CHAPTER 1

INTRODUCTION

1.1 Background

Energy drives our societies and industries. The growth of a nation, encompassing all sectors of the economy and all sections of society, is contingent on meeting its energy requirements adequately. Oil and gas are critical components of our energy basket and will continue to play a crucial role in meeting the energy requirement of our country in the foreseeable future until some renewable form of energy becomes viable.

Oil India Limited (OIL), a National Oil Company (NOC), is engaged in the business of exploration, development and production of crude oil and natural gas, transportation of crude oil and production of Liquid Petroleum Gas (LPG). OIL was incorporated on 18 February 1959 as a Partnership Venture (i.e. Oil India Private Limited) between Government of India (GOI) with one third share and Burmah Oil Company, United Kingdom (BOC) with two third share to manage oilfields of Naharkatiya in Assam. On 14 October 1981, OIL became a Government of India Enterprise, as a wholly owned public sector undertaking, under the administrative control of Ministry of Petroleum and Natural Gas (MOPNG) by taking over the equity of BOC. It was converted (August 1995) into a Public Limited Company to enable it to issue shares to its employees as well as to the public at large to augment resources for increasing exploration efforts. OIL became a listed company in September 2009 with 78.43 per cent share holding by Central Government and 21.57 per cent held by public and other financial institutions. OIL was conferred the 'Navratna Status' in April 2010.

One of main objectives[1] of OIL is to carry out exploration and to develop, optimize production of hydrocarbon by geological, geophysical or any other kind of surveys for exploration of petroleum resources, to carry out drilling, both onshore and offshore and other prospecting operations to probe and estimate the reserves or petroleum resources, to undertake, encourage and promote such other activities as may lead to the establishment of such reserves including but not limited to geological, geophysical, geochemical, scientific and other investigations.

The operations of OIL cover the entire gamut of upstream activities of hydrocarbon sector which includes geological survey, exploration and development of oilfields, production of crude oil and natural gas, conversion of natural gas into LPG, transportation of crude oil and natural gas. The operations of OIL are monitored from five places viz. Duliajan (Assam),

[1] Source: Memorandum and Articles of Associations of OIL

Jodhpur (Rajasthan), Kakinada (Andhra Pradesh), Guwahati (Assam) and Noida (Uttar Pradesh).

OIL's entire crude oil production comes from fields located in Assam and Arunachal Pradesh while production of gas comes from Assam, Arunachal Pradesh and Rajasthan fields. OIL also produces LPG in its LPG Bottling Plant at Duliajan, Assam.

1.2 Hydrocarbon Exploration and Production

Accretion of hydrocarbon is the goal of any upstream oil and gas company. The first phase in the process of extraction of hydrocarbon is exploration – the search for oil and gas deposits beneath the earth's surface. Such deposits could either be onshore or offshore. The major activities involved in the process of exploration are given in table 1.1:

