DGH

DIRECTORATE GENERAL OF HYDROCARBONS

(Ministry of Petroleum & Natural Gas, Government of India)

सत्यमेव जयते

A New E&P Paradigm

INDIA'S HYDROCARBON OUTLOOK : 2016-17

A Report on Exploration & Production Activities

CREATION

DGH was formed through a Government of India resolution dated 08.04.1993 under the administrative control of Ministry of Petroleum & Natural Gas.

OBJECTIVE

To promote exploration and sound management of the petroleum & natural gas resources and also non-conventional hydrocarbon energy resources while having balanced regard for the environment, safety, technological and economic aspects.

DISCLAIMER

All boundaries shown in the maps are not authenticated.
The statistics given in the report are collated from different E&P Companies operating in India and also from available published data in public domain. The correctness of information given herein, is therefore, subjective to that extent.

Facts and figures given in the report are provisional / indicative and cannot be used for any commercial or legal purpose.

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DGH

हाइड्रोकार्बन महानिदेशालय

पेट्रोलियम एवं प्राकृतिक गैस मंत्रालय | भारत सरकार

Directorate General of Hydrocarbons

Ministry of Petroleum and Natural Gas | Government of India

भारत का हाइड्रोकार्बन परिदृश्य

अन्वेषण व उत्पादन गतिविधियों पर एक रिपोर्ट 2016–17

India's Hydrocarbon Outlook

A Report on Exploration & Production Activities 2016-17

At a glance: Indian E&P Sector – 2016-17

37 Hydrocarbon Discoveries

29 under Nomination Regime and 8 under PSC Regime

36.01 MMT

Crude Oil Production

31.9 BCM

Natural Gas Production

248.74 MMT [O+OEG]

In-Place Accretion

111.89 MMT [O+OEG]

Accretion of Reserves

4 Declaration of Commerciality

Approved by Management Committee under in PSC Regime

5 Field Development Plan

Approved by Management Committee under PSC Regime

111 Active PSCs

12 Pre-NELP, 73 NELP & 26 Small & Medium Size Field PSCs

372 Active Nomination Acreages

15 PEL and 357 PML Acreages

19240.75 GLKM

2D Seismic Data Acquired

13648.27 SQKM

3D Seismic Data Acquired

544 Wells

Exploratory & Development Wells Drilled in 2016-17

1 PEL and 3 ML

Granted under PSC regime

11967 Essentiality Certificates

Issued of Rs. 4,135 Crore in value

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भारत सरकार
नई दिल्ली–110001

सत्यमेव जयते

DHARMENDRA PRADHAN
Minister of State (I/C)
Petroleum & Natural Gas
Government of India
New Delhi-110 001

MESSAGE

The world has experienced a sharp decline in oil prices since mid-2014 due to an oversupply in the oil market primarily on account of US shale oil revolution and OPEC's stand against curtailing oil production to protect market share and a simultaneous slowdown in demand in some of the erstwhile fastest growing economies of the world. This low crude oil price scenario has given a huge fillip to the public exchequer and has contributed to India being among the world's fastest growing economies and will remain so for years to come. The oil and gas sector is among the six core industries in India and plays a major role in influencing decision making for all the other important sections of the economy.

Since E&P of oil and gas is a capital intensive and high risk business, an immediate cutback in upstream spending is happening but little impact is seen on production. E&P companies in India had to strive to thrive in an oversupplied business environment by utilizing technological advancements with increased efficiency to squeeze out higher volumes with less investment.

In line with the vision of Hon'ble Prime Minister to cut down India's import dependence for domestic energy needs by 10% in the next 6-7 years, the Ministry has introduced landmark changes in the Indian Upstream E&P sector by launching a slew of policy initiatives. The launch of Discovered Small Fields Policy and Hydrocarbon Exploration and Licensing Policy are a few to name. The recent policy initiatives are a part of Government's "Ease of Doing Business" initiative to make Indian oil & gas sector fair, transparent and investor friendly through appropriate regulatory, fiscal and policy interventions. The World Bank declared that India has moved up 12 places (to 130th rank) in the Global Ease of Business rankings. Government has also identified hydrocarbon sector as one of the 25 priority areas for promotion of manufacturing under the "Make in India" campaign.

I am pleased to say that Directorate General of Hydrocarbons (DGH), the technical arm of Ministry of Petroleum and Natural Gas, has been successful in facilitating companies in Upstream Oil Industry by extending all possible help within the ambit of contractual terms. I compliment DGH on its Annual Publication "India's Hydrocarbon Outlook : 2016-17" that encapsulates the E&P activities in our country.

DHARMENDRA PRADHAN

उज्ज्वला
पहल
#GiveItUp
खुशियां बांटने की खुशी
स्वच्छ भारत
एक कदम स्वच्छता की ओर

कपिलदेव त्रिपाठी

सचिव
पेट्रोलियम एवं प्राकृतिक गैस मंत्रालय
भारत सरकार
शास्त्री भवन, नई दिल्ली–110001

सत्यमेव जयते

K.D. TRIPATHI

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MESSAGE

The global upstream oil and gas industry, having endured strain on account of excess supplies and rising inventories in the previous year, made a significant comeback this year with crude prices hovering near $50/barrel mark. The future forecasts augur optimistic trends with an equally enabling domestic economic environment on the backdrop of profound change in its policy and regulatory framework.

Irrespective of global economic slowdown, the Government has boldly introduced significant progressive reforms in the oil and gas industry like Hydrocarbon Exploration and Licensing Policy (HELP), Discovered Small Field Policy and marketing and pricing freedom for gas in difficult areas, which sets a stable foundation for evincing investor's interest for making sound and informed investment decisions.

After a lull of over seven years, 30 discovered oil & gas fields were successfully awarded in a very short span of time under the DSF Bid Round 2016. Notwithstanding subdued oil prices, the success made in the DSF Round is testimony to the manifestation of benefits of the new E&P regime for investors.

Recently, the Government has launched a National Data Repository (NDR) which is an integrated digital database of India's hydrocarbon basins in line with Digital India and Ease of Doing Business reform initiatives. NDR, a national asset, forms the backbone for future offering of blocks, is also a pre-requisite under Open Acreage Licensing (OAL) round. The recently launched government projects such as resource re-assessment studies of Indian sedimentary basins, national seismic programme, and non-exclusive multi-client survey have made steady headway. Course corrections have been made by eliminating existing rigidities in CBM contracts and PSCs. These steps are expected to attract investment required for accelerating exploratory efforts and boosting domestic oil & gas production.

I compliment Director General of Hydrocarbons for bringing out this publication which encompasses important developments in Indian upstream oil & gas sector during 2016-17 which would be immensely useful for all its stakeholders.

K.D. TRIPATHI

From the Director General

Dear Stakeholders,

With the stabilization of crude prices, there is a modicum of normalcy in the global oil and gas industry. Severe headwinds owing to collapsing crude prices threatened industry's creditworthiness by hurting cash flows, drying up liquidity and pummeling producer profit margins. However, the industry's resilience to the price shock and the way to recovery has been remarkable, yet stifled at times. Worldwide, E&P companies and service providers have realized the ability to live with the current prices and have resorted to money-saving engineering ideas and downturn-led incremental improvements in technology for lowering costs and greater field efficiencies.

Over the course of this downswing, Government of India has taken bold measures in the form of policy reforms and interventions that has ushered India as a leading E&P investment destination. With the advent of National Data Repository (NDR), Open Acreage Licensing (OAL) under the Hydrocarbon Exploration and Licensing Policy (HELP) coupled with the recently concluded Discovered Small Fields (DSF) Bid Round-2016, Indian upstream hydrocarbon sector stands at precipice of a new era. The Government has realized that the only way to open the spigot on capital infusion in upstream projects is to reduce the lumbering administrative regulations. Investors thrive on a simplified, transparent, predictable and synergized fiscal ecosystem where business goes through every stage of the lifecycle without hassle. Recognizing this, DGH ruminated on the ambiguities in the existing contracts and strengthened the architecture of existing PSC and CBM Contracts by policy course corrections. To increase the velocity of capital flow and for early monetization of CBM blocks and PSC blocks, entry and exits from projects have been simplified, pricing and marketing freedom has been provided for gas production from Deepwater, Ultra Deepwater and High Pressure-High Temperature areas and in CBM blocks.

Concerted effort for 10% reduction in import dependence by 2022 is called for to make India strategically secure. Enhancing productivity from existing fields, increasing acreage under E&P and producibility from difficult and unconventional reservoirs are broadly the contours of the multi-pronged approach adopted to meet the target. Government is mulling over Production Enhancement contracts and incentives for application of Enhanced Oil Recovery methods to enhance production from existing reservoirs. To increase acreage under E&P, Government has launched Discovered Small Field (DSF) Bid Round 2016 and initiated Hydrocarbon Exploration and Licensing Policy (HELP) programmed by Open Acreage Licensing (OAL), which is a paradigm shift from Production Sharing to Revenue Sharing mechanism. The DSF Bid round 2016 saw remarkable success with contracts awarded for 30 blocks. This also saw new entrepreneurs on Indian hydrocarbon scene. DSF Round-II is under consideration.

National Data Repository is India's upstream E&P databank and is primed to launch in 2017. NDR will assist potential investors to make informed decisions and will facilitate future launch of blocks through OALP under HELP. Till March 2017, a total of 17,04,326 LKM of 2D seismic data, 6,11,713 SKM of 3D seismic data and 9,676 well & log data has been uploaded in NDR. It is planned to open a Secondary Data Centre (SDC) at Bhubaneshwar which will act as a fail-safe and back-up to the present NDR.

India has 26 sedimentary basins having an area of 3.14 Million Sq. km. As of now 48% of Indian sedimentary area has been apprised and remaining 52% sedimentary area is still unapprised. To get more information about unexplored and unapprised areas with hydrocarbons prospectivity, a "National Seismic Program (NSP)" has been formulated to conduct 2D seismic surveys in all sedimentary basins of India where no/scanty data is available. It is planned to Acquire, Process and Interpret (API) 48,243 LKM 2D seismic data. In FY 2016-17, under NSP, total 5,671.26 LKM 2D data has been acquired by NOCs. A project has been initiated by a Multi Organization Team (ONGC, OIL & DGH) to carry out re-assessment of hydrocarbon resources of India in all its 26 sedimentary basins based on geo-scientific data generated over past decades. Studies on 11 basins have been completed and further studies are being carried out in 12 basins. The progress of the project is adhering the proposed timelines.

Unconventional hydrocarbon resources have looked promising and are poised to play a vital role in boosting domestic oil and gas production and will claim a greater share of India's energy mix soon. In FY 2016-17, Coal Bed Methane production has increased by ~50% and reached 1.56 MMSCMD and is poised to increase to 6 MMSCMD by 2018-19. India's shale gas reserves could be anywhere between 300 TCF (8.5 TCM) and 2,100 TCF (59.5 TCM). Under the current agreement, exploration of shale gas is being carried out by the Oil and Natural Gas Corporation (ONGC) alongside Oil India Limited. So far, 83 core samples have been collected from 22 wells drilled by ONGC. While tight oil and shale gas are within the realm of possibility, gas hydrate, currently under research, has to reach a stage when we can think of commercial production. Natural Gas Hydrate Program (NGHP)-2 was successfully completed in July 2015 wherein 42 wells were drilled at 25 sites in Krishna Godavari and Mahanadi Deepwater basin by hiring Japanese drillship CHIKYU. Significant gas hydrate bearing zones have been identified and pilot production testing is planned to be conducted under NGHP-3.

To highlight the E&P activities in FY 2016-17; a total of 19,240 LKM of 2D seismic data and about 13,650 SKM of 3D seismic data was acquired. 141 exploratory wells were drilled in the year with an exploratory meterage of 392.31 km. 398 development wells were drilled with a cumulative meterage of 842 km. Total crude oil production in the country in FY 2016-17 is 36.01 MMT (71.75% from nomination regime and 29.25% from PSC regime) and cumulative natural gas production is 31.9 BCM (78.45% from nomination, 19.78% from PSC regime and 1.77% from CBM). As on March 2017, the in-place volume of crude oil is 6,754 MMT and 3,981 BCM for gas (10,735 MMT O+OEG), there has been a cumulative accretion of in-place volume 249 MMT. Total 37 hydrocarbon discoveries were made in FY 2016-17 with 29 in nomination regime and 8 in PSC regime.

Though crude oil and natural gas, two of the eight core sectors in the Index of Industrial Production (IIP) of India have recorded negative growth rates in 2016-17, I am confident that the resonating optimism garnered by the recent policy reforms will beckon investment and evince interest in oil and gas sector and growth will ensue. Current statistics may indicate a tepid response, but these are mere indications of a larger machinery rolled out that will gather momentum in days to come. Irrespective of the short-time aberrations in global oil industry, DGH will continue spearheading the campaign in creating opportunities for engagement and investment in upstream E&P sector. Synergy and collaboration between policymakers and stakeholders is the key to sustain a positive investment environment and DGH will endeavour to assert further reforms in the pipeline to decongest the way to prospective investors. For this, I express my gratitude to Ministry of Petroleum and Natural Gas whose support and guidance have let us discharge our duties effectively.

The DGH Annual Publication "India's Hydrocarbon Outlook – 2016-17" has been designed as a formal source for disseminating the information on activities of the Indian Upstream Hydrocarbon sector and cogently showcases the achievements by the sector in lieu of recent policy reforms. I am confident that this report will be a valuable reference to all stakeholders in the industry.

Sincerely yours,

Atanu Chakraborty

महानिदेशक का संदेश

हिन्दी संस्करण

प्रिय स्टेकहोल्डर

कच्चे तेल की कीमतों के स्थिर होने से तेल और गैस के वैश्विक उद्योग में स्थिति नाम मात्र ही सामान्य हुई है। कच्चे तेल की कीमतों में भारी गिरावट आने से अत्यंत विपरीत परिस्थितियां उत्पन्न हुईं जिसके कारण नकद प्राप्ति पर बुरा प्रभाव पड़ा, नकदी समाप्त होने लगी और उत्पादकों के लाभांश कमतर होने लगे जिससे इस उद्योग की साख को खतरा उत्पन्न हो गया। हालांकि, कीमतों में उतार–चढ़ाव को जिस तरह इस उद्योग ने झेला है और जिस तरह बहाल हुआ है, वह अत्यंत सराहनीय है, फिर भी कई बार यह उद्योग पतन के कगार पर पहुँच गया। विश्वभर में अन्वेषण एवं उत्पादन कंपनियों और सेवा प्रदाताओं ने वर्तमान कीमतें ही बनाए रखने की अपनी क्षमता को पहचान लिया है और कीमतें कम करने के लिए और फील्ड में अपनी कार्यक्षमता बढ़ाने के लिए किफायती इंजीनियरी उपाय अपनाए हैं और मंदी का सामना करने के लिए किए गए ऐसे प्रौद्योगिकीय सुधार किए जो धीरे–धीरे लाभ में वृद्धि करें।

इस मंदी के समय में भारत सरकार ने नीति में सुधार और हस्तक्षेप द्वारा साहसिक कदम उठाए हैं, जिससे भारत अन्वेषण एवं उत्पादन में निवेश का अग्रणी गंतव्य बन गया है। राष्ट्रीय डाटा रेपोजिटरी (एन.डी.आर.), हाइड्रोकार्बन अन्वेषण एवं लाइसेंस नीति (एच.ई.एल.पी.) के तहत ओपन एकरिज लाइसेंस (ओ.ए.एल.) और हाल ही में आयोजित अन्वेषित लघु क्षेत्र (डी.एस.एफ.) बोली राउंड 2016 के परिणामस्वरूप भारतीय अपस्ट्रीम हाइड्रोकार्बन सेक्टर नए युग के कगार पर खड़ा है। सरकार ने यह महसूस किया है कि अपस्ट्रीम परियोजना में पूँजी प्रदान करने पर लगी रोक को खोलने का एकमात्र तरीका प्रशासनिक नियंत्रण को कम करना है। निवेशक सरलीकृत, पारदर्शी, पूर्वानुमानित और सहयोगी वित्तीय पारिस्थितिकी तंत्र चाहते हैं जिससे कि प्रत्येक चरण में व्यवसाय बिना किसी परेशानी से संपन्न किया जा सके। इसको देखते हुए डी.जी.एच. ने वर्तमान संविदाओं में अस्पष्टता पर चिंतन किया है और नीति में सुधार करते हुए मौजूदा पी. एस.सी. और सी.बी.एम. संविदाओं की संरचना को मजबूत किया है। पूँजी प्रवाह की गति बढ़ाने और सी.बी.एम. और पी.एस.सी. ब्लॉकों के शीघ्र मौद्रीकरण के लिए परियोजना में प्रवेश और परियोजना को छोड़ना सरल बना दिया गया है। गहरे पानी, अति गहरे पानी और उच्च दाब–उच्च तापमान क्षेत्रों और सी.बी.एम. ब्लॉकों में गैस उत्पादन के लिए मूल्य निर्धारण और विपणन में स्वतंत्रता प्रदान की है।

भारत को इस क्षेत्र में सतत रूप से सुरक्षित बनाने के लिए वर्ष 2022 तक पेट्रोलियम आयात में 10% निर्भरता कम करनी है। इसके लिए मौजूदा क्षेत्रों से अधिक से अधिक उत्पादन में वृद्धि करने, अन्वेषण एवं उत्पादन के वर्ग क्षेत्र को बढ़ाने, कठिन और अपरंपरागत आगारों से उत्पादकता में वृद्धि करने के लक्ष्य को पूरा करने हेतु बहुमुखी दृष्टिकोण अपनाना होगा। सरकार मौजूदा आगारों से उत्पादन बढ़ाने के लिए तेल वसूली तरीकों को प्रयोग में लाने के लिए उत्पादन संवृद्धि, संविदाओं और प्रोत्साहनों पर विचार कर रही है। अन्वेषण एवं उत्पादन क्षेत्रों को बढ़ाने के लिए सरकार द्वारा अन्वेषित लघु क्षेत्र (डी.एस.एफ.) बोली राउंड 2016 आयोजित किया गया और ओपन एकरिज लाइसेंस (ओ.ए.एल.) द्वारा क्रमादेशित हाइड्रोकार्बन अन्वेषण एवं लाइसेंस नीति (एच.ई.एल.पी.) शुरू की गई है जोकि उत्पादन भागीदारी से राजस्व भागीदारी व्यवस्था में एक बदलाव है। डी.एस.एफ. बोली राउंड 2016 में 30 ब्लॉकों के लिए संविदा कर एक उल्लेखनीय सफलता प्राप्त की और इसमें भारत के हाइड्रोकार्बन क्षेत्र में नए उद्यमियों को भी देखा गया। डी.एस.एफ. राउंड II विचाराधीन है।

राष्ट्रीय डाटा रेपोजिटरी (एन.डी.आर.) भारत का अपस्ट्रीम अन्वेषण एवं उत्पादन डाटा बैंक है और यह 2017 से अस्तित्व में आया है। एन.डी.आर. के माध्यम से सशक्त निवेशकों को निर्णय संबंधी जानकारी प्रदान करने में सहायता मिलेगी और हाइड्रोकार्बन अन्वेषण लाइसेंस नीति (एच.ई.एल.पी.) के अंतर्गत खुला रकबा लाइसेंस कार्यक्रम (ओ.ए.एल.पी.) के माध्यम से भावी ब्लॉक प्रस्तुत करना सुकर होगा। मार्च 2017 तक 2डी भूकंपीय (सेस्मिक) डाटा के 17,04,326 एल.के.एम., 3डी भूकंपीय डाटा के 6,11,713 एस.के.एम. और 9,676 कूप और लॉग डाटा एन.डी.आर. में दर्ज कर दिए गए हैं। भुवनेश्वर में एक सहायक डाटा केंद्र (एस.डी.सी.) खोले जाने की योजना है जो वर्तमान एन.डी.आर. के 'फेल सेफ' और 'बैक अप' के रूप में कार्य करेगा।

भारत में 3.14 मिलियन वर्ग कि.मी. में 26 अवसादी बेसिन हैं। अब तक 48% भारतीय अवसादी क्षेत्र के मूल्यांकन संबंधी जानकारी प्राप्त हुई और शेष 52% क्षेत्र की मूल्यांकन संबंधी जानकारी प्राप्त होना बाकी है। गैर–अन्वेषित और अमूल्यांकित क्षेत्रों के हाइड्रोकार्बन संभाव्यता संबंधी और अधिक जानकारी प्राप्त करने के लिए भारत के ऐसे सभी अवसादी बेसिनों में 2डी भूकंपीय सर्वेक्षण के लिए 'राष्ट्रीय भूकंपीय कार्यक्रम' (एन.एस.पी.) तैयार किया गया है, जहाँ के आँकड़े नहीं हैं अथवा बहुत कम हैं। 48,243 एल.के.एम. 2डी भूकंपीय आँकड़े प्राप्त करने, संसाधित करने एवं विवेचन (ए.पी.आई) करने की योजना बनाई गई है। वित्त वर्ष 2016–17 में राष्ट्रीय भूकंपीय कार्यक्रम (एन.एच.पी.) के तहत राष्ट्रीय तेल कंपनियों द्वारा कुल 5,671.26 एल.के.एम. 2डी डेटा प्राप्त हुए हैं। बहु संगठन टीम (ओ.एन.जी.सी., ऑयल इंडिया लिमिटेड और डी.जी.एच.) ने पिछले दशकों में प्राप्त भूवैज्ञानिक आँकड़ों के आधार पर भारत में इन 26 अवसादी बेसिनों में हाइड्रोकार्बन संसाधनों के पुनर्मूल्यांकन की एक परियोजना प्रारंभ की है। 11 बेसिनों पर अध्ययन पूरा किया जा चुका है और 12 बेसिनों पर अध्ययन किया जा रहा है। परियोजना का कार्य प्रस्तावित समय–सीमा के अनुसार हो रहा है।

अपरंपरागत हाइड्रोकार्बन संसाधन आशाजनक हैं और घरेलू तेल और गैस उत्पादन को बढ़ाने में इनकी मुख्य भूमिका रही है और शीघ्र ही भारत की ऊर्जा में इसकी एक बहुत बड़ी हिस्सेदारी होगी। वित्त वर्ष 2016–17 में कोल बेड मीथेन उत्पादन ~50% तक बढ़कर 1.56 एम.एम.एस.सी.एम.डी. पहुँच गया है और वर्ष 2018–19 तक 6 एम.एम.एस.सी.एम.डी. तक पहुँचने के लिए प्रयासरत है। भारत में शेल गैस का भंडार लगभग 300 टी.सी.एफ. (8.5 टी.सी.एम.) से 2,100 टी.सी.एफ. (59.5 टी.सी.एम.) के बीच हो सकता है। वर्तमान करार के अंतर्गत शेल गैस अन्वेषण का कार्य ऑयल इंडिया लिमिटेड और ऑयल एंड नेचुरल गैस कॉर्पोरेशन लिमिटेड (ओ.एन.जी.सी.) द्वारा किया जा रहा है। ओ.एन.जी.सी. द्वारा वेधित 22 कूपों से अब तक 83 कोर सैम्पल लिए गए हैं। हालांकि टाइट ऑयल और गैस की पूरी संभावना है, गैस हाइड्रेट की खोज करके हमें ऐसे स्तर पर पहुँचाना है कि हम वाणिज्यिक उत्पादन करने के बारे में सोच सकें। हमने जुलाई 2015 में नेचुरल गैस हाइड्रेट प्रोग्राम (एन.जी.एच.पी.)–2 सफलतापूर्वक पूरा कर लिया है। इस कार्यक्रम के तहत जापान ड्रिलशिप 'चिक्यू' के द्वारा कृष्णा गोदावरी और महानदी के गहरे पानी (डीप वाटर) के बेसिन में 25 स्थलों पर 42 कूपों को वेधित किया गया था।
महत्वपूर्ण गैस हाइड्रेट युक्त क्षेत्रों की पहचान की गई है और एन.जी.एच.पी.–3 के अंतर्गत प्रायोगिक उत्पादन परीक्षण किए जाने की योजना है।

वित्त वर्ष 2016–17 में अन्वेषण एवं उत्पादन गतिविधियों को प्रदर्शित करने के लिए 2डी भूकंपीय आँकड़ों का 19,240 एल.के.एम. और 3डी भूकंपीय आँकड़ों का लगभग 13,650 वर्ग किलोमीटर प्राप्त हुआ था। इस वर्ष के दौरान 141 अन्वेषणीय कूपों को वेधित किया गया था और इसका अन्वेषणीय मीटरेज 392.31 किलोमीटर था। 84.2 कि.मी. संचयी मीटरेज के साथ 398 विकास कूपों को वेधित किया गया था। वित्त वर्ष 2016–17 में भारत देश में कच्चे तेल का कुल उत्पादन 36.01 एम.एम.टी. (71.75% मनोनीत क्षेत्र से और पी.एस.सी. क्षेत्र से 29.25%) है और संचयी प्राकृतिक गैस का उत्पादन 31.9 बी.सी.एम. (मनोनीत क्षेत्र से 78.45%, पी.एस.सी. क्षेत्र से 19.78% और सी.बी.एम. क्षेत्र से 1.77%) रहा। मार्च 2017 को अंत: स्थल (इन्प्लेस) कच्चे तेल की मात्रा 6,754 एम.एम.टी. और गैस 3981 बी.सी.एम. [10,735 एम.एम.टी. (ओ.+ओ.ई.जी.)] है। संबद्ध स्थान मात्रा में 249 एम.एम.टी. की कुल अभिवृद्धि हुई है। वित्त वर्ष 2016–17 में मनोनीत क्षेत्र में 29 और पी.एस.सी. क्षेत्र में 8 को मिलाकर कुल 37 हाइड्रोकार्बन खोज की गईं।

यद्यपि, वर्ष 2016–17 के दौरान भारत के औद्योगिक उत्पादन सूची (आई.आई.पी.) के आठ प्रमुख क्षेत्रों में से दो महत्वपूर्ण क्षेत्रों, कच्चा तेल और प्राकृतिक गैस की वृद्धि दर नकारात्मक दर्ज की गई है तथापि मुझे पूरा विश्वास है कि हाल के नीतिगत सुधारों के परिणामस्वरूप उत्पन्न आशावाद से निवेश का मार्ग प्रशस्त होगा और तेल और गैस के क्षेत्रों में दिलचस्पी बढ़ेगी जिससे विकास सुनिश्चित होगा। हालांकि वर्तमान आँकड़े बहुत उत्साहवर्धक नहीं हैं तथापि ये मात्र एक बड़े नए तंत्र की ओर संकेत करते हैं जिससे वैश्विक तेल उद्योग में अल्पकालिक अस्थिरता के बावजूद आने वाले दिनों में तेजी आएगी। तेल उद्योग क्षेत्र में आए इस विश्वस्तरीय विपथन के बावजूद डी.जी.एच. अपस्ट्रीम अन्वेषण तथा उत्पादन क्षेत्र में निवेश अवसरों को सुलभ कराने का प्रयास जारी रखेगा। नीति निर्माताओं और स्टेकहोल्डर के बीच सहयोग और सहक्रियाशीलता द्वारा ही निवेश में स्थिरता और सकारात्मकता का वातावरण संभव है। डी.जी.एच. संभावित निवेशकों के लिए इस दिशा में और अधिक सुधार का प्रयास कर रहा है। इसके लिए मैं पेट्रोलियम और प्राकृतिक गैस मंत्रालय का आभार व्यक्त करता हूँ जिनके सहयोग एवं मार्गदर्शन से हम अपने कर्तव्यों का बेहतर निर्वहन कर सके।

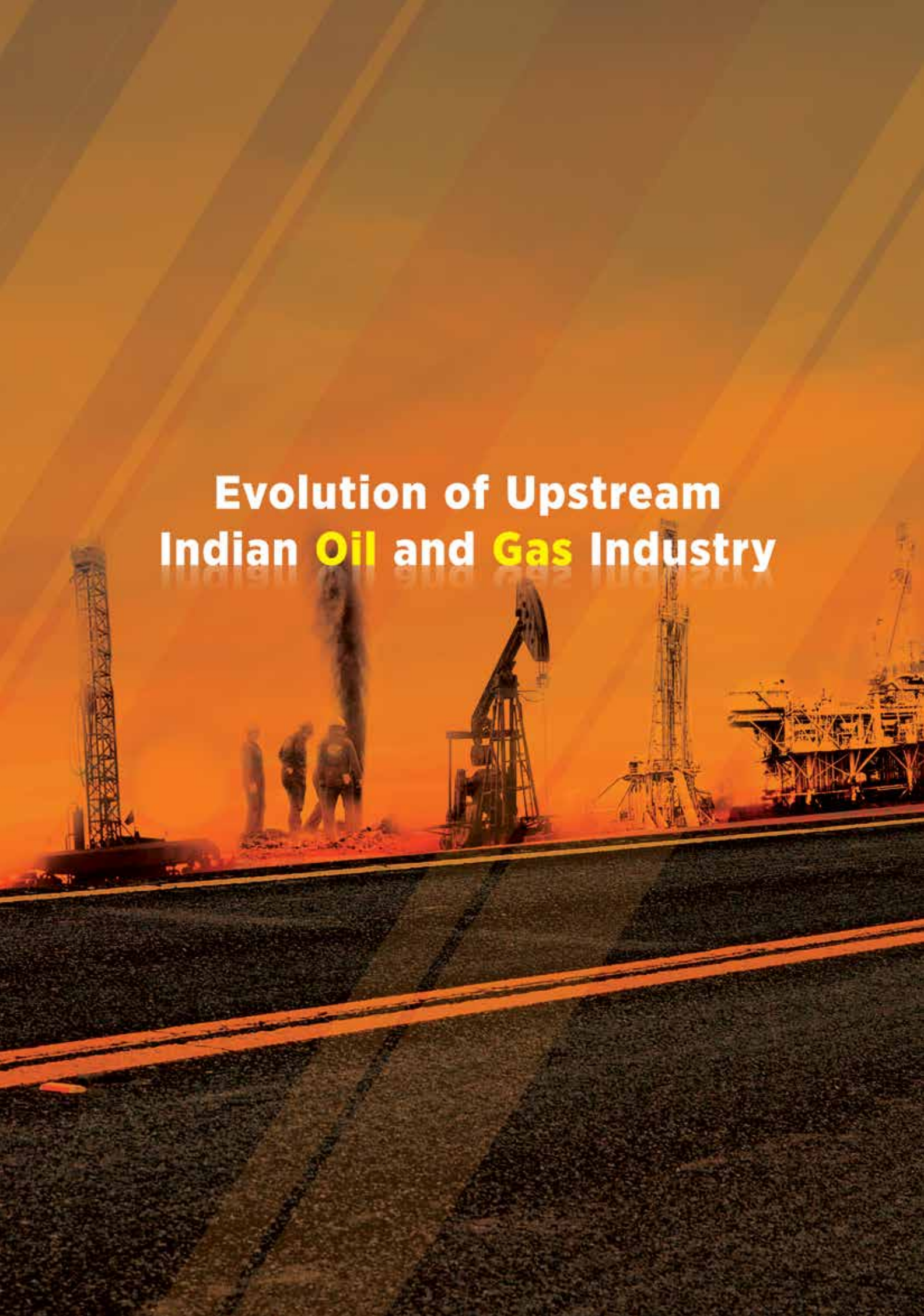
"भारतीय हाइड्रोकार्बन परिदृश्य 2016–17" नामक डी.जी.एच. के इस वार्षिक प्रकाशन का उद्देश्य भारत के अपस्ट्रीम हाइड्रोकार्बन क्षेत्र की गतिविधियों की सूचना तथा प्रचार–प्रसार का औपचारिक स्रोत के रूप में उपलब्ध कराना है और इसमें हाल ही में इस क्षेत्र में किए गए नीतिगत सुधारों एवं उपलब्धियों को प्रदर्शित किया गया है। मुझे पूर्ण विश्वास है कि इस रिपोर्ट से तेल उद्योग के स्टेकहोल्डर को महत्वपूर्ण जानकारी मिलेगी।

भवदीय

अ. चक्रवर्ती

अतनु चक्रवर्ती

Evolution of Upstream Indian Oil and Gas Industry



Evolution of Upstream Indian Oil and Gas Industry

1.1. History of Upstream Oil and Gas Industry

The story of oil exploration in India began in the dense jungles, swamps and river-valleys of the north-eastern corner of the country. Lt. R. Wilcox, Major A. White, Capt. Francis Jenkins, Capt. P.S. Hanny, W. Griffith, W. LicutBigge - they all saw at different times petroleum seepages from the banks of river Dihing. Mr. C.A Bruce (1828) and Mr. H.B. Medicott (1865) of the Geological survey of India also saw oil seepages while prospecting for coal in Upper Assam.

Barely seven years after Edwin L. Drake drilled the world's first oil well in 1859 at Titusville, Pennsylvania, USA, in 1866, Mr. Goodenough of McKillop, Stewart & Company, Calcutta, drilled a hand-dug well of 102 feet at Nahorpung near Jaipur area of Upper Assam but failed to establish satisfactory production. In his second attempt on 26 March 1867, oil was struck at merely 118 feet (35.97-m) in Asia's first mechanically drilled well at Makum near Margherita area of Upper Assam.

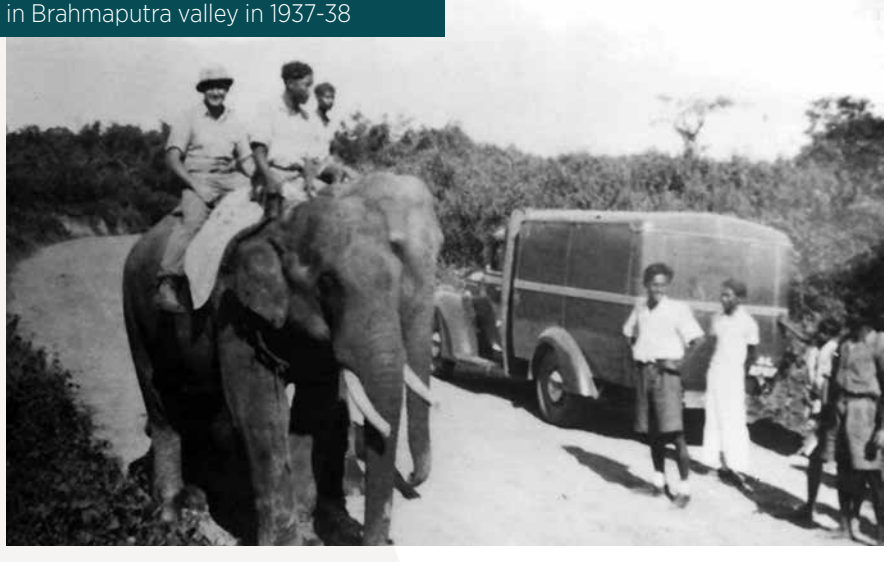
However, the first well dug at Digboi field in Assam in September 1889 and completed in November 1890 at depth of 662 feet by Assam Railways and Trading Company Limited (AR&T Co. Ltd.), registered at London, is regarded as the first commercially successful oil discovery (200 gallons per day). To add colour to geologic reasoning, legend was created that during the construction of a railway line by AR&T, in the year 1867, a herd of logging elephants returned to camp with their feet covered in oil after a night-time excursion to find food and water. This led men to trail to the salt lick where seepages were prolific. Looking this, the elated English owner cried out to his men, "Dig boy, dig". Probably the name Digboi itself came from that word.

AR&T subsequently acquired a 77.7 square kilometer petroleum-rights concession in the Makum area of Assam, and by 1893, it had drilled 10 wells at Digboi producing 757.08 liters/day. AR&T established Assam Oil Company (AOC) in 1899 with a capital of £310,000 to take over the petroleum interests of AR&T, including the Digboi and Makum concessions and set up a small refinery at Margharita (Upper Assam) with a capacity of 500 BOPD to refine the Digboi-oil. Thereafter, systematic drilling began in 1891 and two years later in 1901, Asia's first oil refinery was set up at Digboi. It is still functional as the world's oldest operating refinery.

Failure to utilize geologic reasoning, promiscuous wild catting, misguided investment and nonchalance of the management towards technical support led to compounding of errors by AOC which made the company technically and financially impotent. Later, UK based Burma Oil Company (BOC) arrived in 1911 in Upper Assam (Surma Valley) and in 1915, after acquiring Oil interest from Budderpore Oil Co. Ltd (formed by a syndicate of Budderpore tea garden during 1911-13) began testing option in the Badarpur structure in the Surma valley (Upper Assam). Gradually by 1921, in a phase-wise manner, BOC acquired petroleum interests of AOC.

Torsion balance which was successfully adapted for geophysical surveys of oil was used at Bordubi (Assam) by a geophysical team in 1925. The Indian Co. "TATA Engineering co." has also drilled several wells in Jagatia, Gujarat and produced small amount of gas in 1930s. In 1937, BOC jointly with British Petroleum (then Anglo-Iranian Oil Co.) and Shell proposed to Govt. of India to carry out a geophysical survey of the important plain areas of India. The proposal was accepted, and a new form of grant known as geophysical license was issued by Assam Government. In Assam, successful seismic survey was carried out in Naharkatiya during 1937-39, triggering new enthusiasm in oil search and it became forerunner of discoveries in Assam basins and others also. The successful outcome of well NHK-1 in 1937 was vindication for geophysical method in oil exploration.

Elephants being used in seismic survey in Brahmaputra valley in 1937-38



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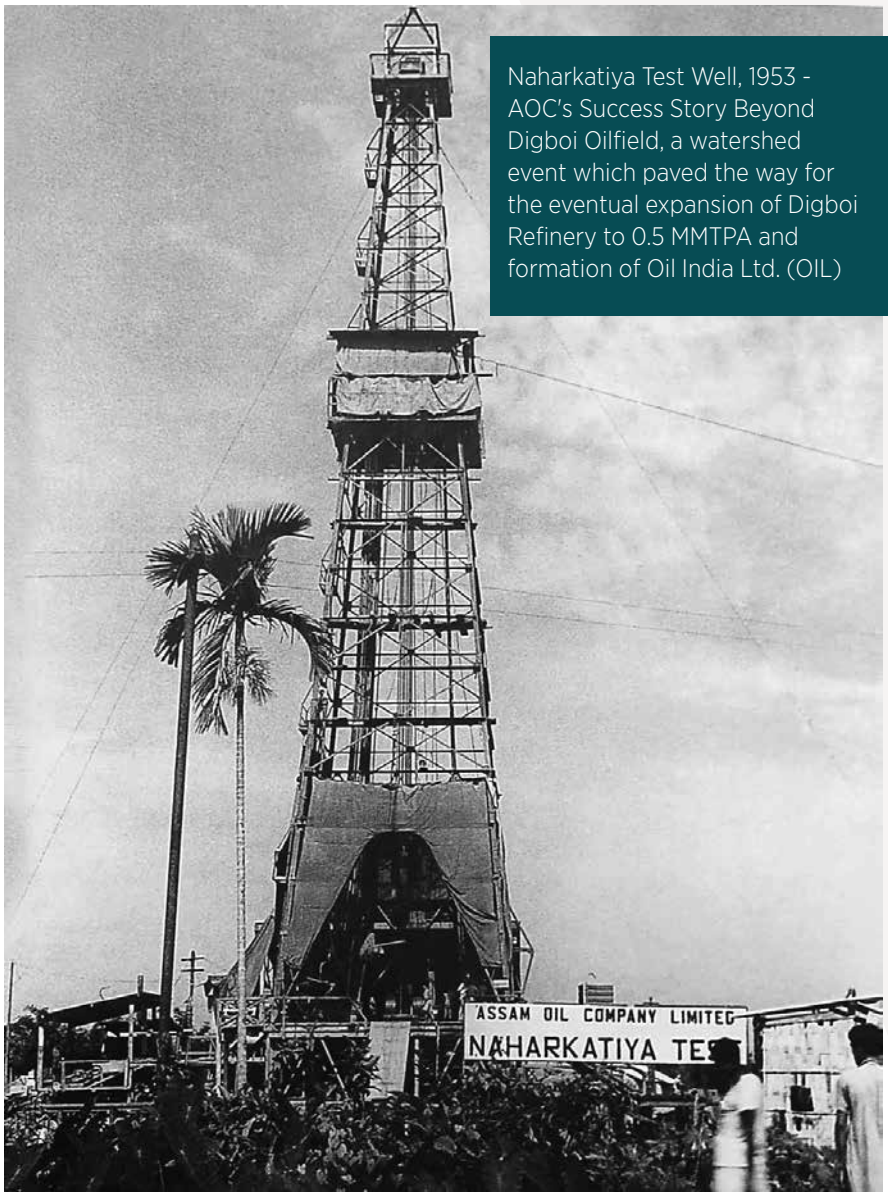
Assam Shelf & Assam-Arakan Fold Belt (AAFB): Tectonically, the Assam-Arakan Basin has been subdivided in to two major Basins viz., Assam Shelf & Assam-Arakan Fold Belt. Assam Shelf is along the Brahmaputra River from Dibrugarh in northeast to Dhubri in the southwest and Arunachal Pradesh and its area is 57,000 sq. km. Assam-Arakan Fold Belt (AAFB) covers the southern districts of Assam and the states of Tripura, Mizoram, Manipur and Nagaland and its area is 60,000 sq. km. The prognosticated hydrocarbon resources (5,040 million metric tons (MMT)) is around 18% of the country (likely to Increase). Resources in Assam Shelf is 11% & Assam-Arakan Fold Belt is 7%. Out of which volume of 2,224 MMT (44%) has been established so far. 40% of Sedimentary Basin area has been appraised so far and considerable opportunities exist to establish the remaining 56% of the hydrocarbon and to discover, develop and produce the same. The Assam Shelf basin is explored. However Assam-Arakan Fold Belt is yet to be explored extensively. Structural complexities and difficult terrain are an integral part of Fold Belt, which have influenced the exploration inputs and exploration strategy for this area.

