



# DIRECTORATE GENERAL OF HYDROCARBONS

Under Ministry of Petroleum and Natural Gas

## HYDROCARBON EXPLORATION AND PRODUCTION ACTIVITIES

INDIA  
2011-12



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# **HYDROCARBON EXPLORATION AND PRODUCTION ACTIVITIES**



**2011-12**



**DIRECTORATE GENERAL OF HYDROCARBONS**  
Under Ministry of Petroleum & Natural Gas, Govt. of India



एस. जयपाल रेड्डी  
S. JAIPAL REDDY



मंत्री  
पेट्रोलियम एवं प्राकृतिक गैस  
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GOVERNMENT OF INDIA  
NEW DELHI-110 001

## **MESSAGE**

With the ever increasing gap between the demand and supply in the Hydrocarbon sector, the scenario is a challenge for a country. The growing economy is bound to increase the demand for energy further and a good portion of this demand will have to be met by hydrocarbons. Despite increased exploration and production activities in the country by both national oil companies and private players, India depends on imported crude to meet 75% of its domestic demand.

In line with the Hydrocarbon Vision 2025, the main thrust of the activities for the upstream sector would be to focus on oil security, through intensification of exploration efforts and achievement of 100% coverage of unexplored sedimentary basins, in a time bound manner. The hydrocarbon sector is open and there is free and fair competition, between public sector enterprises, private companies and other international players. All acreages are awarded through International Competitive Bidding with no mandatory state participation.

To bridge the ever increasing supply and demand gap it is imperative to focus our attention also to the economic exploitation and commercialization of the unconventional Resources as well. The Directorate General of Hydrocarbons (DGH) plays a pivotal role in the country's upstream hydrocarbon sector. Its role in attracting foreign investments in the E&P sector along with the effective monitoring of the activities of exploration and production deserves to be acknowledged and applauded.

This report on the "Hydrocarbon Exploration and Production Activities 2011-12" encapsulates the gist of the activities in this vital sector and highlights the performance of all the players involved in the quest for hydrocarbons in the country. I congratulate the DGH for intricately carrying out its duties and complement its staff for responsibly implementing the mandate given to them by the Government of India.

**(S. Jaipal Reddy)**



आर.पी.एन. सिंह  
R.P.N. SINGH



राज्य मंत्री  
पेट्रोलियम एवं प्राकृतिक गैस  
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MINISTER OF STATE FOR  
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### MESSAGE

Increasing gap between demand and supply of oil & gas provides ample investment opportunities in the Indian hydrocarbon industry but is a growing concern for the Government of India.

The launch of New Exploration Licensing Policy (NELP), with an aim of encouraging private sector participation in the oil and gas sector, was effective in providing healthy professional competitiveness, with an influx of new technology and new ideas. The National Oil Companies along with the Private Companies / Joint Ventures have been successful in discovering hydrocarbons over the last decade. The NELP has so far facilitated Nine International Competitive bidding rounds inviting wider participation from major oil and gas companies. I look forward for aggressive exploitation of reserves, faster field developments from new discoveries and exploration through forthcoming NELP rounds for conventional resources, to meet future challenges of energy demand.

The report entitled "Hydrocarbon Exploration and Production Activities 2011-12" is a well detailed document to keep us abreast of the latest in the upstream hydrocarbon sector, particularly fields and exploratory blocks under Production Sharing Contracts (PSC) and Coal Bed Methane (CBM) fields. It acts as a ready referral for those keen to contribute in India's endeavours for its energy security. I compliment Directorate General of Hydrocarbons (DGH) on this compilation and appreciate their efforts for the effective implementation of Government policies and efficient management of the country's vital resources.

(R.P.N. Singh)



**G.C. Chaturvedi, IAS**  
Secretary



भारत सरकार  
पेट्रोलियम एवं प्राकृतिक गैस मंत्रालय  
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### **MESSAGE**

Efficient, reliable and competitively priced energy supplies are prerequisites for accelerating economic growth. Affordable energy directly contributes to reducing poverty, increasing productivity and improving quality of life.

For a developing country like ours, the strategy for energy development is an integral part of the overall economic strategy. Efficient use of resources and long-term sustainability remains core objective of economic planning. Hydrocarbons have been a major chunk of the energy basket globally, India being no exception.

High oil and gas prices have prompted increased in level of investments in the exploration and production (E&P) sector, posing new challenges for the sector in the form of increased cost of operations due to high service costs, exposure to logistically difficult terrain and shortage of technical manpower.

The Government is committed to mitigating these challenges and has, in fact, launched accelerated domestic exploration through its New Exploration Licensing Policy (NELP) policy initiative. Some of the world class oil discoveries have recently been reported from blocks offered under the NELP regime

In years to come it is indicated that the share of gas in the energy basket would increase. Alternate Resources like Coal Bed Methane, Shale gas are also expected to contribute to the supply chain.

The role of the Directorate General of Hydrocarbons therefore is extremely vital and productive. As the technical arm of the Ministry, critical inputs from DGH have been much appreciated and helped the Government take timely decisions to accelerate the exploration activities in the country. The team DGH has been consciously and efficiently playing the pivotal role in the hydrocarbon sector fulfilling the mandate given to them through the Cabinet Resolution of 1993.

“Hydrocarbon Exploration and Production Activities 2011-12” is a well documented script which is eagerly awaited by all concerned. I am pleased to pen my thoughts for the readers of this useful document and wish DGH all the very best for this and all its future endeavours.

 17/9/12

**(G C Chaturvedi)**



सत्यमेव जयते

**R. N. CHOUBEY, IAS**  
Director General



**Directorate General of Hydrocarbons**  
Ministry of Petroleum & Natural Gas  
Government of India

## ***FROM THE DIRECTOR GENERAL'S DESK***



Exploration activity, prior to New Exploration and Licensing Policy (NELP), was dominated by public sector firms such as Oil and Natural Gas Corporation Ltd. (ONGC) and Oil India Ltd. (OIL). The discovery of massive Mumbai High fields in 1974 gave a major boost to the sector as these fields still continue to be the mainstay of India's indigenous production. Realizing that these fields would gradually deplete over time and no major discoveries were being brought into production, the Government introduced the NELP, with the objective of encouraging private sector participation in the oil and gas sector. Increasing gap between demand and supply of oil & gas provides ample investment opportunities in the Indian hydrocarbon industry.

In line with the Hydrocarbon Vision 2025, in brief, the main thrust of the activities for the upstream sector would be:-

- a) Focus on oil security through intensification of, exploration efforts and achievement of 100% coverage of unexplored basins in a time bound manner to enhance domestic availability of oil and gas.
- b) Secure acreages in identified countries having high attractiveness for ensuring sustainable long term supplies.
- c) Open up the hydrocarbon market so that there is free and fair competition, between public sector enterprises, private companies and other international players.

The Directorate General of Hydrocarbons has been instrumental in achieving a lot during the 19 years of its existence in promoting exploration and sound management of the petroleum & natural gas resources as also non-conventional hydrocarbon energy resources, having regard for the environment, safety, technological and economic aspects. The organisation has lived up to its vision statement "To be an upstream advisory & technical regulatory body of international repute, creating

value for society through proliferation & dissemination of E&P knowledge optimal hydrocarbon resources management & environment friendly practices.” The team of highly skilled technical staff has not only carried out to the mandate given by the Government of India, but has contributed immensely in attracting foreign investment in the Exploration & Production sector through the attractive fiscal benefits provided through the New Exploration Licensing Policy (NELP) launched in 1999 and the Coal Bed Methane(CBM) policy in 2001. The award of 249 Blocks under the Nine rounds of NELP and the 33 Blocks awarded under Four round of CBM has been upto 31.03.2012 instrumental in not only accelerating the exploration activities, but also in bringing ‘state of the art’ technology and a healthy competitive atmosphere in this sector. It is this platform that DGH could use to bring the number of E&P players up from the two National Oil Companies, viz. Oil India Limited and Oil & Natural Gas Corporation Ltd to 84 E&P players, comprising of 45 operators and 39 non operators, currently working in India.

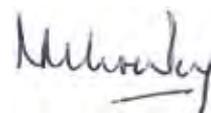
The Government Policies have yielded desired results which can be seen in the form of 11 discoveries made under NELP in the year 2011-12 and the commercial production of 0.3 MMSCMD of CBM. Today, the country can boast of having E&P operations spread over 19 sedimentary basin out of 26 sedimentary basins of the country both on-land and offshore including deep waters. What is remarkable about the deep water operations in India is the fact that the exploration activities are largely dominated by the Indian companies.

It is still a long way to go. Out of 200 billion barrels of Oil & Oil equivalent gas prognosticated resources only 70 billion barrels have been converted to In Place volumes. A staggering 130 billion barrels are in 'yet to find' category.

In the search to discover these ‘yet to be found’ resources, DGH attempts to up-grade the country’s less explored basinal areas through enrichment of geo-scientific knowledge base using state of the art geo-scientific data acquisition either through speculative route or through its own funding and efforts. This has helped in carving out large acreages for systematic exploration for offer under NELP bidding rounds. It is this endeavour that has brought 2.15 million sq.kms out of the 3.14 million sq kms of basinal area within the ambit of exploration.

DGH is also responsible for exploration and development of other non conventional hydrocarbon energy resources like Gas Hydrates, Shale Oil and Shale Gas etc. With the global resources for the unconventional gas excluding gas hydrates touching the 32,560 TCF mark, these resources cannot be ignored.

“Hydrocarbon Exploration and Production Activities 2011-12” not only highlights the conventional hydrocarbon activities but gives a snap shot of what is happening in the unconventional hydrocarbon scene as well. I am confident that this annual fact-book would not only update the reader on the current E&P scenario in India but would be useful reference for all the stakeholders.



**(R. N. Choubey)**  
Director General

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## PRELUDE

- DGH and its activities
- Contribution to Government Exchequer
- Sedimentary Basins of India

# DGH - At a Glance

## OBJECTIVE

To promote sound management of the Indian petroleum and natural gas resources having a balanced regard to the environment, safety, technological and economic aspects of the petroleum activity.

## ROLE AND FUNCTIONS

- Formed in 1993 by Govt. resolution.
- A nodal agency under Ministry of Petroleum & Natural Gas for implementation of NELP and CBM policy.
- An agency to advise Ministry of Petroleum & Natural Gas on Exploration strategies & Production Policies.
- To provide technical advice to the Ministry of Petroleum and Natural Gas on issues relevant to the exploration and optimal exploitation of hydrocarbons in the country.
- To review the exploration programmes of companies operating under Petroleum Exploration Licences granted under the Oilfields (Regulation and Development) Act, 1948 and the Petroleum and Natural Gas Rules, 1959 with a view to advising Government on the adequacy of these programmes.
- To evaluate the hydrocarbon reserves discovered and estimated by the operating companies.
- To advise the Government on the offering of acreages for exploration to companies as well as matters relating to relinquishment of acreage by companies.
- To review the development plans for commercial discoveries of hydrocarbon reserves proposed by the operating companies and advise Government on the adequacy of such plans and the exploitation rates proposed and matters relating thereto.
- To review and audit concurrently the management of petroleum reservoirs by operating companies and advise on any mid course correction required to ensure sound reservoir management practices in line with the optimal exploitation of reserves and the conservation of petroleum resources.
- To regulate the preservation, upkeep and storage of data and samples pertaining to petroleum exploration, drilling, production of reservoirs etc. and to cause the preparation of data packages for acreage on offer to companies.
- All other matters incidental thereto and such other functions as may be assigned by Government from time to time.
- Assist Govt. in Contract management functions.
- Exploration & Development of unconventional hydrocarbon resources like Gas Hydrate, Shale gas/oil and oil shale.

## ADVISORY & ADMINISTRATIVE COUNCIL OF DGH

In view of the need to establish an agency that could effectively supervise the activities of all E&P companies from the private & joint sectors in the national interest, Directorate General of Hydrocarbons was set up through GOI resolution No. O-20013/2/92/ONG-III, on 8<sup>th</sup> of April, 1993 under the administrative control of the Ministry of Petroleum and Natural Gas. The objective of DGH is to promote sound management of the Indian Petroleum and Natural Gas resources having a balanced regard for the environment, safety, technological and economic aspects of the petroleum activity.

The Directorate General has an Advisory Council, which has been appointed by Government on 31.05.1993 comprising a Chairman and members, who are eminent persons in the field of hydrocarbon exploration and production. The Advisory Council is serviced by the Directorate which will be headed by a Director General who is also the Member Secretary to the Council. In the year 2011-12, the composition of Advisory Council was :

S. No.	Name	Designation
1.	Shri. P. Shankar	Chairman
2.	Dr. B. B. Bhattacharya	Member
3.	Dr. I. B. Singh	Member
4.	Dr. E. Desa	Member
5.	Director General, Directorate General of Hydrocarbons	Member-Secretary

In order to guide and take care of all administrative aspects of the functioning of DGH, an Administrative Council has been set up by GOI through Office Memorandum No. O-32012/1/95-ONG-III dated 2.2.2001. The Administrative Council, in particular, takes decisions on various matters concerning establishment, budget and also undertakes periodical review of the functioning of DGH and submits the reports to Ministry. It is headed by Secretary (P&NG) and had the following composition in 2011-12 :

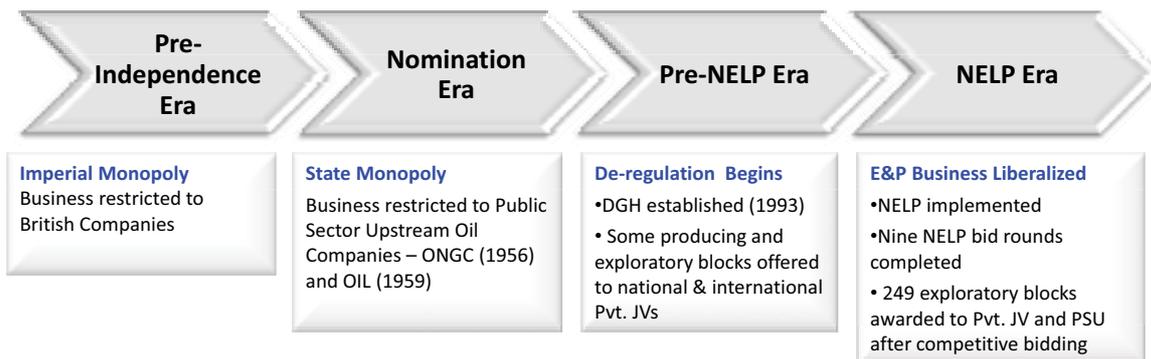
S. No.	Name	Designation
1.	Secretary, MOPNG	Chairman
2.	Additional Secretary, MOPNG	Member
3.	AS&FA, MOPNG	Member
4.	JS(E), MOPNG	Member
5.	Secretary, OI&B	Member
6.	DG, Directorate General of Hydrocarbons	Member-Convener

# AWARD OF BLOCKS / FIELDS FOR EXPLORATION / PRODUCTION OF OIL & GAS

India has an estimated sedimentary area of 3.14 million sq km. comprising 26 sedimentary basins, out of which, 1.35 million sq km. area is in deepwater and 1.79 million sq km. area is in onland and shallow offshore. At present 0.93 million sq km. area is held under Petroleum Exploration Licenses in 19 basins by national oil companies viz. Oil and Natural Gas Corporation Limited (ONGC), OIL India Limited (OIL) and Private/Joint Venture companies. Before implementing the New Exploration Licensing Policy (NELP) in 1999, 11% of Indian sedimentary basins were under exploration, which has now increased significantly.

There have been five different regimes in the matter of mining lease/ licenses for exploration/ production of oil and gas, namely:

- A) Petroleum Exploration License (PEL) and Petroleum Mining Lease (PML) granted to National Oil Companies [Oil and Natural Gas Corporation Ltd.(ONGC) and Oil India Ltd. (OIL)], on Nomination basis.
- B) Mining Licences granted under small / medium size discovered field PSCs,
- D) Petroleum Exploration License and Petroleum Mining Lease granted under Pre-NELP PSCs, and
- E) PEL and PML granted under the New Exploration Licensing Policy (NELP).



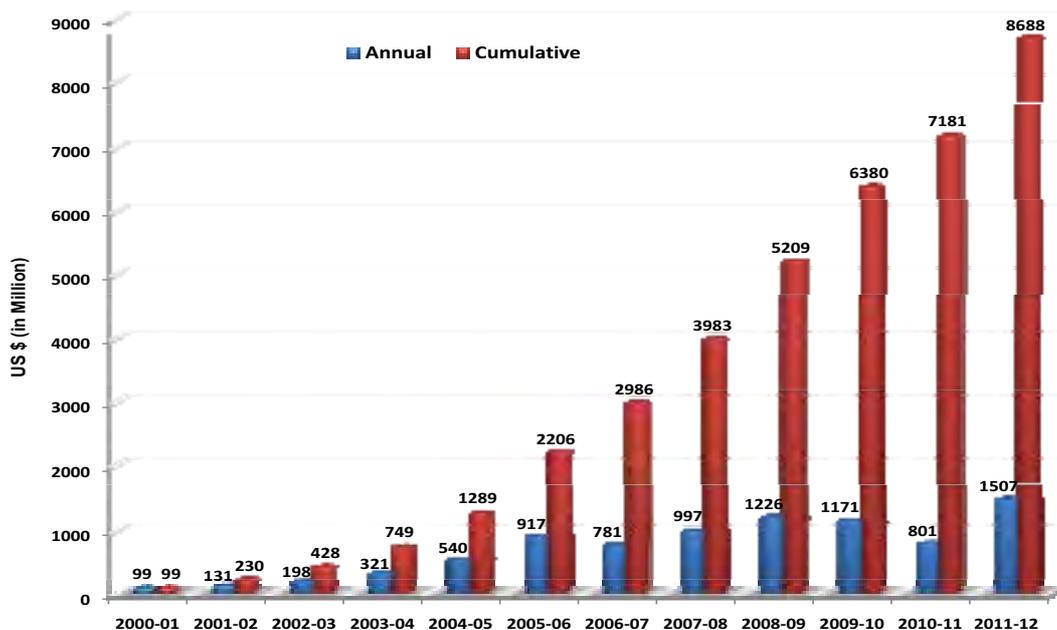
- Under the first regime, exploration blocks were offered to national oil companies on **nomination basis**. These companies are required to pay full statutory levies viz. royalty to the state government/ central government for onland/offshore areas and cess to the central government.
- Some of the **small and marginal fields** discovered by ONGC and OIL were offered to other parties for rapid development under three rounds of bidding during the year 1991 to 1993. In the PSCs relating to those fields, the rates of royalty and cess were frozen with a view to providing fiscal stability i.e. a stable tax regime to the contractors.
- Prior to 1997, **in the pre-NELP exploration blocks**, the two national oil companies as licensees, were required to bear all the liability of statutory levies, but the exploration blocks were offered to various companies in order to attract private investments in exploration and production of oil. The private companies were selected through a bidding process during six round of bidding between 1993 to 1995.
- The system of offering exploration blocks to various parties was modified in **1997** with the introduction of the **NELP**, under which the national oil companies and private players are treated at par and are required to compete with each other for acquiring exploration acreages under uniform contractual and fiscal framework. As regards PSCs entered into under NELP, the policy was announced by the government in 1997 and it became effective in **1999**. Under NELP, the net revenue remaining after deduction of royalty and costs (i.e. pre-tax profit) is to be shared between the contractor and the government of India on the basis of an investment multiple system. The contractor is allowed full cost recovery on all costs incurred in an exploration block.

# CONTRIBUTION TO GOVERNMENT EXCHEQUER

The following are earnings of Government of India from Profit Petroleum and Royalty.

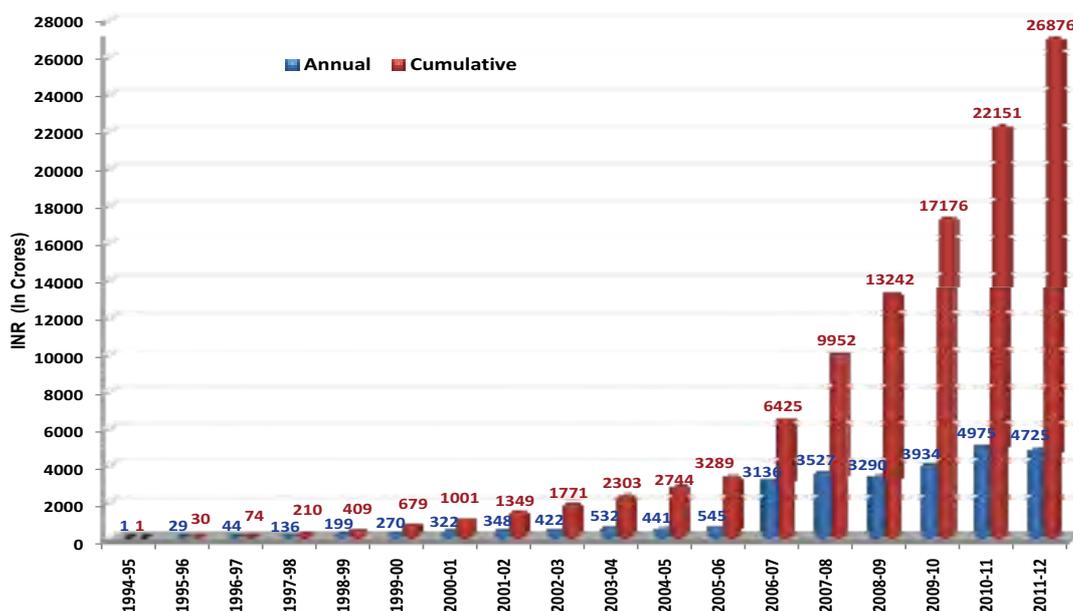
## Profit Petroleum

During the Financial Year 2011-12, Profit Petroleum of US \$ 1507.13 Million was contributed to Government Exchequer. The cumulative Profit Petroleum earned as on 31st. March 2012 is US \$ 8687.64 Million.



## Royalty

During the Financial Year 2011-12, Royalty paid to Central Exchequer was Rs. 4,725.39 crores. The cumulative Royalty contributed is Rs. 26,875.69 crores.

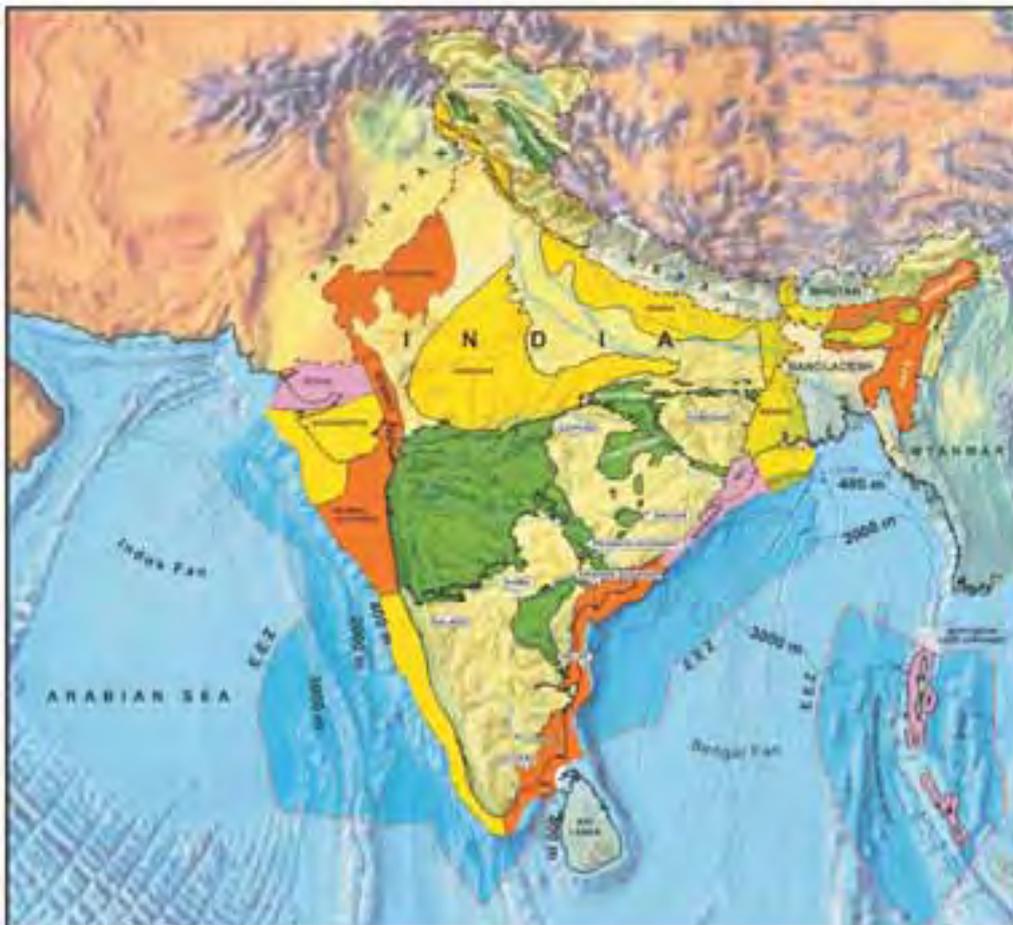


\* **Note:** The royalty data of ONGC (nominated blocks) have been incorporated w.e.f. 2006-07.

# SEDIMENTARY BASINS

- The sedimentary basins of India, onland and offshore up to the 200m isobath, have an areal extent of about 1.79 million sq. km. So far, 26 basins have been recognized and they have been divided into four categories based on their degree of prospectivity as presently known. In the deep waters beyond the 200m isobath, the sedimentary area has been estimated to be about 1.35 million sq. km. The total thus works out to 3.14 million sq. km.
- Since the launch of NELP, there have been significant forward steps in exploring the hydrocarbon potential of the sedimentary basins of India. Credit for this achievement goes in large measure to surveys carried out by DGH in unexplored/ poorly explored areas of the country including Deepwaters off west coast, east coast and in Andaman sea and accreages awarded for exploration under NELPs. Concerted efforts are continuously being done to reduce the unexplored area further.

SEDIMENTARY BASINS OF INDIA



**LEGEND**

<ul style="list-style-type: none"> <li><span style="display: inline-block; width: 20px; height: 10px; background-color: orange; margin-right: 5px;"></span> CATEGORY-I BASIN (Proven commercial productivity)</li> <li><span style="display: inline-block; width: 20px; height: 10px; background-color: pink; margin-right: 5px;"></span> CATEGORY-II BASIN (Identified prospectivity)</li> <li><span style="display: inline-block; width: 20px; height: 10px; background-color: yellow; margin-right: 5px;"></span> CATEGORY-III BASIN (Prospective Basins)</li> </ul>	<ul style="list-style-type: none"> <li><span style="display: inline-block; width: 20px; height: 10px; background-color: green; margin-right: 5px;"></span> CATEGORY-IV BASIN (Potentially Prospective)</li> <li><span style="display: inline-block; width: 20px; height: 10px; background-color: lightyellow; margin-right: 5px;"></span> PRE-CAMBRIAN BASEMENT/ TECTONISED SEDIMENTS</li> <li><span style="display: inline-block; width: 20px; height: 10px; background-color: lightblue; margin-right: 5px;"></span> DEEP WATER AREAS WITHIN EEZ</li> </ul>
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## HISTORICAL CATEGORIZATION OF SEDIMENTARY BASINS

Basinal Area (Sq. Km.)

Category*	Basin	Onland	Offshore	Total
<b>UP TO 200M ISOBATH</b>				
I	Cambay	51,000	2,500	53,500
	Assam Shelf	56,000	----	56,000
	Mumbai offshore	----	116,000	116,000
	Krishna Godavari	28,000	24,000	52,000
	Cauvery	25,000	30,000	55,000
	Assam-Arakan Fold Belt	60,000	----	60,000
	Rajasthan	126,000	----	126,000
<b>SUB. TOTAL</b>		<b>346,000</b>	<b>172,500</b>	<b>518,500</b>
II	Kutch	35,000	13,000	48,000
	Mahanadi-NEC	55,000	14,000	69,000
	Andaman-Nicobar	6,000	41,000	47,000
<b>SUB. TOTAL</b>		<b>96,000</b>	<b>68,000</b>	<b>164,000</b>
III	Himalayan Foreland	30,000	----	30,000
	Ganga	186,000	----	186,000
	Vindhyan	162,000	----	162,000
	Saurashtra	52,000	28,000	80,000
	Kerala-Konkan-Lakshadweep	----	94,000	94,000
	Bengal	57,000	32,000	89,000
<b>SUB. TOTAL</b>		<b>487,000</b>	<b>154,000</b>	<b>641,000</b>
IV	Karewa	3,700	----	3,700
	Spiti-Zanskar	22,000	----	22,000
	Satpura-South Rewa-Damodar	46,000	----	46,000
	Narmada	17,000	----	17,000
	Decan Syncline	273,000	----	273,000
	Bhima-Kaladgi	8,500	----	8,500
	Cuddapah	39,000	----	39,000
	Pranhita-Godavari	15,000	----	15,000
	Bastar	5,000	----	5,000
	Chhattisgarh	32,000	----	32,000
<b>SUB. TOTAL</b>		<b>461,200</b>	<b>----</b>	<b>461,200</b>
<b>TOTAL</b>		<b>1,390,200</b>	<b>394,500</b>	<b>1,784,700</b>

### DEEP WATERS

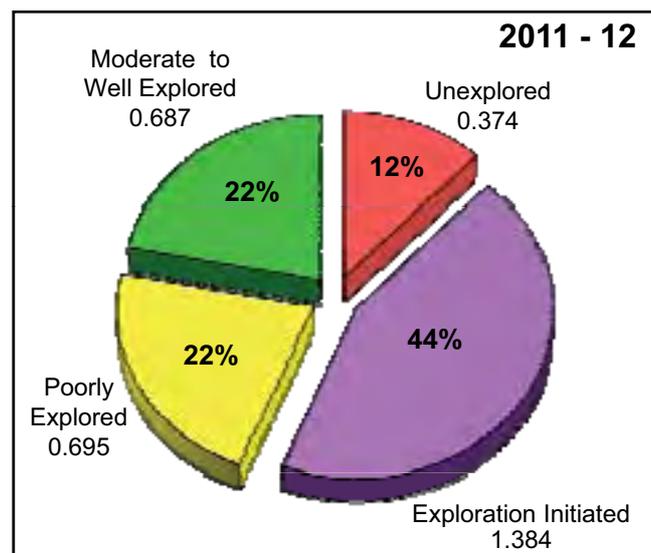
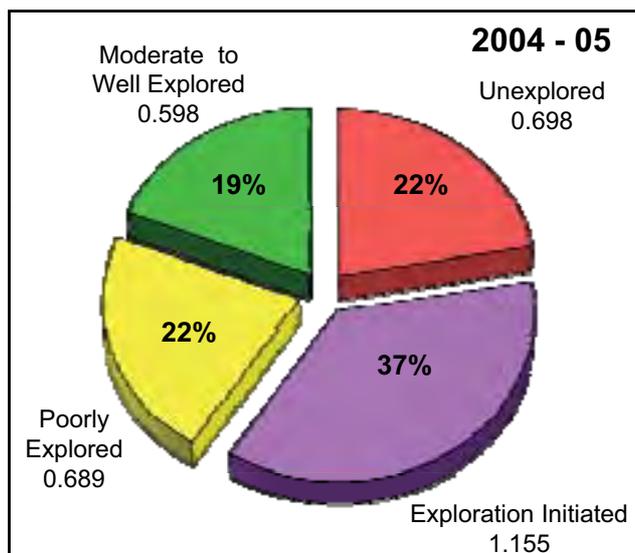
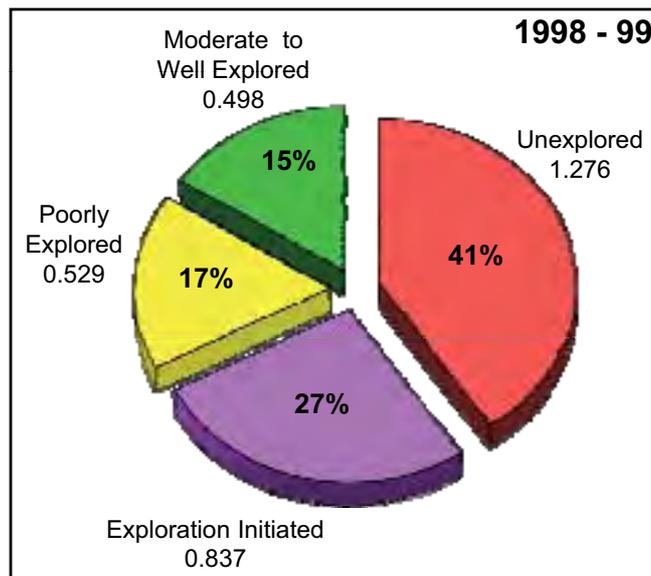
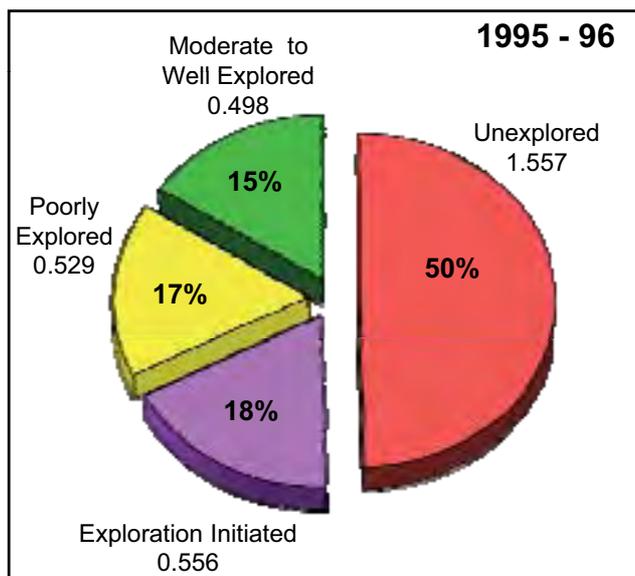
Kori-Comorin	}	----	----	1,350,000
85° E				
Narcodam				

<b>GRAND TOTAL</b>	<b>----</b>	<b>----</b>	<b>3,134,700</b>
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\* Categorization based on the prospectivity of the basin as presently known. The four recognized categories are basins which have :

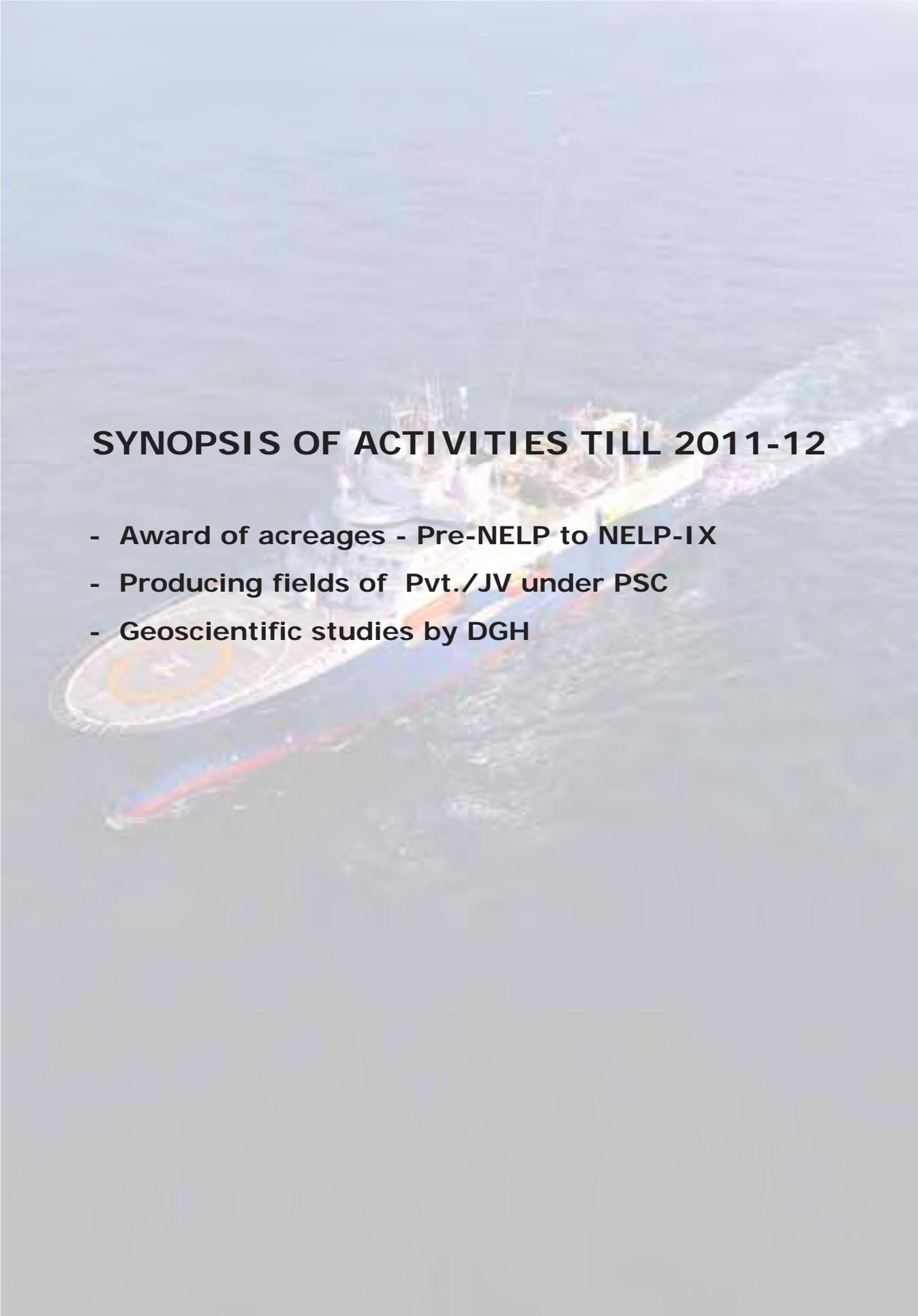
- I Established commercial production
  - II Known accumulation of hydrocarbons but no commercial production as yet
  - III Indicated hydrocarbon shows that are considered geologically prospective
  - IV Uncertain potential which may be prospective by analogy with similar basins in the world.
- This categorization will necessarily change with the results of further exploration.

## SEDIMENTARY BASINAL AREAS



**Total Sedimentary Area : 3.14 Million Sq. Km.**

LEVEL OF EXPLORATION	AREA (Million Sq.Km.)			
	1995-96	1998-99	2004-05	2011-12
UNEXPLORED	1.557	1.276	0.698	0.374
EXPLORATION INITIATED	0.556	0.837	1.155	1.384
POORLY EXPLORED	0.529	0.529	0.689	0.695
MODERATE TO WELL EXPLORED	0.498	0.498	0.598	0.687

An aerial photograph of an offshore oil rig at sea. The rig is a large, complex structure with multiple levels and a central derrick. It is surrounded by a large area of water. The rig is positioned in the center of the frame, with a white wake trailing behind it. The water is a deep blue-grey color. The rig's structure is primarily white and yellow, with some red and blue accents. The overall scene is a wide expanse of open ocean.

## **SYNOPSIS OF ACTIVITIES TILL 2011-12**

- Award of acreages - Pre-NELP to NELP-IX
- Producing fields of Pvt./JV under PSC
- Geoscientific studies by DGH



## AWARD OF ACREAGES - NELP

### New Exploration Licensing Policy (NELP):

New Exploration Licensing Policy (NELP) was formulated by the Government of India, with Directorate General of Hydrocarbons (DGH) as a nodal agency, during 1997-98 to provide a level playing field to both Public and Private sector companies in exploration and production of hydrocarbons. Government of India's commitment to the liberalization process is reflected in NELP, which has been conceptualized keeping in mind the immediate need for increasing domestic production. To attract more investment in oil exploration and production, NELP has steered steadily towards a healthy spirit of competition between National Oil Companies and private companies. This has been a landmark event in the growth of the upstream oil sector in India. The foreign and Indian private companies are invited to supplement the efforts of National Oil Companies in the discovery of hydrocarbons. The development of E&P sector has been significantly boosted through this policy of Government of India, which brought major liberalization in the sector and opened up E&P for private and foreign investment, where 100% Foreign Direct Investment (FDI) is allowed.

Under NELP, which became operational in February 1999, acreages are offered to the participating companies through the process of open global competitive bidding. The terms and conditions of this open and transparent policy rank amongst the most attractive in the world. The first round of offer of blocks was in the year 1999 and the latest ninth round in 2010. The Government of India has so far completed Nine rounds of offer of acreages under NELP where in 360 exploration blocks have been offered and 249 blocks have been awarded till 31.03.2012. Oil and Oil-Equivalent Gas (O+OEG) in place reserve accretion under NELP is approximately 735.7 million metric tonnes.

- In the first round of NELP (NELP-I), 24 blocks were awarded for hydrocarbon exploration, which include 7 blocks in east coast deep water, 16 blocks in shallow water of east and west coasts and 1 onland. 17 blocks have been relinquished / surrendered. 7 exploration blocks are presently under operation.
- Under NELP-II, 23 blocks were awarded for exploration including 8 in the deep waters off the west coast, 8 in the shallow water of both east and west coasts, and 7 onland. 18 blocks have been relinquished / surrendered. 5 exploration blocks are presently under operation.
- Under NELP-III, 23 blocks were awarded for exploration including 9 in the deep waters off the west and east coast of India, 6 in the shallow water of both east and west coasts, and 8 onland. 9 blocks has been relinquished and presently 14 blocks are under operation.
- Under NELP-IV, a total of 20 blocks were awarded, of which 10 blocks are in onland and 10 in the deep water of the west coast, east coast and Andamans. Blocks in Andaman offshore were awarded for the first time. 3 blocks has been relinquished and presently 17 blocks are under operation.
- Under NELP-V, a total of 20 blocks were awarded, of which 6 blocks in the deepwater, 2 in the shallow water and 12 in onland. 6 blocks has been relinquished and presently 14 blocks are under operation.
- Under NELP-VI, a total of 52 blocks were awarded of which 21 blocks fall in deepwater, 6 blocks in shallow water and 25 blocks fall in onland. All 52 blocks are presently under operation.
- Under NELP-VII, out of 57 offered blocks, bids were received for 44 blocks. The offered blocks comprise 19 deepwater, 9 shallow offshore and 29 onland blocks. 41 blocks were awarded in this NELP round.

- Under NELP-VIII, a total of 70 blocks, which are the highest number of exploration blocks ever offered under NELP, were on offer for exploration of hydrocarbon. Total area of these blocks was about 0.163 million sq.km. The offered blocks comprise 24 deepwater, 28 shallow offshore and 18 onland including type S blocks. 32 blocks were awarded in this NELP round.
- Under NELP-IX, a total of 34 blocks, were an offer for exploration of Hydrocarbon. Total area offered was 88,807 sq.km. The offered blocks comprise 8 deepwater, 7 shallow offshore and 19 onland including 8 type S blocks. 14 blocks were awarded in this NELP round till 31.03.2012.

<b>Round</b>	<b>Launch Year</b>	<b>Signing Year</b>
PRE-NELP	1993	1993-2003
NELP-I	1999	Apr, 2000
NELP-II	2000	Jul, 2001
NELP-III	2002	Feb, 2003
NELP-IV	2003	Feb, 2004
NELP-V	2005	Sep, 2005
NELP-VI	2006	Mar, 2007
NELP-VII	2007	Dec, 2008
NELP-VIII	2009	Jun, 2010
NELP-IX	2010	March 2012

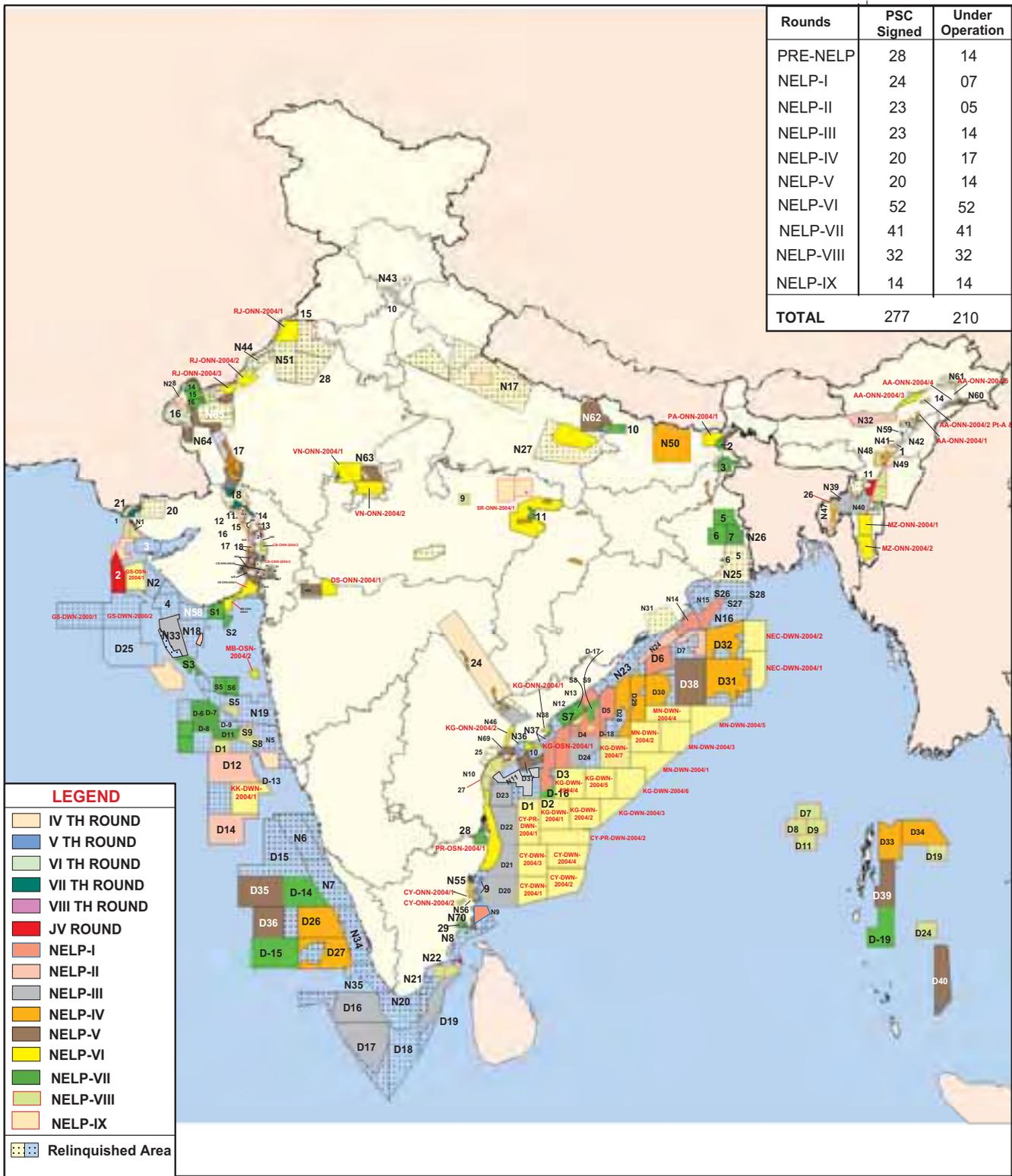
**Status of Blocks under NELP**

Round	Offered	Awarded				Relinquished	Operational
		Deep Water	Shallow Water	Onland	Total		
NELP-I	48	7	16	1	24	17	7
NELP-II	25	8	8	7	23	18	5
NELP-III	27	9	6	8	23	9	14
NELP-IV	24	10	-	10	20	3	17
NELP-V	20	6	2	12	20	6	14
NELP-VI	55	21	6	25	52	-	52
NELP-VII	57	11	7	23	41	-	41
NELP-VIII	70	8	11	13	32	-	32
NELP-IX	34	-	2	12	14*	-	14
<b>TOTAL</b>	<b>360</b>	<b>80</b>	<b>58</b>	<b>111</b>	<b>249</b>	<b>53</b>	<b>196</b>

\* Awarded till 31.03.2012

## PRE-NELP & NELP EXPLORATION BLOCKS UNDER OPERATION BY NOC'S & Pvt/JV COMPANIES

Rounds	PSC Signed	Under Operation
PRE-NELP	28	14
NELP-I	24	07
NELP-II	23	05
NELP-III	23	14
NELP-IV	20	17
NELP-V	20	14
NELP-VI	52	52
NELP-VII	41	41
NELP-VIII	32	32
NELP-IX	14	14
<b>TOTAL</b>	<b>277</b>	<b>210</b>



(AS ON 01-04-2012)

SYNOPSIS OF ACTIVITIES TILL 2011-12

**EXPLORATION BLOCKS AWARDED UNDER PRE-NELP**

(As on 01.04.2012)

SL. NO.	BASIN	BLOCK NAME	REF. NO ON MAP	CONSORTIUM (PARTICIPATING INTEREST)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA ( in sq.km )	PRESENT AREA
<b>CURRENT ACTIVE BLOCKS (14 BLOCKS)</b>								
<b>ONLAND</b>								
1	PG	GN-ON-90/3	24	HOEC(75)& MIL(25)	29-03-1993	29200	7350	21850
2	RJ	RJ-ON-90/1	17	CEIL (35), CEHL (35) & ONGC (30)	15-05-1995	11108	7996.73	3111.2
3		RJ-ON/6	16	FEL(10),ISIL(65) &NOCL(25)	30-06-1998	5378	1351.84	4026.2
4	CB	CB-ON/7	22	HOEC ( 50) & GSPCL(50)	-	525	517.36	7.64
5		CB-ON/2	23	GSPC(80), GGR(20)	12-04-2000	1710	844	866
6		CB-ON/1	18	RIL(40),TIOL(50)& OOHL(10)	16-07-1998	7390	5857	1533
7		CB-ON/3	19	EOL 100%	16-07-1998	510	390.95	119.05
8	GK	GK-ON/4	21	FEL(100)	30-06-1998	1550	775	775
9	AA	AAP-ON-94/1	14	HOEC(40.32),OIL(16.12)&IOC(43.56)	30-06-1998	870	565	305
10		AA-ON-07*	13	CRL(65) & ACL(35)	19-02-1999	1934	1615	319
11		AA-ONJ/2	11	ONGC(100)	07-11-2003	1595	318	1277
<b>SHALLOW WATER</b>								
12	CB	CB-OS/1	6	ONGC(55.26), HOEC (38.07) & TPL(6.7)	19-11-1996	3290	2444	846
13		CB-OS/2	7	CAIRN(40),ONGC(50)&TPL(10)	-	3315	3110	205
14	GK	GK-OSJ/3	2	RIL(60),ONGC(25)& OIL(15)	06-09-2001	5725	0	5725
<b>RELINQUISHED BLOCKS (13 BLOCKS)</b>								
15	AA	AA-ON/3	26	OKLAND(100)	-	3000	3000	0
16		CR-ON-90/1	12	PONEI(29),EOL(16),IOC(35)&OIL(20)	-	2570	2570	0
17	RJ	RJ-ON-90/5	15	ESSAR (75) & POGC(25)	-	16030	16030	0
18		RJ-ON-90/4	28	EOL	-	16600	16600	0
19	GK	GK-ON-90/2	20	OKLAND(100)	-	11820	11820	0
20		GK-OS/5	3	RIL(40),TOIL(50)&OKLAND(10)	-	5000	5000	0
21		GK-OSJ/1	1	RIL(50),TULLOW(25) &ONGC(25)	-	1275	1275	0
22	KG	KG-ON/1	25	RIL(40) & TOIL(60)	-	4180	4180	0
23		KG-OS/6	10	CAIRN(50) & VIDIOCON(50)	-	8775	8775	0
24		KG-OS-90/1	27	HARDY	-	3720	3720	0
25	MB	BB-OS/5	5	ESSAR (79) &PETROM SA(21)	-	9095	9095	0
26	CY	CY-OS/2	9	HEPI(75) & GAIL(25)	19-11-1996	5010	5010	0
27	GS	SR-OS-94/1	4	RIL(100)	12-04-2000	9150	9150	0
<b>TOTAL AREA :</b>						<b>170325</b>	<b>129359.88</b>	<b>40965.09</b>

NOTE : \* SUBJUDICE

AA	-	Assam Arakan	MB	-	Mumbai
AN	-	Andaman Nicobar	MN	-	Mahanadi - NEC
PG	-	Pranhita Godavari	KK	-	Kerala Konkan
CB	-	Cambay	SR	-	South Rewa
RJ	-	Rajasthan	WB	-	Bengal
GK	-	Gujarat Kutch	VN	-	Vindhyan
GS	-	Gujarat Saurashtra	DS	-	Deccan Syneclise
GV	-	Ganga Valley	PR	-	Palar
HF	-	Himalayan Foreland	PA	-	Purnea
KG	-	Krishna Godavari	MZ	-	Mizoram
CY	-	Cauvery			

## EXPLORATION BLOCKS AWARDED UNDER FIRST ROUND OF NELP (NELP-I)

(As on 01.04.2012)

SL. NO.	BASIN	BLOCK NAME	REF. NO ON MAP	CONSORTIUM (PARTICIPATING INTEREST)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						( in sq.km )		
<b>CURRENT ACTIVE BLOCKS (7 BLOCKS)</b>								
<b>DEEP WATER</b>								
1	KG	KG-DWN-98/1	D1	RIL(70) & BPEAL (30)	12-04-2000	10810	4110	6700
2		KG-DWN-98/2	D2	ONGC(65),CEIL(10),PIBBV(15) & HOEIBV(10)	12-04-2000	9757	2462	7295
3		KG-DWN-98/3	D3	RIL(60), BPEAL (30) & NIKO(10)	12-04-2000	7645	0	7645
4		KG-DWN-98/5	D5	ONGC(85) & OIL(15)	12-04-2000	8980	4490	4490
5	MN	MN-DWN-98/2	D6	RIL(70) & BPEAL	12-04-2000	9605	2410	7195
6		MN-DWN-98/3	D7	ONGC(60) & PIB-BV(40)	12-04-2000	10005	5017	4988
<b>SHALLOW WATER</b>								
7	MN	NEC-OSN-97/2	N-15	RIL(60), BPEAL(30) & NIKO(10)	12-04-2000	14535	5074	9461
<b>RELINQUISHED BLOCKS (17 BLOCKS)</b>								
8	MN	NEC-OSN-97/1	N-16	GAZPROM(100)	12-04-2000	10425	10425	0
9	MN	MN-OSN-97/3	N-14	ONGC(85) & GAIL(15)	12-04-2000	5740	5740	0
10	KG	KG-DWN-98/4	D4	ONGC(55), BG(30) & OIL(15)	12-04-2000	9940	9940	0
11		KG-OSN-97/4	N-10	RIL(100)	12-04-2000	4020	4020	0
12		KG-OSN-97/3	N-11	RIL(100)	12-04-2000	2460	2460	0
13		KG-OSN-97/2	N-12	RIL(100)	12-04-2000	4790	4790	0
14		KG-OSN-97/1	N-13	ONGC(100)	12-04-2000	2785	2785	0
15	CY	CY-OSN-97/1	N-9	Mosbacher(20) & HOEC(80)	12-04-2000	4940	4940	0
16	CY	CY-OSN-97/2	N-8	OIL(100)	12-04-2000	5215	5215	0
17	KK	KK-OSN-97/2	N-6	RIL(100)	12-04-2000	19450	19450	0
18		KK-OSN-97/3	N-7	ONGC(100)	12-04-2000	15910	15910	0
19	MB	MB-OSN-97/2	N-3	RIL(100)	12-04-2000	5270	5270	0
20		MB-OSN-97/3	N-4	RIL(100)	12-04-2000	5740	5740	0
21		MB-OSN-97/4	N-5	ONGC(70) & IOC(30)	12-04-2000	18870	18870	0
22	SR	SR-OSN-97/1	N-2	RIL(100)	12-04-2000	5040	5040	0
23	GK	GK-OSN-97/1	N-1	RIL(100)	12-04-2000	1465	1465	0
24	GV	GV-ONN-97/1	N-17	ONGC(40),IOC(30),CEIL(15) & CEEPC(15)	12-04-2000	36750	36750	0
<b>TOTAL AREA :</b>						<b>230147</b>	<b>182373</b>	<b>47774</b>

## EXPLORATION BLOCKS AWARDED UNDER SECOND ROUND OF NELP (NELP-II)

(As on 01.04.2012)

SL. NO.	BASIN	BLOCK NAME	REF. NO ON MAP	CONSORTIUM (PARTICIPATING INTEREST)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						( in sq.km )		
<b>CURRENT ACTIVE BLOCKS (5 BLOCKS)</b>								
<b>SHALLOW WATER</b>								
1	GS	GS-OSN-2000/1	N18	RIL 90%,HEPI 10%	17-07-2001	8841	2951	5890
2	MN	MN-OSN-2000/2	N24	ONGC 40%, GAIL 20%, IOC 20%, OIL 20%	17-07-2001	8330	4269	4061
<b>ONLAND</b>								
3	AA	AS-ONN-2000/1	N32	RIL 90%,HARDY 10%	17-07-2001	5754	0	5754
4	CB	CB-ONN-2000/1	N29	GSPC 60% ,GAIL 40%	17-07-2001	1424	999	425
5		CB-ONN-2000/2	N30	NIKO 100%	17-07-2001	419	394.75	24.25
<b>RELINQUISHED BLOCKS (18 BLOCKS)</b>								
6	KK	KK-DWN-2000/1	D12	RIL 100%	17-07-2001	18113	18113	0
7		KK-DWN-2000/2	D13	ONGC 85%, GAIL 15%	17-07-2001	20998	20998	0
8		KK-DWN-2000/3	D14	RIL 100%	17-07-2001	14889	14889	0
9		KK-DWN-2000/4	D15	ONGC 100%	17-07-2001	26149	26149	0
10		KK-OSN-2000/1	N20	ONGC 100%	17-07-2001	16125	16125	0
11	CY	CY-OSN-2000/1	N21	ONGC 100%	17-07-2001	5920	5920	0
12		CY-OSN-2000/2	N22	ONGC 100%	17-07-2001	3530	3530	0
13	GS	GS-DWN-2000/1	D8	ONGC 100%	17-07-2001	13937	13937	0
14		GS-DWN-2000/2	D9	ONGC 85%, GAIL 15%	17-07-2001	14825	14825	0
15	MB	MB-DWN-2000/1	D10	ONGC 85%, IOC 15%	17-07-2001	11239	11239	0
16		MB-DWN-2000/2	D11	ONGC 50%, GAIL15% IOC 15%, OIL 10%, GSPC 10%	17-07-2001	19106	19106	0
17		MB-OSN-2000/1	N19	ONGC 75%, IOC 15%, GSPC 10%	17-07-2001	18414	18414	0
18	MN	MN-OSN-2000/1	N23	ONGC 100%	17-07-2001	6730	6730	0
19		MN-ONN-2000/1	N31	ONGC 20%, GAIL 20%, IOC 20%, OIL 25% SUNTERA 15%	17-07-2001	7900	7900	0
20	WB	WB-OSN-2000/1	N25	ONGC 85%, IOC 15%	17-07-2001	6700	6700	0
21		WB-ONN-2000/1	N26	ONGC 85%, IOC 15%	17-07-2001	12505	12505	0
22	GV	GV-ONN-2000/1	N27	ONGC 85%, IOC 15%	17-07-2001	23500	23500	0
23	RJ	RJ-ONN-2000/1	N28	OIL 60% SUNTERA 40%	17-07-2001	2535	2535	0
<b>TOTAL AREA :</b>						<b>267883</b>	<b>251728.75</b>	<b>16154.25</b>

## EXPLORATION BLOCKS AWARDED UNDER THIRD ROUND OF NELP (NELP-III)

(As on 01.04.2012)

