

PRE FEASIBILITY REPORT FOR EXPLORATORY DRILLING IN
10 ML BLOCKS LOCATED IN MEHSANA DISTRICT

1.0 Introduction:

Oil & Natural Gas Corporation Ltd. (ONGC) has been playing an important role to meet the energy requirements of the country. The increase in demand of petroleum products has put a lot of pressure on ONGC for further exploration and production of hydrocarbons. ONGC has already drilled around 5932 wells in Cambay Basin.

The Cambay basin is a proven and rich petroleum province and has generally favourable combination of source sediments, reservoir rocks, regional seals and traps. The Cambay shale is the main source rock sequence in the basin along with minor contributions of oil from Kalol, Tarapur and Olpad formation. The fluvio-deltaic sediments of the Kalol and Ankleshwar formations of upper Eocene age are the main reservoirs. Oil trapped in these upper Eocene reservoirs are effectively sealed by the Tarapur/Kanwa shales of upper Eocene-Oligocene age.

A favourable combination of reservoir-source-cap in the Eocene –Oligocene sequence of the basin formed essentially one petroleum system. This can be divided into two sub systems depending on its development in the Northern and Southern part of the basin.

1. The Cambay shale-Kadi/Kalol Tarapur petroleum system in the northern part of the basin (Cambay-Tarapur and Ahmedabad-Mehsana Blocks, and
2. The Cambay shale – Hazad-Kanwa petroleum system in the southern part of the basin (Narmada and Broach Jambusar blocks).

The said ML Blocks are with ONGC since 1965 with 100% operatorship and producing blocks. In support of the long term hydrocarbon exploration program, ONGC proposed to drill exploratory wells in the said ML Blocks in deeper prospects.

All 10 ML Blocks are located in Mehsana District. The nearest major landmark for approaching the Blocks area is Mehsana City which is well connected by road and rail from Mumbai and New Delhi All the 10 blocks can be approached by rail and road from Ahemdabad and Gandhinagar and Mehsana. The blocks are located adjacent to other oil fields of ONGC and ONGC is operating these nearby oil fields since long time and are having proven hydrocarbon reserves.

Before starting the exploratory drilling work, environmental clearance from MOEF and other statutory clearances from State Pollution Control Board shall be obtained to ensure that the proposed exploratory activity does not in any way, harm the biotic and abiotic environment, social and cultural institutions and all the components that make up of the environment within the above said blocks and its periphery.

Each Exploratory well shall be logged and open hole drill stem tested. Water based non toxic drilling mud shall be used during exploratory drilling of well. If potential oil and or gas reserves are observed then the well shall be cased with production casing. After confirming casing integrity and cement bonding, the well shall be temporarily abandoned for future completions. Depending on the success of exploratory drilling program ONGC may drill additional exploratory wells within the said Block and develop a plan for commercial production of hydrocarbons.

3.0 Work Programme:

As per the minimum work programme, total 29 nos. of exploratory wells are to be drilled in below said ML Blocks after 2D and 3D seismic data acquisition processing and interpretation. Targeted depths of proposed exploratory wells shall be upto 3000M. The details of proposed work programme is as given below and Coordinates of all 10 ML Blocks are given in **Annexure-I**.

Sl. No.	Name of Block	Area of Block	Wells already drilled	Wells proposed to be drilled	Targeted depth of wells in Meter
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1	Lanwa Ext.-1 ML	2.148	167	1	3000
2	Lanwa ML	30.00		3	3000
3	Mehsana City ML	8.850	6	2	3000
4	Balol ML	24.004	259	3	3000
5	Geratpur ML	18.310	6	4	3000
6	Santhal ML	19.460	313	3	3000
7	Dedna ML	5.441	1	1	3000
8	Jotana Ext.-1 ML	57.700	201	8	3000
9	Bechraji ML	37.110	192	3	3000
10	Chanasma ML	2.813	4	1	3000

Based on the results of data acquisition and success of hydrocarbon finding from these exploratory wells, ONGC may drill additional wells after completion of minimum work programme.

