldest month with monthly mean maximum and minimum daily temperatures of nearly 32.0 and 25.4⁰C, and 23.0 and 10.2⁰C, respectively.
- Ø Mean relative humidity is highest in August and lowest in April.

- Ø Average annual rainfall is 2323.5 mm. July month alone accounts for nearly 19.8% and November to January months together account for only 3.0% of annual rainfall at Sibsagar.
- Ø The prevailing winds at 8:30 and 17:30 hours generally blow from N-NE sector towards S-SW sector throughout the year.
- Ø Annual average wind speed is 3.8 kmph with April and July having the highest mean wind speed of 5.4 kmph and December having the lowest mean wind speed of 1.7 kmph.
- Ø Meteorological measurements were carried out at Sibsagar during winter season (January to February, 2008).

Ambient Air Quality:

- Ø National ambient air quality standards for residential rural and other area are always met for SO₂ and NO_x at all eight locations but these standards for SPM and RPM are always met only at one location and not at other 7 locations.

Noise:

- Ø Ambient noise L_{day} values varied in a range of 50.6 to 60.5 dB(A) and L_{night} values varied in a range of 37.6 to 48.8 dB(A).

Land Use:

- Ø Land use distribution as per Census 2001 for the block area villages is as follows: forest area = Nil, culturable area = 78.29%, culturable waste area = 9.74% and area not available for cultivation = 11.97%. Irrigated area is only 0.47% of culturable area.

Terrestrial Flora:

- Ø Hot sub-humid (moist) to humid climate with moderate to heavy rainfall supports all types of vegetation in the study area. But since the area is a flat plain, it is used for cultivation and there is no forest area.

Terrestrial fauna:

- Ø Absence of forest area does not support any wildlife.

Demographic and Socio-Economic:

- Ø As per Census 2001, the block area has 59 villages with a total population of 66842 corresponding to a population density of 465 persons/km², sex ratio of 948 and literacy rate of 76.35%.
- Ø The study area has 21.31% main workers out of which 36.21% are cultivators, 2.22% are agricultural labourers, 3.81% are household industry workers and rest 57.76% are other workers.
- Ø Out of 59 villages in the block area, 56 villages have one or more primary schools, all villages have drinking water facility, 46 villages have pucca approach road, 54 villages have power supply, 35 villages have bus facility and 22 villages have some medical facilities as per 2001 Census.

- ∅ There is very little industrial or commercial activity in the study area.

4. **ENVIRONMENTAL IMPACT ASSESSMENT**

Topography and Physiography:

- ∅ Exploratory drilling and testing of 6 wells for oil and gas will have no impact on topography and physiography of the area.

Soils:

- ∅ There will be no impact on soils of the area except for the collection of rock cuttings, bentonite clay and other non-toxic ingredients of wasted WBM in HDPE lined effluents pits due to drilling of 6 wells.

Water Resources and Quality:

- ∅ Dikhow and Jhanji are perennial rivers in the block and majestic Brahmaputra river flows just north-west of the block area. There is no shortage of water in the area due to good rainfall. Water requirement of nearly 40 m³/d to meet drilling operations and 10 m³/d during testing operation at each well for a limited period will be easily met by available ground water supply sources. There will be no impact on the availability of water for competitive users in the villages of the study area.
- ∅ The construction of HDPE lined shallow effluents pits will ensure that there is no adverse impact on ground water or surface water quality of the block area.

Ambient Air Quality:

- ∅ Discharge of exhaust gas emissions from DG sets of diesel powered drilling rig used for electric supply at drilling site and due to ground flaring of gaseous hydrocarbons produced during exploratory testing for 3 to 4 days at each of 6 wells using a properly designed flare pit will ensure that the impact of gaseous pollutants in exhaust emissions is insignificant in surrounding area.
- ∅ Dust generated due to vehicular movement on unpaved roads will settle quickly and will not cause any dust problem in the area.

Noise:

- ∅ Selection of equipments and their proper maintenance will ensure that the noise levels at the boundary of well site operational area does not exceed 75 dB(A) during exploratory drilling and testing of 6 wells and this will ensure that there is insignificant impact of drilling on noise levels during day- and night-time in the surrounding village areas.

Land Use:

- ∅ There will be no impact on land use of the area because total land requirement for each drilling location for drilling & testing operations, effluent pit, campsite, etc. is expected to be only about 2.94 hectares(22 bighas/29,400sq m) within the block area.

Terrestrial Flora and Fauna:

- ∅ There will not be any perceptible adverse impact on the terrestrial flora and fauna of the area due to exploratory drilling and testing activities.

Demographic and Socio-Economic:

- ∅ The demography of the area will not be affected by temporary presence of nearly 30 to 50 persons during drilling and testing operations for about 24 months in the block area for exploratory drilling of 6 wells.
- ∅ No adverse impact can be expected on socio-economic conditions of the area during exploratory drilling and testing operations. Slight beneficial impact on job opportunity may be expected because some local persons may get temporary employment as unskilled or semi-skilled workers during the drilling phase.