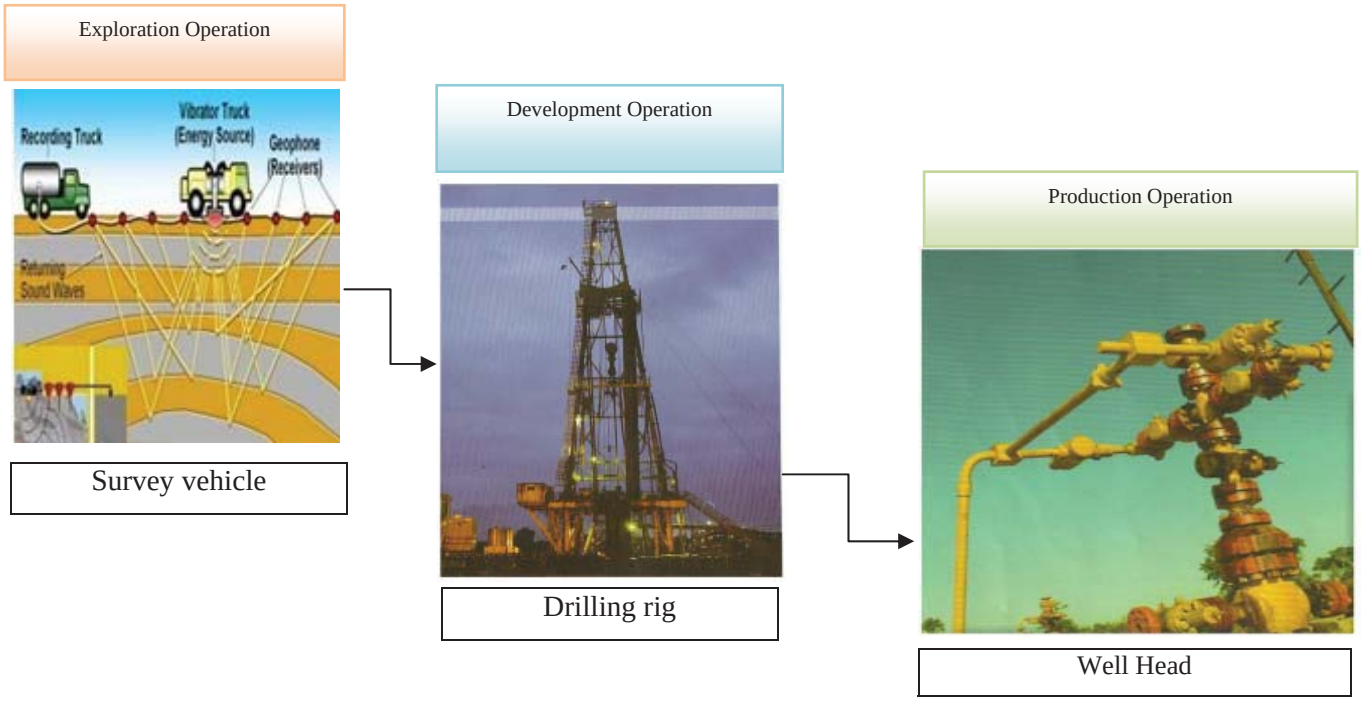
Table 1.1 – Phases of exploration

Types of Activities	Phases of exploration	Reference to the Chapter No. of the Report
Preliminary Survey - Surface Surveys and Sub Surface Survey	Surface surveys is the study and evaluation of surface structures and features including aerial photography, satellite imaging, imaging radar, and topographical and geological mapping from which inferences can generally be made regarding sub-surface formations. Sub-surface surveys is the study and evaluation of underground formations which involve accumulation of data to determine properties like gravitational pull, magnetic field and response to sound waves of the sub-surface rock structures using gravity meters, magnetometers and seismographs. Seismic studies (2D, 3D) are the most commonly used and important type of sub-surface testing.	Chapter-4
Seismic Survey	Seismic survey is conducted to identify the formation and possibility of locating hydrocarbon reservoirs. It involves acquisition of seismic data, processing and interpretation by geologists to identify formations with high probability, commonly known as Acquisition, Processing and Interpretation (API). Time taken in respect of API depends on the area of the Block, the volume of seismic data, the number of wells available in the Block, the number of prospects, the type of prospects, the vintage and quality of available data, the requirement for additional data and type of data and the size of the survey team.	Chapter-4

Exploratory Well and Exploratory Appraisal Well	Based on the results of survey, exploratory wells are drilled for the purpose of searching for undiscovered hydrocarbon accumulation on any geological entity. Wells drilled in an unproved area to determine the existence or otherwise of oil or gas after prospects are identified and evaluated. For adding newer areas of hydrocarbon reserves, exploratory drilling is important. Exploratory appraisal wells are drilled around exploratory wells to gauge the boundaries of the reservoir with the objective of accurately estimating the recoverable oil /gas reserves.	Chapter-5
Development wells	Development drilling starts once exploration has provided a reservoir model with enough information to choose drilling locations. Development wells are drilled for the purpose of increasing the production of hydrocarbon from an established field.	Chapter-5
Commercial Discovery/ Monetization	This is a declaration made by upstream oil companies duly approved by Management Committee comprising of representatives of MOPNG, Directorate General of Hydrocarbon (DGH) and local management and accepted by DGH regarding the commercial viability of discovered hydrocarbon reserve through monetization.	Chapter-3

