Executive summary

For

EIA Study for drilling of 29 exploratory wells in 10 ML blocks

Mehsana and Patan Districts
1.1 About ONGC

Founded on August 14, 1956, Oil and Natural Gas Corporation Limited (ONGC) is the largest Indian public sector company. It is also the second largest Indian company in terms of net profit and the third largest Indian company by market capitalization. It has been ranked at 449th position as per Fortune Global 500 - 2015 list, based on revenues. ONGC has been conferred the Maharatna status by the Central Government.

ONGC is engaged in hydrocarbon exploration and production activities. Major functions of ONGC are to plan, promote, organize and implement programs for development of petroleum resources and the production and sale of petroleum and its products. It is involved in exploring and exploiting hydrocarbons in about 26 sedimentary basins of India. ONGC produces crude oil which is 80% of India's crude oil production. It owns and operates more than 11,000 kilometers of pipelines in India. The most important contribution of ONGC, however, is its self-reliance and development of core competence in exploration and production activities at a globally competitive level.

1.2 About Proposed Project

As per the minimum work programme, total 29 numbers of exploratory wells are to be drilled in 10 ML blocks after 2D and 3D seismic data acquisition processing and interpretation. Targeted depths of proposed exploratory wells shall be up to 3000M.

The 10 ML Blocks are with ONGC since 1965 with 100% operatorship. In support of the long term hydrocarbon exploration program, ONGC proposed to drill exploratory wells in these ML Blocks in deeper prospects. Blocks are located in Bechraji and Mehsana taluka of Mehsana district and Chanasma taluka of Patan District.

1.3 Project Chronology till date

- As part of its EC process, M/s. ONGC had submitted relevant documents, namely Form-1 (as per the EIA Notification 2006, amended till date) along with a Pre-feasibility Report and proposed Terms of References (ToR) for carrying out environmental studies, to the Expert Appraisal Committee (Industry-2) MoEF, vide proposal dated 29th January 2016.
- ToR was prescribed vide its letter F. No. J-11011/45/2016-IA II (I) dated 26/04/2016.
- M/s. Kadam Environmental Consultants (a National Accreditation Board for Education and Training (NABET) Accredited Consultant Organization (ACO) and is qualified to prepare EIA reports for Project / Activity 1(b) (Onshore Oil and Gas Exploration, Development and Production only) undertook the study during the post monsoon season 2016, in accordance with the ToR issued by MoEF & CC and presented the preliminary study findings in its draft report released for the purpose of public consultation as per the EIA Notification 2006 and compliance to the condition of issued TOR.

1.4 Proposed Project

1.4.1 Location of the Project

Location details of 10 ML block of ONGC are as follow:

Taluka: Bechraji, Mehsana and Chanasma
District: Mehsana and Patan, State: Gujarat
1.4.2 The Drilling Process

ONGC proposes to drill well(s) 29 of exploratory in nature in the 10 ML blocks. The tentative well locations have been finalized based on the results of the various geological and engineering studies carried out.

Drilling operations will be conducted round-the-clock. The time taken to drill a borehole depends on the depth of the hydrocarbon bearing formation and the geological conditions. ONGC intends to drill wells to depths up to 3000 m. This would take around 30 – 45 days for each well.

Where a hydrocarbon formation is found, initial well tests- possibly lasting more than one month (if tested by work over rig, which is similar to a drilling rig) are conducted to establish flow rate of oil & gas and formation pressure along with other reservoir parameters. These tests may then generate oil, gas and formation water. This mode of drilling would also reduce the land used or “foot print”. On completion of testing the well would be declared oil / gas producer or dry.

In the event that economic quantities of hydrocarbons are found, the well will be completed with a well head in place at surface along with x-mass tree and casing & tubing inside the hole down to the desired reservoir depth, but all the other equipment and materials will be removed from the site.

In the event that no economic quantities of hydrocarbons are found, the site would be restored to its original form (as far as possible) and the well abandoned, following standard industry practices.

1.4.3 Workforce Arrangements

No workers camp will be required during drilling of wells. During the drilling operations, about 30 to 40 persons may be working in 8 hour shifts at site. Workers will be able to return to their homes at night and hence no camping will be required at or near the well site. Once drilling is over no person is required at site, except security cover through a contractor.