Conclusions:

- ∅ The impact due to exploratory drilling and testing of 6 wells on various attributes of environment is summarized below:

Environmental Attribute/ Project Activity	Impact
Proposed access cutting	May not be applicable.
Clearing and timber salvage	May not be applicable.
Wild life and habitat protection	Not applicable.
National park	Not applicable
Eco sensitive area	Not applicable
Fuel storage and handling	Insignificant impact
Camps and staging	Temporary, bunk house type, camp facilities will be used for drilling operations.
Liquid and solid waste disposal	Insignificant temporary localized impact
Cultural and archaeological sites	Not applicable
Selection of drilling sites	4 exploratory well sites are already selected and 2 more are yet to be selected.
Terrain stabilization	Not applicable
Protection of fresh water horizons	Drilling effluents will be stored in HDPE lined shallow pits and well casing will protect deeper fresh water horizons.
Blowout prevention plan	Necessary care will be taken during drilling and blowout preventors will be installed at well mouth for any emergency
Flaring during completion and production testing	Separated gases will be flared in suitably designed flare pit/equipment to minimize adverse impact.
Abandonment of wells	Will be applicable only if commercial production of oil/gas is unviable from any of the exploratory/appraisal wells.
Rig dismantling and site completion	Insignificant localized impact in 5 m x 5 m of cellar pit area of drilling rig
Reclamation for abandonment	Not applicable at present
Noise control	Necessary measures will be in use as per OISD & OM Regulations.
Debris disposal	Insignificant localized impact
Protection of natural drainage and water flow	Natural drainage will be protected

5. **ENVIRONMENT MONITORING PROGRAMME**

Pollution Sources:

- Ø Use of WBM for drilling is very eco-friendly and will cause minimum environmental disturbances due to drilling discharges and discharge of used/wasted WBM.
- Ø Major liquid effluents during exploratory drilling and testing will be drilling discharges, drainage discharges, used/wasted WBM, recovered formation water (if any) and domestic waste water.
- Ø Drilling discharges will have cuttings of sandstone, shale, etc. Wasted WBM will have bentonite clay, barite, calcium carbonate and other nontoxic ingredients.
- Ø Liquid effluents from effluent pits before discharge, if required, will be treated to meet on-shore discharge limits. However, such a situation is not envisaged.
- Ø Gaseous emissions will be primarily exhaust gases produced from diesel driven power generators for drilling rig operation and for other uses as well as diesel driven vehicles. These exhaust emissions will primarily contain SO₂, NO_x, CO, unburnt hydrocarbons and soot. Dust will also be generated from vehicular movement on unpaved roads in the block area.
- Ø Formation fluids produced from the exploratory wells will be tested at site for 3 to 4 days to establish the hydrocarbons production potential.

Pollution Control:

- Ø Liquid effluents will be stored in HDPE lined shallow pits constructed within the exploratory drilling location to prevent contamination of ground aquifers.
- Ø On well completion, effluents pits will be filled with drill cuttings and solid debris, covered with HDPE sheet and thick layer of soil to form a small mound with proper slope for rain water drainage.
- Ø Oil containing drill cuttings, if any, will be centrifuged and, if necessary, bioremediated to reduce oil content to less than 1% before disposing in HDPE lined drill cutting disposal pit.
- Ø Organic solid wastes including sewage and food leftovers generated at temporary camp facilities at the exploratory well site will be disposed off as per approved procedure.
- Ø Exhaust gases from various power generators will be discharged from stacks of appropriate heights for dispersion in a wider area by atmospheric dispersion process and will result in extremely low incremental ground level concentrations of pollutants in nearby area only.
- Ø Formation water (if any) produced with oil during exploratory production testing of oil/gas will be treated in the nearest formation water clarification system and treated effluents meeting the on-shore discharge standards will be discharged underground in water disposal wells at a controlled rate, if necessary. Associated gas will be flared as per approved procedure.
- Ø Plastic and other hazardous wastes, such as, spent batteries, waste oil, etc. will be disposed off at Duliajan base camp as per approved safe procedure.

6. RISK ANALYSIS AND DISASTER MANAGEMENT PLAN

- Ø Occurrence of blowout is the major hazard during drilling but trained technical personnel will take all necessary precautions during operations and Blowout Preventors (BOPs) will be installed at well mouth for any emergency.
- Ø Since only sweet oil and gas is expected in the block area, hazard due to occurrence of H₂S is not likely.
- Ø Adequate fire fighting facilities including portable extinguishers will be deployed and suitable personal protective equipments including breathing masks will be available at the drilling site.
- Ø Doctor (MBBS) will be posted at drilling site and a 24 hour standby vehicle (ambulance) will also be available at the site for transport of seriously ill/injured persons to nearest hospital if required.
- Ø Quantitative risk assessment indicates that three phase separator during exploratory well testing and HSD storage tanks will have **light fire and explosion hazard potential** and **low toxicity hazard potential**.
- Ø On-site disaster management plan is suggested for quick and efficient emergency handling even though OIL already has well formulated on-site and off-site emergency plans.

7. ENVIRONMENTAL MANAGEMENT PLAN

- Ø Use of water based mud (WBM) is very eco-friendly as a drilling fluid and does not require any elaborate environmental management plan. Production testing for oil and gas at 6 exploratory wells will also not require any specific management plan.
- Ø Effluents pits will be shallow and HDPE lined to avoid contamination of ground aquifers.
- Ø Oily drill cuttings, if any, will be centrifuged and, if necessary, bioremediated to reduce oil content to less than 1% before storage in HDPE lined drill cutting disposal pit.
- Ø Cutting of some trees, if considered necessary, should be minimized as far as possible for exploratory drilling operational area and for making-passage for the movement of heavy vehicles.
- Ø Personal protective equipments for dust and noise should be used whenever required.
- Ø Efforts should be made by OIL and its contractors to employ local persons for unskilled and semi-skilled jobs and support activities.
- Ø An appropriate environmental monitoring programme during drilling and testing of wells is recommended.

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