Oil and gas are established from clastic reservoirs of Mio-Pliocene-Girujan, Miocene-Tipam, Oligocene-Eocene–Barails, Mid-Upper Eocene-Kopilli, Lower Eocene–Lakadong and Therria and from the fractured Archean Basement. The Miocene-Oiligocene–Tipam and Barail Formations contain most of the discovered oil.

Area under PEL ~16% | Area under PML ~9% | 75% Area is open under HELP/OAL | 5 PSU Cos., 6 Indian Private and 2 Foreign Cos. are working in the basin under PSC Regime

Production: Average crude oil production ~11.54 Thousand tons per day (TPD)/4.20 (MMT) Average rate of gas production is around ~8.6 MMSCMD/3.13 BCM

The world knew importance of oil and after Independence; Indian leaders realized its utility for rapid industrialization and security of nation.



Naharkatiya Test Well, 1953 - AOC's Success Story Beyond Digboi Oilfield, a watershed event which paved the way for the eventual expansion of Digboi Refinery to 0.5 MMTPA and formation of Oil India Ltd. (OIL)

The company rule which were earlier framed to satiate the raw material need of British Empire was re-framed. While framing industrial policy 1948, the development of petroleum industry in the country was given top priority.

By 1948, GSI has started geophysical survey in Cambay area. The first oil discovery in independent India was made by AOC on 1953 in Naharkatiya and then in Moran in 1956 both in Upper Assam. The oil industry, after independence, remained operated by foreign company for a considerable period. Burma Oil Company (BOC) kept its position as largest company in India till end of its operation.

In 1955-56, a delegation led by Mr. K.D. Malviya, Minister of Natural Resources, visited several European countries to study status of Oil industry in those countries and facilitate training of Indian professionals. Foreign experts also visited India to share their know-how. Erstwhile USSR helped to draw a detail plan for geological and geophysical survey and drilling plan in second five-year plan (1956-57 & 1960-61).

With the intention of intensifying and spreading exploration to various parts of the country, a separate **Oil and Natural Gas Directorate (ONGD) was set up in 1955,** as a subordinate office under the then Ministry of Natural Resources and Scientific Research. The department was constituted with a nucleus of geoscientists from Geological Survey of India. But soon

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after its formation it was realized that the directorate cannot function efficiently with its limited financial and administrative liberty and in early 1956, its status was changed to a commission. **In October 1959, the ONGC was made a statutory body** by an act of parliament delegating it more power but it remained under Ministry. The job of ONGC was defined as "to plan promote, organize and implement programs for development of Petroleum Resources and the production and sale of petroleum and petroleum products produced by it, and to perform such other function as the central government may, from time to time, assign to it".

ONGC systematically started its geophysical surveys on area considered prospective based on global analogy. Further, thrust was given for survey in area of Himalayan foothills and adjoining Ganga plains, alluvial tracts of Gujarat, upper Assam and basins of Bengal. The exploratory drilling carried out in Himalayan foothill during 1957, remained unsuccessful. Within a year of being formed, ONGC discovered oil at Cambay. The giant Ankleshwar field in the state of Gujarat in 1960, Kalol in 1961, Lakwa in 1964, Geleki in 1968 and gas discovery-Manhartibba in Rajasthan in 1969 were discovered subsequently.

Cambay Basin: The Cambay Rift Basin covering an area of about 53,500 sq. km. is a Category-I Basin and encompasses a narrow, elongated rift graben, extending from Surat in the south to Sanchor in the north. In the north, the Basin narrows, but tectonically continues beyond Sanchor to pass into the Barmer Basin of Rajasthan. On the southern side, the Basin merges with the Bombay Offshore Basin in the Arabian Sea. The first show of oil was seen in September 1958 from exploratory well at Lunej in Cambay Basin of Anand district. This oil discovery dispelled the myth that there is no viable oil source in India, apart from some small ones in Assam. Since the discovery of first exploratory well on Lunej (structure near Cambay in 1958, more than 2,300 wells have been drilled in the Basin by various companies.

The evolution of Cambay Basin from the petroleum point of view is well understood and hydrocarbon accumulations are known in all sequences ranging from Paleocene to Miocene. Major accumulations are known in Middle Eocene structural traps over block uplifts and block edge folds. There are several petroleum systems in the Basin and the most important one is the Cambay-Hazad Petroleum System which is related to several large oil and gas fields. The Cambay-Hazad Petroleum System in South Cambay Basin, has original in-place oil and gas reserves of 395 million tonnes. The system covers 9,320 sq. km. encompassing 20 different oil and gas accumulations.

Currently exploration of the Cambay Rift Basin is in matured stage and bears a good chance of maximizing the probabilities of discovering small fields in subtle traps.

Area under PEL ~13 % | Area under PML ~6 % | 81% Area is open under HELP/ OAL | 7 PSU Cos., 26 Indian Private and 9 Foreign Cos. are working in the basin under PSC Regime

Production: Average crude oil production ~12.65 Thousand tons per day (TPD) / 4.60 MMT Average rate of gas production is around ~4.3 MMSCMD/ 1.56 BCM

Meanwhile, on 18th February 1959, for development and production of Naharkatiya and Moran prospects and to increase the pace of exploration in Assam, Oil India Private Limited was incorporated as a rupee company to take over BOC's affairs in Assam. The company was owned two-third by AOC/BOC and 1/3rd by Government of India and in 1961 they became equal partners by transforming OIL into a Joint-Venture (JV) company. OIL discovered Kusijan oilfield in 1969 and Jorajan oilfield in 1972. Later, Eocene gas was discovered by OIL in Tengakhat field of Assam in 1973.

Offshore exploration was initiated by ONGC in the form of experimental seismic survey in 1962 in Gulf of Cambay and later in western offshore. Detailed seismic surveys in western offshore resulted in a discovery of large structure in Bombay-offshore in 1972-73 and drilling lead to India's biggest commercial discovery – Bombay-High.

Mumbai Offshore Basin: The Mumbai Offshore Basin is the most prolific of all the hydrocarbon bearing provinces in India. Mumbai High field is approximately 160 km west of the Mumbai coast and was discovered in 1974 by the Russian and Indian team from seismic exploration vessel, 'Academic Arkhangelsky', while mapping the Gulf of Cambay between 1964 and 1967. The discovery of Bombay High with subsequent other discoveries of oil and gas fields in western offshore changed the oil scenario of India.

Different oil and gas reservoirs namely, L-I; L-II; L-III; L-IV; L-V; basal clastics and fractured basement from top to bottom, are present on the Mumbai High project. L-II and L-III are primarily the limestone oil reservoirs of Miocene age, further classified into several layers.

Bounded by Diu and Narmada Faults and Deccan Trap outcrops to its north and east, the pericratonic Mumbai Offshore Basin extends towards west parallel to the western continental margin of India up to the Western Margin Basement Arch. NE-SW trending Vengurla Arch separates the Basin from the Kerala-Konkan Basin to its south. Based on structural elements and the nature of sediment fill which influenced characteristic hydrocarbon generation and entrapment patterns in different sectors, the Basin is subdivided in to a number of blocks, viz. Tapti-Daman block, Diu block, Heera-Panna-Bassein block, Mumbai High-Deep Continental Shelf block, Shelf Margin block and the Ratnagiri block.

Continued and sustained exploratory and development efforts in Mumbai Offshore Basin since last four decades have shown remarkable results and led to conversion of nearly 54% of the prognosticated resource of 9,190 MMToE in to In-place volume of hydrocarbons.

Area under PEL ~21% | Area under PML ~29% | 50% Area is open under HELP/OAL | five PSU Cos., Three Indian Private and one Foreign Cos. are

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working in the basin under PSC Regime

Production: Average crude oil production ~46.87 Thousand tons per day (TPD) / 17 MMT Average rate of gas production is around ~50.24 MMSCMD/ 18.29 BCM

Encouraged by Bombay-High discovery, exploration was furthered in entire western offshore including Kerala-Konkan basin and eastern offshore area. This led to large discovery of Bassein and Neelam in western offshore and PY-3 and Ravva in Eastern offshore.

Cauvery Basin: Cauvery Basin is pericratonic Basin, evolved due to rifting between India and Sri Lanka during the break-up of Eastern Gondwana land (Katz, 1978) during Late Jurassic-Early Cretaceous and subsequent drifting (Late Aptian) of Indian plate from Gondwana land along NE-SW oriented Eastern Ghat trend. The rifting has created several horsts and grabens. The present-day horst and graben picture of Mesozoic-Cenozoic stratigraphic column have been related to two principal tectonic episodes namely, extension stage during Late Jurassic – Early Cretaceous and thermal subsidence stage during late Cretaceous to Cenozoic. Cauvery Basin has been divided into sub-basins, namely Ariyalur-Pondicherry, Tranquebar, Nagapattinam, Tanjore, and Ramnad-Palk Bay separated by Kumbakonam-Madanam, Pattukottai-Mannargudi & Mandapam-Delft ridges. Concerted efforts to explore the Basement play resulted in major success with discovery of hydrocarbons from Madanam, Pandanallur and Chidambaram areas.

Exploratory drilling in Madanam and Pandanallur areas established the commercial hydrocarbons from basement play in Cauvery on land area. The other important operative plays in Cauvery onland are - Andimadam Play : (prolific producer in Kuthalam-Kali, Pallivaramangalam–Vijayapuram, Periyakudi fields and is characterised by poor porosities and low permeabilities). Bhuvanagiri Play: (Well established in Pallivaramangalam – Vijayapuram, Pundi, Kanjirangudi and Periyapattinam fields tight reservoirs), Nannilam Play (in most of the wells drilled in Ariyaluru-Pondichery sub basin,well established in Nannilam, Tiruvarur, Kanjirangudi, Periyapattinam, Perungulam and PBS fields) Kamalapuram Play (The Paleocene play is well established in Adaiyakkamangalam, Kamalapuram, Nannilam, Kuthanallur & few fields in Ramnad sub-basin).

Recent discovery from synrift sequence gave a major impetus to synrift play and chance of discovering large fields in the Basin. However, as in the case of Krishna-Godavari, this play is also known for HP-HT conditions. In Cauvery offshore, there is no much breakthrough except in the established **PY and PH fields**. Recent discoveries reported in Cauvery shallow water, deep waters and from Srilanka /Gulf of Mannar Basins have rekindled the exploration interest in the Cauvery Offshore.

Area under PEL ~9% | Area Area under PML ~3% | 88% Area is open under HELP/OAL | 7 PSU Cos., 4 Indian Private and two Foreign Cos. are working under PSC Regime

Production: Average crude oil production ~0.78 Thousand tons per day (TPD) / 0.29 (MMT) Average rate of gas production is around ~2.75 MMSCMD/ 1 BCM

OIL also ventured from Assam to Orissa both in onshore and offshore. During 1979-89 it went to Andaman offshore and Rajasthan onshore. By the end of 80s, ONGC and OIL have together drilled nearly 3100 wells totaling 4.9 million metres.

ONGC's geo scientific survey spread out to UP, Bihar, Tamil Nadu, Rajasthan, J&K, Kutch and Andhra Pradesh. By mid 1980s, ONGC successfully discovered prospects in Cauvery and KG basin. Kharsang oilfield was discovered by OIL in 1976 and in the same year ONGC discovered one of India's biggest gas find of 283.17 BCM in the Bassein fields off Mumbai's coast. Other gas fields discovered by ONGC were mid-Tapti, south Tapti and B-55. In 1978, OIL ventured out of Assam into Orissa offshore and onshore. OIL also ventured into offshore Andamans in 1979-89 and onshore Rajasthan.

Till the end of 1970s, Indian E&P industry was dominated by the two National Oil Companies (NOCs)-ONGC and OIL to whom PELs were granted on nomination basis. Exploration was primarily confined to onland and shallow offshore. The strategic initiative was taken by government in 1979 to attract foreign investment, technology and capital to deal with future commitment and challenges of Indian oil economy by offering 32 exploration blocks (17 offshore & 15 onshore). Government started offering block systematically through bidding. These rounds are also known as Pre-NELP Exploration rounds. The three rounds during 1980-86 were not very successful.

By 1981, Government took over OIL and it became full-fledged PSU. In 1982, ONGC made its biggest gas discovery

Digboi Naharkatiya road under construction in 1955

Bombay High discovered by ONGC in 1974

in Gandhar, Cambay basin, Gujarat and by 1986, KG basin were put in global map with several substantial discoveries made. By the end of 1986, third round of international bidding for exploration block were offered. OIL and ONGC were offered 40% stake in JV, if field was found viable. Few foreign companies participated but there was no committed exploration or breakthrough discovery. The foreshore terminal of IOC was commissioned in Madras (Chennai). However, OIL and ONGC's effort continued in several parts of India and by 1989 OIL discovered gas in Tanot (Mata Temple) in Rajasthan and ONGC discovered south Heera in Mumbai offshore.

In 1990, Fourth round of bidding invited and for the first time, Indian companies could participate with foreign companies. However, no major discovery was made with these partnerships. In 1991, Government of India (GoI) adopted liberalized economic policy that led to de-licensing of core group including petroleum sector and partial dis-investment of government share including other measures. As a result, ONGC was re-organized as a Limited company (under the Company's Act, 1956) from Oil and Natural Gas Commission to Oil and Natural Gas Corporation Limited.

To give momentum to Petroleum sector in India, GoI came up with more lucrative offers in 1994. However, this also led to disagreement in Production Sharing Agreement. In couple of years, ONGC ventured into CBM in Damodar valley and explored EOR options in heavy oil belt of North Gujarat. By 1996, Government conducted 5 rounds of bidding and offered 126 blocks having area in the range of 1 sq. km. to 50,000 sq.km. Beside National Oil Companies and Indian Private Companies, some important companies like Shell, Enron, Amoco and Occidental participated in exploration and contracts were awarded to them.

The government efforts particularly during 1991-96 gave required thrust for opening Oil and Gas sector in India. After this, the process of opening the sector became more streamlined. Many private players also joined in development of this industry. Hindustan Oil Exploration Company (HOEC) which started its E&P venture in 1991, was among few such initial domestic private player.

In view of the liberalized policy adopted by GoI, a need for an independent upstream regulatory body called the Directorate General of Hydrocarbons (DGH) was envisaged to oversee and review the oilfield development programs to conform to sound reservoir engineering practices in line with national interests. Thus, DGH was formed vide GoI resolution dated 08.04.1993.

After the Nomination era till late 1970s, Pre-NELP Exploration era (1980-95) and Pre-NELP Field rounds (1993-94), Government of India formulated

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a policy called as New Exploration Licensing Policy in 1997. The main objective was to attract significant risk capital from Indian and Foreign companies, state of art technologies, new geological concepts and best management practices to explore oil and gas resources in the country to meet rising demands of oil and gas. NELP policy was approved in 1997 and became effective in February 1999. Since then licenses for exploration were awarded only through a competitive bidding system and National Oil Companies (NOCs) were required to compete on an equal footing with Indian and foreign companies to secure Petroleum Exploration Licenses (PELs). Nine rounds of bids have so far been concluded under NELP, in which production sharing contracts for 254 exploration blocks have been signed. Under the PSC regime, two major basins were opened commercially, these are Rajasthan and Krishna-Godavari Basin.

Rajasthan Basin: The 1,26,000 sq. km. of recent sediment covered area to the west of Aravalli up to Pakistan border which is a part of the Thar desert, is designated as the Rajasthan peripheral foreland Basin. It is a part of the Indus Foreland. It is divided into four sub-basins/sectors:-(i) Jaisalmer sub-basin (JB) on the north western slope of the Jaisalmer-Mari basement arch (JMA), (ii) Bikaner-Nagaur (BN) sub-basin on the northeast flank of the arch, (iii) Shahgarh-Miajlar (SM) sub-basin southwest of the arch and (iv) Barmer-Sanchor (BS) sub-basin south of the arch (extension of Cambay Basin). Recent discoveries of oil and gas from this Basin have enhanced the perception.

Barmer–Sanchor sub-basin is a lacustrine failed rift comprising the sedimentary sequence of more than 6 km ranging in age from Mesozoic to Cenozoic with prolific Eocene source rocks. High quality reservoirs are encountered in the Upper Cretaceous-Paleocene, syn rift deposits. Number of oil and gas discoveries like Saraswati, Rageshwari, Kameshwari, Mangala, Aishwarya, Shakti, Bhagyam are some of the significant fields in Barmer-Sanchor sub-basin.

Area under PEL ~10% | Area under PML ~4% | 86% Area is open under HELP/ OAL | 7 PSU Cos., 7 Indian Private and 6 Foreign Cos. are working under PSC Regime

Production: Average crude oil production ~22.43 / Thousand tons per day (TPD) / 8.16 (MMT) Average rate of gas production is around ~3.5 MMSCMD/ 1.27 BCM

KG Basin: The Krishna-Godavari Basin constitutes a typical passive margin Basin and has a polycyclic (dual-rift province) evolution history. Basin comprises a wide array of sedimentary facies from early Permian through Cenozoic with the analogous outcrops defining the Basin limitation, along the north western part of the Basin. It is spread over an area of 28,000 sq. km. in the onland and 14,500 sq. km. (24,000 sq. km. up to 200 m isobath) in the Bay of Bengal offshore.
The prospective area for oil & gas exploration in onland covers the three coastal districts of East Godavari, West Godavari & Krishna and in Offshore till 85° East ridge. Efforts by both NOC's and Private oil companies have unlocked huge hydrocarbon reserves. The major plays established in KG Basin are Mandapeta (Permo-Triassic), Syn-Rift Gollapalli/ Nandigama/ Kanukollu (Late Jurassic to Lower Cretaceous, Raghavapuram (Early-Late Cretaceous), Pasarlapudi/Vadaparru (Late Palaeocene to Eocene), Matsyapuri/Ravva (Oligocene to Miocene) and Godavari (Pliocene). Both biogenic and thermogenic petroleum system are operative in the Basin.

The Basin has distinction of reporting maximum number of discoveries in the last decade. As such, this Basin has shown a very high degree of hydrocarbon potential, particularly in deep waters off the Godavari river mouth, essentially from Mio-Pliocene & Pleistocene Formations. Similarly, recent discoveries of gas from Machilipatnam bay area from Eocene–Pliocene Formations from shallow water segment endorses for sustained exploration. Based on trend of discoveries, there are good chances of discovering large fields, especially from deep water segment.

In KG deep waters mainly slope-channel-levee-complex, debris flows, low stand wedge and Basin floor fan complexes remain as major targets. In shallow water growth fault related structures, channel fills combination traps, upper slope fans remain as attractive plays particularly in the delta-slope transition. In on land, the deeper synrift plays remain as major attractive play.

Area under PEL ~14% | Area under PML ~7% | 79% Area is open under HELP/ OAL | 7 PSU Cos., 4 Indian Private and 5 Foreign Cos. are working under PSC Regime

Production: Average crude oil production ~3.44 Thousand tons per day (TPD) / 1.25 (MMT) Average rate of gas production is around ~12.42 MMSCMD/4.52 BCM

With huge scope of activities and development in Oil and Gas sector in India, a lot of history in this sector is yet to be written.

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1.2. Formation of Directorate General of Hydrocarbons (DGH)

The liberalized economic policy adopted by the Government of India (GoI) in July 1991 sought to deregulate and de-license the core sectors (including the petroleum sector) with partial disinvestments of government equity in Public Sector Undertakings along with other measures. The upstream petroleum sector was largely a monopoly of public sector companies till then and the sector was being increasingly opened to new operating companies in the private and joint sectors. Thus, a need was felt to establish an agency that could effectively supervise the activities of all these companies in the national interest.

The same was elucidated by the committee headed by late Dr. A. B. Dasgupta, which recommended for creation of an autonomous conservation board to oversee and review oilfield development programs for sound reservoir engineering practices in line with national interests. Subsequently, a committee was constituted in 1992 under the chairmanship of late Shri P. K. Kaul, former Cabinet Secretary, to examine the need for restructuring ONGC's organizational structure. This committee also recommended for establishment of an independent regulatory body called the Directorate General of Hydrocarbons (DGH) for discharging the regulatory functions of leasing and licensing, safety and environment and development, conservation and reservoir management of Hydrocarbon resources in India.

Accordingly, Directorate General of Hydrocarbons was set up through GoI resolution No. O-20013/2/92/ ONG-III dated 08.04.1993 under the administrative control of the Ministry of Petroleum and Natural Gas.

1.2.1. DGH – Objective:

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.

Fig. 1.1.

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Exploration and Production Regime in India

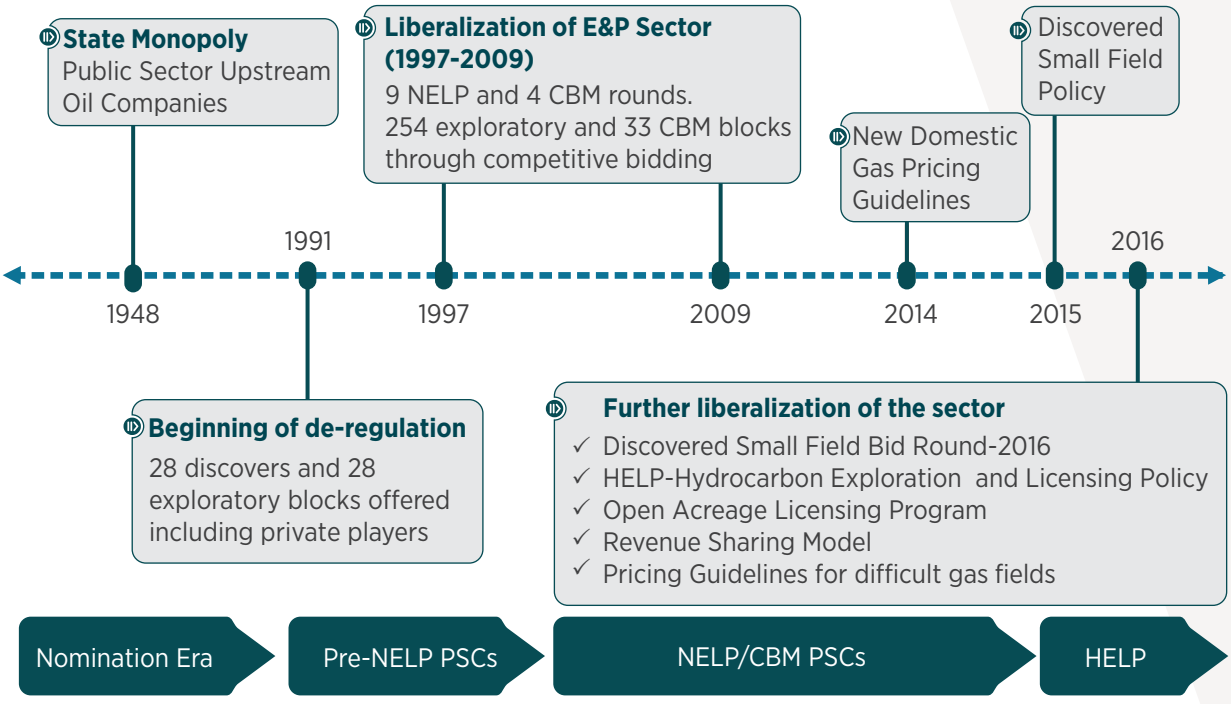

Fig. 1.2. Exploration and Production Regime in India

1.2.2. Role and Functions of DGH:

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.

i. A nodal agency for implementation of NELP and CBM policy on behalf of Ministry of Petroleum & Natural Gas

ii. To advise Ministry of Petroleum & Natural Gas on Exploration Strategies & Production Policies

iii. 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

iv. To review the exploration programs of companies operating under Petroleum Exploration Licenses 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 programs.

v. To evaluate the hydrocarbon reserves discovered and estimated by the operating companies

vi. To advise the Government on the offering of acreages for exploration to companies as well as matters relating to relinquishment of acreage by companies

vii. 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

viii. To review and audit concurrently the management of petroleum reservoirs by operating companies and to 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

ix. 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

x. All other matters incidental thereto and such other functions as may be assigned by Government from time to time

xi. Assist Government in contract management functions

xii. Exploration & Development of unconventional hydrocarbon resources like Gas Hydrate, Shale Gas/Oil and Oil Shale

xiii. Issue Essentiality Certificate for importing goods and services used in E&P sector to avail custom duty concessions

1.2.3. Advisory and Administrative Council of DGH:

Advisory Council

Directorate General of Hydrocarbons has an Advisory Council, which is appointed by the Government

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comprising of Chairman and members, who are eminent persons in the field of hydrocarbon exploration and production. The Advisory Council is serviced by the Directorate which is headed by a Director General who is also the Member Secretary to the Council.

Administrative Council

Government of India set up an Administrative Council on 02.02.2001 to guide and to take care of all administrative aspects of the functioning of DGH, through Office Memorandum No. O-32012/1/95-ONG-III dated 02.02.2001. The Administrative Council takes decisions on various matters concerning establishment, budget and undertakes periodical review of the functioning of DGH. It is headed by Secretary (P&NG) and has the following composition:

Table 1.1. Composition of Administrative Council of DGH

Name	Designation
Secretary, MoP&NG	Chairman
Additional Secretary, P&NG	Member
AS&FA, MoP&NG	Member
Joint Secretary (Expl), MoP&NG	Member
Secretary, OIDB	Member
Director General, DGH	Member - Convener

1.3. Award Process under Pre-NELP and NELP Regime

Petroleum Exploration Licenses (PEL) for domestic exploration & production of crude oil and natural gas were granted under four different regimes over a period time.

1.3.1 Nomination Basis:

Till the end of 1970s, Indian E&P industry was dominated by the two National Oil Companies (NOCs) - ONGC and OIL to whom PELs were granted on nomination basis. Exploration was primarily confined to onland and shallow offshore.

1.3.2 Pre-NELP Exploration Blocks:

28 Exploration blocks were awarded to private companies between 1980 and prior to implementation of NELP where ONGC and OIL had the rights for participation in the blocks after hydrocarbon discoveries.Brief details of the Pre-NELP Exploration blocks is provided below and details of blocks awarded is appended in Chapter-7.

Table 1.2. Brief details of the Pre-NELP Exploration blocks

Year	Exploration Rounds	Description	Contracts signed		
			Offshore	Onshore	Total
1980	First round	PSC signed with Chevron, USA and 3 wells were drilled without success, block area was relinquished in 1985	1	0	1
1982	Second round	No PSC signed	0	0	0
1986	Third round		0	0	0
1991	Fourth round	5 PSCs signed	2	3	5
1992		First development round			
1993	Fifth round	Second development round	4	2	6
	Sixth round	First speculative survey round	2	3	5
1994	Seventh round		2	3	5
	Eighth round	Second speculative survey round	1	3	4
1995	Ninth round	JV Exploration Program	1	1	2
TOTAL			**13**	**15**	**28**

In 1993, GoI offered blocks for geophysical and other surveys to update the information on hydrocarbon potential of India's unexplored sedimentary basins. Once the surveys on these blocks were completed, they were to be offered in subsequent rounds of exploration. The Second speculative survey round was launched in 1994 and the third round in 1995. The third round was called as Joint Venture Speculative Survey Round (JVSSR) with a provision of risk participation/ cost sharing by DGH up to 50%. Government of India has signed 28 contracts for blocks offered under Pre-NELP Exploration regime.

1.3.3 Pre-NELP Discovered Field or Development Rounds:

Government offered Petroleum Mining Lease (PML) of small/medium sized discovered fields (proven reserves were discovered by ONGC and OIL) to the private sector in August 1992. Production Sharing Contracts (PSCs) awarded during 1991-1993 had the distinctive feature of operators as private companies with ONGC/OIL as having participating interest. These rounds received overwhelming response from various private E&P operators.Government of India has signed 28 contracts (One PSC for Panna Mukta–PM) for 29 discovered fields under Pre-NELP Discovered (Small and Medium size fields) regime.

Table 1.3. Pre-NELP Discovered Field or Development rounds

Month/Year of award	Round	Blocks offered in Medium sized field Round		Blocks offered in Small sized field Round		Contracts signed
		Offshore	Onshore	Offshore	Onshore	
August 1992	1	6	6	10	21	18
October 1993	2	2	6	4	29	10
Total Contracts signed						**28**

1.3.4 New Exploration Licensing Policy (NELP):

Government introduced healthy competition and public participation by introducing NELP for exploration & production of oil & gas in the country.Under NELP, blocks were awarded to Indian, private and foreign companies through International Competitive Bidding process where NOCs, viz. ONGC and OIL,were competing on equal footing.

NELP not only accelerated the quest for hydrocarbon exploration, but also brought state-of-the-art technology and efficiency of operations/management to the country.

Government of India has signed 254 contracts under NELP regime with National Oil Companies and private (Both Indian and foreign)/ Joint Venture companies. At present, 111 contracts are operational out of total 310 contracts (254 NELP, 28 Pre-NELP Field round and 28 Pre-NELP Exploration) signed so far under various bidding rounds.

The awarded 254 blocks under NELP regime are located in onland (114), offshore shallow water (59) and deepwater (81) areas. As a result of exploratory activities, several unexplored and poorly explored areas, in particular offshore and deepwater areas have been appraised through geophysical surveys and exploratory drilling. Till date, 240 hydrocarbon discoveries (125 Oil and 115 Gas) have been made under various regimes and most of the gas discoveries have been made in offshore - shallow (52) and deepwater blocks (40).

NELP bidding rounds have attracted many Private and Foreign Companies in addition to PSUs. Before the NELP, a total 35 E&P Companies (5 PSUs, 15 Private and 15 Foreign) were working in Nomination and Pre-NELP regime. After the conclusion of nine rounds of NELP bidding, the total number of companies has increased to 117 (11 PSUs, 58 Private and 48 Foreign Companies as Operators and Non-operators/Consortium Partners). Major Private Companies were RIL, Jubilant and Essar. The major foreign companies were British Gas, British Petroleum, the then Cairn Energy (now Cairn India), ENI, Santos and BHP Billiton.

Public Sector Undertakings (PSUs) IOCL, GAIL, BPCL working under MoP&NG and their subsidiaries like Bharat Petro Resources Ltd. (Subsidiary of BPCL), Prize Petroleum Company Limited (Subsidiary of HPCL), have participated in various NELP bidding rounds and have been awarded exploration blocks in various NELP bidding rounds. In addition to central PSU, state PSU like GSPC have participated in various NELP bidding rounds and have been awarded exploration blocks.

The domestic crude oil/gas production in the country consists of oil production from Nomination Blocks/Fields under ONGC and OIL and from the discovered fields and producing Pre-NELP and NELP blocks under the Production Sharing Contract (PSC) regime. The average oil and gas production under the PSC regime during the current year (April' 16– March' 17) is to the tune of 21,2,095 barrels /day (BOPD) and 611.94 Million Standard Cubic feet per day (MMSCFD) respectively.

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Table 1.4. Status of Blocks under NELP (As on 01.04.2017)

Round	Offered	Awarded				Relinquished				Operational			
		Deep Water	Shallow Water	Onland	Total	Deep Water	Shallow Water	Onland	Total	Deep Water	Shallow Water	Onland	Total
NELP-I	48	7	16	1	24	5	15	1	21	2	1	-	3
NELP-II	25	8	8	7	23	8	7	5	20	-	1	2	3
NELP-III	27	9	6	8	23	9	5	5	19	-	1	3	4
NELP-IV	24	10	0	10	20	10	-	6	16	-	-	4	4
NELP-V	20	6	2	12	20	6	1	8	15	-	1	4	5
NELP-VI	55	21	6	25	52	21	2	18	41	-	4	7	11
NELP-VII	57	11	7	23	41	11	4	12	27	-	3	11	14
NELP-VIII	70	8	11	13	32	8	5	5	18	-	6	8	14
NELP-IX	34	1	3	15	19	1	2	1	4	-	1	14	15
Total	**360**	**81**	**59**	**114**	**254**	**79**	**41**	**61**	**181**	**2**	**18**	**53**	**73**

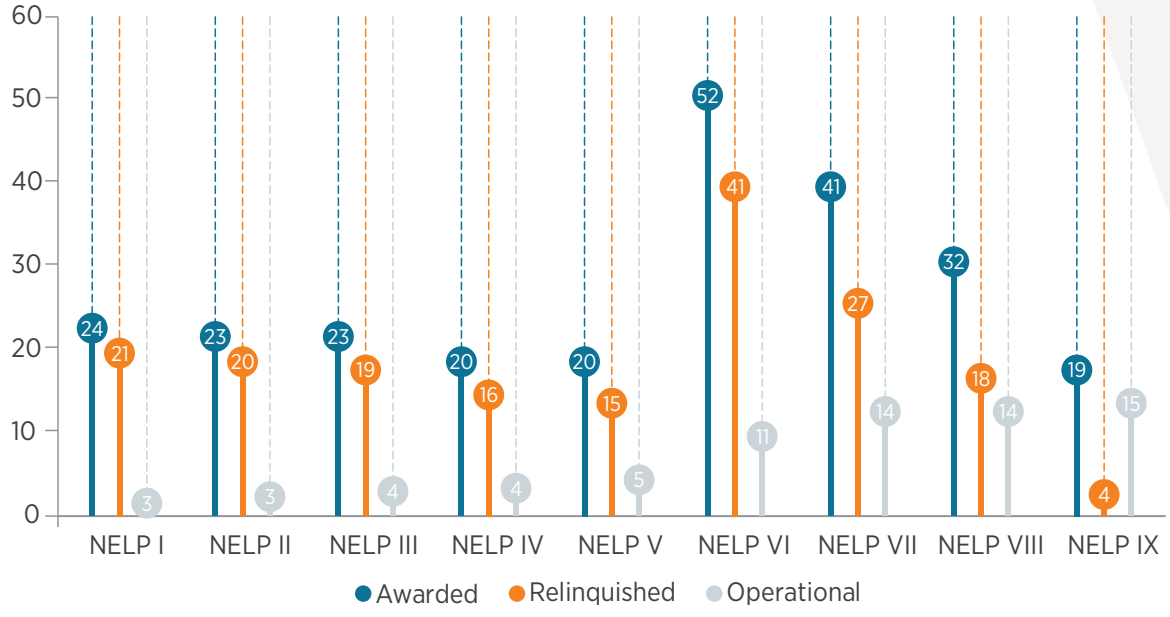

Fig. 1.3. Status of Blocks Awarded under NELP

Table 1.5. Chronology of NELP Bidding Rounds

Round	Launch Year	Signing Year
PRE-NELP Exploration	1980	1980-1995
PRE-NELP Field	1992	1992-1993
NELP-I	1999	2000
NELP-II	2000	2001
NELP-III	2002	2003
NELP-IV	2003	2004
NELP-V	2005	2005
NELP-VI	2006	2007
NELP-VII	2007	2008
NELP-VIII	2009	2010
NELP-IX	2010	2012

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Table 1.6. Investment made in NELP blocks as on 01.04.2017

NELP Committed Investment		Actual Investment as on 01.04.2017		
NELP Rounds	Exploration Investment Commitment (US$ Million)	Actual Exploration Investment (US$ Million)	Actual Development Investment (US$ Million)	Total Investment (US$ Million)
NELP-I	1,082.23	4,721.19	7,873.63	12,594.82
NELP-II	775.41	908.73	33.94	942.67
NELP-III	978.18	3,347.34	1,957.25	5,304.59
NELP-IV	1,135.05	2,095.64	4.54	2,100.18
NELP-V	847.22	1,022.01	1.26	1,023.27
NELP-VI	3,570	2,680.48	1.72	2,682.20
NELP-VII	1,504.61	834.39	0.00	834.39
NELP-VIII	1,102.25	530.90	0.00	530.90
NELP-IX	733.66	190.78	0.00	190.78
Grand Total	**1,1728.61**	**16,331.46**	**9,872.33**	**26,203.80**

PRE-NELP & NELP EXPLORATION BLOCKS UNDER OPERATION BY NOCs & Pvt./JV COMPANIES

Rounds	Contract signed	Operational
Pre-NELP Exploration	28	12
Pre-NELP Discovered	28	26
NELP-I	24	3
NELP-II	23	3
NELP-III	23	4
NELP-IV	20	4
NELP-V	20	5
NELP-VI	52	11
NELP-VII	41	14
NELP-VIII	32	14
NELP-IX	19	15
TOTAL	**310**	**111**

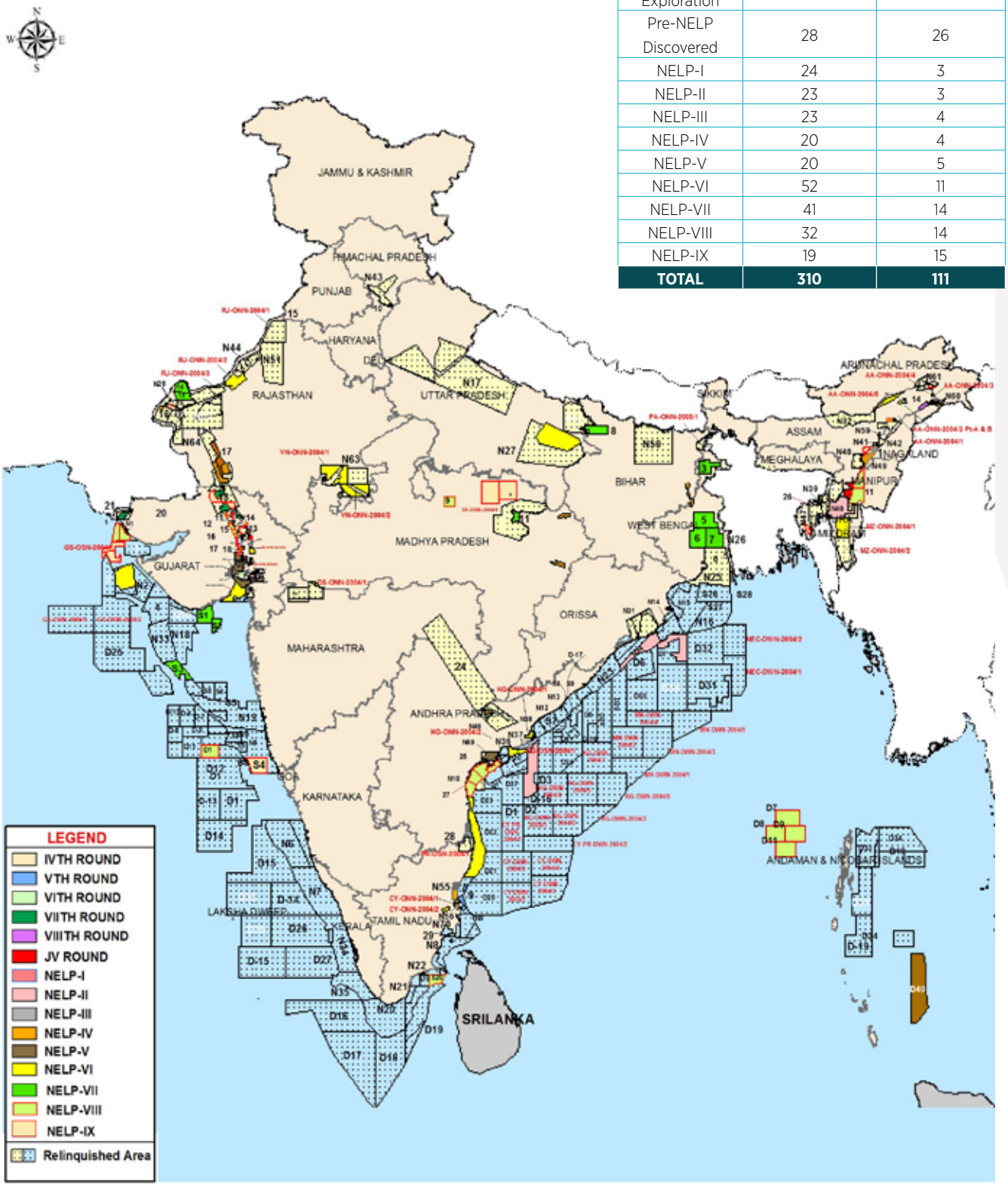

Fig. 1.4. Pre-NELP & NELP Exploration Blocks Under Operation by NOCS & Pvt./JV Companies