SL. NO.	BASIN	BLOCK NAME	REF. NO ON MAP	CONSORTIUM (PARTICIPATING INTEREST)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA ( in sq.km )	PRESENT AREA
<b>CURRENT ACTIVE BLOCKS (14 BLOCKS)</b>								
<b>DEEP WATER</b>								
1	KK	KK-DWN-2001/2	D17	RIL(70) & BPEAL (30)	04-02-2003	31515	8000	23515
2		KK-DWN-2001/1	D16	RIL(70) & BPEAL(30)	04-02-2003	27315	6847	20468
3	CY	CY-DWN-2001/2	D20	RIL(70) & BPEAL(30)	04-02-2003	14325	0	14325
4		CY-PR-DWN-2001/3	D21	RIL(70) & BPEAL(30)	04-02-2003	8600	0	8600
5		CY-PR-DWN-2001/4	D22	RIL(70) & BPEAL(30)	04-02-2003	10590	0	10590
6	PR	PR-DWN-2001/1	D23	RIL(70) & BPEAL(30)	04-02-2003	8255	2100	6155
7	KG	KG-DWN-2001/1	D24	RIL(60), BPEAL(30) & HEPI(10)	04-02-2003	11605	2910	8695
<b>SHALLOW WATER</b>								
8	KG	KG-OSN-2001/3	N38	GSPC(80),GGR(10) & JOGPL(10)	04-02-2003	1850	1320	530
<b>ONLAND</b>								
9	AA	AA-ONN-2001/1	N39	ONGC(100)	04-02-2003	3010	1514	1496
10		AA-ONN-2001/2	N40	ONGC(80) & IOC(20)	04-02-2003	5340	1335	4005
11		AA-ONN-2001/3	N41	ONGC(85) & OIL(15%)	04-02-2003	110	0	110
12		AA-ONN-2001/4	N42	ONGC(100)	04-02-2003	645	0	645
13	CB	CB-ONN-2001/1	N45	ONGC(70),CEIL(15) & CED(15)	04-02-2003	215	189	26
14	HF	HF-ONN-2001/1	N43	ONGC(100)	04-02-2003	3175	1661.13	1513.88
<b>RELINQUISHED BLOCKS (9 BLOCKS)</b>								
15	KK	KK-DWN-2001/3	D18	ONGC(100)	04-02-2003	21775	21775	0
16		KK-OSN-2001/2	N34	ONGC(100)	04-02-2003	14120	14120	0
17		KK-OSN-2001/3	N35	ONGC(100)	04-02-2003	8595	8595	0
18	CY	CY-DWN-2001/1	D19	ONGC(80) & OIL(20)	04-02-2003	12425	12425	0
19	KG	KG-OSN-2001/1	N36	RIL(100)	04-02-2003	1100	1100	0
20		KG-OSN-2001/2	N37	RIL(100)	04-02-2003	210	210	0
21	GS	GS-OSN-2001/1	N33	ONGC(100)	04-02-2003	9468	9468	0
22	RJ	RJ-ONN-2001/1	N44	ONGC(30), OIL(40)&SUNTERA(30)	04-02-2003	3425	3425	0
23	PG	PG-ONN-2001/1	N46	ONGC(100)	04-02-2003	6920	6920	0
<b>TOTAL AREA :</b>						<b>204588</b>	<b>103914.13</b>	<b>100673.88</b>

**EXPLORATION BLOCKS AWARDED UNDER FOURTH ROUND OF NELP (NELP-IV)**

(As on 01.04.2012)

SL. NO.	BASIN	BLOCK NAME	REF. NO ON MAP	CONSORTIUM (PARTICIPATING INTEREST)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA ( in sq.km )	PRESENT AREA
<b>CURRENT ACTIVE BLOCKS (17 BLOCKS)</b>								
<b>DEEP WATER</b>								
1	KK	KK-DWN-2002/2	D26	ONGC(80) & HPCL(20)	06-02-2004	22810	5703	17107
2		KK-DWN-2002/3	D27	ONGC(80) & HPCL(20)	06-02-2004	20910	5228	15682
3	KG	KG-DWN-2002/1	D28	ONGC(70), OIL(20) & BPCL(10)	06-02-2004	10600	2650	7950
4	MN	MN-DWN-2002/1	D29	ONGC(36), ENI(34), OIL(20) & BPCL-10	06-02-2004	9980	2497	7483
5		MN-DWN-2002/2	D30	ONGC(75) & BGEPI(25)	06-02-2004	11390	2848	8542
6		NEC-DWN-2002/1	D31	RIL(60),BPEAL (30)& HARDY(10)	06-02-2004	25565	6391	19174
7		NEC-DWN-2002/2	D32	ONGC(100)	06-02-2004	15465	3879	11586
8	AN	AN-DWN-2002/1	D33	ONGC(100)	06-02-2004	10990	2751.20	8238.80
9		AN-DWN-2002/2	D34	ONGC(100)	06-02-2004	12495	0	12495
<b>ONLAND</b>								
10	AA	AA-ONN-2002/1	N47	JOGPL(20) & GAIL(80)	06-02-2004	1680	420	1260
11		AA-ONN-2002/3	N48	OIL(30) & ONGC(70)	06-02-2004	1460	365	1095
12		AA-ONN-2002/4	N49	ONGC(90) & OIL(10)	06-02-2004	1060	0	1060
13	CB	CB-ONN-2002/1	N52	ONGC(70) & CEBGI(30)	06-02-2004	135	99	36
14		CB-ONN-2002/2	N53	JOGPL(30), GSPC(60) & GGR(10)	06-02-2004	125	31.60	93.40
15		CB-ONN-2002/3	N54	GSPC(55), JEPL(20), PPCL(15) & GGR (10)	06-02-2004	285	245.2	39.8
16	CY	CY-ONN-2002/1	N55	JOGPL(30) GAIL(50) & GSPC(20)	06-02-2004	680	175	505
17		CY-ONN-2002/2	N56	ONGC(60) & BPRL(40)	06-02-2004	280	140	140
<b>RELINQUISHED BLOCKS (3 BLOCKS)</b>								
18	GV	GV-ONN-2002/1	N50	CEIL(50) & CESL(50)	06-02-2004	15550	15550	0
19	GS	GS-DWN-2002/1	D25	ONGC(100)	06-02-2004	21450	21450	0
20	RJ	RJ-ONN-2002/1	N51	OIL(60) & ONGC(40)	06-02-2004	9900	9900	0
<b>TOTAL AREA :</b>						<b>192810</b>	<b>80323.00</b>	<b>112487.00</b>

## EXPLORATION BLOCKS AWARDED UNDER FIFTH ROUND OF NELP (NELP-V)

(As on 01.04.2012)

SL. NO.	BASIN	BLOCK NAME	REF. NO ON MAP	CONSORTIUM (PARTICIPATING INTEREST)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA ( in sq.km )	PRESENT AREA
<b>CURRENT ACTIVE BLOCKS (14 BLOCKS)</b>								
<b>DEEP WATER</b>								
1	KG	KG-DWN-2003/1	D37	RIL(60), BPEAL(30) & HEPI(10)	23-09-2005	3288	0	3288
2	MN	MN-DWN-2003/1	D38	RIL(55) NIKO(15) & BPEAL(30)	23-09-2005	17050	0	17050
3	AN	AN-DWN-2003/1	D39	ONGC(100)	23-09-2005	9970	0	9970
4		AN-DWN-2003/2	D40	ENI (40), ONGC(45) & GAIL(15%)	23-09-2005	13110	0	13110
<b>SHALLOW WATER</b>								
5	CB	CB-OSN-2003/1	N57	ONGC(100)	23-09-2005	2394	598.5	1795.5
<b>ONLAND</b>								
6	AA	AA-ONN-2003/1	N59	JOGP(10), JSPL(35), GSPC(20) & GAIL(35)	23-09-2005	81	0	81
7	VN	VN-ONN-2003/1	N63	ONGC(100)	23-09-2005	3585	912	2673
8	RJ	RJ-ONN-2003/1	N64	ENI(34), ONGC(36) & CE2L(30)	23-09-2005	1335	0	1335
9		RJ-ONN-2003/2	N65	FEL(10), BIL(40) & XOH(50)	23-09-2005	13195	8962.84	4232.16
10	CB	CB-ONN-2003/1	N66	RIL (100)	23-09-2005	635	0	635
11		CB-ONN-2003/2	N67	GSPC(50), GAIL(20), JSPL(20) & GGR(10)	23-09-2005	448	276	172
12	DS	DS-ONN-2003/1	N68	GGR(100)	23-09-2005	3155	789.25	2365.75
13	KG	KG-ONN-2003/1	N69	CEIL(24), ONGC(51) & CE4L(25)	23-09-2005	1697	435	1262
14	CY	CY-ONN-2003/1	N70	NR(V)L(100)	23-09-2005	957	0	957
<b>RELINQUISHED BLOCKS (6 BLOCKS)</b>								
15	KK	KK-DWN-2003/1	D35	RIL(100)	23-09-2005	18245	18245	0
16		KK-DWN-2003/2	D36	RIL(100)	23-09-2005	12285	12285	0
17	GS	GS-OSN-2003/1	N58	ONGC(51) & CE7L(49)	23-09-2005	5970	5970	0
18	AA	AA-ONN-2003/2	N60	GPI(30), NTPC(40), CRL(15) & Brownstone (15)	23-09-2005	295	295	0
19		AA-ONN-2003/3	N61	OIL(85) & HPCL(15)	23-09-2005	275	275	0
20	GV	GV-ONN-2003/1	N62	CEIL(24), CE1L(25) & ONGC(51)	23-09-2005	7210	7210	0
<b>TOTAL AREA :</b>						<b>115180</b>	<b>56253.59</b>	<b>58926.41</b>

## EXPLORATION BLOCKS AWARDED UNDER SIXTH ROUND OF NELP (NELP-VI)

(As on 01.04.2012)

SL. NO.	BASIN	BLOCK NAME	REF. NO ON MAP	CONSORTIUM (PARTICIPATING INTEREST)	DATE OF SIGNING CONTRACT	AWARDED	RELINQ.	PRESENT
						AREA	AREA	AREA
						( in sq.km )		
<b>DEEP WATER</b>								
1	KK	KK-DWN-2004/1	D1	<b>ONGC(45)</b> , CIL(40) & TATA(15)	02-03-2007	12324	0	12324
2	CY	CY-DWN-2004/1	D4	<b>ONGC(70)</b> , GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	10302	0	10302
3		CY-DWN-2004/2	D5	<b>ONGC(70)</b> , GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	12059	0	12059
4		CY-DWN-2004/3	D6	<b>ONGC(70)</b> , GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	12017	0	12017
5		CY-DWN-2004/4	D7	<b>ONGC(70)</b> , GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	12025	0	12025
6		CY-PR-DWN-2004/1	D8	<b>ONGC(70)</b> , GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	13451	0	13451
7		CY-PR-DWN-2004/2	D9	<b>ONGC(70)</b> , GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	9994	0	9994
8	KG	KG-DWN-2004/1	D10	<b>ONGC(70)</b> , GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	11951	0	11951
9		KG-DWN-2004/2	D11	<b>ONGC(60)</b> , GSPC(10), HPCL(10), GAIL(10) & BPCL(10)	02-03-2007	11851	0	11851
10		KG-DWN-2004/3	D12	<b>ONGC(70)</b> , GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	6205	0	6205
11		KG-DWN-2004/4	D13	<b>RIL(70)</b> & BPEAL (30)	02-03-2007	11904	0	11904
12		KG-DWN-2004/5	D14	<b>ONGC(50)</b> , GSPC(10), HPCL(10), GAIL(10), OIL(10) & BPCL(10%)	02-03-2007	11922	0	11922
14		KG-DWN-2004/6	D15	<b>ONGC(60)</b> , GSPC(10), HPCL(10), GAIL(10) & OIL(10)	02-03-2007	10907	0	10907
13		KG-DWN-2004/7	D16	<b>RIL (70)</b> & BPEAL (30)	02-03-2007	11856	0	11856
15	MN	MN-DWN-2004/1	D17	<b>RIL (70)</b> & BPEAL (30)	02-03-2007	9885	0	9885
16		MN-DWN-2004/2	D18	<b>RIL (70)</b> & BPEAL (30)	02-03-2007	11813	0	11813
17		MN-DWN-2004/3	D19	<b>RIL (70)</b> & BPEAL (30)	02-03-2007	11316	0	11316
18		MN-DWN-2004/4	D20	<b>RIL (70)</b> & BPEAL (30)	02-03-2007	8822	0	8822
19		MN-DWN-2004/5	D21	<b>RIL (70)</b> & BPEAL (30)	02-03-2007	10454	0	10454
20		NEC-DWN-2004/1	D22	<b>SANTOS (100)</b>	02-03-2007	7790	0	7790
21		NEC-DWN-2004/2	D23	<b>SANTOS (100)</b>	02-03-2007	8706	0	8706
<b>SHALLOW WATER</b>								
22	GS	GS-OSN-2004/1	1	<b>ONGC (100)</b>	02-03-2007	6589	0	6589
23	CB	CB-OSN-2004/1	2	<b>FOCUS(10)</b> & NEWBURY (90%)	02-03-2007	2616	0	2616
24	MB	MB-OSN-2004/1	3	<b>GSPC(20)</b> , IOC(20), GAIL(20), HPCL(20) & PETROGAS (20)	02-03-2007	1520	0	1520
25		MB-OSN-2004/2	4	<b>PETROGAS(20)</b> ,GAIL(20),IOC(20),GSPC(20) & HPCL(20)	02-03-2007	741	0	741
26	PR	PR-OSN-2004/1	5	<b>CEIL(10)</b> , CAIRN INDIA(25), ONGC(35) & TATA(30)	02-03-2007	9417	0	9417
27	KG	KG-OSN-2004/1	6	<b>ONGC (55)</b> & BGEPI (45)	02-03-2007	1151	20	1131
<b>ONLAND</b>								
28	MZ	MZ-ONN-2004/1	7	<b>OIL(75)</b> , SUNTERA(10) & SHIV-VANI(15)	02-03-2007	3213	0	3213
29	MZ	MZ-ONN-2004/2	8	<b>NAFTOGAZ(10)</b> ,RNRL(10),GEOPETROL(10)& REL(70)	02-03-2007	3619	0	3619
30	AA	AA-ONN-2004/1	9	<b>OIL(85)</b> & SHIV-VANI (15)	02-03-2007	144	36	108
31		AA-ONN-2004/2	10	<b>OIL (90)</b> & SUNTERRA (10)	02-03-2007	218	0	218
32		AA-ONN-2004/3	11	<b>ESSAR ENERGY(90)</b> & ESSAR OIL (10)	02-03-2007	1252	0	1252
33		AA-ONN-2004/4	12	<b>ADANI ENTERPRISES(35)</b> , AISPL(20), NAFTOGAZ(10) & WPPL(35)	02-03-2007	95	0	95
34		AA-ONN-2004/5	13	<b>ESSAR ENERGY(90)</b> & ESSAR OIL (10)	02-03-2007	46	0	46
35	PA	PA-ONN-2004/1	14	<b>ONGC (100)</b>	02-03-2007	2537	0	2537
36	GV	GV-ONN-2004/1	15	<b>ONGC (100)</b>	02-03-2007	8354	0	8354
37	SR	SR-ONN-2004/1	16	<b>PRIZE PETROLEUM (10)</b> & JAIPRAKASH ASSOCIATES LTD. (90)	02-03-2007	13277	0	13277
38	VN	VN-ONN-2004/1	17	<b>ONGC (100)</b>	02-03-2007	5801	0	5801
39		VN-ONN-2004/2	18	<b>ONGC (100)</b>	02-03-2007	4466	0	4466
40	RJ	RJ-ONN-2004/1	19	<b>GSPC(20)</b> , GAIL(20), HPCL(20), HALLWORTHY(PANAMA)(10), NITINFIRE (10), SILVERWAVE(MAYANMAR) (10) & BPCL (10)	02-03-2007	4613	0	4613
41		RJ-ONN-2004/2	20	<b>OIL (75)</b> & GEOGLOBAL (25)	02-03-2007	2196	0	2196
42		RJ-ONN-2004/3	21	<b>OIL(60)</b> , GEOGLOBAL(25) & HPCL (15)	02-03-2007	1330	0	1330
43	CB	CB-ONN-2004/1	22	<b>ONGC(50)</b> , GSPC(40) & HERAMEC (10)	02-03-2007	32	0	32
44		CB-ONN-2004/2	23	<b>ONGC(50)</b> , GSPC(40) & SUNTERA RES. LTD. (10)	02-03-2007	423	0	423
45		CB-ONN-2004/3	24	<b>ONGC(40)</b> , GSPC(35) & ENSEARCH (25)	02-03-2007	113	0	113
46		CB-ONN-2004/4	25	<b>ONGC(50)</b> , GSPC(40) & HERAMEC(10)	02-03-2007	70	0	70
47		CB-ONN-2004/5	26	<b>ADANI ENTERPRISES(35)</b> , ADANI PORT(20), NAFTOGAZ (10) & WELSPUN (35)	02-03-2007	75	67.28	7.72
48	DS	DS-ONN-2004/1	27	<b>GEOGLOBAL RESOURCES (BARBADOS) (100)</b>	02-03-2007	2649	0	2649
49	KG	KG-ONN-2004/1	28	<b>OIL(90)</b> & GEOGLOBAL(10)	02-03-2007	549	38	511
50		KG-ONN-2004/2	29	<b>GSPC (40)</b> , GAIL (40) & PETROGAS (20)	02-03-2007	1140	0	1140
51	CY	CY-ONN-2004/1	30	<b>ONGC (80)</b> & BPCL(20)	02-03-2007	214	0	214
52		CY-ONN-2004/2	31	<b>ONGC (80)</b> & BPCL(20)	02-03-2007	375	0	375
<b>TOTAL AREA :</b>						<b>306389</b>	<b>161.28</b>	<b>306227.72</b>

## EXPLORATION BLOCKS AWARDED UNDER SEVENTH ROUND OF NELP (NELP-VII)

(As on 01.04.2012)

SL NO.	BASIN	BLOCK NAME	REF. NO ON MAP	CONSORTIUM (PARTICIPATING INTEREST)	DATE OF SIGNING CONTRACT	AWARDED AREA (SQ. KM.)
<b>DEEP WATER</b>						
1.	<b>MUMBAI</b>	MB-DWN-2005/2	D-6	<b>BHP BILLITON (26) &amp; GVK (74)</b>	22-12-2008	3,660
2.		MB-DWN-2005/3	D-7	<b>BHP BILLITON (26) &amp; GVK (74)</b>	22-12-2008	3,097
3.		MB-DWN-2005/4	D-8	<b>BHP BILLITON (26) &amp; GVK (74)</b>	22-12-2008	3,408
4.		MB-DWN-2005/5	D-9	<b>BHP BILLITON (26) &amp; GVK (74)</b>	22-12-2008	3,169
5.		MB-DWN-2005/7	D-11	<b>BHP BILLITON (26) &amp; GVK (74)</b>	22-12-2008	3,324
6.		MB-DWN-2005/9	D-13	<b>BHP BILLITON (26) &amp; GVK (74)</b>	22-12-2008	3,138
7.	<b>KERALA-KONKAN</b>	KK-DWN-2005/1	D-14	<b>BHP BILLITON (26) &amp; GVK (74)</b>	22-12-2008	14,675
8.		KK-DWN-2005/2	D-15	<b>ONGC (90) &amp; GSPC (10)</b>	22-12-2008	19,234
9.	<b>KRISHNA-GODAVARI</b>	KG-DWN-2005/1	D-16	<b>ONGC (70), IOCL (20) &amp; GSPC (10)</b>	22-12-2008	1,727
10.		KG-DWN-2005/2	D-17	<b>BP EXPLORATION (30) &amp; RIL (70)</b>	22-12-2008	1,949
11.	<b>ANDAMAN-NICOBAR</b>	AN-DWN-2005/1	D-19	<b>ONGC (90) &amp; OIL (10)</b>	22-12-2008	11,837
<b>TOTAL AREA : 69,218</b>						
<b>SHALLOW WATER</b>						
12.	<b>MUMBAI</b>	MB-OSN-2005/1	S-1	<b>ONGC (80) &amp; GSPC (20)</b>	22-12-2008	2811
13.		MB-OSN-2005/2	S-2	<b>ADAANI WELSPUN (100)</b>	22-12-2008	1191
14.		MB-OSN-2005/3	S-3	<b>EEPL (50) &amp; NEIL (50)</b>	22-12-2008	2810
15.		MB-OSN-2005/5	S-5	<b>ONGC (70) &amp; GSPC (30)</b>	22-12-2008	2402
16.		MB-OSN-2005/6	S-6	<b>ONGC (80) &amp; GSPC (20)</b>	22-12-2008	2820
17.	<b>KRISHNA-GODAVARI</b>	KG-OSN-2005/1	S-7	<b>ONGC (60), GSPC (20) &amp; HMEL (20)</b>	22-12-2008	2810
18.		KG-OSN-2005/2	S-8	<b>ONGC (80) &amp; HMEL (20)</b>	22-12-2008	1881
<b>TOTAL AREA : 16,725</b>						
<b>ONLAND</b>						
19.	<b>ASSAM-ARAKAN</b>	AA-ONN-2005/1	1	<b>ONGC (60), OIL (30) &amp; ACL (10)</b>	22-12-2008	363
20.	<b>PURNEA</b>	PA-ONN-2005/1	2	<b>ONGC (100)</b>	22-12-2008	1096
21.		PA-ONN-2005/2	3	<b>ONGC (100)</b>	22-12-2008	2552
22.	<b>BENGAL</b>	WB-ONN-2005/2	5	<b>ONGC (100)</b>	22-12-2008	3792
23.		WB-ONN-2005/3	6	<b>ONGC (100)</b>	22-12-2008	4001
24.		WB-ONN-2005/4	7	<b>ONGC (75) &amp; OIL (25)</b>	22-12-2008	3940
25.	<b>GANGA</b>	GV-ONN-2005/3	10	<b>ONGC (80) &amp; TATA PETRO (20)</b>	22-12-2008	2227
26.	<b>SATPURA-REWA</b>	SR-ONN-2005/1	11	<b>DEEP ENERGY(10),DEEP INDUS(70)</b> KANVEL FINANCE (10) & SAVLA ELECTRONICS (10)	22-12-2008	789
27.	<b>RAJASTHAN</b>	RJ-ONN-2005/1	14	<b>HOEC (25), BPRL (25), JSPL (25)</b> ONGC & IMC (25)	22-12-2008	1424
28.		RJ-ONN-2005/2	15	<b>OIL (60), HOEC (20)</b> HPCL & MITTAL ENERGY (20)	22-12-2008	1517
29.		RJ-ONN-2005/3	16	<b>GSPC (60) &amp; ONGC (40)</b>	22-12-2008	1217
30.	<b>CAMBAY</b>	CB-ONN-2005/2	18A&B	<b>IOCL (100)</b>	22-12-2008	81
31.		CB-ONN-2005/3	19	<b>MERCATOR PETROLEUM (100)</b>	22-12-2008	48
32.		CB-ONN-2005/4	20	<b>ONGC (51) &amp; GSPC (49)</b>	22-12-2008	31
33.		CB-ONN-2005/5	21	<b>OMKAR NATUAL RESOUR. (100)</b>	22-12-2008	83
34.		CB-ONN-2005/6	22	<b>OMKAR NATUAL RESOUR. (100)</b>	22-12-2008	102
35.		CB-ONN-2005/7	23	<b>IOCL (100)</b>	22-12-2008	199
36.		CB-ONN-2005/8	24	<b>VASUNDHARA RESOUR (100)</b>	22-12-2008	133
37.		CB-ONN-2005/9	25	<b>MERCATOR PETROLEUM (100)</b>	22-12-2008	170
38.		CB-ONN-2005/10	26	<b>ONGC (51) &amp; GSPC (49)</b>	22-12-2008	270
39.		CB-ONN-2005/11	27	<b>QUEST (20), QQVS (40),</b> SREI (20), VIPL2 (10) & PRIM (10)	22-12-2008	223.87
40.	<b>PALAR</b>	PR-ONN-2005/1	28	<b>ONGC (80) &amp; TATA PETRO. (20)</b>	22-12-2008	1807
41.	<b>CAUVERY</b>	CY-ONN-2005/1	29	<b>GAIL (40), GSPC (30) &amp;</b> BENGAL ENERGY (30)	22-12-2008	946
<b>TOTAL AREA : 27,011.87</b>						
<b>GRAND TOTAL : 112954.87 SQ.KM</b>						

## EXPLORATION BLOCKS AWARDED UNDER EIGHTH ROUND OF NELP (NELP-VIII)

(As on 01.04.2012)

SL NO.	BASIN	BLOCK NAME	REF. NO ON MAP	CONSORTIUM (PARTICIPATING INTEREST)	DATE OF SIGNING CONTRACT	AWARDED AREA (SQ. KM.)
<b>DEEP WATER</b>						
1.	MUMBAI	MB-DWN-2009/1	D-1	CEIL(10) & CIL (90)	30-06-2010	2,961
2.	KRISHNA-GODAVARI	KG-DWN-2009/1	D-6 (A&B)	BGEPIL(30), OIL(15), ONGC(45) & APGIC (10)	30-06-2010	1,800
3.	ANDAMAN-NICOBAR	AN-DWN-2009/1	D-7	ONGC (70) & OIL (30)	30-06-2010	4,981
4.		AN-DWN-2009/2	D-8	ONGC (60) & OIL (40)	30-06-2010	3,995
5.		AN-DWN-2009/3	D-9	ONGC (60) & OIL (40)	30-06-2010	3,992
6.		AN-DWN-2009/5	D-11	ONGC (90) & GSPC (10)	30-06-2010	4,002
7.		AN-DWN-2009/13	D-19	ONGC (70), NTPC (10), GAIL (10) & GSPC (10)	30-06-2010	4,007
8.		AN-DWN-2009/18	D-24	ONGC (60), OIL (30) & GAIL (10)	30-06-2010	4,040
<b>TOTAL AREA : 29,778</b>						
<b>SHALLOW WATER</b>						
9.	GUJARAT-KUTCH	GK-OSN-2009/1	S-1	ONGC (40), GSPC (20), AWEL (20) & IOC (20)	30-06-2010	1,264
10.		GK-OSN-2009/2	S-2	ONGC (40), AWEL (30) & IOC (30)	30-06-2010	1,242
11.	MUMBAI	MB-OSN-2009/3	S-5	BHP (100)	30-06-2010	1,492
12.		MB-OSN-2009/6	S-8	BHP (100)	30-06-2010	1,876
13.		MB-OSN-2009/7	S-9	BHP (100)	30-06-2010	1,865
14.	CAUVERY	CY-OSN-2009/1	S-19	Bengal Energy International Inc(100)	30-06-2010	1,362
15.		CY-OSN-2009/2	S-20	OIL (50) & ONGC (50)	30-06-2010	1,621
16.	KRISHNA-GODAVARI	KG-OSN-2009/1	S-22	ONGC (80), APGIC (10) & NTPC (10)	30-06-2010	1,472
17.		KG-OSN-2009/2	S-23	ONGC (90) & APGIC (10)	30-06-2010	1,471
18.		KG-OSN-2009/3	S-24	CEIL (10), CIL (90)	30-06-2010	1,988
19.		KG-OSN-2009/4	S-25	ONGC (50), OIL (30), NTPC (10) & APGIC (10)	30-06-2010	835
<b>TOTAL AREA : 16,488</b>						
<b>ONLAND</b>						
20.	ASSAM-ARAKAN	AA-ONN-2009/1	1	JOGPL(47), JEKPL(17) & JODPL(36)	30-06-2010	2,217
21.		AA-ONN-2009/2	2	JOGPL(47), JEKPL(17) & JODPL(36)	30-06-2010	1,740
22.		AA-ONN-2009/3	3	ONGC (50) & OIL (50)	30-06-2010	84
23.		AA-ONN-2009/4	4	OIL (50) & ONGC (50)	30-06-2010	84
24.	VINDHYAN	VN-ONN-2009/3	9	ONGC (100)	30-06-2010	1,250
25.	CAMBAY	CB-ONN-2009/1	11	ESGPL (100)	30-06-2010	113
26.		CB-ONN-2009/2	12	ESGPL (100)	30-06-2010	68
27.		CB-ONN-2009/3	13	HCIL (100)	30-06-2010	71
28.		CB-ONN-2009/4	14	ONGC (50) & GSPC (50)	30-06-2010	58
29.		CB-ONN-2009/5	15	NTPC (100)	30-06-2010	165
30.		CB-ONN-2009/6	16	HCIL (100)	30-06-2010	177
31.		CB-ONN-2009/7	17	ESGPL (100)	30-06-2010	144
32.		CB-ONN-2009/8	18	JPIL (87) & JPPL (13)	30-06-2010	136
<b>TOTAL AREA : 6,307</b>						
<b>GRAND TOTAL : 52,573 SQ.KM.</b>						

## EXPLORATION BLOCKS AWARDED UNDER NINTH ROUND OF NELP (NELP-IX)

(As on 01.04.2012)

SL NO.	BASIN	BLOCK NAME	REF. NO ON MAP	CONSORTIUM (PARTICIPATING INTEREST)	DATE OF SIGNING CONTRACT	AWARDED AREA (SQ. KM.)
<b>SHALLOW WATER</b>						
1.	<b>GUJARAT-KUTCH</b>	GK-OSN-2010/1	S-1	<b>ONGC(60)</b> , OIL(30) & GAIL (10)	28-03-2012	1,361
2.		GK-OSN-2010/2	S-2	<b>ONGC(90)</b> & GAIL (10)	28-03-2012	1,625
						<b>TOTAL AREA : 2,986</b>
<b>ONLAND</b>						
3.	<b>ASSAM-ARAKAN</b>	AA-ONN-2010/2	2	<b>OIL(40)</b> , ONGC(30), GAIL(20) & East West Petroleum (10)	28-03-2012	396
4.		AA-ONN-2010/3	3	<b>OIL(40)</b> , ONGC(40) & BPRL(20)	28-03-2012	171
5.	<b>VINDHYAN</b>	VN-ONN-2010/1	4	<b>Deep Energy LLC (10)</b> & KGN Industries (90)	28-03-2012	3776
6.		VN-ONN-2010/2	5	<b>Deep Energy LLC (10)</b> , Deep Natural Resources Limited (15) & Safak WSB Energy Pvt. Ltd. (75)	28-03-2012	4909
7.	<b>RAJASTHAN</b>	RJ-ONN-2010/2	8	<b>Focus Energy Ltd. (10)</b> & Birkbeck Investments Ltd. (90)	28-03-2012	535
8.	<b>CAMBAY</b>	CB-ONN-2010/1	9	<b>ONGC (100)</b>	28-03-2012	782
9.		CB-ONN-2010/3	11	<b>Deep Energy LLC (10)</b> & KGN Oil & Gas Pvt. Ltd. (90)	28-03-2012	534
10.		CB-ONN-2010/4	12	<b>Pratibha Oil &amp; Natural Gas Pvt. Ltd.(100)</b>	28-03-2012	61
11.		CB-ONN-2010/5	13	<b>Pan India Consultants (20)</b> & Frost International Ltd. (80)	28-03-2012	49
12.		CB-ONN-2010/6	14	<b>ONGC (80)</b> & IOC (20)	28-03-2012	39
13.		CB-ONN-2010/10	18	<b>Sankalp Oil &amp; Natural Resources Ltd. (100)</b>	27-06-2012	122
14.		CB-ONN-2010/11	19	<b>GAIL (25)</b> , BPRL (25), EIL (20) & BFIL (15) & MIEL (15)	28-03-2012	131
						<b>TOTAL AREA : 11,505</b>
						<b>GRAND TOTAL : 14,491 SQ.KM.</b>

ONGC	-	Oil & Natural Gas Corpn. Ltd.	Deep Energy -	Deep Energy LLC.
IOC	-	Indian Oil Corpn. Ltd.	MP	Mercator Petroleum Ltd.
OIL	-	Oil India Ltd.	ONR	Omkar Natural Resources Pvt. Ltd.
GSPC	-	Gujarat State Petroleum Corporation Ltd.	Quest	Quest Petroleum Ltd.
RIL	-	Reliance Industries Ltd.	Pan	Pan India Consultants
EOL	-	Essar Oil Ltd.	Sanklap	Sankalp Oil & Natural Resources Ltd.
Okland	-	Okland Offshore Holdings Ltd.	NR(V)L	Niko Resources (NELP-V) Ltd.
FEL	-	Focus Energy Ltd.	ENI	ENI India Ltd.
VPL	-	Videocon Petroleum Ltd.	JOGP	Jubilant Oil & Gas Pvt. Ltd.
HEPI	-	Hardy Exploration & Production (India) Inc.	JSPL	Jubilant Securities Pvt. Ltd.
JTI	-	Joshi Technologies Inc.	NTPC	National Thermal Power Corporation Ltd.
EEIPL	-	Energy Equity India Petroleum Pty. Ltd.	PONEI	Premier Oil North East India
BPRL	-	Bharat Petroleum Resources Ltd.	POGC	Polish Oil & Gas Company
CEIL	-	Cairn Energy India Pty. Ltd.	HOEC	Hindusthan Oil Exploration Company Ltd.
CPIL	-	Cairn Petroleum India Ltd.	GAIL	Gas Authority of India Ltd.
CESL	-	Cairn Energy Search Ltd.	NIKO	Niko Resources Ltd.
CEHL	-	Cairn Energy Hydrocarbons Ltd.	GEO	Geo Global Resources (India) Inc.
MIL	-	Mosbacher India LLC	PPCL	Prize Petroleum Company Ltd.
BGEPII	-	British Gas Explo. & Prod. India Ltd.	GGR	GeoGlobal Resources (Barbados) Inc.
Naftogaz	-	Naftogaz India	CRL	Canoro Resources Ltd.
Santos	-	Santos	ACL	Assam Company Ltd.
BHP	-	BHP Billiton Pvt. Ltd.	Gaz	Gazprom
Adani	-	Adani Welspun	GPI	GeoPetrol International Inc.
BPEAL	-	BP Exploration (Alpha) Ltd.	XOH	X Oil, Maruritius

## BASIN-WISE DISTRIBUTION OF PEL AREAS UNDER OPERATION (PRE-NELP & NELP BLOCKS)

SL. NO.	(No. of Blocks)	BASIN		AREA (Sq. Km)									TOTAL
		PRE-NELP	NELP-I	NELP-II	NELP-III	NELP-IV	NELP-V	NELP-VI	NELP-VII	NELP-VIII	NELP-IX		
<b>DEEP WATER (66)</b>													
1	MUMBAI (7)	—	—	—	—	—	—	—	19,796	2,961	—	22,757	
2	KERALA-KONKAN (7)	—	—	—	43,983	32,789	—	12,324	33,909	—	—	123,005	
3	CAUVERY (5)	—	—	—	14,325	—	—	46,403	—	—	—	60,728	
4	CAUVERY-PALAR (4)	—	—	—	19,190	—	—	23,445	—	—	—	42,635	
5	PALAR (1)	—	—	—	6,155	—	—	—	—	—	—	6,155	
6	KRISHNA-GODAVARI (17)	—	26,130	—	8,695	7,950	3,288	76,596	3,676	1,800	—	128,135	
7	MAHANADI-NEC (14)	—	12,183	—	—	46,785	17,050	68,786	—	—	—	144,804	
8	ANDAMAN-NICOBAR (11)	—	—	—	—	20733.80	23,080	—	11,837	25,017	—	80,667.80	
<b>TOTAL AREA :</b>		<b>—</b>	<b>38,313</b>	<b>—</b>	<b>92,348</b>	<b>108,257.80</b>	<b>43,418</b>	<b>227,554</b>	<b>69,218</b>	<b>29,778</b>	<b>—</b>	<b>608,886.80</b>	
<b>SHALLOW WATER (34)</b>													
9	GUJARAT-KUTCH (5)	5,725	—	—	—	—	—	—	—	2,506	2,986	11,217	
10	GUJARAT-SAURASHTRA (2)	—	—	5,890	—	—	—	6,589	—	—	—	12,479	
11	CAMBAY (4)	1,051	—	—	—	—	1,795.50	2,616	—	—	—	5,462.50	
12	MUMBAI (10)	—	—	—	—	—	—	2,261	12,034	5,233	—	19,528	
13	CAUVERY (2)	—	—	—	—	—	—	—	—	2,983	—	2,983	
14	KRISHNA-GODAVARI (8)	—	—	—	530	—	—	1,131	4,691	5,766	—	12,118	
15	MAHANADI-NEC (2)	—	9,461	4,061	—	—	—	—	—	—	—	13,522	
16	PALAR (1)	—	—	—	—	—	—	9,417	—	—	—	9,417	
<b>TOTAL AREA :</b>		<b>6,776</b>	<b>9,461</b>	<b>9,951</b>	<b>530</b>	<b>—</b>	<b>1,795.50</b>	<b>22,014</b>	<b>16,725</b>	<b>16,488</b>	<b>2,986</b>	<b>86,726.50</b>	
<b>ONLAND (110)</b>													
17	VINDHYAN (6)	—	—	—	—	—	2,673	10,267	—	1,250	8,685	22,875	
18	GUJARAT-KUTCH (1)	775	—	—	—	—	—	—	—	—	—	775	
19	RAJASTHAN (11)	7,137.40	—	—	—	—	5,567.16	8,139	4,158	—	535	25,536.56	
20	CAMBAY (42)	2,525.69	—	449.25	26	169.20	807	645.72	1340.87	932	1,718	8613.73	
21	PRANHITA-GODAVARI (1)	21,850	—	—	—	—	—	—	—	—	—	21,850	
22	PALAR (1)	—	—	—	—	—	—	—	1,807	—	—	1,807	
23	CAUVERY (6)	—	—	—	—	645	957.00	589	946.00	—	—	3,137	
24	HIMALAYAN FORELAND (1)	—	—	—	1,513.88	—	—	—	—	—	—	1,513	
25	GANGA VALLEY (2)	—	—	—	—	—	—	8,354	2,227	—	—	10,581	
26	ASSAM-ARAKAN (24)	1,901	—	5,754	6,256	3,415	81	1,719	363	4,125	567	24,181	
27	DECCAN SYNECLISE (2)	—	—	—	—	—	2,365.75	2,649	—	—	—	5,014.75	
28	KRISHNA-GODAVARI (3)	—	—	—	—	—	1,262	1,651	—	—	—	2,913	
29	MIZORAM (2)	—	—	—	—	—	—	6,832	—	—	—	6,832	
30	PURNEA (3)	—	—	—	—	—	—	2,537	3,648	—	—	6,185	
31	BENGAL (3)	—	—	—	—	—	—	—	11,733	—	—	11,733	
32	SOUTH REWA (2)	—	—	—	—	—	—	13,277	789	—	—	14,066	
<b>TOTAL AREA :</b>		<b>34,189.09</b>	<b>—</b>	<b>6,203.25</b>	<b>7,795.88</b>	<b>4,229.20</b>	<b>13,712.91</b>	<b>56,659.72</b>	<b>27,011.87</b>	<b>6,307</b>	<b>11,505</b>	<b>167,613.92</b>	
<b>GRAND TOTAL :</b>		<b>40,965.09</b>	<b>47,774</b>	<b>16,154.25</b>	<b>100,673.88</b>	<b>112,487</b>	<b>58,926.41</b>	<b>306,227.72</b>	<b>112,954.87</b>	<b>52,573</b>	<b>14,491</b>	<b>863,227.22</b>	

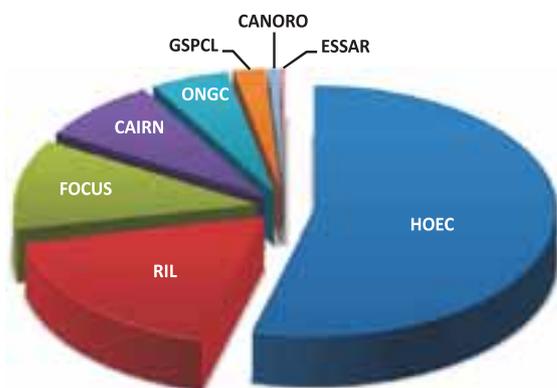
## COMPANY-WISE DISTRIBUTION OF PEL AREAS UNDER OPERATION (PRE-NELP & NELP ROUNDS)

(As on 01.04.2012)

SL. NO.	COMPANY/ OPERATOR	NO. OF BLOCKS	PRE-NELP	NELP-1	NELP-II	NELP-III	NELP-IV	NELP-V	NELP-VI	NELP-VII	NELP-VIII	NELP-IX	TOTAL
1	ONGC	86	2123	16773	4061	7795.88	90319.80	14438.50	165113	65601	32693	3807	402,725.18
2	RIL	26	7258	31001	11644	92348	19174	20973	76050	—	—	—	258,448
3	OIL	12	—	—	—	—	1095	—	7576	1517	1705	567	12,460
4	CAIRN	6	3316.20	—	—	—	—	1262	9417	—	4949	—	18,944.20
5	GSPC	9	866	—	425	530	39.80	172	7273	1217	—	—	10,522.80
6	HOEC	4	22162.64	—	—	—	—	—	—	1424	—	—	23,586.64
7	CANORO	1	319	—	—	—	—	—	—	—	—	—	319
8	ESSAR	4	119.05	—	—	—	—	—	1298	2810	—	—	4,227.05
9	JOGP	6	—	—	—	—	1858.40	81	—	—	3957	—	5,896.40
10	FOCUS	5	4801.20	—	—	—	—	4232.16	2616	—	—	535	12,184.36
11	GGR	2	—	—	—	—	—	2365.75	2649	—	—	—	5014.75
12	NR(V)L	1	—	—	—	—	—	957	—	—	—	—	957
13	NIKO	1	—	—	24.25	—	—	—	—	—	—	—	24.25
14	ENI	2	—	—	—	—	—	14445	—	—	—	—	14,445
15	SANTOS	2	—	—	—	—	—	—	16496	—	—	—	16,496
16	PETROGAS	1	—	—	—	—	—	—	741	—	—	—	741
17	NAFTOGAZ	3	—	—	—	—	—	—	3619	—	—	—	3,619
18	PRIZE PETROLEUM	1	—	—	—	—	—	—	13277	—	—	—	13,277
19	GAIL	2	—	—	—	—	—	—	—	946	—	131	1,077
20	IOCL	2	—	—	—	—	—	—	—	280	—	—	280
21	BHP BILLITON	10	—	—	—	—	—	—	—	34471	5233	—	39,704
22	BP EXPLORATION	1	—	—	—	—	—	—	—	1949	—	—	1,949
23	ADAANI WELSPUN	3	—	—	—	—	—	—	102.72	1191	—	—	1,293.72
24	DEEP ENERGY	4	—	—	—	—	—	—	—	789	—	9219	10,008
25	MERCATOR PET.	2	—	—	—	—	—	—	—	218	—	—	218
26	OMKAR NATURAL	2	—	—	—	—	—	—	—	185	—	—	185
27	VASUNDHARA RES.	1	—	—	—	—	—	—	—	133	—	—	133
28	QUEST	1	—	—	—	—	—	—	—	223.87	—	—	223.87
29	BGEPIL	1	—	—	—	—	—	—	—	—	1800	—	1,800
30	BENGAL ENERGY	1	—	—	—	—	—	—	—	—	1362	—	1,362
31	ESGPL	3	—	—	—	—	—	—	—	—	325	—	325
32	HCIL	2	—	—	—	—	—	—	—	—	248	—	248
33	JPIL	1	—	—	—	—	—	—	—	—	136	—	136
34	NTPC	1	—	—	—	—	—	—	—	—	165	—	165
35	PRATIBHA OIL	1	—	—	—	—	—	—	—	—	—	61	61
36	PAN INDIA	1	—	—	—	—	—	—	—	—	—	49	49
37	SANKALP	1	—	—	—	—	—	—	—	—	—	122	122
<b>TOTAL</b>		<b>210</b>	<b>40,965.09</b>	<b>47,774</b>	<b>16,154.25</b>	<b>100,673.88</b>	<b>112,487</b>	<b>58,926.41</b>	<b>306,227.72</b>	<b>112,954.87</b>	<b>52,573</b>	<b>144,91</b>	<b>863,227.22</b>

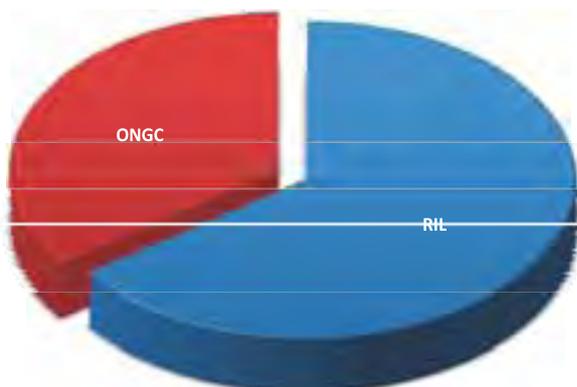
**COMPANY - WISE DISTRIBUTION OF PEL AREAS UNDER OPERATION  
(PRE-NELP & NELP ROUNDS)**

**PRE - NELP**



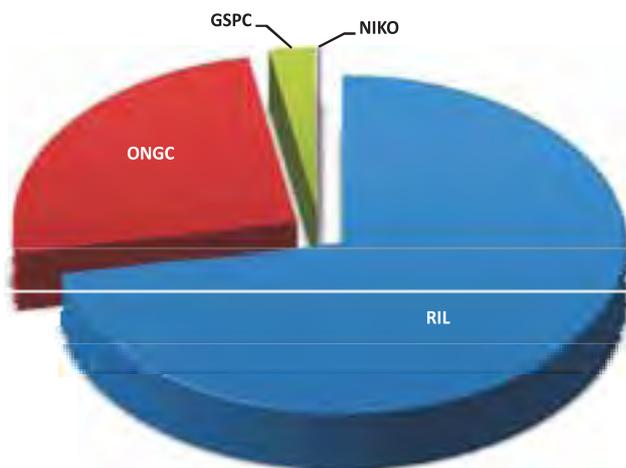
COMPANY / OPERATOR	Present Area (Sq. Km.)	(%)
HOEC	22,162.64	54.10
RIL	7,258.00	17.72
FOCUS	4,801.20	11.72
CAIRN	3,316.20	8.10
ONGC	2,123.00	5.18
GSPCL	866.00	2.11
CANORO	319.00	0.78
ESSAR	119.05	0.29
<b>TOTAL</b>	<b>40,965.09</b>	<b>100</b>

**NELP - I**



COMPANY / OPERATOR	Present Area (Sq. Km.)	(%)
RIL	31,001.00	64.89
ONGC	16,773.00	35.11
<b>TOTAL</b>	<b>47,774.00</b>	<b>100</b>

**NELP - II**

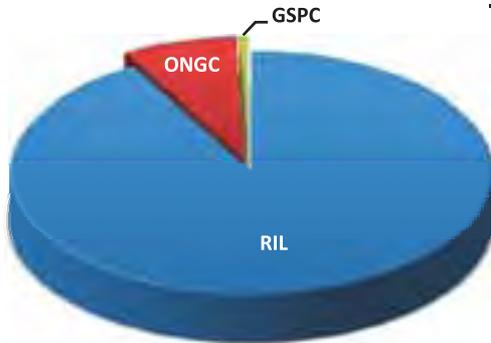


COMPANY / OPERATOR	Present Area (Sq. Km.)	(%)
RIL	11,644.00	72.08
ONGC	4,061.00	25.14
GSPC	425.00	2.63
NIKO	24.25	0.15
<b>TOTAL</b>	<b>16,154.25</b>	<b>100</b>

As on 01.04.12

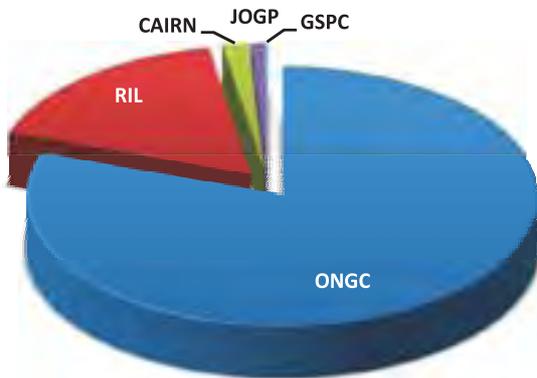
**COMPANY - WISE DISTRIBUTION OF PEL AREAS UNDER OPERATION  
(PRE-NELP & NELP ROUNDS)**

**NELP - III**



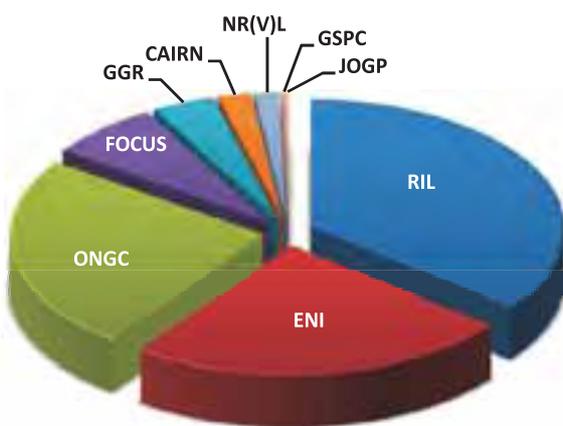
COMPANY / OPERATOR	Present Area (Sq. Km.)	(%)
RIL	92,348.00	91.73
ONGC	7,795.88	7.74
GSPC	530.00	0.53
<b>TOTAL</b>	<b>100,673.88</b>	<b>100.00</b>

**NELP - IV**



COMPANY / OPERATOR	Present Area (Sq. Km.)	(%)
ONGC	90,319.80	80.29
RIL	19,174.00	17.05
JOGP	1,858.40	1.65
OIL	1,095.00	0.97
GSPC	39.80	0.04
<b>TOTAL</b>	<b>112,487.00</b>	<b>100.00</b>

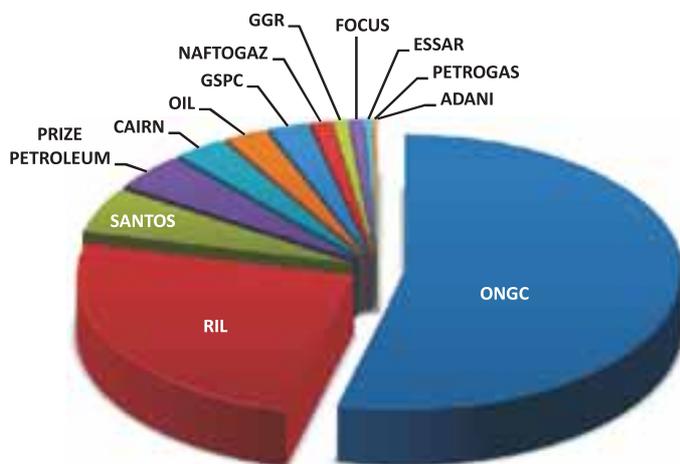
**NELP - V**



COMPANY / OPERATOR	Present Area (Sq. Km.)	(%)
RIL	20,973.00	35.59
ENI	14,445.00	24.51
ONGC	14,438.50	24.50
FOCUS	4,232.16	7.18
GGR	2,365.75	4.01
CAIRN	1,262.00	2.14
NR(V)L	957.00	1.62
GSPC	172.00	0.29
JOGP	81.00	0.14
<b>TOTAL</b>	<b>58,926.41</b>	<b>100.00</b>

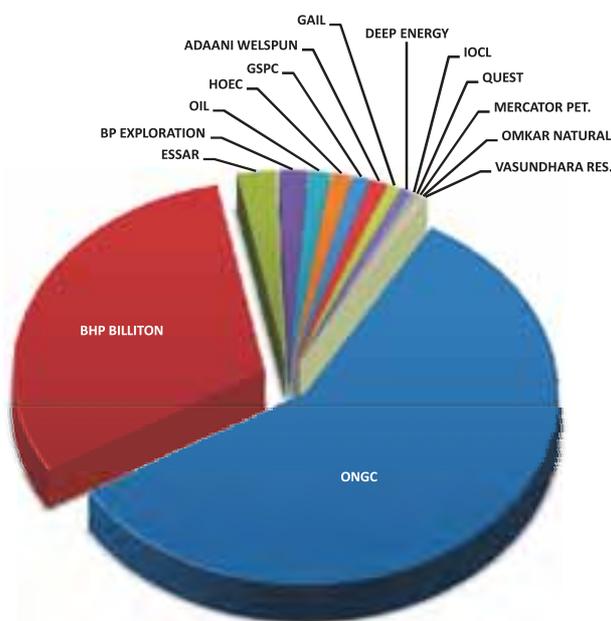
**COMPANY - WISE DISTRIBUTION OF PEL AREAS UNDER OPERATION  
(PRE-NELP & NELP ROUNDS)**

**NELP - VI**



COMPANY / OPERATOR	Present Area (Sq. Km.)	(%)
ONGC	165,113.00	53.92
RIL	76,050.00	24.83
SANTOS	16,496.00	5.39
PRIZE PETROLEUM	13,277.00	4.34
CAIRN	9,417.00	3.08
OIL	7,576.00	2.47
GSPC	7,273.00	2.38
NAFTOGAZ	3,619.00	1.18
GGR	2,649.00	0.87
FOCUS	2,616.00	0.85
ESSAR	1,298.00	0.42
PETROGAS	741.00	0.24
ADANI	102.72	0.03
<b>TOTAL</b>	<b>306,227.72</b>	<b>100.00</b>

**NELP - VII**

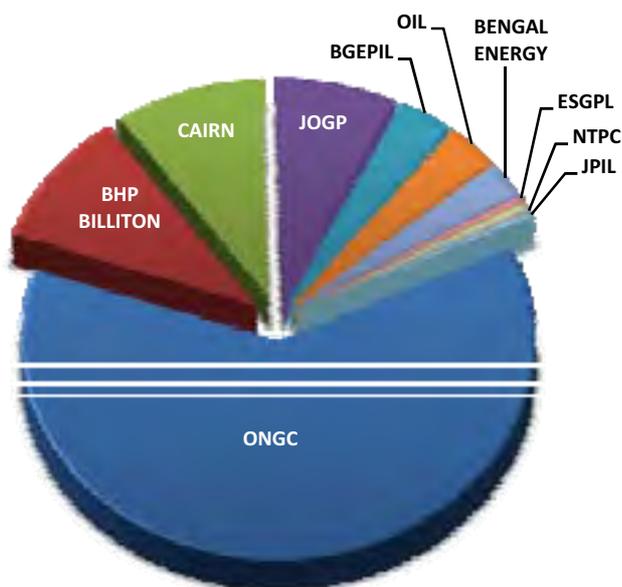


COMPANY / OPERATOR	Present Area (Sq. Km.)	(%)
ONGC	65,601.00	58.08
BHP BILLITON	34,471.00	30.52
ESSAR	2,810.00	2.49
BP EXPLORATION	1,949.00	1.73
OIL	1,517.00	1.34
HOEC	1,424.00	1.26
GSPC	1,217.00	1.08
ADAANI WELSPUN	1,191.00	1.05
GAIL	946.00	0.84
DEEP ENERGY	789.00	0.70
IOCL	280.00	0.25
QUEST	223.87	0.20
MERCATOR PET.	218.00	0.19
OMKAR NATURAL	185.00	0.16
VASUNDHARA RES.	133.00	0.12
<b>TOTAL</b>	<b>112,954.87</b>	<b>100.00</b>

## COMPANY-WISE DISTRIBUTION OF PEL AREAS UNDER OPERATION (PRE-NELP & NELP ROUNDS)

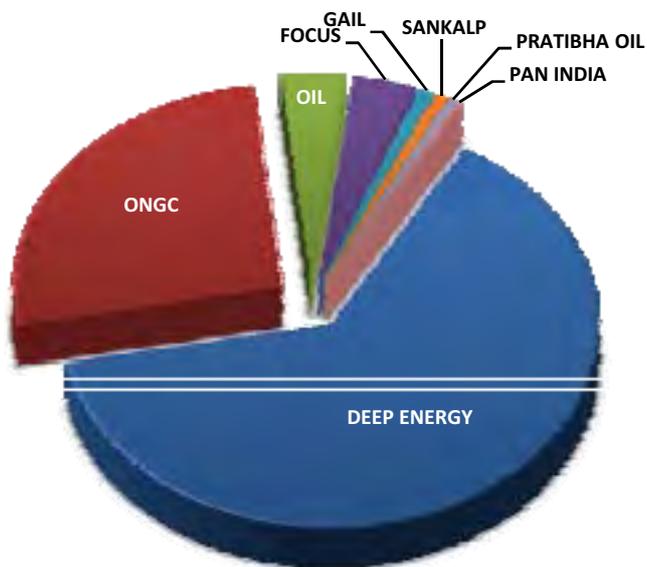
(As on 01.04.2012)

### NELP - VIII



COMPANY / OPERATOR	Present Area (Sq. Km.)	(%)
ONGC	32,693.00	62.19
BHP BILLITON	5,233.00	9.95
CAIRN	4,949.00	9.41
JOGP	3,957.00	7.53
BGEPI	1,800.00	3.42
OIL	1,705.00	3.24
BENGAL ENERGY	1,362.00	2.59
ESGPL	325.00	0.62
HCIL	248.00	0.47
NTPC	165.00	0.31
JPIL	136.00	0.26
<b>TOTAL</b>	<b>52,573.00</b>	<b>100.00</b>

### NELP - IX



COMPANY / OPERATOR	Present Area (Sq. Km.)	(%)
DEEP ENERGY	9,219.00	63.62
ONGC	3,807.00	26.27
OIL	567.00	3.91
FOCUS	535.00	3.69
GAIL	131.00	0.90
SANKALP	122.00	0.84
PRATIBHA OIL	61.00	0.42
PAN INDIA	49.00	0.34
<b>TOTAL</b>	<b>14,491.00</b>	<b>100.00</b>

## SMALL AND MEDIUM SIZED FIELDS AWARDED TO PVT/JV COMPANIES

SL. NO.	ROUND / BASIN	FIELD	CONSORTIUM (PARTICIPATING INTEREST)	DATE OF SIGNING CONTRACT	PRESENT AREA (Sq. Km.)
<b>A. FIELDS AWARDED</b>					
<b>MEDIUM- SIZED FIELDS</b>					
1.	I ASSAM-ARAKAN	KHARSANG	GEO-ENPRO (10), JUBLIANT ENERGY (KHARSANG) (25), GEOPETROL (25) & OIL (40)	16.06.95	10.00
2.	I K-G OFFSHORE	RAVVA	CEIL (22.5), Videocon Industries Ltd.(25), RAVVA OIL PTE. LTD. (12.5) & ONGC (40)	28.10.94	331.26
3.	I MUMBAI OFFSHORE	MID & SOUTH TAPTI	BRITISH GAS EXPLO. & PROD. INDIA LTD. (BGEPIL) (30), ONGC (40) & RELIANCE IND. LTD. (RIL) (30)	22.12.94	1,471.00
4.		PANNA MUKTA	BGEPIL (30), RIL(30) & ONGC (40) BGEPIL (30), RIL(30) & ONGC (40)	22.12.94 22.12.94	430.00 777.00
<b>TOTAL AREA :</b>					<b>3,010.26</b>
<b>SMALL- SIZED FIELDS</b>					
5.	I CAMBAY	ASJOL	HOEC (50) & GSPCL (50)	03.02.95	15.00
6.		LOHAR	SELAN EXPL. TECH. LTD. (100)	13.03.95	5.00
7.		INDRORA	SELAN EXPL. TECH. LTD. (100)	13.03.95	130.00
8.		BAKROL	SELAN EXPL. TECH. LTD. (100)	13.03.95	36.00
9.		KARJISAN	SELAN EXPL. TECH. LTD. (100)	16.02.04	5.00
10.		WAVEL	JOSHI TECH. INC. (JTI) (100)	20.02.95	9.00
11.		DHOLKA	JOSHI TECH. INC. (JTI) (100)	20.02.95	48.00
12.		BAOLA	INTERLINK PETROLEUM LTD (100)	05.04.95	3.09
13.		MODHERA	INTERLINK PETROLEUM LTD. (100)	23.02.01	12.70
14.		SABARMATI	OILEX NL HOLDINGS(I) LTD. (40) & GSPCL (60)	23.09.94	5.80
15.		CAMBAY	OILEX NL (30), GSPC (55), & OILEX NL HOLDINGS (I) LTD. (15)	23.09.94	161.00
16.		BHANDUT	OILEX NL HOLDINGS(I) LTD. (40) & GSPCL (60)	23.09.94	6.00
17.		HAZIRA	NIKO (33.33) & GSPCL (66.67)	23.09.94	50.00
18.	I CAUVERY OFFSHORE	PY-1	HOEC (100)	06.10.95	75.00
19.	II ASSAM-ARAKAN	AMGURI	CRL / GOI (60) & ASSAM CO. LTD. (40)	23.02.01	52.75
20.	II CAMBAY	N. BALOL	HOEC (25), GSPCL (45) & HERAMEC LTD. (30)	23.02.01	27.30
21.		KANAWARA	HERAMEC LTD. (30) & GSPCL (70)	23.02.01	6.30
22.		ALLORA	HERAMEC LTD. (30) & GSPCL (70)	23.02.01	6.85
23.		UNAWA	GSPCL (70) & HERAMEC LTD. (30)	23.02.01	5.65
24.		N. KATHANA	HERAMEC LTD. (30) & GSPCL (70)	23.02.01	12.20
25.		DHOLASAN	HERAMEC LTD. (30) & GSPCL (70)	23.02.01	8.80
26.		SANGANPUR	HYDROCARBON RES. DEV. CO. (P) LTD. (50) & PRIZE PETROLEUM CORP. LTD. (50)	23.02.01	4.40
27.		OGNAJ	SELAN EXPL. TECH. LTD. (100)	16.02.04	13.65
28.		MATAR	NIKO (65) & GSPC (35)	RELINQUISHED	
<b>TOTAL AREA :</b>					<b>700.40</b>
<b>GRAND TOTAL :</b>					<b>3710.66 Sq.Km.</b>
<b>B. AWARD OF FIELD AWAITING FINALIZATION OF CONTRACT</b>					
1.	II MUMBAI OFF.	RATNA-R-SERIES	POL(10), ESSAR OIL LTD.(50) & ONGC(40)		57.60
<b>C. PRODUCING FIELDS DISCOVERED/DEVELOPED IN EXPLORATION BLOCKS BY PVT./JV COMPANIES</b>					
1.	CAUVERY OFF.	PY-3(CY-OS-90/1)	HARDY (18), ONGC (40), TPL (21) & HOEC (21)		81.00
2.	GULF OF CAMBAY	LAKSHMI (CB-OS/2)	CAIRN(40), ONGC(50) & TPL(10)		121.06
3.		GAURI (CB-OS/2)	CAIRN(40), ONGC(50) & TPL(10)		50.70
4.		CB-X	CAIRN(40), ONGC(50) & TPL(10)		33.30
5.	CAMBAY	NS-A (CB-ONN-2000/2)	NIKO(100)		20.22
6.		BHEEMA (CB-ONN-2000/2)	NIKO(100)		4.03
7.		PALEJ-PROMODA (CB-ON/7)	HOEC(35), GSPC(35) & ONGC(30)		7.64
8.		INGOLI (CB-ONN-2000/1)	GSPC (50), GAIL (50)		14.03
9.		ESU (CB-ON/3)	EOL (70) & ONGC (30)		7.81
10.		TARAPUR-1 (CB-ON/2)	GSPC(56), GGR(14) & ONGC (30)		2.14
11.	RAJASTHAN	DA1, DA2 & DA3 (RJ-ON-90/1)	} CEIL (35), CEHL (35) & ONGC (30) FOCUS(7), ISIL(45.5), NOCL (17.5) & ONGC(30) RIL (60), BPEAL (30) & NIKO(10)		3111.17
12.		RJ-ON/6 (SGL)			176.00
13.	KG OFFSHORE	D-1, D-3 & MA (KG-DWN-98/3)			389.12

## GEOSCIENTIFIC STUDIES BY DGH

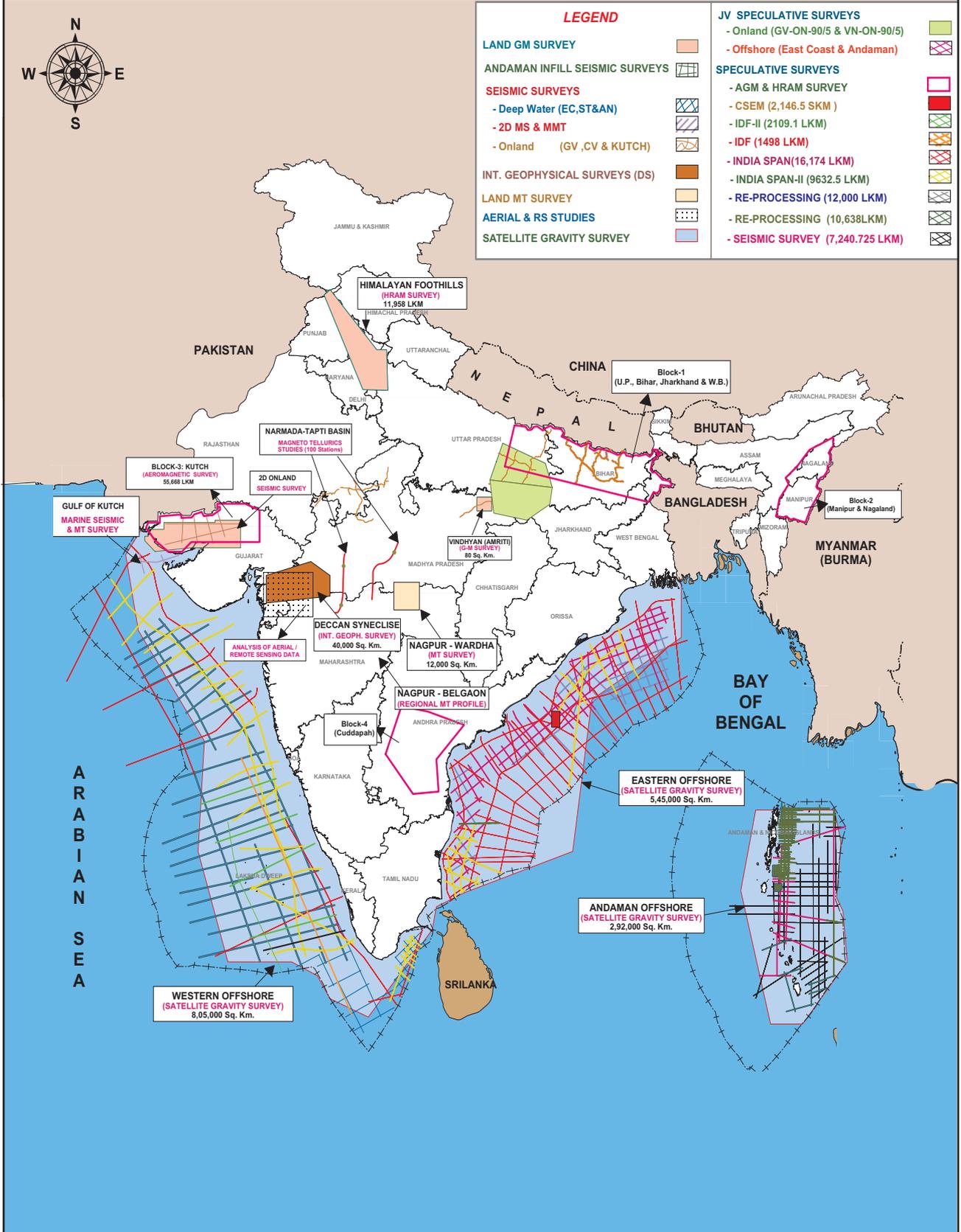
- The DGH has carried out, either alone or in collaboration with reputed companies, several projects to upgrade information in hitherto unexplored/poorly-explored areas. This totals to 2 million sq kms and covers both offshore (82%) and onland (18%).
- Of this total, satellite gravity surveys over the eastern and western offshore areas and Andaman account for 1.642 million sq. Kms. Joint venture offshore speculative geophysical surveys within the same area in eastern offshore and Andaman cover about 0.246 million sq. Kms. These surveys have given valuable indications to structure, tectonics, and sedimentary thickness and play recognition in the deep waters and have provided inputs for modeling studies and for the preparation of hydrocarbon prospect map of the area.
- A 2D seismic coverage of 0.053 million sq. km. was achieved in 1997-98 in the onland areas of U.P., Bihar and M.P. 2D seismic survey was repeated in Bihar in 2002-03 over 0.05 million sq. km. These surveys were carried out to assess the hydrocarbon potential of Vindhyan and Ganga basins. A new lower Vindhyan paleo-embayment comprising of a number of highs and lows basement features has been mapped for the first time. These studies have led to the demarcation of certain prospective areas and with new data, 3 blocks were offered and awarded in Ganga basin under second, fourth and fifth rounds of NELP. In 2003-04, 805.0 GLK 2D seismic data have been acquired from Chambal Valley area to assess the prospectively of the western part of the Vindhyan basin. Three Blocks have been awarded in NELP-V and VI in Vindhyan basin.
- During 1999-2003, 25,000 LKM of 2D seismic surveys were carried out in the deep waters of Andaman, east and west coasts including the southern tip.
- 16174 LKM 2D seismic data have been acquired, processed and interpreted through GX-Technology, USA in eastern & western offshore during 2005-07 under speculative survey programme. Based on this data a good number of blocks were offered and awarded in NELP-VI.
- 690.6 GLK of 2D seismic data has been acquired through NGRI in unexplored Kutch onland basin.
- Integrated geophysical surveys, carried out jointly by DGH and NGRI in the northwestern part of the Deccan Synclise, revealed sub-trappean Mesozoic-Gondwana sediments with a maximum thickness of 3 Kms.
- Aeromagnetic surveys amounting to 24,723 LKM were carried out in Himalayan Foreland area during the year 2003-04, 2004-05 and 2005-06.
- DGH has completed reprocessing of 12000 LKM of 2D seismic data of west coast of India through M/s GGS-Spectrum during the 2007-08.
- DGH has completed Acquisition & processing of Speculative Controlled Source Electromagnetic (CSEM) survey in KG-DWN-2005/3 by EMGS, Norway in 2008 covering an area of 2146.5 sq.km.
- DGH has acquired 55,668.3 LKM of High Resolution Aeromagnetic (HRAM) and 13994.64 LKM Airborne Gravity Magnetic (AGM) data over Kutch, Gujarat through McPhar.