Hydrocarbon exploration and production (E&P) operations, also referred to as upstream operations, can be described in the following phases as depicted in figure 1.1:

Figure: 1.1 Phases of Exploration



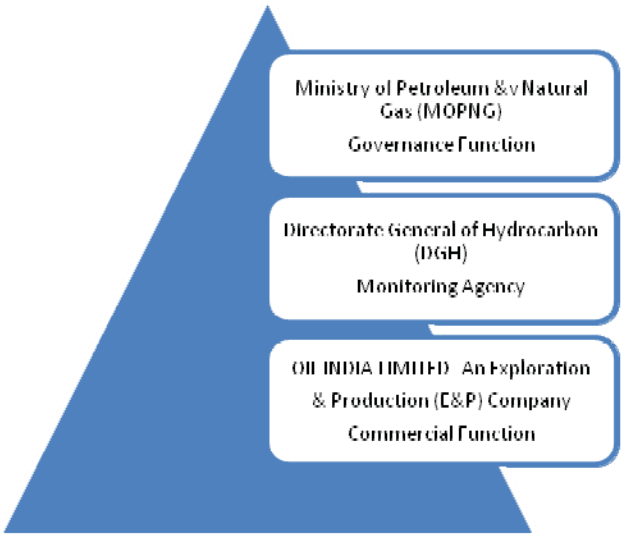
In the present Performance Audit Report, audit reviewed the first two stages of the above (i.e. exploration and development operation) of OIL for gauging hydrocarbon exploration efforts of OIL.

1.3 Institutional Framework for Hydrocarbon Exploration

MOPNG deals with exploration and production of oil and natural gas, refining, distribution and marketing, import, export and conservation of petroleum products. Besides, MOPNG formulates policies, rules and regulations that govern exploration and production operations in the oil and gas sector.

DGH - a nodal agency under administrative control of MOPNG was set up on 8 April 1993 for sound management of the Indian petroleum and natural gas resources and providing advice to MOPNG on issues relevant to the exploration and optimal exploitation of hydrocarbon in the country. The institutional framework showing the relationship of MOPNG, DGH and OIL is depicted in figure 1.2:

Figure: 1.2 Institutional Framework



Oil & Natural Gas Corporation Limited (ONGC) and OIL are two NOCs that are engaged in commercial activities related to exploration and production (E&P) of hydrocarbon. MOPNG with the assistance of DGH regulates the hydrocarbon exploration of OIL and other E&P companies under the provisions of Oilfields (Regulation and Development) Act, 1948 and Petroleum and Natural Gas Rules, 1959. MOPNG is also responsible for issue of licenses to the NOCs and the private operators for the offshore areas and concerned State Governments issue licenses for onshore E&P activities on the recommendation of MOPNG.

As per Petroleum and Natural Gas (Amendment) Rules 2003, “no person shall prospect for petroleum except in pursuance of a petroleum exploration license (hereinafter referred to as a license) granted under these rules, and no person shall mine petroleum except in pursuance of

a Petroleum Mining Lease (hereinafter referred to as a lease) granted under these rules. Every holder of a license and every holder of a lease shall in these rules be referred to as the licensee and the lessee, respectively.

For undertaking exploration activities, an entity is required to obtain Petroleum Exploration License (PEL[2]) under the provisions of the Petroleum and Natural Gas Rules, 1959 from the Central Government in respect of offshore blocks and from the concerned State Government in respect of onshore blocks with the previous approval of the Central Government. After discovery of hydrocarbon, PEL area is converted into Petroleum Mining Lease (PML[3]) area. For extraction of petroleum, the contractor is required to obtain a Mining Lease under the provisions of the Petroleum and Natural Gas Rules, 1959 from the Central/State Government.

The Central Government may, if it deems fit, notify in the official Gazette from time to time particulars regarding the basis on which the Central Government may be prepared to consider proposals for prospecting or mining operations in any specified area or areas. The area covered by a license shall be specified therein and the term of a license shall in the first instance be valid for a period of four years which may be extended for two further periods of one year each.