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DSF BID ROUND - 2016

15.10.2015	Notification of Discovered Small Fields Policy
25.05.2016	Discovered Small Fields Bid Round-2016 launched
06.06.2016	Mumbai DSF Roadshow
25.06.2016	Guwahati DSF Roadshow
14.07.2016	Houston DSF Roadshow
14.07.2016	Calgary DSF Roadshow
23.08.2016	Dubai DSF Roadshow
09.09.2016	Singapore DSF Roadshow
12.09.2016	London DSF Roadshow
14.09.2016	Aberdeen DSF Roadshow
14.10.2016	Bengaluru DSF Roadshow
15.02.2017	Cabinet Committee on Economic Affairs (CCEA) has approved award of 31 contract areas
27.03.2017	Government of India signs Contracts awarded under Discovered Small Field Bid Round 2016

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Government of India signs DSF - 2016 Contracts

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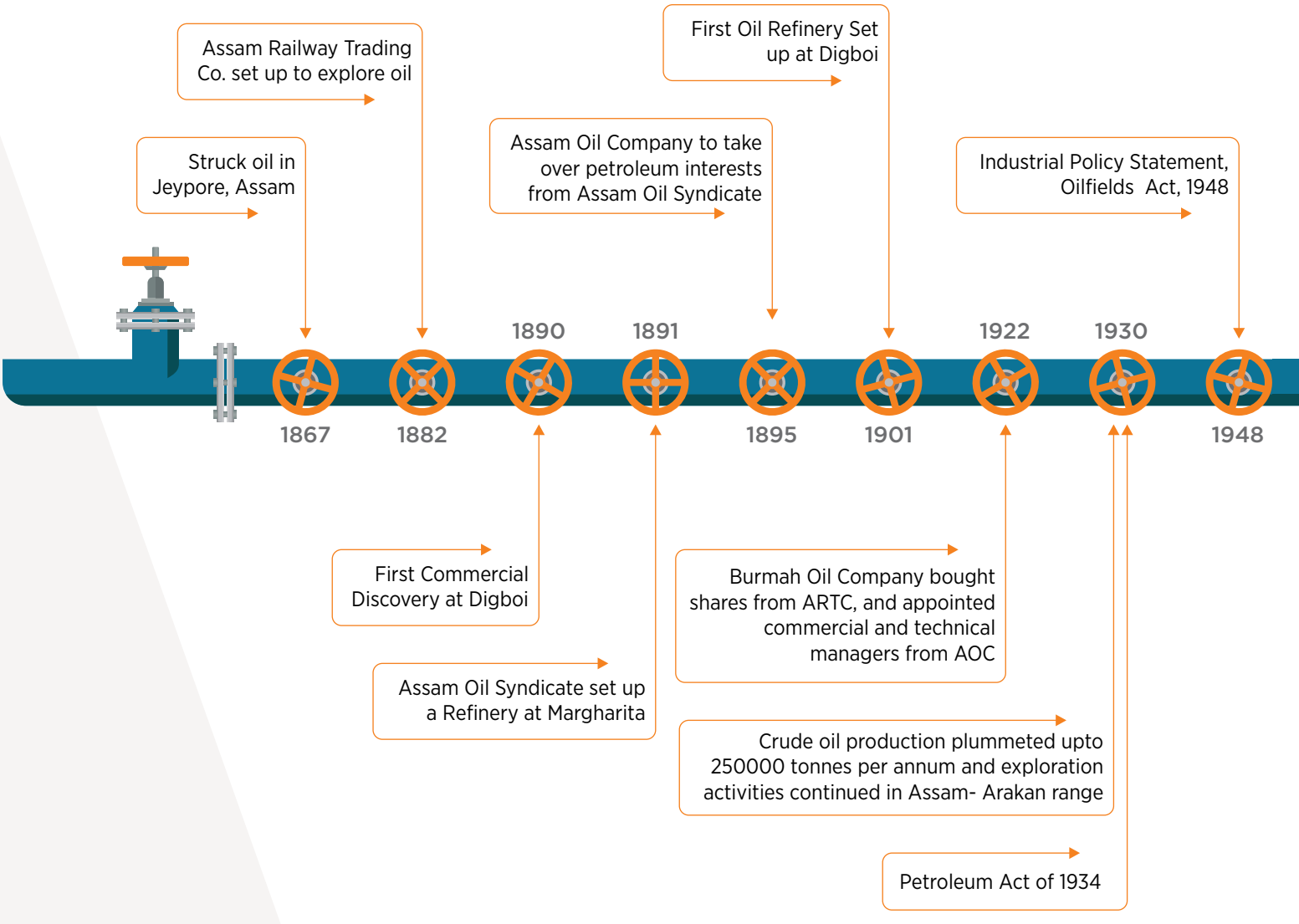

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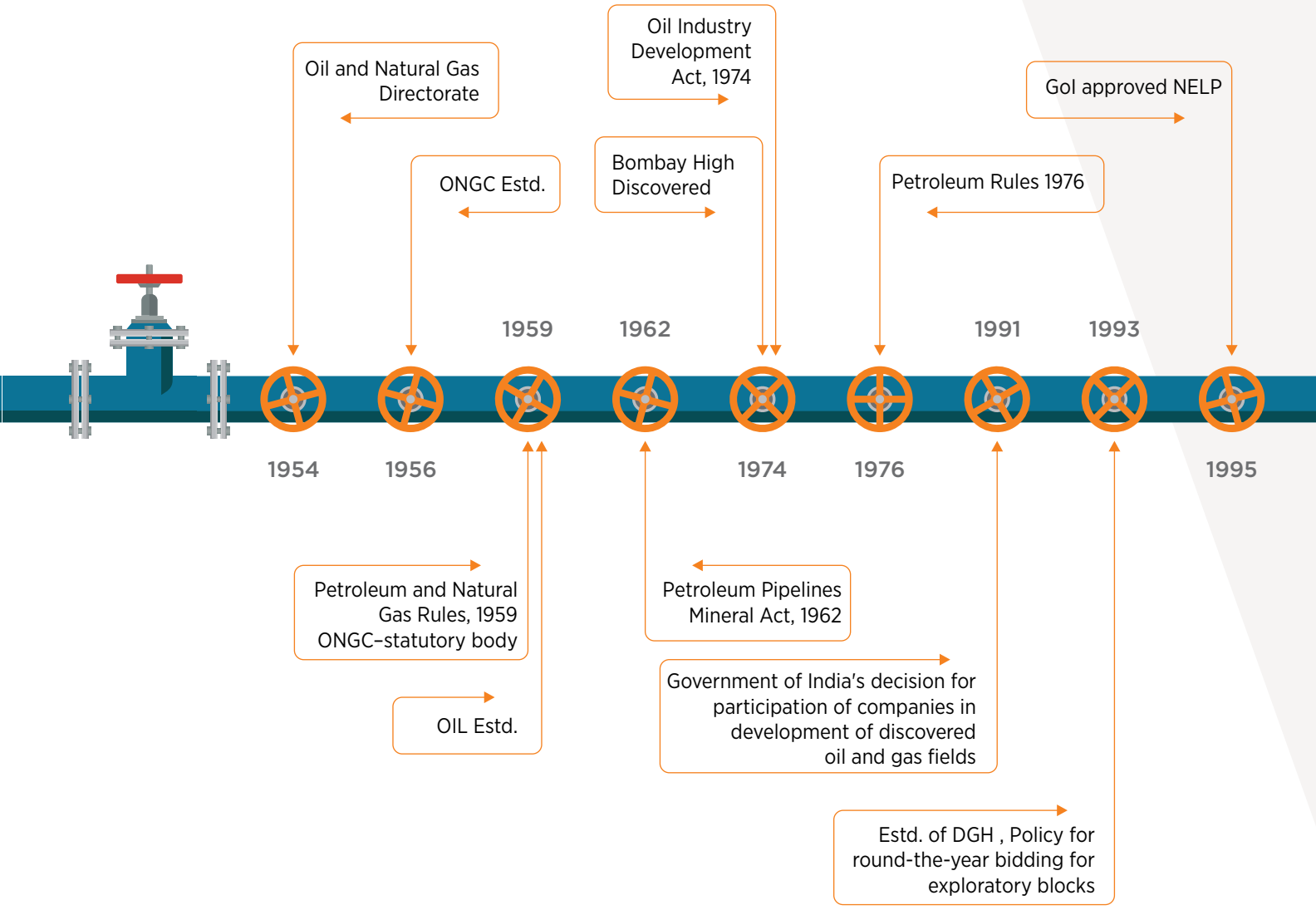

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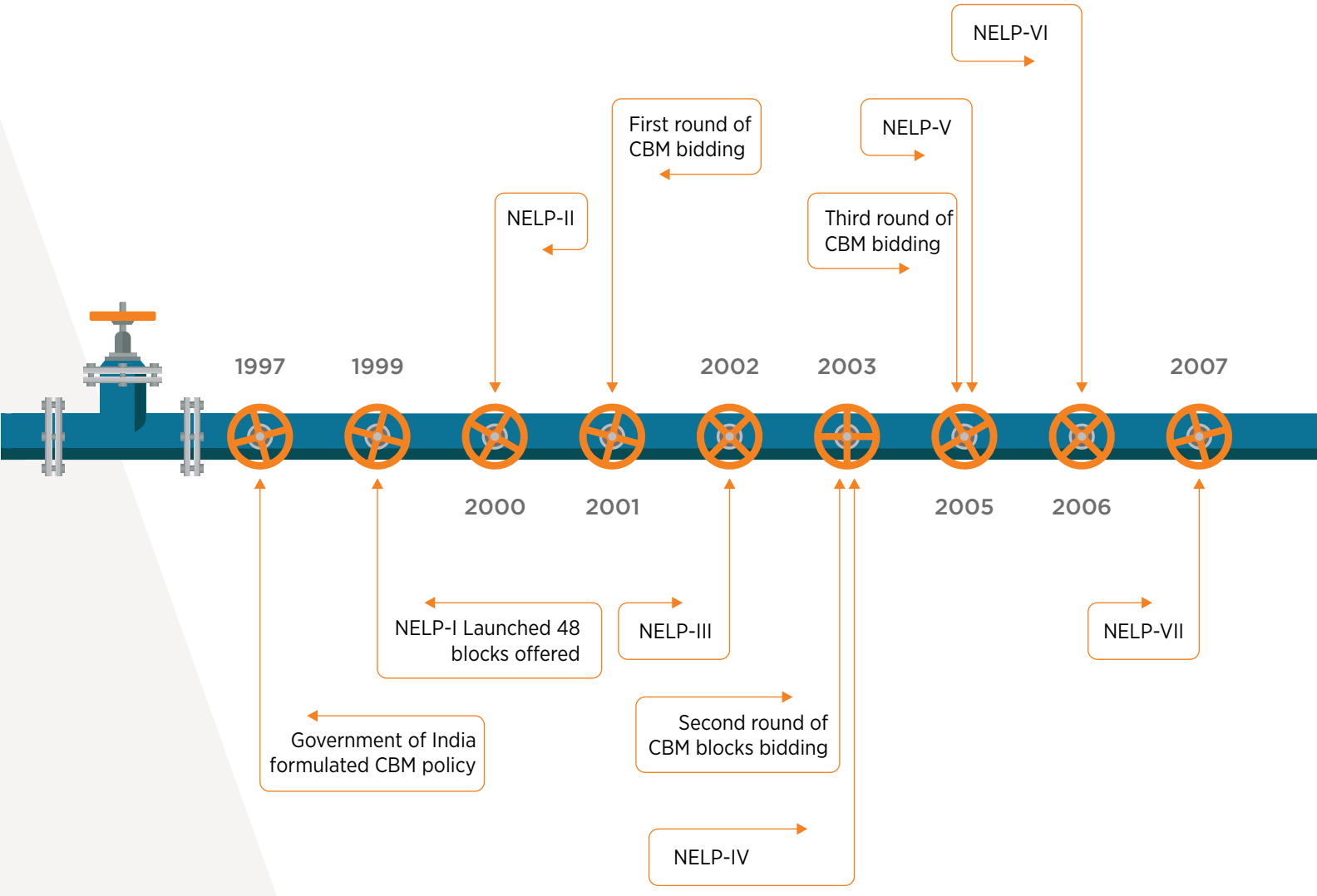

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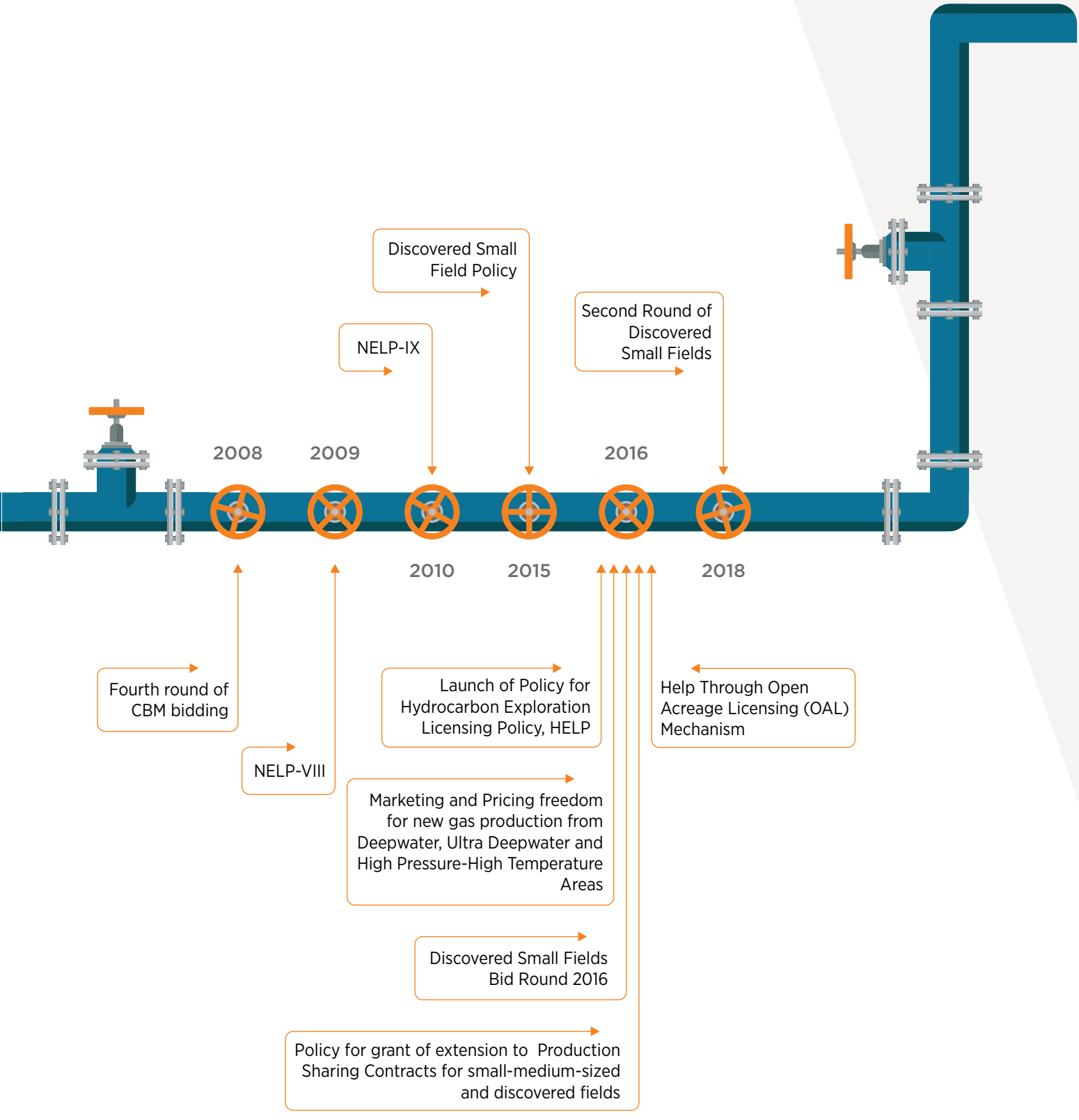

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Investors' Pick

Investors' pick

Robust, predictable and transparent regulatory framework is paramount for infusing investor's confidence in a country. Government of India has ensured to provide a stable environment with little administrative hassles by hosting a slew of investor friendly policies to the fore.

2.1. Policies

2.1.1. Discovered Small (Marginal) Field Policy: Discovered Small Field Bid Round – 2016

Date of Notification: 15 October 2015

Policy Brief:

Over 100+ small fields earlier discovered by ONGC and OIL have not been monetized due to various reasons. To reduce the import dependency of hydrocarbons, to effectively exploit the untapped established reserves and increase indigenous production, Marginal Field Policy was announced. The policy was later rechristened to Discovered Small Field Policy, under the broad policy framework of the new Hydrocarbon Exploration and Licensing Policy (HELP) with several liberal features, such as:

1. Revenue Sharing Contract : A simple and easy way to administer contractual model in line with Government's effort to promote 'Ease of doing business' requiring minimum regulatory burden for field monetisation.
2. Single licence for Conventional & Non-conventional hydrocarbon: Single licence to explore and extract all hydrocarbon resources, including CBM, Shale gas/oil, tight gas, gas hydrates and other resources to be identified in future.
3. No restriction on exploration activity during contract period: Contractor will be allowed to carry out exploration during entire contract duration.
4. Eligibility for Bidding: Up to 100% participation by foreign companies, Joint ventures will be allowed. No mandatory state participation and no carried interest by ONGC and OIL are envisaged.
5. Crude Oil & Gas Pricing and Sale: Contractor will be free to sell the crude oil and Natural Gas exclusively in domestic market through a transparent bidding process at arm's length.
6. Oil Cess & Royalty: No Oil Cess will be applicable on crude oil production however, Royalty rates will be as under NELP regime.
7. Custom duty: Customs duty exemptions for specified goods and services will be available for contract areas.

The DSF bid round was launched in May 2016 under the overarching vision of Hon'ble Prime Minister's vision for reducing import dependency on oil and gas by 10% by 2022. The DSF bid round was completed in record time. Further, many bidders participated despite the global economic slowdown and volatile crude oil price environment. The Bid Round 2016 46 Contract Areas consisting of 67 fields across Nine sedimentary for extraction and exploration of oil and gas. DGH in May 2016 launched the DSF Bid Round - 2016 and invited bids to develop and monetize these contract areas which are estimated to hold in-place Oil and Oil equivalent as reserves of 86 Million Metric Tonnes with estimated recoverable reserves of roughly 30 Million Metric Tonnes.

Government of India signed the contracts of the fields awarded under the DSF Bid Round 2016 with the awardees at New Delhi on 27th March 2017. The event was presided by Shri Dharmendra Pradhan, Hon'ble Minister of State for Petroleum and Natural Gas along with other senior officials of Ministry of Petroleum and Natural Gas (MoPNG) and DGH and witnessed a large audience comprising successful awardees, E&P majors, service companies and key media houses. The details of the contract areas signed are placed at Appendix Table 8.12.

A two-way Interactive Portal for DSF which has been developed by DGH to facilitate contract management. The Government is now working towards a second round of DSF Bidding, and shall also be rolling out the Hydrocarbons Exploration and Licensing Policy (HELP) through the Open Acreage Licensing (OAL) mechanism which shall provide good opportunity for more E&P investors.

Positive Outcome of the Policy:

1. Thirty contract areas have been signed which are expected to come into production within the next 3-4 years.
2. The cumulative peak production from the awarded fields is expected to be around 15,000 BOPD of oil and 2 MMSCMD of gas over the economic life of field.

> **"My vision for India's energy future has four pillars: Energy access, Energy efficiency, Energy sustainability and Energy security."**
>
> **Shri Narendra Modi**
> Hon'ble Prime Minister
> At inaugural session of Petrotech-2016 in New Delhi

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3. Estimated total revenue would be ~Rs. 46,400 crores.
4. Expected Gross royalty collection is 5,000 crores and expected state royalty collection is Rs. 2,100 crores. Government's revenue share would be ~Rs. 9,300 crores.
5. Employment of ~37,500 persons would be generated through the awarded fields.

2.1.2. Policy for E&P, Data Assimilation, Disclosure, Sharing, Accessibility & Dissemination through National Data Repository (NDR) at DGH

Date of notification: 16 March 2017

The objective of this policy is to assimilate, preserve and regulate the E&P data generated by various companies over the last several decades and held within the National Data Repository (NDR) in order to enable systematic disclosure, sharing and dissemination and to standardize the norms for accessibility within the overall provisions of the Oilfields (Regulations and Development Act 1948) and the Petroleum and Natural Gas Rules 1959, Government policies and other guidelines as may be applicable. The policy is broadly divided into the following three parameters:

1. Data assimilation: Under this policy, all data generated will be assimilated by NDR in DGH office. All data held in NDR shall be the property of Government of India with DGH as its custodian. All private cos., PSUs are required to submit the data generated in the blocks to DGH within a stipulated timeframe.
2. Data availability/disclosure/ timelines: Any commercial entity, students from Government Recognized Indian/Foreign Universities, Private Universities, Govt. Recognized Research Institutes and/or any other user authorized by DGH can view the data available in NDR after registering on NDR web portal. NDR/DGH shall have the right to disclose/visualize and sell any or all data including proprietary data, to any person or legal entity.
3. Data dissemination: Data access shall be available to the registered users through web portal. E&P users / investors will be allowed to see data in physical data rooms located at NDR, DGH after scheduling an appointment with NDR. Recognized Indian / Foreign Universities / Educational Institutions will be provided data after uploading the signed and duly stamped scanned copy of Confidentiality Agreement.

Expected Positive Outcome of the Policy:

NDR Data policy is a pre-cursor to award of blocks under Hydrocarbon Exploration and Licensing Policy. It will provide a unique platform to view, analyse, purchase data for all E&P companies, institutions, research agencies, etc.

2.1.3. Policy for the Grant of Extension to the Production Sharing Contracts signed by Government of India awarding Pre-New Exploration Licensing Policy (Pre-NELP) Exploration Blocks.

Date of notification: 7th April 2017

Government of India has approved a policy for granting extension to the Production Sharing Contracts (PSCs) signed by Government of India awarding Pre-New Exploration Licensing Policy (Pre-NELP) Exploration Blocks, to have a transparent and defined framework for granting extension. Salient features of the policy are as below:

1. Submission, Consideration and Approval of request for extension of Contract by contractor at least 2 years before expiry of contract
2. Fiscal parameters for extension: During the extended period of contract, Government's share of profit petroleum will be 10% higher, however, the royalty and cess shall be payable at prevailing rates
3. Duration of extension: 10 years both for oil and gas fields or economic life of the Field, whichever is earlier.
4. Pre-requisites for Evaluation: Area should have valid mining lease, area to have fields under production, area of extension to be determined on basis of existing production/ injection wells or new development plan, exploration work program to be backed by BG with time schedule. Availability of balance recoverable reserves (third party audited), submission of RFDP, adequate technical expertise and no statutory dues and payment due to Government.
5. Criteria for evaluation of request: Contractor should have completed at least 70% of development plan and should have complied with the provisions of creation of Site Restoration Fund (SRF) and Site Restoration Plan (SRP) as per PSC.

Expected Positive Outcome of the Policy:

This policy will help the operators of 10 Pre-NELP Exploration blocks in planning their investments and operations in these fields and will enable the contractors to extract not only the remaining reserves but also plan to extract additional reserves by implementing new technologies. This will help accelerate and supplement indigenous production of hydrocarbon from existing blocks and act as a progressive step towards achieving the target of 10 per cent reduction in import of crude oil by 2022.

2.1.4. Policy framework for Relaxation, Extension & Clarification in existing CBM contract areas for early monetization of CBM

Date of notification: 15th March 2017

Government of India has till date awarded 33 CBM blocks. Owing to various impediments in current contractual provisions, the monetization of CBM hasn't been at par with conventional oil and gas.

Since unconventional hydrocarbons like CBM have higher breakeven prices and to usher renewed exploration and production activities in CBM blocks, the policy exempts CBM from existing pricing and allocation policy and provides pricing and marketing freedom to CBM contractors and provision to sell CBM to affiliates. This is in tune with Government's policy of "Ease of Doing Business".

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Further, Government has been empowered to discharge cases and condone delays on basis of technical merit and reasonable endeavour exercised by contractor.

The new policy includes the following features:

1. Pricing and marketing freedom to sell CBM in domestic market arm's length
2. Provision to reduce CBM contract areas or relinquish contracts with proportionate reduction in work program for contractors with overlap issues in coal blocks, conventional oil and gas, PEL/PML areas etc.
3. Easy exit option for CBM blocks subject to certain conditions
4. Entry into subsequent phase, after paying cost of unfinished MWP
5. Provision for extension and excusable delay in Development phase on account of getting Government Approvals/Permits etc.
6. Provision to sell CBM to affiliates of existing CBM contractors
7. Relaxation of Notice Period for submissions as per CBM Contract
8. Resolution of CBM contractual issues under ECS

Expected Positive Outcome of the Policy:

The policy is expected to boost CBM production to 6 MMSCMD by 2018-19 and generate new avenues of employment and increased investment in CBM blocks. It is also envisaged that 14 CBM blocks which are under relinquishment will be provided an easy exit option under the policy.

2.1.5. Policy for grant of extension to Production Sharing Contracts signed by Government awarding small and medium sized discovered fields to private Joint Ventures

Date of notification: 28th March 2016

To enable optimal recovery of oil and gas after expiry of PSC, policy for extending Production Sharing Contracts for 28 Pre-NELP discovered (small and medium size) fields has been approved. This Policy would provide for a uniform, non-discretionary framework for extension of contract for a period of 10 years both for Oil and Gas. The primary objective of this policy is to continue uninterrupted production from oil and gas reserves engaged under PSC model and to ensure a stable business environment to Contractors and E&P operators of the PSC regime.

Salient features of the policy are as below:

1. Submission, Consideration and Approval of request for extension of Contract by contractor at least 2 years before but not more than 6 years in advance of expiry.
2. Fiscal parameters for extension: During the extended period of contract, Government's share of profit petroleum will be 10% higher, however, the royalty and cess shall be payable at prevailing rates (of nomination regime).
3. Duration of extension: 10 years both for oil and gas fields or economic life of the field, whichever is earlier.
4. Pre-requisites for evaluation: Area should have valid mining lease, evaluation will be on basis of future development plan, firm exploration program supported by BG, availability of balance recoverable reserves (third party audited), submission of RFDP, adequate technical expertise and no statutory dues and payment due to Government.
5. Criteria for evaluation of request: Contractor should have completed at least 70% of development wells of plan or achieved 70% committed production and should have complied with the provisions of creation of Site Restoration Fund (SRF) and Site Restoration Plan (SRP) as per PSC.

Expected Positive Outcome of the Policy:

During the extension period, it is proposed to increase the Government's take by way of charging normal royalty and cess in place of concessional royalty and cess charged during the original contract period. The profit petroleum during extension period will be 10% higher than the normal percentage.

2.1.6. Hydrocarbon Exploration & Licensing Policy (HELP)

Date of notification: 10th March 2016

Hydrocarbon Exploration and Licensing Policy (HELP) is based on a new model i.e. Revenue Sharing Contract (RSC) which replaces the earlier model of Production Sharing Contract (PSC). Based on the Open Acreage Licensing (OAL) mechanism which permits investors to carve out blocks of theory choice by submitting an Expression of Interest (EoI). These blocks would be subsequently offered through bi-annual formal bidding process.

OAL would be manifested through National Data Repository which will provide rapid jumpstart to E&P activities by providing seamless access to the country's entire G&G data for interpretation and analysis. Under Open Acreage Licensing (OAL) the blocks can be carved out without waiting for a formal bid round to be announced by Government.

1. Revenue Sharing Model: Simple, easy to administer; no cost recovery; no micro-management by the Government; operational freedom to the operator
2. Pricing and Marketing Freedom of Oil and Gas produced
3. Single License for exploration and production of conventional as well as non-conventional hydrocarbon resources
4. Exploration allowed throughout the contract period
5. Increase in exploration phase: Exploration Phase for onshore areas has been increased from 7 years to 8 years and for offshore areas increased from 8 years to 10 years
6. Low royalty rates including zero royalty for deep water & ultra-deepwater areas during first seven years

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Positive Outcome of the Policy:

OAL would be formally launched around July 2017 which will open the entire Indian sedimentary basin for investors to realize the untapped potential of Indian Hydrocarbon Sector.

2.1.7. Marketing and Pricing freedom for gas production from Deepwater, Ultra Deepwater and High Pressure-High Temperature areas

Date of notification: 10th March 2016

Government of India announced a policy for all discoveries in DW/UDW/HPHT areas which commence commercial production from 1st January 2016 and all future discoveries due to the challenging cost and technology intensive operations. The policy is aimed to exploit oil and gas resources in Deep-water (DW), Ultra deep-water (UDW) and High Pressure High Temperature (HPHT) areas and to incentivize gas production from these discovered, difficult areas.

Pursuant to this policy, producers will be allowed marketing including pricing freedom subject to a ceiling price based on landed price of alternate fuels, which is calculated once in 6 months and applied prospectively for the next 6 months.

Positive Outcome of the Policy:

The policy is expected to increase gas production by 6.75 TCF by improving the economic viability of discoveries currently made in: 21 DW areas, 1 UDW area and 5 HPHT areas.

Further, this policy would facilitate development of such discoveries to be made in future.

2.1.8. Policy for encouraging E&P activities in North East India (NE Hydrocarbon Vision 2030)

Date of notification: 9th February 2016

Government of India released the Hydrocarbon Vision Document 2030 for NE Region with the aim of preparing a roadmap for the next 15 years to increase the production of oil and gas in NE and outlining the necessary investment in the hydrocarbon sector to increase exploration activities, etc. The vision rests on 5 pillars: People, Policy, Partnerships, Projects and Production.

Objectives to be met:

1. To develop North East (NE) Region as a dominant hydrocarbon hub at the forefront of India's energy economy
2. To double the production of O+OEG by 2030
3. To get access to clean fuel for 100% households at affordable price in the region (LPG/PNG)
4. To develop natural gas grid, CGD networks and CNG Highways

Positive Outcome of the Policy:

An Executive Council has been formed consisting of government officials and industry stakeholders for the implementation of the vision document to develop NE region as a hydrocarbon centre.

2.1.9. Policy framework for development of Underground Coal Gasification in coal and lignite bearing areas

Date of notification: 16th December 2015

A policy framework for development of Underground Coal Gasification (UCG) in coal and lignite bearing areas in the country was approved by the Government. UCG is a method of extraction of energy from coal/lignite resources which are otherwise regarded as uneconomical to work through conventional mining methods. For this purpose, a policy on lines broadly similar to the existing policy for Coal Bed Methane (CBM) development on revenue sharing basis is to be adopted for offering the blocks through competitive bidding.

Positive Outcome of the Policy:

The policy is expected to work towards the larger goal of Energy Security.

2.1.10. Policy for testing requirement

Date of notification: 29th April 2015

Government has approved a one-time policy on testing requirements for discoveries made under New Exploration and Licensing Policy (NELP) Blocks. Under this policy, the contractors have been asked to carry out a pending Drill Stem Test (DST) on the discoveries and submit the results within in a specified time frame.

The policy aims to resolve the dispute related to testing requirements and to bring transparency and uniformity in decision making as against case by case approach in the past.

The policy would provide a way forward for development of 12 discoveries with associated gas reserves of around 90 Billion Cubic Meter (BCM) which would be valued at over Rs. 1 lakh crore at the current gas price of US$ 4.66 / Million British Thermal Unit (mmbtu) on Gross Calorific Value (GCV).

Expected Positive Outcome of the Policy:

The policy is expected to monetize the stuck up discoveries withheld because of DST test not conducted by operators, which might otherwise be relinquished on account of failure of operators to conduct the test.

"A shift towards gas based economy would require adequate availability of natural gas through domestic production as well as imports, adequate investments in pipeline, LNG import terminal and City Gas Distribution infrastructure and even financial support in the form of incentives."

Shri Dharmendra Pradhan
Minister of State (Independent Charge) - Petroleum and Natural Gas
5th IEF (International Energy Forum) - IGU (International Gas Union) Ministerial Gas Forum, 2016.

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2.1.11. New Domestic Natural Gas Pricing Guidelines

Date of Notification: 25th October 2014

1. This pricing policy is based on the prevailing hub prices of United States, Mexico, Canada, European Union and Russia; and has price revision cycle of six months.
2. To protect the interests of consumers as well as producers, a ceiling based on the landed cost of the alternate fuel has been imposed.
3. Ceiling price in USD per MMBTU (GCV) to be calculated as lowest of (i) the landed price of imported fuel oil, (ii) the weighted average import landed price of substitute fuels and (iii) the landed price of imported LNG.
4. The pricing is notified for every six months by Petroleum Planning and Analysis Cell of MoP&NG.

Positive Outcome of the Policy:

Indian gas markets to move towards a largely uniform formula based gas prices

2.1.12. Policy Framework for Relaxations, Extensions and Clarifications at the Development and Production stage under PSC regime for early monetization of hydrocarbon discoveries

Date of Notification: 18th October 2014

This policy framework was developed to address various issues and concerns regarding PSCs. It discusses the relaxation, extensions and clarifications at the Development and Production Stage under the PSC Regime.

Policy framework provides for following relaxations:

1. Extension of time period for submission of DoC and FDP
2. Drilling of Appraisal Well after submission of DoC and probing additional reservoir during appraisal program
3. Reduction of Minimum Work Program in case of overlapping of blocks with SEZ, reserve forests, DRDO danger zones, national parks, urban areas, firing ranges, etc.
4. Swapping of 2D seismic with 3D Seismic Work Program and vice-versa
5. Entry into subsequent phase after payment of Cost of Unfinished Work Program of previous phases
6. Condoning the delays in submission of notice for entering subsequent phase and condoning delays in submission of Annual & Appraisal - Work Program and Budget
7. Drilling of Appraisal wells after submission of DoC
8. Probing additional reservoirs during appraisal programme
9. Acceptance of discoveries for which notification has not been made as per PSC provision

Positive Outcome of the Policy:

1. 40+ issues have been resolved
2. Enabled early monetization of oil and gas discoveries in 5 blocks, which would result in exploitation of about 34.06 million barrels of oil and about 0.731 TCF of gas reserves
3. Will also help in probing additional reservoir and submission of robust FDP in 3 blocks, having estimated reserves of about 172.34 million barrel of oil and 1.934 TCF of gas
4. 11 cases of entire block area or part of block area overlapping with special economic zone, reserve forest, naval exercise area, DRDO danger zone, national parks and firing range of Defence, etc. have been cleared one case in is under consideration
5. Helped in taking technical decisions based on merits for swapping of 2D seismic work program with 3D seismic work program and vice-versa in five blocks

2.1.13. Policy for Production Enhancement Contract (PEC) for nomination areas under NOCs [under formulation]

The Production Enhancement Contract (PEC) policy formulation in the final stages. The policy is for matured/ old acreages being operated under the nomination regime by NOCs. The policy aims to arrest the rate of decline of old and maturing fields with NOCs and enhance the ultimate recoveries of hydrocarbon from such fields in the order of around 10%.

Expected Positive Outcome of the Policy:

The policy is expected to enhance the production through technological and other collaborations with global service providers working in the E&P domain.

2.2. Recent Projects initiated by Govt.

2.2.1.Re-assessment of Hydrocarbon Resources in India

Date of notification: 21st January 2014

Given that the last hydrocarbon resources assessment was carried out almost two decades ago, a Multi-Organization Team (MOT) has been constituted to carry out re-assessment of hydrocarbon resources of India in all its 26 sedimentary basins which is being undertaken by ONGC in association with OIL and DGH.

Status of project:

1. Work has been initiated at seven work centres of ONGC for eight priority basins.
2. Entire work for all 26 sedimentary basins is expected to be completed by November 2017.
3. The project is expected to provide a correct position of the hydrocarbon resources available in the country presently.

2.2.2. National Seismic Programme

Date of notification: 20th May 2014

This project was also introduced under the broad policy framework of Geo-Scientific Data Generation for Hydrocarbons in Indian Sedimentary Basins to appraise the un-appraised onland areas in 26 sedimentary basins by ONGC & OIL.

OIL has been assigned to carry out 2D seismic API of 7408 LKM falling in North Eastern part of India covering states of Assam, Arunachal Pradesh, Nagaland, Manipur, Tripura and

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Mizoram and ONGC has been assigned to carry out 2D seismic API of approx. 40,835 LKM seismic data in onland part of 22 sedimentary basins of India

Status of project:

So far, out of 24 states, in-principal approval from 22 states and forest permissions from 18 states have been obtained.

2.2.3. Non-Exclusive Multi Client Geo Scientific Survey

Date of notification: 20th May 2014

MoP&NG vide letter dated 20.05.2014 has approved the Policy for Geo-Scientific Data Generation for Hydrocarbons in Indian Sedimentary Basins and the Agreement to carry out Non-exclusive Multi-client Geo-scientific Surveys / Activities relating to Hydrocarbons.This project aims to get quality data in offshore basinal areas and to acquire high quality of geophysical/seismic for sedimentary basins. DGH will administer the Policy on behalf of GoI and GoI will continue to be the owner of the data acquired under this Policy.

Policy brief:

The approval process will consist of two stages.

Stage I:

a. Service Providers will submit the proposal along with an Application Fee (US$ 1,000)

b. DGH will seek clearances from MoD and MoHA for the survey area and company

c. Subsequently to obtaining clearance, DGH will issue a "Provisional Letter of Consent" to Service Provider that will help the applicant company to approach and tie up pre-funding with prospective buyers of the data to be generated.

d. Validity of the Provisional Letter of Consent will be for six months. DGH will have power to extend the validity up to a maximum period of one year. Within these six months the Service Provider will look for pre-committers for pre-funding of the Project. If the pre-commitments look positive, then only the Service Provider goes ahead with the signing of the Non-exclusive Multi-client Agreement.

Stage II:

a. The applicant would submit the Non-exclusive Multi-client Agreement with all necessary details to DGH and would pay a Project Fee of US$ 10,000.

b. Applicant Company would furnish a Data Delivery Bank Guarantee of US$ 100,000 and the same shall remain valid for 180 days after expiry of the Survey Period (or extended survey period).

c. Survey Period will be for a Period of 2 years from signing of Agreement and may be extended for maximum period of 12 months by paying 60% percent of the Project Fees (Project Extension Fee) or pro-rata thereof along with the extended Data Delivery Bank Guarantee.

d. No liquidated damages if the generated data is less than that proposed in the Non-exclusive multi-client Agreement.

e. Agreement shall remain valid for a period of 12 years from the signing of Agreement, (including the extended Survey period).

Status of project:

So far, proposals have been submitted for 3 areas and work has been initiated in 1 area.

Expected Positive Outcome:

The policy will encourage competent private players to undertake G&G activities and sell the data to earn profits by sharing a copy of data with the Government. The policy encourages deployment of cutting edge technology by private players.

2.2.4. National Data Repository

India has a long history of Exploration and Production (E&P) activities for oil and gas which goes back to 19th century. Over a period of time a huge amount of E&P data has been acquired by public and private E&P companies supplemented by various government bodies and Institutions. With the increased pace of E&P activities after Pre-NELP and NELP rounds since 1990, the rate of data generation has been quite significant in last couple of decades.

Taking cognizance that E&P data is a national asset and to make this entire data available for commercial exploitation, research & development purpose, National Data Repository was set up by DGH on behalf of Ministry of Petroleum & Natural Gas, Govt of India. NDR has the following broad objectives:

- To validate, store, maintain and reproduce reliable E&P data with provisions for seamless access online and offline
- To facilitate efficient data reporting, data exchange and trading among existing players
- To improve DGH ability to monitor and control E&P activities
- To support E&P activities in India under Hydrocarbon Exploration and Licensing Policy (HELP) for improved E&P environment in India
- To provide data for processing, interpretation and visualization
- To strengthen overall Geo-scientific activities in India

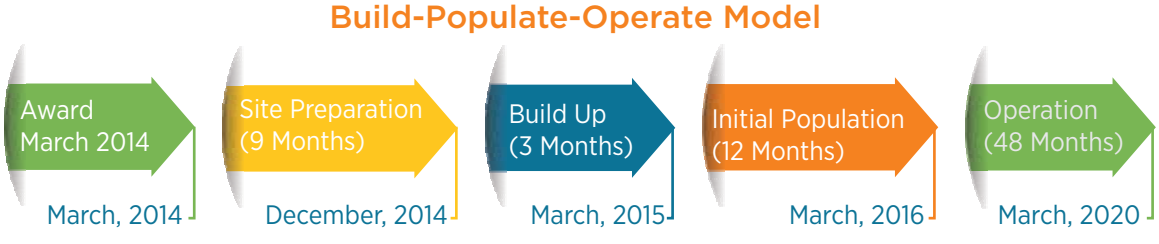

Fig. 2.1.