- Speculative 2D seismic API project acquiring 7240.725 LKM data in offshore Andaman was completed through M/s. PGS.
- Speculative 2D seismic API project (India, Span-II) acquiring 9632.5 LKM data in East & West coast of India was completed through Ms GX Technology.
- Speculative reprocessing of 2D seismic data of 10638 LKM was carried out through Ms Spectrum Geo Ltd., UK.
- Under Speculative 2D seismic API project 1498.35 LKM data has been acquired, processed and interpreted through M/s. Fugro Data Services, Switzerland.
- Speculative 2D seismic API project acquiring 2109.113 LKM data was completed through M/s. Fugro Multiclient services Pty Ltd, Australia.
- DGH has acquired 103 stations {Sihore-Akola (63 stns) & Indore-Jalgaon (40 stns)} of Land MT in Central India through NGRI, Hyderabad.
- DGH has completed analysis of Aerial images / Remote sensing data for 302,500 sq.km area in Narmada - Cambay basin by NGRI.
- The Processing and Interpretation of 690.6 GLK onland 2D seismic data has been completed through GEOPIC, ONGC.
- Archival from lower density media to higher density media of Raw and Processed 2D / 3D seismic data has been completed for 11246 (Raw data 10372 + Processed data 874) Cartridges with ~ 100 TB data.
- Geochemical surveys in Deccan Syncline Basin : Surface Geochemical Soil sampling has been completed in 2007. About 1000 soil samples were collected and analyzed for light hydrocarbon gases.
- Oil Shale Investigations : The contract for the project "Resource estimation in respect of oil shale deposits and syncrude potential in North Eastern part of India" was signed between DGH, BRGM, (France) and MECL (India) in September 2007. Geological field mapping, sampling and drilling activities are envisaged.
- Petroleum system modeling studies : DGH has taken up the petroleum system modeling of two basins namely (i) Bengal onland basin and (ii) Kerala-Konkan offshore basin. The study is being carried out by Beicp-Franlab, France. Contract was signed between DGH & Beicp-Franlab in January 2008, currently the modeling study of Kerala-Konkan basin is in progress.

## GEOSCIENTIFIC STUDIES BY DGH

Sl. No.	Area/Block	Survey Type	Area	Achievement (API)	Year	Agreement/ MOU signed with
<b>I. RECONNAISSANCE SURVEY</b>						
1	Western & Eastern Offshore	Satellite Gravity	Offshore	1.642 Million Sq. Km.	1995-98	Petroscan
2	Kutch Offshore & Onland	Aero-Magnetic	Onland	23,730 LKM	1995-96	NRSA
3	Nagpur-Wardha-Belgaum	MT	Onland	352 Stations	1996-98	NGRI
4	Himalayan Foreland	Aero-Magnetic	Onland	11,958 LKM	2003-05	NRSA
5	Punjab and Foot Hills of Himalayas	Aero-Magnetic	Onland	12,765 LKM	2005-06	NRSA
<b>II. JOINT VENTURE SPECULATIVE SURVEYS OFFSHORE</b>						
<b>OFFSHORE</b>						
6	East Coast	2D seismic & GM	Offshore	7428.685 LKM & RI of 4625 LKM of old data	1996-97	Western Geophysical
7	Andaman-Nicobar	2D seismic & GM	Offshore	3606.375 LKM & RI of 695 LKM of old data	1996-97	Western Geophysical
<b>ONLAND</b>						
8	Ganga Valley (GV-ON-90/5)	2D seismic	Onland	634 GLK	1997-98	Alpha Geo
9	Vindhyan (VN-ON-90/5)	2D seismic	Onland	566 GLK	1997-98	Alpha Geo
<b>III. SPECULATIVE SURVEYS</b>						
10	Western & Eastern Offshore	2D seismic	Offshore	16,174 LKM	2005-07	GXT
11	Western Offshore	2D seismic (Re-processing)	Offshore	Reprocessing (12,000 LKM)	2007-08	GGs Spectrum
12	Andaman Ofshore	2D seismic	Offshore	7240.725 LKM	2007-09	PGS
13	Eastern Offshore	CSEM	Offshore	2146.5 sq. km.	2007-08	EMGS
14	Western Offshore	2D seismic	Offshore	1498.35 LKM	2009-10	Fugro Data Services, Switzerland
15	Western Offshore	2D seismic	Offshore	2109.113 LKM	2009-10	Fugro Multiclient Services Pty Ltd Australia
16	West and east coast	2D seismic	Offshore	9632.5 LKM	2008-10	GXT
17	Andaman Islands of India	2D seismic (Re-processing)	Offshore	Reprocessing (10,638 LKM)	2009-10	Spectrum Geo Ltd
18	Kutch	Airborne HRAM	Onland	55,668.3 LKM	2007-09	Mcphar
		Airborne GM	Onland	13,994.64 LKM	2009-10	Mcphar
<b>IV. SEISMIC SURVEYS</b>						
<b>OFFSHORE</b>						
19	Andaman Infill	2D Seismic	Offshore	1484.75 LKM	1999	Western Geco
20	Southern Tip (ST)	2D Seismic	Offshore	2835.925 LKM	2001-02	Large
21	East Coast (EC)	2D Seismic	Offshore	4319.45 LKM	2001-02	Large
22	Andaman-Nicobar (AN)	2D Seismic	Offshore	4307.275 LKM	2001-02	Large
23	West Coast (WC)	2D Seismic	Offshore	12,000.65 LKM	2002-03	Large
<b>ONLAND</b>						
24	Ganga Valley (GV)	2D Seismic	Onland	1135.05 LKM	2002-03	Alpha Geo
25	Chambal Valley (CV)	2D Seismic	Onland	805.00 GLK	2003-04	Alpha Geo
26	Kutch	2D Seismic (Acq.)	Onland	690.6 GLK	2006-09	NGRI
27	Kutch	2D Seismic (P&I)	Onland	690.6 GLK	2010-12	GEOPIC, ONGC
<b>V. INTEGRATED GEOPHYSICAL SURVEYS</b>						
28	Deccan Syncline (DS) Narmada-Tapti Area	Gravity, MT, DRS, 2D seismic	Onland	6000 Stations, 600 & 50 stations, 700 LKM	2003-04	NGRI
<b>VI. GRAVITY -MAGNETIC SURVEYS &amp; OTHER GEOPHYSICAL SURVEYS</b>						
29	Vindhyan (Amriti)	GM	Onland	303 Stations (80 sq.km)	2003-04	NGRI
30	Gulf of Kutch	MS & MMT	Offshore	133.984 LKM & 13Stn.	2006-08	NGRI
31	Central India	Land MT	Onland	103 Stations	2006-09	NGRI
32	Narmada-Cambay/ Deccan Syncline	Analysis of Aerial Images/ Remote sensing data	Onland	302,500 sq. km	2006-08	NGRI

# GEOPHYSICAL SURVEYS CARRIED OUT BY DGH



## ACTIVITIES DURING THE YEAR 2011-12

- E&P Highlights
- NELP-IX blocks awarded (till 31.03.12)
- Oil & Gas Production
- Hydrocarbon Discoveries



## EXPLORATION & PRODUCTION HIGHLIGHTS 2011-12

S. No.	Subject	Parameter	ONGC (Nomination)	OIL (Nomination)	Pvt/JVs	Total
1	Initial In-place reserves (as on 01.04.2012)	Gas (BCM)	2123.99	332.79	1255.30	3712.08
		Oil (MMT)	4526.73	787.97	816.56	6131.26
		<b>O+OEG (MMT)</b>	<b>6650.72</b>	<b>1120.76</b>	<b>2071.86</b>	<b>9843.34</b>
2	Ultimate Reserves (as on 01.04.2012)	Gas (BCM)	1200.48	180.72	676.59	2057.79
		Oil (MMT)	1429.40	236.72	194.89	1861.01
		<b>O+OEG (MMT)</b>	<b>2629.88</b>	<b>417.44</b>	<b>871.48</b>	<b>3918.80</b>
3	Accretion of In-place reserves	Gas (BCM)	97.95	6.00	46.59	150.54
		Oil (MMT)	99.09	11.62	- 4.11	106.6
		<b>O+OEG (MMT)</b>	<b>197.04</b>	<b>16.91</b>	<b>42.48</b>	<b>251.14</b>
4	Accretion of Ultimate Reserves	Gas (BCM)	43.76	2.69	35.92	82.37
		Oil (MMT)	33.16	6.03	0.00	39.19
		<b>O+OEG (MMT)</b>	<b>76.92</b>	<b>8.40</b>	<b>35.92</b>	<b>118.87</b>
5	2D seismic data acquired	Onland (GLKM)	2535	758.97	4180	7473.97
		Offshore (GLKM)	11071	0.0	35764	46835
		<b>TOTAL</b>	<b>13606</b>	<b>758.97</b>	<b>39944</b>	<b>54308.97</b>
6	3D seismic data acquired	Onland (SKM)	2315	267.70	5180	7762.70
		Offshore (SKM)	7506	0.00	19346	26852
		<b>TOTAL</b>	<b>9821</b>	<b>267.70</b>	<b>24526</b>	<b>34614.70</b>
7	Exploratory wells drilled	Onland	100	12	39	151
		Offshore	35	0	26	61
		<b>TOTAL</b>	<b>135</b>	<b>12</b>	<b>65</b>	<b>212</b>
8	Development wells drilled	Onland	238	23	76	337
		Offshore	42	0	10	52
		<b>TOTAL</b>	<b>280</b>	<b>23</b>	<b>86</b>	<b>389</b>
9	Exploratory meterage drilled	Onland ('000 M)	244.65	45.10	82.78	372.53
		Offshore ('000 M)	130.79	0	82.12	212.91
		<b>TOTAL</b>	<b>375.44</b>	<b>45.10</b>	<b>164.90</b>	<b>585.44</b>
10	Development meterage drilled	Onland ('000 M)	445.58	71.43	118.37	635.38
		Offshore ('000 M)	113.11	0	7.78	120.89
		<b>TOTAL</b>	<b>558.69</b>	<b>71.43</b>	<b>126.15</b>	<b>756.27</b>
11	Oil & Gas production	Gas (BCM)	23.32	2.63	21.52	47.47
		Oil (MMT)	23.71	3.85	10.53	38.09
		<b>O+OEG (MMT)</b>	<b>47.03</b>	<b>6.48</b>	<b>32.05</b>	<b>85.56</b>
		<b>CBM (BCM)</b>	-	-	-	<b>0.084</b>

- ◆ Issuance of Essentiality Certificates for import of goods used in petroleum operations.
- ✓ Clearances issued during April 2011 to March 2012. 11,577 cases valued at Rs. 2,511.11 Crores.

## EXPLORATION BLOCKS AWARDED UNDER NINTH ROUND OF NELP (NELP-IX)

(As on 01.04.2012)

SL NO.	BASIN	BLOCK NAME	REF. NO ON MAP	CONSORTIUM (PARTICIPATING INTEREST)	DATE OF SIGNING CONTRACT	AWARDED AREA (SQ. KM.)
<b>SHALLOW WATER</b>						
1.	<b>GUJARAT-KUTCH</b>	GK-OSN-2010/1	S-1	<b>ONGC(60)</b> , OIL(30) & GAIL (10)	28-03-2012	1,361
2.		GK-OSN-2010/2	S-2	<b>ONGC(90)</b> & GAIL (10)	28-03-2012	1,625
						<b>TOTAL AREA : 2,986</b>
<b>ONLAND</b>						
3.	<b>ASSAM-ARAKAN</b>	AA-ONN-2010/2	2	<b>OIL(40)</b> , ONGC(30), GAIL(20) & East West Petroleum (10)	28-03-2012	396
4.		AA-ONN-2010/3	3	<b>OIL(40)</b> , ONGC(40) & BPRL(20)	28-03-2012	171
5.	<b>VINDHYAN</b>	VN-ONN-2010/1	4	<b>Deep Energy LLC(10)</b> &KGNIndustries (90)	28-03-2012	3776
6.		VN-ONN-2010/2	5	<b>Deep Energy LLC (10)</b> , Deep Natural Resources Limited (15) & Safak WSB Energy Pvt. Ltd. (75)	28-03-2012	4909
7.	<b>RAJASTHAN</b>	RJ-ONN-2010/2	8	<b>Focus Energy Ltd. (10) &amp;</b> Birkbeck Investments Ltd. (90)	28-03-2012	535
8.	<b>CAMBAY</b>	CB-ONN-2010/1	9	<b>ONGC (100)</b>	28-03-2012	782
9.		CB-ONN-2010/3	11	<b>Deep Energy LLC (10) &amp;</b> KGN Oil & Gas Pvt. Ltd. (90)	28-03-2012	534
10.		CB-ONN-2010/4	12	<b>Pratibha Oil &amp; Natural Gas Pvt. Ltd.(100)</b>	28-03-2012	61
11.		CB-ONN-2010/5	13	<b>Pan India Consultants (20) &amp;</b> Frost International Ltd. (80)	28-03-2012	49
12.		CB-ONN-2010/6	14	<b>ONGC (80) &amp; IOC (20)</b>	28-03-2012	39
13.		CB-ONN-2010/10	18	<b>Sankalp (100)</b>	27-06-2012	122
14.		CB-ONN-2010/11	19	<b>GAIL (25)</b> , BPRL (25), EIL (20) BFIL (15) & MIEL (15)	28-03-2012	131
						<b>TOTAL AREA : 11,505</b>
						<b>GRAND TOTAL : 14,491 SQ.KM.</b>

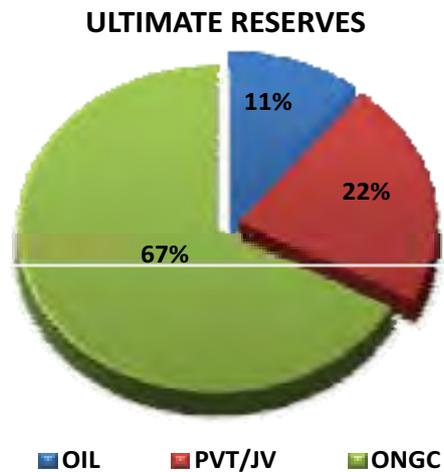
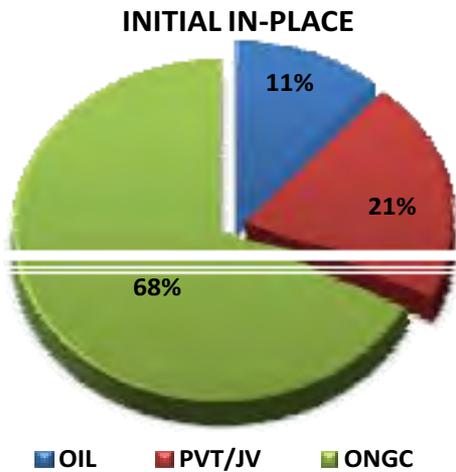
ONGC	-	Oil & Natural Gas Corpn. Ltd.
IOC	-	Indian Oil Corpn. Ltd.
OIL	-	Oil India Ltd.
GSPC	-	Gujarat State Petroleum Corporation Ltd.
FEL	-	Focus Energy Ltd.
BPRL	-	Bharat Petroleum Resources Ltd.
Deep Energy	-	Deep Energy LLC., USA
Pan	-	Pan India Consultants
Sankalp	-	Sankalp Oil & Natural Resources Ltd.
BIL	-	Birkbeck Investment Ltd., Mauritius
GAIL	-	Gas Authority of India Ltd.
East West	-	East West Petroleum
DNRL	-	Deep Natural Resources Limited
SWSBEPL	-	Safak WSB Energy Pvt. Ltd.
KGN	-	KGN Oil & Gas Pvt. Ltd.
FIL	-	Frost International Ltd.
EIL	-	Engineers India Ltd.
BFIL	-	BF Infrastructure Ltd.
MIEL	-	Monnet & Esspat Energy Ltd.

**COMPANY / BASIN WISE OIL & GAS PRODUCTION  
(01.04.2011 TO 31.03.2012)**

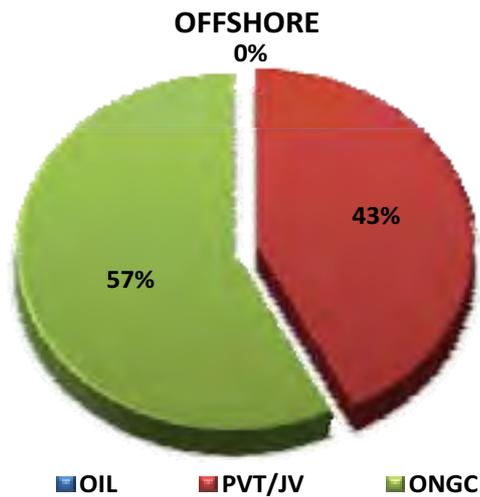
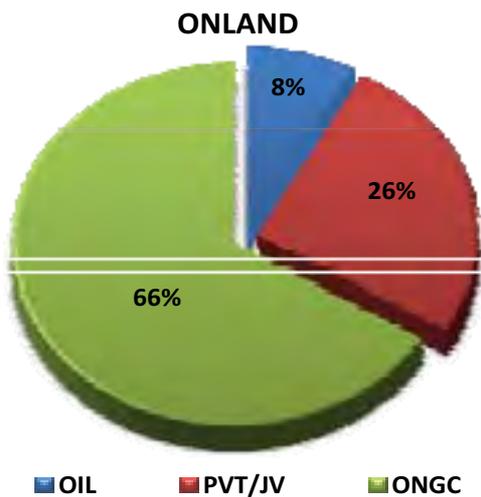
SI. No.	COMPANY / OPERATOR	BASIN	PRODUCTION		
			OIL (MMT)*	GAS (MMSCM)	O+OEG (MMT)
<b>NATIONAL OIL COMPANIES (NOC)</b>					
1	<b>ONGC</b>	Rajasthan	—	16	0.016
2		Cambay	5.630	1939	7.569
3		Cauvery Onland	0.246	1285	1.531
4		KG (Onland & Offshore)	0.343	1389	1.732
5		Assam-Arakan	1.205	1148	2.353
6		Mumbai Offshore	16.289	17540	33.829
<b>TOTALONGC</b>			<b>23.719</b>	<b>23317</b>	<b>47.03</b>
7	<b>OIL</b>	Rajasthan	—	223	0.223
8		Assam-Arakan	3.847	2410	6.257
<b>TOTAL OIL</b>			<b>3.847</b>	<b>2633</b>	<b>6.48</b>
<b>TOTAL NOCs</b>			<b>27.56</b>	<b>25950</b>	<b>53.51</b>
<b>PVT / JV COMPANIES</b>					
9	CAIRN	KG Offshore	1.340	633.462	1.973
10		Gulf of Cambay	0.240	211.917	0.452
11		Rajasthan	6.552	287.838	6.840
12	RIL	KG Offshore	0.681	15611.410	16.292
13	BG-RIL-ONGC	Mumbai Offshore	1.417	4299.878	5.717
14	GEO-ENPRO	Assam-Arakan	0.092	21.579	0.113
15	GOI - ACL	Assam-Arakan	0.0009	8.417	0.001
16	HOEC	Cambay	0.009	11.649	0.021
17		Cauvery Offshore	0.005	139.668	0.144
18	JTI	Cambay	0.037	9.094	0.046
19	NIKO	Cambay	0.021	197.110	0.218
20	SELAN	Cambay	0.026	9.508	0.035
21	HERAMAC	Cambay	0.002	3.199	0.005
22	HRDCL - PPCL	Cambay	0.0001	0.135	0.000
23	GSPCL	Cambay	0.051	3.213	0.054
24	HARDY	Cauvery Offshore	0.050	13.503	0.062
25	OILEX	Cambay	0.001	0.000	0.001
26	ESSAR	Cambay	0.001	0.000	0.001
27	FOCUS	Rajasthan	0.0006	63.193	0.064
<b>TOTAL PVT/JV</b>			<b>10.53</b>	<b>21524</b>	<b>32.05</b>
<b>TOTAL</b>			<b>38.09</b>	<b>47474</b>	<b>85.56</b>
<b>COAL BED METHANE (CBM)</b>					
1	GEECL	Raniganj South	0.0	70.04	0.070
2	ESSAR	Raniganj East	0.0	9.066	0.0090
3	ONGC	Jharia	0.0	3.559	0.0035
4	RIL	Sohagpur East	0.0	0.381	0.0003
5		Sohagpur West	0.0	1.144	0.0011
<b>TOTAL</b>			<b>0.0</b>	<b>84</b>	<b>0.084</b>
<b>INDIA GRAND TOTAL</b>			<b>38.09</b>	<b>47558</b>	<b>85.644</b>

\* NOTE : FIGURES INCLUSIVE OF CONDENSATE (MMT)

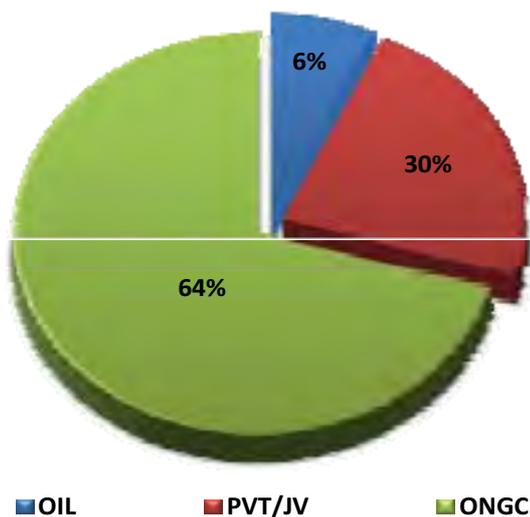
### INITIAL IN-PLACE AND ULTIMATE RESERVES OF HYDROCARBONS (AS ON 01-04-2012)



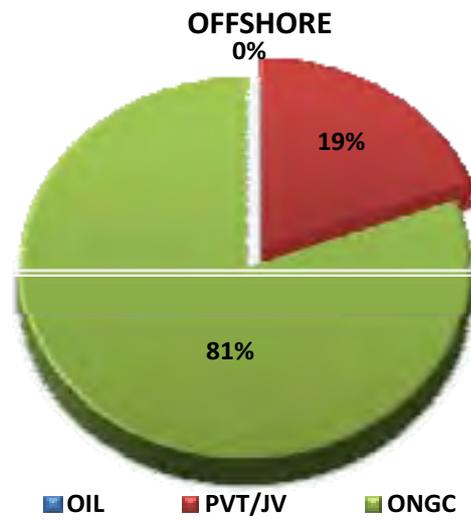
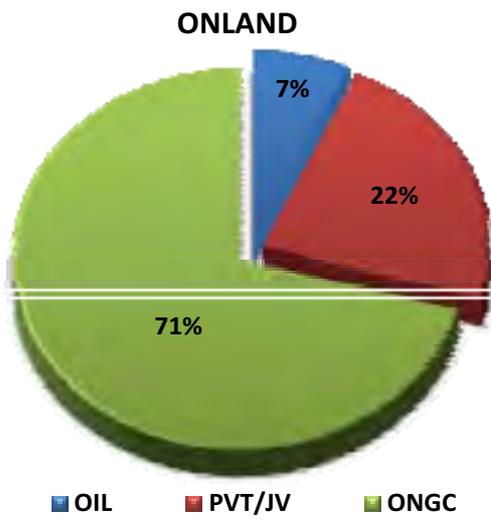
### EXPLORATORY WELLS DRILLED (2011-12)



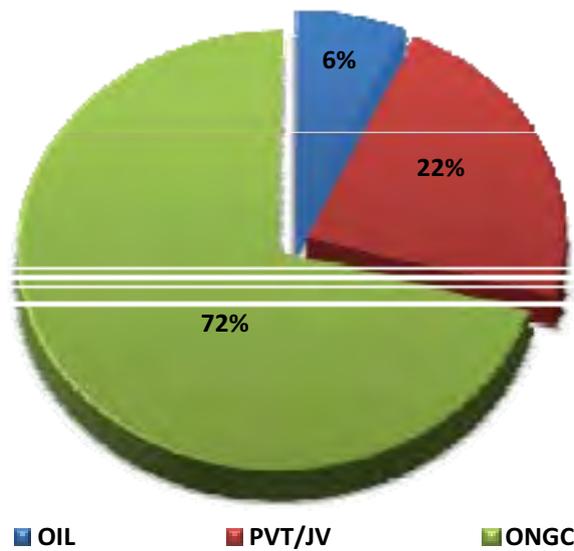
### TOTAL EXPLORATORY WELLS



### DEVELOPMENT WELLS DRILLED (2011-12)

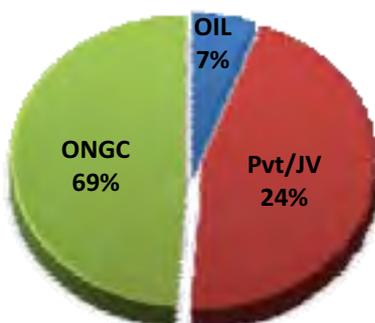


### TOTAL DEVELOPMENT WELLS

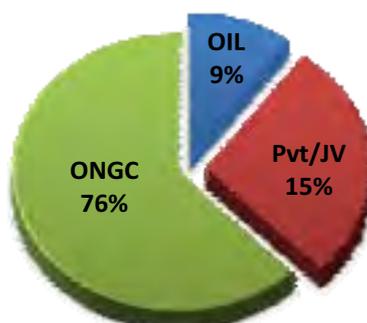


### OIL & GAS PRODUCTION (2011-12)

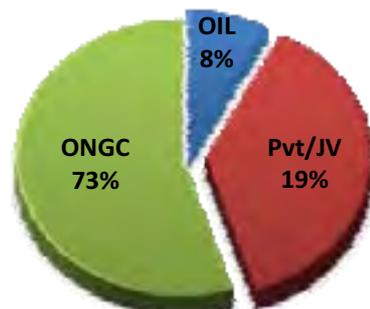
#### GAS PRODUCTION



#### OIL PRODUCTION



#### O+OEG PRODUCTION



# HYDROCARBON DISCOVERIES

A total of 35 hydrocarbon discoveries have been made by ONGC (25), OIL (7), RIL (2) & CEIL (1) in Nomination, NELP and Pre-NELP blocks and fields during 2011-12.

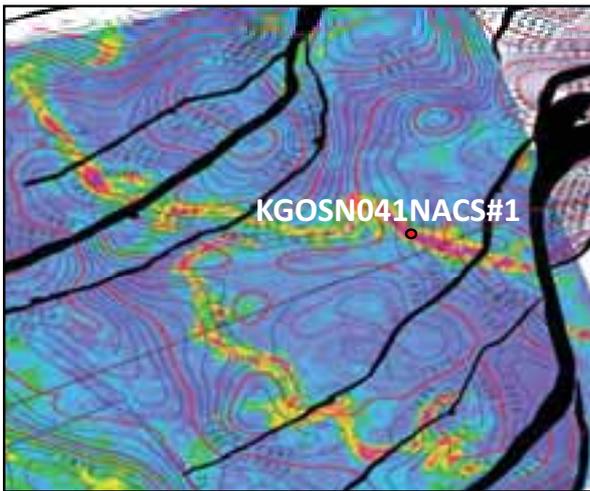
Sl. No.	Basin/State	Prospect Name	Discovery Well	Name of PEL / ML / NELP	Type of Discovery
<b>NOMINATION REGIME</b>					
<b>ONGC</b>					
1	Western Offshore(SW)	BH-67	BH-F	BOFF-123 PEL	Gas
2		B-127E-A	B-127E-1	BOFF-123 PEL	Oil & Gas
3		GK-42-1	GK-42-A	Kutch Off. Block-I Ext. PEL	Oil & Gas
4	Western Onland	East Linch (New pool)	LNBU (LN-81)	Linch ML	Oil
5		North Kadi (New pool)	NK-472 (NKXV)	Jakasana ML	Oil
6		Viraj (New pool)	Viraj-58 (VJEP)	Viraj ML	Oil
7		North Kadi (New pool)	North Kadi-461 (NKPI)	Linch Extn.I ML	Oil
8	KG Offshore (SW)	GS-70-1 (New pool)	GS-70-AA	GS-15/23 ML	Oil & Gas
9		GS-29-AH	GS-29-6	GS-29 ML	Oil & Gas
10	Cauvery Onland	Periyakudi-1	Periyakudi-1 (PDAA)	L-II PEL	Oil & Gas
11		North Kovilkalappal	North Kovilkalappal-3 (NKKAA)	L-II PEL	Oil & Gas
12	Cambay	KVAD	Vemardi-1	Karjan Extn.-II PEL	Oil & Gas
13	Vindhyan (Frontier)	Nohta-2 (New pool)	R-NA-B	Damoh-Jabera-Katni PEL	Gas
14	A&AA / Assam	Patharia	Pattharia-5 (PTAA)	Karimganj Dist. PEL	Gas
15		GKAP	G-354	Namti ML	Oil & Gas
16		Khoraghat	KH-31 (KHAV)	Nambar ML	Oil
17	A&AA / Tripura	Gojalia (New pool)	Gojalia-13 (GOAB)	Gojalia ML	Gas
<b>OIL</b>					
18	A&AA / Assam	Dikcham Structure	DIROI-5	Moran Extension ML	Oil
19	A&AA / Assam	Amgurigaon Structure	NHK-595	Naharkatiya Extension ML	Oil
20	A&AA / Assam	Kharikatia Structure	NHK-594	Chabua ML	Gas + Cond.
21	A&AA / Assam	North West Makum	Makum-41	Hugrijan ML	Oil
22	A&AA / Assam	West Makum Structure	Makum-43	Hugrijan ML	Gas
23	A&AA / Assam	East Zaloni Structure	NHK-597	Hugrijan PML	Gas
24	A&AA / Assam	Balimara Structure	Balimara-1	Dumduma ML	Oil
<b>PSC REGIME</b>					
Sl. No.	Operator	Block / Field	Discovery Well	Name of Discovery	Type of Discovery
25	ONGC	GS-OSN-2004/1	GSSO41NAA-1	GSSO41NAA-1	Gas
26		CB-ONN-2004/3	Uber-2	Uber-2	Gas + Cond.
27		KG-OSN-2004/1	Chandrika South-1	NACS-1	Gas
28		KG-OSN-2004/1	Alankari -1	KGOSNO41NAAL-1	Gas+Cond.
29		NEC-DWN-2002/2	MDW-13	MDW-13	Gas
30		AA-ONN-2001/2	Hortoki-1	Hortoki-1 (HOAB)	Gas
31		AN-DWN-2002/1	ANDW-1	ANDW-1 (ANDW-C)	Gas
32		CB-OSN-2003/1	Aliabet # 3	Aliabet # 3 - ABAF	Gas + Cond.
33	RIL	CY-PR-DWN-2001/2	CYPR-D6	Dhirubhai – 53	Gas + Cond.
34		KG-DWN-2001/1	KG-D9-A2	Dhirubhai – 54	Gas
35	CEIL	KG-ONN-2003/1	Nagayalanka-SE-1	Nagayalanka-SE-1	Oil & Gas

**NEW DISCOVERIES**

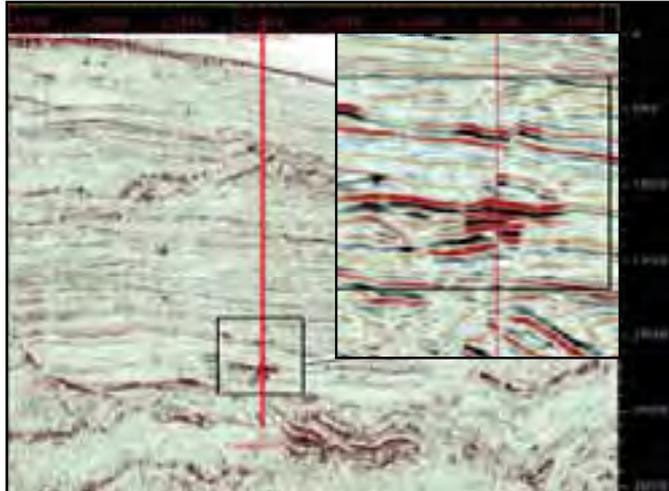
**CHANDRIKA SOUTH #1 (KG-OSN-2004/1)**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
Chandrika South Channel / KGOSN041NACS#1 / KG-OSN-2004/1	The 1941 Lower Pliocene Chandrika south channel sand was tested in two intervals of 1978.5-1975.5, 1974-1972m, and 1946.5 - 1952m and found to be gas bearing	The discovery opened up a new hitherto untested Lower Pliocene channel area for Exploration in the block . This new discovery in the block KG-OSN-2004/1 has led to accretion of In-place of 7.65 BCM



Depth Map on CS Channel with RMS attribute showing CS#1

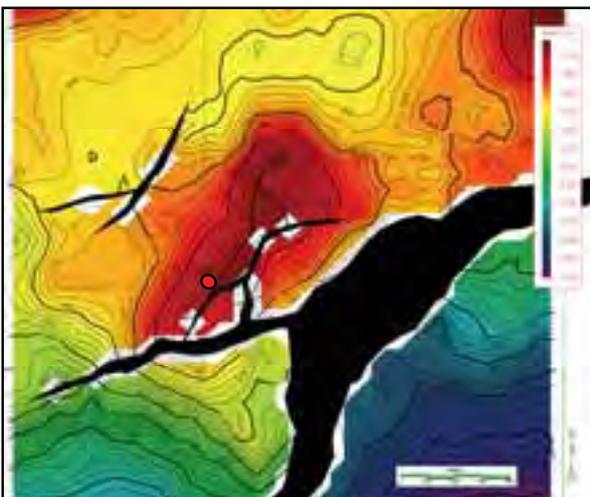


Seismic Section along XL: 5111 passing through the well CS#1 (KG-OSN-2004/1)

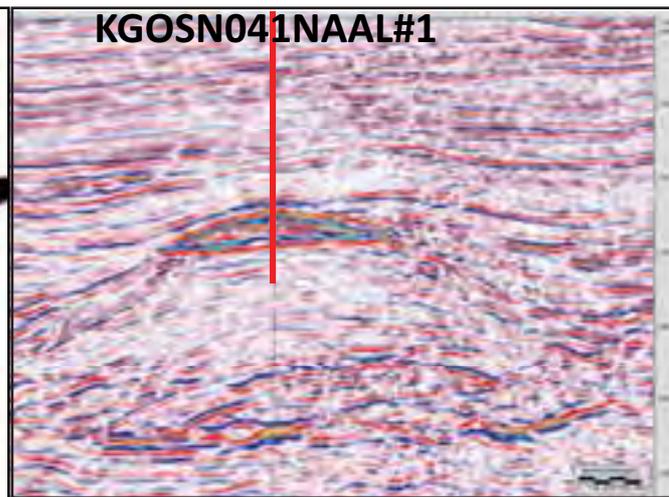
**ALANKARI#1 (KG-OSN-2004/1)**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
Alankari / KGOSN041NAAL#1/ KG-OSN-2004/1	The Mio-Pliocene sand pack from 1738- 1832m. The well tested in the interval from 1829.5-1832m and found to be gas bearing	The discovery opened up the Mio-Pliocene play for further exploration. This new discovery in the block KG-OSN-2004/1 has led to accretion of In-place of 3.20 BCM



Depth Map near to Alankari Pay top



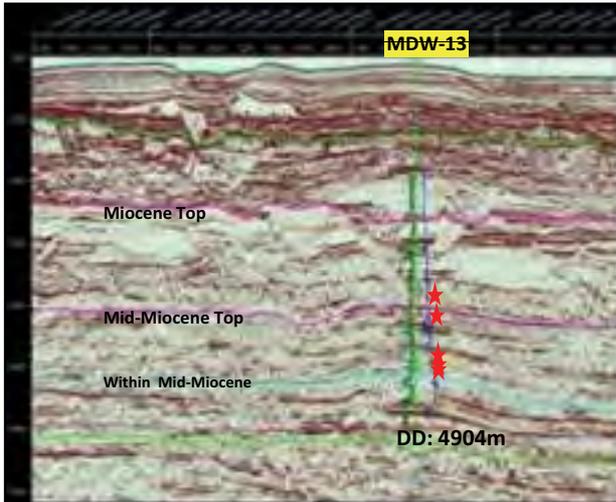
Seismic Section along passing through the well Al#1 (KG-OSN-2004/1)

**NEW DISCOVERIES**

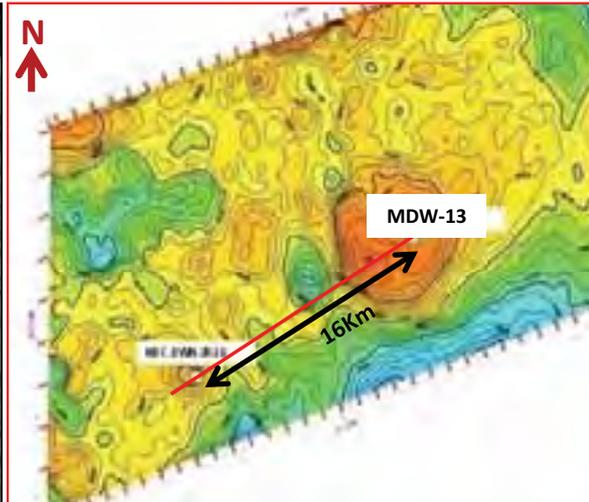
**MDW-13 (NEC-DWN-2002/2)**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
Top of Mid. Miocene / MDW-13 / NEC-DWN-2002/2	The mid Miocene sand pack Net pay is 7.3m and 0.9813 MMscmd Flow rate has been observed.	First time Hydrocarbon evidence and their production potentiality have been assessed from Mid. Miocene in the block NEC-DWN-2002/2. As a follow one well MDW-14 has been drilled and found gas bearing.



Inline 1580 Passing Through Well MDW-13

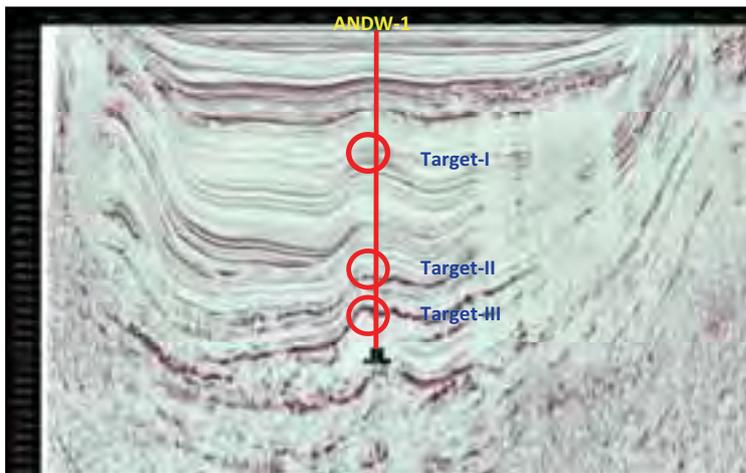


Depth Map on Top of Mid. Miocene

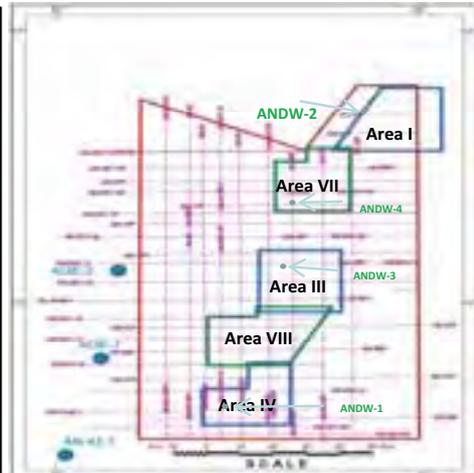
**ANDW#1 (AN-DWN-2002/1)**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
ANDW-1 / AN-DWN-2002/1 / Mio-Pliocene Sequence	Depth: 3084.2m, Formation Pressure: 4645.42 psi (1.06 MWE), Mobility: 32.86, Permeability:55 MD, Open hole form thickness considered: 2.7m, AOF: 1.55 MMscmd	First time gas discovery has been made in the Andaman deep waters in well ANDW#1(Mio-Pliocene).On analyzing the data operator submitted no potential commercial interest notification because the reservoirs are very thin and silt to very fine sands and could not be traced for its lateral extension.



Inline 1947 showing the drilled wells with Target (I-III)



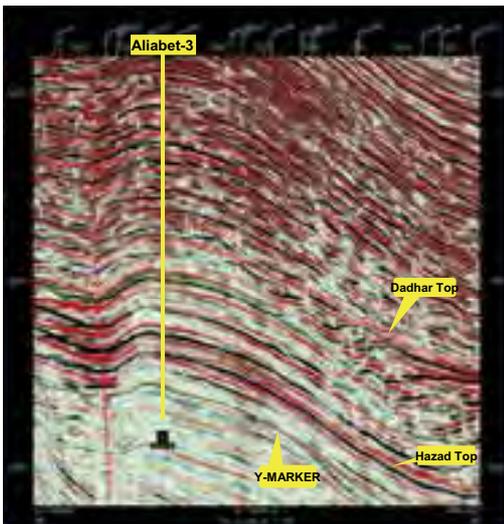
Block AN-DWN-2002/1 showing the 3D Areas and wells.

**NEW DISCOVERIES**

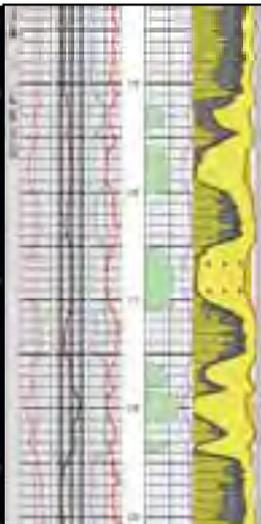
**ALIABET #3 - ABAF/BALB-4(CB-OSN-2003/1)**

**OPERATOR : ONGC**

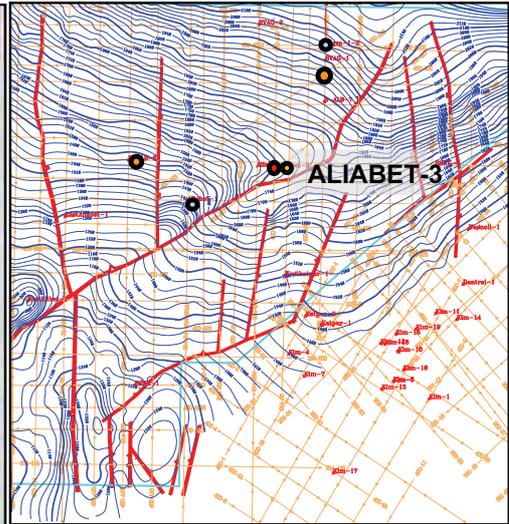
Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
Hazad Top (Middle Eocene) / Aliabet # 3 / CB-OSN-2003/1	Obj I: 2184.5 – 2183 m (MD) 2181 – 2176m (MD) 6mm Bean: Gas @ 39954 m3/d Condensate @ 11 m3/d FTHP : 2050 Psi, CHP: 2100 Psi	This gas discovery in CB-OSN-2003/1 within NELP-V block will open up significant area for further exploration and exploitation. In this discovery Operator found New Sands which are not present in Aliabet # 2 discovery.



Interpreted Seismic line 450-A27 passing through proposed location Aliabet-3



Well Log Motif of Aliabet-3



Time Structure Map near top of Hazad with pinchout boundaries of various sand units

**HOAB (AA-ONN-2001/2)**

**OPERATOR : ONGC**

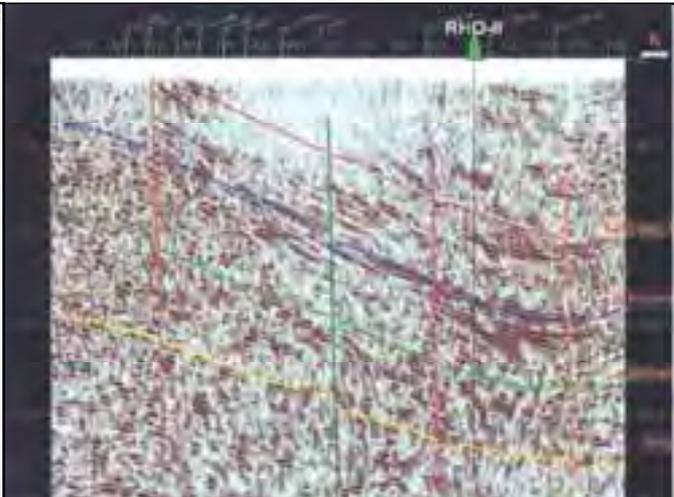
Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
Bhuban / HOAB / AA-ONN-2001/2	Object IV : 3287 – 3292 (Lower Bhuban Formation) 4 mm bean, gas flow 5, 52,674 SCF /d with 147 KSc SCHP , 103 KSc STHP and Flare height 6-7 ft.	The success of this well in Mizoram NELP Block, AA-ONN-2001/2 has opened up a new area in this logistically tough and geologically challenging fold belt for future exploration.



Location map of block AA-ONN-2001/2



Isochron Map of a Horizon close to Middle Bhuban Top



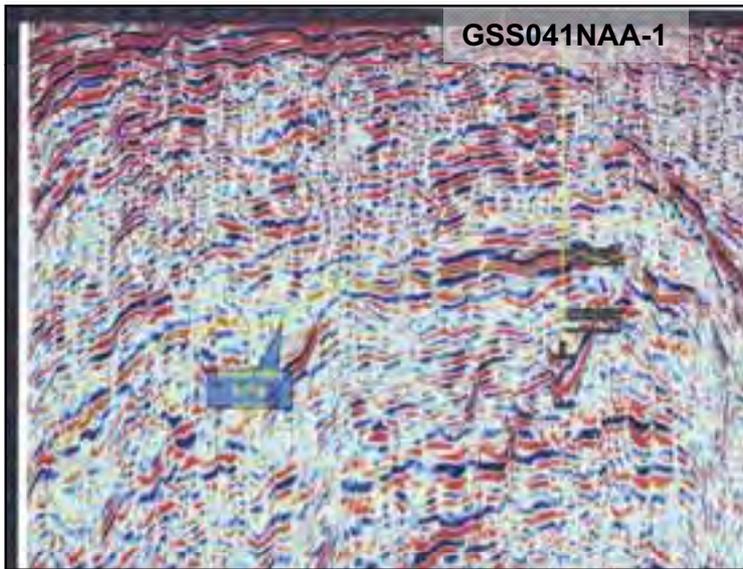
Interpreted Seismic Section along the line M07-07

**NEW DISCOVERIES**

**GSS041NAA-1(GS-OSN-2004/1)**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
Mesozoic / GSS041NAA-1 / GS-OSN-2004/1	MDT Results: Obj 1: 4795.5m- 4784.5m (11m) ¼" : Gas 40606 m3/d FTHP: 1080 psi FTHT: 85 deg F	This is first hydrocarbon discovery in the NELP Block of Western Offshore. The discovery made in block, GS-OSN-2004/1 has opened up the area for future exploration in Mesozoic section.



Seismic section showing through well GSS041NAA-1

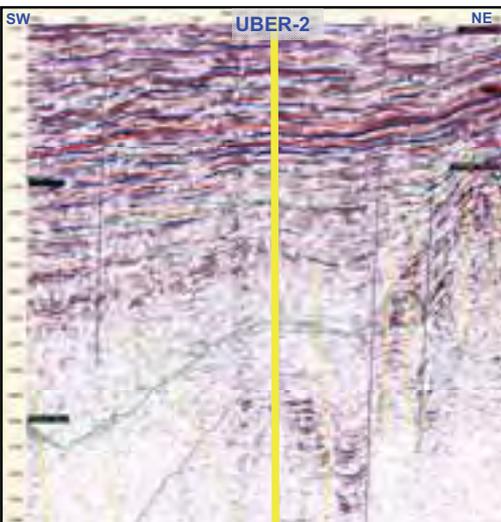


Structure Map ABJECT-I Pay Top

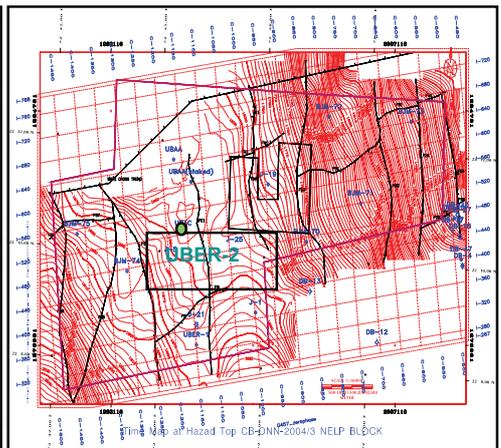
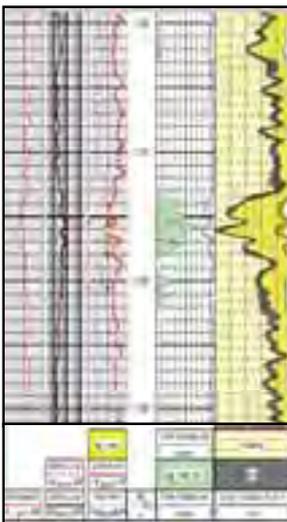
**UBER-2 (CB-ONN-2004/3)**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
(Hazard Member-GS-6 sand) UBER# 2 CB-ONN-2004/3	OBJECT-II : 2177.5-2173.5 Gas @33086 m3/d & condensate 37.5 m3/d	This is anew gas discovery in NELP block, CB-ONN-2004/3 which will open up significant area for exploration and exploitation.



3D Seismic inline 540 passing through well UBER-2



Time Structure Map at Hazard Top

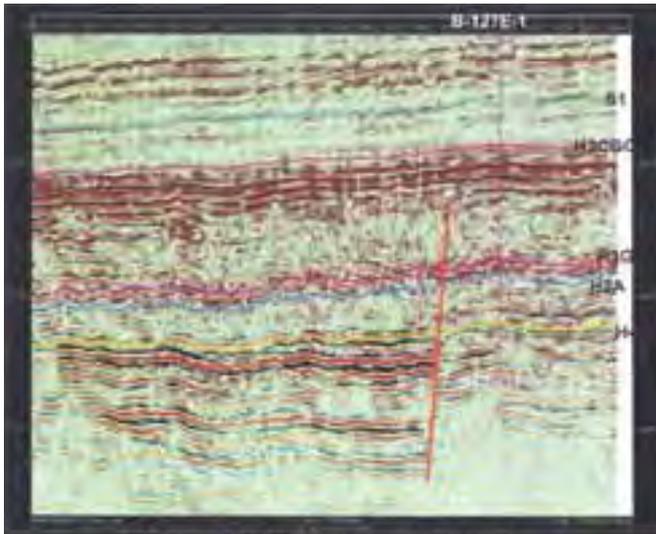
Well Log Motif of UBER-2

**NEW DISCOVERIES**

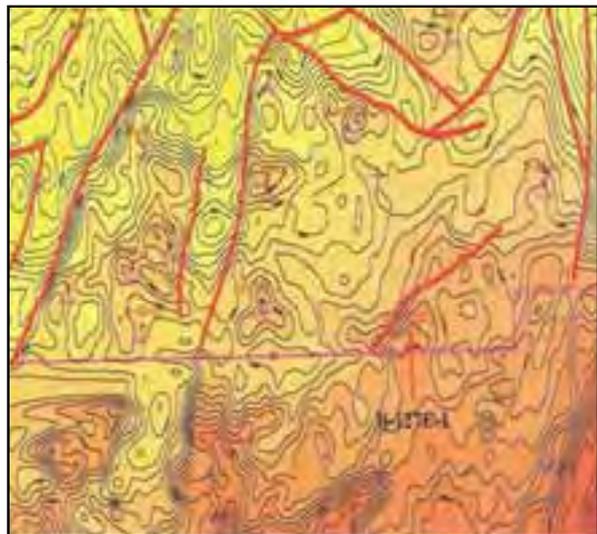
**B-127E-A /B-127E-1 (BOEF 123 PEL)**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
<b>B-127E-A /B-127E-1/ BOEF 123 PEL</b>	Object I: 2651.5 – 2648.5 & 2638.5 – 2637 (Panna Formation) Oil: 1076 bopd Gas: 1,88,704 m <sup>3</sup> /day at half inch FTHP: 1700 psi	This discovery has opened up the area for further exploration and would also help in incremental value creation for the planned B-127-B-55 cluster.