1.4.4 Power Requirements

During drilling operations, diesel engines shall be utilized as prime movers for meeting the power required to run the drilling rig, circulation system etc. A power generator shall also be installed for lighting. The capacity of the diesel engines that shall be used for operating the rig and the circulation system is expected to be of 1240 HP (3 Nos, two running and one standby), which will run on High Speed Diesel. This generator shall consume approximately 2.5 to 3.0 KL of fuel per day, when in operation.

1.4.5 Water Requirement

The most significant requirement of water for drilling activities is for mud preparation. The other requirement would be for drill cutting washing, general wasing of Rig, cooling, and domestic. The water shall be made available through water tanker from nearest ONGC installation.

1.4.6 Waste Water Generation

The drilling operation would generate wastewater in the form of wash water due to washing of equipment, string and cuttings etc. The only other source of wastewater generated from drilling operation is sewage from sanitation facilities, around 1.0 m$^3$/day, which shall be disposed through septic tanks/soak pits. It is expected that wastewater in the form of mud preparation processing, drill cutting washing + Rig washing+ cooling etc shall be generated at an average rate of around 4 m$^3$/day during the drilling operations from a single well. Waste water will be discharged in HDPE lined evaporation pit for disposal, size of the pit is generally 100mx30mx1.5m.
The wash water would contain variable quantities of mineral salts, solids, suspended and dissolved hydrocarbons, and other organic and inorganic components in very minor quantities.

1.4.7 Air Emissions

The emissions to the atmosphere from the drilling operations shall be from the diesel engines, and power generator and temporary from flaring activity (during testing).

1.4.8 Noise Generation

The source of noise generation during this phase of operations would be the operation of rig and diesel-generator sets. The expected noise generation at source, due to operation of rig is 101 dBA (Source: "Control of Noise Pollution from Diesel Generator sets", Programme Objective Series; PROBES/71/1998-99, Central Pollution Control Board). Besides, certain pumps are expected to be in operation during this phase, for mud circulation. The noise generation work however is transient and limited to the drilling period only.

1.4.9 Waste Management

- 150-200 MT / well of drill cuttings shall be generated at site per well during drilling operations. This shall be stored in well-designed HDPE line pit.
- Used /waste Oil – During the drilling approx. 200 litres of spent oil shall be generated per well. This oil shall be sent to authorized recyclers.
- Domestic waste of 1-2 kg/day per well shall be generated at site, which shall be segregated at source (Organic / Inorganic) and disposed accordingly.

1.4.10 Safety and Environment

Adequate safety measures such as fire-fighting equipment shall be provided at the site in accordance with the norms of OISD 189. A high-pressure influx of formation fluids (water and/or gas) into the well bore is commonly known as a 'kick'. Well control is aimed at preventing the kick and a possible blowout. Well control can be conveniently sub-divided into two main categories, namely primary well control and secondary well control.

1.4.11 Abandonment of Operations

At the conclusion of the drilling program at each drilling site, an orderly withdrawal of all personnel and the removal of all drilling and testing equipment and non-fixed items from the drilling site will be undertaken.

Broadly, there are two such scenarios:

- In case that the well is completed when economic quantities of hydrocarbons are found, the well will be left with a wellhead in place, but all other drilling equipment and materials will be removed from the site. The well site will be fenced and will be reduced to 30m X 30 m for the production phase and all non-essential area will be fully reclaimed as per site restoration policy of ONGC dated 02.12.2015
- In any other case the site will be cleared and refurbished to permit recovery to as near as possible the pre-existing local environment as per site restoration policy of ONGC dated 02.12.2015

1.5 Description of the Environment

Baseline environmental studies were carried out during post monsoon season 2016.
1.5.1 Study Area

The study area is defined as area within a radius of 10 km covering blocks.

1.5.2 Landuse of the Study Area

A recent satellite image for the study area was collected using Google Earth Pro-version 7.1.5.1557. The image was interpreted through manual supervised classification based on National Remote Sensing Agency (NRSA) classifications. Ground truthing was done to confirm and edit the interpreted landuse / land cover classes.

For Study Area the main landuse / landcover class in the area is Agricultural Land, with a ~80.17% component of the total landuse. Vegetation Cover comes next with ~12.07% followed by Built up land / habitation, Waste Land, Water bodies.