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NDR is a Government-sponsored data bank to preserve and disseminate Oil & Gas information, which is based on "Build, Populate and Operate" Model on a turnkey basis. Given that augmentation of data is a continuous process, data is acquired on a perpetual basis. Being one-stop and the only legal source of E&P data of India, NDR will be the base for rolling out Open Acreage Licensing Programme (OALP) mechanism under HELP supporting the program at implementation level. Setting up of NDR is the key facilitator to provide a rapid jumpstart to E&P activities in India. The key beneficiaries of NDR- E&P operators, Govt. agencies, Universities, Research Institutes & Parties entitled by DGH.

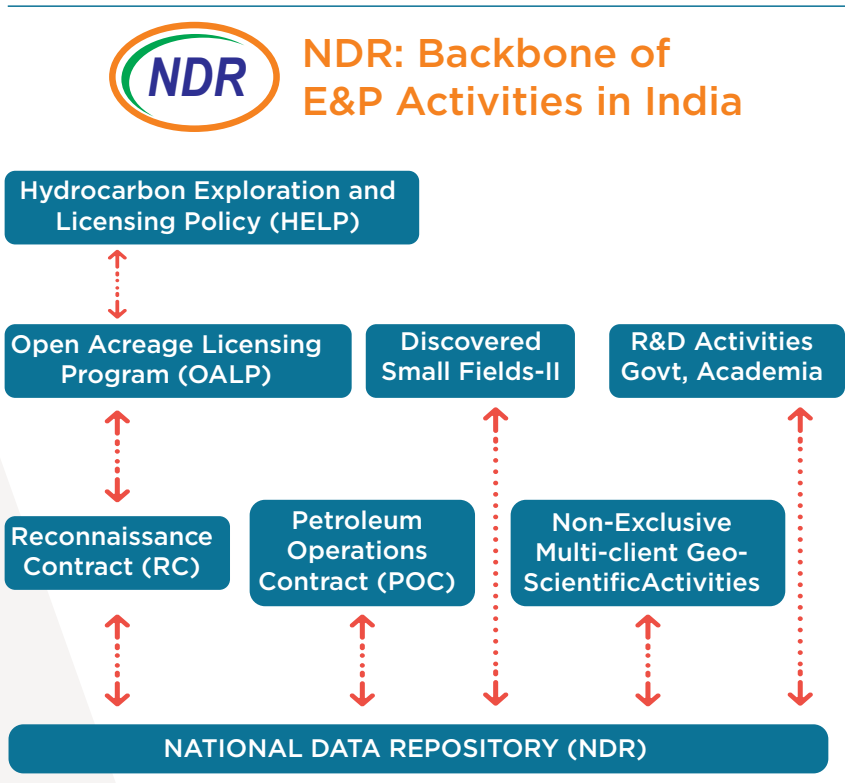

Fig. 2.2. NDR: Backbone of E&P Activities in India

Some of the key features of NDR are:

i. State of the art Primary Data Centre (PDC) equipped for data storage capacity of 156TB of hard disk to store processed data& 720TB robotic tape library

ii. Secondary Data Centre (SDC) facility with 60TB for Disaster Recovery and Business Continuity to be opened at Bhubaneshwar

iii. Real time data replication between PDC & SDC

iv. Fully equipped Data Visualization Rooms set up for viewing G&G data

v. Skill Development Centre facility for specialized training

vi. Highly secured access with multiple biometric entry and exit points for separate teams

vii. Network access secured by two layers of firewall

NDR is located on fifth and sixth floors of DGH Office, OIDB Bhavan, NOIDA. It was established on Build, Populate and Operate Model on a turnkey basis by Halliburton Offshore Services Inc. with following timelines:

NDR is a world-class IT enabled centre to store and retrieve national Exploration and Production (E&P) data with provisions of seamless access, data visualization and purchase. This is the core element of data aggregation and data trading across E&P operators and Geo-scientific agencies, supporting DGH's ability to monitor and control the E&P activities in the country. NDR aims to provide complete backend support to OALP /HELP and DSF programs for an improved Global E&P Business Environment in India.

Setting up of NDR is the key facilitator to provide a rapid jumpstart to E&P activities in India.

Status of the project:

Given that augmentation of data is a continuous process, data is being populated in NDR on a perpetual basis. The E&P data population in NDR has been done at a fast pace to meet the demands for data requests from E&P companies intending to submit EOI under current round of OALP or carrying out G&G studies as well as to operators awarded the fields under DSF-I round for timely submission of FDPs and start early productions.

2.2.5. Site Restoration Guidelines for Petroleum Operations

Date of notification: 9th October 2017

Government of India constituted a committee for formulation of Site Restoration guidelines for petroleum operations. The draft report has been reviewed by the committee members and Recommendation of committee members have been finalized, adopted and submitted to Ministry for notification. The guidelines aim to lay down the procedures for site restoration to be carried out by operator and to establish transparent policies and procedures for abandonment and decommissioning of petroleum operational activities

NDR is located on fifth and sixth floors of DGH Office, OIDB Bhavan, NOIDA. It was established on Build, Populate and Operate Model on a turnkey basis by Halliburton Offshore Services Inc. with following timelines:

Status of project:

The document will serve as a guide for understanding the broad guidelines and procedures pertaining to site restoration for petroleum operations. The document is currently available on public domain.

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As on 31st October, 2017 data available in NDR:

- ~17 lakh LKM of 2D seismic data
- ~6 lakh SKM of 3D seismic data
- 9,400 well log & 11,900 well header data
- NDR expected to be inaugurated shortly

Way forward to NDR

- Cloud based solution for virtual data room.
- Interpretation solution in Physical data viewing room.
- ISO certification

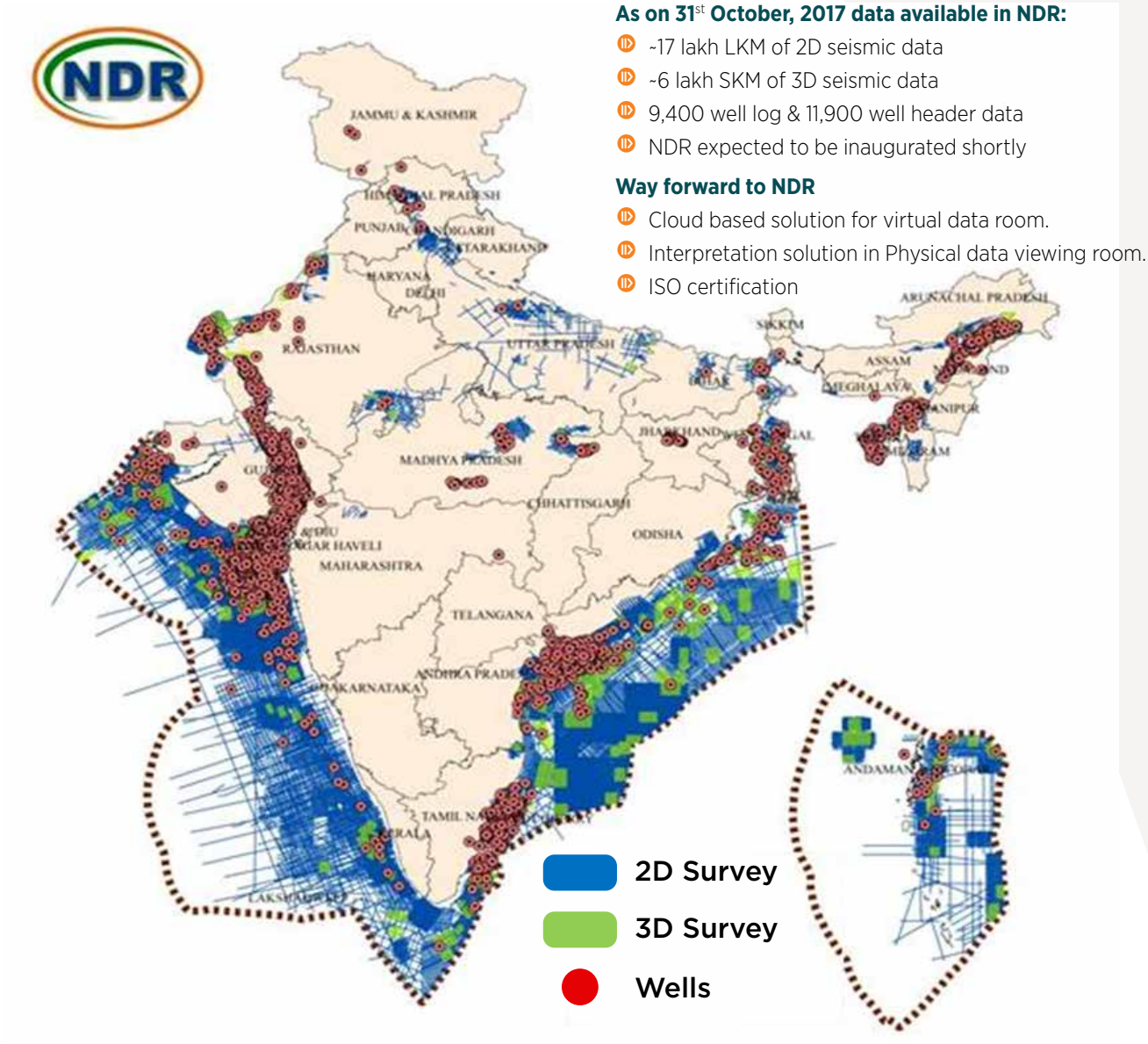

Fig. 2.3. Composite view of populated data

Data Population: Success Story

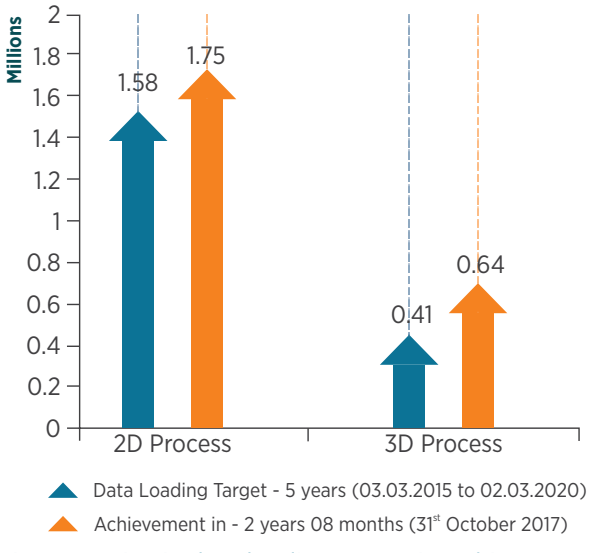

Fig. 2.4. Seismic data loading Target in Achievement

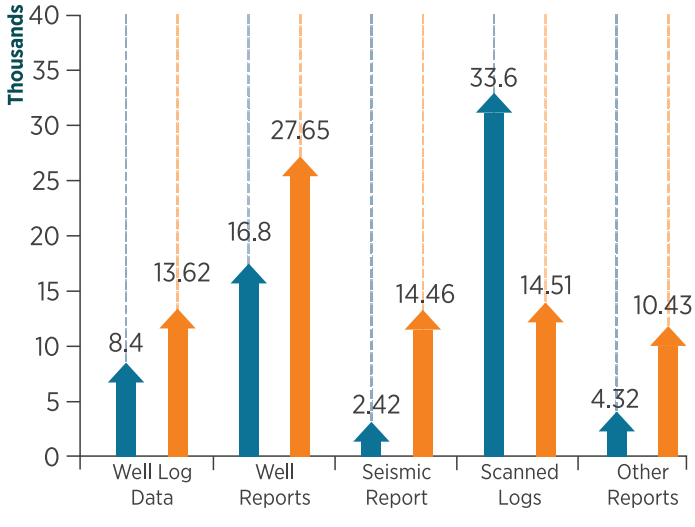

Fig. 2.5. Reports loading target in achievement

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E&P Activities

E & P Activities

The quantum of Exploration and Production (E&P) activities in a country is indicative of the investment environment and regulatory framework in place. Despite relatively low crude prices globally, substantial E&P activities have been carried out in the country in 2016-17 which augurs of the consistent government policies in-place. The chapter encompasses the gamut of these activities. Also provided are the details of hydrocarbon discoveries made in 2016-17 and statistics of exploration activities, development activities and production of the country.

3.1. Exploration Activities

In FY 2016-17, cumulative 14,624 LKM 2D offshore seismic data was acquired in comparison to 4,616.75 LKM in onshore area most of which was carried out under PSC regime by Pvt. companies/JVs. 7,825.29 SKM of 3D seismic data was acquired in Onland and 5,822.98 SKM 3D seismic data was acquired in offshore area, majority of 3D data was generated by ONGC in its nomination areas. Total 141 exploratory wells (including onland and offshore) amounting to a drilling meterage of 3,92,309 m were drilled.
Details of exploratory activities in Nomination & PSC regime in FY 2016-17 compiled in Table 3.1 and company-wise exploratory activities under PSC regime are provided in Table 3.2.

Table 3.1. Exploratory efforts in Nomination & PSC regime in FY 2016-17

No.	Subject	Parameter	ONGC* (Nomination)	OIL* (Nomination)	Pvt./JVs	Total
1	2D seismic data acquired	Onland (GLKM)	262.7	196.96	4,157.09	**4,616.75**
		Offshore (GLKM)			1,4624	**1,4624**
Total 2D Seismic			**262.7**	**196.96**	**18,781.09**	**19,240.75**
2	3D seismic data acquired	Onland (SKM)	2,263.61	67.08	5,494.60	**7,825.29**
		Offshore (SKM)	5,011.98		811	**5,822.98**
Total 3D Seismic			**7,275.59**	**67.08**	**6,305.60**	**13,648.27**
3	Exploratory wells drilled	Onland	52	19	30	**101**
		Offshore	31		9	**40**
Total Exploratory Wells			**83**	**19**	**39**	**141**
4	Exploratory Meterage drilled	Onland ('000)	131.99	63.88	78.37	**274.24**
		Offshore ('000)	92.69		25.39	**118.07**
Total Exploratory Meterage Drilled			**224.67**	**63.88**	**103.75**	**392.31**

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Table 3.2. Exploratory efforts by Companies in FY 2016-17 under PSC regime

Operator	2D (LKM)	3D (SKM)	Exploratory Wells
Indian Private			
Cairn Energy India Pvt. Ltd.	3,124	811	1
Focus Energy Ltd.	11,500	0	1
Hindustan Oil Exploration Company Limited	110	1,151	0
Jubilant Oil & Gas Private Limited	104.11	0	0
Pan India Consultants	0	0	2
Reliance Industries Ltd.	0	0	6
Indian Private Total	**14,838.11**	**1,962**	**10**
PSUs			
Bharat Petro Resources Ltd.	10	131	2
GAIL (India) Limited	0	500	6
Oil and Natural Gas Corporation Ltd.	3,932.98	3,634.60	17
Oil India Ltd.	0	78	4
PSU Total	**3,942.98**	**4,343.60**	**29**
Grand Total	**18,781.09**	**6,305.60**	**39**

National Oil Companies (NOCs)/PSUs have generated out 4,403 LKM in 2D seismic, 11,686 SKM in 3D seismic and drilled 131 exploratory wells in 2016-17. Cumulative of 11,65,496 LKM of 2D seismic and 2,98,614 SKM of 3D seismic have been acquired and 6,632 exploratory wells have been drilled by PSUs till date.

Private E&P companies have generated out 14,838 LKM in 2D seismic, 1,962 SKM in 3D seismic and drilled 10 exploratory wells in 2016-17. Cumulative of 1,28,944 LKM of 2D seismic and 1,09,471 SKM of 3D seismic have been acquired and 357 exploratory wells have been drilled by private E&P companies till date. Foreign companies have carried out 64,790 LKM of 2D seismic survey, 22,143.39 SKM of 3D seismic survey and have drilled 249 exploratory wells till March 2017. Company-wise details are in Table 3.3.

Table 3.3. Exploratory efforts by operators in Indian E&P sector

No.	Company (Operator)	As on FY 2016-17		
		2D Seismic (LKM)	3D Seismic (SKM)	Exploratory Wells (Nos.)
PSUs				
1	ONGC - Nomination	8,82,587.48	1,20,282.46	5,880
2	Oil India Ltd. - Nomination	73,729.56	12,547.34	381
3	ONGC - PSC regime	2,00,375.9	1,45,273.84	243
4	Oil India Ltd. - PSC regime	2,022.2	7,139	87
5	Bharat Petro Resources Ltd.	20	221.55	4
6	Gujarat State Petroleum Corporation Ltd.	6,421	1,1371	16
7	Indian Oil Corporation Ltd.	0	277	7
8	Gail (India) Limited.	0	1,077	6
9	National Thermal Power Corporation	340	425	8
PSUs Total		**11,65,496.14**	**2,98,614.19**	**6,632**

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No.	Company (Operator)	As on FY 2016-17		
		2D Seismic (LKM)	3D Seismic (SKM)	Exploratory Wells (Nos.)
Indian Private				
10	Adani Welspun Exploration Ltd.	0	3,586	0
11	Essar Oil Ltd.	4,425	1619	18
12	Cairn India	6,833	3,240.39	49
13	Esveegee Steel (Gujarat) Pvt. Ltd.	0	135	0
14	Focus Energy Ltd.	26,287.56	5,717.77	98
15	Geo Enpro	52	114	2
16	Hindusthan Oil Exploration Company Ltd.	736	3,011	15
17	Interlink Petroleum Ltd.	0	64	2
18	Jay Polychem (India) Ltd.	0	268	2
19	Jubilant Oil & Gas Private Limited,	796.25	638	14
20	Mercator Petroleum Private Limited	773	175	5
21	Pan India Consultants	0	0	2
22	Prize Petroleum Company Ltd.	2,050	304	2
23	Reliance Industries Ltd.	86,475	90,316	140
24	Selan Expl. Tech. Ltd.	166	132	5
25	Omkar Naturals Resources Pvt. Ltd.	350	83	1
26	Sintex Oil & Gas Pvt. Ltd.	0	68	2
Indian Private Total		**1,28,943.81**	**10,9,471.16**	**357**
Foreign				
27	BHP Billiton Pty. Ltd.	12,806	0	0
28	British Gas Exploration and Production (India) Ltd.	2,006	5,187	15
29	Cairn Energy India Pvt Ltd.	19,925	6,684.39	180
30	Canoro Resources Ltd.	346	104	4
31	ENI (India) Ltd.	5,141	3,170	1
32	Geo-Global Resources Inc.	476	0	0
33	Geo-Petrol International Inc.	206	0	0
34	Hardy E&P India Inc.	518	718	4
35	Heramac Ltd.	0	9	2
36	Naftogaz	319	537	8
37	Niko Resources Limited.	161	1,304	26
38	OAO Gazprom	4,932	530	3
39	Oilex-NL Holdings Ltd	0	178	1
40	Okland Offshore Holdings Ltd.	0	0	1
41	Petrogas	440	1,120	3
42	Premier Oil North East India.	261	0	1
43	Santos International Operations Pty. Ltd.	17,253	2,602	0
Foreign Total		**64,790**	**22,143.39**	**249**
Grand Total		**13,59,229.95**	**4,30,228.7444**	**7,238**

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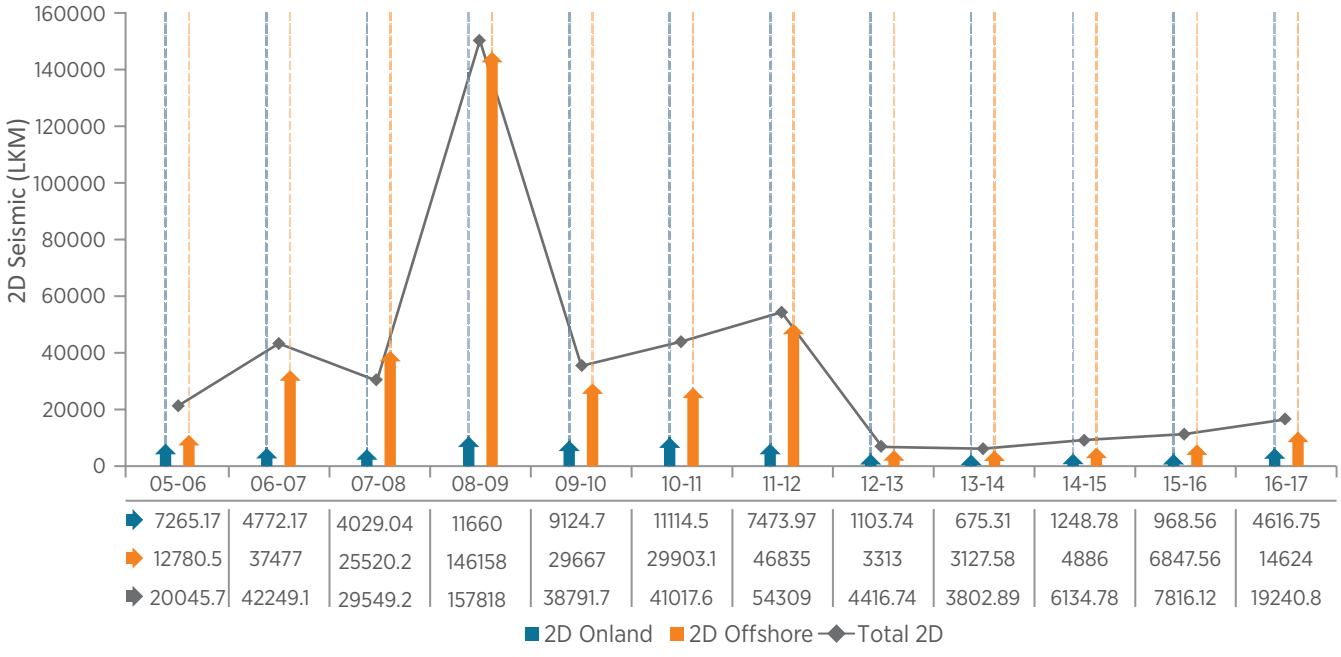

Fig. 3.1. Year-wise 2D Seismic data generated

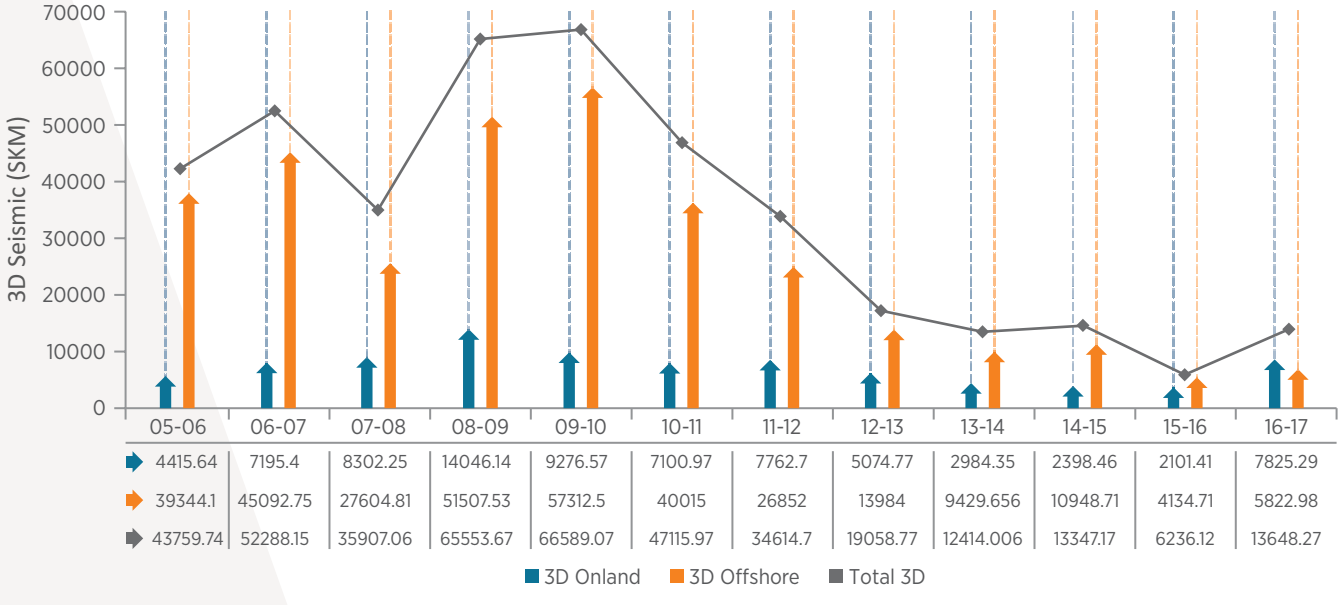

Fig. 3.2. Year-wise 3D Seismic data generated

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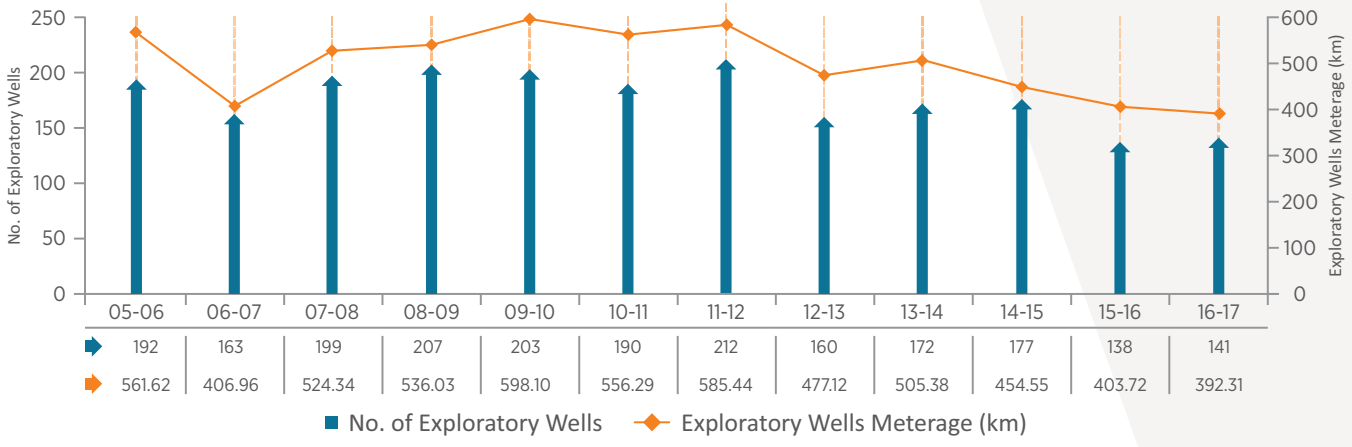

Fig. 3.3. Year-wise Exploratory wells drilled

3.2. Development Activities

3.2.1. Development wells drilled and meterage in 2016-17

Total 398 development wells were drilled by NOCs and Pvt./JVs in FY 2016-17 with a cumulative development well meterage to 8,41,560 m. Majority of the wells were drilled by ONGC in its onland nomination areas.

Table 3.4. Development wells and meterage

Subject	Parameter	ONGC (Nomination)	Oil (Nomination)	Pvt./JVs	Total
Development Wells Drilled	Onland	266	37	9	312
	Offshore	86	0	0	86
Total Development Wells Drilled		**352**	**37**	**9**	**398**
Development Meterage Drilled	Onland ('000 m)	493.05	105.44	21.21	619.69
	Offshore ('000 m)	221.87	0	0	221.87
Total Development Meterage Drilled		**714.92**	**105.44**	**21.21**	**841.56**

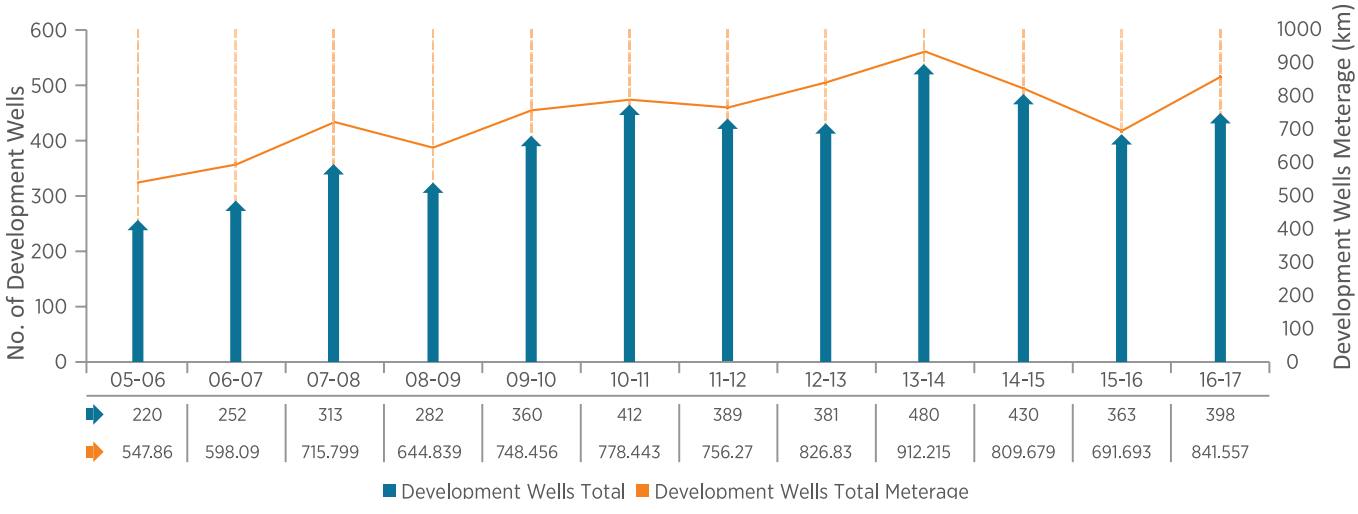

Fig. 3.4. Year-wise Development wells drilled

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3.2.2. Discoveries in development phase in FY 2016-17

Five Field Development Plans (FDPs) were approved in FY 2016-17. Details are as follows:

a. Aliabet – 2, 3 and 4

Aliabet 2, 3 and 4 are Gas discoveries in NELP-V block CB-OSN-2003/1 and located in Gulf of Cambay area. Major portion of the block lies in the western offshore continuation of Jambusar Broach Tectonic block. Petroleum system in the area consists of Cambay shale as source rock, Hazad member and Dadhar formation as reservoir rock and Shale members above it as Cap rock. Present development plan envisages production from 7 wells by September 2018.

Table 3.5. Bolck details of CB-OSN-2003/1

Block	CB-OSN-2003/1
Location	Cambay (Shallow water)
Round	NELP-V
Development Area	243 sq. km.
Consortium	ONGC (100%)
Operator	ONGC

b. GSAH#5

GSAH#5 an oil discovery is located in CB-ONN-2000/1 block in Cambay basin which is proven for commercial production of hydrocarbon. The basin in a narrow elongated intra-cratonic rift graben and split into 5 tectonic blocks from south to north namely Narmada-Tapti, Broach-Jambusar, Cambay-Tarapur, Ahmedabad-Mehsana and Patan-Tharad block.There are number of developed and proven oil and gas fields around the area to the northeast and east of the block, namely, Kalol, Sananad, Jhalora, Nawagam, Dholka, Baola, South Kadi and Bechraji. Present development plan aims to commence production by 2017 from 6 wells.

Table 3.6. Bolck details of CB-ONN-2000/1

Block	CB-ONN-2000/1
Location	Cambay Onland
Round	NELP-II
Development Area	37.32 sq. km.
Consortium	GSPC (50%) GAIL (50%)
Operator	GSPC

c. Mangala (Revision 1-A)

Mangala field is under development phase in the block RJ-ON-90/1, a part of DA-1. Original FDP of Mangala field was approved in 2006 and Revision to FDP approved in July 2009. The discovery of hydrocarbon is from Fatehgarh formation of Palaeocene age. Revision 1A to FDP was approved in March 2017. Present revision 1A includes additional development activities and revised production profile with incremental oil gain. Mangala field is under production since 2009.

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Table 3.7. Bolck details of RJ-ON-90/1

Block	RJ-ON-90/1
Location	Barmer Basin
Round	Pre-NELP
Development Area	1859 Sq Km (DA-1
Consortium	Vedanta (35%),CEHL (35%) & ONGC (30%)
Operator	Vedanta (Cairn India)

d. Dirok Discovery

Dirok gas discovery was made in Block AAP-ON-94/1, block of Assam-Arakan Basin. Dirok structure is bounded between the Kumsai & Margherita thrusts. Discovery is found in Girujan formation of Miocene age. Multiple sands have been encountered in existing wells.

Table 3.8. Bolck details of AAP-ON-94/1

Block	AAP-ON-94/1
Location	Assam-Arakan Basin (Onland)
Round	Pre-NELP
Development Area	110 Sq. Km
Consortium	HOEC (40.32%), OIL (16.12%) & IOC (43.56%)
Operator	HOEC

e. Chandrika, Saveri, Alankari, NL#2 & Malhar- 1 Discoveries

Five gas discoveries namely Chandrika, Saveri, Alankari, NL#2 & Malhar- 1 made in shallow water. Block KG-OSN-2004/1 have entered development phase. Hydrocarbon found in Chandrika, Alankari, NL#2 & Malhar- 1 discoveries are of Pliocene age & Saveri discovery is of Eocene age. Lower tertiary sequence in block is mostly represented by the Shelfal, slope or basinal depositional system. The reservoir of Pliocene probed in most of the wells are of high quality, clean sands of Offshore bars or channel and slope fans. Present development plan aims to commence production by March 2019 from 8 wells.

Table 3.9. Bolck details of KG-OSN-2004/1

Block	KG-OSN-2004/1
Location	KG Basin (Shallow offshore)
Round	NELP-VI
Development Area	148.76 Sq. Km
Operator	ONGC (100%)

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3.2.3. Oil and Gas discoveries in 2016-17

Table 3.10. Oil and Gas discoveries in 2016-17

No.	Name of ML/ PEL(Basin)	Date of Notification	Well Name	Oil/ Gas
Discoveries made by ONGC				
1	GK-OSN-2010/1[NELP- IX] (Gujarat Kutch)	23/03/2017	GKS101NCA-1	Gas
2	KG-OSN-2009/2[NELP - VIII] (Krishna Godavari)	18/04/2016	KGS092NASRI-1	Oil
3	MB-OSN-2005/1[NELP-VI] (Saurashtra Offshore)	04-06-2016	MBS051NAA-2	Gas
4	CB-ONN-2001/1[NELP-III] (Cambay)	29/06/2016	NDDA (Nadiad # 4)	Oil
5	Golaghat District PEL (A&AA Basin [South Assam Shelf])	28/06/2016	Suphayam-2	Oil
6	Kasomarigaon (Additional) PML [A&AA Basin (South Assam Shelf)]	15/10/2016	Dayalpur-1	Oil & Gas
7	Nambar PML [A&AA Basin (South Assam Shelf)]	13/06/2016	Nambar-12	Gas
8	Nambar PML [A&AA Basin (South Assam Shelf)]	10/02/2017	(KHBB_Z) Khoraghat-38_Z	Oil & Gas
9	Namati PML [A&AA Basin (North Assam Shelf)]	26/10/2016	Geleki-390	Oil &Gas
10	Akholjuni PML (Cambay Basin)	14/02/2017	Akholjuni-29	Oil
11	South Dahej PML (Cambay Basin)	09/06/2016	Dahej-20	Gas
12	Olpad-Dandi-Extn-I PML (Cambay Basin)	29/03/2017	Olpad-47	Gas
13	Gandhar Ext-XII PML (Cambay Basin)	31/03/2017	Gandhar-724	Oil & Gas
14	Adavipalem- Ponnamanda PML (KG Onshore)	24/08/2016	Kesanapalli West Deep-1	Oil & Gas
15	Godavari Onland PML (KG Onshore)	22/09/2016	Thurupu Vipparu-1	Gas
16	Nohta-Damoh-Jabera PML (Vindhyan Basin)	06/10/2016	Jabera-4	Gas
17	South & East Bassein PML (Mumbai Offshore)	27/04/2016	B-34-2	Oil
18	BOFF PML (Mumbai Offshore)	05/12/2016	B-154N-1	Oil & Gas
19	BOFF PML (Mumbai Offshore)	18/10/2016	B-157N-1	Oil & Gas
20	BOFF PML (Mumbai Offshore)	12/02/2017	D-30-2	Oil & Gas
21	'C' Series ML (Western Offshore)	29/09/2016	B-12C-2	Gas
22	GS-15 & 23 PML [KG Offshore (SW)]	27/10/2016	GS-71-1	Oil & Gas
23	Vasishta PML [KG Offshore (SW)]	20/03/2017	G-1-N-2	Oil & Gas
Discoveries made by Oil India Limited				
24	Hugrijan PML (Upper Assam Onshore)	07/05/2016	HJN055	Oil
25	Hugrijan PML (Upper Assam Onshore)	22/06/2016	NHK606	Oil
26	27 Hugrijan PML (Upper Assam Onshore)	23/09/2016	HJN062	Oil & Gas
27	Nahorkatiya Extension PML (Upper Assam Onshore)	14/09/2016	NHK595	Oil
28	Dumduma PML (Upper Assam Basin)	30/12/2016	HJN067	Gas
29	Hugrijan PML (Upper Assam Basin)	16/11/2016	MKM060	Oil
30	Tinsukia PML (Upper Assam Basin)	04/12/2016	KRJ001	Oil
31	Hugrijan PML (Upper Assam Basin)	17/01/2017	NHK637	Gas
32	Moran PML (Upper Assam Basin)	14/03/2017	BHB001	Oil
33	Hugrijan PML (Upper Assam Basin)	30/01/2017	MKM043	Gas

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	Testing Result	Zone/ Formation/ Age
	Object-I (917-914 m): Flowed gas @ 1,63,000 m^3/day at FTHP: 1010 psi through ½" choke.	Object-I/Chhasra/ Mid. Miocene
	Object-I (3889-3882, 3866-3834 m): Flowed oil @ 32 bpd and gas @ 820 m3/day) through 12/64" choke.	Object-I/Syn-rift play/Upper Jurassic to Early Cretaceous
	Object-I (2465.5-2462 m): Flowed gas @ 95,275 m^3/day, condensate @ 72 bpd at FTHP: 1600 psi through 3/8"choke	Object-I/Daman plays/Upper Oligocene
	Object-I (1618-1613 m): Flowed oil @ 9 m^3/day at FTHP: 14 kg/cm^2 through 4.0 mm bean	Object-I/Younger Cambay Shale (YCS) pay/Lower Eocene
	Object-IV (2310-2306 m): Flowed oil @ 38.4 m^3/day (WC-5%) and gas @ 14,747 m^3/day through 6 mm bean.	Object-IV/Bokabil plays/Miocene
	Object-IIA (2956-2952 m –Sylhet): Flowed oil @ 91.7 m^3/d & gas @ 6417 m^3/d through 6.0 mm bean	Object-IIA/Sylhet/Middle Eocene
	Object-I (2578-76 & 2574.5-72 m): Flowed gas @ 66,533 m^3/day and condensate @ 1.68 m^3/day (API° 53.3) through 6 mm bean.	Object-I/Sylhet/Middle Eocene
	Object-II (2330-2327.5 m): Flowed oil @ 10.44 m^3/day & gas @ 34000 m^3/day through 6.0 mm bean	Object-II/Sylhet/Middle Eocene
	Object-I (3707-3701 m, TS-6B): Well flowed oil @ 12 m^3/day & gas @ 6500 m^3/day on gas lift	Object-I/TS-6B- Tipam/Pliocene
	Object-I (1458.5-56 m) &Obj-II (1454-53 & 1452-50 m): Flowed oil @ 39.0 m^3/day through 5.0 mm bean at FTHP-16 kg/cm^2.	Object-I/MBS pay/Miocene
	Object-II (3600-3596.5 m): Flowed gas @ 71,700 m^3/day and condensate @ 38.32 m^3/day at FTHP: 2750 psi through 6.0 mm bean.	Object-II/Hazad/Early to mid Eocene
	Object-V: (1223-1219 m): Flowed gas @ 50,885 m^3/day at FTHP: 1050 psi through 7.0 mm bean.	Object-V/Tarkeshwar/Early Miocene
	Object-II: (2862-2860 m): Flowed oil @ 60 m^3/day and gas @ 4857 m^3/day through 6.0 mm bean at FTHP: 785 psi.	Object-II/GS-4-Hazad/Mid-Eocene
	Object-I (2899 – 2908 m): Flowed oil @ 327 m^3/d and gas @ 58000 m^3/d through 8.0 mm bean	Object-I/Vadaparu/Eocene
	Object-I (2553-50 & 2546-40 m): Flowed gas @1,23,500 m^3/day and condensate @ 8 m^3/day at FTHP: 3405 psi through 6.0 mm bean.	Object-I/Raghavapurm Fm./Late Cretaceous
	Object-I (1350-1279 m, barefoot): Flowed gas @ 1536 m^3/day with FTHP: 3 kg/cm^2 through 6 mm bean.	Object-I/Middle Rohtas Limestone/ Proterozoic
	Object-I (2907-2903 m): Flowed oil @ 870 bpd & gas @ 48,277 m^3/d at FTHP: 800 psi through 1/2" choke.	Object-I/Panna/Paleocene
	Object-I (3217-3211 m in Panna) flowed oil @ 776 bpd and gas @ 12785 m^3/d at FTHP: 90 psi through ½" bean.	Object-I/Panna/Paleocene
	Object-I (2787-2784m - Panna):Flowed oil @ 2379 bpd & gas @ 86,560 m^3/d at FTHP: 1900 psi through ½" choke.	Object-I/Panna/Paleocene
	Object-II (2478-2464 m): Flowed oil @ 1190 bpd and gas @ 9748 m^3/day at FTHP: 440 psi through ½" choke (oil API: 34.7°)	Object-II/Mukta/Early Oligocene
	Object-I:2465-2461.5 m: Flowed gas @ 3,39,874 m^3/day, and condensate @ 560 bpd (API: 52.2°) at FTHP: 4500 psi through 3/8" choke.	Object-I/Daman Fm./Upper Oligocene
	Object-I (3446-44, 3427-25.5 & 3414-06 m): Flowed oil @ 8.6 m^3/d, gas @ 1315 m^3/d at FTHP: 24.23 kg/cm^2 (14/64" choke). Obj-III (3276-73 & 3256-49 m): Flowed oil @ 240.39 m^3/d, gas @ 168066 m^3/d at FTHP: 194.01 kg/cm^2 (28/64" choke). Obj-VI (2336.5-35.5 m): Flowed condensate. @ 85.5 m^3/d, gas @ 249534 m^3/d at FTHP: 144.72 k/cm^2 through 34/64" choke.	Object-III//Vadaparru Shale Fm./ Eocene
	Object-I (2311-10 & 2299.5-96 m): Flowed oil @ 617.84 m^3/day, gas @ 1,27,772 m^3/day at FTHP: 146.41 kg/cm2 through ½" choke.	Object-I/Godavari Clay/Pliocene
	Object I: (3085.0-3089.0 m, 3084.0-3090.0 m) Produced oil@ 5 KLPD through 6 mm bean.	Object-I/Barail/Oligocene
	Object I: (3649.0-3655.0 m) Produced oil@ 20 KLPD through 5 mm bean.	Object-I/Barail/Oligocene
	Object I: (2436.0-2442.0 m, 2434.0-2440.0 m) Produced gas@ 57000 SCUMD through 5 mm bean.	Object-I/Upper
	Object I: (2676.0-2681.0 m) Produced oil@ 37 KLPD through 7 mm bean.	Object-I/Barail/Oligocene
	Object I: (2798.0-2804.0 m) Produced gas at the time of testing, after unloading 38 BBLS of well fluid.	Object-I/Barail/Oligocene
	Object II: (2627.0-2633.0 m) Produced oil@ 26 KLPD through 12 mm bean on gas lift.	Object-II/Barail/Oligocene
	Object I: (4074.0-4075.0 m) Indication of heavy /high pour point oil was observed while carrying out MDT and production testing. Well is presently kept shut in.	Object-I/Lk+Th/Eocene
	Object I: (2708.0 -2714.0 m) Produced gas @ 30000 SCUMD & condensate @16 KLPD through 4 mm bean.	Object-I/Barail/Oligocene
	Object I: (3333.0-3336.0 m) Produced oil@ 28 KLPD in Full bore. Presently well is kept shut in.	Object-I/Barail/Oligocene
	Object I: (2323.0-2329.0 m) Produced gas@ 30000 SCUMD.	Object-I/Tipam/Miocene

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CAMBAY BASIN

Table 3.11. CB-ONN-2010/8 | Operator: BPRL

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Pasunia#01/ CBPAAA/ K-III+IV A	Obj-II (1235-1239 m): Flowed Oil @ 27 bopd with immeasurable quantity of gas through 12/64" bean.	Established extension of Kalol-III+IV pay in Southern part of Mehsana-Ahmedabad tectonic block. Both the objects flowed oil from Late Eocene K-III+IV pay of Kalol Formation.
Pasunia#02/ CBPAAB/ K-III+IV B	Obj-I (1256-1261 m): Flowed Oil @ 25 bopd with immeasurable quantity of gas through 24/64" bean.	