Inline 2545 through well B-127E-1

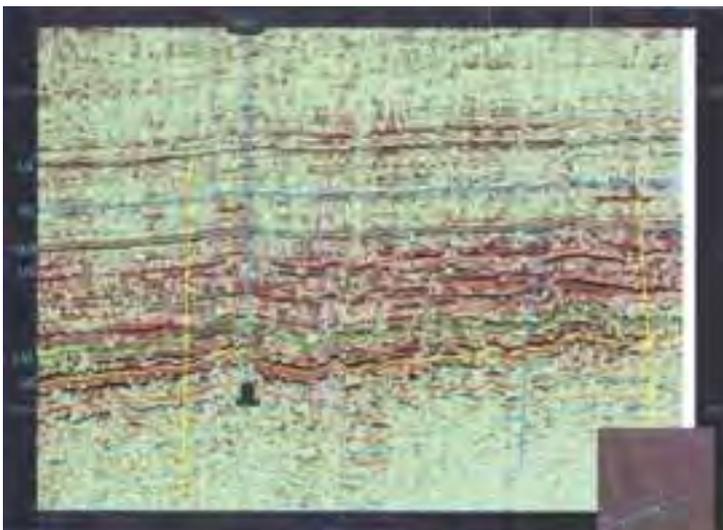


Structure Map H4 showing B-127E prospect

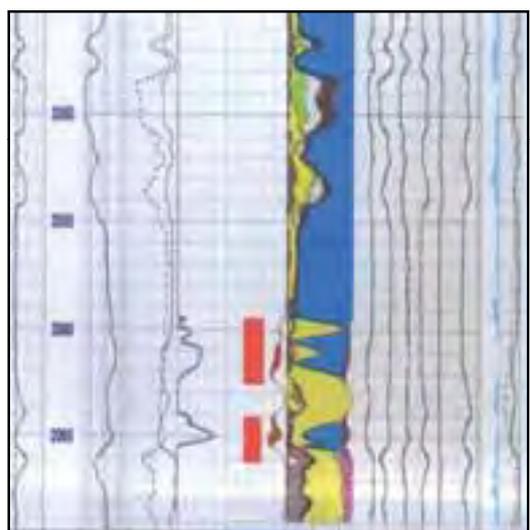
**BH-67 (BOEF 123 PEL)**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
<b>BH-67 / BOEF-123 PEL / Oligocene</b>	Object I: 2066 – 2064 & 2062.5 – 2059.5 (Basal Formation, Oligocene) ½" choke: Gas: 130000 m <sup>3</sup> /day FTHP: 1000psi	This discovery is the south of Bombay High field in Basal Clastics has opened up scope for further exploration in Basal clastics in the nearby areas.



Line 2100 passing through well BH-67



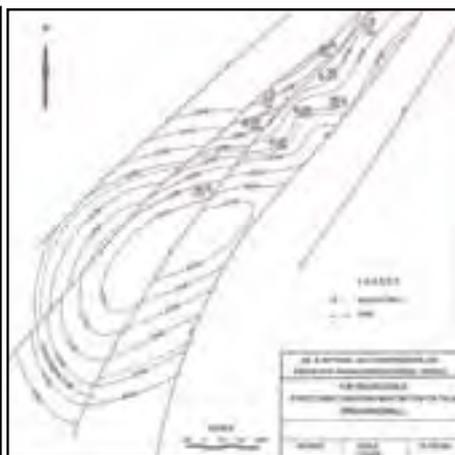
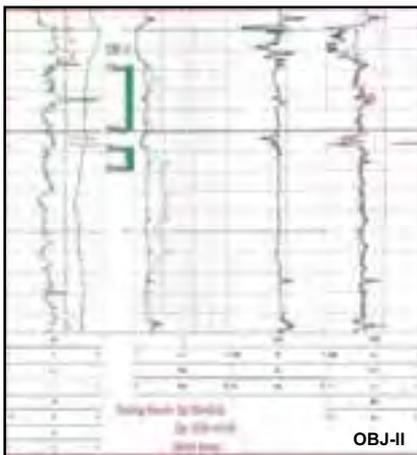
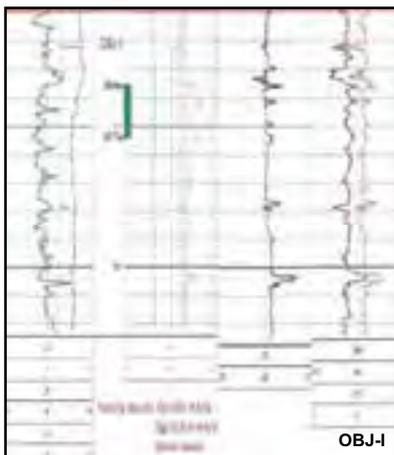
Well Log Motif of BH-67

### NEW DISCOVERIES

**G-354 / GKAP (Namti PML)**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
<b>GKAP / Geleki-354 / Namti PML Block / Miocene</b>	<b>Obj-I:</b> 2877-2868m (Tipam Formation, Miocene) Oil: 107 m3/day, 6mm bean Gas: 11314 m3/day, 6mm bean FTHP: 97 kg/cm2 <b>Obj-II:</b> 2810-2804m (Tipam Formation, Miocene) Oil: 72 m3/day, 6mm bean, Gas: 12706 m3/day, 6mm bean FTHP: 60 kg/cm2	The multiple pays encountered in this well have reinforced the prospectivity of south-west Geleki area. Commercial hydrocarbon production from TS-3B has established a new pool together with TS-3A indicating increase in hydrocarbon column towards south.



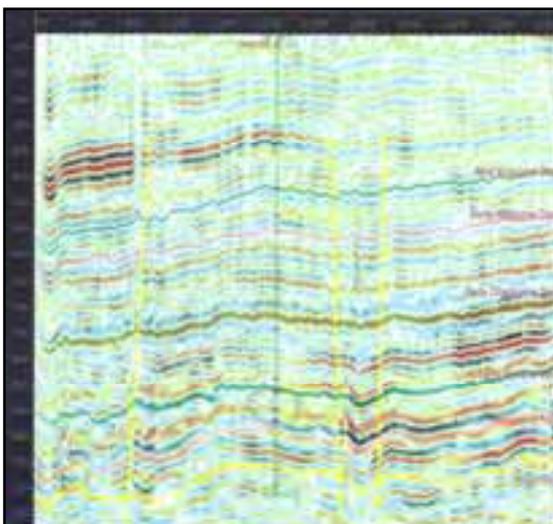
Log Motif of Object-I & Object-II in well G-354 (GKAP)

Structure Contour Map on Top of TS-3B

**GK-42-1 / GK-42-A (KUTCH OFFSHORE BLOCK-1 PEL)**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
<b>GK-42-1 / GK-42-A / Kutch Offshore Block – 1 Extension PEL / Palaeocene</b>	Object-I: 1372-1369m, Nakhatrana Formation, Palaeocene) 3/8" Choke: Gas: 9898 m3/day, Liquid: 36 blpd (Oil water emulsion with 20% oil), FTHP: 250 psi	The discovery in the south of GK-28 prospect has given a boost to exploration in this part of Kutch Offshore Basin and has opened up scope of early monetization of discoveries.



Seismic section passing through well GK-42-1

Well log motif of GK-42-1

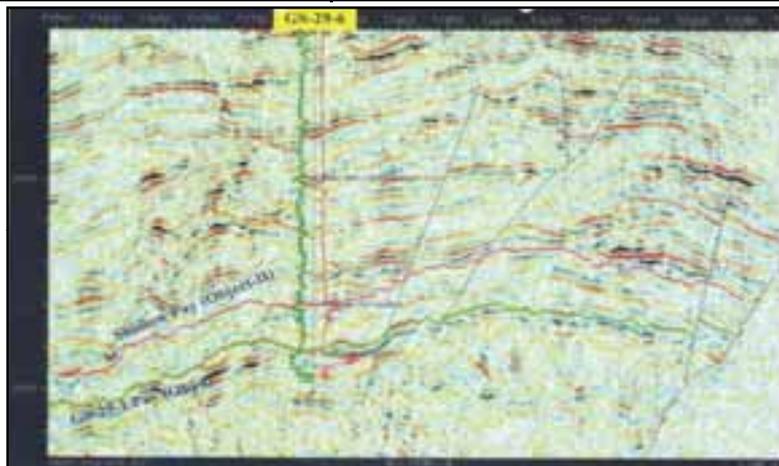
GK-42 Prospect Structure Contour Map of Paleocene Pay

**NEW DISCOVERIES**

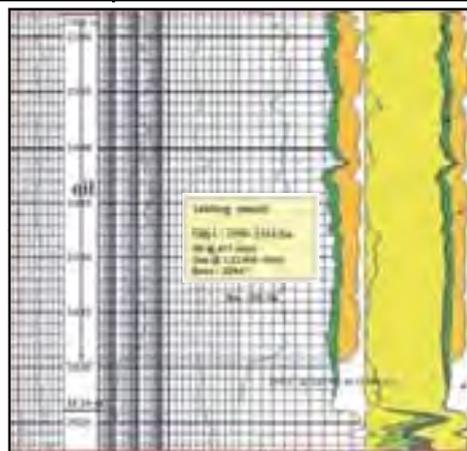
**GS-29-AH/GS-29-6 (GS-29 PML)**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
GS-29-AH / GS-29-6 / GS-29 PML/ Miocene	<b>Object-I:</b> 2390–2414.5m (Ravva Formation, Miocene) Oil: 617 m3/day, 32/64" Choke Gas: 1,23400 m3/day, 32/64" Choke FTHP: 2377 psi <b>Object-II:</b> 2237–2245 m (Ravva Formation, Miocene) Oil: 570.33 m3/day, 32/64" Choke Gas: 1,18925 m3/day, 32/64" Choke FTHP: 2262 psi	This discovery along with the successful delineation of GS-29-1 pay sand would enable to go forward with the formulation development plan of GS-29 Oil discovery.



Seismic line : 642 through well GS-29-6 (AH)



Well Log motif of GS-29-6 (AH) showing oil bearing sand

**KH-31 (KHAV) (NAMBAR PML)**

**OPERATOR : ONGC**

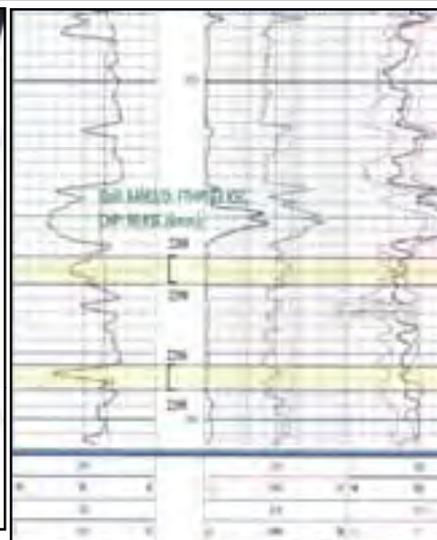
Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
KH-31 (KHAV) / Nambar PML/ Late Eocene	<b>Object:</b> 2288–2290 & 2296-2298m (Kopilli Formation, Late Eocene) Oil: 64 m3/day, 6mm bean Gas: 3100 m3/day, 6mm bean FTHP: 63 kg/cm2	This first oil discovery in Kopili Formation in Khoraghat-Nambar area towards the southern part of Dhansiri Valley will lead to further exploration activities in the area.



Inline 852 passing through well KH-31 (KHAV)



Structure Map on close to Kopili pay top



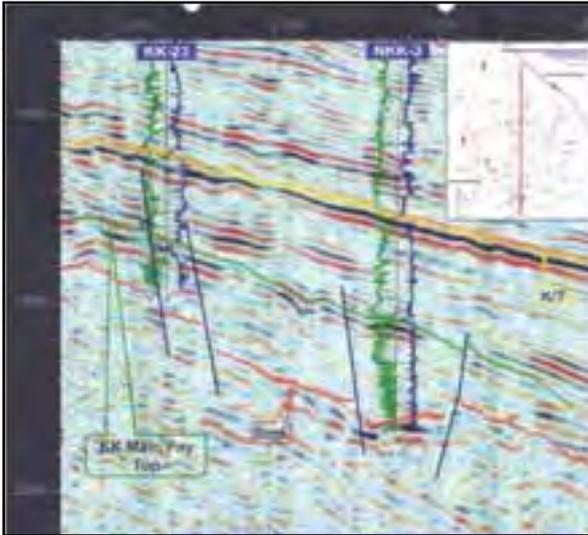
Well Log motif of KH-31 (KHAV)

**NEW DISCOVERIES**

**NORTH KOVIKALAPPAL-03 (NKK-3) (L-II PEL)**

**OPERATOR : ONGC**

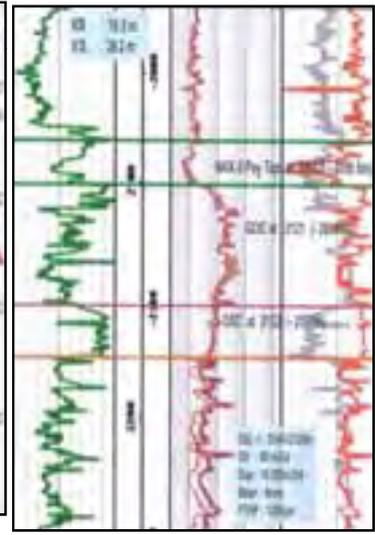
Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
NKKAA / North Kovikalappal-03/ L-II PEL Block/ Cretaceous	<b>Object:</b> 2135–2145m (Andimadam Formation, Cretaceous) Oil: 80 m <sup>3</sup> /day, 6mm bean Gas: 10000 m <sup>3</sup> /day, 6mm bean FTHP: 84.4 Ksc	This has opened up the area further east of NKK-1 for exploration/appraisal.



Line TR 2160 passing through well KK-23 & NKK-3



Structure Contour Map on top of Sand

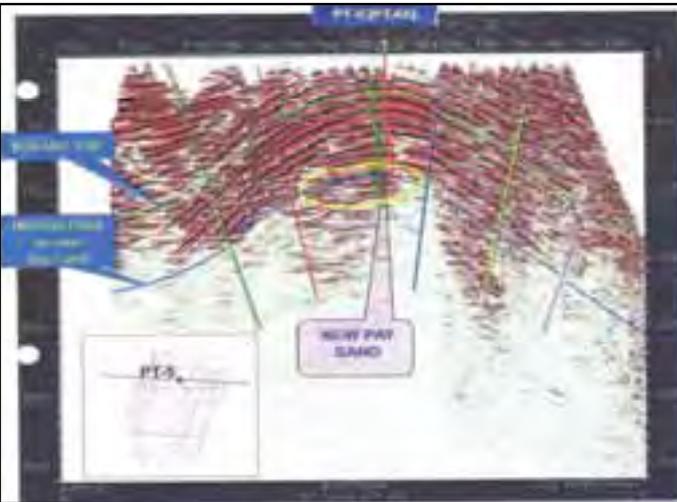


Well Log motif of NKK-3

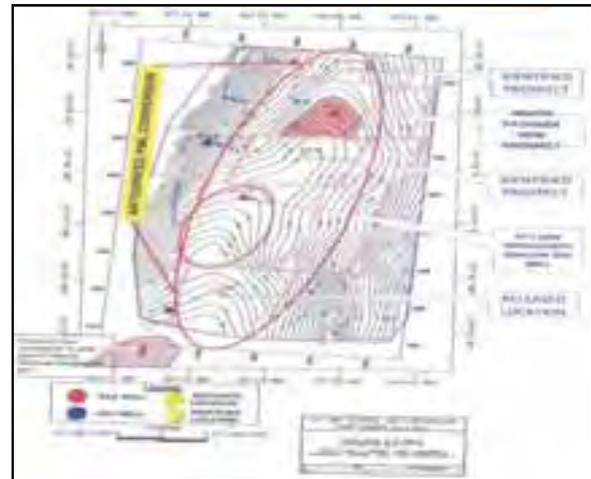
**PATHARIA-5 (KARIMGANJ DISTRICT PEL)**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
PTAA / Patharia - 5/ Karimganj District PEL Block/ Miocene	<b>Object I:</b> 1136-1128m (Bokabil Formation, Miocene) Gas: 9400 m <sup>3</sup> /day with little water, 3mm bean FTHP: 44 Ksc <b>Object II:</b> 1121-1114m (Bokabil Formation, Miocene) Gas: 4820 m <sup>3</sup> /day with little water, 4mm bean FTHP: 45 Ksc	The success of this well has reinforced the hydrocarbon prospectivity of the northern plunge of Patharia Anticline in Cachar Fold Belt areas.



Seismic Section IL 650 passing through well PT-5



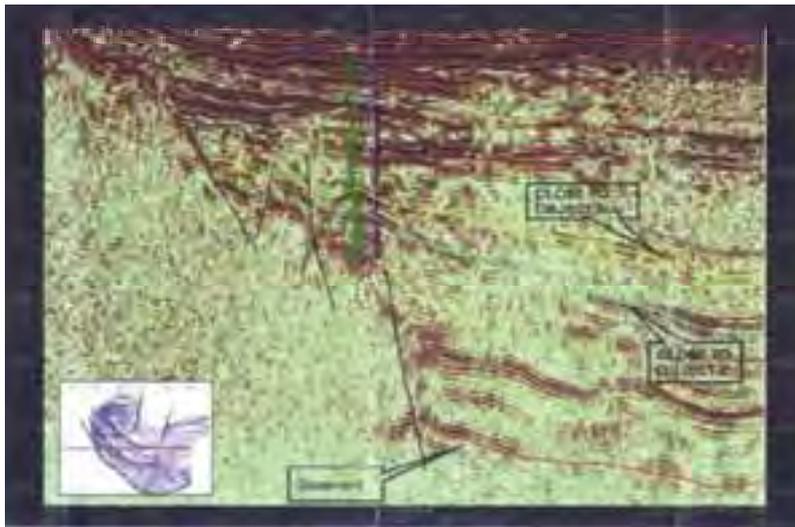
Time map on the top of a reflector close to new gas sand of PT-5 (within Bokabil)

**NEW DISCOVERIES**

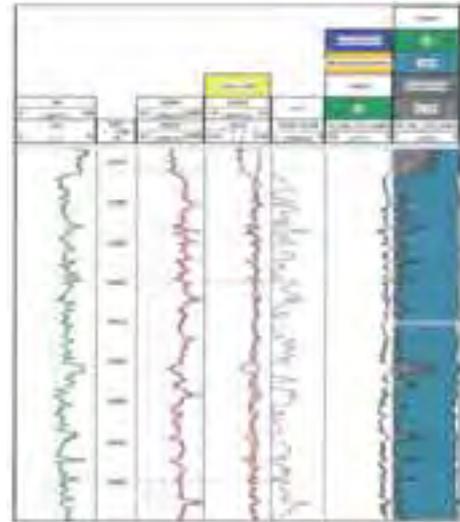
**PERIYAKUDI-1 (PDAA) (L-II PEL)**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
PDAA / Periyakudi-1/ L-II PEL Block/ Cretaceous	<b>Object:</b> 4350-4273 m (Andimadam Formation, Cretaceous) Oil: 3.34 m <sup>3</sup> /day, 6mm bean Gas: 5500 m <sup>3</sup> /day, 6mm bean FTHP: 15.8 Ksc	Besides the presence of hydrocarbons in deeper horizons of Early Cretaceous having huge reservoir thickness. Pattern of hydrocarbon occurrence has opened new vistas in Synrift Exploration in Cauvery Basin.



Line 2239 through well PD-1

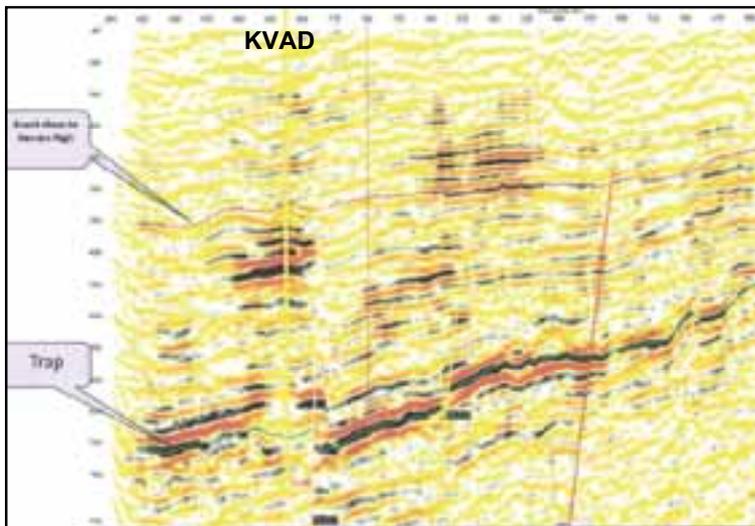


Well Log motif of PDAA

**Vemardi-1 (KVAD) (KARJAN EXTN.-II PEL)**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
KVAD / Vemardi-1 (B-Vemardi) / Karjan Ext. II PEL/ Middle to Upper Eocene	<b>Object:</b> 578-576.5 & 572.5-571m (Ankleshwar Formation, Middle to Upper Eocene) Oil: 5 m <sup>3</sup> /day, 6mm bean Gas: 6336 m <sup>3</sup> /day, 6mm bean FTHP: 525 psi	This is a new prospect discovery which will result in reserve accretion and additional area for development



Inline 927 passing through location KVAD



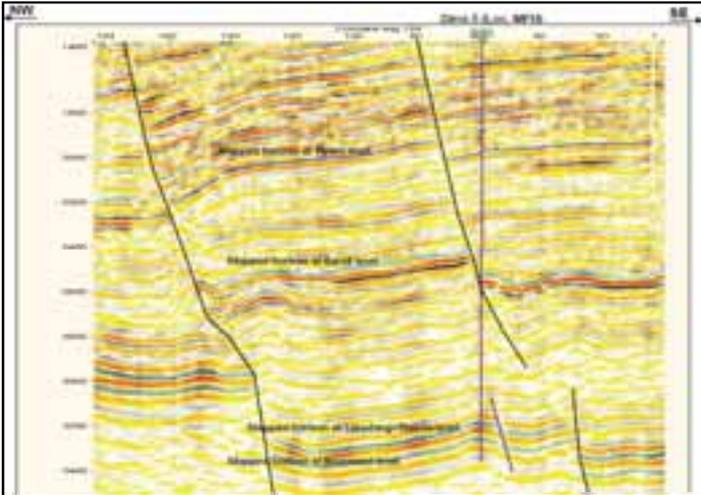
Time map close to Trap top

**NEW DISCOVERIES**

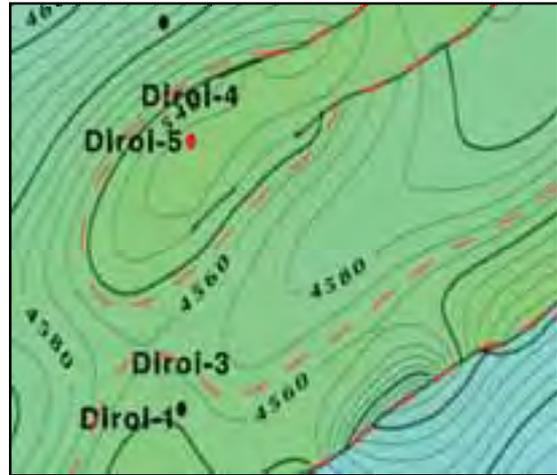
**DIROI-5 (MORAN EXTENSION ML)**

**OPERATOR : OIL**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
<b>Dikcham Structure in Moran Extension ML / DIROI-5 (Loc. MFH)/ Palaeocene-Lower Eocene</b>	Object: 4503.5-4508.5, 4504-4508 and 4498-4503m (Lakadong & Therria sand / Palaeocene-Lower Eocene) A total of 331 bbls of well-fluid was unloaded by NPU/CTU/self-unloading. Oil: 98.5% traces (API: 28.6-32.8°, PP: 30-33°C)	The discovery of oil within the Lakadong + Therria sand in this well has opened up new area for exploration in Diroi Area especially in Palaeocene-Lower Eocene formations. The well has helped in accretion to In-place volume of O+ OEG in 2P Category is about 0.30 MMSKL..



Seismic section XL-159 across well Diroi-5, Borbil-Diroi 3D

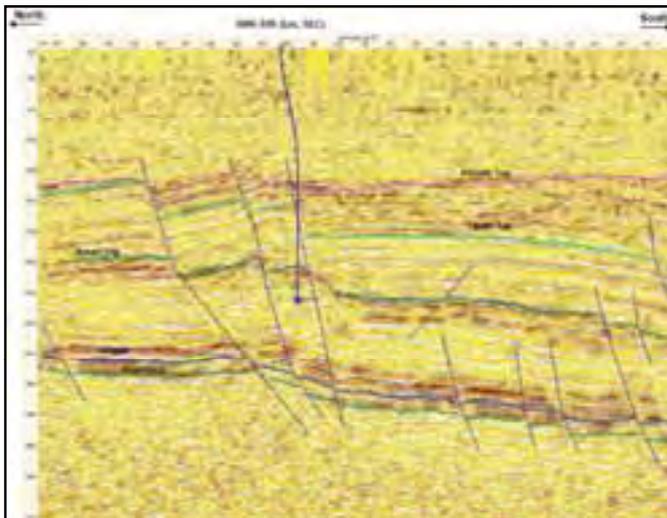


Well Diroi-5 : Depth Contour Map Close to Lakadong +Therria Top

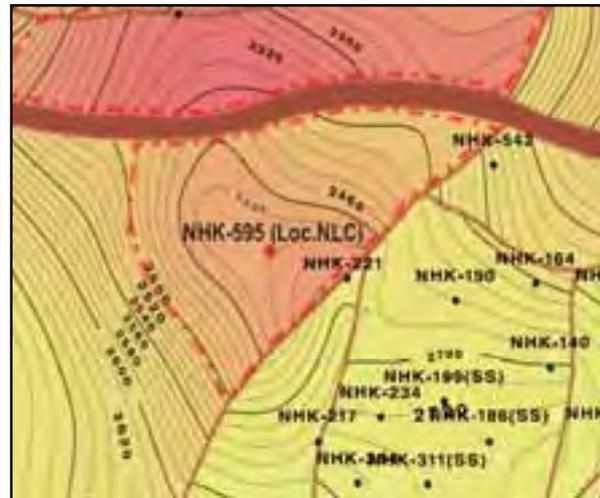
**NHK-595 (NAHARKATIYA EXTENSION ML)**

**OPERATOR : OIL**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
<b>Amgurigaon Structure in Naharkatiya Extension ML / NHK-595 (Loc. NLC)/ Upper Eocene to Lower Oligocene</b>	Object: 2808 - 2820m (Barail Formation / Upper Eocene to Lower Oligocene) Oil: 48 KLPD @6mm bean, 99.5% (API: 27.30, PP: 360C) FTHP: 52.7 kg/cm2	The discovery of oil within the Barail Formation in this well has opened up new area for exploration in Amgurigaon area within Naharkatiya Extension ML area. This well has helped in accretion to In-place volume of O+OEG in 2P Category is about 4.38 MMSKL.



Inline 372 passing through well NHK-595



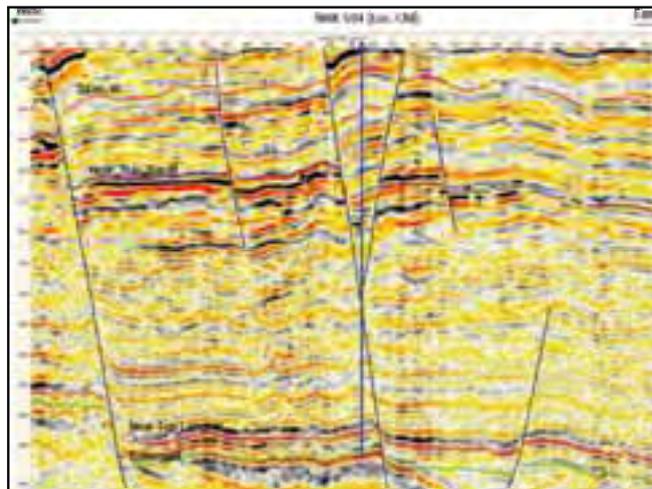
Amgurigaon Structure well NHK-595) - Depth Contour Map Close to Barail Top

**NEW DISCOVERIES**

**NHK-594 (CHABUA ML)**

**OPERATOR : OIL**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
<b>Kharikatia structure in Chabua ML/ NHK-594 (Loc. CM)/ Palaeocene Lower-Eocene</b>	Object: 3744.0-3746.0 m (Lakadong & Therria sand / Palaeocene-Lower Eocene) Gas: 50,000-55000 SCUMPD and about 10klpd condensate through 4mm bean. FTHP: 263-264 kg/cm <sup>2</sup> .	The discovery of gas within the Lakadong & Therria sand in this well has opened up new area for exploration in Kharikatia area especially in Palaeocene-Lower Eocene formations within Chabua ML area. The well has helped in accretion to In-place volume of O+OEG in 2P Category is about 0.63 MMSKL.



Seismic section XL-1175 passing through well NHK-594

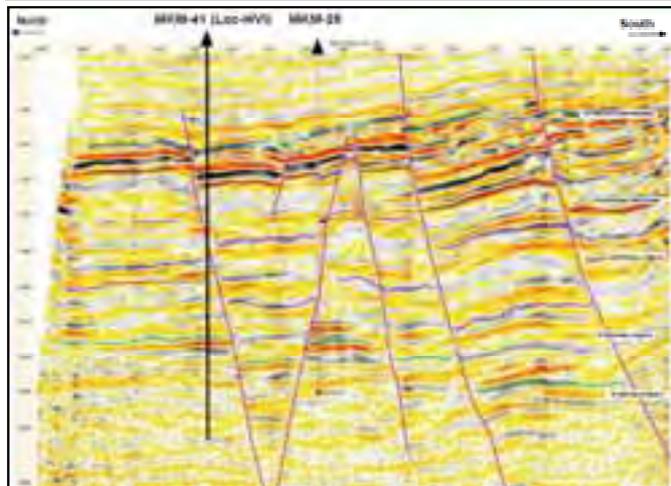


Kharikatia Structure with well NHK-594 – Depth Contour Map Close to Langpar Top

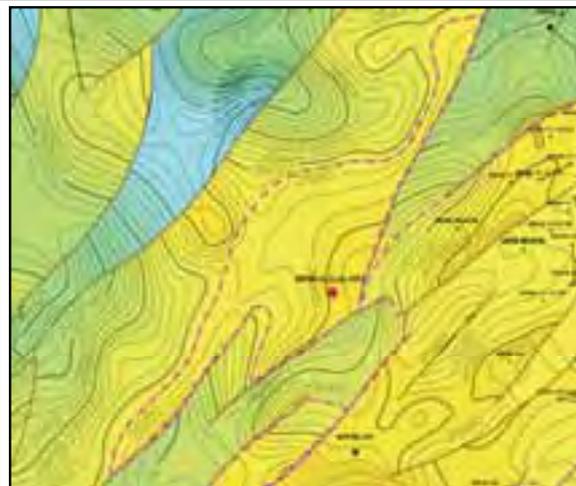
**MAKUM-41 (HUGRIJAN ML)**

**OPERATOR : OIL**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
<b>North-West Makum structure of Makum-North Hapjan oil field in Hugrijan ML/ Makum-41 (Loc. HVI) / Upper Eocene to Lower Oligocene</b>	Object: 2657.5-2663.5m & 2650.5-2654m (Barail Formation / Upper Eocene to Lower Oligocene) Oil: 42 klpd (Oil: 38 klpd & water: 4 klpd) through 6.5 mm bean, (API: 14.2°, PP: <9°C), FTHP: 27 kg/cm <sup>2</sup> .	The discovery of oil within the Barail Arenaceous zone in this well has opened up a new play for exploration/exploitation in North-West Makum structure within Hugrijan ML area. This well has helped in accretion to In-place volume of O+OEG in 2P Category is about 4.58 MMSKL.



Seismic Inline 1741 (Khagorijan-Matimekhana3D) with well MKM-41 (NW Makum)



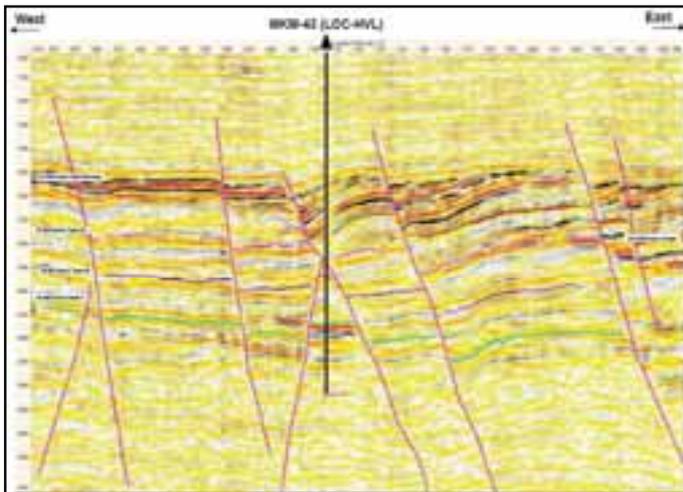
NW Makum Structure with well MKM-41 – Depth Contour Map Close to 34mfs/Near Top Barail 3/4

**NEW DISCOVERIES**

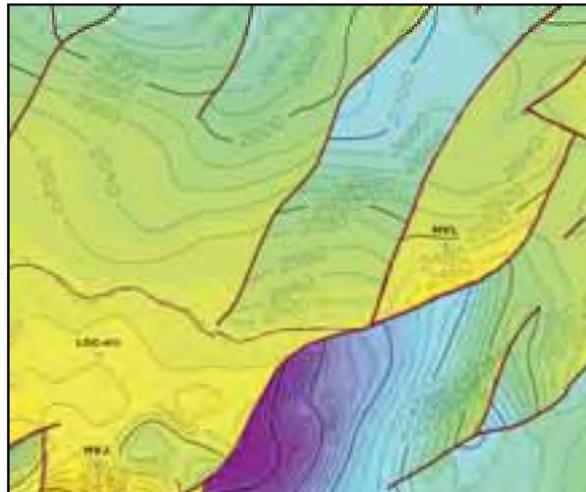
**MAKUM-43 (HUGRIJAN ML)**

**OPERATOR : OIL**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
West Makum structure in Hugrijan ML/ Makum-43 (Loc. HVL) / Upper Eocene to Lower Oligocene	Object: 2696-2702m (Barail Formation / Upper Eocene to Lower Oligocene) Gas: 50,000 SCMD with minor amount of condensate through 5 mm bean FTHP: 179 kg/cm2.	The discovery of gas within the Barail Formation in this well has opened up new play for exploration/ exploitation in West Makum structure within Hugrijan ML area. The well has helped in accretion to In-place volume of O+ OEG in 2P Category is about 0.62 MMSKL.



Seismic crossline 1173 (Khagorijan-Matimekhana3D) with well MKM-43 (West Makum)

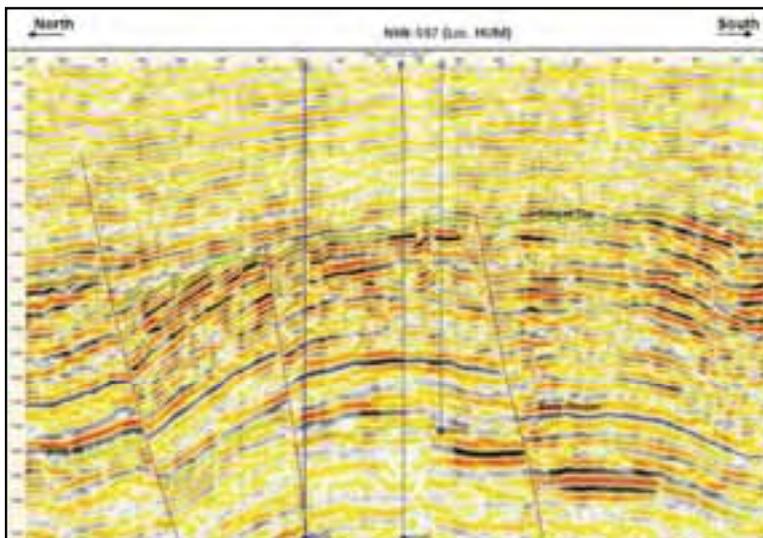


West Makum Structure with well MKM-43 - Depth Contour Map Close to 34mfs/Near Top Barail

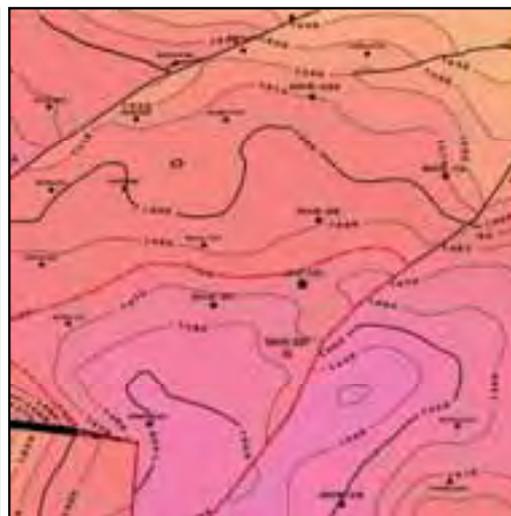
**NHK-597 (HUGRIJAN ML)**

**OPERATOR : OIL**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
East Zaloni structure in Hugrijan ML/ NHK-597 (Loc. HUM)/ Miocene to Pliocene	Object: 1549.0-1455.0m (Girujan Formation / Miocene to Pliocene) Gas: 14,200 SCMD through 4 mm bean. FTHP: 136 kg/cm2.	The discovery of gas within Girujan Formation in this well has opened up new gas play exploration /exploitation in the Area within Hugrijan ML area. This well has helped in accretion to In-place volume of O+ OEG in 2P Category is about 0.10 MMSKL.



In line 77 passing through well NHK-597 (Loc. HUM)



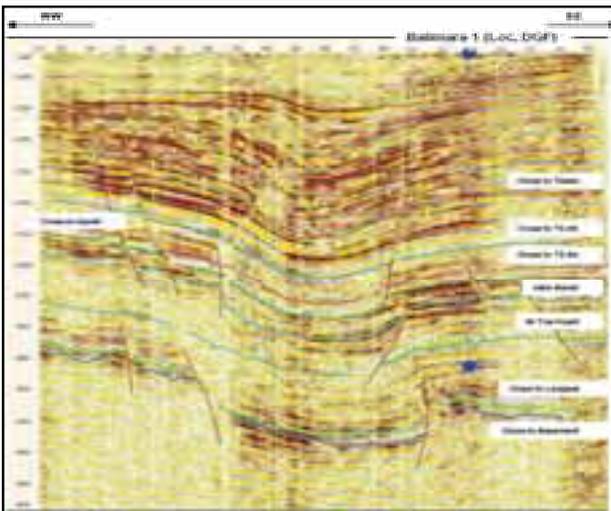
East Zaloni Structure with well NHK-597 Depth Contour Map Close Top Girujan

**NEW DISCOVERIES**

**Balimara-1 (DUMDUMA ML)**

**OPERATOR : OIL**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
<b>Balimara structure in Dumduma ML/ Balimara-1 (Loc. DGF)/ Upper Eocene to Lower Oligocene</b>	Object: 4049.0-4055 m (Barail Formation / Upper Eocene to Lower Oligocene) Oil: 77 klpd (oil: 75 klpd, water: 2 klpd) through 5 mm bean, (API: 31.30; PP: 330C). FTHP: 84 kg/cm2.	The discovery of oil within Barail Formation in this well has opened up new play for oil exploration/ exploitation in Balimara structure within Dumduma ML area. The well has helped in accretion to In-place volume of O+ OEG in 2P Category is about 1.60 MMSKL.



Seismic section along IL 985 passing through the well Balimara-1



Balimara Structure with well Balimara-1 – Depth Contour Map Close to 34 SB / Near Top Barail

**NAGAYALANKA-SE-1**

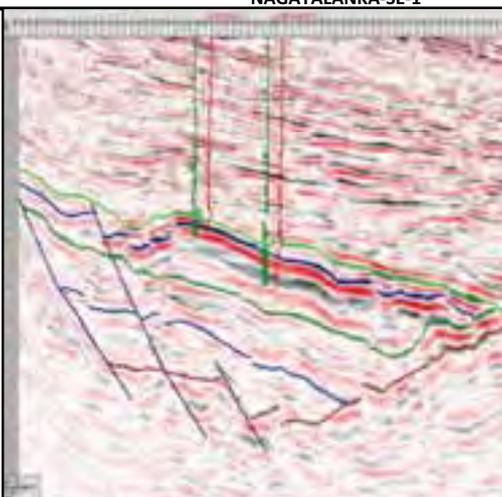
**OPERATOR : CEIL**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
<b>Nagayalanka-SE-1 / KG-ONN-2003/1</b>	Average oil flow rate 70 bbl/day and average gas flow rate 0.6 mmscfd	This discovery has opened up the west Godavari sub-basin for hydrocarbon exploration.

NAGAYALANKA-SE-1



Location map of block KG-ONN-2003/1



Seismic section showing through well Nagayalanka-SE1



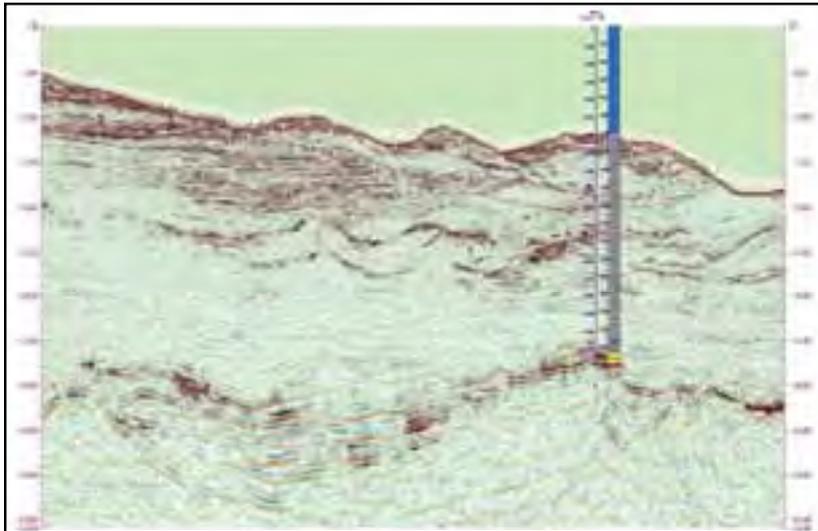
Well Log Motif of Nagayalanka-SE-1

**NEW DISCOVERIES**

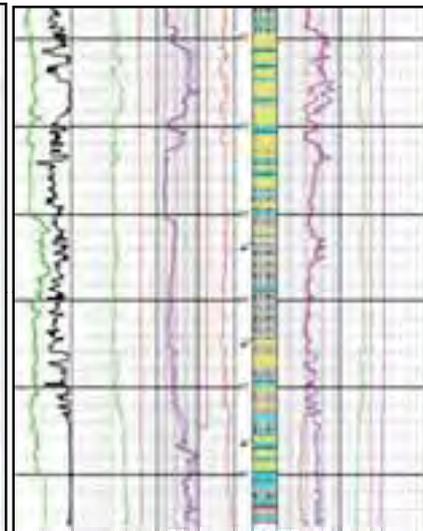
**Dhirubhai-53 (CYPRIID6-SA1) (CY-PR-DWN-2001/2)**

**OPERATOR : RIL**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
Mesozoic Sequence / CYPRIID6-SA1 / CY-PR-DWN-2001/2 (CYPR-D6)	Well Flowed gas @ 37 MMSCF /day and 1100 bbls/day condensate (45 degree API) @ 56/64 " choke for 24 hrs with a flowing THP 2282 psia and WHT 103 °F	Opened up synrift prospect in the Mesozoic section in this area of Cauvery basin.



Seismic section showing through well CYPRIID6-SA1

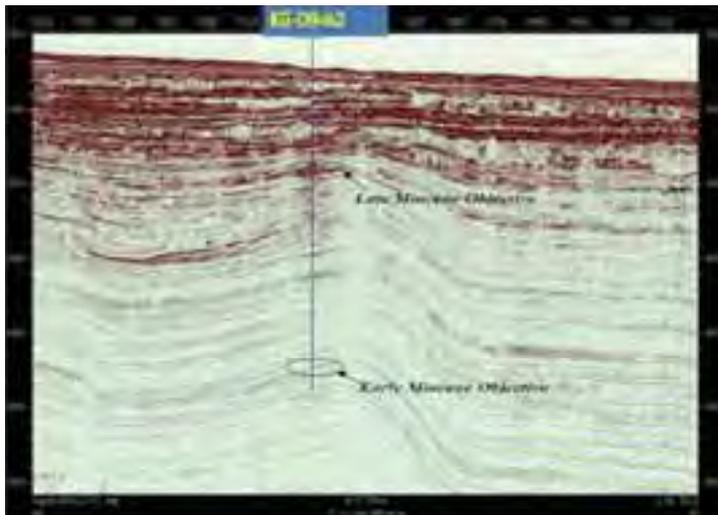


Well Log Motif of CYPRIID6-SA1

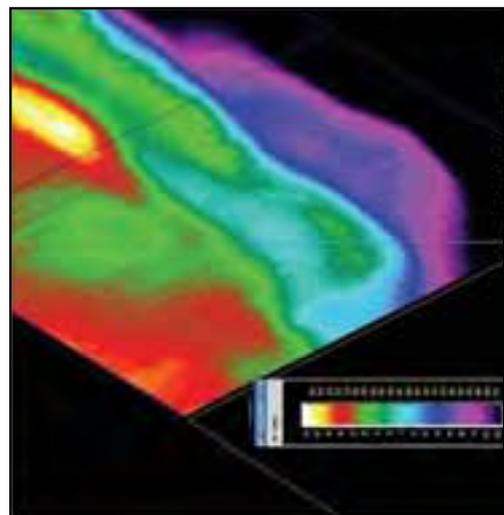
**Dhirubhai-54 (KG-D9-A2) (KG-DWN-2001/1)**

**OPERATOR : RIL**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
Late Miocene Sequence / Dhirubhai-54 (KG-D9-A2) / KG-DWN-2001/1 (KG-III-D9)	Following hydrocarbon interesting zones with geological age/formation 3375 – 3382m MDRT (Gas) 3465 – 3475m MDRT (Gas) 3616 -3621m MDRT (Gas)	Led to identify different hydrocarbon bearing channel levee complexes of Lower Miocene age.



Seismic depth section passing through location for KG-D9-A2



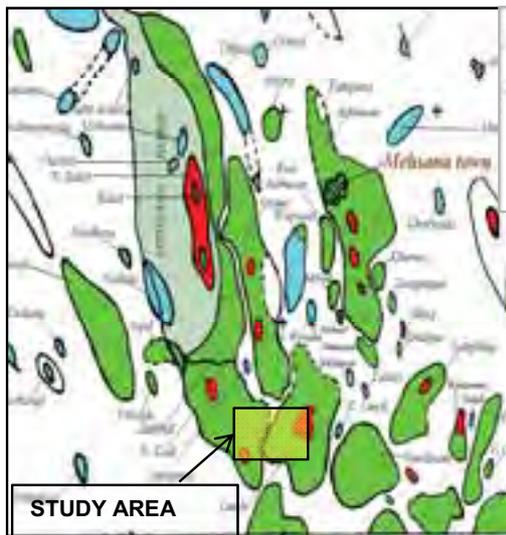
Depth Structure Map of Late Miocene Gas sand

**NEW POOLS : WESTERN ONLAND**

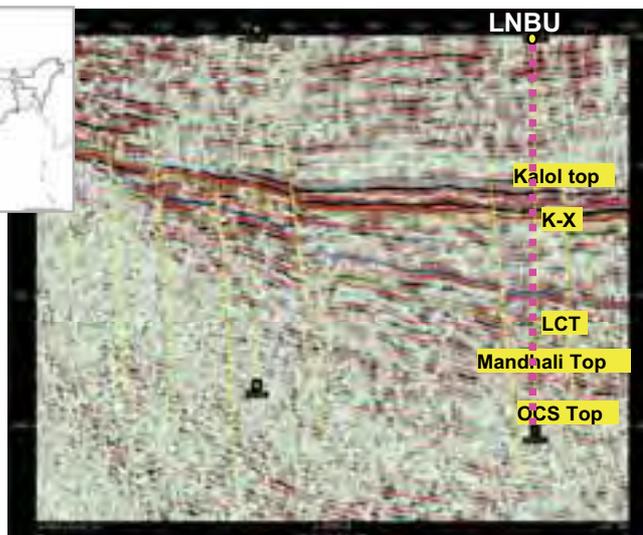
**LNBU / LN-81**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
East Linch / LNBU / LN-81	Obj-IV: 1857-1854 m, flowed oil @ 29 m <sup>3</sup> /d through 5 mm bean.	<i>This is a new prospect discovery in this part of the block. This will open up significant area for exploration and exploitation.</i>



Prospect Map of Mehsana showing study area

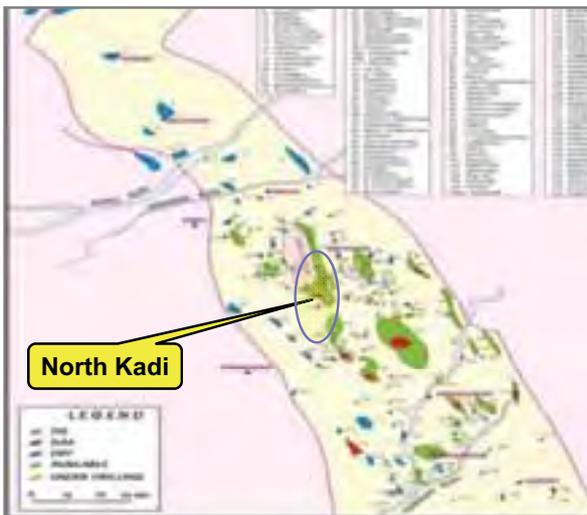


PART OF IL 350 SHOWING LOCATION LNBU

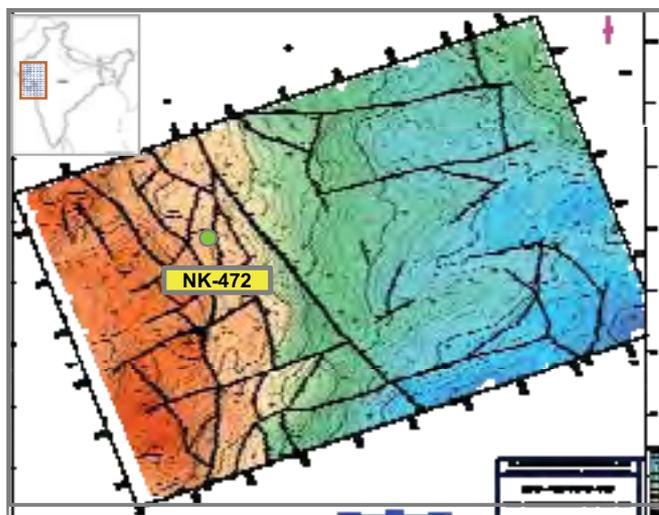
**NKXV / NK-472**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
North Kadi / NKXV / NK-472	Obj-I: 1279-1277 m, flowed oil @ 23.7 m <sup>3</sup> /d through 6 mm bean.	<i>This well, N.Kadi-472 produced oil for the first time from MP-IV unit of Mandhali Member in North Kadi area. This new pool discovery is likely to open up new areas for further exploration and will also contribute for reserve growth and production.</i>



Prospect Map



Time Structure Map at the Top of Kalol-X

**NEW POOLS : WESTERN ONLAND**

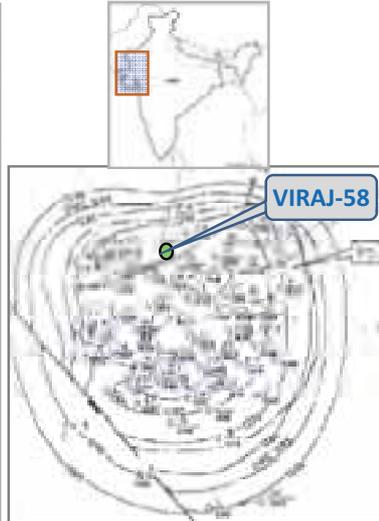
**VJEP / VIRAJ-58**

**OPERATOR : ONGC**

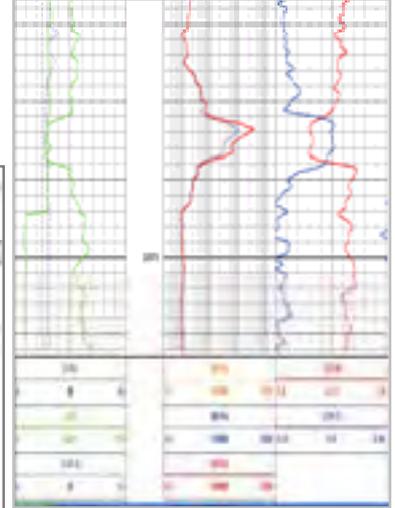
Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
Viraj / VJEP / Viraj-58 <sup>^</sup>	Obj-I:1869-1866 m, flowed oil @ 108 m3/d through 5 mm bean.	<i>This is for the first time oil &amp; gas has been discovered in commercial quantities in Mandhali Member of Kadi Formation in Viraj Field. The new pool discovery is likely to open up new areas for exploration and will also contribute in reserve growth and production.</i>



Prospect Map



Structure Map At The Top Of L-I

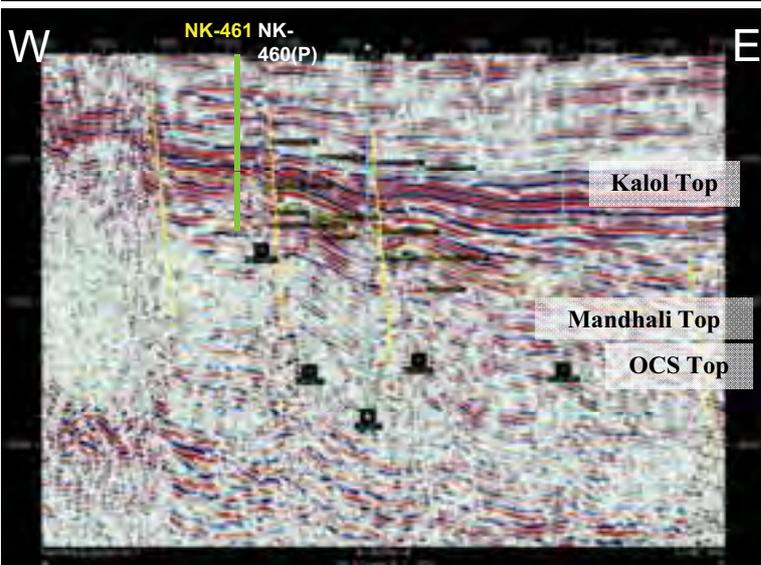


Log motif of the Mandhali Member

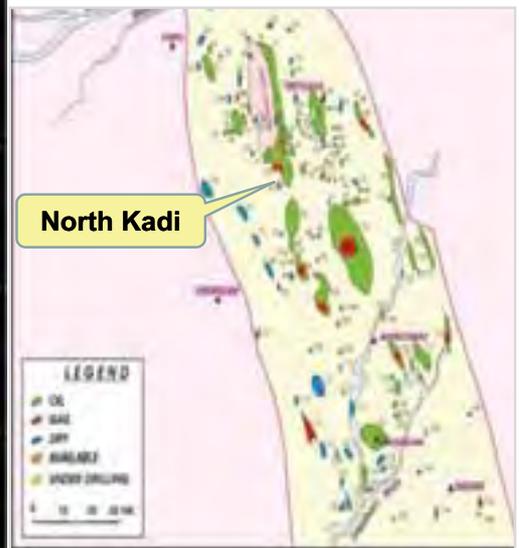
**NKPI / NORTH KADI-461**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
North Kadi / NKPI / North Kadi-461	Obj-II: 1316-1312.5 m, produced oil @17 m3/d through 8 mm bean.	<i>This is a new pool discovery and has opened up large area east of the North Kadi Field for further exploration and exploitation of Mandhali Reservoirs.</i>



INLINE 390 - Showing well, NK-461



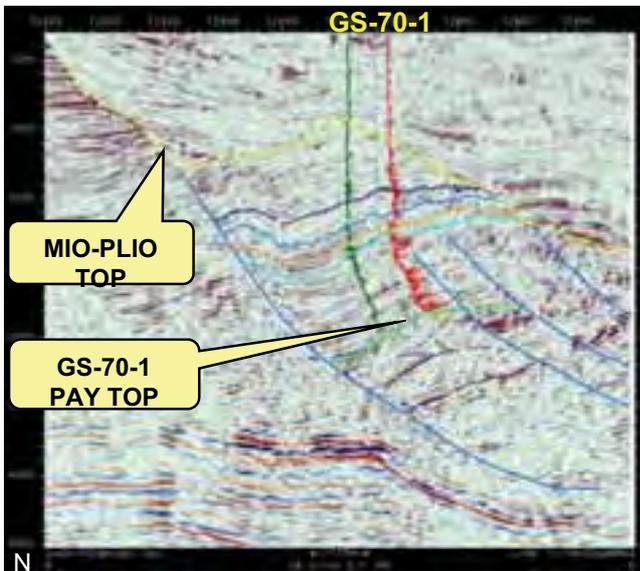
Prospect Map

**GS-70-AA / GS-70-1**

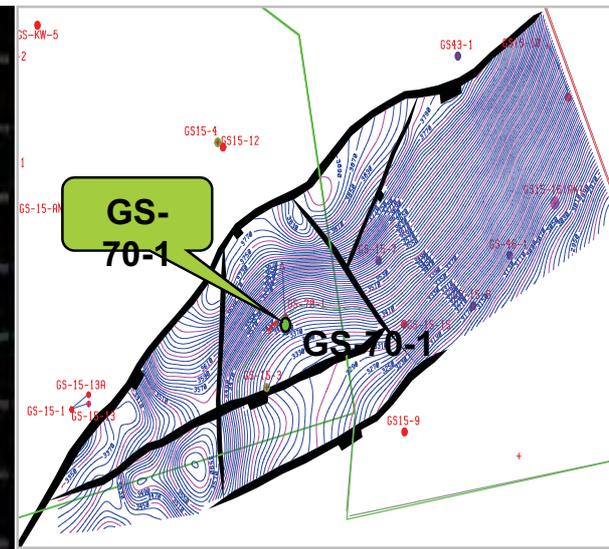
**NEW POOLS : KG OFFSHORE**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
GS-70 / GS-70-AA / GS-70-1	Obj-l: 3703-3697 m, produced oil @ 69.10 m3/d, gas @ 78,000 m3/d and water @ 1.5 m3/d through 6 mm bean.	The discovery is of significant techno-economic value in the proposed development plan of the area.



Inline 11118 through well GS-70-1



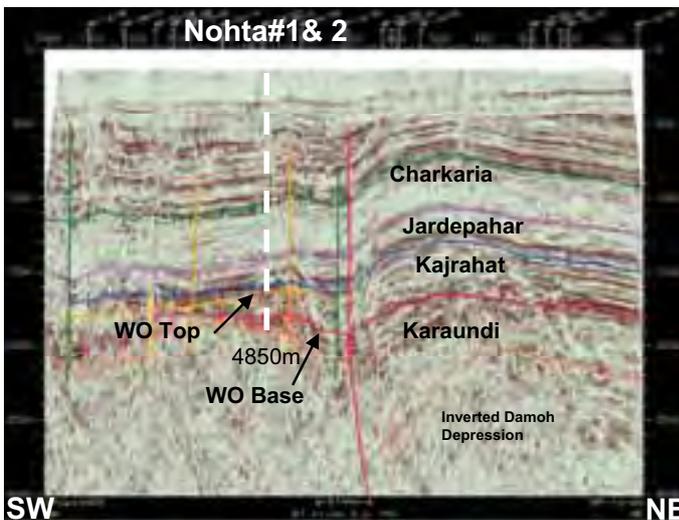
Time map of a Horizon close to pay sand of well GS-70-1

**NEW POOLS : VINDHYAN (SON VALLEY)**

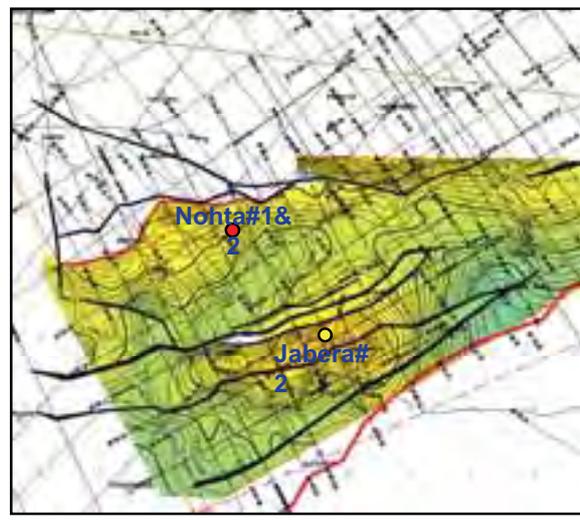
**R-NA-B / NOHTA-2**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
Nohta-2 / R-NA-B / Nohta-2	Object - Barefoot: 1727-1702 m, flowed gas @ 3724 m3/d through 6 mm bean.	Well, Nohta-2 has produced gas for the first time from Rohtas Formation of Meso-Neo Proterozoic age in Damoh-Jabera-Katni PEL of Vindhyan Basin. The new discovery is likely to open up new areas for exploration and will also contribute in reserve growth and production.