1.5.3 Climatology

The climate of this region is characterized by a hot summer and general dryness except in the southwest monsoon season. The year may be divided into four seasons. The cold season from December to February is followed by the hot season from March to middle of June. The period from middle of June to September is the southwest monsoon season. October and November constitute the post-monsoon or retreating monsoon season.

- Meteorological data shows that mean average wind speed during study period are 1.5 m/s.
- During study period wind blows mostly from NE direction.
- Mean average temperature recorded during study period was 24.7°C with mean maximum temperature of 32.0°C and mean minimum of 18.8°C.
- The mean average relative humidity recorded was 56.8% with mean maximum humidity of 75.0% and mean minimum of 32.7%.

1.5.4 Ambient Air

Ambient air quality monitoring was carried out during post monsoon season 2016. The ambient air quality monitoring stations were set up at 10 different locations.

- The average concentration of PM10 recorded at 10 locations ranged from 70.8 µg/m³ (Chadasana village) to 80 µg/m³ (Maguna Village). All these values are exceeds the specified limit of PM10 given by CPCB (100 µg/m³).
- The average concentration of PM2.5 recorded at 10 locations ranged from 30.4 µg/m³ (Santhal village) to 33.9 µg/m³ (Chadasana Village). All these values are within the specified limit of PM2.5 given by CPCB (60 µg/m³).
- The average concentration of SO₂ recorded at 10 locations ranged from 12.1 (Sametra Village) to 15.9 µg/m³ (Maguna Village). All these values are within the specified limit of CPCB (80 µg/m³).
- The average concentration of NOX recorded at 10 locations ranged from 16.1 µg/m³ (Ganget Village) to 24.1 µg/m³ (Mehsana). All these values are within the specified limit of CPCB (80 µg/m³).
- The average concentration of HC recorded at 10 locations ranged from 1051.1 µg/m³ (Ganget Village) to 1150 µg/m³ (Chadasana Village).
- The average concentration of NMHC recorded at 10 locations ranged from 21.5 µg/m³ (Geratpur Village) to 11.0 µg/m³ (Ganget Village).
- The average concentration of VOC recorded at 10 locations is all below 1 ppm.
1.5.5 Noise

Noise levels were recorded at 21 different locations within the study area.

- Noise level during daytime, in Residential area was observed in the range of 54.6 dBA to 56.7 dBA during daytime which is slightly higher than CPCB standards residential area (55 dBA (d)) and higher noise levels at some of the monitoring locations is attributed to vehicular movements.
- Noise level during Nighttime, in Residential area was observed in the range of 44.8 dBA to 47.9 dBA, which is slightly higher than the CPCB standards i.e. residential area 45 dBA (n)).

1.5.6 Soil

Soil samples were collected from 12 different locations within the study area.

Assessment soil physical properties revealed that porosity ranged from 41 to 57 % and WHC (water holding capacity) varied from 27.5 to 49.8 %, while soil permeability ranged from 16 to 62.3 mm/hr. Moderate to high permeability is on account of sandy loam to loam/sandy clay loam texture.

The soil EC (electrical conductivity) varied from 0.107 to 12.90 dS/m, indicating low (<0.8 dS/m) to very high (>2.0 dS/m) salinity level of soils. The ESP (exchangeable sodium percentage) also varied from <0.1 to 2.28, however, it was within the prescribed limit of <5. The high EC could be on account using underground saline water. The soil pH varied from 7.16 to 8.55, which indicates that though soils are of lighter texture there is gradual accumulation of sodium and soils are normal (pH <8.2) to alkaline (pH >8.2). This has been reflected in exchangeable cations wherein predominance of sodium (0.31 – 1.51) is seen followed by Mg (0.18 – 0.58), Ca (0.22 – 0.48) and K (0.02 - 0.25).

1.5.7 Surface Water Quality

The analysis results of surface water samples (12 locations) were compared with Inland Surface Water (CPCB) Standards. It is observed from the analysis report of surface water samples that:

Based on the analyzed parameters, it can be concluded that above surface water is not fit for drinking purposes unless it is treated and disinfected.

1.5.8 Ground Water Quality

Ground water samples were collected from 12 different locations within the study area and analysed for parameters mentioned in the Indian Standard IS 10500:2012.