Fig. 3.5. Location Map showing well, Pasunia #01 & #02

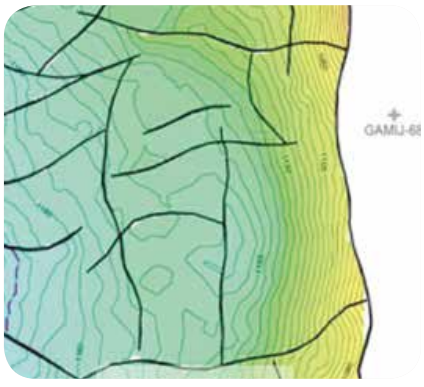

Fig. 3.6.

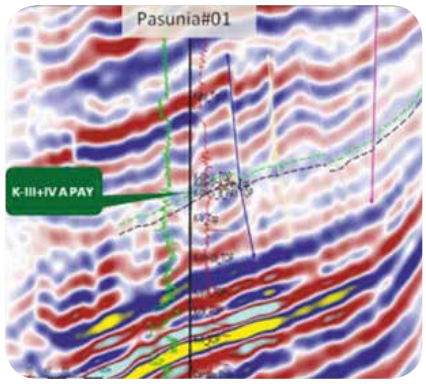

Fig. 3.7. Line passing near the well, Pasunia #01

Table 3.12. South Dahej PML/Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Dahej /DJAT Dahej-20	Object-II (3600-3596.5 m): Flowed gas @ 71,700 m^3/day and condensate @ 38.32 m^3/day at FTHP: 2750 psi through 6.0 mm bean.	The success in this well has established commercial accumulation of gas in DS-5 sands in Dahej Field for the first time. This lead has opened up scope for further exploration of DS-5 Pay in the surrounding area.

Fig. 3.8. Location Map showing well, Dahej-20

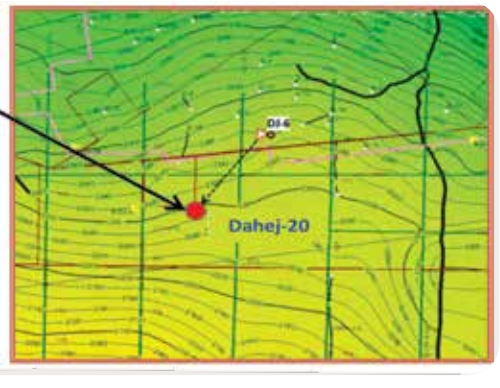

Fig. 3.9. Isochron Map at a Hortizon close to Base of Hazad Member

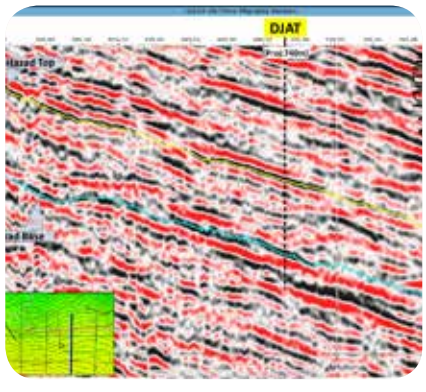

Fig. 3.10. 2D Line 214-36 passing near the well, Dahej-20

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Table 3.13. Akholjuni PML / Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
South Akholjuni/ Akholjuni-29/ AKAP	Obj-I (1458.5-56 m) &Obj-II (1454-53 & 1452-50 m): Flowed oil @ 39.0 m^3/day through 5.0 mm bean at FTHP-16 kg/cm^2.	The testing results of exploratory well Akholjuni-29 established extension of MBS pays in the southern part of Akholjuni Field and has opened up the area towards south for further exploration.

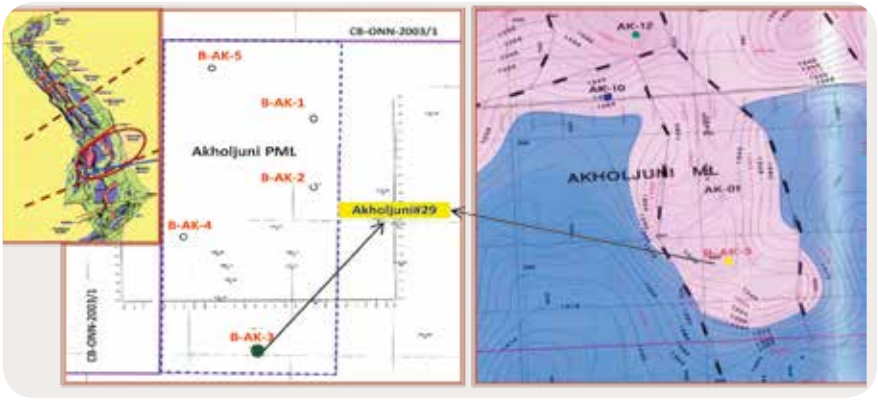

Fig. 3.11. Location Map Showing well, Akholjuni-29

Fig. 3.12. Time Structure Map close to MBS Top

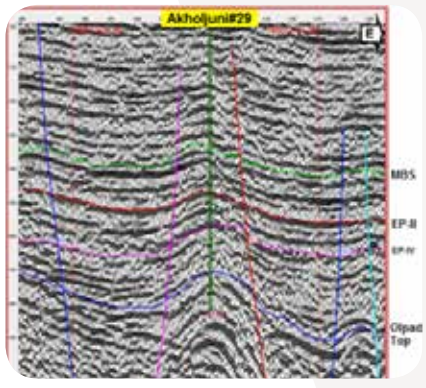

Fig. 3.13. G214-14 Showing Well, Akholjuni-29

Table 3.14. Gandhar Ext-XII PML / Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Gandhar / Gandhar-724 / GGAM	Obj-II: (2862-2860 m):Flowed oil @ 60 m^3/ day and gas @ 4857 m^3/day through 6.0 mm bean at FTHP: 785 psi.	This commercial presence of hydrocarbon accumulation in GS-4 Pay Sand in the north eastern part of Gandhar Field has opened up a new area for further exploration of this sand in the eastern margin of the field.

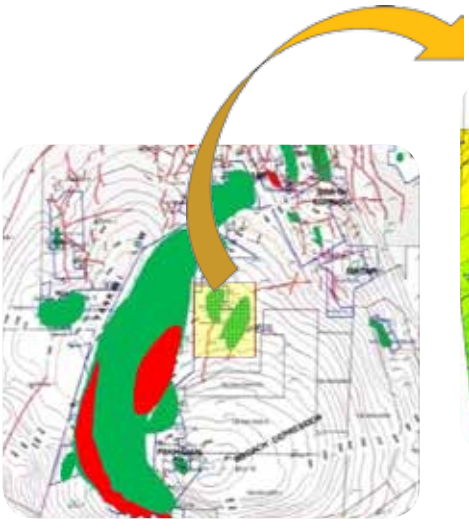

Fig. 3.14. Location Map Showing well, Gandhar-724

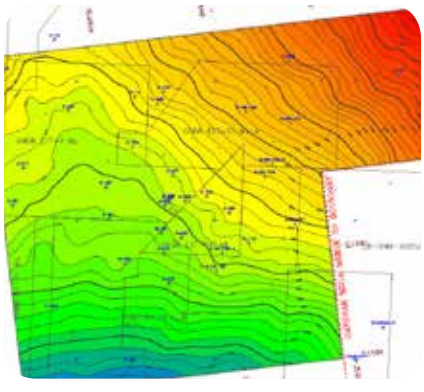

Fig. 3.15. Time Structure Map at Hazad Top

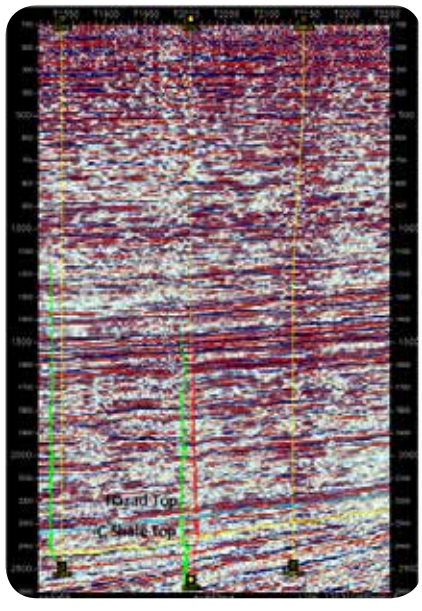

Fig. 3.16. Inline 1313 passing through Well, Gandhar-724.

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Table 3.15. Olpad-Dandi-Extn-I PML / Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Olpad/Olpad-47 / OPAM	Obj-V: (1223-1219 m): Flowed gas @ 50,885 m3/day at FTHP: 1050 psi through 7.0 mm bean.	This discovery was made nearly 10 km away from the main Tarkeshwar Sands of Olpad Field and has opened up new exploration area for Tarkeshwar Sands further towards south-west.

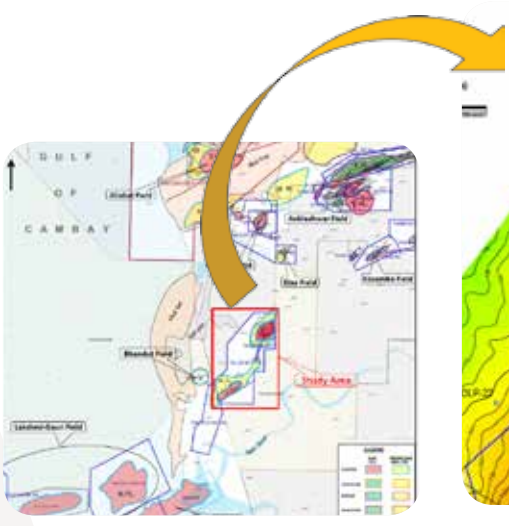

Fig. 3.17. Location Map Showing well, Olpad-47

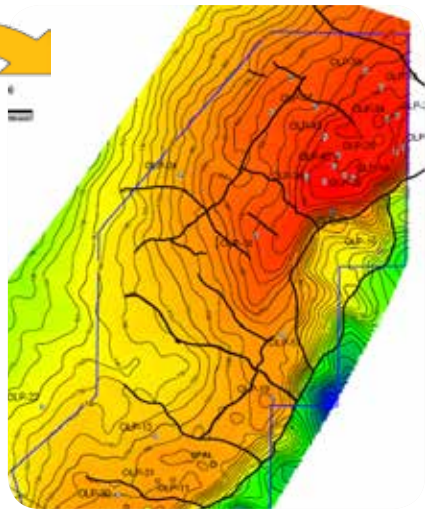

Fig. 3.18. Time Structure Map close to Top of Tarkeshwar Formation

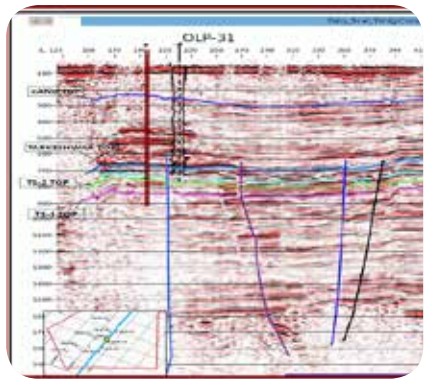

Fig. 3.19. XL-1785 passing through well, Olpad-47

Table: 3.16. CB-ONN-2001/1 (Nadiad PML) / Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Nadiad-1 / NDDA / Nadiad-4	Object-I (1618-1613 m): Flowed oil @ 9 m^3/ day at FTHP: 14 kg/cm^2 through 4.0 mm bean	The successful testing results of Object-I in this development well, Nadiad-4 has established new oil pool in Younger Cambay Shale (YCS) pay for the first time in the block. This discovery has opened-up new play for exploration/ development in the block.

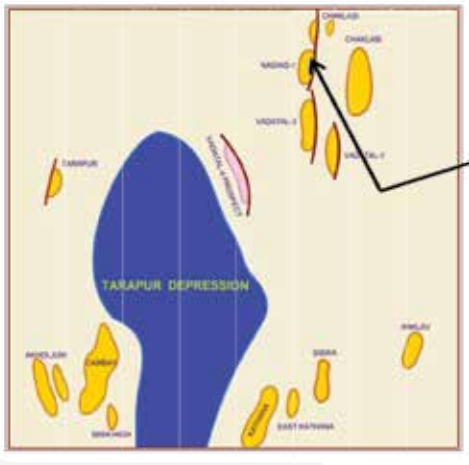

Fig. 3.20. Location Map showing well, Nadiad-4

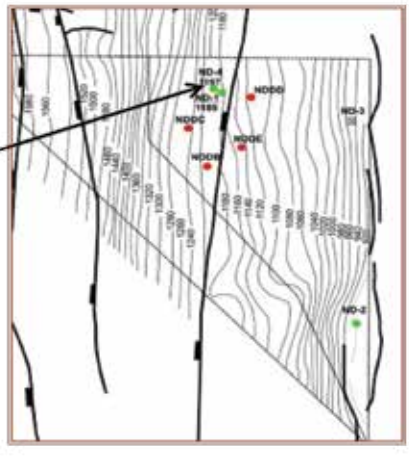

Fig. 3.21. Structure Contour Map on top of Chhatral

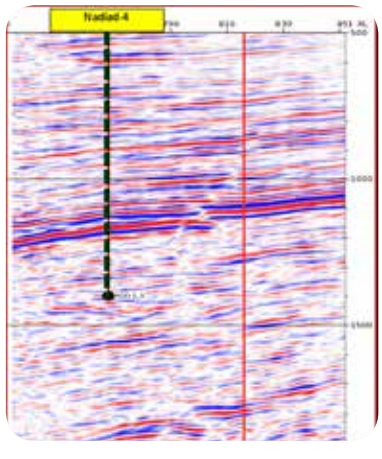

Fig. 3.22. In line 533 passing near well, ND-4

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ASSAM AND ASSAM-ARAKAN BASIN

Table: 3.17. Golaghat District PEL | Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Suphayam / SUAA/ Suphayam-2	Object-IV (2310-2306 m): Flowed oil @ 38.4 m^3/day (WC-5%) and gas @ 14,747 m^3/day through 6 mm bean.	This New Prospect discovery has provided a major lead for Bokabil plays in the entire sector between Kasomarigaon in the north to Khoraghat towards the south. This success would also facilitate conversion of Golaghat District PEL into regular long term PML.

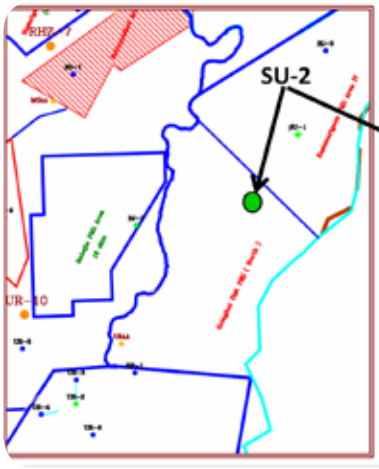

Fig. 3.23. Location Map showing well, SU-2

Fig. 3.24. Time Structure Map close to Sylhet top

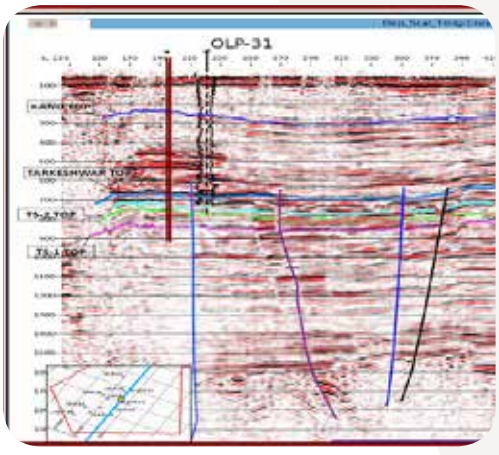

Fig. 3.25. Crossline 1645 passing through well, SU-2

Table: 3.18. Kasomarigaon(Additional)PML | Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Dayalpur/ SUAB/ Dayalpur-1	Obj-IIA (2956-2952 m–Sylhet): Flowed oil @ 91.7 m^3/d & gas @ 6417 m^3/d through 6.0 mm bean	This discovery with multiple plays has opened up a large area for further exploration. The success in this well has helped in establishing the Sylhet prospectivity in Dayalpur sector of South Assam Shelf and will facilitate conversion of seven Year Kasomarigaon (Additional) PML in to regular PML.

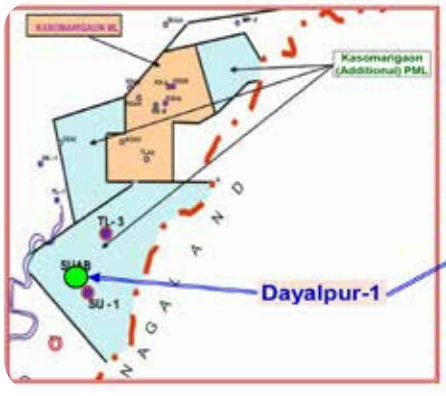

Fig. 3.26. Location Map showing Dayalpur-1

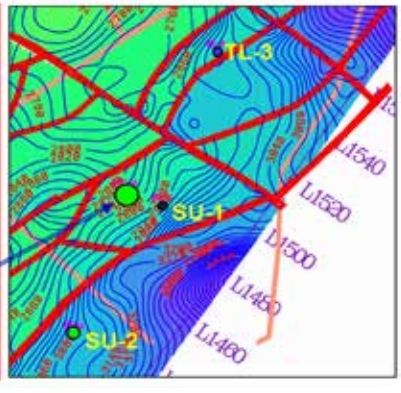

Fig. 3.27. Structure Map on Top of Sylhet

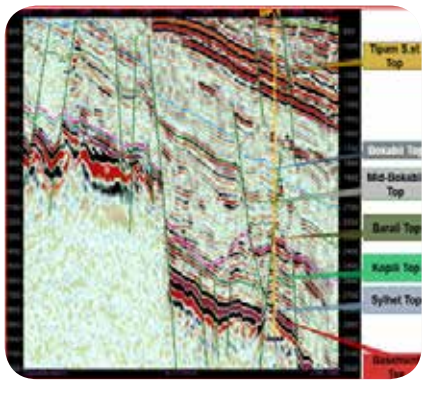

Fig. 3.28. Inline-1485 Passing Through Well, Dayalpur-1 with interpreted Horizons

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Table: 3.19. Nambar PML / Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Nambar / NRAF / Nambar-12	Object-I (2578-76 & 2574.5-72 m): Flowed gas @ 66,533 m^3/day and condensate @ 1.68 m^3/day (API° 53.3) through 6 mm bean.	The success in this well has reinforced hydrocarbon prospectivity perception of Sylhet play in Nambar Field of South Assam Shelf and has opened up deeper plays for further exploration in this sector.

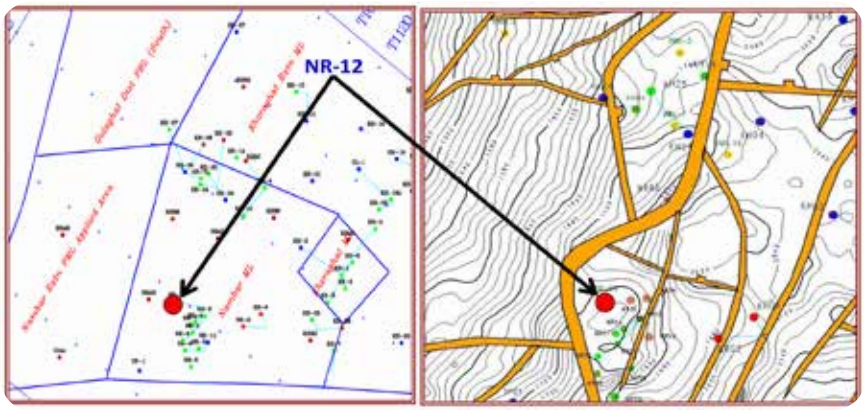

Fig. 3.29. Location Map showing well, Nambar-12

Fig. 3.30. Time Structure Map close to Kopili Pay

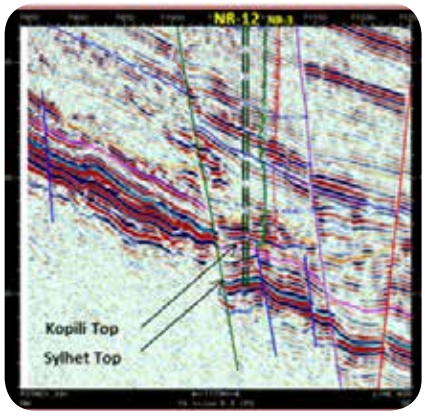

Fig. 3.31. Inline 800 passing through Well, Nambar-12

Table: 3.20. Nambar PML / Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Khoraghat/ (KHBB_Z) Khoraghat-38_Z	Obj-II (2330-2327.5 m): Flowed oil @ 10.44 m^3/day & gas @ 34000 m^3/day through 6.0 mm bean	The success in this well has helped in establishing the Sylhet prospectivity in west Khoraghat sector of South Assam Shelf and will open new areas for Sylhet exploration.

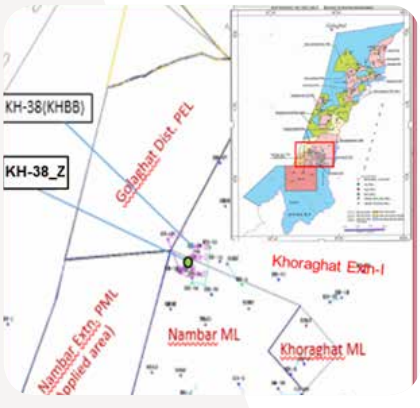

Fig. 3.32. Location Map showing well Khoraghat-38_Z

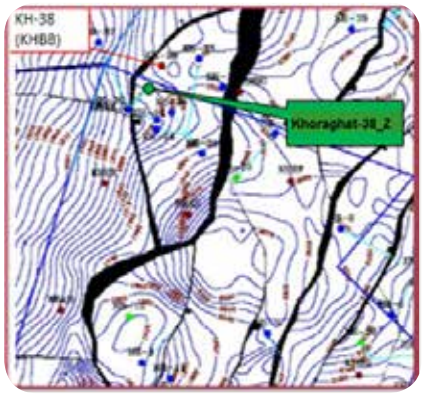

Fig. 3.33. Time Structure Map close to Sylhet Top

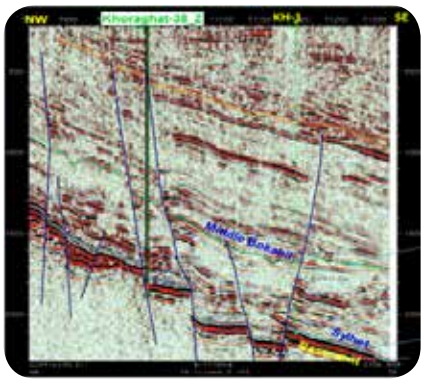

Fig. 3.34. Inline-858 passing through well Khoraghat-38_Z

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Table: 3.21. Namati PML / Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
South West Geleki / GKHX / Geleki-390	Obj-I (3707-3701 m, TS-6B): Well flowed oil @ 12 m^3/day & gas @ 6500 m^3/day on gas lift	The successful testing results in this development well has helped in establishing TS-6 prospectivity (TS-6B new sand) in the South Western part of Geleki sector of North Assam Shelf.

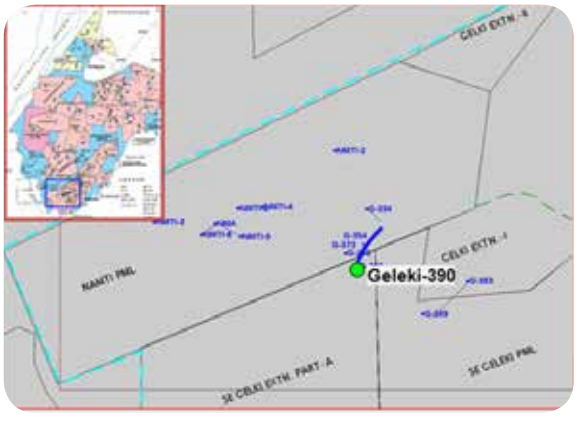

Fig. 3.35. Location Map Showing Well, Geleki-390

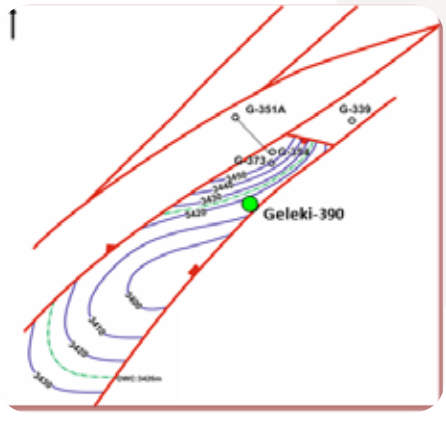

Fig. 3.36. Structure Contour Map of TS-6B pay sand of G-390 Block

VINDHYAN BASIN

Table: 3.22. Nohta-Damoh-Jabera PML/ Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Jabera / RJBF / Jabera-4	Object-I (1350-1279 m, barefoot): Flowed gas @ 1536 m^3/day with FTHP: 3 kg/cm^2 through 6 mm bean.	The lead established in well, Jabera-4 has enhanced the prospectivity of Rohtas Formation in Nohta-Damoh-Jabera PML, particularly in the area west of Jabera Structure.

Fig. 3.37. Location Map of Jabera-4

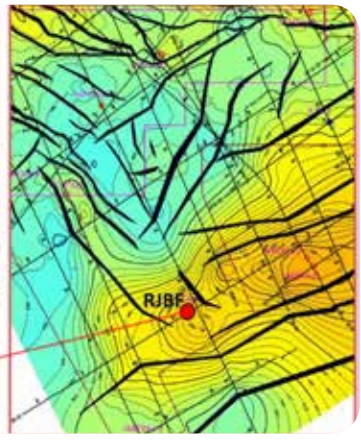

Fig. 3.38. Time Structure Map close to Rohtas top

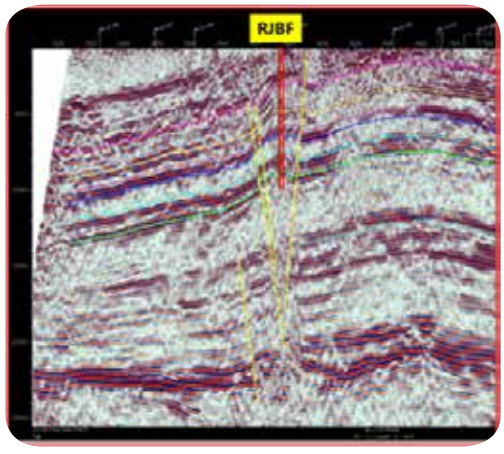

Fig. 3.39. Line MP-29-10 passing through well

MUMBAI OFFSHORE BASIN

Table: 3.23. South & East Bassein PML / Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
B-34 / B-34-B / B 34-2	Obj-I (2907-2903 m): Flowed oil @ 870 bpd & gas @ 48,277 m^3/d at FTHP: 800 psi through 1/2" choke.	The discovery has opened up the area west of B-28A for Panna exploration (which is close to the B-28A development area) and hence any further successes in the area can be monetised early.

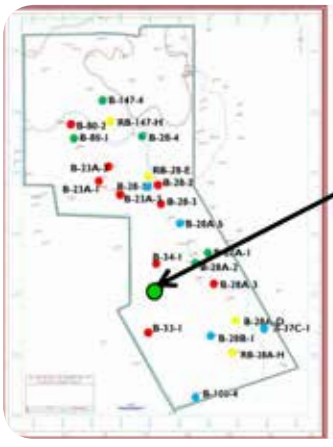

Fig. 3.40. Location Map showing well, B-34-2

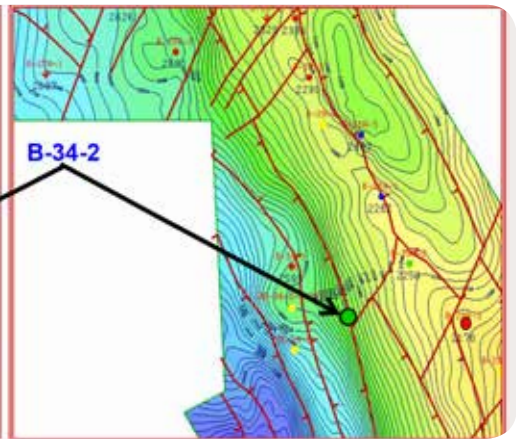

Fig. 3.41. Depth Structure Map on top of Panna (H4)

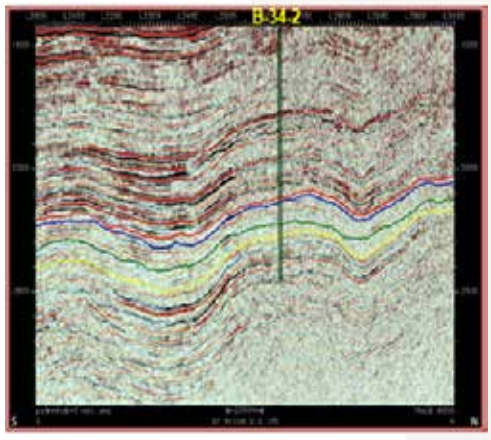

Fig. 3.42. Inline 2640 passing through well, B-34-2

Table: 3.24. BOFF PML/ Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
B-157N/B-157N-A /B-157N-1	Obj-I (2787-2784m - Panna): Flowed oil @ 2379 bpd & gas @ 86,560 m^3/d at FTHP: 1900 psi through ½" choke.	This discovery in Panna Formation has opened up a large area for Panna exploration in the North of Mukta area.

Fig. 3.43. Prospect Map Showing B-157N-1

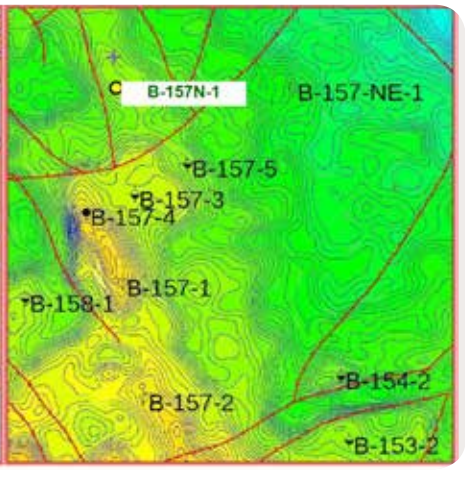

Fig. 3.44. Structure Map at Panna (H-4) Top

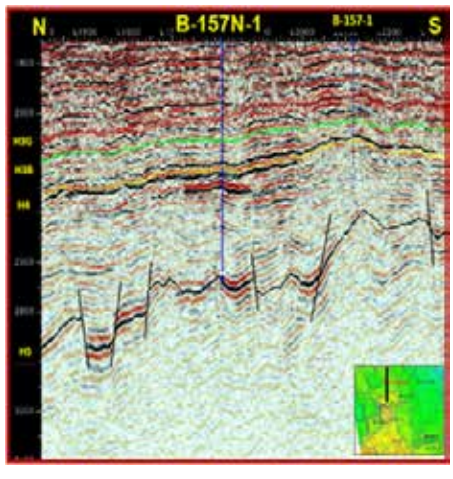

Fig. 3.45. Crossline 3362 Showing well, B-157N-1

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Table: 3.25. BOFF PML/ Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
B-154N/B-154N-A /B-154N-1	Object-I (3217-3211 m in Panna) flowed oil @ 776 bpd and gas @ 12785 m^3/d at FTHP: 90 psi through ½" bean.	This discovery has opened up scope of exploration of hydrocarbons in Panna plays in this area.

Fig. 3.46. Prospect Map Showing B-154N Structure

Fig. 3.47. Structure Map on top of H4 Level

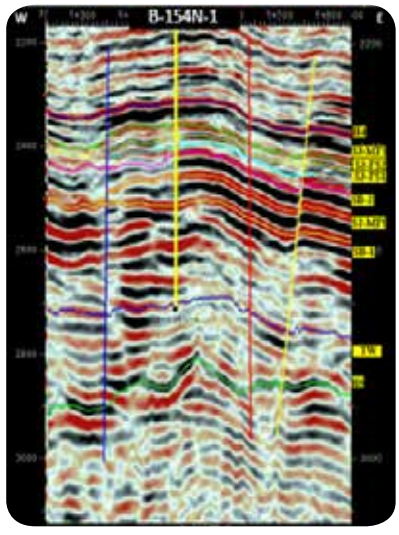

Fig. 3.48. Inline 2020 Passing through well, B-154N-1

Table: 3.26. BOFF PML / Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
D-30/D-30-2/D-30-A	Obj-II (2478-2464 m): Flowed oil @ 1190 bpd and gas @ 9748 m^3/day at FTHP: 440 psi through ½" choke (oil API: 34.7°)	This discovery in well, D-30-2 has proved presence of hydrocarbon beyond Cluster-7 structures and has opened up more area for further exploration. It will also help to convert part of BOFF PML from seven years to long term.

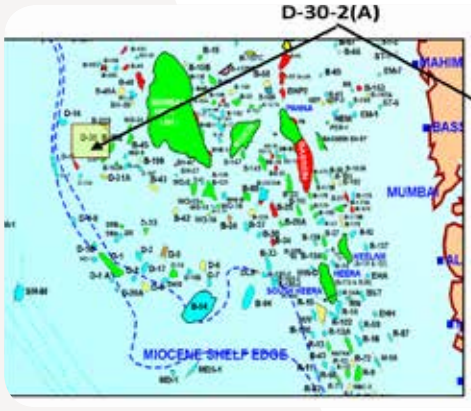

Fig. 3.49. Location Map Showing well, D-30-2

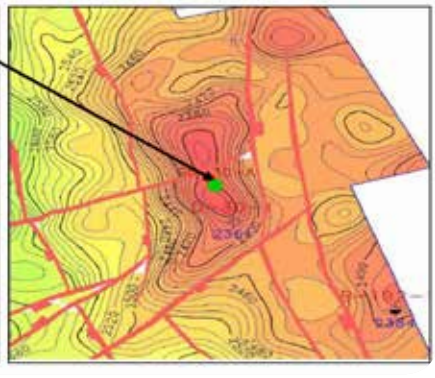

Fig. 3.50. Time Structure Map at H3-A Top

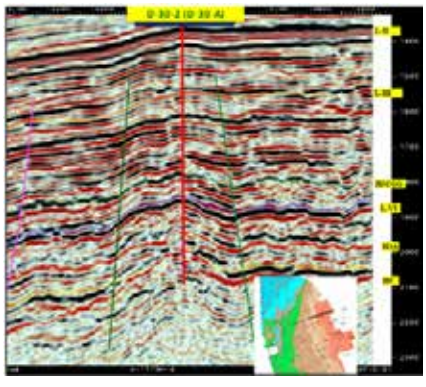

Fig. 3.51. Inline 2945 passing through well, D-30-2

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WESTERN OFFSHORE BASIN

Table: 3.27. 'C' Series ML | Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
B-12(Dahanu)/ B-12C-A/ B-12C-2	Obj-I: 2465-2461.5 m: Flowed gas @ 3,39,874 m^3/day, and condensate @ 560 bpd (API: 52.2°) at FTHP: 4500 psi through 3/8" choke.	This New pool discovery in Daman Sand-55 has imparted great impetus for future exploration and opened up large area besides providing additional volumes for further development of Daman Development Project.

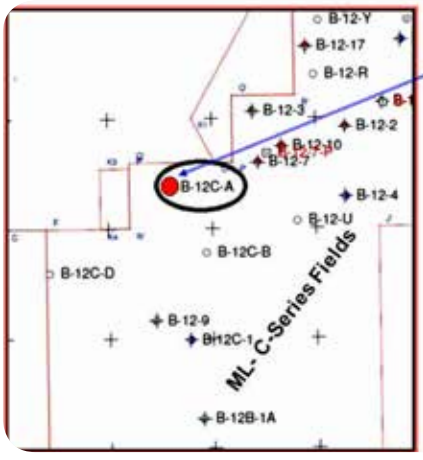

Fig. 3.52. Location Map of well, B-12C-2 (B-12C-A)

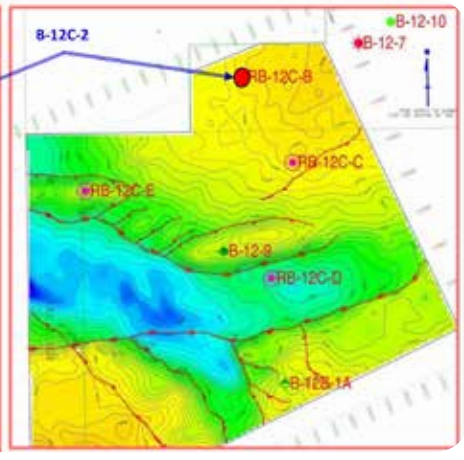

Fig. 3.53. Structure Map at Daman Top

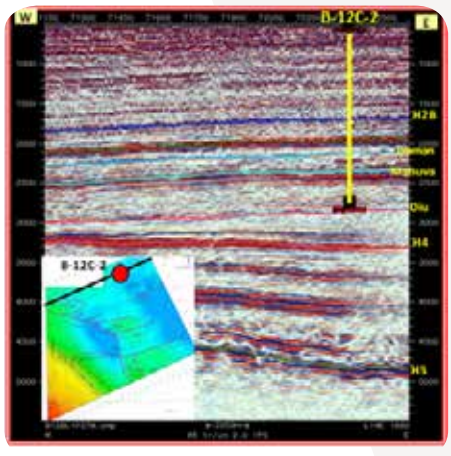

Fig. 3.54. Inline 1890 Passing through Well, B-12C-2 (A)

KG BASIN

Table: 3.28. Godavari Onland PML/Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Penugonda/TVAA /Thurupu Vipparu-1	Object-I (2553-50 & 2546-40 m): Flowed gas @1,23,500 m^3/day and condensate @ 8 m^3/day at FTHP: 3405 psi through 6.0 mm bean.	This discovery (Thurupu Vipparu-1) has confirmed the spatial extension of Penugonda Pay in the north west within the axial low between Tanuku and Kavitam Horst.