New Exploration Licensing Policy[4] (NELP) was formulated by the Government of India (GOI) in 1997 to provide a level playing field to both public and private sector companies in exploration and production of hydrocarbon. NELP became effective from February 1999. Since then, licenses for exploration are being awarded only through a competitive bidding system. Under NELP, NOCs are required to compete on an equal footing with Indian and foreign companies to secure PELs. Upto 31 March 2014, the GOI announced nine rounds between 1999 and 2010, inviting companies to bid for exploratory blocks under deep water, shallow water and onshore category in various basins[5].

Keeping in view the vital role of hydrocarbon sector in the economic growth of the country and to have a long-term policy i.e. 100 per cent exploration coverage of the Indian

[2] For undertaking exploration activities, the contractor is required to obtain Petroleum Exploration License under the provisions of the Petroleum and Natural Gas Rules, 1959 from the Central Government in respect of offshore blocks and from the concerned State Government in respect of onland blocks with the previous approval of the Central Government.

[3] For extraction of petroleum, the contractor is required to obtain a Mining Lease under the provisions of the Petroleum and Natural Gas Rules, 1959 from the Central/State Government.

[4] With the introduction of NELP in 1997, MOPNG awarded exploration blocks through a competitive bidding process to NOCs and private sector companies and are known as NELP blocks.

[5] A depression in the earth's crust where sedimentary materials are accumulated over the years.

sedimentary basins by 2025, for the hydrocarbons sector, MOPNG formulated the Hydrocarbons Vision–2025 in March 2000. The vision addresses the issues such as energy security, use of alternative fuels, inter-changeability of technology which are vital to ensure that the mix of energy sources used in the economy is optimal and sustainable and that adequate quantities of economically priced clean and green fuels are made available to the Indian consumers. The objectives of the vision, inter alia, are:

- To undertake a total appraisal of Indian sedimentary basins for tapping the hydrocarbon potential and to optimise production of crude oil and natural gas in the most efficient manner so as to have Reserve Replacement Ratio (RRR) of more than 1.
- To keep pace with technological advancement and application and be at the technological forefront in the global exploration and production industry,
- To achieve as near as zero impact, as possible, on environment.

OIL constituted (November 2009), an internal multi-disciplinary Task Force to formulate the Strategic and Corporate Plan for it. OIL, as such, prepared a draft Strategic and Corporate Plan 2011-2020 which was discussed in a Strategic Meet held in March 2012. However, the said plan was not placed before the Board for approval.

OIL's Draft Strategic and Corporate Plan 2011-20 has taken into consideration Hydrocarbon Vision 2025 as highlighted in table 1.2:

Table 1.2 – Hydrocarbon Vision 2025 vis-à-vis OIL's Draft Strategic and Corporate Plan 2011-20

Hydrocarbon Vision 2025	OIL Draft Strategic & Corporate Plan 2011-2020
To assure energy security by achieving self-reliance through increased indigenous production.	Maintain & Enhance reserves and production from NE assets by improving output and thus profitability of OIL would enhance by fully exploiting the potential of NE assets.
To undertake a total appraisal of Indian sedimentary basins for tapping the hydrocarbon potential and to optimize production of crude oil and natural gas in the most efficient manner so as to have RRR of more than 1.	Undertake regional basin modeling of Assam-Arakan Basin, geo-modelling and exploration in thrust belt area. Explore stratigraphic/ combination reservoirs. Explore Eocenes in and around matured fields.
To assure energy security by achieving self-reliance through investment in oil equity abroad.	Look for inorganic growth opportunities overseas.
Optimise recovery from discovered/matured	Build dynamic models for all fields and formulate

fields.	Field Redevelopment Plan/Development Plan. Establish reservoir-wise deliverability of existing oil & gas fields. Revisit Eastern and Western Satelite fields. Undertake reservoir optimization of Jorahan-Jaipur Field. Undertake measures to revitalize Digboi field.
Continue technology acquisition and absorption along with development of indigenous R&D	4-D Seismic for Reservoir Monitoring. Apply IOR/EOR methods and Water Flooding and bring Recovery Factor (RF) up to 45 per cent. Undertake enhanced systematic work-over operations. Reviews & Improve existing water injection system/monitoring of Water Front.
Aggressively pursue extensive exploration in non-producing and frontier basins for knowledge building and new discoveries including deep-sea offshore areas.	Exploration in frontier areas.
Acquire acreages abroad for exploration as well as production.	Acquire proven/producing assets or companies with proven/producing assets in India and overseas.