- The groundwater is bicarbonate-chloride type with TDS up to 3000 mg/l.
- The ground Water quality in the deeper aquifers (within about 300m depth) which may also be called user confined aquifer is generally fresh (TDS < 2000 mg/l) and is good for drinking as well as Irrigation purpose

1.5.9 Biological Environment

Biodiversity survey of the project site (core zone) and 1 km surroundings and surrounding environ of up to 10 km (buffer zone) was carried out to understand floral and faunal status of the study area. Secondary data from other EIA reports on biodiversity status have been extracted and efforts have been made to verify same by visiting various habitats and secondary sources like local people interactions.

Project site and 1 km surroundings zone encompasses six species of common shrubs, herb and grasses. Though the proposed development is situated either in agriculture land or waste land, a site is having
moderate dense vegetation and common floral species from ecological point of view. So only existing floral and faunal species at project site and surrounding 1 km were enlisted/inventoried. Buffer zone was roamed covering various habitats to inventorize floral and faunal components.

Project site and 1 km surroundings zone and buffer zone, the dominant land use pattern of this region was predominated by agricultural fields. Natural habitats has confined to very limited area. Many small water bodies like Gram talav and sub canal of Narmada channel were observed in the study area. There is no Wildlife Sanctuary, Biosphere Reserve, Tiger / Elephant Reserve, Migratory Corridors, breeding sites, nesting sites / grounds, foraging & resting grounds within 10 km radius of proposed project site. 

The trees are dominated by Salvadora persica, Salvadora olivoides, Azadirachta indica, Butea monosperma, Acacia nilotica, Pithecellobium dulce. Shrubs are the dominant perennials of this area, represented mainly by, Prosopis juliflora, Lowsonia internis, Dichorostachys cinera, Mimosa hamata, Calotropis procera, Calotropis gigantea, , Lantana camara, Zizyphus nummularia, Cassia auriculata, Ipomoea fistulosa, Euphorbia nivulia Capparis decidua etc. There is no rare and endangered plant species observed in the study area

Among bird species like Common Hoopoe, Green bee-eater, Blue-tailed bee-eater, Cattle Egret, Intermediate Egret, Little Egret, Indian Cormorant, Black-winged Stilt, Red-wattled Lapwing, Red-naped Ibis, Black-headed Ibis Spotted dove, Asian koel, Asian paradise-flycatcher, White-browed wagtail, Indian Robin, flamingos, coot, spot-billed duck been sighted at proposed study area (within 1 km peripheral of 29 wells)

Among the reptiles, Indian Cobra (Naja naja), Checkered Keelback Water Snake (Xenochrophis piscator) and Common rat snake (Ptyas mucosus) were provided protection as per Schedule-II of Wild life protection act, (1972)

Among mammals; Langur, (Semnopithecus entellus) is Schedule II animal, Nilgai (Boselaphus tragocamelus) and Wild Boars (Sus scrofa) are a schedule –III animals of Wild Life Protection act 1972.

During aquatic survey Five (5) species of phytoplankton under the order of Bacillariophyceae (Navicula sp., Cyclotella sp.,); Myxophyceae (Anabaena sp. and Nostoc. Sp.), Chlorophyceae (Microspora sp.) were identified. Six (6) species of zooplankton under the orders of Cladocera (Daphnia sp., and Moina sp.), Copepods (Cyclops sp., and Nauplius sp.), Rotifers (Diaptomus sp.,), Euglenales (Euglena sp.) were identified in the aquatic habitats. The Phytoplanktons are dominated by diatoms like Navicula sp. followed by Anabaena sp. and Nostoc sp. and Zooplanktons are dominated by Rotifers (Diaptomus sp.).

Regarding benthos fresh water mussels been observed and no other molluscs species been found in entire study area. Invertebrate worms are quite dominant which might supports the presence of large numbers of aquatic birds.

1.5.10 Socio economic Profile

The block area falls in Mehsana and Patan Districts, the block area consists of 36 villages and outside the block area consists of 260 villages. According to the Census of India 2011, the total study area depicted 181,637 households and total population of 863,984.