SEISMIC LINE MP-19-06



Isochron map at wedge out top within Kajrahat formation

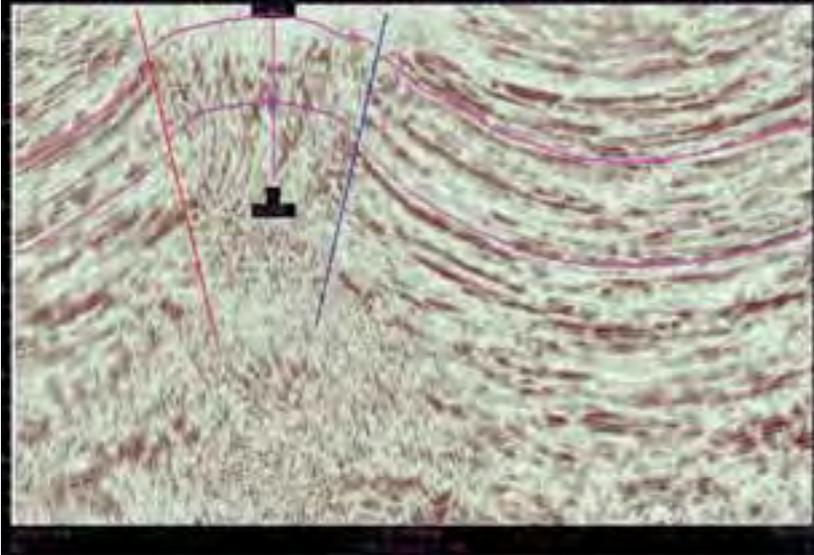
**NEW POOLS : AAFB (TRIPURA)**

**GOAB / GO-13**

**OPERATOR : ONGC**

Structure / Well No. & Location	Testing Result	Leads / Expl. Efficacy
<p><b>Gojalia / GOAB / GO-13</b></p>	<p>Obj-IV: 1957-1953 m, flowed gas @ 1,01,200 m<sup>3</sup>/d and through 10 mm bean.</p>	<p><i>This is a new pool discovery from Middle Bhuban Formation which has reaffirmed the hydrocarbon prospectivity of the southern part of Gojalia Structure.</i></p>

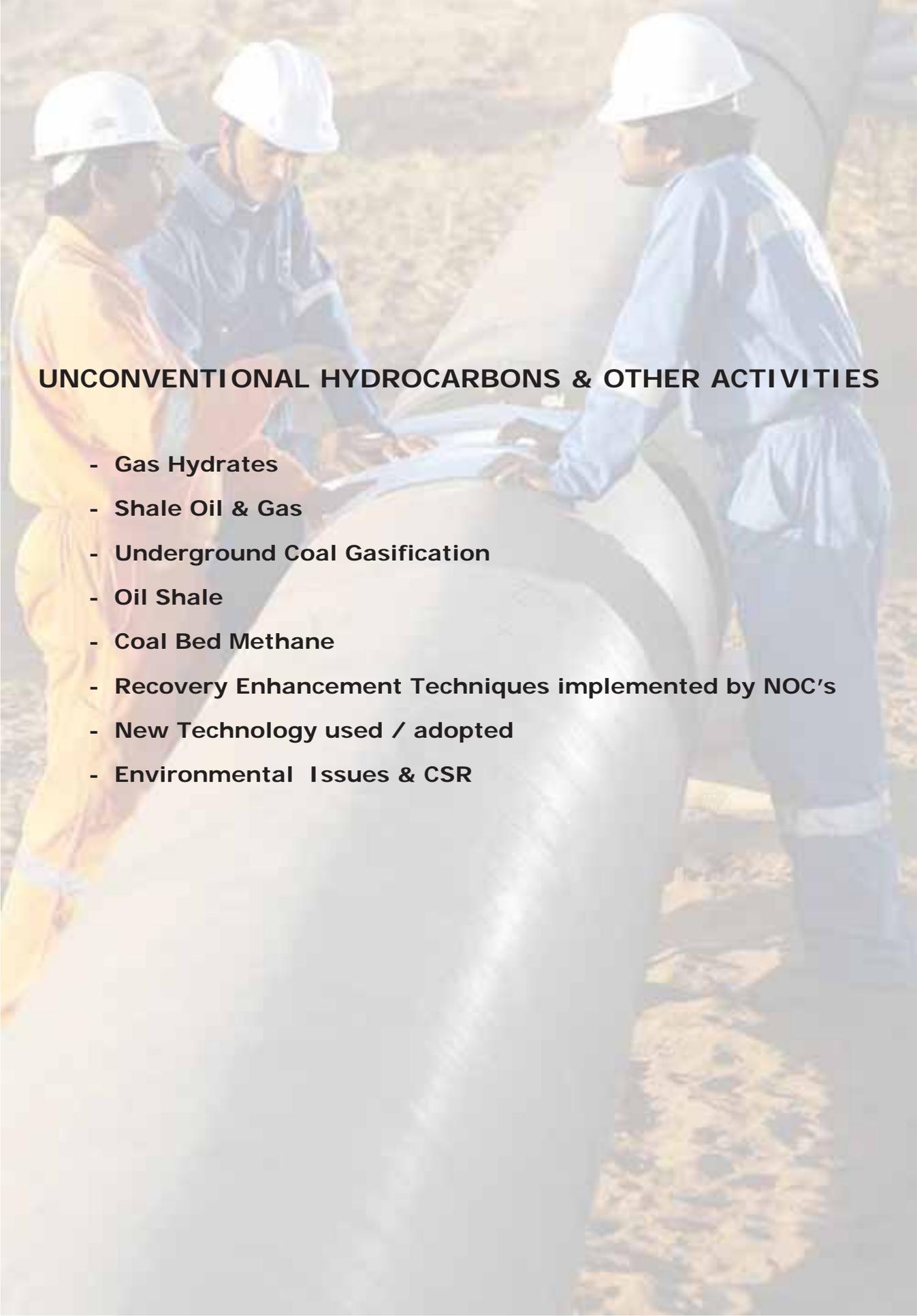
**GO-13**



Interpreted line TR-43-07



Time Map: Top Of Middle Bhuban



## UNCONVENTIONAL HYDROCARBONS & OTHER ACTIVITIES

- Gas Hydrates
- Shale Oil & Gas
- Underground Coal Gasification
- Oil Shale
- Coal Bed Methane
- Recovery Enhancement Techniques implemented by NOC's
- New Technology used / adopted
- Environmental Issues & CSR



# UNCONVENTIONAL HYDROCARBONS

## GAS HYDRATES

Steered by the Ministry of Petroleum and Natural Gas and technically coordinated by Directorate General of Hydrocarbons (DGH), National Gas Hydrate Program (NGHP) is a consortium of National E & P companies, namely ONGC, GAIL, OIL and national research institutions NIO, NIOT and NGRI. During the period 1998 to 2003, data of Krishna Godavari Basin (offshore), Cauvery Basin (offshore), Gulf of Mannar and Western offshore were studied by ONGC for assessing Gas Hydrate prospectivity. These studies provided technical support in formulating NGHP-1 program, wherein 21 sites were drilled/ cored in Indian offshore during 28<sup>th</sup> April, 2006 to the 19<sup>th</sup> August, 2006 through the ship Joides Resolution by Overseas Drilling Ltd. USA. Gas Hydrate layer was encountered at sites NGHP-01-10 in the Krishna-Godavari Basin and at site NGHP-01-17 in offshore of the Andaman Islands. The following are highlights of the findings:

- Established presence of gas hydrate in KG, Mahanadi and Andaman deep waters in numerous complex geologic settings.
- Collected an unprecedented number of gas hydrate cores
- Most of the recovered gas hydrate was characterized as either pore-filling grains or particles disseminated in coarser grain sediments or as a fracture-filling material in clay dominated sediments.
- Gas hydrate was found occurring in “combination reservoirs”.
- Delineated and sampled one of the richest marine gas hydrate accumulations yet discovered (Site NGHP-01-10 in the KG Basin).
- Discovered one of the thickest and deepest (612M) gas hydrate occurrences yet known (offshore of the Andaman Islands, Site NGHP-01-17).
- Scientific Contribution globally acknowledged.

### **NGHP Expedition-02**

Based on the findings of NGHP Expedition-01, the Krishna Godavari deepwater basin and the Mahanadi deep waters have been considered potential areas where large tracts of turbidity sand channel systems can be expected in the delta sequence accumulations. Three areas in KG offshore namely ‘A’ in Vizag offshore (Industrial well L1-1A area), Area ‘B’ in Krishna Offshore (South of KD Prospect) and Area ‘C’ (East of GD Prospect) have been identified.

The aims and objectives of the NGHP Expedition-02 are to identify gas hydrate bearing sands, identify the free gas below the gas hydrate stability zone and identify suitable location for carrying out pilot production testing in NGHP Expedition-03. 3D seismic data interpretation is in progress to identify potential sand channel systems. The results of the studies will yield potential sites for NGHP Expedition-02. The NGHP Expedition-02 consists of an exclusive logging while drilling programme, followed by intensive coring and G & G Acquisition.

### **Identification of Locations:**

Based on the geophysical studies carried out so far in Area ‘A’ (320 sq.km in Krishna Godavari Offshore Deepwater areas) 8 sites have been evaluated and prioritized for Leg-01 of the NGHP Expedition-02. These locations have been prioritized and extended in consultation with USGS scientists. Geoscientific studies are in progress to identify more locations in the area.

**Resource Estimation:**

Earlier studies have prognosticated gas hydrate resources of 1894 TCM for India and 933 TCF (USDOE, Feb 2012) is the concentration of gas hydrate in sands within the gas hydrate stability zone. This estimate is encouraging although the estimated presence of sand is approximated based on gross geological depositional models. NGHP is carrying out resource estimation of the gas hydrates in offshore areas of East Coast.

**MoU for Gas Hydrates**

NGHP has MoU with USGS, USDOE, USMMS, JOGMEC and IFM-Geomar for collaborative research in gas hydrates. USGS scientists are in close consultation for prioritizing locations.



**GAS HYDRATE CORE SAMPLES FROM KG BASIN – EXPEDITION-01**

**Exploitation of methane from Gas Hydrates**

A collaborative project with IIT, Kharagpur was taken up to firm up theoretical background of the method. The project has brought out that the heat transfer rates are very slow and hence the ultimate production rate by thermal stimulation will be very low. (a few thousand cubic meter per day). Also the studies at IEOT, ONGC has brought out that apart from the problem of low production rates, sea floor stability is a more serious problem in carrying out gas production from gas hydrates in shallow marine environments. A conceptual mining method is being considered and various technical aspects are being looked into.

**Future plans**

As per observation of the team consisting of scientists from DGH, NGRI, NIO etc. headed by USGS expert Dr. Tim Collette the sites presented by KDMIPE in an area having 3D seismic coverage in offshore

Krishna-Godavari Basin (Vizag offshore) hold merit and warrant drilling for Gas Hydrate prospects because of occurrence of sand facies in Gas Hydrate Stability Zone and observation of distinct BSR.

The NGHP technical committee agreed to test probable gas hydrate bearing sand in channel-levee system by drilling of six out of eight proposed locations in area 'A' as top priority and two as alternate locations during NGHP-02 expedition. The paleogeographic reconstruction of study area provided insight into sediment supply and the gas sourcing and charging reasonably fits into tectono-stratigraphic model and proven-petroleum system of KG Basin (offshore).

### **Global Analogues : 2011-12 Field Program, North Slope Alaska (Source: NETL)**

Ignik Sikumi field trial in the Prudoe Bay area of North Slope Alaska began in December, 2011, with the reconstruction of the ice pad around the well head installed the prior winter (Figure1).

Throughout January and February 2012, equipment was installed to conduct the exchange trial, fluids were re-circulated to confirm the well's mechanical integrity. The well was then filled with a mixture of CO<sub>2</sub> and N<sub>2</sub> gas that displaced the well preservation fluids. An oriented perforating gun was lowered, and a 30-ft interval of casing was perforated at six-inch spacing with no damage to the downhole pressure temperature gauges or the fiber-optic cables. A sand screen designed to control sand production was then set across the perforated interval.

Between February'15 and Feb'28, 2012, 210,000 standard cubic feet (scf) of blended CO<sub>2</sub>(23%) and N<sub>2</sub>(77%), along with small volumes of chemical tracers, were successfully injected into the formation. Mixed gas was used rather than pure CO<sub>2</sub> to enhance opportunities for carbon dioxide

to interact with native methane-hydrate by inhibiting formation of secondary CO<sub>2</sub>-hydrate – both by displacing movable formation water and by changing the reservoir chemistry near the wellbore. The injection phase proceeded smoothly, and injectivity increased slowly and steadily during the test, without any indications of formation fracturing. Once the planned gas volumes were injected, the well was shut-in and reconfigured for flow back.

On March 4, 2012, the well was re-opened and produced a mixture of gases under its own energy, for one-and-a-half days, before it was shut-in for installation of a downhole jet pump. For the next seven days, the well was produced by pumping fluids from the wellbore, thereby lowering pressure at the level of the perforations to draw fluids from the formation, while remaining above the pressure that would destabilize any native CH<sub>4</sub>-hydrate. Ignik Sikumi #1 produced water and gas at a wide range of rates during this phase, accompanied by intermittent recovery of very fine-grained sand. Pressure drawdown was below methane-hydrate stability pressure. During this phase of the field test, hydrate dissociation was successfully initiated and gas production rates peaked. After producing for two and a half days, the wellbore was shut-in to mitigate an ice plug that formed in the flare line.

During this shut-in period, the downhole jet pump was also replaced with a model that permitted lower drawdown pressures. Production was reinitiated on March 23, 2012 and the well flowed continuously for the next 19 days, until final shut-in on April 11, 2012. During this final period, flowing reservoir



*Figure 1: Ignik Sikumi Field Trial Site, North Slope, Alaska*

pressures were smoothly lowered and production rates steadily increased. The recovered gas was progressively dominated by methane. Overall, the well produced for 30 days during the 38-day flow-back period, with cumulative gas production approaching one million standard cubic feet.

The well was plugged and abandoned in accordance with the regulations of the Alaska Oil and Gas Conservation Commission, including filling the wellbore to surface with cement, capping the well, cutting the well off below ground surface, then backfilling it to fit the pre-existing tundra landscape. The site will continue to be visually monitored as spring thaw removes all visible signs of the test site.

### Challenges Met

The Ignik Sikumi field trial overcame a number of challenges. First, careful program planning and management enabled a complex scientific field experiment to be conducted in the midst of normal operation activities in the Prudhoe Bay Unit with no interference with the simultaneous production operations. Second, the field team successfully managed the oriented perforating of the target zone with no damage to the well's extensive downhole monitoring equipment, enabling full collection of data throughout the duration of the test. Third, careful engineering of the gas injection phase enabled the precise mixing and control of injectant components, as well as the management of injection pressure such that the targeted volume of 210,000 scf of gas was injected within the allotted time without fracturing the formation, an event that would have made real-time monitoring and post-test modeling more difficult. Fourth, the team addressed the potential for rapid loss of injectivity due to direct CO<sub>2</sub>-hydrate formation through the use of a N<sub>2</sub>-CO<sub>2</sub> gas mixture. This mixture met the program goal of modifying the near-wellbore physical and chemical environment in such a way that injection could occur without adversely affecting the hydrate-bearing reservoir. Fifth, the well was successfully transitioned from injection to production, during which the downhole pressure was lowered in a controlled manner, enabling the measurement and management of produced gases, fluids, and solids, at pressures both above and below the dissociation pressure of native CH<sub>4</sub>-hydrate. Ignik Sikumi #1 flowed for approximately 30 days, at rates as high as 175,000 scf/d. During the final phase of drawdown testing, gas rates steadily increased from 20,000 scf/day to 45,000 scf/day while significantly exceeding both the duration and the cumulative gas recovery of prior field testing programs. Finally, water and fine formation sand were liberated as by-products of dissociation, and the production of both were efficiently managed as the test progressed.

Figure 2: After measurement and compositional analysis, gas is flared at the Ignik Sikumi # 1 well site



Nordic-Calista Drilling Rig #3 on site at the Ignik Sikumi #1 well, Prudhoe Bay Unit, Alaska North Slope - photo courtesy ConocoPhillips

## SHALE OIL & GAS

Shale gas has gained predominance particularly in USA and contributes approx. 20% of total gas production. The experience accumulated so far in USA with the exploration and exploitation of these plays has encouraged other countries to venture into such plays. Though Shale gas was recognized much earlier, two things in particular, horizontal multilateral drilling with water fracturing and improved prices of gas in the US markets, have changed the scenario rapidly after 2001.

There are large basinal segments, which appear interesting from Shale Gas point of view, by drawing analogy from US basins. A systematic approach has been initiated by DGH under MOPNG since 2010 to identify, characterize and prioritize the Indian sedimentary basins for focused shale oil /gas exploitation and also to assess and establish the potential of fields.

Memorandum of understanding (MOU) has been signed between Department of State, USA and MOPNG, GOI on November 06,2010 to cooperate in areas of

- a. Assessment of Shale Gas Resources in India.
- b. Training
- c. Assistance in regulatory frameworks
- d. Investment Promotion

In this respect technical workshops were held during Jan 2011, May 2011 and Jan 2012, at Delhi attended by USGS Team, MOPNG, DGH, ONGC, OIL , GAIL and several others.

MOPNG, Government of India through DGH has taken initiative to identify prospective areas for Shale Gas exploration in India. DGH has been entrusted asked to prepare a road map for issue related to Policy and Legal framework prior to forthcoming first round of offer of shale oil / blocks of India.

- DGH under MoP & NG has initiated steps to
  - a. Identify prospective areas for Shale Gas exploration and acquisition of additional geo-scientific data
  - b. Formulation of Policy for Shale Oil & Gas exploration
  - c. Launch First Shale Oil & Gas round
- Based on the data available from conventional oil/gas exploration in the country for the last so many years, it appears that following sedimentary basins may be prospective from Shale gas point of view under Phase-I.
  - ◆ Cambay Basin
  - ◆ Gondwana Basin
  - ◆ KG Basin
  - ◆ Cauvery Basin
  - ◆ Indo-Gangetic Basin
  - ◆ Assam Arakan Basin

However, detailed analysis of geo-scientific data gathered during conventional exploration of Oil/Gas is being carried out to identify areas/basins prospective for shale gas.

Studies have been initiated for 12 basins / sub basins (including 6 basins given above) to analyze geo-scientific data gathered over the years to assess shale oil/gas prospectivity, for future action plan.

- Gol has granted permission to ONGC for an R&D project in Gondwana Basin in the existing two CBM Blocks for exploration of Shale Gas. ONGC has drilled 4 Pilot wells to gather data relevant to Shale Gas. Presence of gas has been reported by ONGC. Further studies on the samples are in progress.
- A Multi Organizational Team (MOT) of DGH, ONGC, OIL, GAIL has been formed by MOPNG to analyze the existing data set and suggest methodology for Shale Gas development in India.
- Studies have been awarded to ONGC & CMPDI to identify prospective areas in 12 Basins / sub basins.
- MoP&NG / DGH are in discussion with other agencies to address Environmental issues and issues related for social impact etc.
- Different agencies have reported upon the shale gas resources in India. EIA, USA (Apr'11) has reported a GIP concentration of 1170 TCF, risked gas-in-place of the order of 293 TCF with 69 TCF as recoverable in 4 Indian basins. USGS (Jan'12) has estimated 6.1 TCF as technical recoverable in 3 Indian basins and mention potential for Shale oil. Media reports mention shale gas resources ranging from 300 to 2100 TCF in India.

#### Future Action Plan

- Identification of prospective areas in different sedimentary basins
- Finalization of Shale Gas Policy & necessary amendments in P & NG Rules, if required
- Carving out and Offering of Blocks, based on availability of all necessary clearances and finalization of Shale Gas policy.

#### Shale Gas Pilot Project-Damodar Basin: (provided by ONGC)

- ONGC has undertaken a pilot study in the Damodar Valley, where 4 wells have been drilled. The first shale gas well RNSG#1, and other wells in the series viz. NKSG#2, RNSG#2, NKSG#1 have been drilled and completed with full set of logs and extensive coring in the Barren Measures Shales. This has marked the completion of drilling and phase-2 operations.
- Well **RNSG#1** (Damodar Basin, Jharkhand and West Bengal) flowed the shale gas at surface on 25<sup>th</sup> January, 2010.
- The Shale gas project was to be completed in 7 phases. All the phases have been successfully accomplished and in the Raniganj sub basin the Gas in Place (GIP) has been estimated based on the subsidence modeling as 35 TCF and based on the core log data the same has been estimated as 48 TCF.

## UNDERGROUND COAL GASIFICATION (UCG) submitted by ONGC

ONGC signed an Agreement of Collaboration (AOC) with M/s Skochinsky Institute of Mining (SIM), Russia on 25<sup>th</sup> November, 2004 for implementation of Underground Coal Gasification (UCG) program in India. As follow-up MOUs was signed with various coal companies for accessing the coal/lignite blocks for evaluating their suitability to UCG. After evaluating a number of coal/lignite blocks, Vastan Mine block belonging to GIPCL in Surat district, Gujarat was found suitable for UCG. This site has been taken up by ONGC as an R&D project to establish UCG technology.

### **Work at Vastan Mine Block:**

All the ground work and inputs for pilot construction have been finalized for implementation of UCG pilot at Vastan. In order to implement UCG the following steps have been undertaken:

- The “**Environmental Clearance**” from MoEF, GoI has been obtained in the month of Feb’ 2010.
- Basic and detailed engineering design has been prepared with the help of SIM, Russia and Ukrainian Design Institute, OJSC Dongiproshakht in November, 2009.
- The spade work for execution of pilot module in terms of land acquisition, electric supply, water connection, soil survey etc. have been initiated.
- Draft contract for construction of UCG pilot has been finalised after cost optimisation and inclusion of Indian vendors.

### **Status of other UCG Sites:**

In parallel action, other sites have been taken up for studying their suitability for UCG. ONGC and Neyveli Lignite Corporation Limited (NLC) jointly identified Tarkeshwar in Gujarat and Hodu-Sindhari & East Kurla in Rajasthan. One more site was also jointly identified by ONGC & Gujarat Mineral Development Corporation Ltd, Gujarat (GMDC) viz. Surkha in Bhavnagar Distt., Gujarat. The data of all the fields have already been analysed for evaluating the suitability of these sites for UCG and all the sites have been found suitable for UCG. These projects will be taken up on the basis of learning curve from Vastan project.

## OIL SHALE

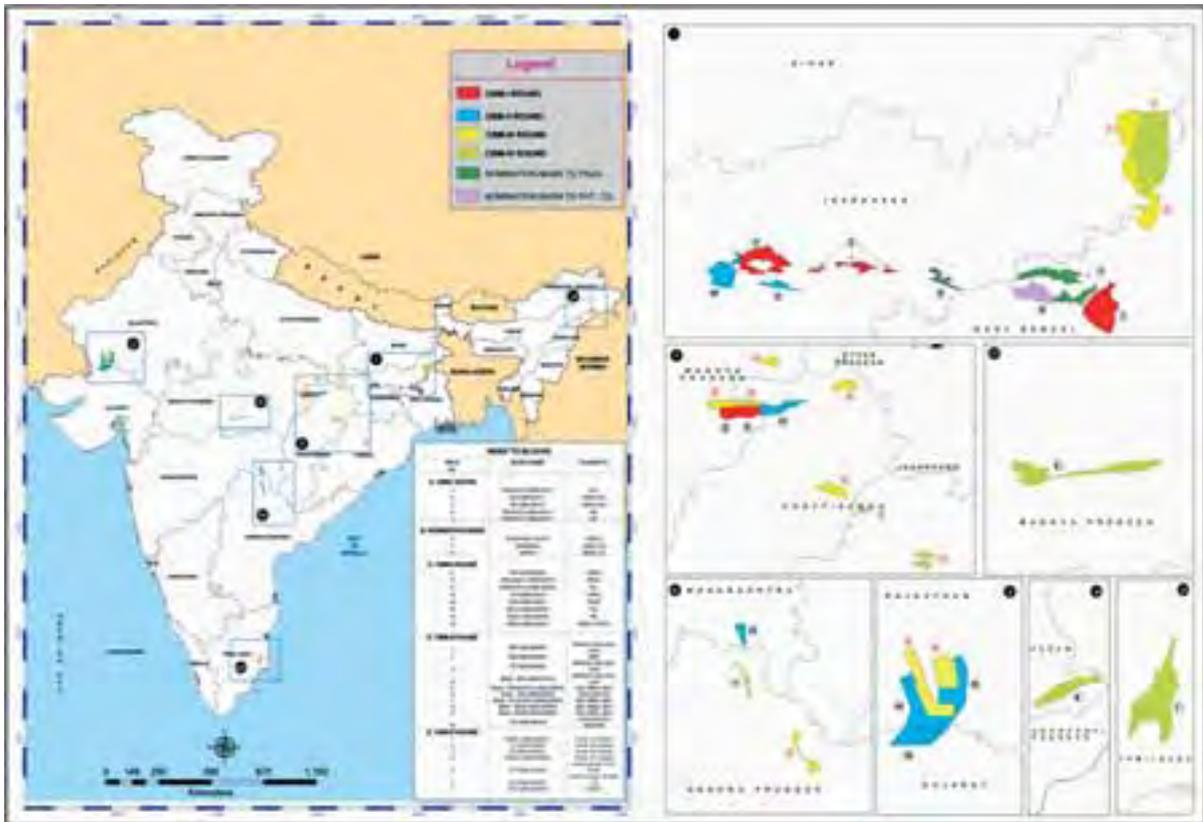
- Oil Shale prospectivity mapped in Assam-Arakan Basin
- Oil Shale resources estimated to be around 400 MMT of oil upto a depth of 500m in selected areas in Assam-Arakan Basin
- Vision document on Oil Shale prepared

**COAL BED METHANE (CBM)**

India, having the fourth largest proven coal reserves in the world, holds significant prospects for exploration and exploitation of CBM. The prognosticated CBM resources in the country are about 92 TCF (2608 BCM). In order to harness CBM potential in the country, the Government of India formulated CBM policy in 1997 wherein CBM being Natural Gas is explored and exploited under the provisions of OIL Fields (Regulation & Development) Act 1948 (ORD Act 1948) and Petroleum & Natural Gas Rules 1959 (P&NG Rules 1959) administered by Ministry of Petroleum & Natural Gas (MOP&NG).

CBM blocks were carved out by DGH in close interaction with MOC & CMPDI. Till date, four rounds of CBM bidding rounds have been implemented by MOP&NG under the CBM policy resulting in award of 33 CBM blocks which covers 17,200 Sq.km out of the total available coal bearing areas for CBM exploration of 26,000 sq.km. Exploration under CBM policy has been undertaken by national and international companies. Total prognosticated CBM resource for awarded 33 CBM blocks, is about 63.85 TCF (1810 BCM), of which, so far, 8.92 TCF (252.8 BCM) has been established as Gas in Place (GIP).

Commercial CBM production has started from 1 block since 14th July 2007 which contributes about 0.25 MMSCMD of CBM production. Four more CBM blocks are expected to start commercial production in near future. The total CBM production is expected to be around 4MMSCMD by end of 12th plan.



**CBM BLOCKS AWARDED SO FAR**

### CBM BLOCKS AWARDED

SL NO.	COAL FIELD / STATE	BLOCK NAME	CONSORTIUM (PARTICIPATING INTEREST)	DATE OF SIGNING CONTRACT	AWARDED AREA (SQ. KM.)
<b>CBM-I ROUND</b>					
1.	RANIGANJ EAST / WEST BENGAL	RG(E)-CBM-2001/1	EOL (100)	26.07.2002	500
2.	BOKARO / JHARKHAND	BK-CBM-2001/1	ONGC (80) & IOC (20)	26.07.2002	95
3.	N. KARANPURA / JHARKHAND	NK-CBM-2001/1	ONGC (80) & IOC (20)	26.07.2002	340
4.	SOHAGPUR EAST / M.P	SP(E)-CBM-2001/1	RIL (100)	26.07.2002	495
5.	SOHAGPUR WEST / M.P	SP(W)-CBM-2001/1	RIL (100)	26.07.2002	500
<b>TOTAL AREA :</b>					<b>1930</b>
<b>ON NOMINATION BASIS</b>					
6.	RANIGANJ NORTH / WEST BENGAL	RANIGANJ NORTH	ONGC (74) & CIL (26)	06.02.2003	350
7.	JHARIA / JHARKHAND	JHARIA	ONGC (90) & CIL (10)	06.02.2003	85
8.	RANIGANJ SOUTH / WEST BENGAL	RANIGANJ SOUTH	GEECL (100)	31.05.2001	210
<b>TOTAL AREA :</b>					<b>645</b>
<b>CBM-II ROUND</b>					
9.	SOUTH KARANPURA / JHARKHAND	SK-CBM-2003/II*	ONGC (100)	06.02.2004	70
10.	NORTH KARANPURA / JHARKHAND	NK(WEST)-CBM-2003/II*	ONGC (100)	06.02.2004	267
11.	SONHAT / CHATTISGARH & M.P.	SH(NORTH)-CBM-2003/II	RIL (100)	06.02.2004	825
12.	BARMER / RAJASTHAN	BS(1)-CBM-2003/II*	RIL (100)	06.02.2004	1045
13.	BARMER / RAJASTHAN	BS(2)-CBM-2003/II*	RIL (100)	06.02.2004	1020
<b>TOTAL AREA :</b>					<b>3227</b>
<b>CBM-III ROUND</b>					
14.	RAJMAHAL / JHARKHAND	RM-CBM-2005/III*	ARROW(35)-GAIL(35)-EIG(15)-TATA(15)	07.11.06	469
15.	BIRBHUM / WEST BENGAL	BB-CBM-2005/III*	BPE(100)	16.11.06	248
16.	TATAPANI RAMKOLA / CHATTISGARH	TR-CBM-2005/III*	ARROW(35)-GAIL(35)-EIG(15)-TATA(15)	07.11.06	458
17.	MAND RAIGARH / CHATTISGARH	MR-CBM-2005/III*	ARROW(40)-GAIL(45)-EIG(15)	07.11.06	634
18.	SOHAGPUR / M.P.	SP(N)-CBM-2005/III	GEO(10)-REL(45)-RNPL(45)	07.11.06	609
19.	SINGRAULI / M.P.	SR(N)-CBM-2005/III	COALGAS(10)-DIL(90)	07.11.06	330
20.	KOTHAGUDEM / ANDHRA PRADESH	KG(E)-CBM-2005/III	GEO(10)-REL(45)-RNPL(45)	07.11.06	750
21.	BARMER / RAJASTHAN	BS(4)-CBM-2005/III	GEO(10)-REL(45)-RNPL(45)	07.11.06	1168
22.	BARMER / RAJASTHAN	BS(5)-CBM-2005/III	GEO(10)-REL(45)-RNPL(45)	07.11.06	739
23.	GODAVARI / ANDHRA PRADESH	GV(N)-CBM-2005/III	COALGAS(10)-DIL(40)-ADINATH(50)	07.11.06	386
<b>TOTAL AREA :</b>					<b>5791</b>
<b>CBM-IV ROUND</b>					
24.	RAJ MAHAL / JHARKHAND	RM(E)-CBM-2008/IV	ESSAR OIL LIMITED (100)	29.07.10	1128
25.	TALCHIR / ORISSA	TL-CBM-2008/IV	ESSAR OIL LIMITED (100)	29.07.10	557
26.	IB VALLEY / ORISSA	IB-CBM-2008/IV	ESSAR OIL LIMITED(100)	29.07.10	209
27.	SOHAGPUR / MP & CHHATTISGARH	SP(NE)-CBM-2008/IV	ESSAR OIL LIMITED (100)	29.07.10	339
28.	SATPURA / MADHYA PRADESH	ST-CBM-2008/IV	DART ENERGY(80)-TATA POWER(20)	29.07.10	714
29.	NORTH EAST / ASSAM	AS-CBM-2008/IV	DART ENERGY(60)-OILINDIA(40)	29.07.10	113
30.	MANNARGUDI / TAMIL NADU	MG-CBM-2008/IV	GEECL (100)	29.07.10	667
<b>TOTAL AREA :</b>					<b>3727</b>
<b>RELINQUISHED CBM-II BLOCKS</b>					
1.	SATPURA / M.P.	ST-CBM-2003/II	ONGC (100)	06.02.2004	714
2.	WARDHA / MAHARASHTRA	WD-CBM-2003/II	ONGC (100)	06.02.2004	503
3.	BARMER-SANCHOR / GUJARAT	BS(3)-CBM-2003/II	ONGC(70)&GSPCL(30)	06.02.2004	790

\* : Relinquishment proposed by Operator

Note : Name of Arrow Energy has been changed to Dart Energy

## RECOVERY ENHANCEMENT TECHNIQUES IMPLEMENTED BY NOC'S

### ONGC

IOR/EOR efforts on a field scale are a continuous process for enhancement in recovery and have helped in realization of oil gain by arresting the natural decline of brown and mature fields of ONGC. The IOR/EOR schemes conceptualized in 2000-01 in 14 major fields have helped in sustaining production levels from the major brown fields since inception of the schemes and their effects are also seen in concluded fiscal year 2011-12.

The major fields undergoing IOR/EOR programmes have witnessed continuous growth in Inplace volumes and all efforts are made to translate the same to reserves. The majors namely Mumbai High, Heera & South Heera are targeted through Rolling Development programmes, while the Balol and Santhal fields are on production through In-Situ Combustion (ISC) process. The performance of North Kadi field has improved post implementation of IOR programme. Some of the salient efforts on revitalization/redevelopment of major fields are given below:

#### Offshore areas

**Mumbai High:** Integrated development plan (IOR Phase-II) for L-I, L-II and L-III reservoirs of Mumbai High North was firmed up and is under implementation for enhancing recovery from the field.

**Heera Field:** Post implementation of redevelopment programme in Heera field, there has been increased levels of oil production. The second phase of Heera redevelopment including Panna formation has been formulated and the FR was approved in March 2012.

**D1 field:** The field extension in D1 is addressed by additional development study. The inputs envisaged 14 development wells, 6 in D-1-4/11/12 block and 8 in D-1-14 block. Drilling activity at D1 main and D1-14 blocks is lined up for 1<sup>st</sup> quarter of 2012-13.

**Bassein Field:** Additional development of Bassein field considering integrated development of Mukta, Bassein and Panna Pays has been worked out during the year 2011-12. The study envisages 1 new platform, 18 locations (5 are proposed to be drilled as subsea).

#### IOR Projects under Implementation

1. Mumbai High South Redevelopment Project Phase-II: The project envisages an incremental Oil & gas production of 18.31 MMT and 2.70 BCM (revised) respectively by the year 2030.
2. Mumbai High North Redevelopment Project Phase-II: The project envisages an incremental Oil & gas production of 17.354 MMT and 2.987 BCM respectively by the year 2030.
3. Additional Development of Heera Part-II: The scheme envisages incremental oil gain of 13.363 MMT and 1.666 BCM of gas by 2034-35.
4. Part of Mumbai High South Field Redevelopment Phase III: The project is expected to result in incremental production of 1.031 MMT of oil and 213.817 MMm3 of gas by March 2030.

#### Onshore areas

ONGC has already identified and initiated IOR/EOR schemes in 11 major onshore fields i.e. Kalol, Sanand, Gandhar, North Kadi, Sobhasan, Jotana, Santhal, Balol, Lakwa-Lakhmani, Geleki and Rudrasagar to be implemented in stages through 13 schemes. IOR schemes in all the wells and major facilities in Kalol, Gandhar, North Kadi Phase-I & Phase-II, Sobhasan, Jotana & Santhal Infill have been completed.

### IOR schemes under implementation:

Three IOR schemes in Assam i.e. Lakwa-Lakhmani, Geleki and Rudrasagar fields are under various stages of implementation.

These three IOR schemes were reviewed during the course of implementation and the following corrective measures are being taken up:

- Thrust on development drilling activity and prioritization of high potential wells.
- Tracing the bypassed / undrained areas based on the latest available simulation models due to reservoir heterogeneities.
- Use of high volume lift pumps (ESPs) in Lakwa field.
- Reservoir pressure maintenance by enhancement of water injection in Geleki Field operating under depletion drive to arrest the decline in reservoir pressure.

### Enhanced Oil Recovery (EOR) Schemes under implementation:

Three EOR schemes in three onshore fields i.e. Sanand, Balol and Santhal in Gujarat have already been initiated.

**Santhal Field:** Santhal is the largest heavy oil field of ONGC and the field is under In-situ Combustion (ISC) since 1997. As on 31<sup>st</sup> March, 2012, 23% of the STOIIP has been recovered which is 6% more than envisaged in primary recovery. Once all the released wells are drilled in KS-II, the air injection shall be gradually increased to create a stabilized and uniform thermal front.

**Balol Field:** The response of In-situ Combustion (ISC) process post-B#45 in Balol is mixed. Overall the field has recovered 18% of the STOIIP. In the Phase-I, GGS-II and Block of 179 the recovery is 53%, 48% and 29% respectively. Block of 169 and 189 areas has performed satisfactorily with recovery of 21% and 26% respectively. But North Balol, which is having 5 MMt of STOIIP, has recovered only 6%.

**Field scale WAG in GS-11 sand, Gandhar Field:** Based on encouraging WAG pilot response, full scale reservoir implementation was studied targeting OIIP of 8.9 MMt. The oil production of 4.44 MMt is envisaged in 20 years, which gives incremental recovery of 7% (incl. 3% by WAG) with 7 OP, 3 WAG Injector, 7 Conversions to WAG Injectors. All the ten locations were subsequently released. The initial schedule for implementation of full field WAG injection has been rescheduled to December, 2012.

**WAG Pilot in GS-9 (Central Block), Gandhar Field:** WAG Pilot was commenced in June, 2010. It has been decided to implement full field WAG in GS-9 reservoir also. A WAG pattern with 25 producers and 20 injectors has been conceptualized.

The details of IOR/EOR schemes ONGC's onshore areas and their envisaged oil/gas gain & cumulative incremental oil/gas gain are as under :

Sl. No.	Name of the scheme	Envisaged incremental Oil Gain (MMT) / Gas Gain(BCM)	Cumulative incremental Oil Gain (MMT), Gas Gain (MMSCM)up to Mar'12
1	Gandhar	Oil-4.338 & Gas-2.690 by 2020	Oil-4.526 Gas-2817.67
2	North Kadi Ph.I	Oil-1.097 by 2020	Oil-0.892
3	North Kadi Ph.II	Oil-0.363 by 2018	Oil-0.434
4	Jotana	Oil-0.915 by 2020	Oil-0.474
5	Sanand EOR *	Oil-0.069 (Revised) by 2020	Oil-1.125
6	Balol EOR +	Oil-6.520 by 2020	Oil-2.244
7	Santhal EOR +	Oil-14.770 by 2020	Oil-5.916
8	Santhal Infill	Oil-0.326 by 2013	
9	Sobhasan	Oil-1.194 by 2020	Oil-0.641
10	Kalol	Oil-2.656 & Gas-0.460 by 2020	Oil-1.971 Gas-365.03

\* EOR gain is the total field production and envisaged oil production plan from the field till 2020 is 3.884 MMT.

+ EOR oil gain is less as air injection was stopped in Balol field and controlled in Santhal field after Balol 45 incident.

### OIL

A total of 43 water injectors were in operation covering 12 reservoirs in Nahorkatiya, Moran, Jorajan and Shalmari oilfields. The terminal water injection rate was around 9000 klpd. The cumulative water injection was 3,229,462 kls. In most of the reservoir blocks, which have been subjected to fairly long duration schemes, oil recovery has been in the range of 30-50%, far exceeding the recovery estimated from primary depletion. The improvement in oil recovery factor due to water injection, over the primary depletion recovery for most of the reservoirs has been of the order of 10-20%.

An Eocene reservoir in Kamkhat field has been identified for initiation of water injection (as a pilot project). Results of this pilot project are expected to provide insight into the applicability and efficacy of water injection in Eocene reservoirs and thereby determine its applicability to other Eocene reservoirs.

In order to improve oil recovery, studies on applicability of EOR/ IOR methods as well as field development plan of major Eocene and Oligocene fields viz. Barekuri, Baghjan, Dikom, Kathaloni, Chabua, Tengakhat and Makum-North Hapjan were carried out. Detailed feasibility study on EOR/ IOR applications in these fields have been made and it has been inferred that EOR methods have limited applicability in these fields since primary recovery is high due to very good sweep efficiency, good PI and good reservoir quality. Based on these studies, a few infills as well as horizontal wells were also drilled and the results have been found to be encouraging. Subsequently, a few infills as well as step out locations have been lined up for drilling. Studies have also been initiated to incorporate sand screens and inflow control devices (ICD) in horizontal wells.

The possibility of extended reach drilling (ERD) as well as multilaterals has also been examined to drain hydrocarbon potential from logistically inaccessible areas like Barekuri and Baghjan. This is envisaged to be field implemented following requisite approval from statutory bodies.

## NEW TECHNOLOGY USED / ADOPTED

### ONGC

To keep pace with latest technology and state-of-the-art solutions, ONGC has a well defined programme to identify, evaluate and adopt new and emerging technologies in the field of exploration and development of hydrocarbons. ONGC has been continuously incorporating new data API, drilling, completion, production and work-over techniques as part of these efforts. The new technologies adopted and their usefulness are given below:

**3D-Visualization Centre (Stereoscopic display):** This technology will accelerate workflow from basin scale exploration through detailed prospect and reservoir analysis by quick subsurface viewing and analysing Multi-Attribute/Multi-Volume Seismic, Well and Cultural data and reservoir models.

**The Fluid Eval:** The Fluid Eval is Standard mercury free automated PC based system which analyzes the samples of oil and gas condensate. It is useful to study the phase behaviour of hydrocarbon fluids at reservoir conditions of temperature and pressure.

**Induction of Common Reflection Angle Migration (CRAM) software from M/s Paradigm:** CRAM gives accurate images of the complex reservoir and gives amplitude and phase preserved angle gathers. CRAM is an anisotropic multi-arrival solution that uses the entire wave field which solves complex imaging objectives including over thrust and salt delineation.

**Petrel software for processing of seismic data from M/s Geoquest Systems B.V. :** The software will be used for seismic data processing.

**Induction of Geo-science core system and seismic interpretation module of Petrel software from M/s Geoquest Systems B.V. :** The software enables better interpretation of seismic data for detailed prospect analysis.

**Induction of MATLAB Software from M/s Designtech Systems Ltd:** The software is helpful to establish Kalman filter applications for reservoir studies.

**Multi-Component Seismic Survey- 3D- 3C:** Multi component seismic is a developing tool which is used for special studies and reservoir characterization and delineation of pay sands. Proper utilization of reflections captured at longer offset can help in deeper seismic imaging including sub-basalt imaging.

**DISCover (Deep Interpolated Streamer Coverage):** DISCover (Deep Interpolated Streamer Coverage) technology of M/S Western-Geco is inducted for a Pilot Project in Western Offshore for which the seismic data has been acquired and processed. This technology gives 3D seismic data with enhanced bandwidth, providing both high resolution and deep penetration. This is expected to give improved imaging beneath highly absorptive overburdens such as basalt and salt, or acquiring data suitable for inversion to absolute rock properties.

**Passive Seismic Tomography (PST):** It has been decided to induct the Passive Seismic technology-proposal of M/s Parsan Overseas Ltd., in Frontier Basin. PST would provide a detailed 3-D seismic velocity and Poisson ratio model of upper few km of the crust. Careful interpretation can transfer the velocity model into a complete 3D subsurface image, whereas the FFC provides Fault geometry, generation mechanism and Fracture distribution

**TuffTRAC:** A new generation wire line-conveyed tractor, used for carrying out perforations. This tractor is designed for perforating high angle wells. It has advantages over Tubing conveyed perforation (TCP) because of less operation time.

**Ultra HPHT TCP-DST:** The technology is used to test wells in very High Temperature & Pressure conditions having temperatures beyond 450 °F. The perforation charges and the DST string are of ultra HPHT rating to facilitate well testing.

**RF Safe perforating System:** Radio Frequency perforating system is nearly foolproof safe practice providing protection against accidents caused by extraneous electricity is in place now. In this system, firing is controlled via an electronic system integrated into the microprocessor of each detonator which can be fired only after a specific digital coded signal is delivered to release an electronic switch.

**Seismic Guided Drilling:** It is an integrated and iterative approach i.e. a combination of surface seismic, depth imaging and anisotropic velocity modelling workflows with the more traditional inversion and reservoir modelling methods. Result is enhanced subsurface definition and improved well placement. This technology has already been tried in 2 wells ANDW-2 and ANDW-3 of Andaman area of East coast with considerable cost and time savings

**Acreege Monitoring software (Acemon):** Software developed inhouse for managing the data pertaining to all the acerages (pre NELP, NELP and ML). The software initially installed in A&AA basin is being rolled out to other work centres.

**Microbial process for mitigation of wax deposition in flow lines:** A microbial process for mitigation the problem of deposition of wax in the flow lines of wells of Mumbai High has been developed and successfully tried. The process has been found to be quite effective in controlling the deposition of wax.

Field implementation of various **MEOR processes** in the different fields of ONGC: Paraffin Degrading Bacterial (PDB) Job and Field trial of high temperature (96°C) microbial system for enhanced oil recovery.

**HAI (High Pressure Air Injection) Set up:** Studies have been carried out on AI Process in large no. of fields namely Nawagam, Gamij, Wasna, Geleki, Heera, Lanwa, Sobhasan (Mandhali pay), D1 fields in the "Air Injection Laboratory" setup of IRS. This setup has attracted overseas projects from PDVSA, Venezuela for studies on air injection process. This process would be instrumental in identifying candidate reservoirs for air injection as a part of EOR efforts and extending the heavy oil learning curve to the light/medium oil system. **A pilot project of AI in Gamij field is being conceptualized.**

**Surfactant Alternate Gas :** Surfactant Alternate Gas technique implemented in Western Onshore basin. After implementation incremental recovery 5.15 % of HCPV over 5 cycle of WAG process was achieved.

## OIL

OIL has adopted state-of-the art technology at par with other Global E&P Companies for exploration and development activities. The core areas where the new technology that has been adopted and integrated are :

- a. The Virtual Reality Centre, "Kalpalok" (virtual world) is effectively inter-twinning with TEAM Centre and projects carried out in TEAM Centre can be visualized in virtual collaborative environment of Kalpalok. Kalpalok is also connected with "Decision Centre" in OIL's Corporate Office at NOIDA through video-conferencing and desk top sharing facility for effective collaboration and communication between geo-scientists at Fields Headquarter, Duliajan and E&D Team at NOIDA. This state of the art facility shall facilitate effective and faster decision-making, planning and co-ordination. The following are some important facts about the facility:
  - i. Hardware and peripherals from DELL EMC
  - ii. Display and Visualization System from Barco (as on installation date the display screen of Kalpalok was the biggest (6.00 m x 2.14 m) Barco screen in India)
  - iii. Software: Geoframe 4.5, Petrel 2011 from M/s Schlumberger, GIS from ESRI, image processing from ERDAS and Plotting software is ZEH 4.8
  - iv. Video Conferencing and sound system facility from Sight and Sound
  - v. Total project Execution (turnkey) by M/s Schlumberger

- b. A Seismic to Modeling of real field data Work Association with M/s Schlumberger is in progress and about 32% of total targeted jobs have been completed as on 31.03.2012.
- c. The existing BLACK OIL simulation software 'ECLIPSE' was upgraded to ECLIPSE 2010.1 version in the month of April 2011. The upgraded version makes it possible to dynamically model the challenge of complex reservoir.
- d. ECLIPSE PARALLEL (a module of Eclipse Simulator Suite) license was installed on 24 March 2012. The usefulness of the software becomes critical when multiple uncertainty scenarios need to be run in a given time frame, which is quite common in Field Development studies nowadays where large Dynamic Models are run.
- e. Latest softwares such as **Transient Analysis, MBAL, and Water Flood, GREAT** are being used to monitor the reservoir performance and timely reservoir management for maximizing recovery and implementation of suitable IOR – EOR schemes.
- f. Use of latest wire-line logging technology, tools, log interpretation and wireline testing softwares to identify oil and gas zones in low resistivity sands, fluid types, collection of fluid samples for PVT studies etc.
- g. With the help of **GEOLOG**, borehole image processing and interpretation software helps to perform structural, sedimentological and petrophysical interpretation from the processed image data. This software facilitates analysis of fractures, in-situ stress, thin bed and also in shale gas prospects identification.
- h. On-line monitoring of drilling, mud and geological parameters through Mud Logging Unit (MLU) for better drilling efficiency and timely operational decisions.
- i. Drilling of horizontal wells to avoid drawdown related problems occurring in conventional vertical wells and to substantially increase the production rate.
- j. Technology such as PLT, CBL-USIT, and RST are used to ascertain remedial measures in case of sick wells.
- k. Production and injection data generated from producing and injection wells are managed with the help of a customized data base like GRPC.
- j. All the legacy G&G and drilling data since inception are available in a robust E&P Data Bank for quick retrieval and better decision making.

#### PVT. / JV

- I. **Smart Horizontal Well Completions** In Mangala Field, the horizontal wells are being drilled and completed with stand-alone sand screens and the latest Inflow Control Device (ICD) technology. Some of these wells have produced over 10,000 barrels/day and represent the highest rate onshore producers in India. These wells are equipped with heater string for flow assurance, Electric Submersible Pumps (ESP) for artificial lift and two downhole chemical injection lines for dosing of corrosion inhibitors, de-emulsifier chemicals.
- II. **Micro-Seismic Hydro-Frac Monitoring in Rajasthan Cairn-ONGC JV** is the first in India to use micro-seismic monitoring of hydraulic fracturing. It is used to delineate the size and orientation of induced hydro-fracs in the subsurface, as well as map out their propagation through time. It can also identify faults and preexisting fractures. This information is critical for optimal well placement, hydro-frac design and overall reservoir management. Micro-seismic frac monitoring was employed during two Raageshwari Deep Gas Field (RDG) frac campaigns in Rajasthan. It confirmed the principle stress direction, fracture orientation and identified the presence of a complex natural fracture network. The planned hydro-frac design for future wells has been modified in accordance with the improved subsurface understanding.

- III. Enhanced Oil Recovery in Rajasthan:** Cairn-ONGC JV has is studying application of aqueous-based chemical flooding EOR techniques for the Mangala, Bhagyam and Aishwariya fields. Early application of chemical flooding in these fields has been designed to extend their oil production plateau periods, increase recovery factor, reduce water production, mitigate future decline rates and potentially accelerate crude oil production. Alkali and surfactant chemicals injected water is planned to enhance the displacement efficiency. The first phase of laboratory studies for Mangala Field was successfully concluded in January 2007. The core-flood data was successfully matched in a reservoir simulator allowing full field simulation of polymer and Alkaline-Surfactant-Polymer (ASP) flooding and justify a pilot study in the field, now underway.
- IV. World's Longest Heated Insulated Pipeline for Crude evacuation** An ambitious pipeline project of national importance to transport and market highly waxy crude from Barmer of Rajasthan to the Gujarat coast has been designed and made functional by Cairn. The crude is being transported through Polyurethane Foam (PUF) insulated pipeline. A second pipeline for gas follows the oil line to supply fuel gas to intermediate heating stations and power generation at Viramgam and Bhogat terminals. To ensure continuous heat tracing of the oil pipeline, 35 unique Skin Effect Heat Management System (SEHMS) is used and 32 AGI are installed at every 18 to 20 kilometers along the pipeline. This 670 kilometer insulated and heated pipeline of such complexity is the first of its kind in the world.
- V. Expandable Sand Screens** In order to reduce well costs and improve productivity of sand control completions, Expandable Sand Screens (ESS) technology was successfully applied in Cairn assets.
- VI. 4D Seismic in Ravva for mapping bypassed Pay:** Application of 4D and High Density 3D seismic technology (4D / HD3D) in Ravva Field has imaged time lapse effects in the reservoir as result of hydrocarbon production and water injection. This is the first 4D in India. It allowed design of an infill drilling campaign in this mature, developed field. Further refinement and superimposition of 4D data with High Resolution 3D data is in progress to identify other value-adding opportunities.
- VII. Multistage hydro fracturing:** In Cambay Field, the horizontal well was drilled in tight reservoir of 610m horizontal section with 8 fracture stages (16 fracture initiation points).
- VIII.** The advancement in new technologies as utilized in seismic API by Operators under PSC regime are summarized below:

  - Acquisition of 2D seismic data with long offset i.e. with 10-12 km long streamer length.
  - Specially designed seismic source was used to map sub-trappean sediments.
  - A longer record length of up to 18sec used to image deeper subsurface.
  - Synthetic Aperture Radar Technology
  - High Resolution Aero-Magnetic (HRAM) and Airborne Gravity Magnetic (AGM) data was acquired to understand basinal configuration.
  - Special seismic data processing steps were applied to attenuate coherent & incoherent noises and to handle out of plane multiples.
  - Generation of processed output in time and depth domain to have better subsurface geological imaging.
  - Interpretation of processed seismic data and other geophysical data such as GM, SAR etc. for regional understanding covering tectonic interpretation, lead identification and prospect mapping to have effective geological appraisal of the area for advance exploration.

# ENVIRONMENTAL ISSUES

## ROLE of DGH towards Safety & Environment

The Oil & Gas Industry needs to take its own, unilateral steps to increase dramatically safety throughout the industry including self policing mechanisms that supplement governmental enforcement. This goes a long way in building trust of the stakeholders. DGH under the aegis of MOP&NG ensures through the stipulations of the Production Sharing Contract under its Article 14, use of modern oil field and petroleum industry practices and standards including advance techniques, practices and methods of operation and compliance of applicable laws for protection of environment and conservation of natural resources.

## Studies by DGH on environmental issues

DGH with its proactive approach plays a vital role in addressing some of the key environmental issues like Terrain stabilization and Wildlife and habitat protection. Out of two major studies initiated by DGH on environmental issues, Satellite tracking study of migratory path of Olive Ridley Sea Turtles in the east coast of India, is the biggest ever project of this kind in the world and the involvement of MOP&NG in sea turtle conservation and research activities was acknowledged in the various international forums.

This study offered a better understanding of the distribution, habitat requirement and movement pattern of Olive Ridley sea turtles in the coastal waters off Orissa coast and the socio-economic concerns of fishermen and other stake holders with respect to their long term conservation and for rational planning of hydrocarbon exploration in this region. Wildlife Institute of India, Dehradun (WII) under the direction of Ministry of Environment & Forests, Government of India undertook the project study of satellite tracking study with 70 Platform Transmitter Terminals (PTT).

## Offshore Safety and Environmental Protection :

With increasing shipping movement due to crude oil imports & upcoming deep water E&P activities in Indian waters and the aftermath of Macando oil well blowout in gulf of Mexico, a meeting was held earlier under chairmanship of Addl. Secretary P&NG on 23rd June 2010 to review offshore safety with representatives of MOEF, OISD, DGH, Coast Guard and all offshore operators. In the meeting, the Ministry reiterated Government's commitment to ensure safe oil and gas operations. All E&P companies were advised to be ever prepared for any contingencies even at the cost of redundancy in safety systems and it was cautioned that the Gulf of Mexico disaster is a wakeup call and we should aim for 100% safe operations through upgradation of SOP's and lessons learnt. For adequate oil spill response capability in India, the Ministry requested Coast Guard to take up the matter with concerned ministries to explore the possibility of setting up two oil response centres, as proposed by DGH one in the East Coast and the other in the West Coast of India which should be similar to EARL, Singapore and OSRL, U.K to handle larger oil spill. As a need of hour, based on the sensitivity and activities, total of eight locations in East Coast and West Coast of India were identified and MOU were set for pooling capability. These 8 locations are mentioned below :

	<u>Location</u>	<u>MOU among the Operators for pooling resources</u>
1.	VADINAR	IOCL, RIL, ESSAR & BORL
2.	HAZIRA	CAIRN INDIA & NIKO
3.	MUMBAI HIGH	ONGC & BG
4.	KOCHI	BPCL & PORT
5.	PUDUCHERRY	HARDY & HOEC
6.	KG BASIN / YANAM	CAIRN, RIL, GSPC & ONGC
7.	VIZAG	HPCL & PORT
8.	PARADEEP	IOCL & PORT

It was also decided that Tier I level Oil spill response facilities should be ensured during exploration / production phase to combat oil spill at incipient stage and it is being complied to. Presently Coast Guard is equipped with Level 2 oil spill response facilities and all E&P operators are members of EARL, Singapore and OSRO, U.K. for level 3 oil spill response. Coast Guard and other organisations are

imparting training to build up trained power to handle the response. There has been a close coordination among DGH, OISD, ICG and Ports on the issue of oil spill response capacity build up. Government of India is seriously considering establishing Oil spill response centres in Indian waters for larger oil spill contingency.

**Contribution to ecological restoration and environmental remediation by NOC's**

**ONGC**

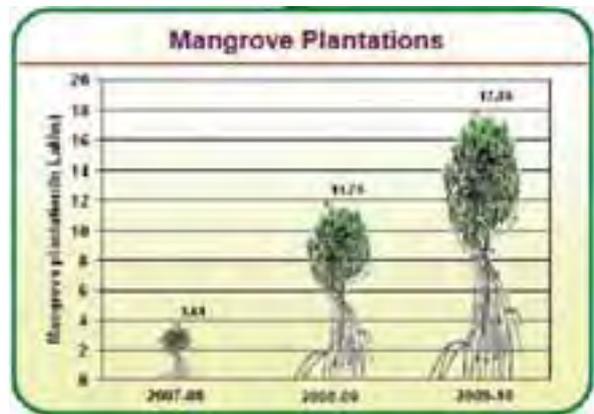
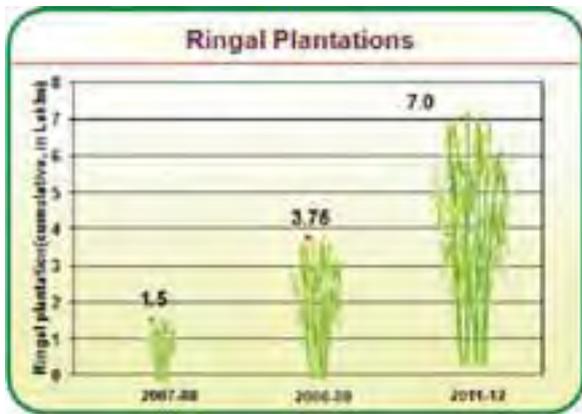
ONGC, being responsible organization for protection of environment and restoration of Biodiversity, has extended two major projects to conserve the vital biodiversity.

**Ringal Bamboo Plantation and Eco Forestry**

ONGC got planted 4.0 lakh ringal plants in Kedarnath Wildlife Division (KWD), Nanda Devi Biosphere region (NDBR) and Munsyari Block of Pithoragarh forest Division in Upper Himalaya. This project of eco-rebuilding of fragile Himalayan ecosystem is not only beneficial from environmental point of view but also would be able to provide livelihood and employment opportunity to people living at high altitude having very meager source of income. So far more than 7.0 ringal plants have been planted in upper Himalayas. It is planned to cover 730 ha of forest area to plants in phased manner.

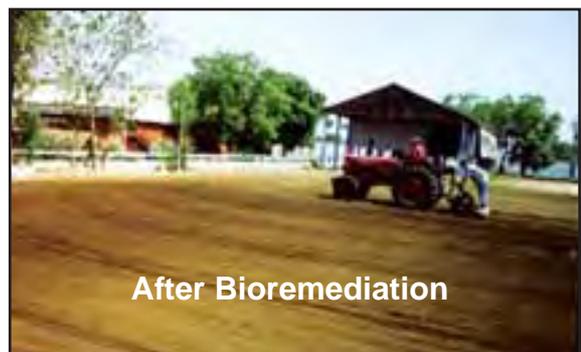
**Mangrove Plantation**

ONGC has undertaken a drive to plant mangrove in the coastal areas of Dadhar River and in the phase-I has planted more than 17 lakh mangrove plants and propugules against target of 5.0 lakh mangrove plants. During the year 2011-12, second phase of 'Mangrove Restoration and Conservation Education Unit' project has been launched to plant mangrove in Ankleshwar and Hazira. The project envisages planting of 5.0 lakh mangrove plants and 10.0 lakh propugules in Ankleshwar and 1.0 lakh mangrove plants in Hazira.



**Bioremediation of oily sludge and contaminated soil**

ONGC has adopted an environmentally sound technique of bioremediation for treatment of oily sludge and oil contaminated soil in operating installations. The harmful organic components of sludge/ soil are converted into carbon dioxide and water after treatment. This technique has been successfully utilized for treatment of 25000 MT approx. of oily sludge/ oil contaminated soil during the year 2011-12.



## OIL

OIL has successfully carried out a project on Bio-remediation of oily sludge in collaboration with TERI. This technique is also now applied in fields wherever applicable. A project of Bio-remediation has been implemented in old pits containing oily sludge. OIL has carried out a pilot scale study on phyto-remediation of oil contaminated soil and field trial is in progress. The new initiative such as disposal of MSW in a scientific way, policy decision for environmental protection and safety of drilling locations to restore the well plinth to make it at least aesthetically acceptable after the drilling is completed and has brought encouraging results in controlling pollution and maintaining better environment in OIL's operational areas.

### Corporate Social Responsibility (CSR) by E&P Companies

We are living at a time when the social context of business is being redefined. From the past decade, the social demand made on companies to be environmentally and socially responsible in their business has been increasing at unprecedented rates. The Companies now recognise the importance of Corporate Social Responsibility and the need to strike a balance between the overall objectives of achieving corporate excellence vis-à-vis the corporate responsibility towards the community.