1.4 Performance Accountability Arrangements for Exploration

The Memorandum of Understanding (MOU) is a negotiated agreement between the management of the Central Public Sector Enterprises (CPSEs) and the GOI. The main purpose of the MOU system is to ensure a level playing field to the PSE vis-à-vis the private corporate sector. The management of the CPSE, is made accountable to the Government through the promise of a performance contract. The Government continues to exercise control in setting of MOU targets, and through performance evaluation during and at the end of the year. The Performance targets for MOUs are framed on a five point scale (i.e. Excellent, Very good, Good, Fair and Poor).

The performance evaluation of MOUs are divided into financial and non-financial parameters carrying weightage of 50 per cent each. The financial parameters relate to profit, size and productivity. The non-financial parameters are divided into dynamic, enterprise-specific (i.e. safety and pollution) and sector-specific (i.e. change in demand and supply, price fluctuation, variation in interest rates etc.) parameters. Subsequently, CSR, R & D and Sustainable Development were included in non-financial parameters with a weightage of five per cent each. The choice of individual non-financial parameters constitutes 50 per cent of weightage left to the combined wisdom of the CPSE, Administrative Ministry and Department of Public Enterprises (DPE).

Evaluation of MOU is done at the end of the year by MOPNG and DPE through a Task Force on the basis of actual achievement vis-à-vis the MOU targets. The overall MOU composite score is arrived at by adding weightage for all the parameters.

The year-wise weightage given to exploration activities (seismic surveys and drilling), accretion to recoverable reserve, production of crude, finding cost, cost of production of crude, are given in table 1.3:

Table 1.3 - Weightage given in MOU for exploration activities

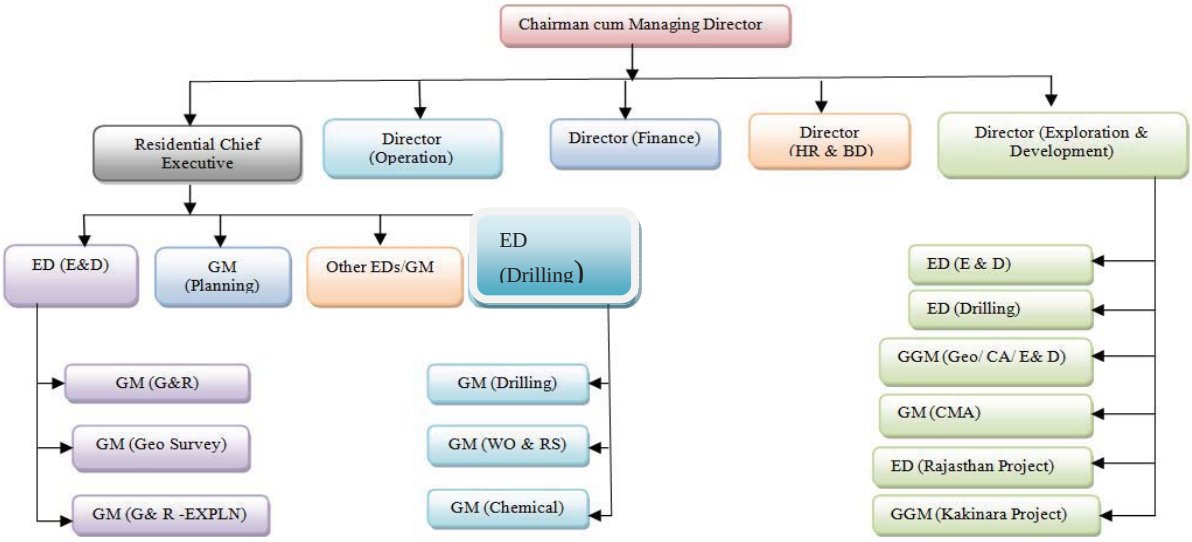
Particulars	2009-10	2010-11	2011-12	2012-13	2013-14
Seismic survey (2D and 3D)	1	2	0	0	0
Drilling of wells in NELP	1	1	2	0	0
Accretion to recoverable reserve	8	8	7	4	5
Finding cost	5	4	1	1	2
Cost of production of crude	5	4	1	2	2

Based on the performance of OIL during the period from 2009-10 to 2013-14, DPE graded OIL as “Excellent” in four out of five years and was graded as “Very Good” for the year 2010-11.