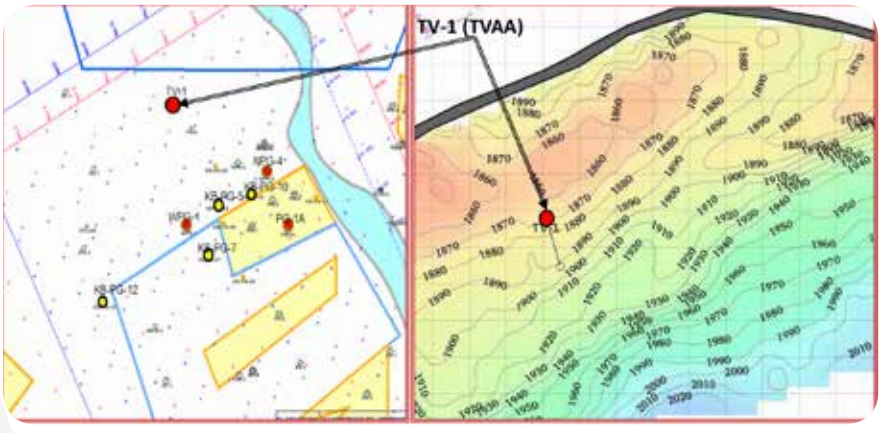

Fig. 3.55. Location Map of Well, TV-1 (TVAA)

Fig. 3.56. Time Structure Map on Top of TV-1 Pay Sand (Obj-I)

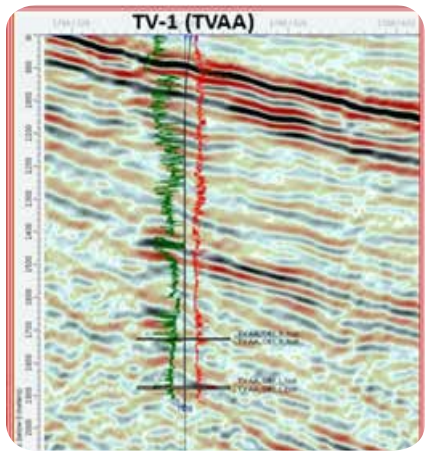

Fig. 3.57. Inline 1766 Passing through Well, TV-1

Table: 3.29. Adavipalem- Ponnamanda PML / Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Kesanaplli / KWD-AA/ Kesanapalli West Deep-1	Object-I (2899 – 2908 m: Flowed oil @ 327 m^3/d and gas @ 58000 m^3/d through 8.0 mm bean.	This is a New Pool oil & gas discovery within Vadaparru Formation in the producing field, Kesanapalli West with excellent flow rates. It has been put on production which will immediately augment the production from the PML and will further consolidate the potential of Vadaparu Formation.

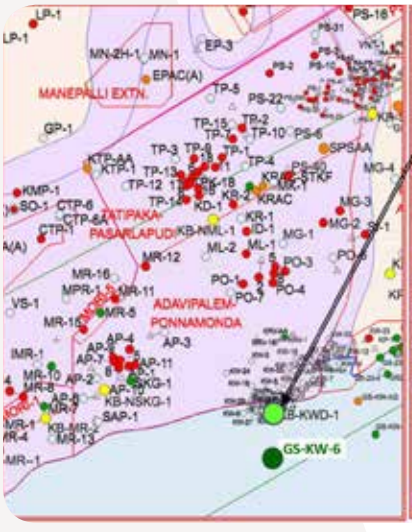

Fig. 3.58. Location Map of well, KWD-1

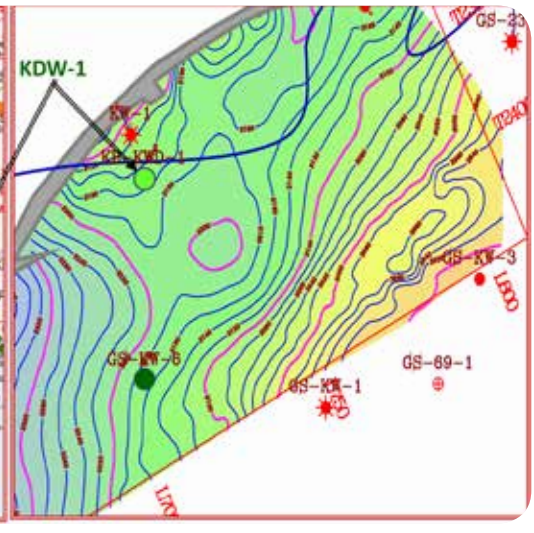

Fig. 3.59. Structure Map close to top of SD-1D pay sand of well GS-KW-6

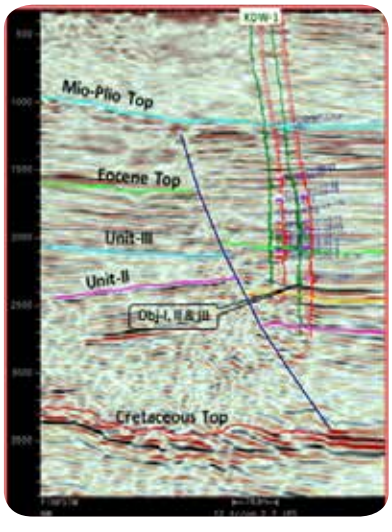

Fig. 3.60. Inline 726 through KWD-1

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Table: 3.30. GS-15 & 23 PML | Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
GS-71 / GS-71-AA / GS-71-1	Obj-I (3446-44, 3427-25.5 & 3414-06 m): Flowed oil @ 8.6 m3/d, gas @ 1315 m^3/d at FTHP: 24.23 kg/cm^2 (14/64" choke). Obj-III (3276-73 & 3256-49 m): Flowed oil @ 240.39 m^3/d, gas @ 168066 m^3/d at FTHP: 194.01 kg/cm^2 (28/64" choke). Obj-VI (2336.5-35.5 m): Flowed condensate. @ 85.5 m^3/d, gas @ 249534 m^3/d at FTHP: 144.72 k/cm^2 through 34/64" choke.	This lead has opened up further exploration of hydrocarbons in Vadaparru & Ravva plays in this area. The testing results of this well has proved the presence of hydrocarbons within Vadaparru & Matsyapuri formation to the North of well GS-15-4.

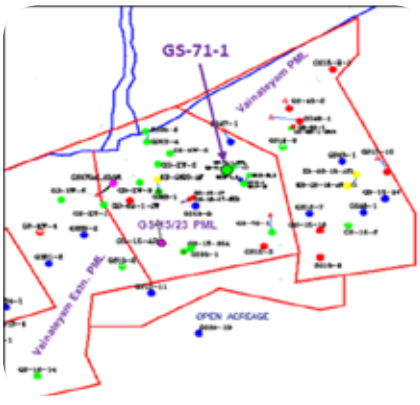

Fig. 3.61. Location Map of GS-71-1-1 with PML boundaries

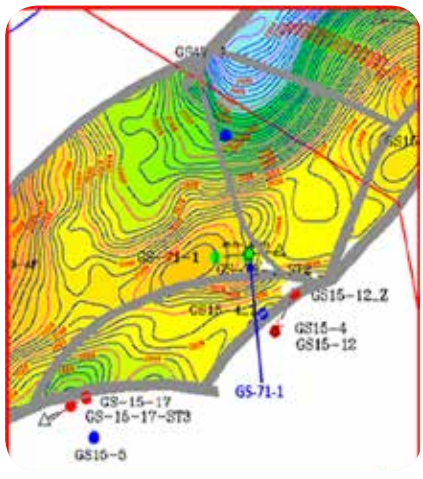

Fig. 3.62. Depth Map Of Horizon Close To Object-III Of GS-71-1-ST2

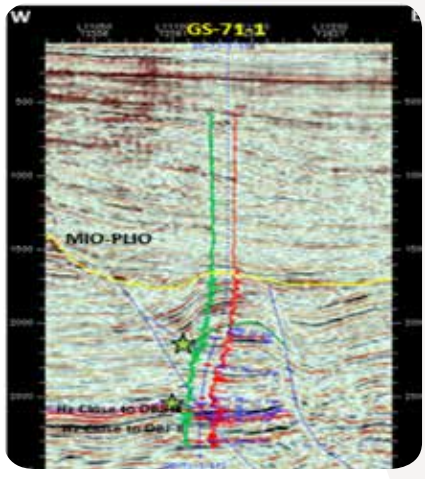

Fig. 3.63. RC Line Through Well Path Of GS-71-1-ST2

Table: 3.31. Vasishta PML | Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
G-1-N /G-1-N-2/ G-1-N-AB	Obj-I (2311-10 & 2299.5-96 m): Flowed oil @ 617.84 m^3/day, gas @ 1,27,772 m^3/day at FTHP: 146.41 kg/cm^2 through ½" choke.	The establishment of hydrocarbon in new sand (Godavari Clay Formation) has opened up substantial area north of G-1 Field for further exploration and also for reassessment in the open acreage north of G-1 Field.

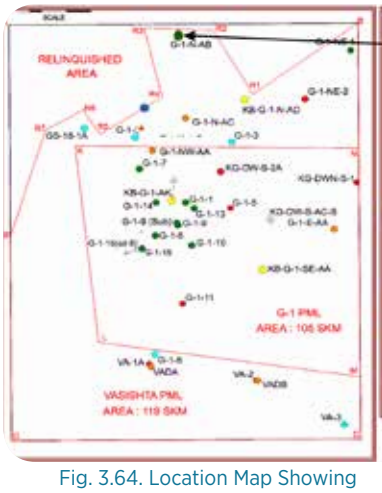

Fig. 3.64. Location Map Showing well, G-1-N-2

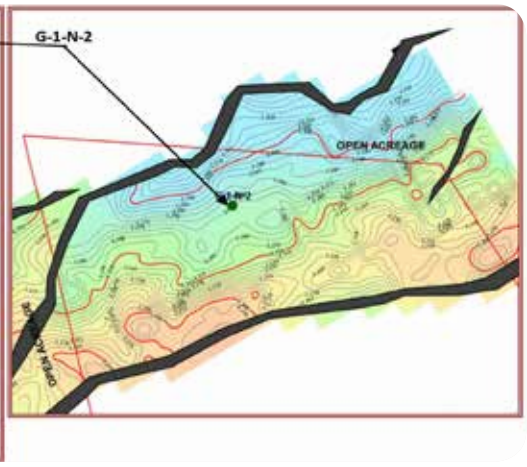

Fig. 3.65. Depth Map on Top of Zone-6 (New Find)

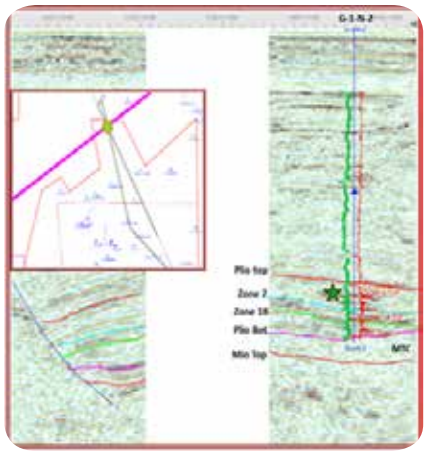

Fig. 3.66. Xline-3286 passing through well G-1-N-2

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Table: 3.32. KG-OSN-2009/2| Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
KGS092NA-SRI-1 /SRI-AA / SRI-1	Obj-I (3889-3882, 3866-3834 m): Flowed oil @ 32 bpd and gas @ 820 m^3/day) through 12/64" choke.	This is the first discovery in this NELP block and has opened up Syn-rift play for further exploration and improved prospectivity of the block.

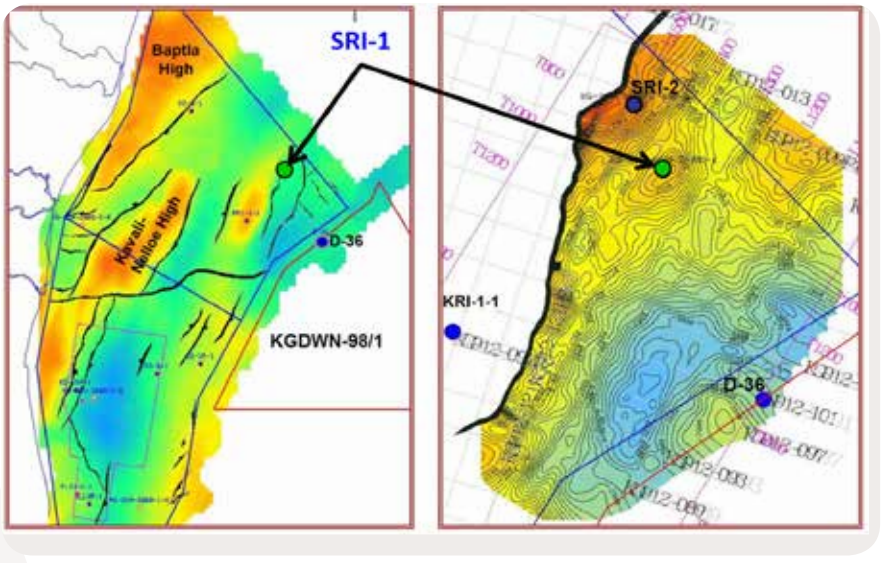

Fig. 3.67. Location Map showing well, SRI-1

Fig. 3.68. Time Map close to Syn Rift Top

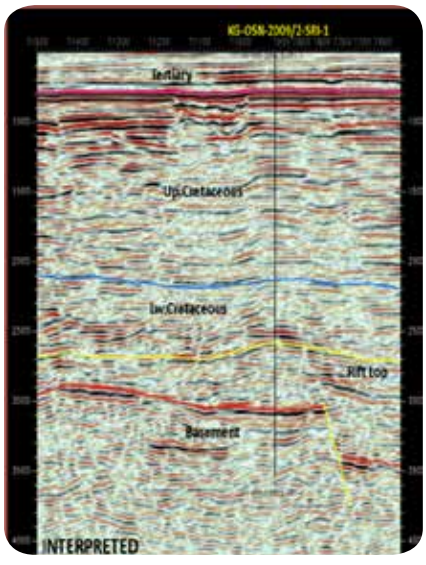

Fig. 3.69. Inline-1382 passing through well, SRI-1

SAURASHTRA OFFSHORE BASIN

Table: 3.33. MB-OSN-2005/1| Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
MBS051NAA-1 / MBS051NAA-B / MBS051NAA-2	Object-I (2465.5-2462 m): Flowed gas @ 95,275 m^3/day, condensate @ 72 bpd at FTHP: 1600 psi through 3/8"choke	The successful testing result in this NELP block has opened up more area for exploration of Daman plays and will help in early monetization of the discoveries of the block.

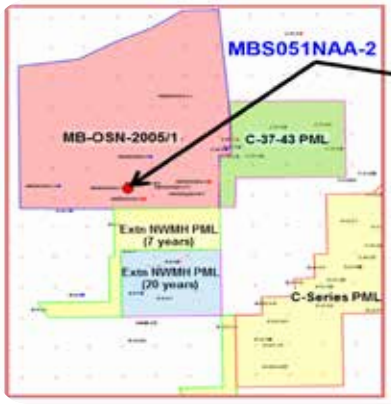

Fig. 3.70. Location Map showing well, MBS051NAA-2

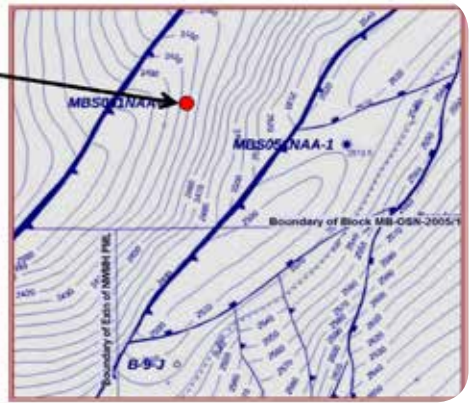

Fig. 3.71. Structure Map on top of Daman Pay Sand-1

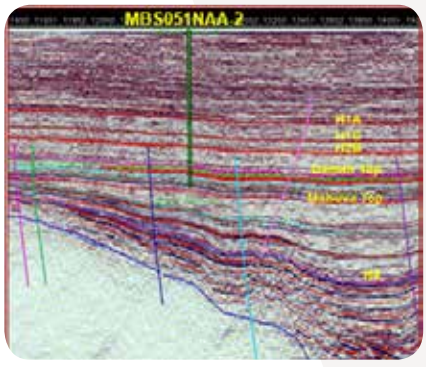

Fig. 3.72. Inline 2567 passing through well, MBS051NAA-2

KUTCH OFFSHORE BASIN

Table: 3.34. GK-OSN-2010/1| Operator: ONGC

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
GKS101NCA / GKS101NCA-1 / GKS101NCA-A	Obj-I (917-914 m): Flowed gas @ 1,63,000 m^3/day at FTHP: 1010 psi through ½" choke.	Hydrocarbon discovery in Chhasra Formation (Mid. Miocene) beyond GK-28 area has been a major exploration lead. It has opened up new area for further exploration of Chhasra Formation.

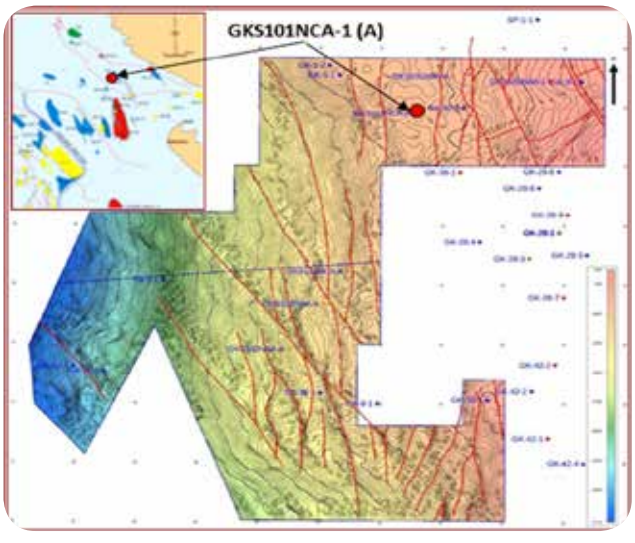

Fig. 3.73. Structure Map at Early Miocene top showing well, GKS101NCA-1

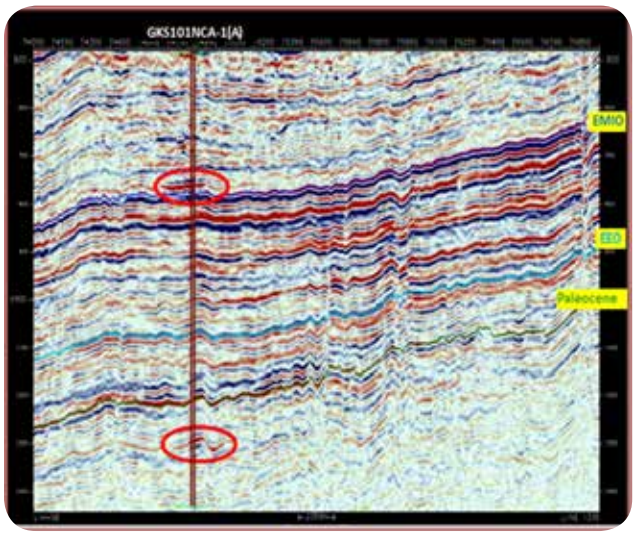

Fig. 3.74. Inline 1335 showing well GKS101NCA-1

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UPPER ASSAM BASIN

Table: 3.35. Onshore/(Hugrijan PML) / Operator: OIL

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Hapjan/ HJN055 & Loc. HRU	Object I: (3085.0-3089.0 m, 3084.0-3090.0 m) Produced oil@ 5 KLPD through 6 mm bean. Object I produced oil from Oligocene Barail Formation.	Oil entrapment in Barail Formation was encountered for the first time in this area. This new prospect discovery in Barail Formation in the area will enhance the prospectivity of the area for further exploration.

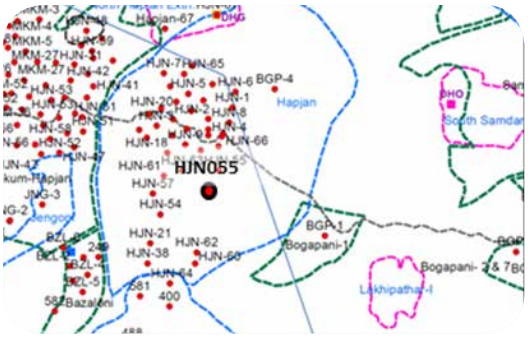

Fig. 3.75. Location Map of well HJN055

Fig. 3.76. Depth Contour Map on near top of Barail 4th Sand

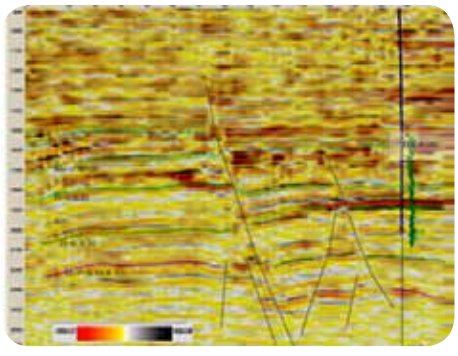

Fig. 3.77. Seismic Crossline 129 passing through Well Hapjan-55

Table: 3.36. Onshore Hugrijan PML / Operator: OIL

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Hapjan/ HJN062 & Loc. HYK	Object I: (2436.0-2442.0 m, 2434.0-2440.0 m) Produced gas@ 57000 SCUMD through 5 mm bean. Object I produced oil from Miocene Upper Tipam Formation.	Gas entrapment in Upper Tipam Formation was encountered for the first time in this area. This new prospect discovery in Upper Tipam Formation in the area will enhance the prospectivity of the area for further exploration.

Fig. 3.78. Location Map of well HJN062

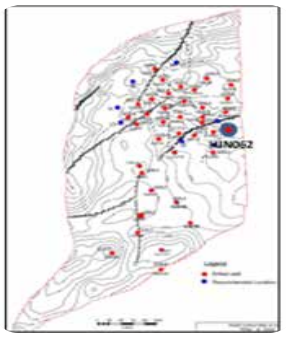

Fig. 3.79. Depth Contour Map on top of Tipam-40

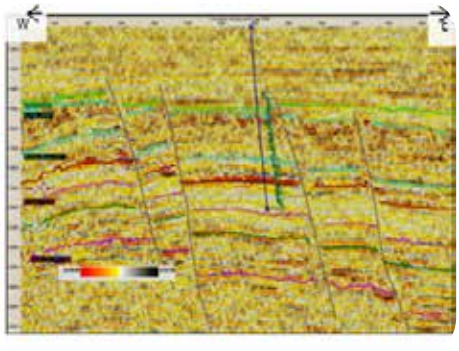

Fig. 3.80. Seismic Crossline 588 passing through Well HJN-62

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Table: 3.37. Nahorkatiya Extension PML/ Operator: OIL

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Amgurigaon/ NHK595 & Loc. NLC	Object I: (2676.0-2681.0 m) Produced oil @ 37 KLPD through 7 mm bean. Object I produced oil from Oligocene Barail Formation.	Oil entrapment in Oligocene Barail Formation was encountered for the first time in this area. This new prospect discovery in Oligocene Barail Formation in the area will enhance the prospectivity of the area for further exploration.

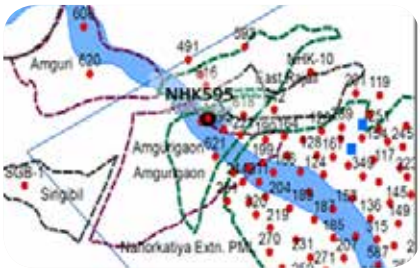

Fig. 3.81. Location Map of well NHK595

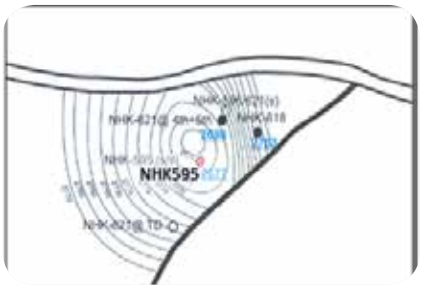

Fig. 3.82. Depth Contour Map on top of Barail 4th+5th Sand

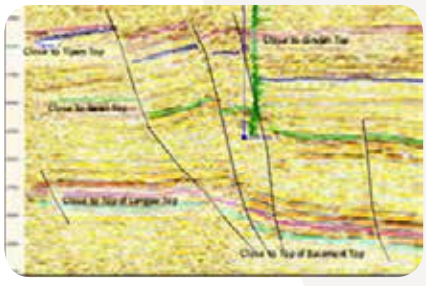

Fig. 3.83. Seismic Inline 372 passing through Well NHK-595

Table: 3.38. Dumduma PML/ Operator: OIL

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
North Hapjan/ HJN067 & Loc. DHF	Object I: (2798.0-2804.0 m) Produced gas at the time of testing, after unloading 38 BBLS of well fluid. Presently shut in. Object I produced gas from Oligocene Barail Formation.	Gas entrapment in Barail Formation was encountered for the first time in this area. This new prospect discovery in Barail Formation in the area will enhance the prospectivity of the area for further exploration.

Fig. 3.84. Location Map of well HJN067

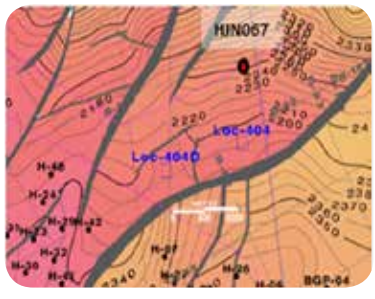

Fig. 3.85. Depth Contour Map near top of Barail 4th Sand

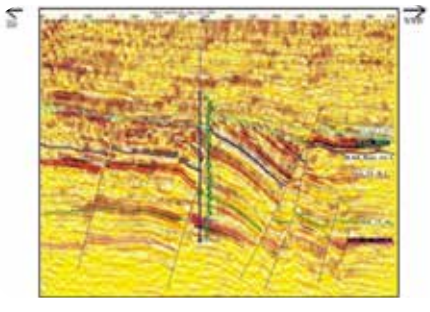

Fig. 3.86. Seismic Inline 165 passing through Well Hapjan-67

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Table: 3.39. Hugrijan PML/ Operator: OIL

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Makum/ MKM060 & Loc. HYK	Object II: (2627.0-2633.0 m) Produced oil @26 KLPD through 12 mm bean on gas lift. Object II produced oil from Oligocene Barail Formation.	Oil entrapment in Oligocene Barail Formation was encountered for the first time in this area. This new prospect discovery in Oligocene Barail Formation in the area will enhance the prospectivity of the area for further exploration.

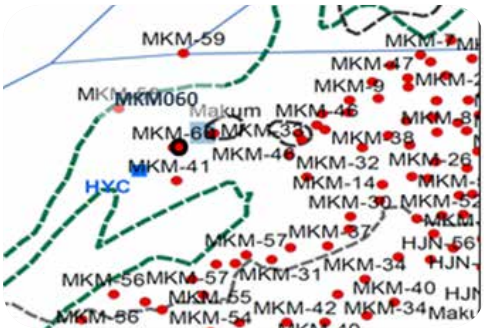

Fig. 3.87. Location Map of well MKM060

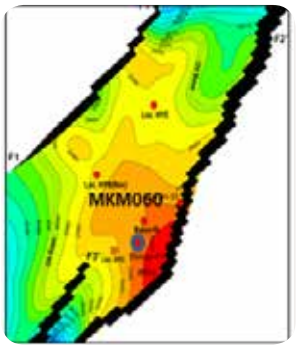

Fig. 3.88. Depth Contour Map on top of Barail 4th+5th Sand

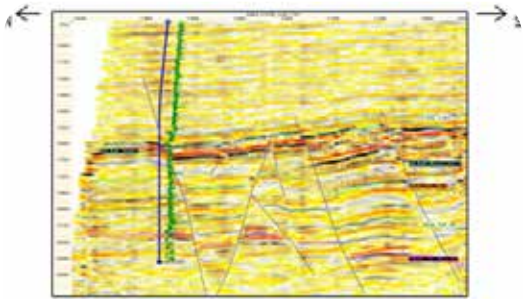

Fig. 3.89. Seismic Inline 1741 passing through Well Makum-60

Table: 3.40. Tinsukia PML/ Operator: OIL

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Kharjan / KRJ001 & Loc. TAT	Object I: (4074.0-4075.0 m) Indication of heavy /high pour point oil was observed while carrying out MDT and production testing. Well is presently kept shut in. Object I indicated high pour point oil from Eocene Lk+Th Formation.	Oil entrapment in Eocene Lk+Th Formation was encountered for the first time in this area. This new prospect discovery in Eocene Lk+Th Formation in the area will enhance the prospectivity of the area for further exploration.

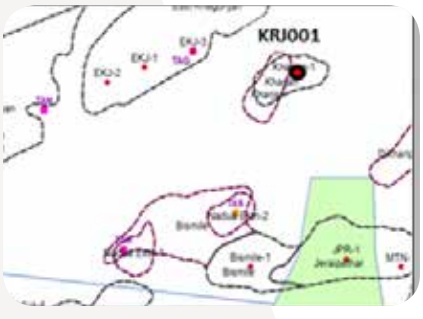

Fig. 3.90. Location Map of well KRJ001

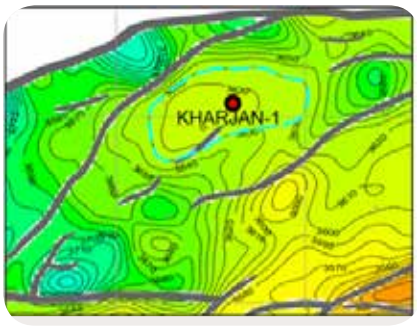

Fig. 3.91. Depth Contour Map well with in Lk+Th Formation

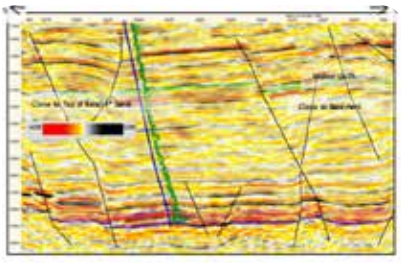

Fig. 3.92. Seismic Inline 1361 passing through Well Kharjan-1

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Table: 3.41. Hugrijan PML/ Operator: OIL

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Jutlibari/ NHK637 & Loc. HYT	Object I: (2708.0 -2714.0 m) Produced gas @ 30000 SCUMD & condensate @16 KLPD through 4 mm bean. Object I produced gas from Oligocene Barail Formation.	Gas entrapment in Oligocene Barail Formation was encountered for the first time in this area. This new prospect discovery in Oligocene Barail Formation in the area will enhance the prospectivity of the area for further exploration.

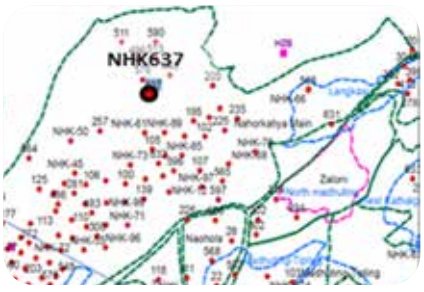

Fig. 3.93. Location Map of well NHK637

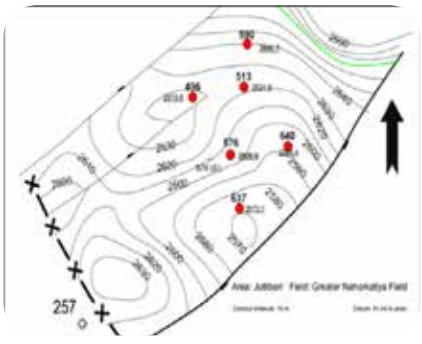

Fig. 3.94. Depth Contour Map on Top of Barail 3rd Sand

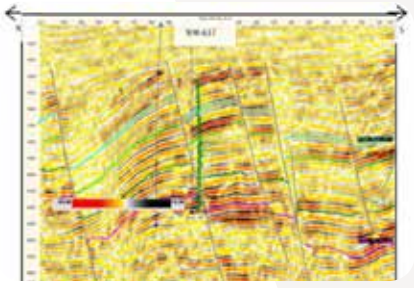

Fig. 3.95. Seismic Inline 41 passing through Well NHK-637

Table: 3.42. Moran PML/ Operator: OIL

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Borbhuibil / BHB001 & Loc. MFJ	Object I: (3333.0-3336.0 m) Produced oil@ 28 KLPD in Full bore. Presently well is kept shut in. Object I produced oil from Oligocene Barail Formation.	Oil entrapment in Oligocene Barail Formation was encountered for the first time in this area. This new prospect discovery in Oligocene Barail Formation in the area will enhance the prospectivity of the area for further exploration.

Fig. 3.96. Location Map of well BHB001

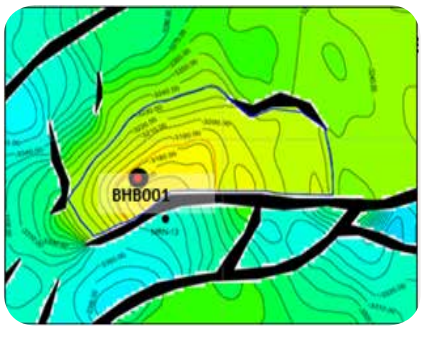

Fig. 3.97. Depth Contour Map close to Barail Top

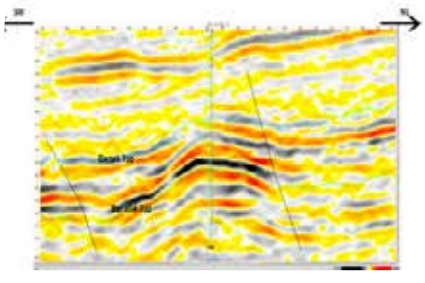

Fig. 3.98. Seismic Inline 139 passing through Well Borbhuibil-1

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Table: 3.43. Hugrijan PML/ Operator: OIL

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Bhadoi/ NHK606 & Loc. HTD	Object I: (3649.0-3655.0 m) Produced oil @ 20 KLPD through 5 mm bean. Object I produced oil from Oligocene Barail Formation.	Oil entrapment in Barail Formation was encountered for the first time in this area. This new prospect discovery in Barail Formation in the area will enhance the prospectivity of the area for further exploration.

Fig. 3.99. Location Map of well NHK606

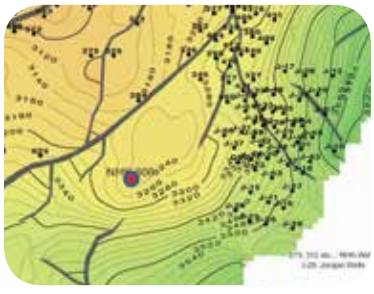

Fig. 3.100. : Depth Contour Map close to Top of Barail 4th Sand

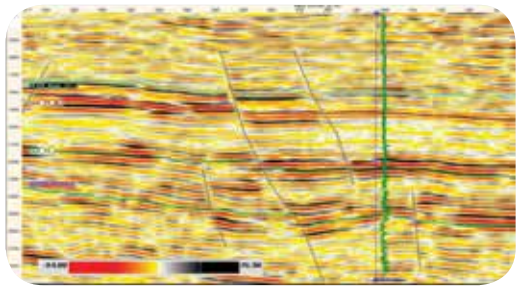

Fig. 3.101. Seismic Inline 247 passing through Well NHK-606

Table: 3.44. Hugrijan PML/ Operator: OIL

Structure/ Well No. & Location	Testing Results	Leads/ Expl. Efficacy
Makum/MKM043 & Loc. HVL	Object I: (2323.0-2329.0 m) Produced gas @ 30000 SCUMD. Object I produced gas from Miocene Tipam Formation.	Gas entrapment in Miocene Tipam Formation was encountered for the first time in this area. This new prospect discovery in Miocene Tipam Formation in the area will enhance the prospectivity of the area for further exploration.

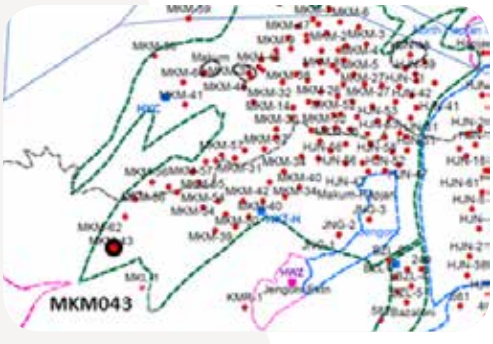

Fig. 3.102. Location Map of well MKM043

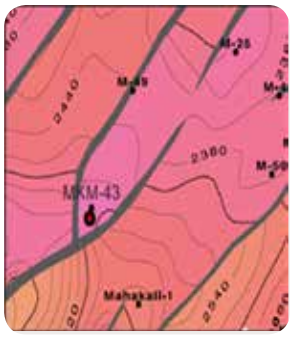

Fig. 3.103. Depth Contour Map near Top of Tipam-60

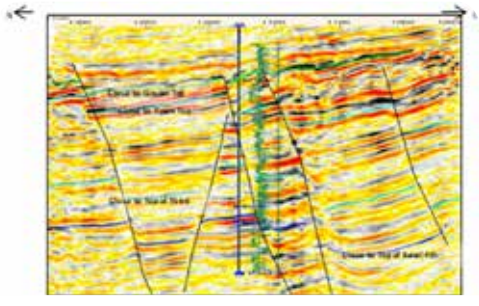

Fig. 3.104. Seismic Inline 1711 passing through Well Makum-43

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Eight discoveries were made in 2016-17 under PSC regime. Most of them were in Cambay Basin (five). Details have been listed in Table 3.45.

Table 3.45. Discoveries notified under PSC regime during the FY 2016-17

No.	Discovery Name	Block	Basin	Location	PSC Round	Operator	Oil / Gas	Discovery Notification Date
1	GKS101NCA-1	GK-OSN-2010/1	Gujarat Kutch	Shallow water	NELP-IX	ONGC	Gas	23-03-2017
2	KGS092NASRI-1 (KGS092NASRI-AA)	KG-OSN-2009/2	Krishna Godavari	Shallow water	NELP-VIII	ONGC	Oil	18-04-2016
3	MBS051NAA-2	MB-OSN-2005/1	Mumbai Offshore	Shallow water	NELP-VI	ONGC	Gas	06-04-2016
4	NDDA (Nadiad # 4)	CB-ONN-2001/1	Cambay	Onland	NELP-III	ONGC	Oil	29-06-2016
5	NTPC-A1	CB-ONN-2009/5	Cambay	Onland	NELP-VIII	NTPC	Oil	12-05-2016
6	Pasunia#01 (PA#01)	CB-ONN-2010/8	Cambay	Onland	NELP-IX	BPRL	Oil	23-09-2016
7	Pasunia#2 (PA#02)	CB-ONN-2010/8	Cambay	Onland	NELP-IX	BPRL	Oil	27-10-2016
8	Dugari-1	CB-ONN-2010/11	Cambay	Onland	NELP-IX	GAIL	Oil	26-03-2017

Cumulatively 240 Oil and Gas discoveries were made in PSC regime, out of which 16% (39 discoveries) have been put on production, 50% are active (121 discoveries) and yet to be put on production and remaining 33% (80 discoveries) are inactive. Details have been listed in Table 3.46.