- Literacy rate in the study are for male is about 56.72% and for female 43.28%.
- Sex ratio in the study area is 921 per 1000 male as per 2011 census.
- As per Census 2011 average SC & ST polulation of study area is 8.65% and 6.2% respectively.
- As per Census data of 2011, total working population is 39.45%average 8.21% are cultivator, 9.84% agricultural, 0.35% household, 15.49% are others and 5.56% are marginal worker.
1.6 Anticipated Environmental Impact Identification, Prediction and Mitigation

1.6.1 Ambient Air

A number of sources are there to cause potential impacts on air quality, which are as follows:

- Emissions from DG sets used as part of the drilling rig;
- Flaring of gases primarily during the testing phase will contribute to additional air pollution;
- Fugitive emissions during site preparation and closure phases;
- Emissions from vehicular movement;

Impacts of emissions from DG sets on the GLC at various distances were predicted using the dispersion modeling guidelines given by the Central Pollution Control Board, New Delhi and the AERMOD of the United States Environment Protection Agency (USEPA) based on type of fuel (HSD), Fuel consumption rate and operating conditions.

The maximum 24 hourly GLC’s are observed to be 0.233 µg/m³, 5.13 µg/m³ and 0.233 µg/m³ for SO2, NOx and particulate matter respectively. These GLC’s are expected to occur at a distance of 100 m from the source towards the South West direction.

The predicted impact level due to the operation of DG set is within the limit prescribed in National Ambient Air Quality Standards.

The mitigation measures for air quality impacts are:

- Technical flaring shall be restricted to process upsets only;
- Water spraying will be done on the access roads to control re-entrained dust during dry season (if required);
- The engines and exhaust systems of all vehicles and equipment used will be maintained as such, that exhaust emissions are low and do not breach statutory limits set for the concerned vehicle/equipment type;
- D.G set & fire engine shall be properly maintained;
- Ensuring the availability of valid Pollution Under Control Certificates (PUCC) for all vehicles used on site.

1.6.2 Noise Environment

The proposed drilling operations and related activities will lead to emission of noise that may have significant impact on the surrounding communities in terms of increase in noise levels and associated disturbances, but it shall be transient in nature.

Following activities would result in increase in noise level

- Noise from rig and associated machinery
- Noise from vehicular movement
- Noise from DG sets

Mitigation measures for noise will include the following:

- Temporary sound reflective barriers to be kept surrounding the drilling site of the project
- The minimum height of the barriers should be 2.5 m and with 15 dB shadow zone transmission loss rating
- Sufficient engineering control during installation of equipments and machineries (like mufflers in DG sets) is to be ensured to reduce noise levels at source;
- Proper and timely maintenance of machineries and preventive maintenance of vehicles is to be adopted to reduce noise levels;
- Personnel Protective Equipments (PPE) like ear plugs/muffs is to be given to all the workers working in the vicinity of the equipment/machinery with SPL higher than 85 dB at site

1.6.3 Surface Water /Ground water

Quantity
Drilling operations require the use of water for domestic requirements as well as for operations, but the use will be of temporary nature and limited to a few days (30 - 45 days) for each well (30 m³ per day per well). Water will be sourced from through tanker water supply. Hence these impacts are not significant.

Quality
Wastewater discharged from the drilling/other operations shall be collected in HDPE lined pit for evaporation. Domestic waste water will be disposed off in soak pit.

Following mitigation measures will be implemented for water pollution control:

- Proper treatment of discharged wastewater will be made by disposing waste water in an impervious HDPE lined pit for evaporation;
- The domestic waste water will be discharged into the soak pits;
- All chemical and fuel storage areas will have proper bunds so that contaminated run-off cannot meet the storm-water drainage system;
- ONGC will ensure proper spill control at site
- ONGC will use best engineering technique during drilling operation and also during the cementing job and installation of casing so that drilling mud does not contaminate the ground water

1.6.4 Land
Impact on land environment, due to site preparation shall be loss of vegetation or change in land use from agriculture land use/other land use to industrial land use for a parcel of land of 110 m X 110 m. For 29 wells, considering an area of 1.21 ha (110 x 110 m) per operation well, a total land take of up-to 35 ha (~0.35 km²) can be expected at the maximum. The drilling activities will require leasing of land for which voluntary land acquisition will be carried out, based on mutually agreed terms and conditions

In case of discovery of commercial quantity of hydrocarbon an area of 30 m X 30m shall be retained and rest shall be restored to its original condition. In other case full area shall be restored and returned to the owner.