Operators are making significant social investments in the communities where they operate and also contribute positively to local sustainability through their operations. The Corporate Social Responsibility (CSR) programmes by E&P companies in India fall under the various thematic areas of Education, Livelihood, Medical & Health, Environment, Disaster relief, Women empowerment, Cultural, Community improvement, Welfare, Economic Infrastructure & human development.

All CSR projects are mainly carried out by following ways:

- Directly by Operator/JV
- In association with State Government Departments
- In partnership with reputed NGOs
- By donation



Glimpse of CSR activities



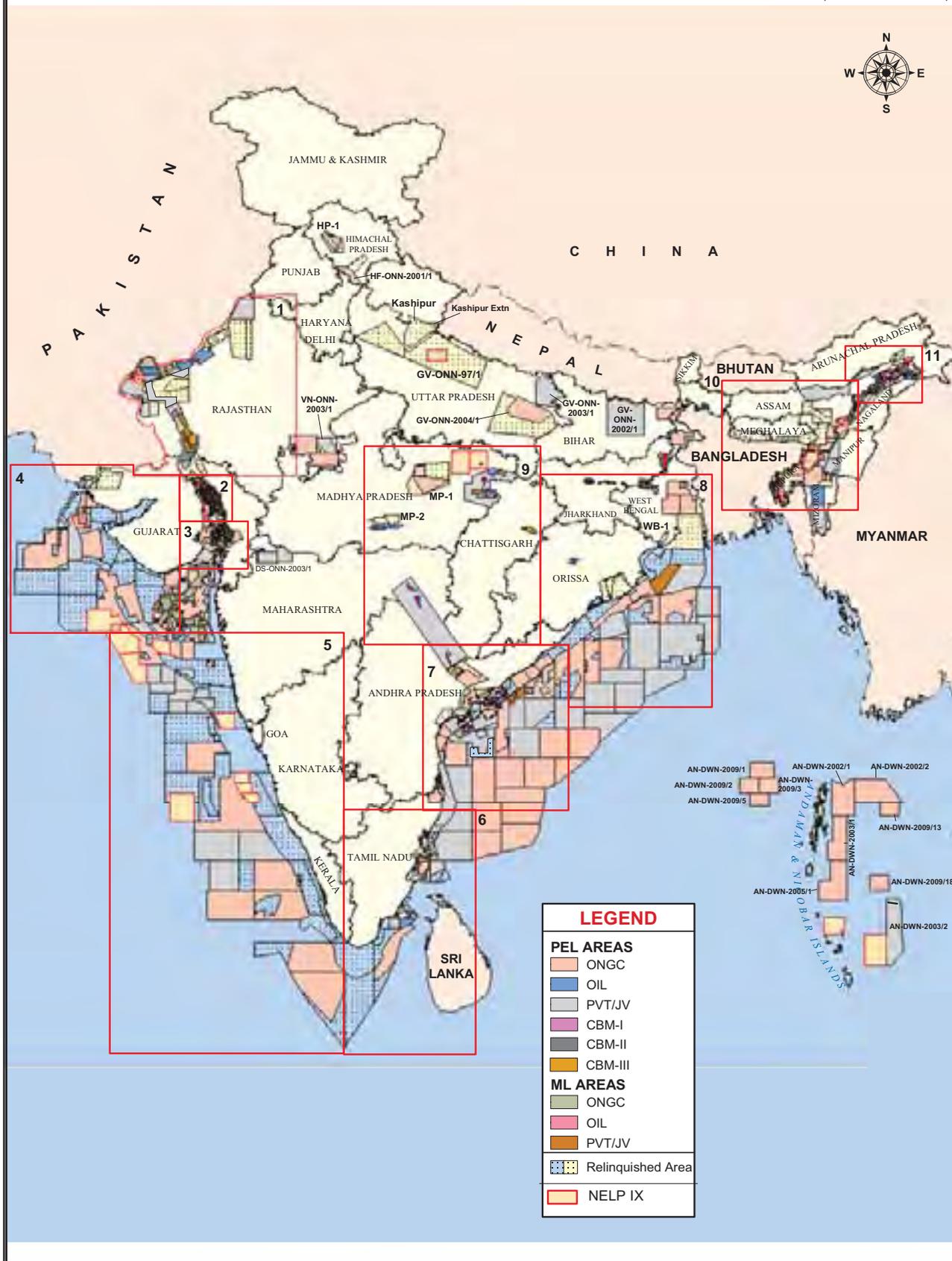


## SUPPLEMENTARY INFORMATION

- PEL & ML Details
- Inplace reserves accretion, Oil/Gas Discoveries & Production trends
- Details of Oil & Gas Discoveries in Pre-NELP and NELP
- Extracts from XII<sup>TH</sup> Five Year Plan
- Extracts from BP Statistics Review 2012
- Glossary of common Oil field Terms
- List of some companies in Indian E&P sector

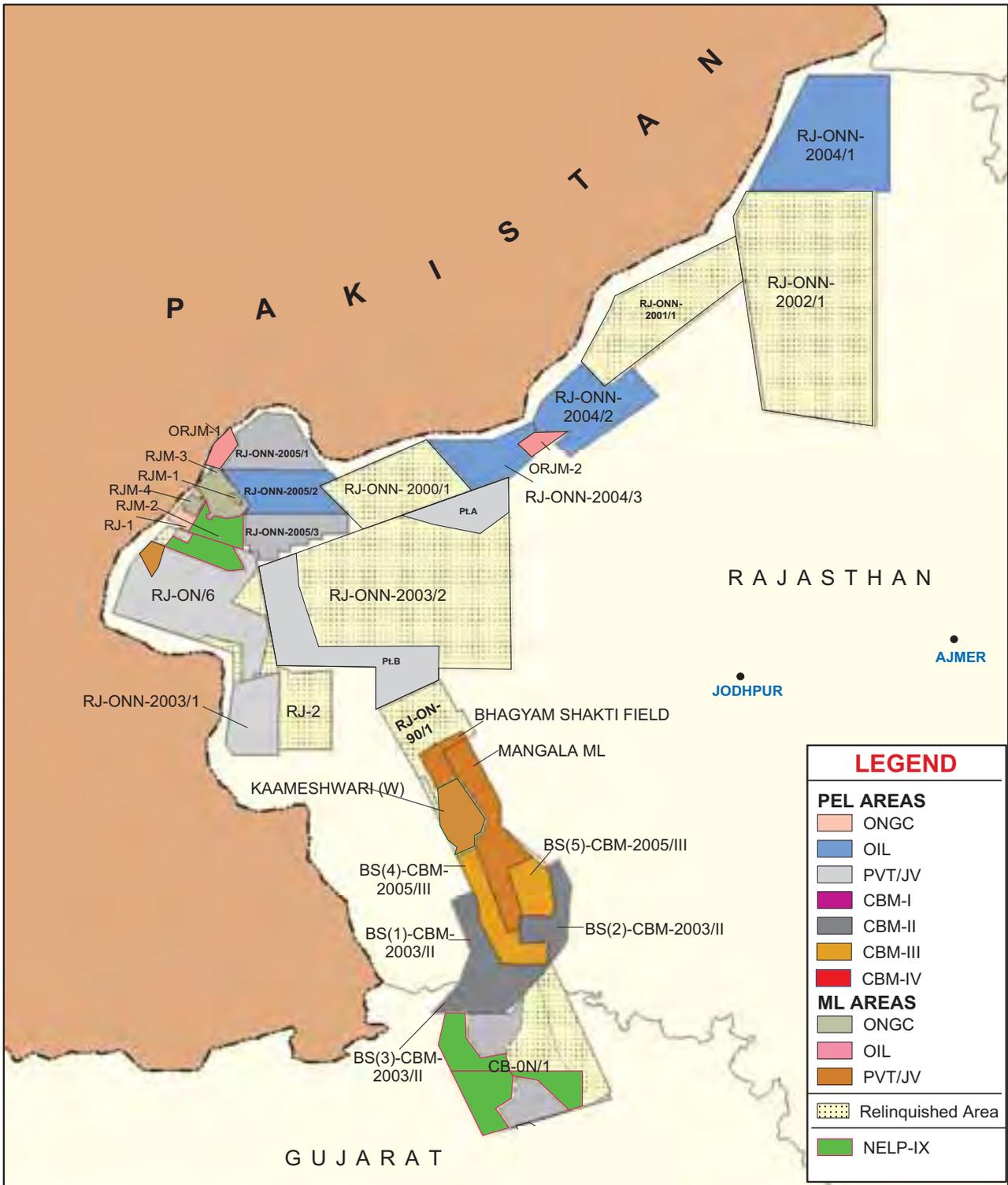
PEL AND ML AREAS UNDER OPERATION BY ONGC, OIL AND PVT/JV COMPANIES

(AS ON 01.04.2012)



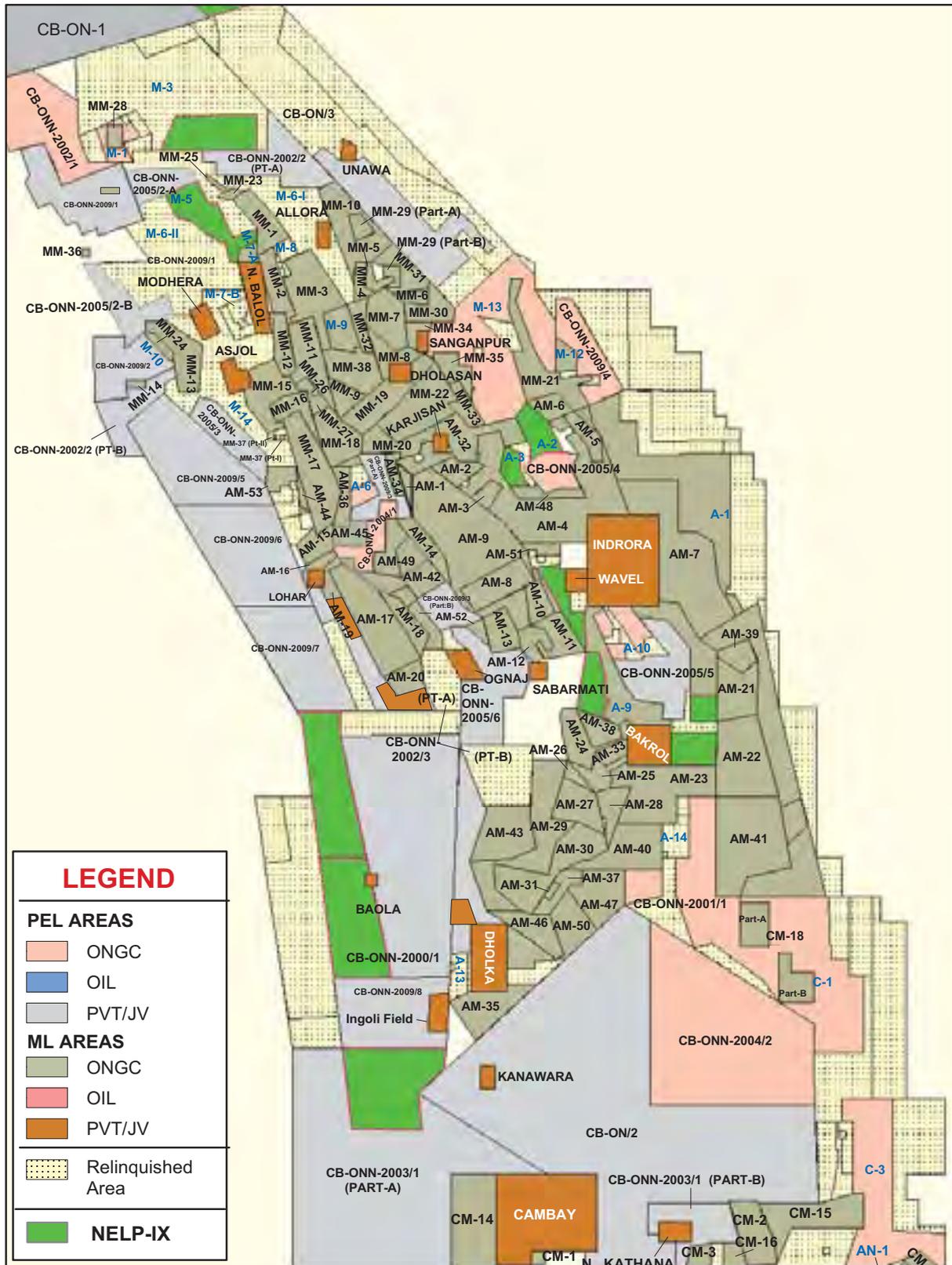
LEGEND	
<b>PEL AREAS</b>	
[Orange Box]	ONGC
[Blue Box]	OIL
[Grey Box]	PVT/JV
[Purple Box]	CBM-I
[Dark Grey Box]	CBM-II
[Yellow Box]	CBM-III
<b>ML AREAS</b>	
[Green Box]	ONGC
[Pink Box]	OIL
[Brown Box]	PVT/JV
[Dotted Box]	Relinquished Area
[Red Box]	NELP IX

# 1. RAJASTHAN BASIN

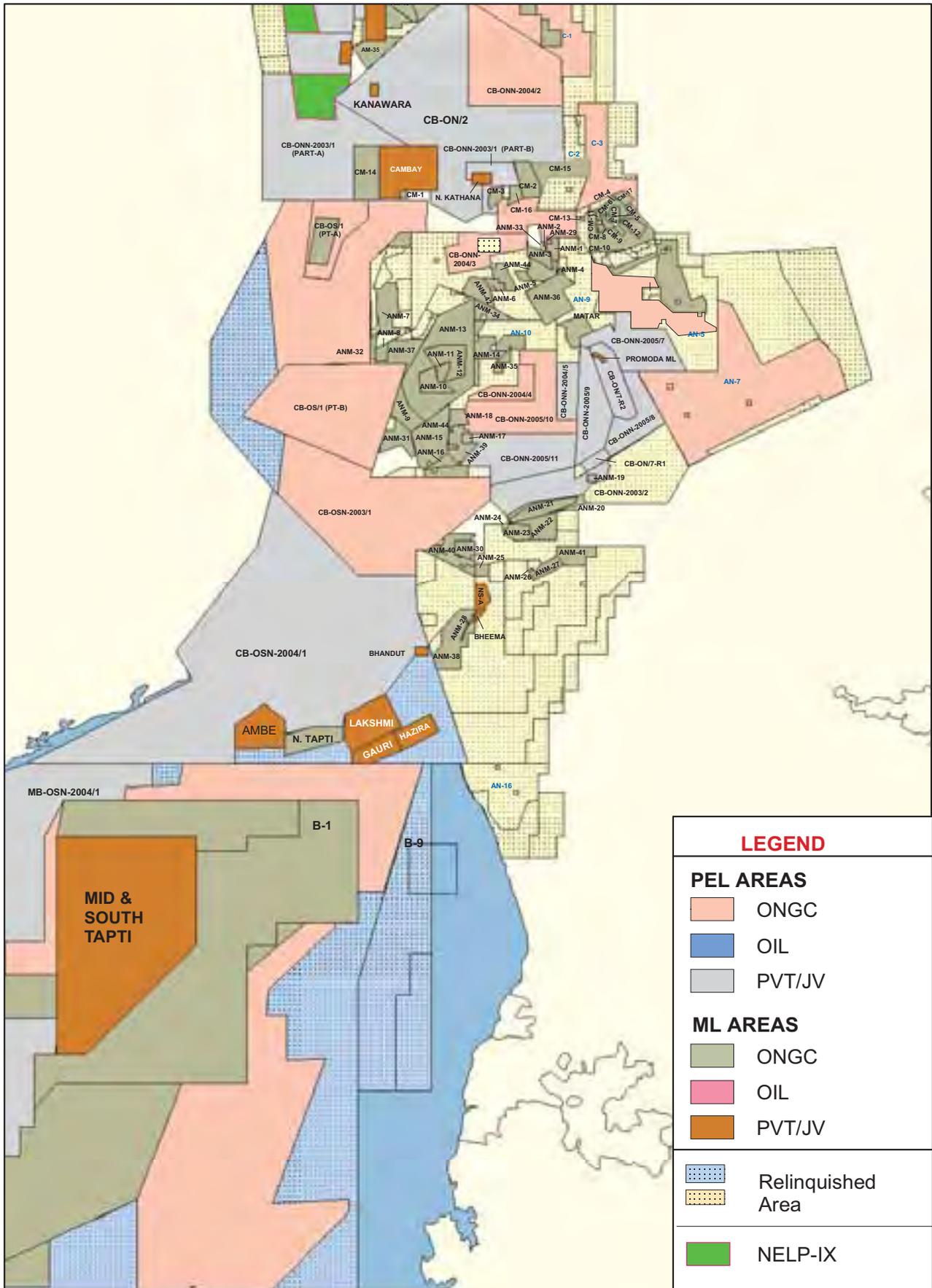


## 2. NORTH CAMBAY BASIN

SUPPLEMENTARY INFORMATION

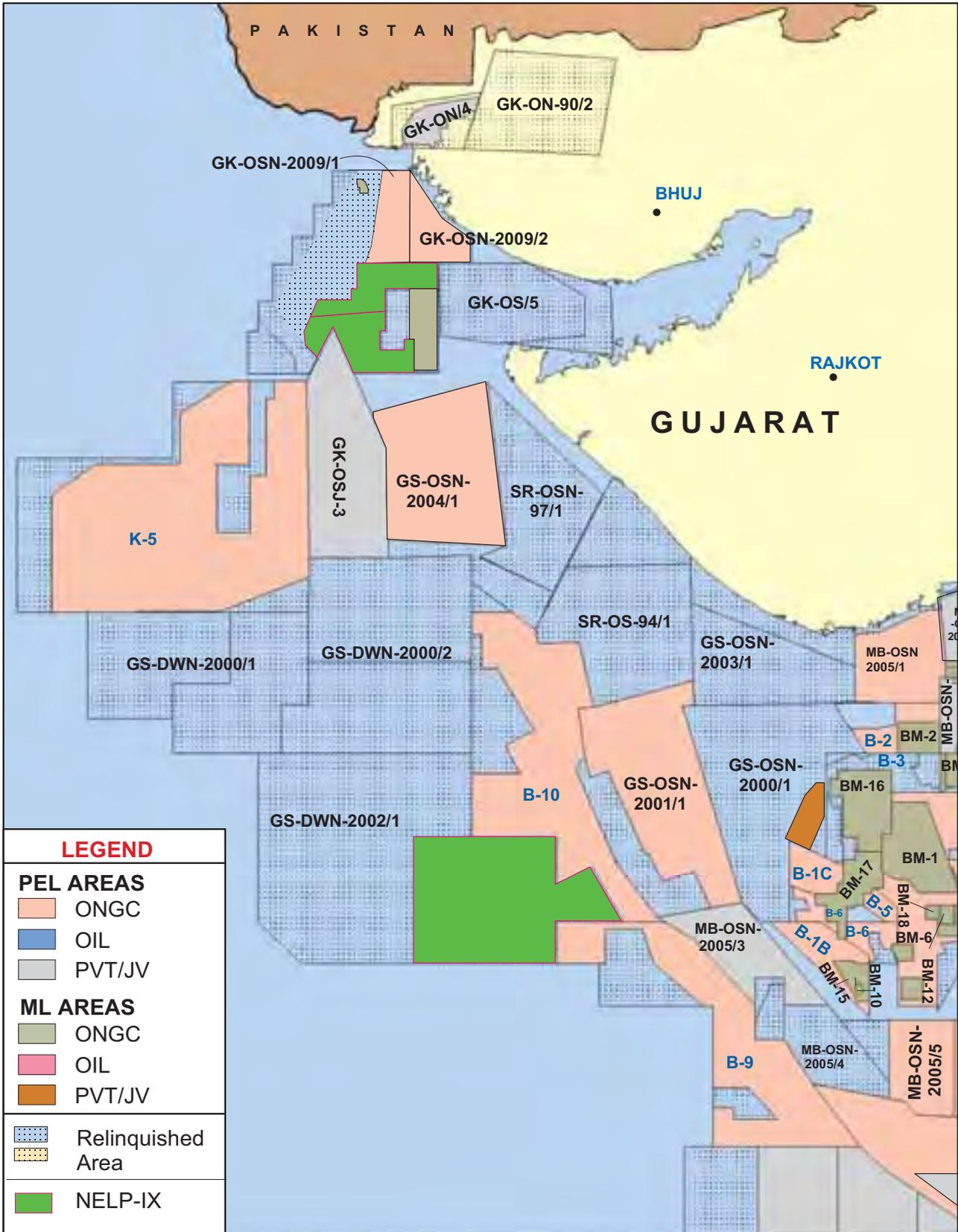


### 3. SOUTH CAMBAY BASIN

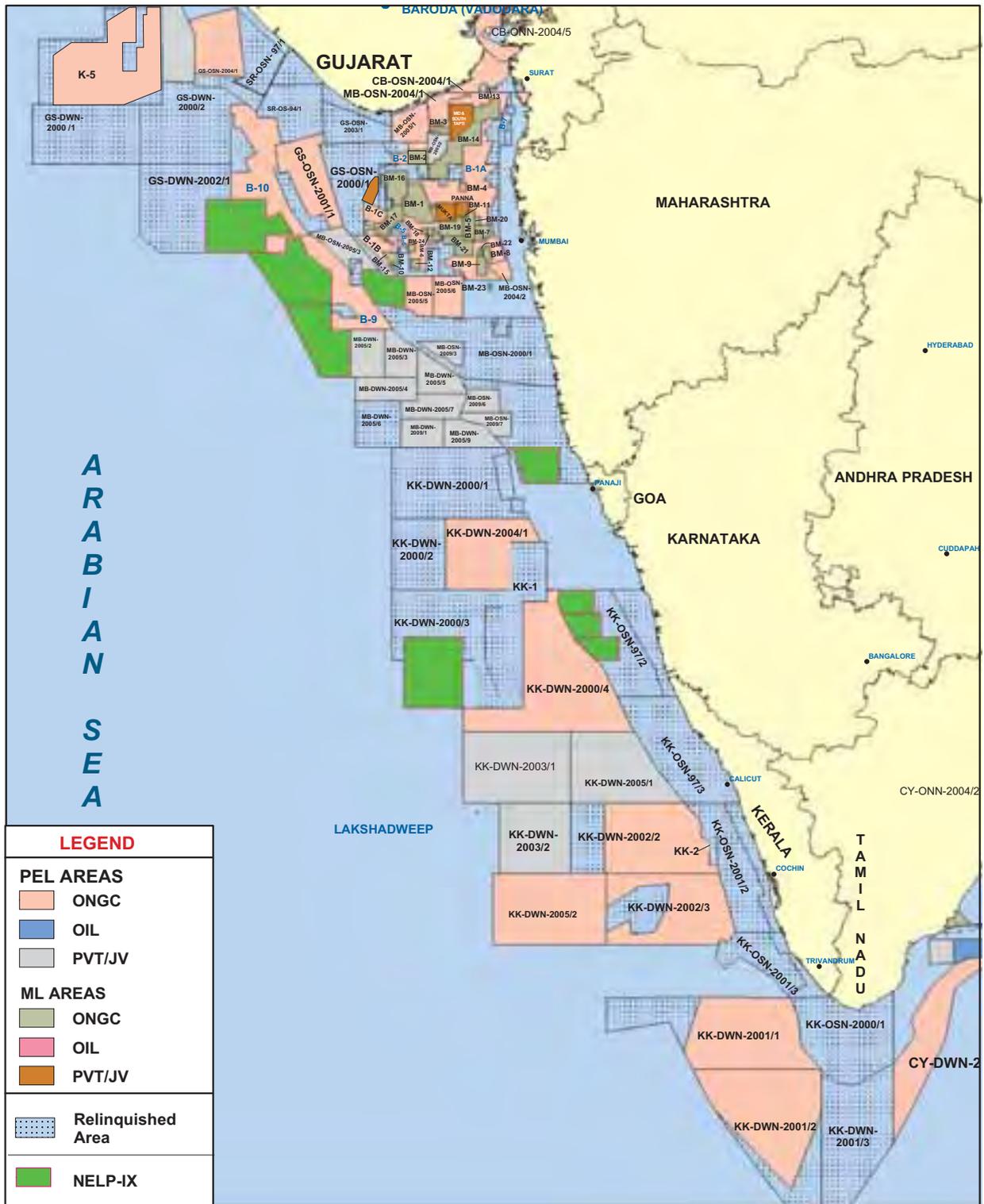


SUPPLEMENTARY INFORMATION

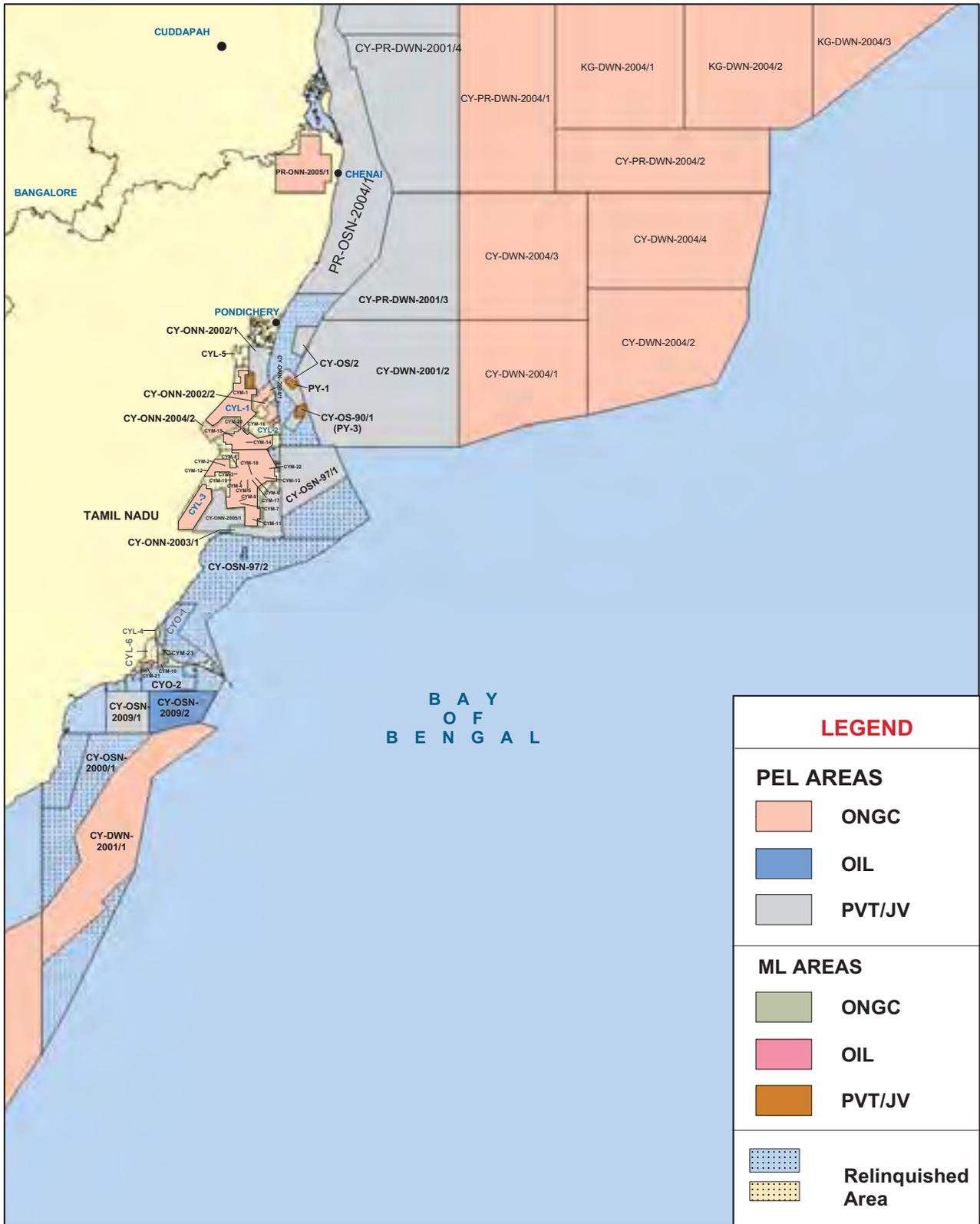
### 4. KUTCH-SAURASHTRA BASIN



### 5. MUMBAI OFFSHORE & KERALA - KONKAN BASIN

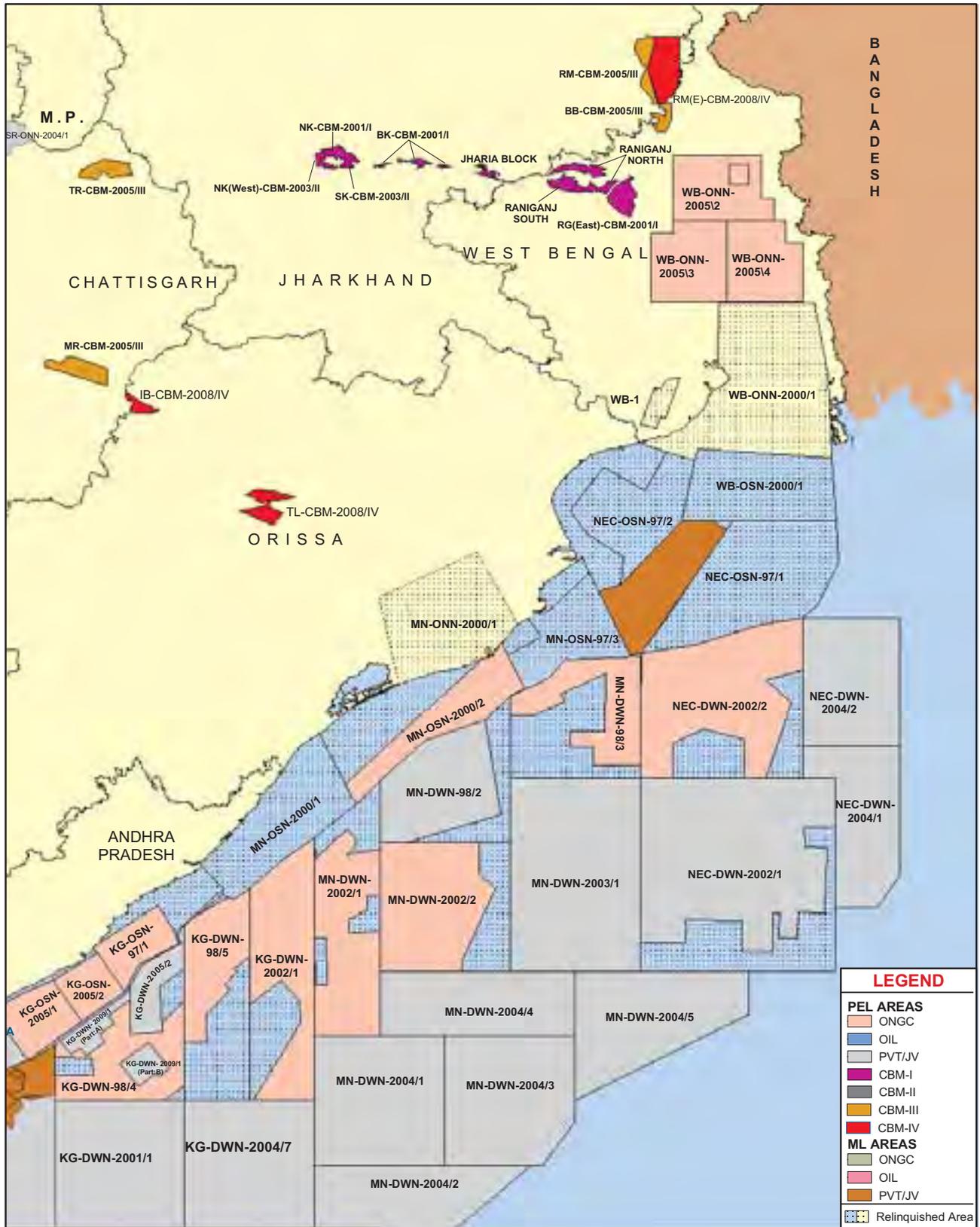


### 6. CAUVERY BASIN



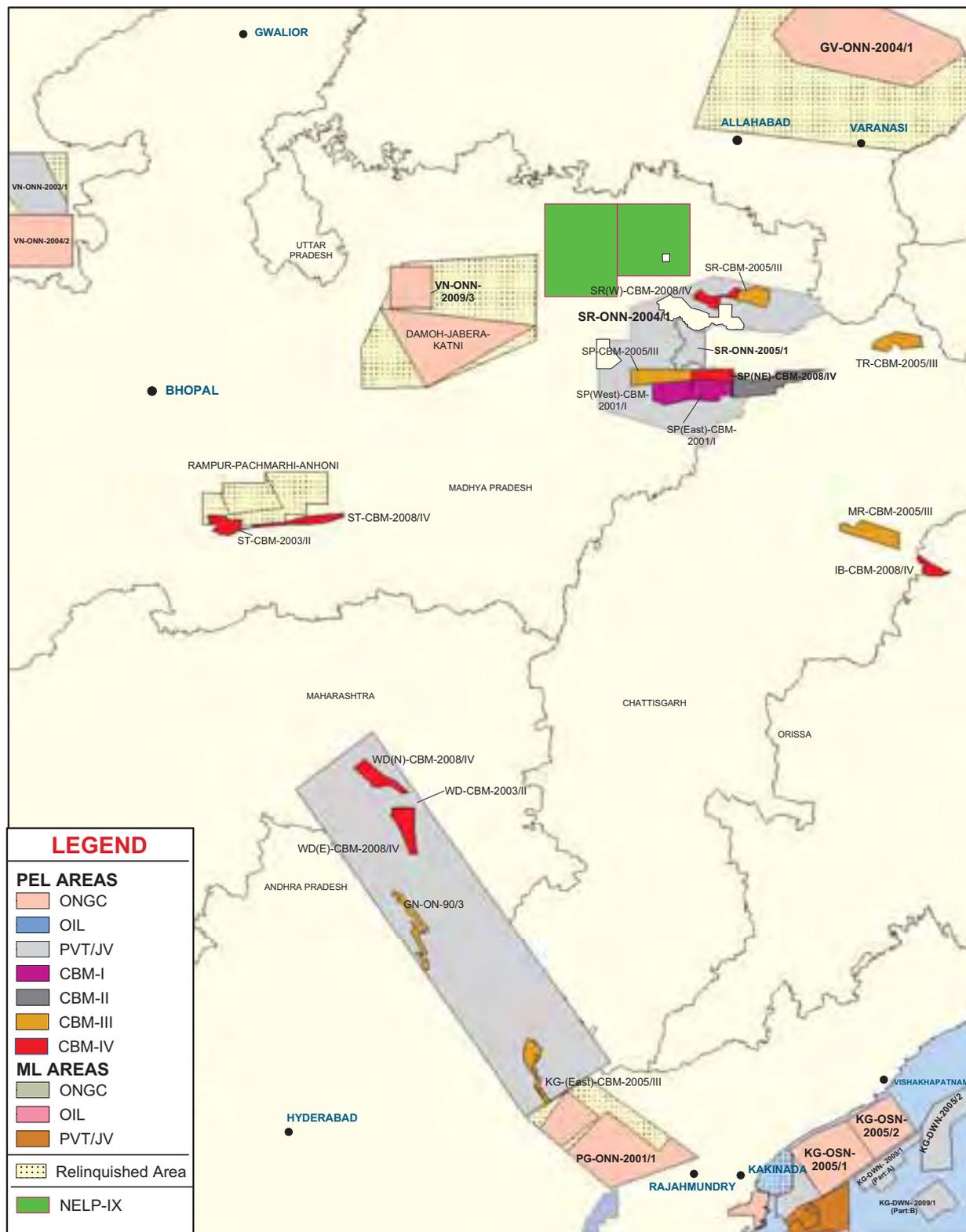


### 8. MAHANADI - NEC - BENGAL - DAMODAR BASINS

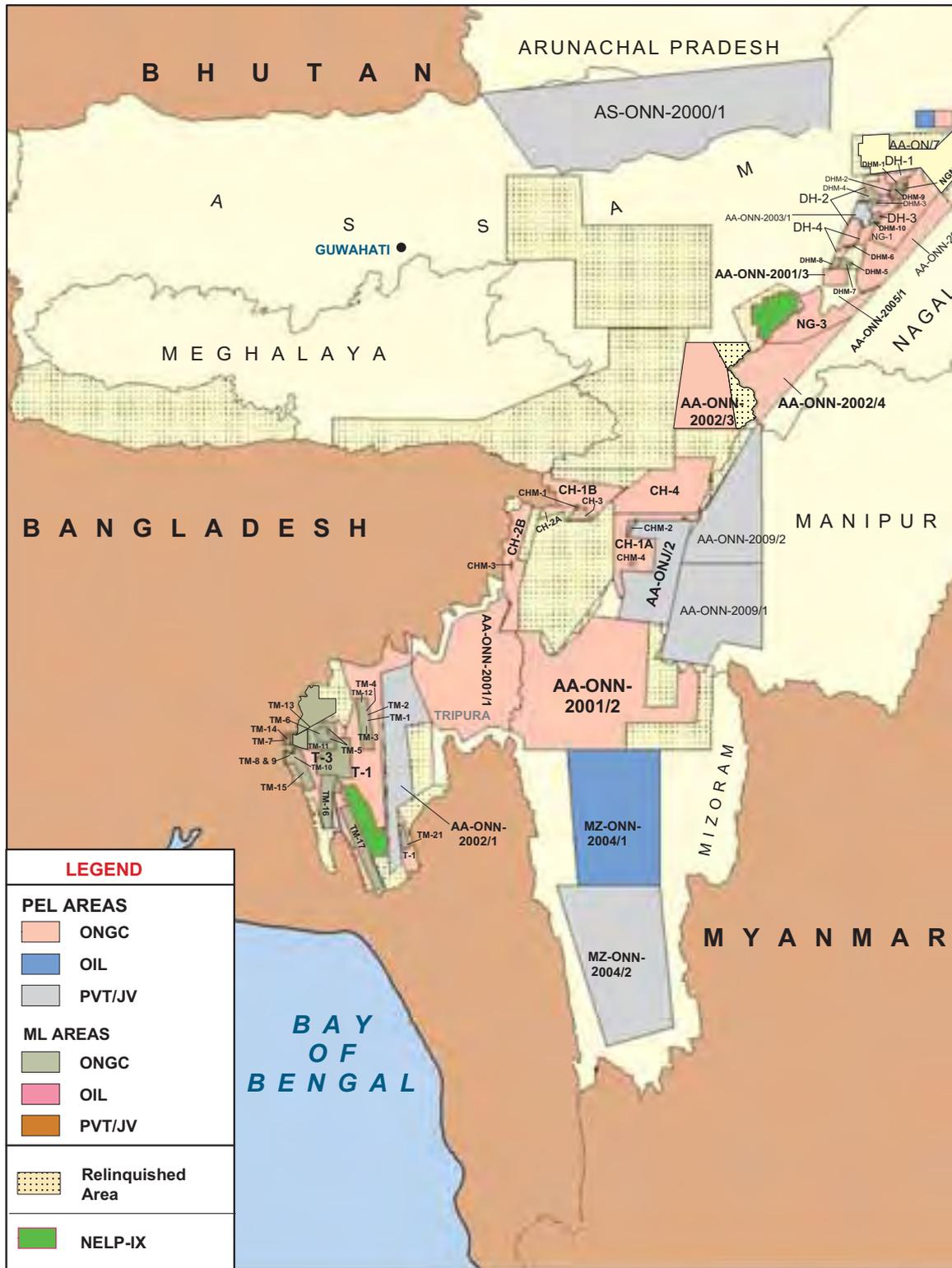


SUPPLEMENTARY INFORMATION

### 9. SATPURA-PRANHITA GODAVARI BASINS

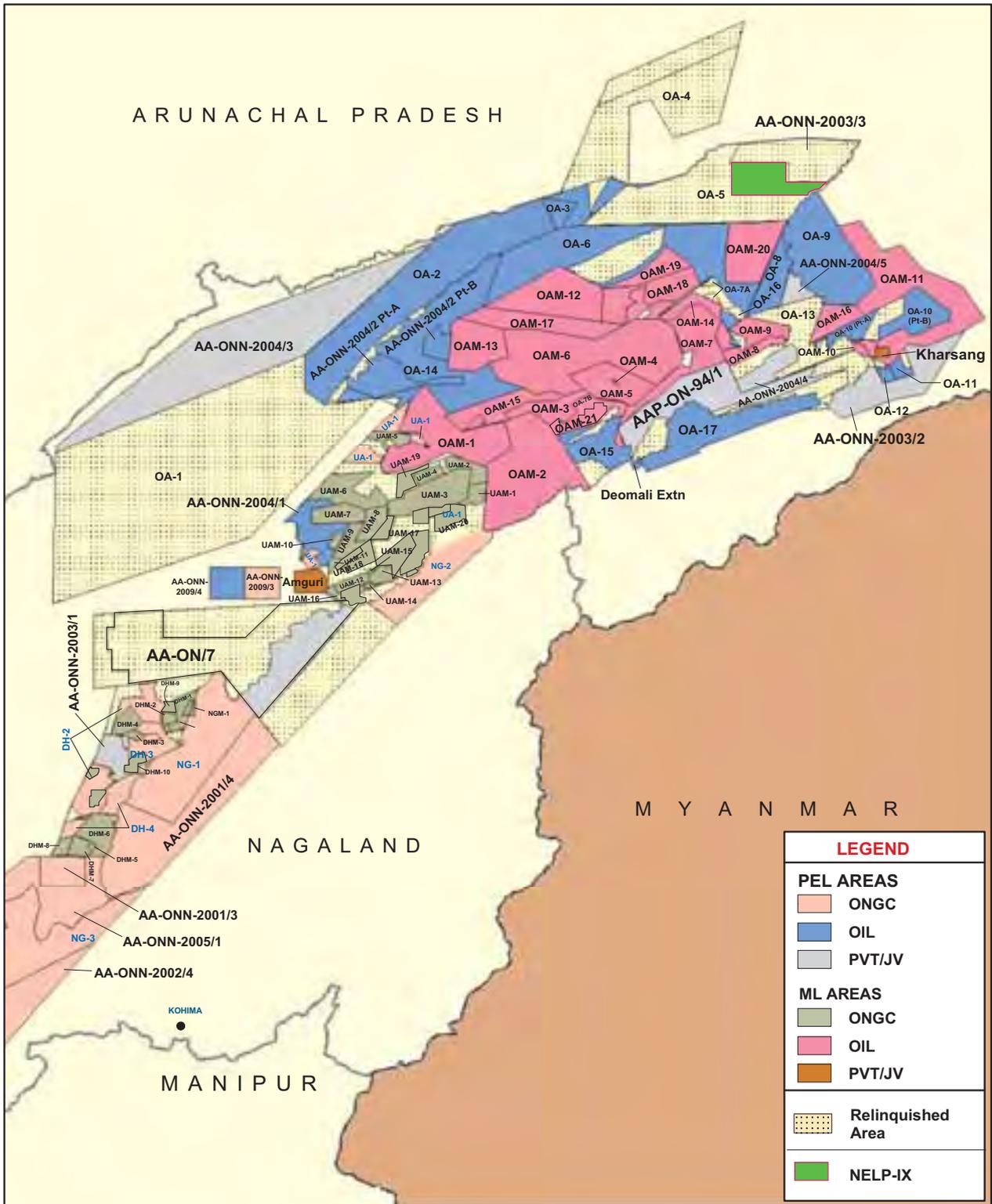


### 10. ASSAM-ARAKAN BASIN



SUPPLEMENTARY INFORMATION

### 11. ASSAM-ARAKAN BASIN



SUPPLEMENTARY INFORMATION

**PELs OPERATED BY OIL**

As on 01.04.2012

Sl. No.	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF PEL	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)
<b>NOMINATION BLOCKS</b>						
1	Assam-Arakan	Murkongselek (NF)	OA-2	01.04.02	449.00	2366.75
2		Tinsukia	OA-6	01.04.02	480.00	
3		Dirak	OA-8	18.11.01	85.00	
4		Namsai	OA-9	25.11.04	370.00	
5		Namchik	OA-10	01.05.05	195.00	
6		Jairampur	OA-12	01.04.06	18.00	
7		Deomali	OA-17	18.02.05	113.50	
8		Dibrugarh	OA-14	15.02.11	427.00	
9		Borhat	OA-15	15.02.11	111.00	
10		Jairampur Extn.	OA-11	01.04.06	23.25	
11		Murkongselek (F)	OA-3	01.04.08	95.00	
<b>TOTAL</b>						<b>2366.75</b>
<b>PRE-NELP / NELP BLOCKS</b>						
1	Rajasthan	RJ-ONN-2004/2	20	21.01.08	2196.00	5043.00
2		RJ-ONN-2004/3	21	21.01.08	1330.00	
3		RJ-ONN-2005/2	15	22.12.08	1517.00	
4	Assam-Arakan	AA-ONN-2002/3	N-48	05.02.05	1095.00	2072.00
5		AA-ONN-2004/1	9	28.06.07	108.00	
6		AA-ONN-2004/2	10	28.06.07	218.00	
7		AA-ONN-2009/4	4	30.06.10	84.00	
8		AA-ONN-2010/2	2	28.03.12	396.00	
9		AA-ONN-2010/3	3	28.03.12	171.00	
10	Mizoram	MZ-ONN-2004/1	7	22.05.07	3213.00	3213.00
11	Krishna - Godavari	KG-ONN-2004/1	28	16.02.08	511	511.00
12	Cauvery	CY-OSN-2009/2	S-20	30.06.10	1621	1621.00
<b>TOTAL</b>						<b>12460.00</b>
<b>GRAND TOTAL</b>						<b>14826.75</b>

**PELs OPERATED BY ONGC**

As on 01.04.2012

Sl. No.	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF PEL	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)
<b>NOMINATION BLOCKS</b>						
1	Cambay	Patan-Tharad	M-1	04.09.05	11.10	1427.27
2		Charada - Mansa Extn.I	M-13	03.11.03	187.50	
3		Valod	A-10	10.12.05	30.27	
4		Karjan Extn.II	AN-5	24.10.03	365.40	
5		Raj-Pardi	AN-7	26.03.04	833.00	
6	Cauvery Onland	L-I	CYL-1	01.04.04	948.16	2490.18
7		L-II	CYL-3	01.04.04	1542.02	
8	K-G Onland	1A	KGL-1	28.12.03	1517.50	3309.70
9		1B	KGL-2	13.01.04	1792.20	
10	Assam - Arakan	Sibsagar District	UA-1	01.04.02	456.50	5275.08
11		Merapani	DH-3	01.10.01	60.00	
12		Golaghat District	DH-4	20.01.01	83.00	
13		Cachar District	CH-1 A&B	01.04.03	733.00	
14		Sector-V C (Assam)	CH-4	01.04.04	824.00	
15		West Tripura	T-1	15.09.03	1528.58	
16		Bhagty Bhandari	NG-1	28.04.06	620.00	
17		Singphan	NG-2	28.04.06	320.00	
18		Dimapur	NG-3	28.04.06	650.00	
19	Himalayan Foreland	Kangra-Mandi	HP-1	10.11.03	1828.00	1828.00
20	Vindhyan	Damoh-Jabera-Katni	MP-1	10.11.03	4208.00	4208.00
<b>TOTAL ONLAND</b>						<b>18538.23</b>
21	Gujarat-Kutch Offshore	GK-DW-1	K-5	01.10.04	16557.00	16557.00
22	Mumbai Offshore	Bombay Off (BOFF 1 / 2 / 3)	B-1 A,B&C	14.11.03	13452.06	31447.06
23		Saurashtra-Dahanu	B-2	20.07.05	876.50	
24		SW of BH & DCS Area	B-6	01.01.04	631.50	
25		BB-OS-DW-I	B-9	28.12.04	7537.00	
26		BB-OS-DW-II	B-10	28.12.04	8950.00	
27	K-G Offshore	Block - IE	KGO-1	16.12.04	107.00	1371.00
28		Block - IA	KGO-5	22.10.04	74.00	
29		KG-OS-DW-III	KGO-7	15.05.03	1190.00	
<b>TOTAL OFFSHORE</b>						<b>49375.06</b>
<b>TOTAL NOMINATION</b>						<b>67913.29</b>
<b>PRE-NELP / NELP BLOCKS</b>						
1	Cambay	CB-OS/1	6	19.11.06	846.00	
2		CB-ONN-2001/1	N45	19.08.03	26.00	
3		CB-ONN-2002/1	N52	18.10.04	36.00	
4		CB-OSN-2003/1	N57	05.12.05	1795.50	
5		CB-ONN-2004/1	22	20.10.07	32.00	
6		CB-ONN-2004/2	23	28.05.07	423.00	
7		CB-ONN-2004/3	24	17.05.07	113.00	
8		CB-ONN-2004/4	25	28.05.07	70.00	
9		CB-ONN-2005/4	20	22.12.08	31.00	
10		CB-ONN-2005/10	26	22.12.08	270.00	
11		CB-ONN-2009/4	14	30.06.10	58.00	

**PELs OPERATED BY ONGC**

Sl. No.	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF PEL	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)
12	Cambay	CB-ONN-2010/1	9	28.03.12	782.00	4521.50
13		CB-ONN-2010/6	14	28.03.12	39.00	
14	Cauvery Onland	CY-ONN-2002/2	N56	31.08.04	140.00	729.00
15		CY-ONN-2004/1	30	02.05.08	214.00	
16		CY-ONN-2004/2	31	30.05.08	375.00	
17	Assam-Arakan	AA-ONJ/2	11	-	1277.00	9040.00
18		AA-ONN-2001/1	N39	01.05.03	1496.00	
18		AA-ONN-2001/2	N40	29.07.03	4005.00	
19		AA-ONN-2001/3	N41	19.12.03	110.00	
20		AA-ONN-2001/4	N42	28.04.06	645.00	
21		AA-ONN-2002/4	N49	28.04.06	1060.00	
22		AA-ONN-2005/1	1	22.12.08	363.00	
23	AA-ONN-2009/3	3	30.06.10	84.00		
24	Purnea	PA-ONN-2004/1	14	12.09.07	2537.00	6185.00
25		PA-ONN-2005/1	2	22.12.08	1096.00	
26		PA-ONN-2005/2	3	22.12.08	2552.00	
27	Ganga Valley	GV-ONN-2004/1	15	11.12.07	8354.00	10581.00
28		GV-ONN-2005/3	10	22.12.08	2227.00	
29	Vindhyan	VN-ONN-2003/1	N63	23.09.05	2673.00	14190.00
30		VN-ONN-2004/1	17	17.01.08	5801.00	
31		VN-ONN-2004/2	18	17.01.08	4466.00	
32		VN-ONN-2009/3	9	30.06.10	1250.00	
33	Him. Foreland	HF-ONN-2001/1	N43	10.06.03	1513.88	1513.88
34	Gujarat - Kutch - Saurashtra Offshore	GS-OSN-2004/1	1	25.04.07	6589.00	12081.00
35		GK-OSN-2009/1	S-1	30.06.10	1264.00	
36		GK-OSN-2009/2	S-2	30.06.10	1242.00	
37		GK-OSN-2010/1	S-1	28.03.12	1361.00	
38		GK-OSN-2010/2	S-2	28.03.12	1625.00	
39	Mumbai Offshore	MB-OSN-2005/1	S-1	22.12.08	2811.00	8033.00
40		MB-OSN-2005/5	S-5	22.12.08	2402.00	
41		MB-OSN-2005/6	S-6	22.12.08	2820.00	
42	Kerala-Konkan Offhsore	KK-DWN-2002/2	D26	17.03.04	17107.00	64347.00
43		KK-DWN-2002/3	D27	17.03.04	15682.00	
44		KK-DWN-2004/1	D1	09.05.07	12324.00	
45		KK-DWN-2005/2	D-15	22.12.08	19234.00	
46	Cauvery Offshore	CY-DWN-2004/1	D4	28.05.07	10302.00	46403.00
48		CY-DWN-2004/2	D5	23.05.07	12059.00	
49		CY-DWN-2004/3	D6	21.05.07	12017.00	
50		CY-DWN-2004/4	D7	21.05.07	12025.00	
51	Cauvery-Palar Offshore	CY-PR-DWN-2004/1	D8	15.05.07	13451.00	23445.00
52		CY-PR-DWN-2004/2	D9	23.05.07	9994.00	
53	PALAR	PR-ONN-2005/1	28	22.12.08	1807.00	1807.00
54	K-G Offshore	KG-DWN-98/2	D2	12.04.00	7295.00	
55		KG-DWN-98/5	D5	12.04.00	4490.00	
56		KG-DWN-2002/1	D28	06.02.04	7950.00	
57		KG-OSN-2004/1	6	25.05.07	1131.00	
58		KG-DWN-2004/1	D10	15.05.07	11951.00	

## PELs OPERATED BY ONGC

Sl. No.	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF PEL	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)
59	K-G Offshore	KG-DWN-2004/2	D11	07.05.07	11851.00	83898.00
60		KG-DWN-2004/3	D12	08.05.07	6205.00	
61		KG-DWN-2004/5	D14	23.05.07	11922.00	
62		KG-DWN-2004/6	D15	23.05.07	10907.00	
63		KG-DWN-2005/1	D16	22.12.08	1727.00	
64		KG-OSN-2005/1	S-7	22.12.08	2810.00	
65		KG-OSN-2005/2	S-8	22.12.08	1881.00	
66		KG-OSN-2009/1	S-22	30.06.10	1472.00	
67		KG-OSN-2009/2	S-23	30.06.10	1471.00	
68	KG-OSN-2009/4	S-25	30.06.10	835.00		
69	Mahanadi - NEC Offshore	MN-DWN-98/3	D7	19.05.00	4988.00	36660.00
70		MN-OSN-2000/2	N24	16.08.01	4061.00	
71		MN-DWN-2002/1	D29	17.03.04	7483.00	
72		MN-DWN-2002/2	D30	17.03.04	8542.00	
73		NEC-DWN-2002/2	D32	17.03.04	11586.00	
74	Bengal	WB-ONN-2005/2	5	22.12.08	3792.00	11733.00
75		WB-ONN-2005/3	6	22.12.08	4001.00	
76		WB-ONN-2005/4	7	22.12.08	3940.00	
77	Andaman-Nicobar Off.	AN-DWN-2002/1	D33	17.03.04	8238.80	67557.80
78		AN-DWN-2002/2	D34	17.03.04	12495.00	
79		AN-DWN-2003/1	D39	05.12.05	9970.00	
80		AN-DWN-2005/1	D19	22.12.08	11837.00	
81		AN-DWN-2009/1	D-7	30.06.10	4981.00	
82		AN-DWN-2009/2	D-8	30.06.10	3995.00	
83		AN-DWN-2009/3	D-9	30.06.10	3992.00	
84		AN-DWN-2009/5	D-11	30.06.10	4002.00	
85		AN-DWN-2009/13	D-19	30.06.10	4007.00	
86		AN-DWN-2009/18	D-24	30.06.10	4040.00	
<b>TOTAL</b>						<b>402725.18</b>
<b>GRAND TOTAL</b>						<b>470638.47</b>

**PRE-NELP & NELP BLOCKS WITH PVT. / JV COMPANIES**

As on 01.04.2012

Sl. No.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF PEL	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)	
1	RELIANCE INDUSTRIES LIMITED	K-G Offshore	KG-DWN-98/1	D1	07.06.00	6700.00	50088.00	
2			KG-DWN-98/3	D3	07.06.00	7645.00		
3			KG-DWN-2001/1	D24	03.04.03	8695.00		
4			KG-DWN-2003/1	D37	05.12.05	3288.00		
5			KG-DWN-2004/4	D13	21.05.07	11904.00		
6			KG-DWN-2004/7	D16	23.05.07	11856.00		
7		Cauvery Offshore	CY-DWN-2001/2	D20	03.04.03	14325.00	14325.00	
8		Cauvery-Palar Offs.	CY-PR-DWN-2001/3	CY-PR-DWN-2001/3	D21	03.04.03	8600.00	19190.00
9				CY-PR-DWN-2001/4	D22	03.04.03	10590.00	
10		Palar Offshore	PR-DWN-2001/1	D23	03.04.03	6155.00	6155.00	
11		Mahanadi-NEC Offs		MN-DWN-98/2	D6	07.06.00	7195.00	105170.00
12				NEC-OSN-97/2	N15	07.06.00	9461.00	
13				NEC-DWN-2002/1	D31	18.03.04	19174.00	
14				MN-DWN-2003/1	D38	05.12.05	17050.00	
15				MN-DWN-2004/1	D17	15.05.07	9885.00	
16				MN-DWN-2004/2	D18	15.05.07	11813.00	
17				MN-DWN-2004/3	D19	15.05.07	11316.00	
18				MN-DWN-2004/4	D20	21.05.07	8822.00	
19				MN-DWN-2004/5	D21	23.05.07	10454.00	
20				Kerala-Konkan Offshore	KK-DWN-2001/1	KK-DWN-2001/1	D16	
21		KK-DWN-2001/2	D17			03.04.03	23515.00	
22		Gujarat-Kutch-Saurashtra Offs.	GK-OSJ/3	GS-OSN-2000/1	2	05.10.01	5725.00	11615.00
23				AS-ONN-2000/1	N18	16.08.01	5890.00	
24		Assam-Arakan	AS-ONN-2000/1	N32	—	5754.00	5754.00	
25		Cambay	CB-ON/1	CB-ONN-2003/1 (A&B)	18	05.09.03	1533.00	2168.00
26				CB-ONN-2003/1 (A&B)	N66	05.06.06	635.00	
<b>TOTAL</b>						<b>258,448.00</b>		
27	CAIRN	Rajasthan	RJ-ON-90/1	17	15.05.95	3111.20	18944.20	
28		Cambay	CB-OS/2	7	-	205.00		
29		Krishna Godavari		KG-ONN-2003/1	N69	08.02.07		1262.00
30				KG-OSN-2009/3	S-24	30.06.10		1988.00
31		Palar offshore		PR-OSN-2004/1	5	24.04.07		9417.00
32		Mumbai offshore		MB-DWN-2009/1	D-1	30.06.10		2961.00
33	ESSAR	Cambay	CB-ON/3	19	11.02.03	119.05	4227.05	
34		Assam-Arakan	AA-ONN-2004/3	AA-ONN-2004/3	11	02.05.08		1252.00
35				AA-ONN-2004/5	13	02.05.08		46.00
36		Mumbai offshore	MB-OSN-2005/3	S-3	22.12.08	2810.00		
37	HOEC	Pranhita-Godavari	GN-ON-90/3	24	29.03.93	21850.00	23586.64	
38		Assam - Arakan	AAP-ON-94/1	14	28.11.00	305.00		
39		Rajasthan	RJ-ONN-2005/1	14	22.12.08	1424.00		
40		Cambay	CB-ON/7	22	-	7.64		
41	FOCUS	Rajasthan	RJ-ON/6	16	21.08.99	4026.20	12184.36	
42			RJ-ONN-2003/2	N65	28.01.06	4232.16		
43			RJ-ONN-2010/2	8	28.03.12	535.00		
44		G-K Onland	GK-ON/4	21	19.04.03	775.00		
45		Cambay	CB-OSN-2004/1	2	28.05.07	2616.00		
46	CANORO (Subjodice)	Assam-Arakan	AA-ON/7	13	27.03.01	319.00	319.00	