Table 3.46. Breakup of Active and Inactive discoveries under PSC regime

No.	Status	Oil	Gas	Total
	Discoveries on Production	25	14	39
Active Discoveries (Discoveries being actively pursued for monetization by Operator)				
a)	Discoveries under development	21	16	37
b)	Discoveries for which commerciality established	20	28	48
c)	Discovery for which commerciality proposal (DoC) submitted	4	4	8
d)	Discoveries in Early Stage, DoC to be submitted	12	17	28
Total (Active Discoveries)		**57**	**65**	**121**
Inactive Discoveries (not being executed by operators)				
a)	Discoveries to be monetized falling in ML areas	26	1	27
b)	Revised DoC submitted, but not accepted	0	4	4
c)	Discoveries not pursued/relinquished	18	31	49
Total (Inactive Discoveries)		**44**	**36**	**80**
Total Oil & Gas Discoveries under PSC regime (NELP/Pre NELP)		**126**	**115**	**240**
CBM Development			**8**	**8**

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The 240 discoveries, made till date, have been classified basin-wise, region-wise and regime-wise as below:

Table 3.47. Basin-wise discoveries under various regimes as on 31.03.2017

Basin	Oil	Gas	Total
Andaman-Nicobar	-	1	1
Assam Arakan	-	7	7
Cambay	67	14	81
Cauvery	3	6	9
Gujarat Kutch	-	5	5
Gujarat Saurashtra	-	3	3
Krishna Godavari	18	54	72
Mahanadi	-	4	4
Mumbai Offshore	1	4	5
North East Coast	-	9	9
Rajasthan	36	7	43
Satpura - S. Rewa-Damodar		1	1
Total	**125**	**115**	**240**

Table 3.48. Region wise discoveries under various regimes as on 31.03.2017

Region	Oil			Gas			Total
	NELP	Pre-NELP	PSC-Field Round	NELP	Pre-NELP	PSC-Field Round	
Deep Water	8	-	-	40	-	-	48
On Land	48	53	2	13	10	-	126
Shallow water	5	3	6	46	5	1	66
Total	**61**	**56**	**8**	**99**	**15**	**1**	**240**

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Table 3.49. Details of discoveries under Pre-NELP regime as on 31.03.2017

Operator	Block	PSC Round	Oil	Gas	Total
Shell	Panna-Mukta	PSC-Field Round	1		1
Cairn	CB-OS/2	Pre-NELP	2	3	5
	Ravva	PSC-Field Round	5	1	6
	RJ-ON-90/1	Pre-NELP	35	4	39
ESSAR	CB-ON/3	Pre-NELP	5		5
Focus	GK-ON/4	Pre-NELP		1	1
	RJ-ON/6	Pre-NELP		3	3
GSPC	CB-ON/2	Pre-NELP	11	1	12
HARDY	CY-OS-2	Pre-NELP		1	1
HOEC	AAP-ON-94/1	Pre-NELP		1	1
	CB-ON/7	Pre-NELP	2		2
ONGC	CB-OS/1	Pre-NELP	1		1
RIL	SR-OS-94/1	Pre-NELP		1	1
Selan Exploration Technology Limited	Karjisan	PSC-Field Round	1		1
Sun Petrochemicals Pvt Ltd	Baola	PSC-Field Round	1		1
Total			**64**	**16**	**80**

Table 3.50. Details of oil and gas discoveries under NELP regime as on 31.03.2017

Operator	Block	PSC Round	Oil	Gas	Grand Total
BPRL	CB-ONN-2010/8	NELP-IX	2		2
Focus	CB-OSN-2004/1	NELP-VI	2	3	5
GAIL	CB-ONN-2010/11	NELP-IX	1		1
GSPC	CB-ONN-2000/1	NELP-II	4		4
	CB-ONN-2002/3	NELP-IV	8		8
	CB-ONN-2003/2	NELP-V	2	1	3
	KG-OSN-2001/3	NELP-III		9	9
Jay Polychem(India) Pvt. Ltd.	CB-ONN-2009/8	NELP-VIII	1		1
JOGPL	AA-ONN-2002/1	NELP-IV		3	3
	CB-ONN-2002/2	NELP-IV	2		2
	CY-ONN-2002/1	NELP-IV		1	1
MPL	CB-ONN-2005/9	NELP-VII	2		2
NAFTOGAS	CB-ONN-2004/5	NELP-VI	1		1
NIKO	CB-ONN-2000/2	NELP-II		2	2
NTPC	CB-ONN-2009/5	NELP-VIII	1		1
OIL	KG-ONN-2004/1	NELP-VI		1	1
	RJ-ONN-2004/2	NELP-VI	1		1
ONGC	AA-ONN-2001/1	NELP-III		2	2
	AA-ONN-2001/2	NELP-III		1	1
	AN-DWN-2002/1	NELP-IV		1	1
	CB-ONN-2001/1	NELP-III	2		2
	CB-ONN-2002/1	NELP-IV	1		1
	CB-ONN-2004/1	NELP-VI	1		1

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Operator	Block	PSC Round	Oil	Gas	Grand Total
ONGC	CB-ONN-2004/2	NELP-VI	5		5
	CB-ONN-2004/3	NELP-VI		1	1
	CB-ONN-2005/4	NELP-VII	1		1
	CB-OSN-2003/1	NELP-V		3	3
	CY-ONN-2002/2	NELP-IV	2	1	3
	CY-ONN-2004/2	NELP-VI	1		1
	GK-OSN-2009/1	NELP-VIII		1	1
	GK-OSN-2009/2	NELP-VIII		1	1
	GK-OSN-2010/1	NELP-IX		2	2
	GS-OSN-2004/1	NELP-VI		2	2
	KG-DWN-2005/1	NELP-VII		1	1
	KG-DWN-98/2	NELP-I	6	8	14
	KG-ONN-2003/1	NELP-V	2		2
	KG-OSN-2004/1	NELP-VI		7	7
	KG-OSN-2009/2	NELP-VIII	1		1
	MB-OSN-2005/1	NELP-VII		3	3
	MB-OSN-2005/3	NELP-VII		1	1
	MN-DWN-98/3	NELP-I		2	2
	MN-OSN-2000/2	NELP-II		2	2
	NEC-DWN-2002/2	NELP-IV		1	1
RIL	CB-ONN-2003/1	NELP-V	8		8
	CY-DWN-2001/2	NELP-III		2	2
	CY-PR-DWN-2001/3	NELP-III		1	1
	GS-OSN-2000/1	NELP-II		1	1
	KG-DWN-2001/1	NELP-III		1	1
	KG-DWN-2003/1	NELP-V		4	4
	KG-DWN-98/1	NELP-I	1		1
	KG-DWN-98/3	NELP-I	1	19	20
	KG-OSN-2001/1	NELP-III		3	3
	KG-OSN-2001/2	NELP-III	2		2
	NEC-OSN-97/2	NELP-I		8	8
Grand Total			**61**	**99**	**160**

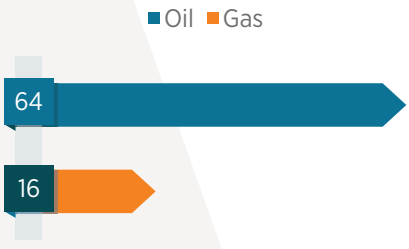

Fig. 3.105. Number of discoveries made under Pre-NELP

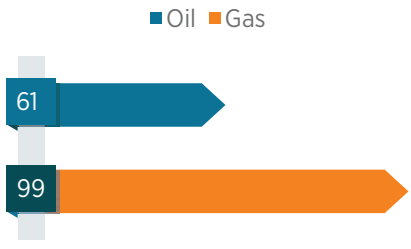

Fig. 3.106. Number of discoveries made under NELP

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3.3. Oil and Gas Production

Targeted crude oil production for the year 2016-17 was 37.085 MMT which was met by 97% as domestic crude oil production of India for the year was 36.008 MMT. Domestic Gas production (31.897 BCM) recorded 6.5% shortfall from the target 34.118 BCM.

There is 2.5% decrease in crude oil production and natural gas production witnessed 1.1% decrease over the previous year. As observed in previous years' trends, NOCs operating in nomination acreages are the major contributors to the oil and gas production (71% and 78% respectively), companies operating PSC regime have registered marginal decline in Oil and Gas production over previous year.

Table 3.51. Oil production in the country – 2016-17

Operator (Regimes)	OIL TMT				
	2015-16	2016-17		%, Ach w.r.t target	%, Ach w.r.t 15-16
	Actual	Target	Actual		
ONGC (N)	22,360	22,766	22,218	97.59%	99.36%
OIL (N)	3,226	3,480	3,258	93.62%	100.99%
PSC	11,356	10,839	10,532	97.17%	92.74%
Country	**36,942**	**37,085**	**36,008**	**97.10%**	**97.47%**

Table 3.52. Gas production in the country – 2016-17

Operator (Regimes)	GAS (MMSCM)				
	2015-16	2016-17		%, Ach w.r.t target	%, Ach w.r.t 15-16
	Actual	Target	Actual		
ONGC (N)	21,177	22,743	22,088	97.12%	104.30%
OIL (N)	2,838	2,950	2,937	99.56%	103.49%
PSC+CBM	8,235	8,425	6,872	81.57%	83.45%
Country	**32,250**	**34,118**	**31,897**	**93.49%**	**98.91%**

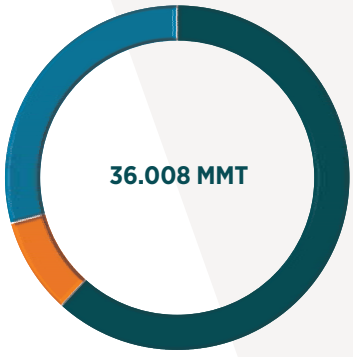

Fig. 3.107. Oil Production of Country in 2016-17 (MMT)

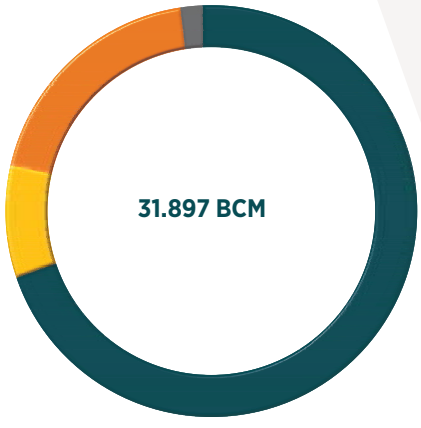

Fig. 3.108. Gas Production of Country in 2016-17 (BCM)

Table 3.53. Basin and Operator-wise production of country in FY 2016-17

No.	COMPANY/ OPERATOR	BASIN	PRODUCTION		
			OIL (MMT)*	GAS (MMSCM)	O+OEG (MMT)
NATIONAL OIL COMPANIES (NOC)					
1	ONGC	Assam-Arakan	0.95	1865.08	2.82
2		Cambay	4.47	1490.13	5.96
3		Cauvery Onland	0.24	977.43	1.21
4		KG (Onland & Offshore)	0.29	1337.76	1.63
5		Mumbai Offshore	16.27	16412.85	32.68
6		Rajasthan	0.00	4.72	0.005
TOTAL ONGC			**22.218**	**22087.98**	**44.31**
7	OIL	Rajasthan	0.00	232.02	0.23
8		Assam-Arakan	3.26	2704.54	5.96
TOTAL OIL			**3.26**	**2936.56**	**6.19**
TOTAL NOCs			**25.48**	**25024.53**	**50.50**
PVT/JV COMPANIES (PSC)					
9	CAIRN	Cambay	0.382	80.693	0.46
10		Krishna Godavari	0.808	192.422	1.00
11		Rajasthan	8.162	686.226	8.85
12	ESSAR	Cambay	0.001	0.000	0.001
13	FOCUS	Rajasthan	0.003	354.372	0.36
14	GEOENPRO	Assam-Arakan	0.048	15.677	0.06
15	GSPC	Cambay	0.049	11.869	0.06
16		Krishna Godavari	0.007	128.149	0.13
17	HERAMEC	Cambay	0.004	8.577	0.01
18	HOEC	Cambay	0.006	4.368	0.01
19		Cauvery	0.002	17.786	0.02
20	HRDCL - PPCL	Cambay	0.000	0.060	0.00
21	JTI	Cambay	0.047	12.956	0.06
22	NIKO	Cambay	0.004	41.966	0.05
23	OILEX	Cambay	0.000	2.400	0.00
24	ONGC	Cambay	0.004	0.000	0.00
25		Cauvery	0.046	5.752	0.05
26	RIL	Krishna Godavari	0.146	2862.089	3.01
27	SELAN	Cambay	0.023	7.952	0.03
28	SHELL	Mumbai	0.793	1874.239	2.67
TOTAL PVT/JV			**10.532**	**6307.555**	**16.84**
COAL BED METHANE (CBM)					
29	ESSAR	Raniganj East		385.471	0.39
30	GEECL	Raniganj South		169.596	0.17
31	ONGC	Jharia		3.083	0.00
32	RIL	Sohagpur East / West		6.439	0.01
TOTAL CBM				**564.589**	**0.56**
INDIA GRAND TOTAL			**36.008**	**31896.677**	**67.91**

*NOTE : FIGURES INCLUSIVE OF CONDENSATE (MMT); 1 MMT = 1 BCM

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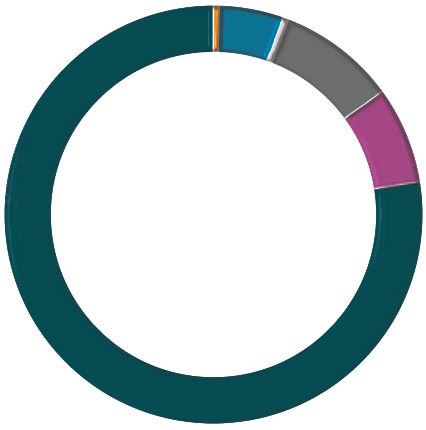

Fig. 3.109. Basin-wise Oil Production in PSC Regime in 2016-17 (TMT)

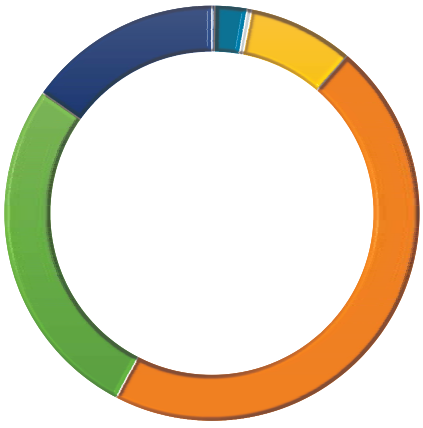

Fig. 3.111. Basin-wise Gas Production in PSC + CBM Regime in 2016-17 (MMSCM)

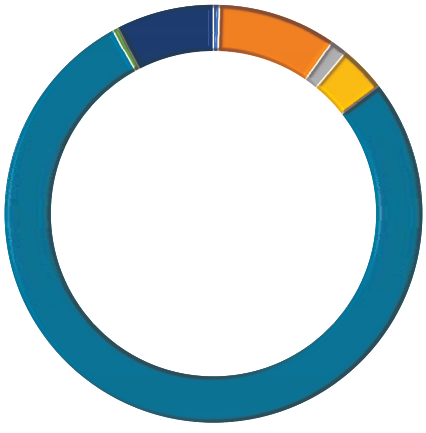

Fig. 3.110. Region-wise Oil Production in PSC Regime in 2016-17 (TMT)

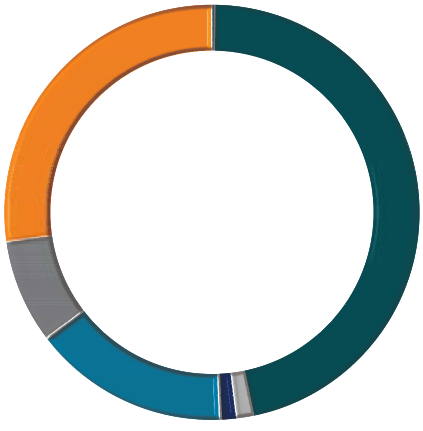

Fig. 3.112. Region-wise Gas Production in PSC + CBM Regime in 2016-17 (MMSCM)

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Oil production have increased steadily under PSC regime till 2011-12 where it has hit a plateau around 10-11 MMT. It is envisaged that pro-industry policies viz. OAL (HELP), DSF and PSC policies will usher renewed vigour in the upstream sector and production will increase. Oil production from PSC regime in 2016-17 is lower than previous year by 7% at 10.53 MMT. Gas production increased meteorically from 2008-09 and faltered post 2012-13. PSC regime's gas production was 6.87 BCM which is 16% lower than previous year.

Table 3.54. Oil and Gas production in PSC+CBM regime

Year	Oil+Cond (MMT)	Gas (BCM)
1994-95	0.25	0.09
1995-96	0.64	0.33
1996-97	1.34	0.51
1997-98	2.51	1.68
1998-99	3.04	2.87
1999-00	4.02	3.46
2000-01	4.08	3.60
2001-02	4.14	4.05
2002-03	4.09	5.41
2003-04	4.31	6.49
2004-05	4.30	6.78
2005-06	4.55	7.36
2006-07	4.83	7.04
2007-08	5.09	7.73
2008-09	4.67	8.09
2009-10	5.26	21.99
2010-11	9.68	26.77
2011-12	10.53	21.61
2012-13	11.64	14.49
2013-14	12.08	9.50
2014-15	11.79	8.91
2015-16	11.36	8.23
2016-17	10.53	6.87

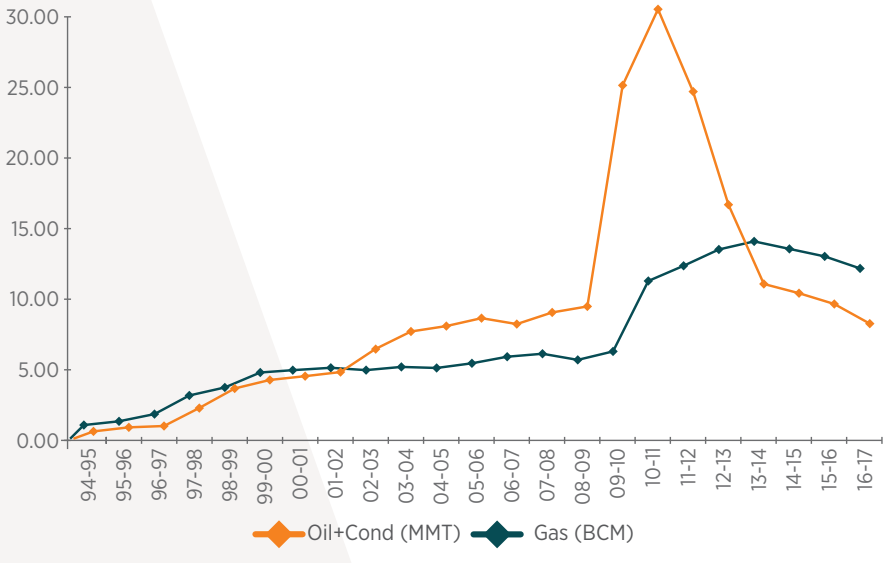

Fig. 3.113. Oil and Gas Production in PSC + CBM Contract Regime Since Inception till 2016-17

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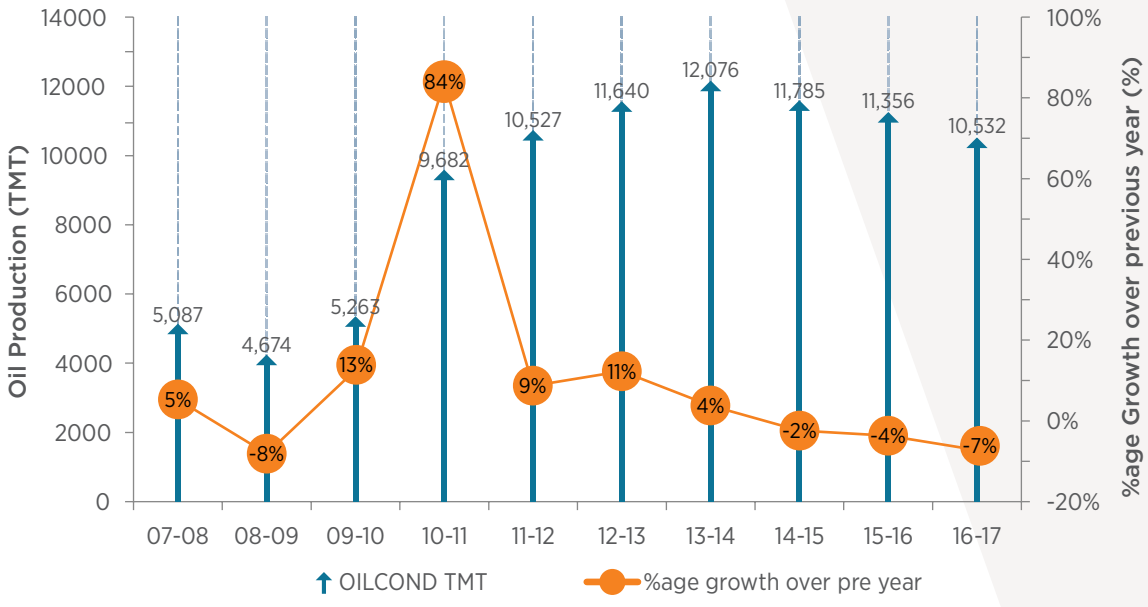

Fig. 3.114. Oil Production in PSC Regime from 2005-06 to 2016-17 (TMT)

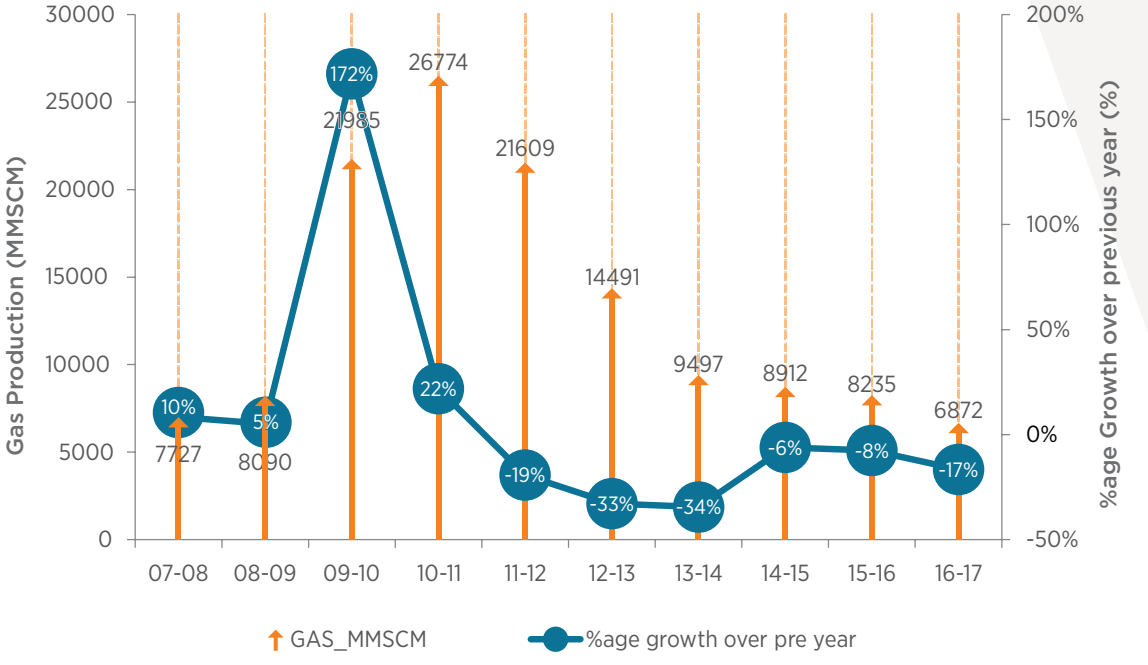

Fig. 3.115. Gas Production in PSC + CBM Regime from 2005-06 to 2016-17 (MMSCM)

Oil production from PSC regime has hit a plateau over the last 6-7 years hovering around 10-11 MMT. Bulk of the crude has come from Onshore fields. Natural Gas production on the other hand has been on the decline. CBM production has increased by 44% over the previous year. Unlike crude oil and sparing CBM, natural gas production is mostly from offshore fields (75%).

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Table 3.55. Location-wise Crude Oil and Natural Gas production under PSC+CBM regime from FY 2007-08 to FY 2016-17

Year	OIL+COND (TMT)				GAS (MMSCM)						
	Offshore	Onshore	Total	%age of onshore with Total	Offshore	Onshore	CBM	Total	%age CBM of Total	%age of offshore with Total	%age of onshore with Total
2007-08	4895	192	5087	4%	6861	867		7727		89%	11%
2008-09	4431	243	4674	5%	7348	722	20	8090	0.24%	91%	9%
2009-10	4529	734	5263	14%	21350	597	38	21985	0.17%	97%	3%
2010-11	4282	5400	9682	56%	26054	679	41	26774	0.15%	97%	3%
2011-12	3733	6794	10527	65%	20910	615	84	21609	0.39%	97%	3%
2012-13	2804	8836	11640	76%	13700	684	107	14491	0.74%	95%	5%
2013-14	2663	9414	12076	78%	8428	904	166	9497	1.74%	89%	10%
2014-15	2729	9056	11785	77%	7589	1095	228	8912	2.56%	85%	12%
2015-16	2546	8810	11356	78%	6605	1236	393	8235	4.77%	80%	15%
2016-17	2137	8396	10532	80%	5155	1152	565	6872	8.22%	75%	17%

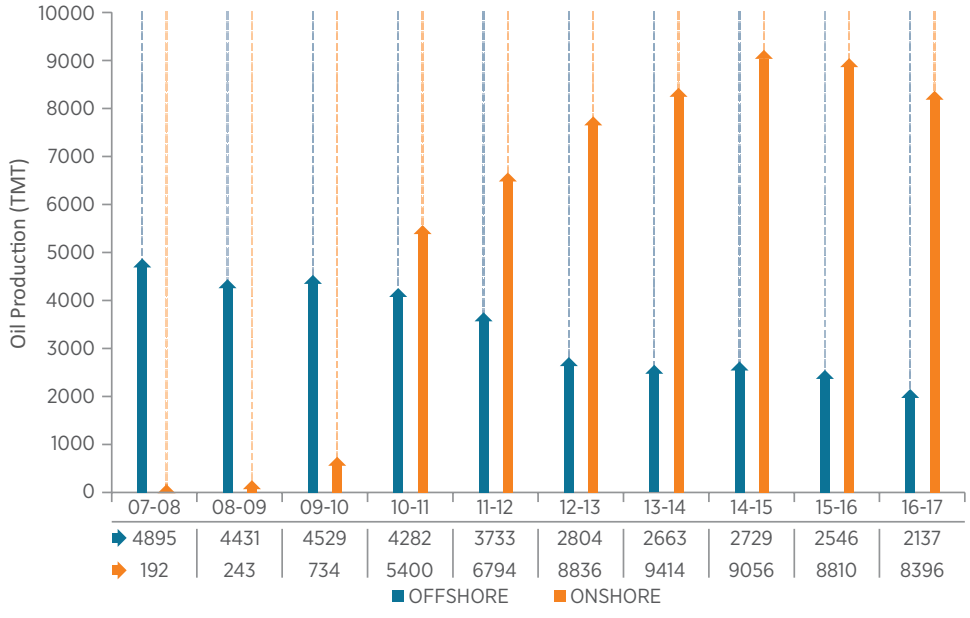

Fig. 3.116. Location wise Oil Production in PSC Regime from 2007-08 to 2016-17 (TMT)

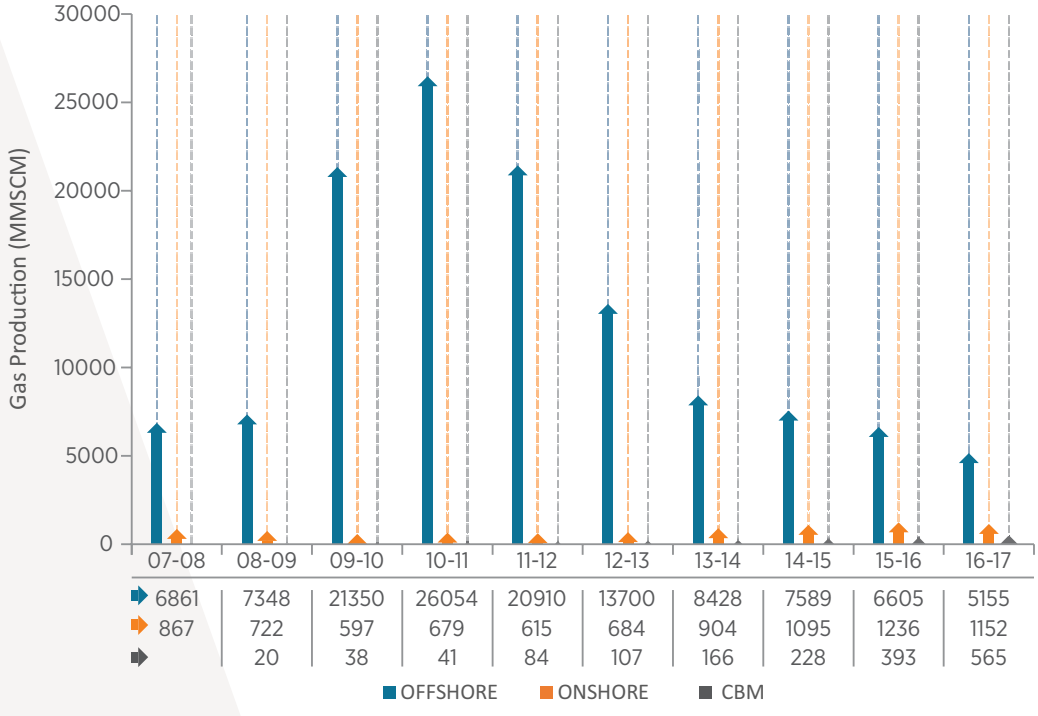

Fig. 3.117. Location wise Gas Production in PSC + CBM Regime from 2007-08 to 2016-17 (MMSCM)

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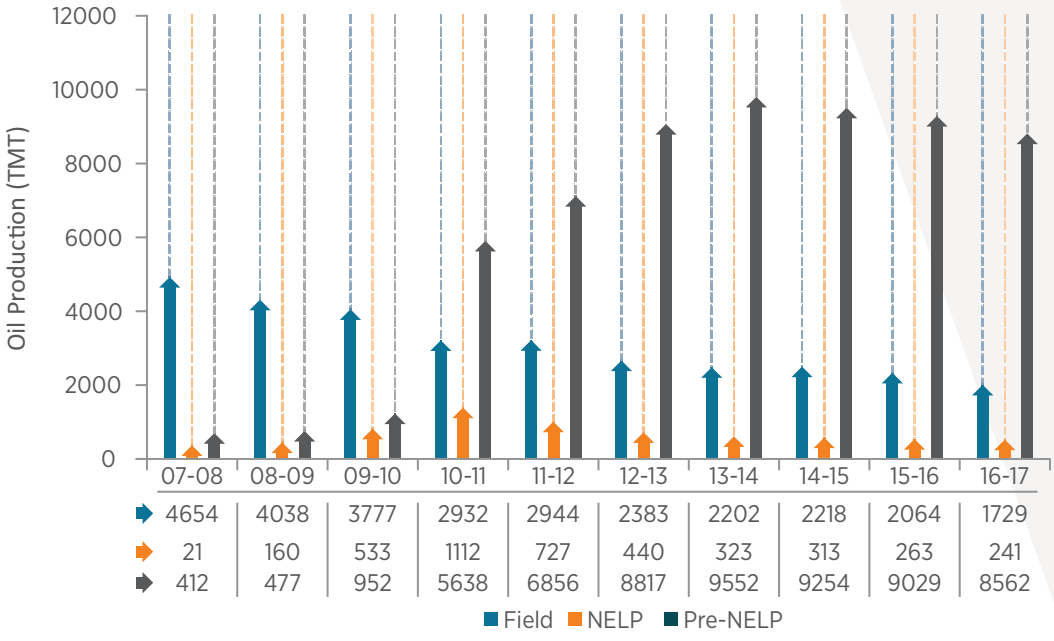

Fig. 3.118. Crude Oil Production in various Regime from 2007-08 to 2016-17 (TMT)

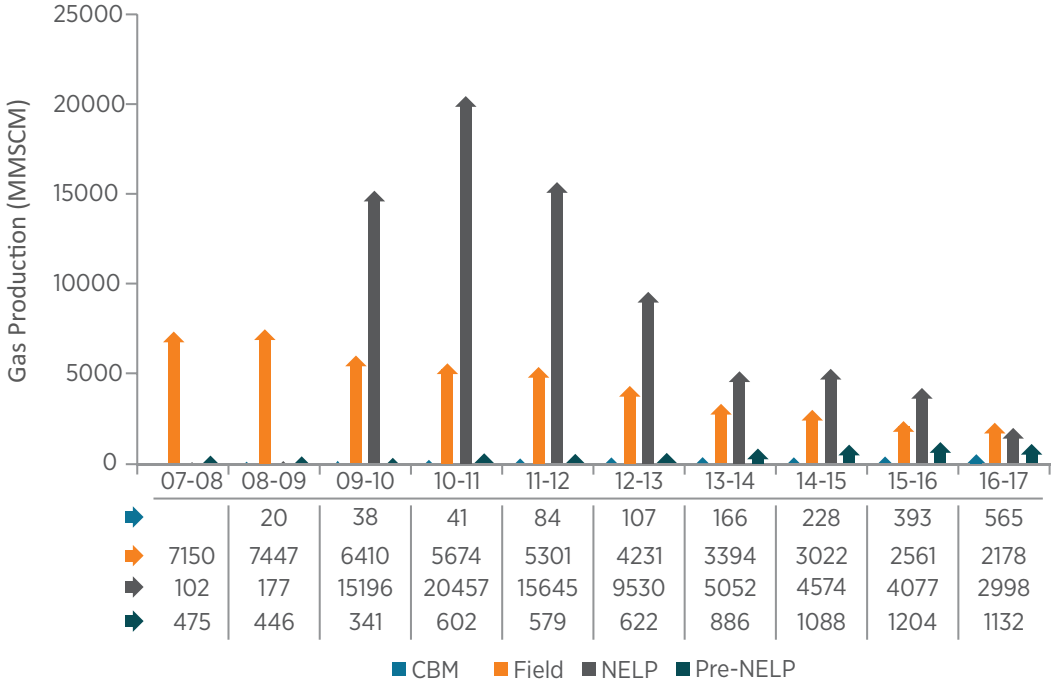

Fig.. 3.119. Gas Production in various Regime from 2007-08 to 2016-17 (MMSCM)

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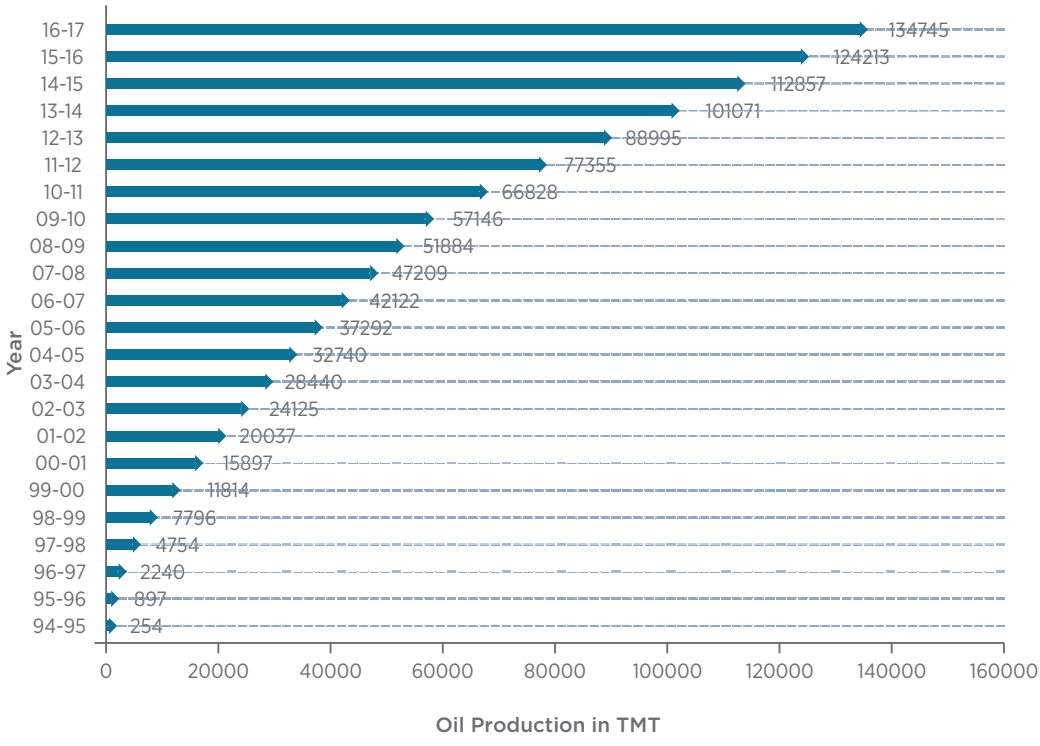

Fig. 3.120. Cumulative Oil Production in PSC Regime (TMT)

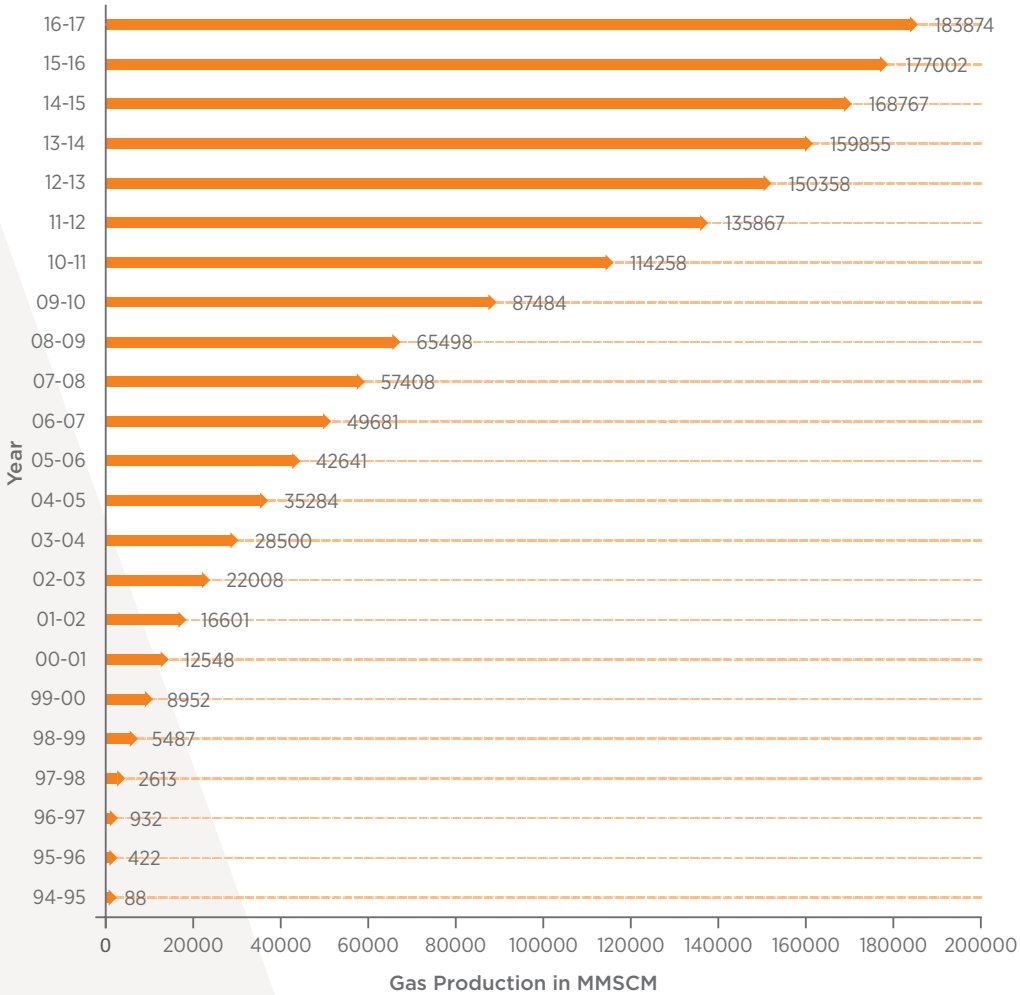

Fig. 3.121. Cumulative Gas Production in PSC + CBM Contract Regime (MMSCM)

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Table 3.56. Contribution by ONGC, OIL and Pvt./JVs in country's Oil and Gas production

Year	Oil Production (MMT)				Gas Production (BCM)			
	ONGC (Nom)	OIL (Nom)	Pvt/JVs (PSC)	Oil Total	ONGC (Nom)	OIL (Nom)	Pvt/JVs (PSC)	Gas Total
2011-12	23.71	3.85	10.53	**38.09**	23.32	2.63	21.61	**47.56**
2012-13	22.56	3.66	11.64	**37.86**	23.55	2.64	14.49	**40.68**
2013-14	22.25	3.47	12.08	**37.788**	23.28	2.63	9.50	**35.407**
2014-15	22.26	3.41	11.79	**37.461**	22.02	2.72	8.91	**33.656**
2015-16	22.37	3.23	11.36	**36.96**	21.18	2.84	8.23	**32.2492**
2016-17	22.22	3.26	10.53	**36.01**	22.09	2.94	6.87	**31.90**

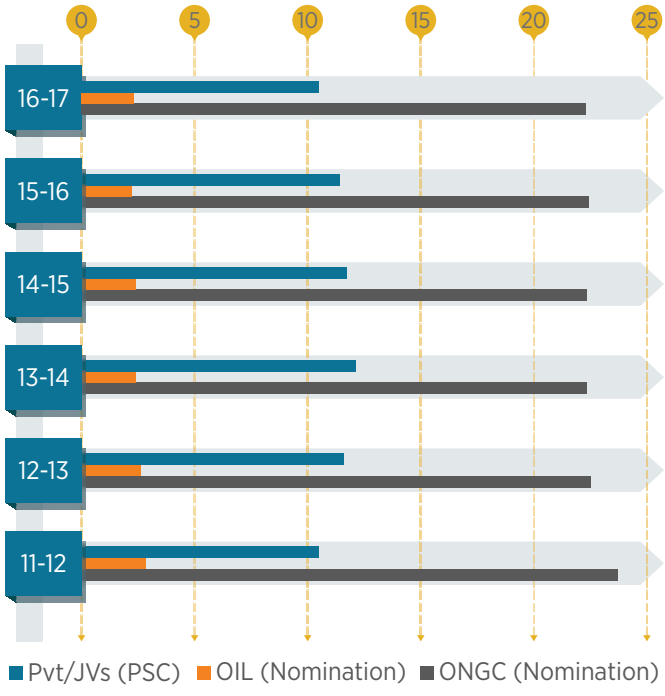

Fig. 3.122. Trend in Oil Production in the country (in MMT)

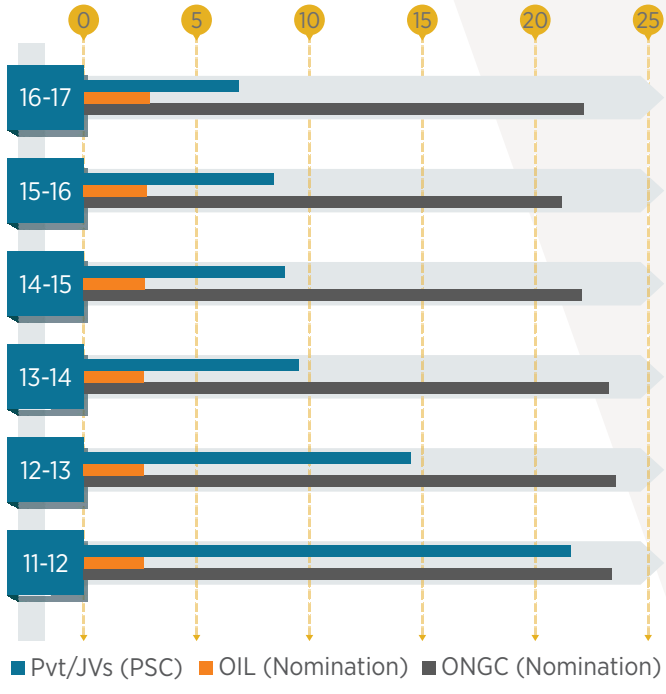

Fig. 3.123. Trend in Gas Production in the country (in BCM)

Geoscientific Studies

Geoscientific Studies

With an objective to reduce hydrocarbon import dependency by the year 2022, Government of India has unveiled a series of initiatives for enhancing exploration activities in the country, "Hydrocarbon Resource Assessment of Indian Sedimentary Basins" and "National Seismic Programme" are two major initiatives of Govt. of India in this direction.