Mitigation measures
- Necessary efforts will be made during selection of drill site to minimize disruption of current land use to the extent possible;
- Necessary restoration efforts will be made during decommissioning and site closure to restore the site back to its original condition to the extent possible;
- Proper restoration of site will be carried out to bring the physical terrain, soils and vegetation, as closely possible to their original condition allowing growth of crop
1.6.5 Soil
During site preparation the topsoil will be removed from the drilling site and the approach road, which contains most of the nutrients and organisms that give soil productivity. This will in turn result in minor changes of topsoil structure.

Soil quality may be affected by setting up of rig and associated machinery and will continue till the site is restored to its original condition.

Contamination of soil can result from the project activities if certain operations like storage of chemicals and fuels, cement and mud preparation, spent oil and lubricants are not managed efficiently.

Improper storage of drilling waste and return/unused drilling mud at the on-site waste disposal facility can also result in contamination of the soil.

Mitigation measures
- Store, preserve and protect topsoil separately to use it during restoration period;
- Carry out adequate restoration of soil at the drilling site;
- Dispose drilling mud and drill cutting temporarily in an impervious HDPE lined pit carefully so that there is no spillage.
- Management of spilling of contaminants such as oil from equipment, cement, drilling mud, etc. on the soil;
- If oil spillage is there use Pseudomonas spp (Barua et al., 2011 and Roy et al., 2013) as scavenger to detoxify the soil and apply liberal quantity of organic manures (compost, press mud. Farm yard manure, vermin compost, cakes etc.) to improve physical and chemical properties of soil.
- Proper designed soak pits will be provided at the drilling site for disposal of domestic waste water;
- If no oil is found and the well is to be abandoned. The compacted soil due to heavy machinery needs to be loosened by cultivation and application of liberal quantity of organic manures and if it has become alkaline requires application of gypsum or sulphur or iron pyrite as per the gypsum requirement of soil

1.6.6 Socio Economic
- The proposed drilling project will have positive impact on socio economic status of the area due to
- Generation of indirect employment in the region due to the requirement of workers in trail making, supply of raw material, auxiliary and ancillary works, which would marginally improve the economic status of the people.
- Result in an increase in local skill levels through exposure to activities.
- As the existing loose / soft surface roads, trails shall be upgraded to facilitate the movement of the heavy equipment required, the project in turn would lead to improvement in transport facilities.

1.6.7 Flora and Fauna
Possible Biological Impacts of proposed Project
- Impact on terrestrial fauna due to noise
- Project infrastructure and well development will disturb agriculture land of site
- Drilling fluids, spillage, leakage and well treatment may produce chemical spillage which will disrupt agriculture of nearby farm
- Drilling related activity may increase deposition of dust and dust settling on the vegetation may alter or limit plants' abilities to photosynthesize and/or reproduce
- Loss/ damage of floral diversity and disturbance to faunal diversity
- Habitat fragmentation
• Contamination of habitat

Mitigation Measures

• Acoustic enclosure shall be provided to D.G. set to reduce the noise intensity during the drilling operation
• Since, the activity is temporary wastewater discharged from the drilling operations shall be collected in HDPE lined collection pit and would be disposed of as per the prescribed norms
• ONGC will develop and implement a spill management plan in case of spill.
• Use existing facilities (e.g. Access Roads) to the extent possible to minimize the amount of new disturbance
• Avoid use of unnecessary lighting at night to avoid attracting avifauna
• Reclamation of project site and surrounding area

1.6.8 Occupational Health and risk to surrounding community

• Site preparation, drilling and post drilling activities involve many occupational health hazards to the workers at site.
• Noise generated during drilling operation may affect the workers and staff members
• Handling of chemicals, fuel, may cause health hazard if not handled properly.
• Uncontrolled flow of hydrocarbon or other fluids during blow out may cause serious health injuries including fatality of workers as well as surrounding communities.