1.5 Organisational Arrangements in OIL

The management of OIL is vested in a Board of Directors consisting of 12 Directors including two Government Nominee Directors and five independent Directors. The Chairman-cum-Managing Director (CMD) is the Chief Executive of the Company who looks after the day to day affairs of OIL with the assistance of a Director (Exploration and Development), Director (Human Resource and Business Development), Director (Operation), Director (Finance) and Company Secretary at the Corporate Office, Residential Chief Executive (RCE) at Registered Office at Duliajan, Assam and Group General Managers at the Project offices. The Director (Exploration and Development) is assisted by two General Managers at Corporate office level and General Managers at field level and are responsible for oil and gas exploration activities. The organizational chart of OIL related to exploration activities is given in figure 1.3:

Figure 1.3 - Organizational Chart of OIL's Exploration Activities

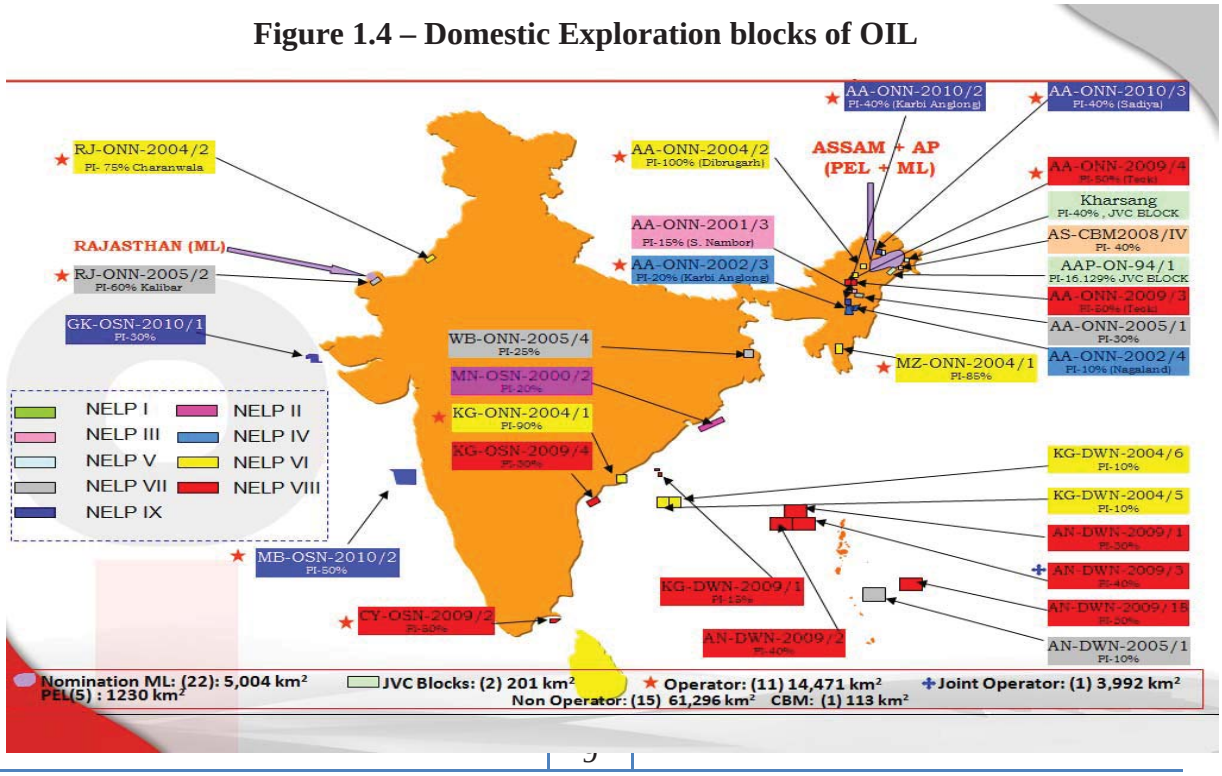


The Board set up (August 1993) a Corporate Business Committee (CBC), with all functional directors, for approval of all procurements and contracts (including service contracts, consultancy and turnkey contracts) upto ₹120 crore. The approval for procurement and contracts beyond the power of CBC vests with the Board of Directors (BOD).