4.0 Exploratory Drilling Process

Drilling of oil/gas wells employs mobile drilling rig. The drilling rig consists of a derrick at the top of which is mounted a crown block. A hoisting block having a hook is suspended from the crown block and a swivel is attached to the hoisting block by its shackle. From the swivel a tube of square section is suspended, which is called “Kelly stem”. The Kelly stem is passed through a square hole in horizontal rotary table which is driven by a electric motor. At the beginning of drilling operations, a round drill pipe at its end is screwed to the Kelly stem. The electric motor located near derrick rotates the rotary table through the Kelly stem rotations are transmitted to the drill pipe and finally to the bit. Kelly stem is needed to facilitate rotation, as round pipes are difficult to grip for rotating during drilling operations. As the hole is deepened, new sections are screwed to the drill pipe. Each section of drill pipe is about 6 to 10 meters in length and threaded at both ends. A string constitutes two/three drill pipes. Usually several such strings are kept ready at the derrick, so that they can be rapidly screwed with the help of special devices, as the well deepens.

The drill cuttings are removed by flushing the well and for doing so a hose is connected to stationary part of the swivel, through which a slush pump forces special drilling mud fluid also known as mud, down the string of drill pipes. The mud fluid is eco-friendly, non toxic and non hazardous in nature. The drilling mud then passes through the openings in bit to the bottom of the hole and back upwards between the walls of the well and drill pipes, thus bringing along with it the rock cuttings. The slush pump draws this mud fluid from special mud tanks. The diameter of the bit is always greater than that of a drill pipes, so as to ensure sufficient clearance between drill pipe and walls of the well along with which mud fluid returns to the surface after flushing the well.

The drilling mud fluid not only carries along with it crushed rock from the bottom hole but it also cools the bit which heats up during the drilling. Moreover, it reinforces the walls of the well by lining them with clay or pudding them thereby diminishing possibility of crumbling or caving in of the well walls. However, such pudding of the well walls is often ineffective and only in very hard rock the wells are free from danger of caving. It is for this reason, deep wells are usually reinforced by lowering casing pipes down their shafts. The mud fluid is discharged from well along a trough back into the mud tank and it is returned to the well after heavier particles of rock have been removed. In this way, it performs a continuous cycle. Mud fluids are prepared from particular types of clays capable of forming highly dispersed colloidal solutions. The most suitable clays for this purpose are bentonite clays. Drilling Mud fluid is prepared in tanks in nearby centrally located Mud Preparation Plant. The clay and water are fed to mud mixers and the resulting solution is filtered for separating un-dissolved lumps of clay and gravel. The volume of mud fluid in mud tank is always kept to about three times than that of entire mud circulating system. Before use, mud is always tested for its density, viscosity, water loss and put into drilling operations only if the test results are satisfactory.

5.0 Manpower Arrangement

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.

7.0 Land Requirement

ONGC shall acquire the land apprx. 110m x 110m per well on temporarily basis for the purpose of preparation of the drill site and drilling operations. The site may require temporary approach road from an existing one for transportation of rig and other equipment necessary for drilling work. The site shall be fenced in the event the well is successful. The well site shall be reduced to approximately 30m x 30m for the production phase and all non-essential areas shall be fully reclaimed.

8.0 Power Requirement

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 1240HP (3 Nos, two running and one standby), which will be run by High Speed Diesel. This generator shall consume approximately 250-300 Lit of fuel per hour, when in operation. Besides, the power generator used for lighting is expected to have a rating of approximately 40 - 60 KVA, which would consume HSD at the rate of 0.02 KL/hr, when in operation.

9.0 Water Requirement

The most significant requirement of water for drilling activities is for mud preparation. The other requirement would be for engine cooling, floor / equipment / string washing, sanitation, fire-fighting storage / make-up and drinking.

During the drilling activity, about 30 m³ per day water will be required which will include requirements for operation and that for sanitation and drinking of the workers during drilling single well. The water shall be made available from the nearest ONGC installation, and will be transported by water tanker.

A water pit of 150 m³ capacity will be constructed at the site for the purpose of fire fighting.

10.0 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 seismic survey as well as drilling operation is sewage from sanitation facilities, which shall be disposed through septic tanks/soak pits.

It is expected that wastewater in the form of washings shall be generated at an average rate of around 5 m³/day during the drilling operations from a single well. Waste water will be discharged in HDPE lined evaporation pit, size of the pit is generally 70mx30mx2m.

11.0 Air Emission

The emissions to the atmosphere from the drilling operations shall be from the diesel engines, and power generator.

12.0 Solid and Hazardous Waste Management

The top layer of soil shall be stacked at site for reuse after completion of drilling operations. The solid waste generated from drilling operation will be disposed in following manner.

Drill Cuttings – 150-200 MT / well will be generated, which are mainly inert solids. Drill cuttings shall be water washed and then solar dried at site in HDPE lined cutting pit, size 22mx15mx1.5m. Dry cuttings shall be covered with top layer of soil.