Mitigation measures

• ONGC shall arrange medical checkups in two stages which include clinical examination and laboratory test if required
• During site preparation and drilling and post drilling proper care would be taken by ONGC, proper PPE will be provided to site workers and staff members
• Site preparation work will be carried out during day time only
• Acoustic enclosures will be provided to DG sets and other noise generating equipment
• ONGC will develop and implement a spill management plan to prevent risk of spill which may cause health problem
• Blow out preventer of sufficient capacity will be used to mitigate risk of blow out

1.7 Additional Studies

Hazard Identification and Consequence Assessment

Hazards are identified for release of HSD and crude oil from storage tank at drill site. Consequence analysis of all possible containment scenarios was carried out using DNV Technica Software (PHAST 7.1)

Result of Consequence Assessment

Heat radiation of 4 kw/m² crosses the boundary premises in both the scenario i.e. 25 mm eq diameter leak and catastrophic rupture of HSD storage tank at drill site, which may cause pain if duration is longer than 20 sec.

Heat radiation of 12.5 kw/m² is within the boundary premises all the catastrophic rupture scenario HSD storage tank at drill site, which may cause 1% lethality in one minute or First degree burns in 10 sec.

ONGC shall take utmost safety precautions to prevent any such kind of incidents.
Disaster Management Plan

The DMP describes the role and responsibilities of various authorities under the emergency organization. First objective of a DMP is to save human life and then comes minimizing damage to property. Specifically, the DMP contains the following:

- Major emergencies likely to happen
- Prevention plan of an impending emergency by control of incidents;

It is recommended that the DMP be integrated into the actual operations prior to commencement of project work. Mock drills should be conducted at periodic intervals to check the efficacy of the DMP. ONGC shall develop Organizational DMP/ERP and integrate it with district and national level Disaster Management Plans.

1.8 Project Benefits

The project benefits are summarized as follows:

- New oil/gas finds in the block will lead to reduction in India’s dependence on imported crude oil and thereby result in considerable savings in foreign exchange.
- The activities would result in an increase in local skill levels through exposure to drilling technology.
- In the event of discovery of commercial quantity of hydrocarbon reserves, more long-term employment opportunities shall be created. Besides, the hydrocarbons brought to the surface shall help in contributing the ongoing efforts of the government to meet the national demand of petroleum resources.
- Development of ancillary activities resulting into indirect jobs of local manpower.

1.9 Environmental Management Plan (EMP)

The EMP provides a delivery mechanism to address potential adverse impacts, to instruct contractors and to introduce standards of good practice to be adopted for all project works. For each stage of the programme, the EMP lists all the requirements to ensure effective mitigation of significant biophysical and socio-economic impacts identified in the EIA. The EMP covers the following:

Role of ONGC and its contractors;

- A comprehensive listing of the mitigation measures (actions) will be prepared and implemented
- The parameters that will be monitored to ensure effective implementation of the action;
- The timing for implementation of the action to ensure that the objectives of mitigation are fully met.

1.9.1 Expenditure on Environmental Matters

The one-time expenditure for environmental management and mitigation is estimated to be approx. Rs.1, 12, 39,000 per well. Additional Rs 15, 00,000 will be spent for site restoration in case of no hydrocarbon discovery

1.9.2 Environmental Monitoring

The following will be monitored on a regular basis during drilling operation to ensure a high level of environmental performance and also to comply with statutory / legal conditions:

- Environment Monitoring during drilling.
- Post project monitoring.
- The general effectiveness of pollution control measures shall also be monitored.
1.10 Conclusions

The study brings out the following points:

- The drill site after completion of drilling operations shall be reinstated to its original condition as soon as possible in case of no discovery of commercial quantity of oil and gas. The proposed activities are not likely to have any significant adverse impact on the environment and the neighboring population.

- The sources of air emissions include generator sets, flaring of natural gas at drilling site during well testing. It was observed that the ambient air quality due to proposed activities is not expected to cause a major impact on vegetation and human settlements in the vicinity of the operational sites.

- The noise generated due to the diesel engines operating the rig along with the mud circulation system is considered to be significant in the vicinity of the noise generating equipment only. This can be mitigated satisfactorily by the workers wearing ear protection while working. This noise is transient & temporary and lasts for a short period.

The proposed drilling activities will not cause any significant adverse effect on water resources. Characteristics of wastewater discharged from the drilling operations shall meet the prescribed statutory norms.