1.6 Exploration Blocks of OIL in India and Overseas

The exploration blocks of OIL in India as on 31 March 2014 are shown in figure 1.4:

Figure 1.4 – Domestic Exploration blocks of OIL



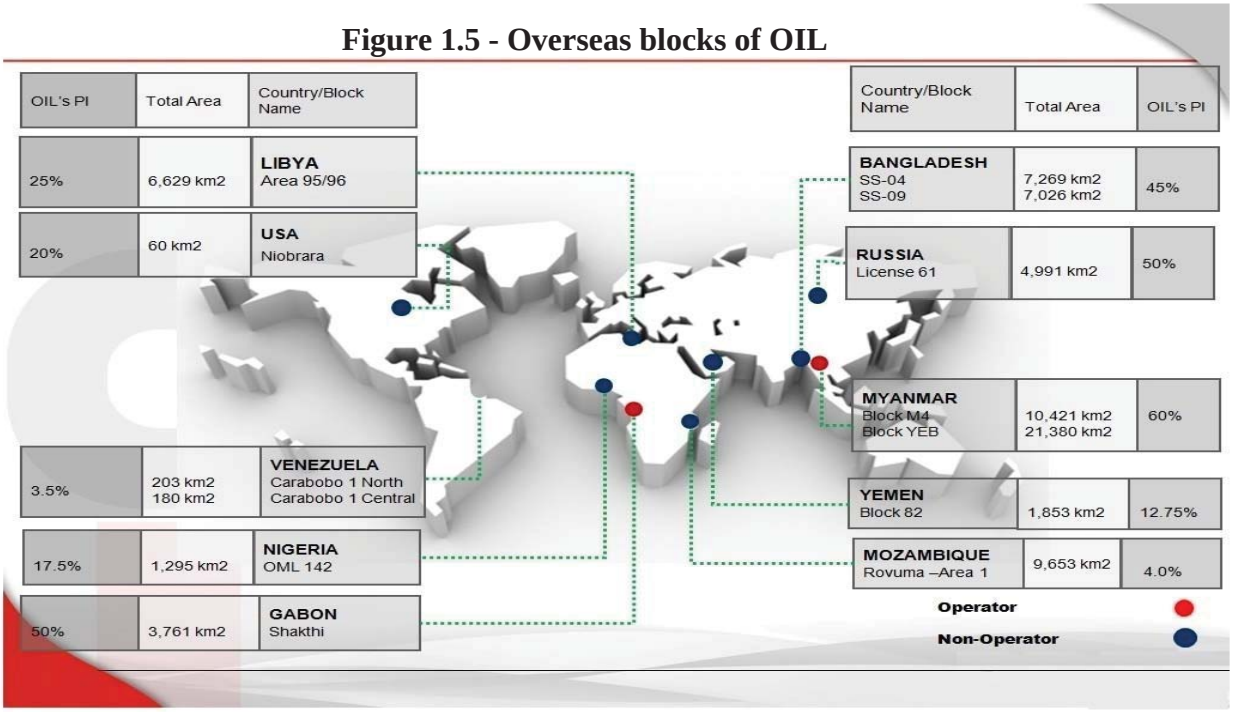
The activities of OIL in country are spread over the states/ union territories of Assam, Arunachal Pradesh, Mizoram, Rajasthan, Andhra Pradesh, Puducherry, Tamilnadu, Andaman, Maharashtra, Odisha, West Bengal and Gujarat. The total operational area of OIL under nomination is 6234 sq.km. and the same under NELP is 18463 sq.km.

OIL is currently operating in 22 nominated PML and 5 nominated PEL areas, allotted under the nomination regime[6]. OIL upto the end of NELP IX round is holding participating interest (PI) in total 30 NELP blocks both as operator and non-operator. These blocks are situated in ten[7] sedimentary basins. OIL holds PIs as non-operator in 15 blocks, 2 JVC and 1 CBM block.