Spent Oil – During the drilling approx. 200 lts. of spent oil shall be generated. This oil shall be sent to authorized recyclers, as per ONGC policy.

Oil Sludge/ Hazardous waste – The proposed drilling is temporary activity and exploratory in nature, no hazardous waste shall be generated. In case of any Oil Sludge/ Hazardous waste is generated during the drilling activities, same shall be sent for incineration to a TSDF site.

Drilling Mud – Water base drilling mud shall be used, approx. 200m³ drilling mud per well is required. Waste mud shall be sent to central mud plant of ONGC for processing, recycling and reuse.

13.0 Environmental Impact

Ambient Air

The only source of air pollution is flue gasses from DG Set. Stack height of DG Set shall be kept approx. 9.0 M, as per CPCB norms to maintain the ambient air quality.

Water

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 for each well. Hence these impacts are not significant.

The wastewater discharged from the ONGC's drilling operations shall be collected in HDPE lined collection pits, so no significant impact is envisaged.

Land/Soil

Water based drilling mud shall be used for control of operations. No residual impact is envisaged on the land environment. HDPE lining shall be provided in drilling pits so no impact on the chemical, biological quality of soil, as part of these operations. However, it is emphasized that all precautionary measure will be strictly implemented.

Noise Level

The source of noise generation is due to operation of rig, diesel-generating sets and certain pumps operating for mud circulation. The noise level is generally well below the specified limits. The impact of noise generated by drilling on the near-by population is expected to be insignificant.

Flora and Fauna

The other minor impacts on land environment, due to the proposed operations could be due to vegetation loss during access cutting and site preparation. However since this activity is not entailing any tree cutting, the impact is minimal.

Impact of flora fauna due to air, water and soil pollution caused by the project is ruled out due to the limited and temporary nature of the drilling activities. Thus, adverse impact on flora is ruled out.

Socio-economic Environment

The proposed activities shall generate indirect employment in the region, which would marginally improve the economic status of the people. The activities would result in an increase in local skill levels through exposure to drilling activities and technology.

In the event that commercial quantities of hydrocarbon reserves are discovered, more long-term employment opportunities would 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.

14.0 Environment Management Plan

The Environment Management Plan provides a delivery mechanism to address potential adverse impacts, to instruct contractors and to introduce standards of good practices to be adopted during drilling operations. For each stage of the programme, the EMP shall list all the requirements to ensure effective mitigation of every potential biophysical and socio-economic impact. For each impact, or operation, which could otherwise give rise to impact, the following information is presented:

- A comprehensive listing of the mitigation measures (actions) that ONGC shall implement
- 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.

15.0 Environmental Mitigation

The exploratory drilling program shall be designed to avoid or minimize impacts to the environment and local communities wherever practicable & desirable. ONGC is committed towards environment protection with a target to achieve exploration and production goals. One of the very important part of environment protection is the selection of location of proposed exploratory wells so that it should not affect the land use pattern of the area, which is very important component of environment. In general locations of the wells are decided at a safe distance from the dwellings, avoid minimum interferences with agricultural activities, community infrastructure and also to avoid disturbances to forest lands and otherwise sensitive or unique habitats. Wherever residual

impacts remain, environment, mitigation measures shall be taken to reduce the impact to an acceptable level or adequately offset it.

16.0 Environmental Monitoring

The following will be monitored on a regular basis throughout the life of the project to ensure a high level of environmental performance being maintained:

- Oil content in produced water;
- Materials used in drilling fluid make up;
- Fluid losses;
- Baseline sampling prior to any drilling activity to establish pre-project environmental characteristics.

17.0 Occupational Health Surveillance Programme

This includes identification and control of health hazard and health care. Deployed Rig crew shall go for periodic health check up as company policy.

18.0 Disaster Management Plan

The findings of the hazard assessment and risk assessment form the basis for the development of the Disaster Management Plan. The DMP has the following objectives:

- Ensure checks and inspections to prevent incidents leading to emergency.
- Ensure well maintained and well operated plant and machinery to ensure trouble free and long life of the plant and machinery.

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

- Information about the MCLS and their effect zones;
- Checks and inspections to prevent incidents leading to emergencies;
- Prevention plan of an impending emergency by control of incidents;
- Internal emergency reporting and communication system;
- Offsite plan components;

- Regulatory requirements.

It is recommended that the DMP be integrated into the actual operations prior to commencement of project work. A mock drill should be conducted during the drilling programme to check the efficacy of the DMP. It is also important to integrate the DMP of ONGC with the district level DMP/ Emergency Response Planning initiated by the District Administration.