**PRE-NELP & NELP BLOCKS WITH PVT. / JV COMPANIES**

Sl. No.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF PEL	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)
47	GSPC	Cambay	CB-ON/2	23	23.11.00	866.00	10522.80
48			CB-ONN-2000/1	N29	17.07.01	425.00	
49			CB-ONN-2002/3	N54	29.07.04	39.80	
50			CB-ONN-2003/2	N67	01.04.06	172.00	
51		Krishna Godavari	KG-OSN-2001/3	N38	12.03.03	530.00	
52			KG-ONN-2004/2	29	10.01.08	1140.00	
53		Mumbai Offshore Rajasthan	MB-OSN-2004/1	3	12.06.07	1520.00	
54			RJ-ONN-2004/1	19	06.11.07	4613.00	
55	RJ-ONN-2005/3		16	22.12.08	1217.00		
56	PETROGAS	Mumbai Offshore	MB-OSN-2004/2	4	21.05.07	741.00	741.00
57	JOGPL	Assam-Arakan	AA-ONN-2002/1	N47	07.04.04	1260.00	5896.40
58			AA-ONN-2003/1	N59	-	81.00	
59			AA-ONN-2009/1	1	30.06.10	2217.00	
60			AA-ONN-2009/2	2	30.06.10	1740.00	
61		Cauvery Onland Cambay	CY-ONN-2002/1	N55	22.11.04	505.00	
62			CB-ONN-2002/2(Part-A&B)	N53	21.05.04	93.40	
63	GEO-GLOBAL RESOURCES	Deccan Syncline	DS-ONN-2003/1	N68	-	2365.75	5014.75
64			DS-ONN-2004/1	27	07.06.07	2649.00	
65	ENI	Andaman-Nicobar Rajasthan	AN-DWN-2003/2	D40	05.12.05	13110.00	14445.00
66			RJ-ONN-2003/1	N64	04.01.06	1335.00	
67	NR(V)L	Cauvery Onland	CY-ONN-2003/1	N70	28.07.06	957.00	957.00
68	NAFTOGAZ	Mizoram	MZ-ONN-2004/2	8	25.05.07	3619.00	3619.00
69	SANTOS	Mahanadi - NEC offshore	NEC-DWN-2004/1	D22	08.05.07	7790.00	16496.00
70			NEC-DWN-2004/2	D23	09.05.07	8706.00	
71	PRIZE	South-Rewa	SR-ONN-2004/1	16	12.07.07	13277.00	13277.00
72	GAIL	Cauvery Cambay	CY-ONN-2005/1	29	22.12.08	946.00	1077.00
73			CB-ONN-2010/11	19	28.03.12	131.00	
74	IOCL	Cambay	CB-ONN-2005/2	18 A&B	22.12.08	81.00	280.00
75			CB-ONN-2005/7	23	22.12.08	199.00	
76	BHP Billiton	Mumbai offshore	MB-DWN-2005/2	D-6	22.12.08	3660.00	39,704.00
77			MB-DWN-2005/3	D-7	22.12.08	3097.00	
78			MB-DWN-2005/4	D-8	22.12.08	3408.00	
79			MB-DWN-2005/5	D-9	22.12.08	3169.00	
80			MB-DWN-2005/7	D-11	22.12.08	3324.00	
81			MB-DWN-2005/9	D-13	22.12.08	3138.00	
82			MB-OSN-2009/3	S-5	30.06.10	1492.00	
83			MB-OSN-2009/6	S-8	30.06.10	1876.00	
84			MB-OSN-2009/7	S-9	30.06.10	1865.00	
85		Kerala-Konkan off.	KK-DWN-2005/1	D14	22.12.08	14675.00	
86	BP Explo.	Krishna-Godavari	KG-DWN-2005/2	D-17	22.12.08	1949.00	1949.00
87	Adani Welspun	Assam-Arakan	AA-ONN-2004/4	12	07.09.07	95.00	1293.72
88		Cambay	CB-ONN-2004/5	26	26.09.07	7.72	
89		Mumbai offshore	MB-OSN-2005/2	S-2	22.12.08	1191.00	
90	Deep Energy	Satpura-Rewa	SR-ONN-2005/1	11	22.12.08	789.00	10008.00
91		Vindhyan	VN-ONN-2010/1	4	28.03.12	3776.00	
92		VN-ONN-2010/2	5	28.03.12	4909.00		
93		Cambay	CB-ONN-2010/3	11	28.03.12	534.00	

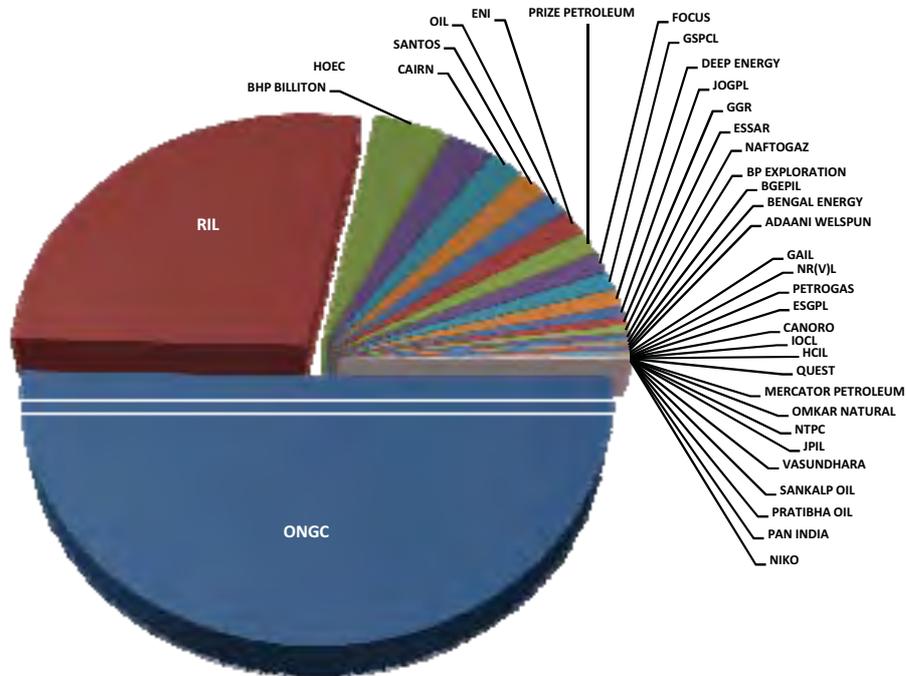
**PRE-NELP & NELP BLOCKS WITH PVT. / JV COMPANIES**

Sl. No.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF PEL	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)
94	Mercator Petr.	Cambay	CB-ONN-2005/3	19	22.12.08	48.00	218.00
95			CB-ONN-2005/9	25	22.12.08	170.00	
96	Omkar Natural	Cambay	CB-ONN-2005/5	21	22.12.08	83.00	185.00
97			CB-ONN-2005/6	22	22.12.08	102.00	
98	Vasundhara	Cambay	CB-ONN-2005/8	24	22.12.08	133.00	133.00
99	Quest	Cambay	CB-ONN-2005/11	27	22.12.08	223.87	223.87
100	BGEPIL	Krishna-Godavari	KG-DWN-2009/1	D-6(A&B)	30.06.10	1800.00	1800.00
101	Bengal Energy	Cauvery	CY-OSN-2009/1	S-19	30.06.10	1362.00	1362.00
102	ESGPL	Cambay	CB-ONN-2009/1	11	30.06.10	113.00	325.00
103			CB-ONN-2009/2	12	30.06.10	68.00	
104			CB-ONN-2009/7	17	30.06.10	144.00	
105	HCIL	Cambay	CB-ONN-2009/3	13	30.06.10	71.00	248.00
106			CB-ONN-2009/6	16	30.06.10	177.00	
107	NTPC	Cambay	CB-ONN-2009/5	15	30.06.10	165.00	165.00
108	JPIL	Cambay	CB-ONN-2009/8	18	30.06.10	136.00	136.00
109	NIKO	Cambay	CB-ONN-2000/2	N30	-	24.25	24.25
110	PAN India	Cambay	CB-ONN-2010/5	13	-	49.00	49.00
111	Pratibha Oil	Cambay	CB-ONN-2010/4	12	-	61.00	61.00
112	Sankalp Oil	Cambay	CB-ONN-2010/10	18	-	122.00	122.00
<b>TOTAL</b>							<b>189594.04</b>
<b>GRAND TOTAL</b>							<b>448042.04</b>

**Grand Total of PELs awarded in the country : 933507.26 Sq.km**

## PEL AREAS UNDER OPERATION BY NOC'S AND PVT/JV COMPANIES

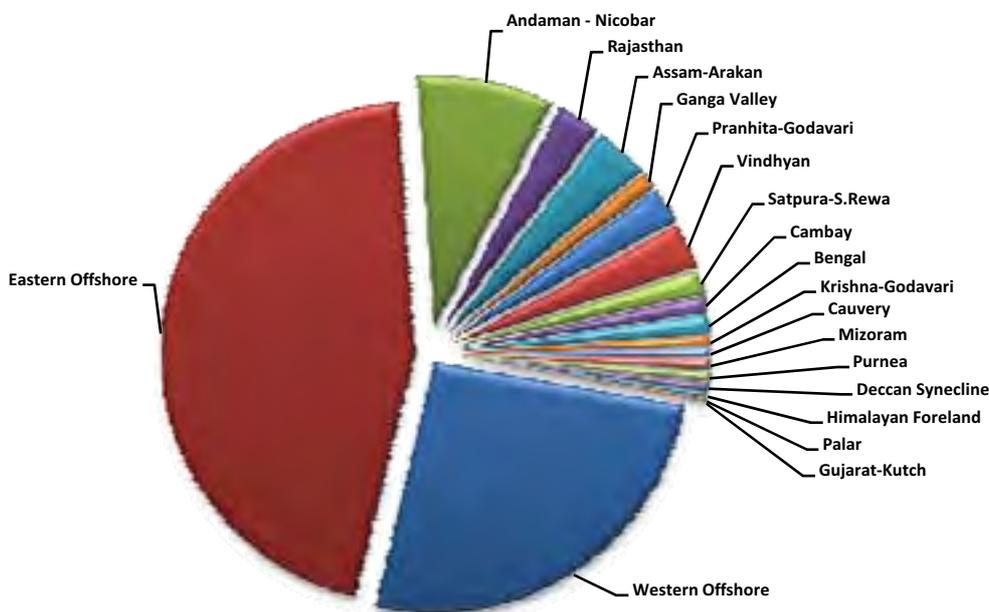
As on 01.04.12



COMPANY / OPERATOR	PEL AREA		COMPANY / OPERATOR	PEL AREA	
	(Sq. Km.)	(%)		(Sq. Km.)	(%)
ONGC	470638.47	50.42	ADAANI WELSPUN	1293.72	0.14
RIL	258448.00	27.69	NR(V)L	957.00	0.10
BHP BILLITON	39704.00	4.25	GAIL	1077.00	0.12
HOEC	23586.64	2.53	PETROGAS	741.00	0.08
CAIRN	18944.20	2.03	ESGPL	325.00	0.03
SANTOS	16496.00	1.77	IOCL	280.00	0.03
ENI	14445.00	1.55	CANORO	319.00	0.03
OIL	14826.75	1.59	HCIL	248.00	0.03
PRIZE PETROLEUM	13277.00	1.42	QUEST	223.87	0.02
FOCUS	12184.36	1.31	MERCATOR PETROLEUM	218.00	0.02
GSPCL	10522.80	1.13	OMKAR NATURAL	185.00	0.02
DEEP ENERGY	10008.00	1.07	NTPC	165.00	0.02
JOGPL	5896.40	0.63	JPIL	136.00	0.01
GGR	5014.75	0.54	VASUNDHARA	133.00	0.01
ESSAR	4227.05	0.45	SANKALP OIL	122.00	0.01
NAFTOGAZ	3619.00	0.39	PRATIBHA OIL	61.00	0.01
BP EXPLORATION	1949.00	0.21	PAN INDIA	49.00	0.01
BGEPIL	1800.00	0.19	NIKO	24.25	0.00
BENGAL ENERGY	1362.00	0.15			
<b>GRAND TOTAL : 933,507.26 (100%)</b>					

### BASIN WISE DISTRIBUTION OF PEL AREAS

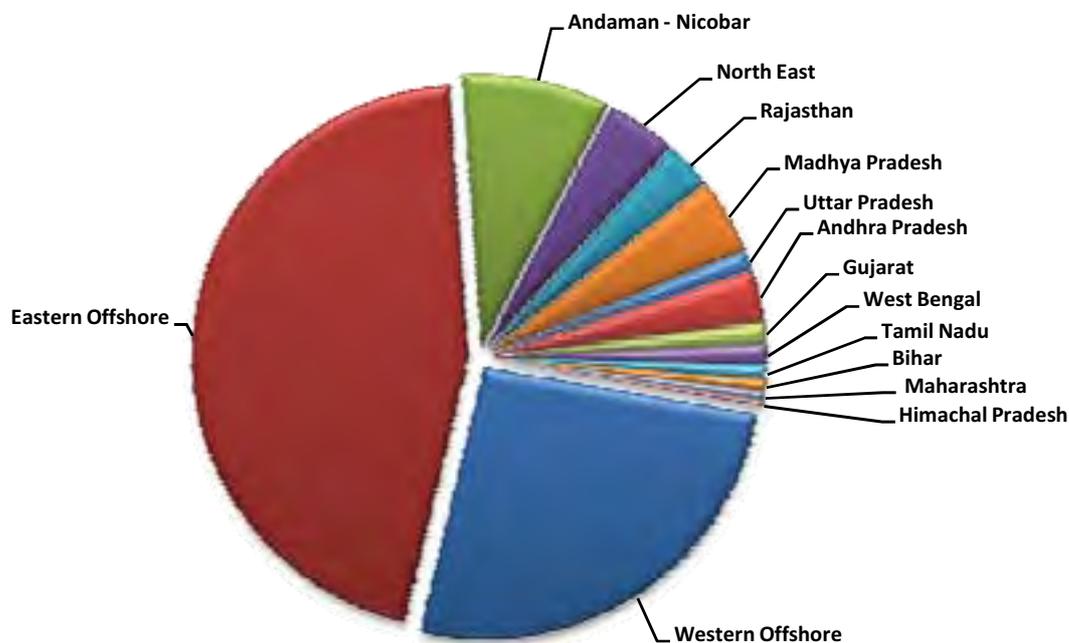
As on 01.04.12



OFFSHORE/BASIN	PEL AREA	
	(Sq. Km.)	(%)
<b>OFFSHORE</b>		
WESTERN	242,452.56	25.97
EASTERN	421,868.00	45.19
ANDAMAN - NICOBAR	80,667.80	8.64
<b>TOTAL OFFSHORE</b>	<b>744,988.36</b>	<b>79.81</b>
<b>ONLAND</b>		
RAJASTHAN	25,536.56	2.74
ASSAM - ARAKAN	31,822.83	3.41
GANGA VALLEY	10,581.00	1.13
PRANHITA - GODAVARI	21,850.00	2.34
VINDHYAN	27,083.00	2.90
SATPURA - S. REWA	14,066.00	1.51
CAMBAY	10,041.00	1.08
BENGAL	11,733.00	1.26
KRISHNA - GODAVARI	6,222.70	0.67
CAUVERY	5,627.18	0.60
MIZORAM	6,832.00	0.73
PURNEA	6,185.00	0.66
DECCAN SYNECLISE	5,014.75	0.54
HIMALAYAN FORELAND	3,341.88	0.36
PALAR	1,807.00	0.19
GUJARAT - KUTCH	775.00	0.08
<b>TOTAL ONLAND</b>	<b>188,518.90</b>	<b>20.19</b>
<b>GRAND TOTAL</b>	<b>933,507.26</b>	<b>100.00</b>

## STATE WISE DISTRIBUTION OF PEL AREAS

As on 01.04.12



OFFSHORE/STATE	PEL AREA	
	(Sq. Km.)	(%)
<b>OFFSHORE</b>		
WESTERN	242,452.56	25.97
EASTERN	421,868.00	45.19
ANDAMAN - NICOBAR	80,667.80	8.64
<b>TOTAL OFFSHORE</b>	<b>744,988.36</b>	<b>79.81</b>
<b>STATE</b>		
NORTH-EASTERN STATES	38,654.83	4.14
RAJASTHAN	25,536.56	2.74
MADHYA PRADESH	41,149.00	4.41
UTTAR PRADESH	10,581.00	1.13
ANDHRA PRADESH	28,072.70	3.01
GUJARAT	10,816.00	1.16
WEST BENGAL	11,733.00	1.26
TAMIL NADU	7,434.18	0.80
BIHAR	6,185.00	0.66
MAHARASTRA	5,014.75	0.54
HIMACHAL PRADESH	3,341.88	0.36
<b>TOTAL ONLAND</b>	<b>188,518.90</b>	<b>20.19</b>
<b>GRAND TOTAL</b>	<b>933,507.26</b>	<b>100.00</b>

**ML AREAS UNDER OPERATION BY NOC's AND PVT/JV COMPANIES**

As on 01.04.2012

SI. No.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)
1	ONGC	Rajasthan	Manherra Tibba	RJM-1	01.05.94	24.00	<b>704.46</b>
2			Bakriwala	RJM-2	10.01.01	1.00	
3			Ghotaru Ext. - I	RJM-3	10.01.01	564.60	
4			Chinnewala Tibba	RJM-4	15.10.03	114.86	
5		Cambay	Lanwa	MM-1	09.12.02	30.00	
6			Balol	MM-2	25.05.10	24.00	
7			Jotana Ext.-I	MM-3	28.11.06	57.70	
8			West Sobhasan	MM-4	23.04.03	9.60	
9			Mehsana City	MM-5	08.08.96	8.85	
10			Mehsana City Ext.-II	MM-6	18.07.95	7.58	
11			Sobhasan	MM-7	20.08.93	35.89	
12			Geratpur	MM-8	20.08.00	18.31	
13			Linch Ext.-II	MM-9	24.03.07	13.35	
14			North Sobhasan Ext.-I	MM-10	12.03.01	56.85	
15			Jotana	MM-11	26.07.00	39.50	
16			Santhal	MM-12	09.06.94	19.46	
17			Bechraji	MM-13	31.08.11	37.11	
18			Bechraji Ext.-I	MM-14	29.03.04	3.06	
19			Kadi Ext.-II	MM-15	08.12.95	41.01	
20			N. Kadi Ext.-I	MM-16	03.05.93	20.42	
21			Kadi	MM-17	22.06.09	64.49	
22			Linch Ext.- I	MM-18	18.03.07	34.25	
23			Linch	MM-19	16.10.93	43.73	
24			Nandasani Ext.-I	MM-20	18.07.95	26.39	
25			Mansa	MM-21	26.07.95	58.72	
26			Nandasani - Langnaj	MM-22	27.04.06	61.90	
27			Chanasma	MM-23	28.09.96	2.81	
28			Dedana (ML)	MM-24	04.11.96	5.44	
29			Lanwa Ext.-I	MM-25	16.12.96	2.15	
30			Jotana Ext.-II	MM-26	16.06.97	0.87	
31			Jakasma(ML)	MM-27	02.06.01	9.80	
32			South Patan	MM-28	16.06.97	6.99	
33			N. Sobhasan Pt. A+B	MM-29	25.01.99	12.05	
34			East Sobhasan	MM-30	28.06.02	22.42	
35			North Sobhasan Ext.-II	MM-31	17.11.01	23.00	
36			West Mewad(ML)	MM-32	11.10.00	13.20	
37			Langhnaj-Wadasma	MM-33	05.02.01	13.84	
38			Sanganpur ML	MM-34	05.06.02	6.97	
39			Langhnaj ML	MM-35	23.07.02	17.92	
40			Chandrora	MM-36	16.02.04	1.39	
41			Kadi Asjol	MM-37	28.08.03	0.72	
42			Jotana-Warosan	MM-38	24.06.05	38.05	
43			Charada Mansa Extn.-I	MM-39	20.09.08	12.50	
44			Jotana South	MM-40	10.03.08	23.00	
45			Rajpur	AM-1	26.06.95	6.76	
46			Wadu	AM-2	26.05.10	15.41	
47			Kalol North-East	AM-3	15.03.10	9.44	
48			Paliyad-Kalol-Limbodra	AM-4	26.06.95	161.48	
49			Limbodra	AM-5	21.12.05	15.75	
50			Limbodra Ext.-I	AM-6	25.03.98	14.96	
51			Halisa	AM-7	30.01.98	143.44	
52			Kalol (Main)	AM-8	13.05.04	35.84	
53			Kalol Ext.-I	AM-9	04.08.06	159.92	
54			Kalol Ext.-II	AM-10	11.04.09	15.50	
55			Motera Ext.-II	AM-11	25.03.98	26.02	
56			Motera	AM-12	14.08.96	15.69	

**ML AREAS UNDER OPERATION BY NOC's AND PVT/JV COMPANIES**

SI. No.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)
57	ONGC	Cambay	Motera Ext.-I	AM-13	25.03.97	23.65	
58			Wamaj	AM-14	30.09.95	19.44	
59			Viraj	AM-15	26.07.00	17.49	
60			Lohar	AM-16	16.11.04	8.29	
61			Sanand	AM-17	10.05.09	81.36	
62			Sanand Ext.-I	AM-18	30.04.93	18.51	
63			Sanand Ext.-II	AM-19	23.03.99	10.37	
64			Sanand Ext.-III	AM-20	11.11.11	19.30	
65			Gamij	AM-21	13.10.94	39.16	
66			Gamij Ext.-I	AM-22	25.03.97	81.22	
67			Hirapur	AM-23	24.10.97	87.92	
68			Ahmedabad-Bakrol	AM-24	05.08.09	30.16	
69			Ahmedabad Ext.-I	AM-25	22.02.01	17.29	
70			Ahmedabad Ext.-II	AM-26	29.07.08	5.98	
71			Ahmedabad Ext.-III	AM-27	11.11.11	34.75	
72			Nandej East	AM-28	26.06.95	20.92	
73			Nandej	AM-29	25.03.97	90.18	
74			Nawagam Main	AM-30	28.03.07	72.23	
75			Nawagam Ext.-I	AM-31	21.03.03	2.77	
76			Wadu Ext.-I	AM-32	19.05.97	55.17	
77			Ahmedabad Ext.-IV	AM-33	08.10.98	10.21	
78			Rajpur Ext.-I	AM-34	02.02.99	8.70	
79			Asmali ML	AM-35	15.06.98	43.26	
80			Kadi Ext-III	AM-36	02.02.99	16.07	
81			Nawagam Ext.-II	AM-37	26.11.99	14.66	
82			Ahmedabad Ext-V	AM-38	08.05.00	17.75	
83			Gamij Ext.-III ML	AM-39	08.02.02	15.41	
84			Nandej Ext.-I	AM-40	08.02.02	56.18	
85			Gamij Ext. - II	AM-41	04.04.01	116.22	
86			South Wamaj ML	AM-42	28.06.02	18.29	
87			Nawagam Ext. - III	AM-43	31.08.00	56.00	
88			Kalol West Extn.-I	AM-44	03.02.06	27.00	
89			Kalol West ML	AM-45	21.11.03	14.53	
90			Nawagam South Ext.-I	AM-46	21.11.03	30.88	
91			Nawagam South Ext.-II	AM-47	21.11.03	43.94	
92			Rupal	AM-48	29.10.04	14.06	
93			Kadi Extn.-IV	AM-49	13.11.03	5.28	
94			Nawagam South Ext.-III	AM-50	13.12.05	53.71	
95			Valod	AM-51	07.11.07	8.58	
96			Kalol West Ext.-II	AM-52	20.09.07	20.00	
97			Balasar	AM-53	08.06.09	12.00	
98			Cambay	CM-1	14.12.04	2.60	
99			Siswa	CM-2	12.02.00	37.78	
100			Kathana	CM-3	20.11.08	16.95	
101			Padra Ext.-II	CM-4	03.09.93	14.50	
102			Padra Ext.-I	CM-5	12.04.91	8.42	
103			Padra Main	CM-6	18.09.06	1.25	
104			Padra Ext.-III	CM-7	12.05.94	0.38	
105			Padra Ext.-IV	CM-8	14.03.96	6.37	
106			Padra Ext.-V	CM-9	03.02.97	3.58	
107			Padra Ext.-VI	CM-10	28.01.99	83.95	
108			Padra Ext.-VII	CM-11	26.04.00	7.11	
109			Padra Ext.-VIII	CM-12	08.11.00	15.68	
110			Padra Ext.-IX	CM-13	10.03.04	21.00	
111			Akholjuni	CM-14	27.07.00	81.25	
112			Anklav Ext.-I	CM-15	15.02.02	61.00	

**ML AREAS UNDER OPERATION BY NOC's AND PVT/JV COMPANIES**

SI. No.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)		
113	ONGC	Cambay	Kathana Ext.-I	CM-16	15.03.04	16.99			
114			Padra Ext.-X	CM-17	15.01.08	10.00			
115			Chaklasi-Rasnol	CM-18	06.12.07	42.00			
116			Dabka Ext.-I	ANM-1	23.08.08	12.85			
117			Dabka Ext.-II	ANM-2	30.06.09	0.56			
118			Dabka	ANM-3	01.05.93	21.67			
119			Umera	ANM-5	10.08.87	8.44			
120			Umera Ext.-I	ANM-6	19.10.94	9.93			
121			Malpur (ML)	ANM-7	03.06.07	1.00			
122			Nada	ANM-8	19.02.09	9.85			
123			Gandhar Ext.-IV	ANM-9	30.08.94	36.75			
124			Gandhar Ext.-I	ANM-10	08.10.06	32.75			
125			Gandhar	ANM-11	07.01.05	11.78			
126			Gandhar Ext.-II (Denwa)	ANM-12	08.07.06	54.30			
127			Gandhar Ext.-III	ANM-13	24.02.07	235.38			
128			Gandhar Ext.-V	ANM-14	22.03.96	29.43			
129			Dahej Ext.-I	ANM-15	17.04.94	90.90			
130			Dahej	ANM-16	06.02.05	18.52			
131			Pakhajan(ML)	ANM-17	21.08.07	6.25			
132			Pakhajan Ext.-I	ANM-18	10.01.95	18.00			
133			Kasiyabet	ANM-19	12.09.09	5.06			
134			Ankleshwar Ext.-I	ANM-20	26.05.05	17.43			
135			Ankleshwar (Main)	ANM-21	15.08.01	38.98			
136			Motwan	ANM-22	04.07.99	42.20			
137			Sanaokhurd	ANM-23	30.12.96	23.29			
138			Kudara	ANM-24	28.06.02	2.60			
139			Elav	ANM-25	30.03.90	10.37			
140			Kharach	ANM-26	23.03.95	0.72			
141			Kosamba	ANM-27	03.01.08	19.17			
142			Olpad (A)	ANM-28	24.11.02	2.75			
143			Dabka Ext.-IV (D#6)	ANM-29	20.02.97	1.00			
144			Kim(ML)	ANM-30	10.03.97	18.33			
145			Gandhar Ext.-VI (G#388)	ANM-31	22.01.97	44.47			
146			Nada Ext.-I	ANM-32	03.09.98	6.12			
147			Dabka Ext.-V (D#38)	ANM-33	29.06.99	2.00			
148			Gandhar Ext.-VII(G#155)	ANM-34	24.04.99	25.82			
149			Gandhar Ext.-VIII	ANM-35	16.08.00	7.23			
150			Kural (ML)	ANM-36	03.04.01	83.49			
151			Gandhar Ext. - IX	ANM-37	20.08.02	40.91			
152			Olpad - Dandi Ext. - I	ANM-38	01.01.04	94.40			
153			Pakhajan Extn. - II	ANM-39	16.09.02	38.50			
154			Kim Ext. - I	ANM-40	04.01.02	56.11			
155			Kosamba Extn.-I	ANM-41	01.03.03	39.00			
156			Umra Extn.-II	ANM-42	13.03.03	34.43			
157			South Dahej	ANM-43	12.11.08	27.00			
158			Jambusar-Dabka	ANM-44	25.03.08	48.00			
159			Charada	ANM-45	06.10.09	10.60			
160			Matar	ANM-46	01.10.09	36.00			
161			Balol Extn.-I	ANM-47	26.12.08	5.83			
162			Gandhar Extn.-X	ANM-48	19.06.09	9.00			
163			Gandhar Extn.-XI	ANM-49	19.06.09	7.20		<b>4711.57</b>	
164			Cauvery Onland	Greater Bhuvanagiri	CYM-1	15.12.07		14.00	
165				Mattur	CYM-2	04.05.94		3.00	
166				Nannilam-I	CYM-3	26.04.93		4.70	
167				Kamalapuram-II	CYM-4	04.05.94		3.50	
168				Kamalapuram-I	CYM-5	27.05.99		23.50	

## ML AREAS UNDER OPERATION BY NOC's AND PVT/JV COMPANIES

SI. No.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)			
169	ONGC	Cauvery Onland	Adiyakka Mangalam	CYM-6	27.05.99	17.80				
170			Greater Kovilkalappal	CYM-7	15.05.07	33.61				
171			Nannilam-II	CYM-8	27.05.99	1.00				
172			Perungulam-Periyapattinam	CYM-9	15.07.97	75.00				
173			Tulsapatnam	CYM-10	27.05.99	3.70				
174			Pundi	CYM-11	27.05.99	1.00				
175			Kizhavalur	CYM-12	27.05.99	3.60				
176			Kuthalam	CYM-13	01.06.01	91.00				
177			Kuthalam-13	CYM-14	12.02.04	12.00				
178			Kali	CYM-15	01.06.01	19.00				
179			Vijayapuram #13	CYM-16	03.11.02	2.00				
180			Greater Kamalapuram	CYM-17	26.02.04	22.00				
181			Kuthanallur	CYM-18	26.02.04	6.25				
182			Kali-6	CYM-19	01.01.04	1.60				
183			Kanjirangudi	CYM-20	13.10.03	68.00				
184			Greater Narimanam	CYM-21	27.01.06	54.00				
185			PBS-1-1	CYM-22	01.10.03	9.00				
186			Adichapuram	CYM-23	13.04.07	2.30				
187			Neyveli	CYM-24	15.03.08	3.84				
188			Karaikal	CYM-25	10.09.08	2.00				
189			Vadatheru	CYM-26	31.12.07	15.18				
190			Tiruvarur-19	CYM-27	12.02.04	2.00				
191			Greater Kali	CYM-28	21.07.10	36.00		<b>530.58</b>		
192			K-G Onland		Endamuru-I	KGM-1		03.04.12	3.00	
193					Endamuru-4	KGM-2		30.04.03	6.00	
194					Pasarlapudi-9	KGM-3		23.07.12	6.60	
195					Pasarlapudi-8	KGM-4		27.06.92	5.50	
196					Tatipaka-Pasarlapudi	KGM-5		14.02.94	62.00	
197	Kesanapalli-I	KGM-6			18.07.12	3.70				
198	Mori-5	KGM-7			02.06.94	1.56				
199	Mori-1	KGM-8			07.04.11	6.50				
200	Razole-1 & 2	KGM-9			23.01.08	18.85				
201	Elamanchali	KGM-10			21.02.11	6.00				
202	Medapadu	KGM-11			08.07.12	16.60				
203	Penumadam-1	KGM-12			03.04.12	9.60				
204	Lingala	KGM-13			21.12.99	7.60				
205	Kaikalur-3	KGM-14			10.09.06	9.00				
206	Vadali	KGM-15			20.04.90	4.00				
207	Mandapeta	KGM-16			22.08.95	40.00				
208	Mandapeta-19	KGM-17			01.05.98	6.00				
209	Mandepeta West	KGM-18			01.06.04	20.00				
210	Addvipalem-Ponnamanda	KGM-19			30.07.96	95.00				
211	Nandigama	KGM-20			31.01.00	55.00				
212	Enugupalli	KGM-21			06.07.00	7.00				
213	Kesavadasupalem	KGM-22			30.07.02	26.50				
214	Suryaraopeta	KGM-23			30.07.02	56.00				
215	Lingala Ext. & Kaikalur-12	KGM-24			30.07.02	30.00				
216	Lakshmaneswaram	KGM-25			30.07.02	23.50				
217	Endamuru-7&9	KGM-26			19.05.03	7.30				
218	Penumadam-2	KGM-27			01.07.04	3.20				
219	Srikatpalli	KGM-28			30.07.02	163.00				
220	Turputallu	KGM-29			28.11.08	2.00				
221	Achanta	KGM-30			28.11.08	14.10				
222	Kavitam	KGM-31			12.10.07	36.00				
223	Bantumilli Extn.	KGM-32			05.01.09	38.00				
224	Manapalli Extn.	KGM-34	12.11.09	10.00	<b>799.11</b>					

**ML AREAS UNDER OPERATION BY NOC's AND PVT/JV COMPANIES**

SI. No.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)
225	ONGC	Assam-Arakan	Sonari	UAM-1	01.08.09	30.00	
226			Banamali	UAM-2	17.12.02	50.00	
227			Lakwa	UAM-3	29.09.08	172.49	
228			Laipling-Gaon	UAM-4	13.10.03	26.00	
229			Panidihing	UAM-5	19.05.04	34.00	
230			North Rudrasagar	UAM-6	30.01.06	149.00	
231			Rudrasagar	UAM-7	30.05.09	70.50	
232			Charali	UAM-8	20.03.99	51.64	
233			Charali Ext.-I	UAM-9	20.05.98	45.00	
234			Changmaigaon	UAM-11	07.02.04	10.00	
235			Namti	UAM-12	09.11.07	35.55	
236			Geleki	UAM-13	16.08.10	27.94	
237			Geleki Ext.-I	UAM-14	23.11.09	5.01	
238			Geleki Ext.- II	UAM-15	14.12.01	2.65	
239			SE Geleki	UAM-16	30.01.06	20.50	
240			Mekeypore-Santak-Nazira	UAM-17	30.01.06	77.00	
241			Changmaigaon East	UAM-18	30.01.06	15.00	
242			Charaideo-Nahorhabi	UAM-20	30.01.06	14.00	
243			Changpang ML	NGM-1	14.03.07	12.00	
244			Borholla	DHM-1	17.06.98	32.12	
245			Mekrang	DHM-2	19.09.97	16.00	
246			East Lakhibari	DHM-3	23.07.03	8.50	
247			East Lakhibari Extn.	DHM-4	27.01.06	49.00	
248			Khoraghat	DHM-5	27.07.09	3.00	
249			Khoraghat Ext. - I	DHM-6	17.07.00	83.00	
250			Number	DHM-7	05.09.99	26.00	
251			Number Extn.	DHM-8	27.01.06	20.00	
252	Badarpur	CHM-1	01.08.09	2.30			
253	Banaskandi	CHM-2	21.07.97	15.00			
254	Adamtila	CHM-3	24.11.09	4.00			
255	Bhubandar	CHM-4	22.12.02	6.00			
256	Baramura(BRM-1)	TM-1	18.07.04	4.71			
257	Baramura(BRM-10)	TM-2	15.03.07	2.22			
258	Baramura(BRM-11)	TM-3	27.07.91	1.41			
259	Baramura(BRM-12)	TM-4	01.10.93	2.41			
260	Agartala Dome (AD-1)	TM-5	01.05.09	15.75			
261	Agartala Dome (AD-4)	TM-6	01.01.98	32.58			
262	Konaban (RO-4)	TM-7	01.01.98	11.11			
263	Manikya Nagar (RO-15)	TM-8	01.01.98	0.80			
264	Rokhia (RO-2)	TM-9	14.11.08	5.04			
265	Rokhia (RO-19)	TM-10	26.02.92	0.58			
266	Agartala Dome Extn.-II	TM-11	01.02.06	160.86			
267	Baramura Extn.-IV	TM-12	01.02.06	150.25			
268	Konaban Extn.-III	TM-13	01.02.06	16.89			
269	Manikyanagar-Sonamura Extn-I	TM-15	01.02.06	138.55			
270	Konaban Field (Rokhia)	TM-14	01.08.04	0.81			
271	Tichna block	TM-16	07.02.06	195.41			
272	Gojalia block	TM-17	07.02.06	271.17			
273	Kunjaban	TM-18	14.07.08	288.00			
274	Titabar	TM-19	24.12.08	10.00			
275	Kasomarigaon	TM-20	09.12.09	20.00			
276	Tulamura	TM-21	20.11.09	45.00			
277	Golaghat Extn.-IIA	TM-22	09.12.09	24.00	<b>2510.75</b>		
278	Mumbai Off.	Single PML MH Field	BM-1	24.10.10	1953.83		
279			Extn. of NW-Mumbai High	BM-2	17.11.08		531.00
280			C-37 (BOFF I, II & III)	BM-3	12.09.07		292.00

**ML AREAS UNDER OPERATION BY NOC's AND PVT/JV COMPANIES**

SI. No.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)			
281	ONGC	Mumbai Off.	B-55	BM-4	30.06.99	135.85				
282			South Bassein	BM-5	01.10.07	743.00				
283			B-119 / B-121	BM-6	15.05.97	113.40				
284			B-173A	BM-7	01.06.98	51.95				
285			Neelam	BM-8	14.11.09	213.00				
286			Heera	BM-9	20.11.04	448.05				
287			D-1 Field	BM-10	31.07.05	25.60				
288			Bassein Field Extn. (SB-II)	BM-11	15.06.05	22.55				
289			D-18	BM-12	01.01.05	194.00				
290			North Tapti Field	BM-13	09.01.06	68.14				
291			C-Series Fields	BM-14	01.04.06	3620.00				
292			Around D-1 Field	BM-15	14.09.09	384.00				
293			Mumbai High NW	BM-16	01.04.06	1567.67				
294			Mumbai High-SW	BM-17	01.04.06	1064.71				
295			Mumbai High-South	BM-18	09.01.06	331.00				
296			West of Bassein	BM-19	01.04.06	835.00				
297			Vasai East	BM-20	10.04.06	103.69				
298			S&E of Bassein	BM-21	01.04.06	1447.31				
299			North Heera	BM-22	04.12.07	82.00				
300			Ratna (R-12) field	BM-23	11.02.01	67.93				
301			D-33 (BOFF I, III, SWBH)	BM-24	05.09.06	134.00		<b>14429.68</b>		
302			K-G Off.		GS-15 & 23	KGM-32		04.09.98	80.00	
303					G-1 Field	KGM-33		05.09.03	105.00	
304					Vainateyam	KGM-35		20.09.08	221.00	
305	GS-29	KGM-36			30.10.09	35.00				
306	GS-49	KGM-37			22.10.09	32.00				
307	Yanam	KGM-38			19.11.09	94.00				
308	Godavari	KGM-39			24.01.08	111.50				
309	Vasistha	KGM-40			15.02.08	119.00	<b>797.50</b>			
310	Cauvery Off.	PBS-1-1 Extn.			CYM-29	10.04.09	11.00	<b>11.00</b>		
311	Gujarat-Kutch	KD Field	KM-2	01.04.11	46.00	<b>46.00</b>				
<b>ONGC TOTAL</b>							<b>24540.65</b>			
312	OIL	Rajasthan	Dandewala (Jaisalmer)	ORJM-1	01.01.86	250.00	<b>460.00</b>			
313			Baghewala	ORJM-2	30.05.03	210.00				
314		Assam-Arakan		Moran	OAM-1	01.11.06	429.42			
315				Moran Extn.	OAM-2	10.01.91	560.00			
316				Dum-Duma BK-A	OAM-3	26.11.09	98.42			
317				Nahorkatiya	OAM-4	04.02.04	1.42			
318				Nahorkatiya Extn.	OAM-5	10.01.91	165.76			
319				Hugrijan	OAM-6	10.01.01	725.20			
320				Dum-Duma BK-B	OAM-7	26.11.09	311.96			
321				Digboi	OAM-8	14.10.01	49.33			
322				Dum-Duma BK-C	OAM-9	26.11.09	85.47			
323				Dum-Duma BK-D	OAM-10	26.11.09	10.36			
324				Ningru	OAM-11	27.11.03	540.67			
325				Tinsukia	OAM-12	02.08.01	250.00			
326				Dibrugarh	OAM-13	06.08.01	186.00			
327				Borhapan	OAM-14	07.08.01	87.00			
328				Dholiya	OAM-15	02.08.01	131.00			
329				Ningru Extension	OAM-16	04.06.03	75.00			
330				Chabua	OAM-17	12.06.02	189.00			
331				Tinsukia Extension	OAM-18	17.05.03	185.00			
332				Baghjan	OAM-19	14.05.03	75.00			
333	Mechaki			OAM-20	19.05.03	195.00				
334	Sapkaint	OAM-21	24.12.07	105.00	<b>4456.01</b>					
<b>OIL TOTAL</b>							<b>4916.01</b>			

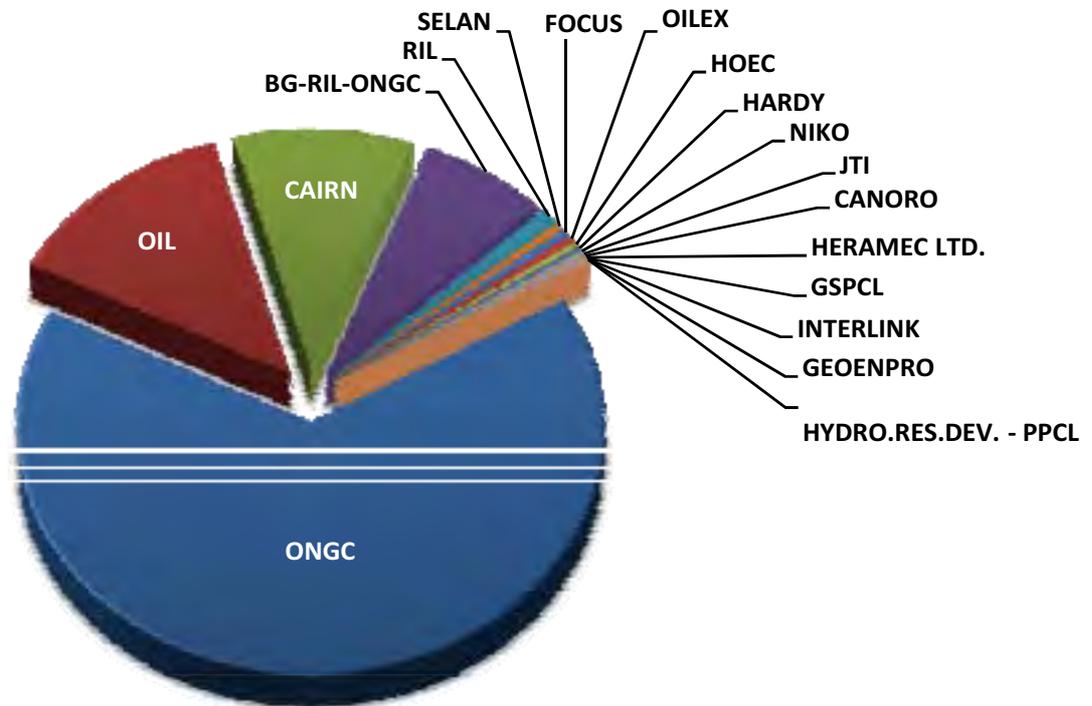
**ML AREAS UNDER OPERATION BY NOC's AND PVT/JV COMPANIES**

SI. No.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)
335	CAIRN	K-G Off.	Ravva	—	28.10.94	331.26	
336			Gulf of Cambay	Lakshmi	—	07.07.98	
337		Rajasthan	Gauri	—	—	50.70	
338			Ambe	—	—	107.47	
339			CBX	—	—	33.30	
340			Mangala (RJ-ON-90/1)	—	21.06.05	1859.00	
341			Bhagyam-Shakti	—	15.11.06	430.17	
342	Kaameshwari West	-	27.10.09	822.00	<b>3754.96</b>		
343	BG-RIL-ONGC	Mumbai Off.	Mid & South Tapti	—	22.12.94	1471.00	
344			Panna	—	22.12.94	430.00	
345			Mukta	—	22.12.94	777.00	
346	GEOENPRO	Assam-Arakan	Kharsang	—	21.10.97	10.00	<b>10.00</b>
347	CANORO	Assam-Arakan	Amguri	—	01.11.03	52.75	<b>52.75</b>
348	HOEC	Cambay	Asjol	—	09.04.96	15.00	
349			N. Balol	—	21.03.02	27.30	
350			Promoda & Palej	—	21.09.05	7.64	
351	INTERLINK	Cauvery Off.	PY-1	—	06.10.95	75.00	<b>124.94</b>
352			Baola	—	12.12.96	4.00	
353	JTI	Cambay	Modhera	—	19.05.07	12.70	<b>16.70</b>
354			Wavel	—	20.02.95	9.00	
355	NIKO	Cambay	Dholka	—	20.02.95	48.00	<b>57.00</b>
356			Hazira	—	23.09.94	50.00	
357			NS-A	—	01.05.04	20.22	
358	SELAN	Cambay	Bheema	—	29.09.04	4.03	<b>74.25</b>
359			Lohar	—	13.03.95	5.00	
360			Indrora	—	13.03.95	130.00	
361			Bakrol	—	13.03.95	36.00	
362			Karjisan	—	23.11.05	5.00	
363			Ognaj	—	05.08.08	13.65	<b>189.65</b>
364	Heramec	Cambay	Kanawara	—	04.02.03	6.30	
365			Dholasan	—	27.02.03	8.80	
366			Allora	—	16.05.03	6.85	
367			N. Kathana	—	11.06.03	12.20	
368	HYDROCARBON RES. DEV.-PPC	Cambay	Sanganpur	—	27.02.02	4.40	<b>4.40</b>
369	OILEX	Cambay	Cambay	—	23.09.94	161.00	
370			Sabarmati	—	23.09.94	5.80	
371			Bhandut	—	23.09.94	6.00	
372	GSPCL	Cambay	Unawa	—	19.05.03	5.65	
373			Ingoli Field (CB-ONN-2001/1)	—	—	14.03	
374	FOCUS	Rajasthan	RJ-ON/6 (SGL)	—	—	176.00	176.00
375	HARDY	Cauvery Off.	CY-OS-90/1 (PY-3)	—	20.07.98	81.00	<b>81.00</b>
376	RIL	KG Off.	KG-DWN-98/3(D-1&3)	—	02.03.05	339.40	
377			KG-DWN-98/3 (D-26)	—	17.04.08	49.72	
<b>Pvt./JV TOTAL</b>						<b>7835.40</b>	
<b>GRAND TOTAL</b>						<b>37292.06</b>	

**Grand Total of MLs awarded in the country : 37292.06 Sq.km**

## ML AREAS UNDER OPERATION BY NOC'S AND PVT/JV COMPANIES

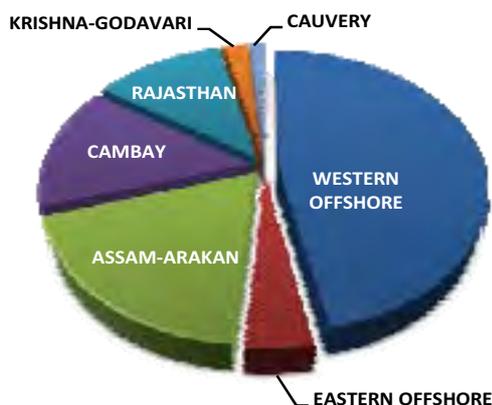
As on 01.04.12



COMPANY / OPERATOR	ML AREA	
	(Sq. Km.)	(%)
ONGC	24,540.65	65.81
OIL	4,916.01	13.18
CAIRN	3,754.96	10.07
BG-RIL-ONGC	2,678.00	7.18
RIL	389.12	1.04
SELAN	189.65	0.51
FOCUS	176.00	0.47
OILEX	172.80	0.46
HOEC	124.94	0.34
HARDY	81.00	0.22
NIKO	74.25	0.20
JTI	57.00	0.15
CANORO	52.75	0.14
HERAMEC LTD.	34.15	0.09
GSPCL	19.68	0.05
INTERLINK	16.70	0.04
GEOENPRO	10.00	0.03
HYDRO.RES.DEV. - PPCL	4.40	0.01

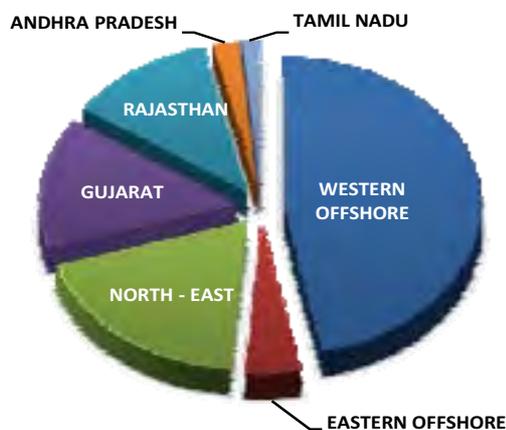
## BASIN / STATE WISE DISTRIBUTION OF ML AREAS

As on 01.04.12



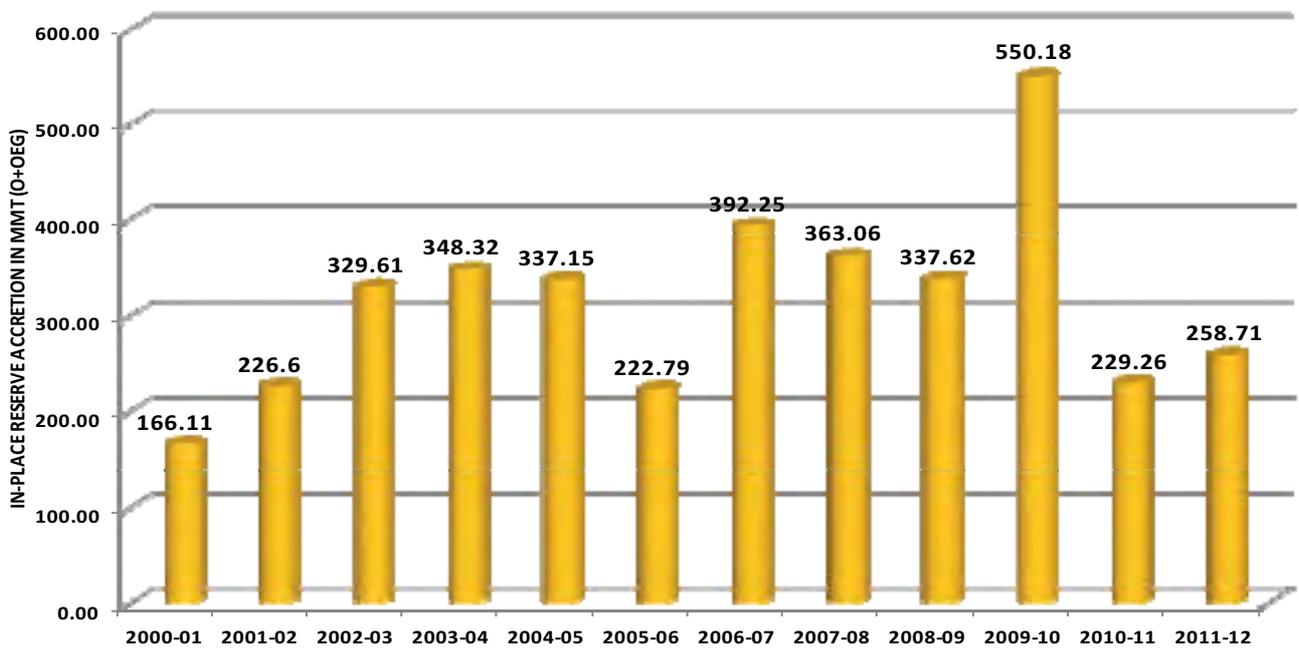
OFFSHORE/BASIN	ML AREA		PRODUCTION (2011-12)	
	(Sq.km)	(%)	Gas (MMSCM)	Oil (MMT)
<b>OFFSHORE</b>				
WESTERN	17,466.21	46.84	22051.80	17.946
EASTERN	1,684.88	4.52	16423.04	2.114
<b>TOTAL OFFSHORE</b>	<b>19,151.09</b>	<b>51.35</b>	<b>38,474.84</b>	<b>20.060</b>
<b>ONLAND</b>				
ASSAM - ARAKAN	7,029.51	18.85	3588.00	5.145
CAMBAY	5,330.14	14.29	2172.91	5.778
RAJASTHAN	4,451.63	11.94	590.03	6.553
KRISHNA-GODAVARI	799.11	2.14	1364.00	0.305
CAUVERY	530.58	1.42	1285.00	0.246
<b>TOTAL ONLAND</b>	<b>18,140.97</b>	<b>48.65</b>	<b>8999.93</b>	<b>18.027</b>
<b>GRAND TOTAL</b>	<b>37,292.06</b>	<b>100.00</b>	<b>47474.77</b>	<b>38.09</b>

## STATE WISE DISTRIBUTION OF ML AREAS

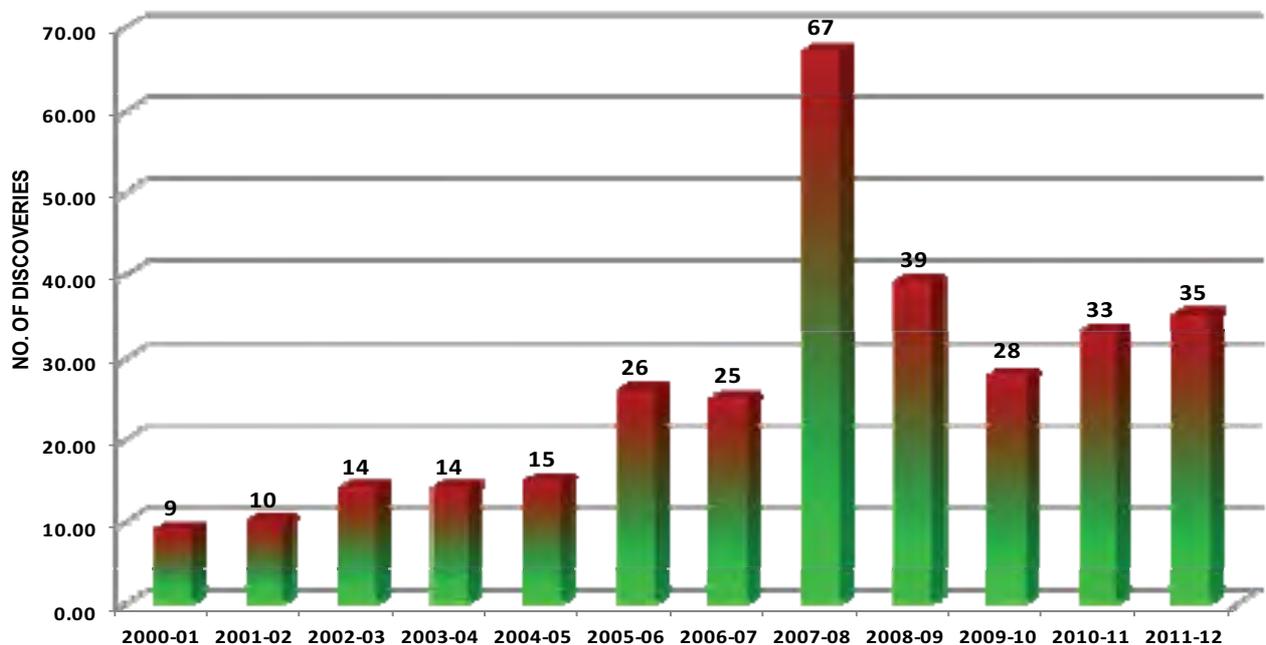


OFFSHORE/BASIN	ML AREA		PRODUCTION (2011-12)	
	(Sq.km)	(%)	Gas (MMSCM)	Oil (MMT)
<b>OFFSHORE</b>				
WESTERN	17,466.21	46.84	22051.80	17.946
EASTERN	1,684.88	4.52	16423.04	2.114
<b>TOTAL OFFSHORE</b>	<b>19,151.09</b>	<b>51.35</b>	<b>38,474.84</b>	<b>20.06</b>
<b>ONLAND</b>				
NORTH - EASTERN STATES	7,029.51	18.85	3588.00	5.145
GUJARAT	5,330.14	14.29	2172.91	5.778
RAJASTHAN	4,451.63	11.94	590.03	6.553
ANDHRA PRADESH	799.11	2.14	1364.00	0.305
TAMIL NADU	530.58	1.42	1285.00	0.246
<b>TOTAL ONLAND</b>	<b>18,140.97</b>	<b>48.65</b>	<b>8999.93</b>	<b>18.0266</b>
<b>GRAND TOTAL</b>	<b>37,292.06</b>	<b>100.00</b>	<b>47474.77</b>	<b>38.09</b>

### **INPLACE RESERVE ACCRETION TREND**



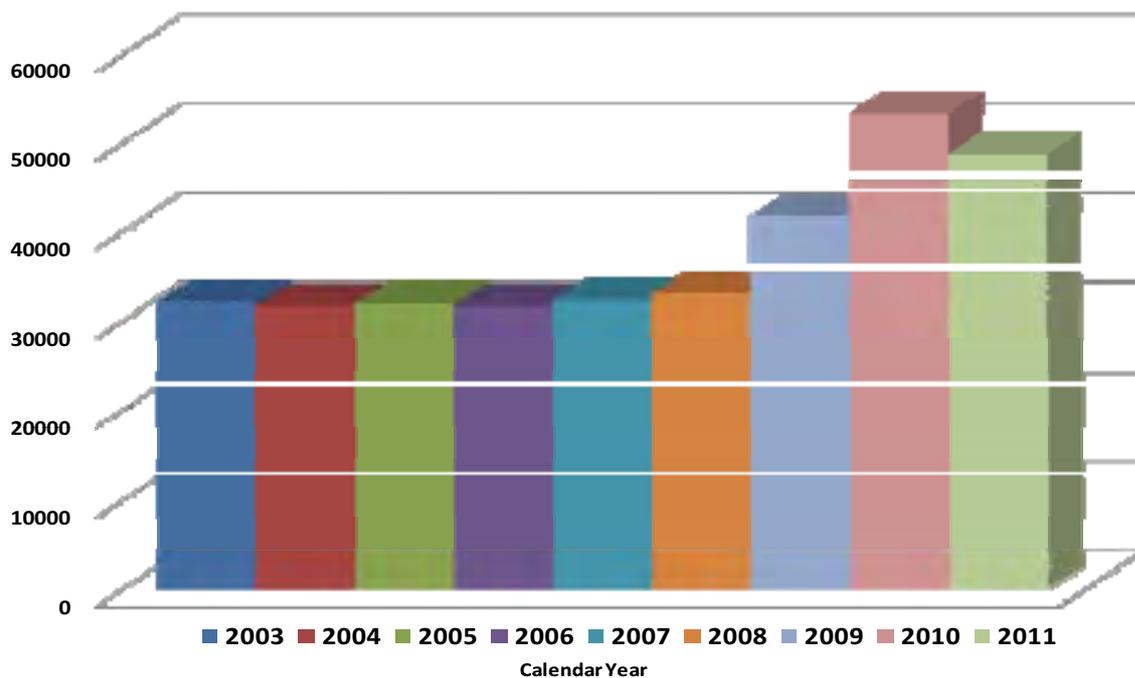
### **OIL & GAS DISCOVERY TREND**



Note : Trends include Nomination and PSC regime

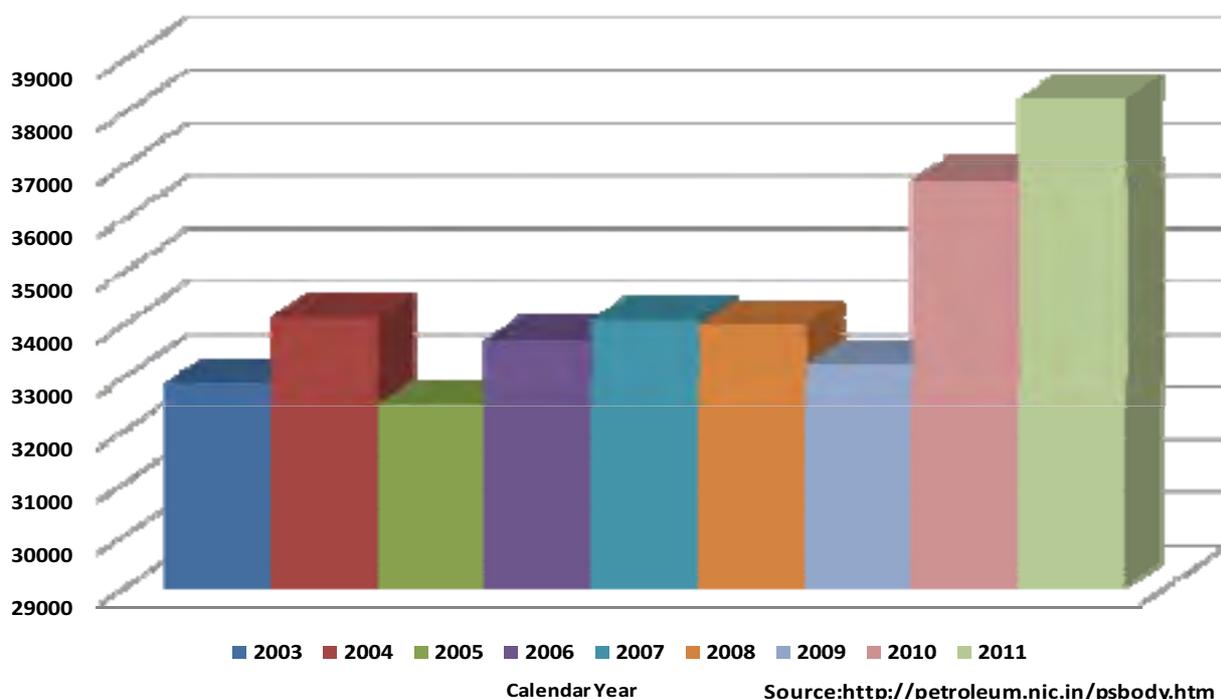
## OIL & GAS PRODUCTION TREND

### Gas Production Yearwise in MCM



Source : <http://petroleum.nic.in/psbody.htm>

### Oil Production Yearwise in '000 Tonnes



Source: <http://petroleum.nic.in/psbody.htm>

Note : Trends include Nomination and PSC regime

**Details of oil & gas discoveries under NELP / Pre-NELP as on 31.03.2012**

Sl. No.	Company Name	Block Name / Field	Round	OIL	GAS	TOTAL
1	RIL(48)	KG-DWN-98/3	NELP I	1	18	19
2		KG-OSN-2001/2	NELP III	2	-	2
3		KG-OSN-2001/1	NELP III	-	3	3
4		NEC-OSN-97/2	NELP I	-	8	8
5		GS-OSN-2000/1	NELP II	-	1	1
6		KG-DWN-98/1	NELP I	1	-	1
7		CY-DWN-2001/2	NELP III	1	-	1
8		KG-DWN-2003/1	NELP V	-	3	3
9		CB-ONN-2003/1	NELP V	8	-	8
10		CY-PR-DWN-2001/3	NELP-III	-	1	1
11		KG-DWN-2001/1	NELP-III	-	1	1
12	ONGC (27)	KG-DWN-98/2	NELP I	-	7	7
13		MN-DWN-98/3	NELP I	-	2	2
14		MN-OSN-2000/2	NELP II	-	2	2
15		CB-OSN-2003/1	NELP V	-	3	3
16		CB-ONN-2002/1	NELP IV	1	-	1
17		AA-ONN-2001/1	NELP III	-	1	1
18		CB-ONN-2001/1	NELP III	1	-	1
19		CB-ONN-2004/1	NELPVI	1	-	1
20		CB-ONN-2004/2	NELP VI	2	-	2
21		AN-DWN-2002/1	NELP IV	-	1	1
22		KG-OSN-2004/1	NELP VI	-	2	2
23		NEC-DWN-2002/1	NELP IV	-	1	1
24		AA-ONN-2001/2	NELP III	-	1	1
25		CB-ONN-2004/3	NELP VI	-	1	1
26		GS-OSN-2004/1	NELP VI	-	1	1
27	CEIL (5)	KG-DWN-98/2	NELP I	2	1	3
28		KG-ONN-2003/1	NELP V	2	-	2
29	NIKO (2)	CB-ONN-2000/2	NELP II	-	2	2
30	GSPC (22)	CB-ONN-2000/1	NELP II	3	-	3
31		KG-OSN-2001/3	NELP III	1	8	9
32		CB-ONN-2002/3	NELP IV	7	-	7
33		CB-ONN-2003/2	NELP-V	2	1	3
34	JUBILANT (5)	CB-ONN-2002/2	NELP IV	2	-	2
35		CY-ONN-2002/1	NELP IV	-	1	1
36		AA-ONN-2002/1	NELP IV	-	2	2
37	NAFTOGAZ (1)	CB-ONN-2004/5	NELP VI	1	-	1
<b>NELP Total</b>				<b>38</b>	<b>72</b>	<b>110</b>
1	CAIRN (22)	RJ-ON-90/1	Pre-NELP	12	3	15
2		CB-OS/2	Pre-NELP	3	2	5
3		Ravva	Pre-NELP	1	1	2
4	ESSAR OIL (5)	CB-ON/3	Pre-NELP	5	-	5
5	FOCUS (2)	RJ-ON/6	Pre-NELP	-	2	2
6	GSPC (3)	CB-ON/2	Pre-NELP	1	2	3
7	HARDY (1)	CY-OS/2	Pre-NELP	-	1	1
8	HOEC (2)	CB-ON/7	Pre-NELP	1	-	1
9		AAP-ON-94/1	Pre-NELP	-	1	1
10	ONGC (1)	CB-OS/1	Pre-NELP	1	-	1
11	RIL (1)	SR-OS-94/1	Pre-NELP	-	1	1
12	BGEPIL (1)	Panna-Mukta	Pre-NELP	1	-	1
13	Interlink (1)	Baola	Pre-NELP	1	-	1
<b>Pre-NELP/Field Total</b>				<b>26</b>	<b>13</b>	<b>39</b>

**Note:** The above status is indicative only and may not be a comprehensive list of all discoveries, as notified by the operators.