OIL is operator in six basins consisting of 11 blocks and joint operator in one basin having 1 block. Among these, 9 blocks are in four basins, e.g Assam, Assam-Arakan, Krishna-Godavari and Rajasthan. Remaining 3 blocks are in Cauvery, Mumbai and Andaman basins which are in initial stages of operation, where blocks were awarded in NELP round-VIII to IX between June 2010 and August 2012.

The exploration blocks of OIL in overseas as on 31 March 2014 are shown in figure 1.5:

Figure 1.5 - Overseas blocks of OIL



[6] Before introduction of New Exploration Licensing Policy in 1997, the National Oil Companies (NOCs) viz., ONGC and OIL were awarded blocks for exploration on nomination basis and are known as "Nomination Blocks'

[7] Assam , Assam -Arakan, Rajasthan, Krishna-Godavari, Cauvery, Andaman, Mumbai, Mahanadi (non-operator), West Bengal(non-operator) and Gujarat-Kutch (non-operator)

OIL's overseas E&P activities comprises of 13 blocks and are spread over 10 countries covering Libya, Gabon, Nigeria, Yemen, Myanmar, Bangladesh, Venezuela, USA, Mozambique and Russia. Total area under OIL's overseas operations is 74721 sq.km.

1.6.1 Nomination blocks

The year-wise details of nomination blocks of OIL along with the areas held for the last five years ended March 2014 is given in table 1.4:

Table 1.4 - Year-wise position of Nomination blocks

Year	Year-wise position of PEL Blocks	Area (Sq. Km)	Year-wise position of ML Blocks	Area (Sq. Km)
2009-10	16	5367.750	19	4811.006
2010-11	7	1760.500	21	5028.500
2011-12	8	1783.750	20	4916.010
2012-13	8	1894.000	21	5095.000
2013-14	5	1230.000	22	5004.000

Source : Annual Plan of OIL

1.6.2 NELP blocks

The year-wise details of NELP blocks of OIL along with the areas held for the last five years ended March 2014 is given in table 1.5:

Table 1.5 - Year-wise position of NELP blocks

Particulars	2009-10		2010-11		2011-12		2012-13		2013-14	
	No.	Area (Sq. Km)	No.	Area (Sq. Km)	No.	Area (Sq. Km)	No.	Area (Sq. Km)	No.	Area (Sq. Km)
Onshore	10	11802	10	10987	10	10621	10	9513	9	9439
Offshore-Shallow water	0	0	1	1621	1	1621	2	5032	2	5032
Offshore-Deep Water[8]	0	0	1	3992	1	4040	1	3992	1	3992
Total	10	11802	12	16600	12	16282	13	18537	12	18463

Source : Annual Plan of OIL

1.7 Financial Parameters for Exploration Activities of OIL

The year-wise financial position of OIL during the last five years ended 31 March 2014 is given in table 1.6:

[8] Jointly operated block

Table 1.6 - Financial position of OIL

(₹ in crore)

Liabilities	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**Assets**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Paid up Capital	240.45	240.45	240.45	601.14	601.14	Net fixed assets	4018.90	4248.29	4493.53	4994.87	5478.73
Reserves & Surplus	13523.34	15361.42	17480.89	18610.34	20107.04	CWIP	927.11	1324.05	1131.50	1769.01	2077.16
Borrowings	37.50	1026.79	10.13	1057.81	9782.69	Investment	859.44	890.41	783.09	857.90	11256.61
Other long-term liabilities	1022.79	1313.53	1480.49	1666.76	2069.32	Other non-current assets	--	--	324.65	630.77	620.11
Trade dues & Other current liabilities	3269.29	3321.61	3469.31	3244.80	2314.26	Current Assets Loans and advances	12287.92	14801.05	15948.50	16928.30	15441.84
Total	**18093.37**	**21263.80**	**22681.27**	**25180.85**	**34874.45**	**Total**	**18093.37**	**21263.80**	**22681.27**	**25180.85**	**34874.45**

The year-wise total budgeted estimates, revised estimates and actual expenditure of OIL during the last five years ended 31 March 2014 is given in Annexure I.