## EXTRACTS FROM XII<sup>TH</sup> FIVE YEAR PLAN (2012-2017)

### Extracts from “Report of Working Group on Petroleum & Natural Gas Sector for the 12<sup>th</sup> Five Year Plan (2012-17)

#### Energy Security

The Integrated Energy Policy of the Planning Commission defines Energy Security as, “We are energy secure when we can supply lifeline energy to all our citizens irrespective of their ability to pay for it as well as meet their effective demand for safe and convenient energy to satisfy their various needs at competitive prices, at all times and with a prescribed confidence level considering shocks and disruptions that can be reasonably expected”.

#### Energy Issues in India & Way Ahead

Energy security remains a concern for India as the country faces challenges in meeting its energy needs. The country depends on imports to meet more than 75% of its hydrocarbon energy requirements. The growth in domestic oil & gas production is not commensurate with the growing consumption of petroleum products in the fast developing economy like India.

In view of the above, a number of programmes are proposed to be taken up during the 12<sup>th</sup> Plan that would help to bridge the shortfall in availability of oil and gas in the country.

#### Hydrocarbon Reserve Position

The total prognosticated resources of the country have been estimated at about 28 billion tonnes. As on 1.4.2011, the balance recoverable reserve position of O+OEG is about 2041 million tonnes, which has increased by 10.5% from 1847 million tonnes as on 1.4.2007. The reserve position as on 1.4.2011 is given in Table 1.

**Table 1 Position of Hydrocarbon Reserves**

(Figs. in MMT)

	Initial In Place			Ultimate Reserves			Reserves*		
	Oil	Gas	O+OEG	Oil	Gas	O+OEG	Oil	Gas	O+OEG
ONGC	4960.66	2416.13	7376.79	1403.25	1191.67	2594.92	552.61	659.38	1211.99
OIL	776.09	317.06	1093.15	230.06	170.83	400.89	81.79	100.81	182.6
Pvt./JV	820.67	1208.70	2029.37	194.89	640.67	835.56	122.995	524.22	647.215
<b>Total</b>	<b>6557.42</b>	<b>3941.89</b>	<b>10499.31</b>	<b>1828.20</b>	<b>2003.17</b>	<b>3831.37</b>	<b>757.395</b>	<b>1284.41</b>	<b>2041.805</b>

\*Note: Reserves denote balance recoverable reserves of hydrocarbons

#### Exploration & Production

The major steps taken to bridge the growing gap in demand and supply in oil and the shortfall in supply of gas are: (i) offering of exploration blocks in Indian sedimentary basins through New Exploration Licensing Policy (NELP), (ii) development of alternate sources of hydrocarbon such as Coal Bed Methane (CBM) and Shale Gas, (iii) Research & Development for new sources such as Gas Hydrate and Underground Coal Gasification (UCG), and (iv) to carry out E&P operation in safe and environment friendly manner.

For the 12<sup>th</sup> Plan Period, it is proposed to accelerate the exploration activities in new non-producing areas of Indian sedimentary basins including frontier areas. The new generation rigs and better acquisition & processing techniques are likely to be adopted during 12<sup>th</sup> Plan period in the country. In the onland and offshore areas, the following exploration strategies have been identified:

- Intensive exploration in proven hydrocarbon basins.
- Extending exploration to new areas within producing basins to establish new plays.
- Substantial exploration activity is being carried out in frontier basins such as Vindhyan, Ganga Valley and Palar, Pennar, etc., which will add significant value to the nation in case of success.
- Major focus is on east coast India and more so in deep-waters. Exploration in deep targets deepwater frontiers.
- Acquiring regional datasets both vintage data from DGH and multi-client data for better geological understanding of portfolio.
- Acquiring deep imaging seismic data for enhanced understanding of crustal architecture of east coast basins.
- Covering the prospective area with 3D seismic before firming up drilling locations.
- Exploring for Liquids in deeper Mesozoic play of KG & Cauvery basins.
- New generation rigs deployed for better drilling efficiencies in deepwater, which is crucial for increasing commercial chance of success.
- Enhancement of oil production through various artificial lifting methods.
- Pressure maintenance schemes like, gas injection and water injection to restore or maintain the reservoir pressure.
- Development of tight sands is being evaluated as part of the step out region of Hazira block.
- Better processing techniques in 3D Seismic to preserve amplitudes.
- Enhanced thick bed evaluation techniques to increase reserves locked in these stratigraphic domains.
- Reserve characterization studies for better understanding of lithology and fluid distribution.

In addition, the major thrust areas during 12<sup>th</sup> plan period will be as under:

- Shale gas exploration
- NDR & Implementation of OALP
- Intensifying exploration in non producing basins
- Level playing field to E&P companies
- Faster development of hydrocarbon discoveries
- Optimize recovery from ageing oil & gas fields
- R&D efforts and feasibility to understand the potential of Oil Shale

**Table - Year-wise sales/consumption of Natural Gas during the 11<sup>th</sup> Plan**

(Fig. in BCM)

Product	2007-08	2008-09	2009-10	2010-11	2011-12 (P)
Natural Gas	94.0	117.7	147.7	179.0	194

Note: Figs. For 2011-12 are provisional

Source: GAIL

**Table - Crude oil production in 11<sup>th</sup> Plan**

(figs in MMT)

	X Plan	XI Plan	2007-08	2008-09	2009-10	2010-11	2011-12	XI Plan
	Actual	Proj.	Actual	Actual	Actual	Actual	Proj.	Likely
ONGC	129.0	140.06	25.94	25.37	24.67	24.42	23.74	124.14
OIL	15.49	18.99	3.10	3.47	3.57	3.59	3.76	17.49
Pvt./JV	22.08	47.71	5.09	4.67	5.26	9.68	10.69	35.40
<b>Total</b>	<b>166.57</b>	<b>206.76</b>	<b>34.13</b>	<b>33.51</b>	<b>33.51</b>	<b>37.69</b>	<b>38.19</b>	<b>177.02</b>

**Table - Natural gas production in 11<sup>th</sup> Plan**

(Fig. in BCM)

	X Plan	XI Plan	2007-08	2008-09	2009-10	2010-11	2011-12	XI Plan
	Actual	Proj.	Actual	Actual	Actual	Actual	Proj.	Likely
<b>ONGC</b>	115.81	112.39	22.33	22.49	23.11	23.10	23.46	114.48
<b>OIL</b>	10.17	16.43	2.34	2.27	2.42	2.35	2.63	12.01
<b>Pvt./Jv</b>	33.07	126.45	7.73	8.09	21.99	26.77	25.58	90.16
<b>Total</b>	<b>159.05</b>	<b>255.27</b>	<b>32.40</b>	<b>32.85</b>	<b>47.51</b>	<b>52.22</b>	<b>51.67</b>	<b>216.65</b>
<b>Total (MMSC MD)</b>	<b>87.1</b>	<b>139.9</b>	<b>88.8</b>	<b>90.0</b>	<b>130.2</b>	<b>143.1</b>	<b>141.6</b>	<b>118.7</b>

**Table - Exploration areas awarded under NELP**

Parameter	NELP-I	NELP-II	NELP-III	NELP-IV	NELP-V	NELP-VI	NELP-VII	NELP-VIII
Month/Year	April 2000	July 2011	Feb 2003	Feb 2004	Dec 2005	Mar 2007	Dec 2008	June 2010
Area Awarded (Sq. km)	228472	263050	204588	192810	113687	306331	112988	52603
% area*	7.3%	8.4%	6.5%	6.1%	3.6%	9.8%	3.6%	1.7%

\*Percentage area awarded in each round w.r.t total sedimentary area (3.14 million sq. km.)

The round –wise break-up in various rounds of awarded area under NELP is given in Table above.

During 12<sup>th</sup> Five Year Plan period, about 4 lakhs sq. km. exploration area (12.6% of Indian sedimentary basins) is planned to be brought under exploration. The offering of exploration area will be thorough competitive bidding process either through NELP or Open Acreages Licensing Policy (OALP) route. The annual break-up of exploration area likely to be offered during 12<sup>th</sup> Plan period is given in Table below.

**Table - Exploration areas to be offered in 12<sup>th</sup> Plan**

2012-13	2013-14	2014-15	2015-16	2016-17	Total
70,000	70,000	80,000	88,000	88,000	3,96,000

The offering of planned exploration area under the 12<sup>th</sup> Plan would depend on timely clearances to be given by other Ministries/Departments such as Defence, Home, Environment & Forests etc. In addition, about 5000 sq. km area is likely to be offered during 12<sup>th</sup> Plan period in consultation with Ministry of Coal for exploration and production of CBM gas. Government of India has already awarded about 70.5% area, out of 26000 sq. km. area available for the said purpose in the country.

**E& P program in 12<sup>th</sup> Plan**

Crude Oil and Gas Production :

**Table A- Projection of Crude oil production in 12<sup>th</sup> Plan**

(Figs. in MMT)

Company	2012-13	2013-14	2014-15	2015-16	2016-17	Total
ONGC	25.045	28.27	28.002	26.286	25.456	133.059
OIL	3.92	4.00	4.06	4.16	4.20	20.34
Pvt./JV	13.34	13.30	12.70	12.10	11.50	62.94
<b>Total</b>	<b>42.305</b>	<b>45.57</b>	<b>44.762</b>	<b>42.546</b>	<b>41.156</b>	<b>216.339</b>

**Table B- Projection of Natural Gas production in 12<sup>th</sup> Plan**

(Figs. in BCM)

Company	2012-13	2013-14	2014-15	2015-16	2016-17	Total
ONGC	24.9	25.5	26.7	28.2	38.7	143.9
OIL	3.1	3.8	4.0	4.1	4.2	19.2
Pvt./JV	15.0	14.5	16.5	18.5	21.0	85.5
<b>Total</b>	<b>43.0</b>	<b>43.8</b>	<b>47.2</b>	<b>50.8</b>	<b>63.9</b>	<b>248.6</b>
<b>Total MMSCMD</b>	<b>118</b>	<b>120</b>	<b>129</b>	<b>139</b>	<b>175</b>	<b>—</b>

The above projections of natural gas production in 12<sup>th</sup> plan are as revised vide MoPNG OM no Q-26012/3/2010-ED (Vol II) dated 4 May, 2012- "Revised Estimates of Domestic Natural Gas Production- 12<sup>th</sup> Plan"

**TABLE - SUMMARY OF 12TH FIVE YEAR PLAN**

ACTIVITY	UNIT	ONGC	OIL	Private/JV	Total
Seismic Surveys 2D	Kilometer	28170	6850	103954	<b>138974</b>
Seismic Surveys 3D	Sq. Km	24163	8364	49961	<b>82488</b>
Exploration Wells	Nos.	611	174	525	<b>1310</b>
Reserves Accretion IIH	MMTOE	1080	78.14	728	<b>1886.14</b>
Ultimate Hydrocarbon Reserves Accretion	MMTOE	360	26	341	<b>727</b>

# BP STATISTICAL REVIEW 2012

## OIL PROVED RESERVES

Thousand million barrels	1981 to 1991	1991 to 2001	2001 to 2011	2011 share of Total
US	385.4	300.2	300.2	1.9%
Canada	447.9	867.2	1782.5	10.6%
Mexico	599.3	379.0	133.6	0.7%
<b>Total North America</b>	<b>1432.6</b>	<b>1546.4</b>	<b>2216.2</b>	<b>13.2%</b>
Argentina	23.3	25.8	25.4	0.2%
Brazil	29.0	67.8	123.2	0.9%
Colombia	15.6	26.4	15.7	0.1%
Ecuador	13.7	38.6	53.7	0.4%
Peru	8.0	8.5	11.0	0.1%
Trinidad & Tobago	6.5	7.1	8.6	0.1%
Venezuela	507.0	714.1	1477.5	17.9%
Other S. & Cent. America	6.4	10.6	13.2	0.1%
<b>Total S. &amp; Cent. America</b>	<b>609.6</b>	<b>898.9</b>	<b>1728.3</b>	<b>19.7%</b>
Azerbaijan	NA	4.7	70.0	0.4%
Denmark	5.1	9.2	10.9	♦
Italy	7.0	7.8	9.7	0.1%
Kazakhstan	NA	21.6	191.4	1.8%
Norway	70.7	109.1	84.9	0.4%
Romania	14.6	10.9	5.2	♦
Russian Federation	NA	272.7	821.4	5.3%
Turkmenistan	NA	2.2	5.8	♦
United Kingdom	60.7	47.5	35.1	0.2%
Uzbekistan	NA	2.4	5.9	♦
Other Europe & Eurasia	693.8	388.9	22.1	0.1%
<b>Total Europe &amp; Eurasia</b>	<b>851.8</b>	<b>877.0</b>	<b>1262.4</b>	<b>8.5%</b>
Iran	843.4	944.3	1387.8	9.1%
Iraq	858.0	1077.0	1178.1	8.7%
Kuwait	961.3	965.0	1007.5	6.1%
Oman	43.1	53.6	55.6	0.3%
Qatar	43.2	89.9	266.3	1.5%
Saudi Arabia	2221.0	2618.2	2641.1	16.1%
Syria	20.1	25.2	26.3	0.2%
United Arab Emirates	750.1	979.2	978.0	5.9%
Yemen	10.1	20.3	27.8	0.2%
Other Middle East	1.6	1.3	2.1	♦
<b>Total Middle East</b>	<b>5751.8</b>	<b>6774.0</b>	<b>7570.5</b>	<b>48.1%</b>
Algeria	98.8	105.6	120.5	0.7%
Angola	19.0	38.5	112.3	0.8%
Chad	NA	1.8	13.2	0.1%
Rep. of Congo (Brazzaville)	8.1	14.0	18.6	0.1%
Egypt	43.8	37.0	39.6	0.3%
Equatorial Guinea	0.3	5.6	16.2	0.1%
Gabon	8.0	19.7	29.1	0.2%
Libya	246.1	287.9	425.7	2.9%
Nigeria	184.2	237.5	364.9	2.3%
Sudan	3.3	3.6	59.9	0.4%
Tunisia	20.3	3.8	5.4	♦
Other Africa	9.4	6.7	9.3	0.1%
<b>Total Africa</b>	<b>641.2</b>	<b>761.6</b>	<b>1214.7</b>	<b>8.0%</b>
Australia	31.5	41.4	38.9	0.2%
Brunei	15.1	11.6	11.0	0.1%
China	174.3	160.8	152.4	0.9%
<b>India</b>	<b>47.7</b>	<b>55.4</b>	<b>57.1</b>	<b>0.3%</b>
Indonesia	93.9	50.8	42.6	0.2%
Malaysia	35.0	49.1	53.7	0.4%
Thailand	0.8	3.3	4.9	♦
Vietnam	0.6	12.3	36.7	0.3%
Other Asia Pacific	10.9	12.0	13.0	0.1%
<b>Total Asia Pacific</b>	<b>410.3</b>	<b>396.7</b>	<b>410.3</b>	<b>2.5%</b>
<b>Total World</b>	<b>9697.3</b>	<b>11254.5</b>	<b>14402.5</b>	<b>100.0%</b>

Note : ♦ indicate Less than 0.05%

## OIL PRODUCTION

Million tonnes	1971 to 1981	1981 to 1991	1991 to 2001	2001 to 2011	2011 share of Total
US	5370.67792	4635.762845	3765.733742	3273.474886	8.8%
Canada	909.128358	872.3437442	1153.31024	1531.023893	4.3%
Mexico	629.3101268	1455.961851	1629.890357	1698.396835	3.6%
<b>Total North America</b>	<b>6909.116405</b>	<b>6964.06844</b>	<b>6548.934338</b>	<b>6502.895615</b>	<b>16.8%</b>
Argentina	247.7628621	245.2485172	384.0967931	356.6205491	0.8%
Brazil	103.141267	278.011802	479.6875714	951.3052394	2.9%
Colombia	93.01694979	158.1129701	324.4071226	333.9909234	1.2%
Ecuador	98.48967631	142.1823712	204.4572759	265.1945236	0.7%
Peru	65.58654656	83.66203333	60.04612473	56.57295214	0.2%
Trinidad & Tobago	105.3175034	79.08700753	65.78319609	69.9919217	0.1%
Venezuela	1554.479054	1048.147964	1576.420412	1469.238624	3.5%
Other S. & Cent. America	38.826622	40.18301239	52.48236617	71.33640365	0.2%
<b>Total S. &amp; Cent. America</b>	<b>2306.620482</b>	<b>2074.635678</b>	<b>3147.380862</b>	<b>3574.251137</b>	<b>9.5%</b>
Azerbaijan	0	91.3637	112.6469	336.0741	1.1%
Denmark	2.97423231	40.076502	116.175968	155.2976372	0.3%
Italy	14.946	33.595	50.023	54.53191	0.1%
Kazakhstan	0	172.77	269.969	672.564186	2.1%
Norway	128.2688973	532.8180011	1420.389398	1260.699284	2.3%
Romania	154.066	102.801	66.74	50.571	0.1%
Russian Federation	0	3771.809	3272.783	4700.873757	12.8%
Turkmenistan	0	42.38	56.178	99.19440001	0.3%
United Kingdom	355.136	1111.307	1221.477	810.3502031	1.3%
Uzbekistan	0	18.25	66.871	53.169308	0.1%
Other Europe & Eurasia	5862.452	2161.232	260.0007	215.1975006	0.5%
<b>Total Europe &amp; Eurasia</b>	<b>6517.84313</b>	<b>8078.402203</b>	<b>6913.253966</b>	<b>8408.523286</b>	<b>21.0%</b>
Iran	2498.656846	1273.603214	1853.309116	2034.18059	5.2%
Iraq	1173.557178	838.5918192	670.1963914	1061.349739	3.4%
Kuwait	1314.466941	512.8674199	998.5028442	1251.975368	3.5%
Oman	169.9750168	270.9912165	430.5791016	386.4707642	1.1%
Qatar	261.1177265	176.0948986	288.6104655	529.3112403	1.8%
Saudi Arabia	4552.24388	2763.85294	4419.403175	4910.481519	13.2%
Syria	85.06562074	127.2211078	282.8333492	218.1602207	0.4%
United Arab Emirates	874.754387	794.9988907	1186.981311	1340.653652	3.8%
Yemen	0	36.52228047	166.3178388	170.3891672	0.3%
Other Middle East	33.6521241	24.28295749	23.33822429	18.41302848	0.1%
<b>Total Middle East</b>	<b>10963.48972</b>	<b>6819.026745</b>	<b>10320.07182</b>	<b>11921.38529</b>	<b>32.6%</b>
Algeria	549.717	519.999	604.189	805.8513556	1.9%
Angola	80.166	161.014	328.524	722.8591191	2.1%
Chad	0	0	0	60.01438849	0.1%
Rep. of Congo (Brazzaville)	22.871	65.231	111.4661623	130.321601	0.4%
Egypt	204.11	423.703	435.937	350.852209	0.9%
Equatorial Guinea	0	0	27.10515604	152.5070967	0.3%
Gabon	100.748	96.361	165.935	121.3596785	0.3%
Libya	1024.495803	543.5809615	683.0812841	725.0707167	0.6%
Nigeria	1050.830364	753.3569051	1033.596652	1132.87337	2.9%
Sudan	0	0	23.9634278	186.4967611	0.6%
Tunisia	50.24	51.482	41.605	37.04959196	0.1%
Other Africa	16.74921429	100.339189	80.01433669	79.16440405	0.3%
<b>Total Africa</b>	<b>3100.079382</b>	<b>2715.067056</b>	<b>3535.417019</b>	<b>4504.420292</b>	<b>10.4%</b>
Australia	228.8729072	268.857076	296.4748694	256.6309833	0.5%
Brunei	112.1856431	79.02227193	86.11913787	94.44718604	0.2%
China	878.77	1266.52	1547.67	1849.5284	5.1%
<b>India</b>	<b>104.857</b>	<b>299.025</b>	<b>334.032</b>	<b>364.3867</b>	<b>1.0%</b>
Indonesia	784.3597123	713.0530824	741.5492921	516.0304282	1.1%
Malaysia	86.7815445	237.0489092	323.1965503	316.8275474	0.7%
Thailand	0.066961494	17.60246124	48.46597349	116.6630156	0.3%
Vietnam	0	9.12	105.474	172.2385038	0.4%
Other Asia Pacific	32.41662407	55.30421873	104.4445673	122.8779893	0.3%
<b>Total Asia Pacific</b>	<b>2228.310393</b>	<b>2945.55302</b>	<b>3587.426391</b>	<b>3809.630754</b>	<b>9.7%</b>
<b>Total World</b>	<b>32025.45951</b>	<b>29596.75314</b>	<b>34052.48439</b>	<b>38721.10637</b>	<b>100.0%</b>

## NATURAL GAS : PROVED RESERVES

Trillion Cubic Metres	1981 to 1991	1991 to 2001	2001 to 2011	2011 share of Total
US	57.89850044	47.6415143	65.92915106	4.1%
Canada	29.63800001	19.32600009	17.02317214	1.0%
Mexico	23.22500014	14.76000011	3.844281673	0.2%
<b>Total North America</b>	<b>110.7615006</b>	<b>81.72751451</b>	<b>86.79660487</b>	<b>5.2%</b>
Argentina	7.479000032	6.496000051	4.621417552	0.2%
Bolivia	1.458999984	2.817000009	6.509000003	0.1%
Brazil	1.040159997	1.826032415	3.39726083	0.2%
Colombia	1.217	1.880999967	1.26605244	0.1%
Peru	1.893999996	2.585999981	3.204772025	0.2%
Trinidad & Tobago	3.300999999	4.369000018	4.769766748	0.2%
Venezuela	26.11925006	40.22035003	47.59497023	2.7%
Other S. & Cent. America	1.732631067	1.450349502	0.745780359	♦
<b>Total S. &amp; Cent. America</b>	<b>44.24204113</b>	<b>61.64573197</b>	<b>72.10902018</b>	<b>3.6%</b>
Azerbaijan	0	5.318959355	12.50539637	0.6%
Denmark	0.984000012	1.254999995	0.925000001	♦
Germany	2.767799988	1.978199989	1.228331998	♦
Italy	2.764666662	2.378749996	0.996259458	♦
Kazakhstan	0	8.945086122	18.58023524	0.9%
Netherlands	18.75173342	16.16351128	12.30608881	0.5%
Norway	10.16489998	13.95359993	22.30999994	1.0%
Poland	1.453000009	1.446000017	1.134999983	0.1%
Romania	2.562000014	3.871000022	4.722092032	0.1%
Russian Federation	0	214.3891373	435.7456894	21.4%
Turkmenistan	0	12.88745713	69.35033369	11.7%
Ukraine	0	4.986425459	9.791067481	0.4%
United Kingdom	6.895000041	8.442000031	4.916999996	0.1%
Uzbekistan	0	8.099547625	16.61184978	0.8%
Other Europe & Eurasia	428.5175362	262.6064178	4.047468294	0.1%
<b>Total Europe &amp; Eurasia</b>	<b>474.8606363</b>	<b>566.721092</b>	<b>615.1718125</b>	<b>37.8%</b>
Bahrain	2.212999985	1.390000001	1.445280328	0.2%
Iran	166.0809994	228.7140026	289.7200012	15.9%
Iraq	17.88237017	31.91399956	32.13923264	1.7%
Kuwait	13.37530005	15.03728318	16.97300029	0.9%
Oman	2.19500003	5.421000019	9.68599999	0.5%
Qatar	47.25899982	108.6360002	253.9114838	12.0%
Saudi Arabia	46.50943017	57.84795952	73.01071882	3.9%
Syria	1.444000013	2.331	2.818999976	0.1%
United Arab Emirates	48.63420057	60.11600018	61.5367527	2.9%
Yemen	1.125000004	4.585999995	4.836478442	0.2%
Other Middle East	0.092000001	0.155000004	0.894902857	0.1%
<b>Total Middle East</b>	<b>346.8173002</b>	<b>516.1482452</b>	<b>746.972851</b>	<b>38.4%</b>
Algeria	37.44499969	39.4230001	45.14140081	2.2%
Egypt	3.028000005	9.315999985	20.00380003	1.1%
Libya	9.229000032	13.0940001	14.84000003	0.7%
Nigeria	22.95199037	37.04420018	51.73599958	2.5%
Other Africa	7.228000026	8.686000051	11.60183396	0.6%
<b>Total Africa</b>	<b>79.88199012</b>	<b>107.5632004</b>	<b>143.3230344</b>	<b>7.0%</b>
Australia	8.960899949	16.25600016	28.72540665	1.8%
Bangladesh	4.901000023	3.036000013	3.773999989	0.2%
Brunei	3.164000005	3.869000047	3.271237522	0.1%
China	9.898099899	14.20809996	20.63562715	1.5%
<b>India</b>	<b>6.060000002</b>	<b>7.010160029</b>	<b>10.35345984</b>	<b>0.6%</b>
Indonesia	21.14309031	21.69799984	28.14959359	1.4%
Malaysia	16.44199991	22.32600009	24.43903899	1.2%
Myanmar	2.676999986	2.851000011	4.025633186	0.1%
Pakistan	6.558999985	6.396000087	8.146727026	0.4%
Papua New Guinea	1.145000016	4.407999992	4.34967801	0.2%
Thailand	2.629999995	2.666999981	3.398568749	0.1%
Vietnam	0.029999999	1.537000015	4.060758308	0.3%
Other Asia Pacific	2.801999997	3.692000005	3.974298284	0.2%
<b>Total Asia Pacific</b>	<b>86.41209008</b>	<b>109.9542602</b>	<b>147.3040273</b>	<b>8.0%</b>
<b>Total World</b>	<b>1142.975558</b>	<b>1443.760044</b>	<b>1811.67735</b>	<b>100.0%</b>

Note : ♦ indicate Less than 0.05%

## NATURAL GAS PRODUCTION

Billion Cubic Feet Per Day	1971 to 1981	1981 to 1991	1991 to 2001	2001 to 2011	2011 share of Total
US	661.3558947	466.6869998	514.0070724	540.9550046	20.0%
Canada	84.31129862	87.2442087	157.3573618	171.6808729	4.9%
Mexico	18.62029708	26.48162329	32.33597671	47.84594625	1.6%
<b>Total North America</b>	<b>764.2874904</b>	<b>580.4128318</b>	<b>703.7004109</b>	<b>760.4818237</b>	<b>26.5%</b>
Argentina	8.456180535	15.05411799	27.44615439	40.89428306	1.2%
Bolivia	1.795412408	2.618664274	3.002466162	11.19939299	0.5%
Brazil	0.394190551	2.563016319	5.608232184	11.64025372	0.5%
Colombia	2.409772572	3.87997821	4.925017117	7.894466308	0.3%
Peru	0.441062749	0.41538104	0	3.174247468	0.3%
Trinidad & Tobago	2.358105593	4.422492446	9.205209957	32.98757451	1.2%
Venezuela	12.77484145	18.00990481	26.58092885	28.09570509	0.9%
Other S. & Cent. America	0.996927009	1.287374489	2.627747348	3.250739828	0.1%
<b>Total S. &amp; Cent. America</b>	<b>30.03522429</b>	<b>48.37950289</b>	<b>79.76042952</b>	<b>139.1794491</b>	<b>5.1%</b>
Azerbaijan	0	7.148082271	5.494019442	9.126465565	0.5%
Denmark	0	1.740609179	6.275207461	8.669487521	0.2%
Germany	20.55905943	16.49000733	15.88988218	13.78936143	0.3%
Italy	14.93861545	13.61358977	16.32329423	9.587215695	0.2%
Kazakhstan	0	4.05752852	5.988281605	14.65519967	0.6%
Netherlands	75.98565084	60.93197227	64.29049113	61.4506097	2.0%
Norway	8.465554425	25.28997382	36.92614614	86.08077302	3.1%
Poland	6.32933677	3.787308172	3.395279026	4.048351898	0.1%
Romania	35.49221858	31.77618534	16.11350646	11.55038295	0.3%
Russian Federation	0	350.9627793	522.6477093	557.5826059	18.5%
Turkmenistan	0	53.06491504	33.26454931	52.388915	1.8%
Ukraine	0	20.47050657	16.26683112	17.7444224	0.6%
United Kingdom	35.15584856	39.80839959	79.36853274	74.91228735	1.4%
Uzbekistan	0	24.21552076	44.44421933	54.58940052	1.7%
Other Europe & Eurasia	349.3771278	159.0898656	13.32945324	10.19367198	0.3%
<b>Total Europe &amp; Eurasia</b>	<b>546.3034118</b>	<b>812.4696503</b>	<b>880.0174027</b>	<b>986.3691506</b>	<b>31.6%</b>
Bahrain	2.207797175	4.603356176	7.54371605	11.03859068	0.4%
Iran	18.27773946	16.30361572	42.32249891	107.420457	4.6%
Iraq	1.30928896	2.43555914	2.850941942	1.495901504	0.1%
Kuwait	4.192648276	4.446360119	7.743325798	11.39092824	0.4%
Oman	0.196548856	1.878279133	5.337602498	21.27207495	0.8%
Qatar	2.469869562	5.713128499	17.06843102	66.68827311	4.5%
Saudi Arabia	5.030606874	23.24109953	43.52876202	72.27236477	3.0%
Syria	0	0.533850863	3.492816355	6.018126333	0.3%
United Arab Emirates	4.154666899	15.07234764	32.12881677	46.77415148	1.6%
Yemen	0	0	0	1.592110875	0.3%
Other Middle East	0	0	0	2.292935592	0.1%
<b>Total Middle East</b>	<b>37.96708913</b>	<b>74.50584954</b>	<b>162.2572197</b>	<b>348.3065878</b>	<b>16.0%</b>
Algeria	9.959275268	37.6010104	65.851045	79.92103818	2.4%
Egypt	0.626379914	5.659064294	14.46347834	47.14543391	1.9%
Libya	4.572057594	4.906797746	6.021672045	10.82414099	0.1%
Nigeria	0.779319064	3.181451595	6.530182506	26.9127777	1.2%
Other Africa	0.288336107	1.043889028	4.381845502	12.12182276	0.6%
<b>Total Africa</b>	<b>16.76143218</b>	<b>52.39221306</b>	<b>97.2482234</b>	<b>176.9252135</b>	<b>6.2%</b>
Australia	7.730700684	15.08222938	28.06025727	37.53365274	1.4%
Bangladesh	0.856969554	3.44204949	7.521618649	15.12870043	0.6%
Brunei	5.918865905	8.448466183	10.65831649	11.75163157	0.4%
China	10.7588965	13.27193483	20.96738758	62.77914855	3.1%
<b>India</b>	<b>1.39684316</b>	<b>6.920583557</b>	<b>20.35721993</b>	<b>33.08479901</b>	<b>1.4%</b>
Indonesia	7.727373091	33.31969063	59.75006588	69.76723034	2.3%
Malaysia	0	11.55204024	33.49861305	57.64948301	1.9%
Myanmar	0	0.798731539	2.129905832	11.11766058	0.4%
Pakistan	5.637659493	9.828800967	16.9026168	34.0982734	1.2%
Thailand	0	4.246335354	14.15	26.241	1.1%
Vietnam	0	0	0.612127866	6.082663076	0.3%
Other Asia Pacific	8.392872239	8.612260091	8.050549622	14.32460536	0.6%
<b>Total Asia Pacific</b>	<b>48.82503287</b>	<b>115.6306027</b>	<b>222.7690605</b>	<b>379.5588481</b>	<b>14.6%</b>
<b>Total World</b>	<b>1444.179681</b>	<b>1683.79065</b>	<b>2145.752747</b>	<b>2790.821073</b>	<b>100.0%</b>

# GLOSSARY OF COMMON OILFIELD TERMS

**source:** <http://www.glossary.oilfield.slb.com/Search.cfm>

## **2D seismic data**

A vertical section of seismic data consisting of numerous adjacent traces acquired sequentially.

## **3D seismic data**

A set of numerous closely-spaced seismic lines that provide a high spatially sampled measure of subsurface reflectivity. The original seismic lines are called in-lines. Lines displayed perpendicular to in-lines are called crosslines.

## **4D seismic data**

Three-dimensional (3D) seismic data acquired at different times over the same area to assess changes in a producing hydrocarbon reservoir with time. Changes may be observed in fluid location and saturation, pressure and temperature. 4D seismic data is one of several forms of time-lapse seismic data. Such data can be acquired on the surface or in a borehole

## **Approval For Expenditure (AFE)**

A budgetary document, usually prepared by the operator, to list estimated expenses of drilling a well to a specified depth, casing point or geological objective, and then either completing or abandoning the well.

## **Absolute permeability**

The measurement of the permeability, or ability to flow or transmit fluids through a rock, conducted when a single fluid, or phase, is present in the rock. The symbol most commonly used for permeability is  $k$ , which is measured in units of darcies or millidarcies.

## **Acoustic impedance**

The product of density and seismic velocity, which varies among different rock layers, commonly symbolized by  $Z$ . The difference in acoustic impedance between rock layers affects the reflection coefficient.

## **Aeromagnetic survey**

Measurements of the Earth's magnetic field gathered from aircraft. Magnetometers towed by an airplane or helicopter can measure the intensity of the Earth's magnetic field. The differences between actual measurements and theoretical values indicate anomalies in the magnetic field, which in turn represent changes in rock type or in thickness of rock units.

## **Alkaline-Surfactant-Polymer flooding**

A chemical enhanced oil recovery flood that uses two sources of surfactant and a polymer. Alkaline chemicals such as sodium carbonate react with acidic oil components in situ to create petroleum soap, which is one of the surfactants.

## **API gravity**

A specific gravity scale developed by the American Petroleum Institute (API) for measuring the relative density of various petroleum liquids, expressed in degrees. API gravity is graduated in degrees on a hydrometer instrument and was designed so that most values would fall between 10° and 70° API gravity. The arbitrary formula used to obtain this effect is:  $\text{API gravity} = (141.5/\text{SG at } 60^\circ\text{F}) - 131.5$ , where SG is the specific gravity of the fluid.

**Air drilling**

A drilling technique whereby gases (typically compressed air or nitrogen) are used to cool the drill bit and lift cuttings out of the wellbore, instead of the more conventional use of liquids.

**Appraisal**

The phase of petroleum operations that immediately follows successful exploratory drilling. During appraisal, delineation wells might be drilled to determine the size of the oil or gas field and how to develop it most efficiently.

**Asthenosphere**

The relatively plastic layer of the upper mantle of the Earth on which the tectonic plates of the lithosphere move. The asthenosphere is approximately 200 km thick warm but not molten.

**Attribute**

A measurable property of seismic data, such as amplitude, dip, frequency, phase and polarity. Attributes can be measured at one instant in time or over a time window, and may be measured on a single trace, on a set of traces or on a surface interpreted from seismic data. Attribute analysis includes assessment of various reservoir parameters, including a hydrocarbon indicator, by techniques such as amplitude variation with offset (AVO) analysis.

**Bottom Hole Assembly (BHA)**

The lower portion of the drill string, consisting of (from the bottom up in a vertical well) the bit, bit sub, a mud motor (in certain cases), stabilizers, drill collar, heavy-weight drill pipe, jarring devices (“jars”) and crossovers for various thread forms. The bottom hole assembly must provide force for the bit to break the rock (weight on bit), survive a hostile mechanical environment and provide the driller with directional control of the well.

**Bright spot**

A seismic amplitude anomaly or high amplitude that can indicate the presence of hydrocarbons. Bright spots result from large changes in acoustic impedance and tuning effect, such as when a gas sand underlies a shale, but can also be caused by phenomena other than the presence of hydrocarbons, such as a change in lithology.

**British thermal unit**

A measure of heat energy required to raise the temperature of one pound of water by one degree Fahrenheit. British thermal unit is abbreviated as BTU.

**BBL or bbl**

An abbreviation for oilfield barrel, a volume of 42 US gallons [0.16 m<sup>3</sup>].

**Bubble point**

The pressure and temperature conditions at which the first bubble of gas comes out of solution in oil. At discovery, all petroleum reservoir oils contain some natural gas in solution.

**Christmas tree**

The set of valves, spools and fittings connected to the top of a well to direct and control the flow of formation fluids from the well.

**Condensate**

A low-density, high-API gravity liquid hydrocarbon phase that generally occurs in association with natural gas. Its presence as a liquid phase depends on temperature and pressure conditions in the reservoir allowing condensation of liquid from vapour.

**Core**

A cylindrical sample of geologic formation, usually reservoir rock, taken during or after drilling a well. Cores can be full-diameter cores (that is, they are nearly as large in diameter as the drill bit) taken at the time of drilling the zone, or sidewall cores (generally less than 1 in. [2.5 cm] in diameter) taken after a hole has been drilled.

**Dean-Stark Extraction**

A method for the measurement of fluid saturations in a core sample by distillation extraction. The water in the sample is vaporized by boiling solvent, then condensed and collected in a calibrated trap. This gives the volume of water in the sample. The solvent is also condensed, then flows back over the sample and extracts the oil.

**Depositional System**

The three-dimensional array of sediments or lithofacies that fills a basin. Depositional systems vary according to the types of sediments available for deposition as well as the depositional processes and environments in which they are deposited. The dominant depositional systems are alluvial, fluvial, deltaic, marine, lacustrine and eolian systems.

**Diagenesis**

The physical, chemical or biological alteration of sediments into sedimentary rock at relatively low temperatures and pressures that can result in changes to the rock’s original mineralogy and texture.

**Draw Down**

The difference between the average reservoir pressure and the flowing bottom hole pressure

**Drill Stem Test**

Well tests conducted with the drill string still in the hole. Often referred to as DST, these tests are usually conducted with a down hole shut-in tool that allows the well to be opened and closed at the bottom of the hole with a surface-actuated valve. One or more pressure gauges are customarily mounted into the DST tool and are read and interpreted after the test is completed. The tool includes a surface-actuated packer that can isolate the formation from the annulus between the drill string and the casing, thereby forcing any produced fluids to enter only the drill string.

**Enhanced Oil Recovery**

An oil recovery enhancement method using sophisticated techniques that alter the original properties of oil. Once ranked as a third stage of oil recovery that was carried out after secondary recovery, the techniques employed during enhanced oil recovery can actually be initiated at any time during the productive life of an oil reservoir. Its purpose is not only to restore formation pressure, but also to improve oil displacement or fluid flow in the reservoir.

The three major types of enhanced oil recovery operations are chemical flooding (alkaline flooding or micellar-polymer flooding), miscible displacement (carbon dioxide [CO<sub>2</sub>] injection or hydrocarbon injection), and thermal recovery (steam-flood or in-situ combustion). The optimal application of each type depends on reservoir temperature, pressure, depth, net pay, permeability, residual oil and water saturations, porosity and fluid properties such as oil API gravity and viscosity.

**Estimated ultimate recovery**

The amount of oil and gas expected to be economically recovered from a reservoir or field by the end of its producing life. Estimated ultimate recovery can be referenced to a well, a field, or a basin.

**Facies modelling**

The act of modelling a reservoir using knowledge of the facies that make up the reservoir and the depositional environments that the facies represent. The depositional characteristics will suggest rules concerning the geometries of the facies and the possible relationships between facies, especially where the facies have been related to each other within a stratigraphic sequence or a cyclothem.

**Formation factor**

The ratio of the resistivity of a rock filled with water ( $R_o$ ) to the resistivity of that water ( $R_w$ ). G.E. Archie postulated that the formation factor ( $F$ ) was a constant independent of  $R_w$  and solely a function of pore geometry (the Archie equation I). It has since been shown that  $F$  is independent of  $R_w$  only for a certain class of petrophysically simple rocks (Archie rocks).

$F$  has been related to porosity ( $\phi$ ) by several formulae (Archie, Humble and others) that have the general expression  $F = a / \phi^m$ , where  $a$  is a constant and  $m$  the porosity

**Fishing**

The application of tools, equipment and techniques for the removal of junk, debris or fish from a wellbore.

**Gamma ray log**

A common and inexpensive measurement of the natural emission of gamma rays by a formation. Gamma ray logs are particularly helpful because shales and sandstones typically have different gamma ray signatures that can be correlated readily between wells.

**Gas lift**

An artificial-lift method in which gas is injected into the production tubing to reduce the hydrostatic pressure of the fluid column. The resulting reduction in bottomhole pressure allows the reservoir liquids to enter the wellbore at a higher flow rate.

**Gathering system**

The flowline network and process facilities that transport and control the flow of oil or gas from the wells to a main storage facility, processing plant or shipping point. A gathering system includes pumps, headers, separators, emulsion treaters, tanks, regulators, compressors, dehydrators, valves and associated equipment.

**Geochemistry**

The study of the chemistry of the Earth and within solid bodies of the solar system, including the distribution, circulation and abundance of elements (and their ions and isotopes), molecules, minerals, rocks and fluids.

**Geophysical migration**

A step in seismic processing in which reflections in seismic data are moved to their correct locations in the x-y-time space of seismic data, including two-way traveltimes and position relative to shotpoints.

**Gravel pack**

A sand-control method used to prevent production of formation sand. In gravel pack operations, a steel screen is placed in the wellbore and the surrounding annulus packed with prepared gravel of a specific size designed to prevent the passage of formation sand. The primary objective is to stabilize the formation while causing minimal impairment to well productivity.

**Horizontal drilling**

A subset of the more general term “directional drilling,” used where the departure of the wellbore from vertical exceeds about 80 degrees. Because a horizontal well typically penetrates a greater length of the reservoir, it can offer significant production improvement over a vertical well.

**High Pressure High Temperature (HPHT)**

Pertaining to wells that are hotter or higher pressure than most. The term came into use upon the release of the Cullen report on the Piper Alpha platform disaster in the UK sector of the North Sea, along with the contemporaneous loss of the Ocean Odyssey semisubmersible drilling vessel in Scottish jurisdictional waters. In the UK, HPHT is formally defined as a well having an undisturbed bottom hole temperature of greater than 300oF [149oC] and a pore pressure of at least 0.8 psi/ft (~15.3 lbm/gal) or requiring a BOP with a rating in excess of 10,000 psi [68.95 MPa]. Although the term was coined relatively recently, wells meeting the definition have been safely drilled and completed around the world for decades.

**Hydrate**

An unusual occurrence of hydrocarbon in which molecules of natural gas, typically methane, are trapped in ice molecules. More generally, hydrates are compounds in which gas molecules are trapped within a crystal structure. Hydrates form in cold climates, such as permafrost zones and in deep water. To date, economic liberation of hydrocarbon gases from hydrates has not occurred, but hydrates contain quantities of hydrocarbons that could be of great economic significance. Hydrates can affect seismic data by creating a reflection or multiple.

**Hydraulic fracturing**

A stimulation treatment routinely performed on oil and gas wells in low-permeability reservoirs. Specially engineered fluids are pumped at high pressure and rate into the reservoir interval to be treated, causing a vertical fracture to open.

**Improved Oil Recovery**

A method for recovering additional oil beyond fluid expansion, rock compressibility, gravitational drainage, pressure decline and natural water-drive or gas-drive.

**Inflow Performance Relationship**

A mathematical tool used in production engineering to assess well performance by plotting the well production rate against the flowing bottom hole pressure (BHP). The data required to create the IPR are obtained by measuring the production rates under various drawdown pressures.

**Inversion**

A mathematical process by which data are used to generate a model that is consistent with the data, the process of solving the inverse problem. In seismology, surface seismic data, vertical seismic profiles and well log data can be used to perform inversion, the result of which is a model of Earth layers and their thickness, density and P- and S-wave velocities.

**Jackup rig**

A self-contained combination drilling rig and floating barge, fitted with long support legs that can be raised or lowered independently of each other. The jackup, as it is known informally, is towed onto location with its legs up and the barge section floating on the water. Upon arrival at the drilling location, the legs are jacked down onto the seafloor, preloaded to securely drive them into the sea bottom, and then all three legs are jacked further down. Since the legs have been preloaded and will not penetrate the seafloor further, this jacking down of the legs has the effect of raising the jacking mechanism, which is attached to the barge and drilling package. In this manner, the entire barge and drilling structure are

slowly raised above the water to a predetermined height above the water, so that wave, tidal and current loading acts only on the relatively small legs and not the bulky barge and drilling package.

**Leak-off test**

A test to determine the strength or fracture pressure of the open formation, usually conducted immediately after drilling below a new casing shoe. During the test, the well is shut in and fluid is pumped into the wellbore to gradually increase the pressure that the formation experiences. At some pressure, fluid will enter the formation, or leak off, either moving through permeable paths in the rock or by creating a space by fracturing the rock. The results of the leak-off test dictate the maximum pressure or mud weight that may be applied to the well during drilling operations. To maintain a small safety factor to permit safe well control operations, the maximum operating pressure is usually slightly below the leak-off test result.

**Light crude oil**

Crude oil that has a high API gravity, usually more than 40°.

**Limestone**

A carbonate sedimentary rock predominantly composed of calcite of organic, chemical or detrital origin. Minor amounts of dolomite, chert and clay are common in limestones. Chalk is a form of fine-grained limestone.

**Lithosphere**

The brittle outer layer of the Earth that includes the crust and uppermost mantle. It is made up of six major and several minor tectonic plates that move around on the softer asthenosphere.

**Logging while drilling**

The measurement of formation properties during the excavation of the hole, or shortly thereafter, through the use of tools integrated into the bottom hole assembly.

Timely LWD data can also be used to guide well placement so that the wellbore remains within the zone of interest or in the most productive portion of a reservoir, such as in highly variable shale reservoirs.

**Material Safety Data Sheet**

A specific document that shows important physical and chemical characteristics of a chemical or product to alert a user, transporter or other interested party to potential safety hazards that may be associated with the material.

**Matrix stimulation**

A treatment designed to treat the near-wellbore reservoir formation rather than other areas of the production conduit, such as the casing across the production interval, production tubulars or the perforations. Matrix stimulation treatments include acid, solvent and chemical treatments to improve the permeability of the near-wellbore formation, enhancing the productivity of a well.

**Measurements-while-drilling**

The evaluation of physical properties, usually including pressure, temperature and wellbore trajectory in three-dimensional space, while extending a wellbore. MWD is now standard practice in offshore directional wells, where the tool cost is offset by rig time and wellbore stability considerations if other tools are used.

**Newtonian fluid**

A fluid that has a constant viscosity at all shear rates at a constant temperature and pressure, and can be described by a one-parameter rheological model.

### **NODAL analysis**

An analytical tool used in forecasting the performance of the various elements comprising the completion and production system. NODAL analysis is used to optimize the completion design to suit the reservoir deliverability, identify restrictions or limits present in the production system and identify any means of improving production efficiency. NODAL (production system analysis) is a mark of Schlumberger.

### **Numerical reservoir simulation**

The mathematical simulation of a numerical model of a reservoir's petro-physical characteristics to analyze and predict fluid behaviour in the reservoir over time.

### **Open-flow potential**

The calculated maximum flow rate that a system may provide in the absence of restrictions. The term may be qualified as relating to a specific zone, such as a perforated interval or be used in referring to the production capability of the well.

### **Open-hole completion**

A well completion that has no casing or liner set across the reservoir formation, allowing the produced fluids to flow directly into the wellbore.

### **Perforation**

The communication tunnel created from the casing or liner into the reservoir formation, through which oil or gas is produced.

### **Permeability**

The ability, or measurement of a rock's ability, to transmit fluids, typically measured in darcies or millidarcies. Absolute permeability is the measurement of the permeability conducted when a single fluid, or phase, is present in the rock. Effective permeability is the ability to preferentially flow or transmit a particular fluid through a rock when other immiscible fluids are present in the reservoir (for example, effective permeability of gas in a gas-water reservoir). The relative saturations of the fluids as well as the nature of the reservoir affect the effective permeability. Relative permeability is the ratio of effective permeability of a particular fluid at a particular saturation to absolute permeability of that fluid at total saturation. If a single fluid is present in a rock, its relative permeability is 1.0. Calculation of relative permeability allows for comparison of the different abilities of fluids to flow in the presence of each other, since the presence of more than one fluid generally inhibits flow.

### **Petroleum systems modelling**

A technique used to represent the history of a sedimentary basin, including the processes and components necessary to form petroleum: a petroleum source rock, a reservoir, a trapping mechanism, a seal, and the appropriate relative timing of formation of these.

### **Pipeline capacity**

The quantity (volume) of oil and gas required to maintain a full pipeline. The static capacity of a pipeline is usually expressed as a volume per unit length (for example, bbl/ft). Nevertheless, the fluid volume passing through a pipeline in a specific time period will depend on initial pressure, flow characteristics, ground elevation, density and delivery pressure.

### **Play**

A conceptual model for a style of hydrocarbon accumulation used by explorationists to develop prospects in a basin, region or trend and used by development personnel to continue exploiting a given trend. A play (or a group of interrelated plays) generally occurs in a single petroleum system.

**Plug and Abandon**

To prepare a wellbore to be shut in and permanently isolated. In most cases, a series of cement plugs is set in the wellbore, with an inflow or integrity test made at each stage to confirm hydraulic isolation.

**Porosity**

The percentage of pore volume or void space, or that volume within rock that can contain fluids. Porosity can be a relic of deposition (primary porosity, such as space between grains that were not compacted together completely) or can develop through alteration of the rock (secondary porosity, such as when feldspar grains or fossils are preferentially dissolved from sandstones).

Porosity can be generated by the development of fractures, in which case it is called fracture porosity. Effective porosity is the interconnected pore volume in a rock that contributes to fluid flow in a reservoir. It excludes isolated pores. Total porosity is the total void space in the rock whether or not it contributes to fluid flow. Thus, effective porosity is typically less than total porosity.

Shale gas reservoirs tend to have relatively high porosity, but the alignment of platy grains such as clays makes their permeability very low.

**Pour point**

The lowest temperature (in °F or °C) at which a liquid remains pourable (meaning it still behaves as a fluid). Oil or synthetic muds with high pour points may suffer from poor screening and excessive pressure, surges in deepwater wells or other operations subject to low temperatures. In oils, the pour point is generally increased by a high paraffin content.

**Pressure build-up analysis**

An analysis of data obtained from measurements of the bottom hole pressure in a well that is shut-in after a flow period. The profile created on a plot of pressure against time is used with mathematical reservoir models to assess the extent and characteristics of the reservoir and the near-wellbore area.

**Productivity Index (PI)**

A mathematical means of expressing the ability of a reservoir to deliver fluids to the wellbore. The PI is usually stated as the volume delivered per psi of drawdown at the sand face (bbl/d/psi).

**Prospect**

An area of exploration in which hydrocarbons have been predicted to exist in economic quantity. A prospect is commonly an anomaly, such as a geologic structure or a seismic amplitude anomaly, that is recommended by explorationists for drilling a well.

**Recovery Factor**

The recoverable amount of hydrocarbon initially in place, normally expressed as a percentage. The recovery factor is a function of the displacement mechanism. An important objective of enhanced oil recovery is to increase the recovery factor.

**Remotely Operated Vehicle (ROV)**

An unmanned submersible vehicle controlled from surface. In deepwater operations, remotely operated vehicles are used to inspect subsea structures and equipment, and to control or manipulate valves. They can operate at depths from 1500 to 10,000 ft [457 to 3048 m]. This term is commonly abbreviated as ROV.

**Reservoir-drive mechanisms**

Natural forces in the reservoir that displace hydrocarbons out of the reservoir into the wellbore and up to surface.

Reservoir-drive mechanisms include gas drive (gas cap or solution gas drive), water drive (bottom water drive or edge water drive), combination drive, and gravity drainage. Water drive is the most efficient drive mechanism, followed by gas drive and gravity drainage.

Reservoir-drive mechanisms are also called natural drives.

### **Resistivity log**

A log of the resistivity of the formation, expressed in ohm-m. The resistivity can take a wide range of values, and, therefore, for convenience is usually presented on a logarithmic scale from, for example, 0.2 to 2000 ohm-m. The resistivity log is fundamental in formation evaluation because hydrocarbons do not conduct electricity while all formation waters do. Therefore a large difference exists between the resistivity of rocks filled with hydrocarbons and those filled with formation water.

### **Retrograde condensation**

The formation of liquid hydrocarbons in a gas reservoir as the pressure in the reservoir decreases below dewpoint pressure during production. It is called retrograde because some of the gas condenses into a liquid under isothermal conditions instead of expanding or vaporizing when pressure is decreased.

### **Rotary steerable system**

A tool designed to drill directionally with continuous rotation from the surface, eliminating the need to slide a steerable motor. Rotary steerable systems typically are deployed when drilling directional, horizontal, or extended-reach wells.

### **Sequential Gaussian simulation**

A procedure for estimating the reservoir characteristics between data points. Based on the idea of iterating from a first guess and refining through reduction of errors, the procedure generally transforms the model to normality, simulating the normally distributed transform, and then back-transforming to the original variable of interest.

### **Solution gas drive**

A type of reservoir-drive system in which the energy for the transport and production of reservoir fluids is derived from the gas dissolved in the fluid. As reservoir fluids enter the wellbore, changing pressure conditions cause the gas to break from solution to create a commingled flow of gas and liquid that aids production.

### **Spectral density analysis**

A technique for utilizing fractal geometry to produce reservoir descriptions.

### **Synthetic seismogram**

The result of one of many forms of forward modeling to predict the seismic response of the Earth. A more narrow definition used by seismic interpreters is that a synthetic seismogram, commonly called a synthetic, is a direct one-dimensional model of acoustic energy traveling through the layers of the Earth. The synthetic seismogram is generated by convolving the reflectivity derived from digitized acoustic and density logs with the wavelet derived from seismic data.

### **Sweet spot**

Colloquial expression for a target location or area within a play or a reservoir that represents the best production or potential production. Geoscientists and engineers attempt to map sweet spots enable wellbores to be placed in the most productive areas of the reservoir.

**Simultaneous operation (SIMOP)**

A term used mainly on offshore platforms, or installations with multiple wellheads, where more than one wellbore is being accessed, such as where a drilling rig, slickline unit or coiled tubing unit may be operating at the same time.

**Thermal maturity**

The degree of heating of a source rock in the process of transforming kerogen into hydrocarbon. Thermal maturity is commonly evaluated by measuring vitrinite reflectance or by pyrolysis.

**Thief zone**

A formation encountered during drilling into which circulating fluids can be lost.

**Time-lapse seismic data**

Seismic data from the surface or a borehole acquired at different times over the same area to assess changes in the subsurface with time, such as fluid movement or effects of secondary recovery.

**Transient-pressure response**

The pressure response resulting from changes in a well's production rate. This includes drawdown, in which the pressure falls in response to the production of fluids; buildups, in which the pressure rises after a well is shut in; and falloffs, in which the pressure falls after an injection well is shut in.

**Type-curve analysis**

A method for quantifying well and reservoir parameters such as permeability, skin, fracture half-length, dual-porosity parameters, and others, by comparing the pressure change and its derivative of the acquired data to reservoir model curve families, called type curves. When a match is found between data and a type curve, the parameters that characterize the behaviour of the model providing a match are thereby determined.

**Udden-Wentworth scale**

A grade scale for classifying the diameters of sediments. Particles larger than 64 mm in diameter are classified as cobbles. Smaller particles are pebbles, granules, sand and silt. Those smaller than 0.0039 mm are clay. Several other grain size scales are in use, but the Udden-Wentworth scale (commonly called the Wentworth scale) is the one that is most frequently used in geology.

**Unitized production**

Pooled production from wells or a reservoir. The proceeds of this pooled production are distributed to the participants according to an agreed-upon formula.

**Vertical seismic profile**

A class of borehole seismic measurements used for correlation with surface seismic data, for obtaining images of higher resolution than surface seismic images and for looking ahead of the drill bit; also called a VSP. Purely defined, VSP refers to measurements made in a vertical wellbore using geophones inside the wellbore and a source at the surface near the well.

**Vitrinite reflectance**

A measurement of the maturity of organic matter with respect to whether it has generated hydrocarbons or could be an effective source rock.

**Water drive**

A reservoir-drive mechanism whereby the oil is driven through the reservoir by an active aquifer. As the reservoir depletes, the water moving in from the aquifer below displaces the oil until the aquifer energy is expended or the well eventually produces too much water to be viable.

**Well interference testing**

The pressure variation with time recorded in observation wells resulting from changes in rates in production or injection wells. In commercially viable reservoirs, it usually takes considerable time for production at one well to measurably affect the pressure at an adjacent well.

**Well plan**

The description of a proposed wellbore, including the shape, orientation, depth, completion, and evaluation. Well plans might be relatively simple for vertical wellbores.

**Wellbore damage**

Any restriction to flow from near-well reductions in flow capacity. This damage is thought to result from reductions in near-well permeability caused by perforating debris or from the solids or mud filtrate invasion caused by the drilling process.

**Wireline formation tester**

A tool run on an electric logging cable that pushes a probe into the formation, which then allows production into a small closed chamber. The tool is primarily used to obtain formation pressures at chosen locations in an interval, and, with an accurate quartz gauge, permeability estimates may be obtained. Modern variations on this tool have been developed to acquire formation-fluid samples.

**Well servicing**

The maintenance procedures performed on an oil or gas well after the well has been completed and production from the reservoir has begun. Well service activities are generally conducted to maintain or enhance the well productivity, although some slickline and coiled tubing applications are performed to assess or monitor the performance of the well or reservoir. Slickline, coiled tubing, snubbing and workover rigs or rod units are routinely used in well service activities.

**X-radiography**

A technique for imaging a core by moving a source of X-rays along a core and recording the attenuated X-rays on the other side on a suitable photographic film.

**X-ray diffraction**

A technique for the semi-quantitative mineralogical analysis of a sample of rock by measuring the diffraction peaks in X-rays diffracted by the sample. The position of the diffraction peaks is a measure of the distance between discrete crystallographic diffracting planes within minerals, while their intensity indicates the quantity of the mineral. The technique is only semi-quantitative because the size and shape of the diffraction peak are strongly influenced by the geometry of the measurement, for example orientation of the minerals, and sample preparation.

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### **Adani Enterprises Ltd**

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