Sufficient knowledge of hydrocarbon potential of a basin is necessary for any meaningful attempt towards exploration of oil and gas. In India, a basin-wide assessment of hydrocarbon resources was last carried out during 1995-96 and 15 sedimentary basins including deepwater areas were assessed based on available geo-scientific data and methodologies.

During the last two decades, geo-scientific data grew in volume due to activities pertaining to exploration, development and production. Use of new technologies furthered opened up new hydrocarbon plays (petroleum habitat with favorable geological conditions, occupying specific stratigraphic levels) and improved assessment tools for estimating hydrocarbon potential. Driven by the philosophy of realizing the potentials of Indian sedimentary basins for bidding out oil and gas acreage, an idea was mooted for a comprehensive evaluation of all 26 sedimentary basins with a re-assessed estimate.

4.1. Hydrocarbon Resource Assessment of Indian Sedimentary Basins:

In January 2014, Government of India issued an order and constituted a National Steering Committee ("NSC"), headed by Secretary, Ministry of Petroleum & Natural Gas ("MoP&NG") to administer the re-assessment of hydrocarbon resources (in general parlance, but technically, petroleum) in-place of all sedimentary basins and deepwater areas of India. International competitive bids were invited but no bidder could make it meeting the bidding criteria. ONGC ("Oil and Natural Gas Corporation Limited", a national oil company) proposed to carry out this project in-house in association with OIL ("Oil India Limited", other national oil company) under the guidance of international domain experts. Starting in September 2015, ONGC built the project by collating data from the nomination/lease areas (held by ONGC and OIL) and DGH ("Directorate General of Hydrocarbons", upstream technical arm under MoP&NG) shared the data from contract areas (held by contractors, consortium or joint venture entities). The project has a timeline of 27 months (September 2015 – November 2017) and the cost of the project (close to INR60 Cr) is sourced by DGH funding.

The project has been concurrently undertaken across seven work centers of ONGC. Most rigorous methodology as per global industry standards is used which was just fairly known during 1995-96 (the last assessment), has now been adopted for most of the basins where adequate geoscientific data are available. For rest of the basins where data are scanty to nil, re-assessment is attempted through simpler method, which was used during the earlier assessment. Unlike the study during 1995-96, which was carried out at basin-scale, the present approach is adopted to peep into the unit scale of 'play', in order to have deeper insight into plausible hydrocarbon accumulation. In the current scope of estimate, conventional reservoirs (mostly discrete with finite boundaries) that are developed in clastic and carbonate deposits of sedimentary rocks were primarily assessed. Nevertheless, fractured reservoirs that are present in the basement deposits of igneous rocks are also included. The thermogenic generation of hydrocarbon (under optimum temperature window), its expulsion out of source rocks, migration and accumulation within reservoir rocks are all rigorously modeled using state-of-the-art petroleum system modeling software. Nevertheless, biogenic hydrocarbon plays (mostly methane gas) are also estimated. For basins with limited or no data, analogous basin information from India and abroad is used and hydrocarbons are estimated through yield per unit area. Plays are identified across all 26 basins and belonging to Tertiary, Mesozoic, Pre-Mesozoic.

The current work is focusing on a fact that future bidding should be strengthened with more realistic assessment of Indian sedimentary basins and the results are readily available to the bidders. With HELP ("Hydrocarbon Exploration and Licensing Policy") and OALP ("Open Acreage Licensing Programme") already launched and operational along with NDR ("National Data Repository"), the project outcome of hydrocarbon play information would significantly contribute to enriching the geo-scientific database, essentially required for any meaningful and wiser foray into exploration business.

4.1.1. Project Schedule and Execution:

The project has been undertaken by ONGC in association with OIL and the DGH, which apart from data sourcing and technical review arranged the required funding for overall execution of the project. The project is concurrently carried out across seven work centers of ONGC as per the scheme shown alongside and in line with the adopted methodologies and based on the locations of various data centers. The project started in September 2015 and is scheduled for completion by November 2017.

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NSC being the apex body to administer the overall progress of the project constituted MOT from key members of stakeholders to assure data secrecy and quality of output. A team of four international experts along with national experts with basin-scale knowledge are engaged periodically for critical review at all key project milestones. The project is carried out using industry standard latest software as per global practices on date. Technical Monitoring Group ("TMG") with experts from three project stakeholders (ONGC, OIL and DGH) review the project technically every two months. As of 01.04.2017, MOT meetings have taken place 12 times and TMG seven times. International experts have reviewed the project progress and delivery for four times and NSC briefed for necessary direction for three times.

Since, there has been significant delay in starting the project, NSC has advised ONGC to strictly follow the timelines and complete the project by November 2017.

4.1.2. Assessment Methodologies

Two methodologies are adopted namely 3D Petroleum System Modeling ("PSM") for basins with adequate geological information and Areal Yield ("AY") method for basins with relatively less to scanty to even no data. First method is more rigorous and data-driven. The second method is simpler based on analogies and the method was used during last assessment in 1995-96.

Depending on the availability of suitable datasets, PSM has also been attempted along lines (1D) and sections (2D) in addition to 3D modeling as default case.

Eleven basins have now been re-assessed using 3D PSM approach and 15 basins assessed for AY method. Data suitability is exercised to examine if more basins can be taken up for 3D PSM. Both the methods are used for some basins where data are available in some parts and unsuitable in other parts of the basin. In another case, Kutch and Saurashtra basins are combined for PSM due to apparent commonality of geological parameters.

For both the approaches, available data are analyzed to create a geological model which includes basin tectonics (depth structures/horizons and faults), stratigraphy (facies/ rock types, geological ages and petroleum system elements) and geochemical analysis (source rock propagation), all replicating the subsurface of a basin.

For PSM approach, geological models were integrated with thermal models to build petroleum generation-expulsion scenario and to analyze petroleum system elements for inclusive assessment of petroleum accumulation and source rock tracking. For AY method, the geological models were scaled to analogous basins of India and abroad, identified based on geological parameters. The outcome of both the methods estimate petroleum inplace along with play fairway maps depicting the distribution of total petroleum in-place.

Table 4.1. Basin wise Petroleum System Modeling

No.	Basin	DGH Category	Petroleum System Modeling		
			1D	2D	3D
1	Cambay	I	1D		3D
2	Assam Shelf	I	1D	2D	3D
3	Mumbai	I	1D		3D
4	KG	I	1D		3D
5	Cavery	I	1D		3D
6	AAFB	I	1D	2D	3D
7	Rajasthan	I	1D		3D
8	Kutch	II	1D	2D	3D
9	Mahanadi	II	1D		3D
10	Andaman	II	1D	2D	3D
11	Himalayan Foreland	III	1D		
12	Ganga-Punjab	III	1D		
13	Vindhyan	III	1D		
14	Saurashta	III	1D		3D
15	Kerala-Konkan	III	1D		3D
16	Bengal	III	1D		3D
17	Karewa	IV	1D		
18	Spiti-Zanskar	IV	1D		
19	Satpura-S.Rewa-Dam	IV	1D	2D	
20	Narmada	IV	1D		
21	Deccan Syneclise	IV	1D		
22	Bhima-Kaladgi	IV	1D		
23	Cuddapah	IV	1D		
24	PG	IV	1D		
25	Bastar	IV	1D		
26	Chhattisgarh	IV	1D		

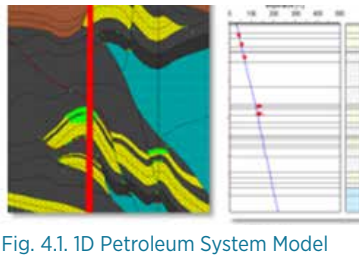

Fig. 4.1. 1D Petroleum System Model

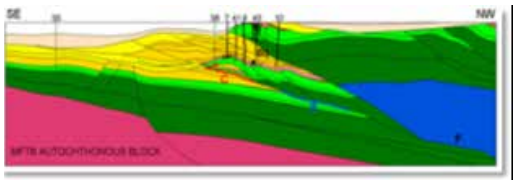

Fig. 4.2. 2D Petroleum System Model

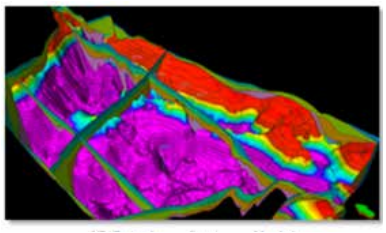

Fig. 4.3. 3D Petroleum System Model

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4.1.3. Current Status of the Project

Geological and Petroleum System model of 10 basins has been completed. Identification of resource assessment units and yet-to-find hydrocarbons is proposed to be done in association with International experts and detailed activity schedule has been prepared to complete the project within the timeline.

Distinguished experts in the areas of geology, geophysics and geochemistry are empanelled for guidance and quality control. To meet the international industry standards, international team of experts have been engaged for guidance and periodic review. Starting in September 2016 till 1st April 2017, total four sessions of technical review took place, including a workshop on "Assessment Units and Estimation of Yet-to-Find Hydrocarbon Resources" in March, 2017 at KDMIPE, Dehradun.

Twenty-six sedimentary basins are the proposed targets for resource reassessment. Kutch and Saurashtra have been conceived into one entity for modeling purpose due to geological commonality. Studies commenced in 24 basins and 10 basins namely

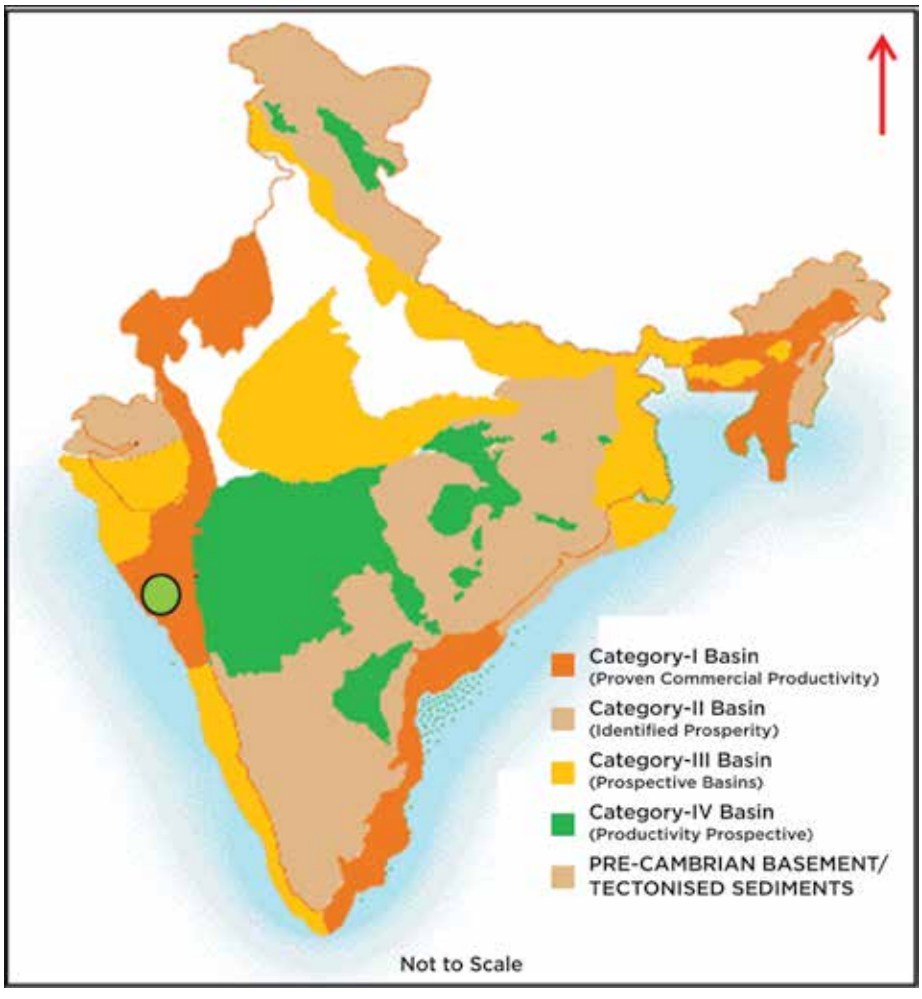

Fig. 4.4. Basinal Map of India

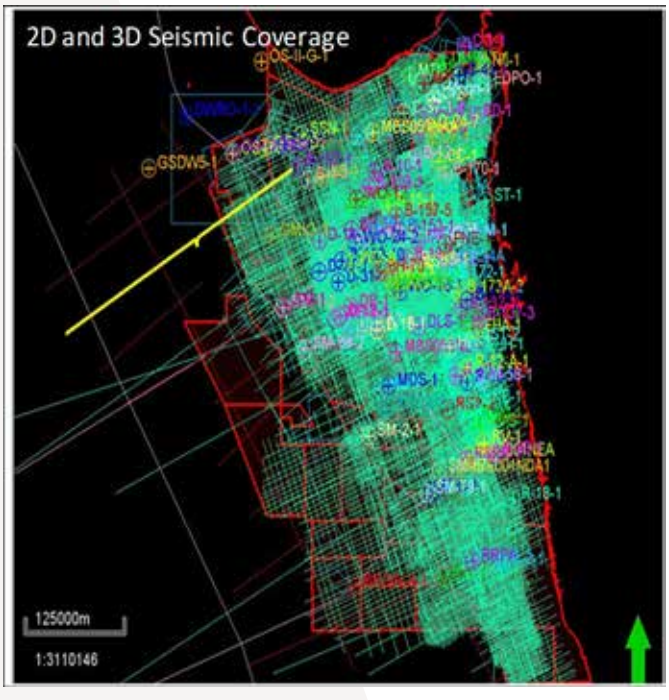

Fig. 4.5. 2D and 3D Seismic Coverage

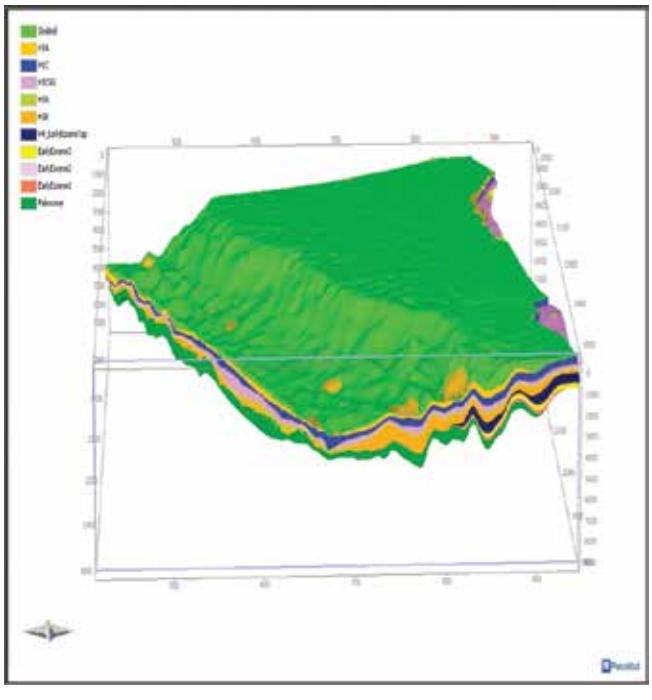

Fig. 4.6. Final Model Geometry

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Satpura-South Rewa-Damodar, Bastar, Chhattisgarh, Karewa, Vindhyan, Rajasthan, Mahanadi, Mumbai Offshore (a few model snapshots above), Spiti-Zanskar and Pranhita-Godavari basins are ready for resource assessment stage.

Work in 14 basins is in progress at the designated work centers (seven) of ONGC. The detailed progress of the work in different sedimentary basins is enumerated below:

Kerala-Konkan: Studies are completed for Areal Yield methodology. Based on the advice of International experts, PSM is initiated and scheduled for completion in April 2017.

Krishna-Godavari, Cambay and Assam Shelf: Static geological model is finalized, PSM in progress, expected completion up to PSM stage in April 2017.

Cauvery, Kutch and Saurashtra: Static geological model is finalized, PSM in progress, expected completion up to PSM stage in May 2017.

Assam Arakan Fold Belt: Static geological model is finalized, 3D PSM to be carried out for Tripura-Cachar part, PSM simulation in progress. It will be used as analog for Areal Yield approach for rest of the area. Expected completion up to geological model stage is in June 2017.

Bengal-Purnea: Static geological model is under finalization. Expected completion up to Petroleum System Model stage is in May 2017.

Ganga-Punjab: Geological model building is in progress. Expected completion up to Geological model stage is in July 2017.

Himalayan Foreland: Geological model is finalized and expected completion up to geological model stage is in May 2017.

Bhima-Kaladgi: Completion of geological model stage is in April 2017.

Andaman: Project is in the stage of data collation and analysis.

Cuddapah: Project is in early stage of data synthesis.

Projects on Narmada Basin and Deccan Syneclise are proposed to be commenced from July and August 2017 respectively. The progress of the project has been reviewed by DGH for Cambay basin at Vadodara and for all basins at Delhi during February 2017.

Out of approved budget of INR 59.03 Cr, until 31.03.2017, the project has spent INR 26.06 Cr. It's conveyed that post completion of the project, hardware, software and peripherals would be handed over to DGH for necessary project update in future and extension of the project scope in unconventional hydrocarbon resources.

During the 1995-96 exercise, deepwater areas were not assigned at basin-level and instead a gross volume was put against deepwater areas between 200 m bathymetry and EEZ limit. In the present case, deepwater areas are redefined between 400 m bathymetry and EEZ limit and the same has been suitably accounted for the basins falling into deepwater.

In a new approach, Rajasthan Basin, was assessed through three sub-basins namely Barmer, Jaisalmer and Bikaner-Nagaur. On the contrary, Ganga Basin was clubbed with Punjab while the two separate basins namely Kutch and Saurashtra were modeled as a single entity due to commonality of geological parameters.

Basins namely Krishna-Godavari (KG), Mumbai, Rajasthan and Assam Shelf have strong subsurface basis of favorable petroleum system elements to emerge as potential basin for future thrust of exploration.

As a part of project's Terms of Reference, the possibility of upgrade of individual basins is also focused following the inputs from new discoveries. It is perceived that the basins like Kutch, Pranhita-Godavari or even Vindhyan may qualify for possible upgrade. Added further is the ever-increasing prospectivity of the Mesozoic, which could be the excellent premises for future exploration thrust.

4.1.4. Project take-away

The project has pooled in a huge amount of geo-scientific data, close to 4,500 wells, 150,000 LKM of 2D seismic and 750,000 SKM of 3D seismic data from different campaigns/ vintages. The 3D PSM methodology has integrated vast amount of laboratory data of bio-stratigraphy, sedimentology and geochemical information in building the robust geological models. In basins where limited data was present, the basic information was gathered from the public domain and selection of analogous basin was then based on similarity of geological parameters.

The project outcomes are expected to serve as a guiding tool for re-aligning exploration strategy for Indian sedimentary basins across areas that are explored, poorly explored or even unexplored. Once it is integrated with NDR, this would significantly enrich the existing database on public domain and make the existing bidding process more equipped, elaborate and attractive.

Upon completion of the project, all deliverables like the data, both hard and soft copies (input and output) including all reports, new (generated) and existing (referred) along with all software, hardware and peripherals (purchased, managed and used for the project) will be handed over to DGH, as per NSC direction in its 4th meeting.

After the completion of the project, it is proposed that DGH will endeavor to pull out Play Atlas from all assessed/ reassessed plays for each basin. Such atlas will display basin-level information in larger but suitable scale with high-resolution pixels for adequate picture sharpness and clarity.

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4.2. NSP: National Seismic Programme

Geophysical data acquisition, processing & interpretation (API) is one of the most important aspects in the process as it helps in giving the initial insight into the prospectivity assessment and also helps in planning the future activities. As a base to launch future E&P activities, appraisal of unapprised areas was considered an important task.

To achieve this, MoP&NG formulated a plan to conduct 2D seismic surveys within timeframe of five years at an estimated cost of INR 2932.99 Crores in all sedimentary basins of India where no/scanty data is available. Directorate General of Hydrocarbons (DGH) identified the need of about 48,243 line kilometer (LKM) 2D seismic data for appraisal of these areas. The project was introduced under the broad policy framework of Geo-Scientific Data Generation for Hydrocarbons in Indian Sedimentary Basins to appraise the un-appraised onland areas in 26 sedimentary basins and was notified on 20th May 2014.

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The project is being implemented through National Oil Companies (NOCs) OIL and ONGC through service providers in north-eastern states and rest of India respectively. OIL has been assigned to carry out 2D seismic API of 7408 LKM falling in North eastern part of India covering states of Assam, Arunachal Pradesh, Nagaland, Manipur, Tripura and Mizoram and ONGC has been assigned to carry out 2D seismic API of approx. 40835 LKM seismic data in onland part of 22 sedimentary basins of India.

So far, out of 24 states, in-principal approval from 22 states and forest permissions from 18 states have been obtained.

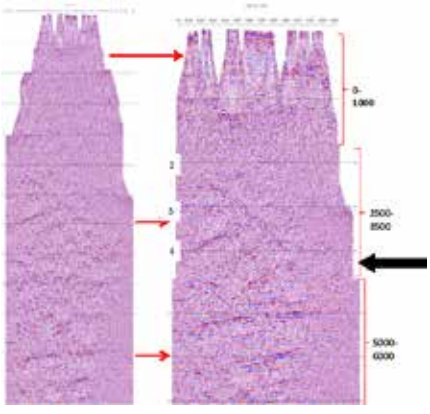

Fig. 4.7. Brute Stack from Sector 7 (Deccan Syneclise North)

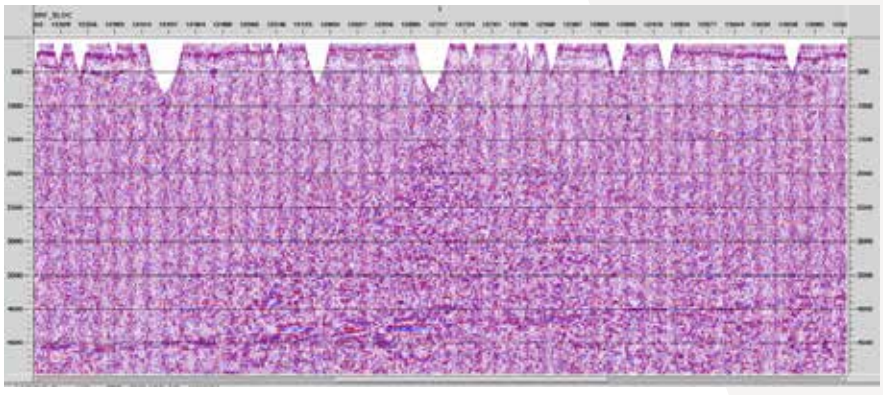

Fig. 4.8. Brute Stack from Sector 5 (Mahanadi)

Table 4.2. Work Progress of ONGC

Sector	Area	Total Target (LKM)	Coverage in FY 2016-17 (LKM)
1	Cambay	1,240	658.20
	Saurashtra	2,280	
2	Kutch	1,760	830.28
	Rajasthan	2,260	
3	Krishna Godavari	600	-
	Pranhita Godavari	350	
	Cauvery	1,900	
	Cudappah	850	
	Bastar	240	
4	Andaman & Nicobar	310	Tendering process for hiring services of 2D data acquisition under progress
5	Bengal	860	1,072.86
	Mahanadi	2,530	
6	Ganga	3,130	-
7	Deccan Synclise-North	5,683	1,119.3
8	Deccan Synclise-South	5,127	444.66
	Bhima	280	
	Kaladgi	310	
9	Vindhyan-A	4,953	797.40
	Narmada	667	
	Satpura	245	
10	Vindhyan-B	300	-
	South Rewa-Damodar	1,460	
	Chhattisgarh	1,400	
11	Himalayan Foreland	1,300	110.82
	SpitiZanskar	500	
	Karewa	300	
ONGC Total		**40,835**	**5,033.34**

The data acquired in the process would help in identifying the prospective areas and to generate interest of bidders in Open Acreage Licensing Policy (OALP) etc. Therefore, this will be of help in deciding the focus areas of the exploration activities in the country and on the basis of this primary data, E&P companies would take up further exploration activities in the acreages awarded to them.

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Table 4.3. Target & Timeline

Agency	Activity		Timeline	
	Acquisition (LKM)	Processing & Interpretation (LKM)	Acquisition	Processing & Interpretation
ONGC	40,835	40,835	March 2019	July 2019
OIL	7,408	7,408	December 2018	February 2019

Work completed during FY: 2016-2017

Table 4.4. 2D Seismic Data Acquisition

Agency (Total Target)	FY 2016-17	
	Annual Target (LKM)	Achievement (LKM) (% w.r.t. FY target)
ONGC(40,835 LKM)	8,725	5.033.34/(57.68%)
OIL(7,408 LKM)	1,214.22	637.92/(52.54%)
Total(48,243 LKM)	**9,939.22**	**5.671.26/(57.06%)**

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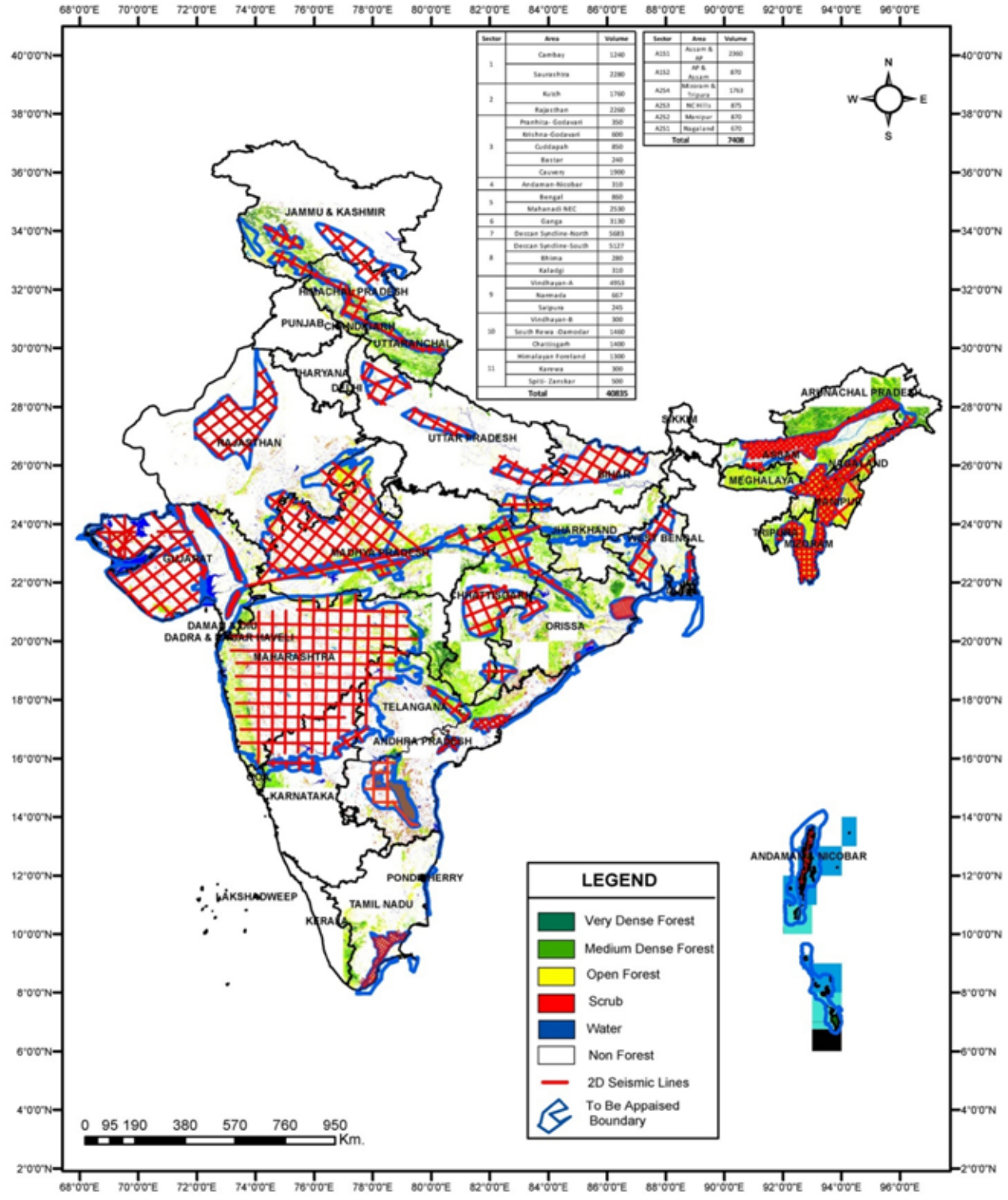

Fig. 4.9. 2D Seismic Survey in "To be Appraised Areas" of Indian Sedimentary Basins

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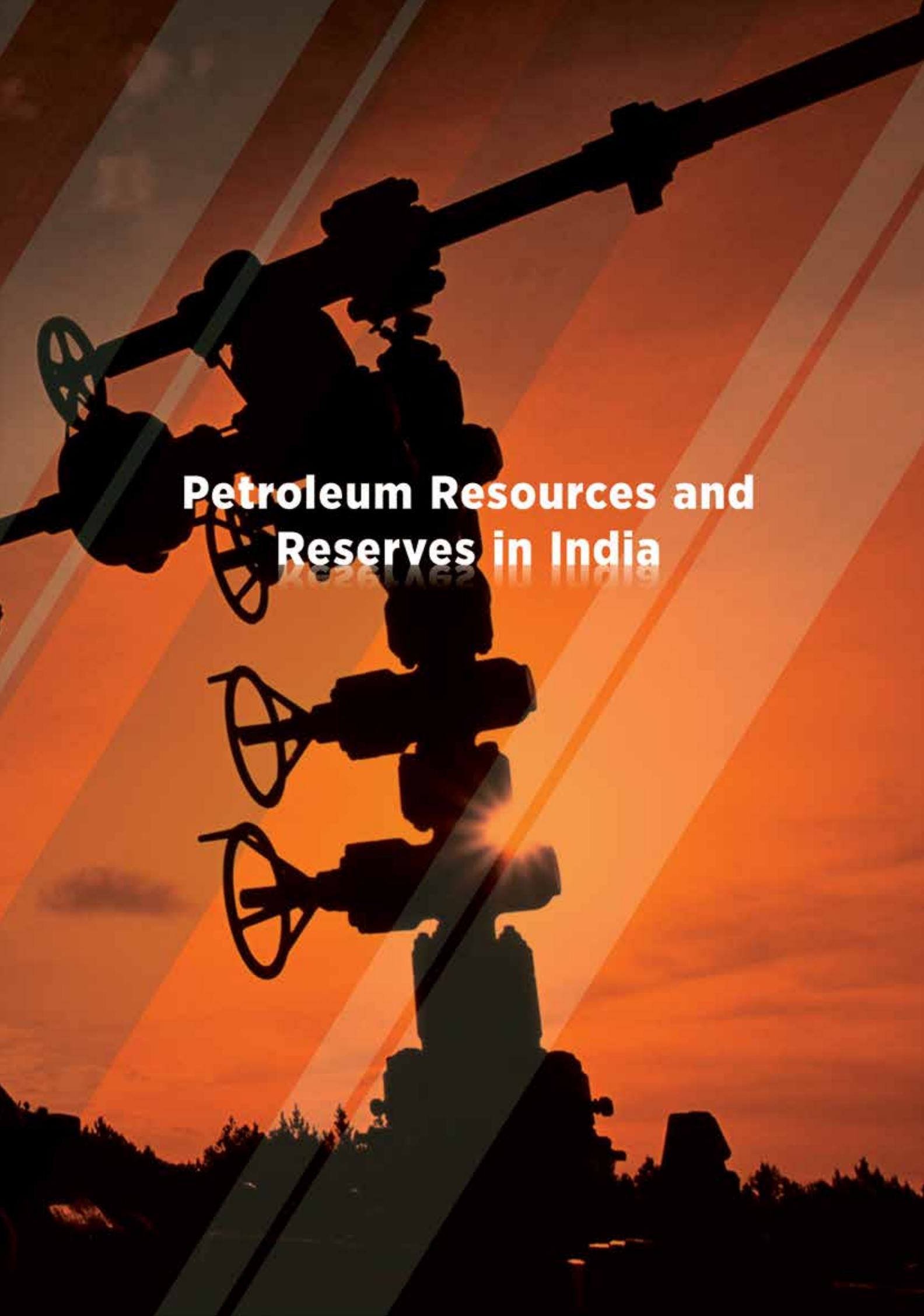

Petroleum Resources and Reserves in India

Petroleum Resources and Reserves in India

5.1. Conventional Hydrocarbons

The resource assessment of Indian Sedimentary Basins was carried out during the year 1990 by Indo-Soviet Resource Appraisal Group (ISRAG) in ONGC under Indo-Soviet protocol and in 1996 by ONGC. Based on this assessment, the conventional hydrocarbon prognosticated resources in 15 sedimentary basins along with the deepwater areas of the country are of the order of 28.1 Billion Tonnes of Oil and Oil Equivalent of Gas (O+OEG). The resources in the offshore are 18.82 Billion Tonnes of O+OEG out of which deepwater areas account for 7 Billion Tonnes. The contribution of onshore part of basins is 9.27 Billion Tonnes of O+OEG. Details are given in the table below:

Table 5.1. Basin-wise details of prognosticated hydrocarbon resources in the country

#	Basin	Oil and Oil Equivalent Gas O+OEG (MMT)		
		Offshore Part of Basin	Onland Part of Basin	Total Basin
1	Mumbai	9,190	-	9,190
2	Assam-Arakan Fold Belt	-	1,860	1,860
3	Cambay	-	2,050	2,050
4	Upper Assam	-	3,180	3,180
5	Krishna-Godavari	555	575	1,130
6	Cauvery	270	430	700
7	Rajasthan	-	380	380
8	Kutch	550	210	760
9	Andaman-Nicobar	180	-	180
10	Kerala-Konkan	660	-	660
11	Saurashtra Offshore	280	-	280
12	Ganga Valley	-	230	230
13	Bengal	30	160	190
14	Himalayan Foreland	-	150	150
15	Mahanadi	100	45	145
Total		**11,815**	**9,270**	**21,085**
	Deep Water	7,000	-	7,000
Grand Total		**18,815**	**9,270**	**28,085**

The Minister of Petroleum & Natural Gas (MoPNG) has issued an office order in January, 2014 to carry out re-assessment of Hydrocarbon Resources for Sedimentary Basins of India including Deepwater Areas. The work of hydrocarbon resource assessment is to be carried out under the leadership of ONGC's Institute KDMIPE (Keshava Deva Malaviya Institute of Petroleum Exploration) at Dehradun and multi Organization Teams were formed to carry out this exercise.

National Steering Committee in its second meeting held on 16.07.2015 and concluded that the mandated exercise of 're-assessment of hydrocarbon resources for sedimentary basins and deepwater areas of India' will be taken up in-house by ONGC in association with OIL and DGH. The project work will be carried out in a decentralized manner at designated work centers of ONGC and be completed in 27 months' time (01.09.2015 – 30.11.2017). The project was kicked off by CMD, ONGC in presence of Board Members on 14.08.2015 at KDMIPE, Dehradun. As on date, study for Satpura-South Rewa-Damodar and Bastar basins has been completed and draft report prepared. Report will be reviewed by international experts for suggestions and the same will be incorporated in the final report. Presently, the study of 13 sedimentary basins is in progress at eight work centers.

Table 5.2. Basin wise ONGC Work Center

Basin	ONGC Work Center
Mumbai Offshore, Assam-Arakan Fold Belt (AAFB), Chhattisgarh	KDMIPE
Kerala-Konkan, Kutch	Mumbai
Krishna-Godavari, Cauvery	Chennai
Mahanadi, Bengal	Kolkata
Cambay	Vadodara
Rajasthan	New Delhi
Vindhyan	GEOPIC
Assam Shelf	Jorhat

5.2. Hydrocarbon Reserves of India

In-place hydrocarbon volume of 10,734.57 MMT of Oil and Oil Equivalent Gas (O+OEG) have been established by ONGC, OIL and Pvt./JVs under PSC and CBM regime. Ultimate reserves are 4,125.29 MMT O+OEG and accretion in ultimate reserves is 111.89 MMT O+OEG. Details are as below:

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Table 5.3. 2P Reserves status during the year 2016-17 (as on 01.04.2017)

No.	Subject	Parameter	ONGC (Nomination)*	OIL (Nomination)*	PSC + CBM regime	Total
1	Initial In-place volume	Gas (BCM)	2,138.92	374.3	1,467.35	3980.57
		Oil (MMT)	4,939	806.67	1,008.33	6754
		O+OEG (MMT)	7,077.92	1,180.97	2,475.68	1,0734.57
2	Accretion of In-place volume	Gas (BCM)	55.18	7.74	104.34	167.25
		Oil (MMT)	62.57	7.47	11.45	81.49
		O+OEG (MMT)	117.75	15.21	115.79	248.74
3	Ultimate Reserves	Gas (BCM)	1,199.43	212.52	818.61	2,230.56
		Oil (MMT)	1,417.81	249.29	227.63	1,894.73
		O+OEG (MMT)	2,617.24	461.81	1,046.24	4,125.29
4	Accretion of Ultimate Reserves	Gas (BCM)	37.21	7.14	49.62	93.97
		Oil (MMT)	13.99	1.24	2.7	17.92
		O+OEG (MMT)	51.2	8.37	52.32	111.89
5	Balance Recoverable Reserves	Gas (BCM)	533.45	123.65	632.5	1,289.61
		Oil (MMT)	437.28	78.71	88.11	604.1
		O+OEG (MMT)	970.73	202.37	720.61	1,893.7

Note : Conversion factor 1 MMT = 1 BCM for ONGC (Nomination and PSC+CBM Blocks)

ONGC provided 3P reserves information in previous Annual Report. In Table 8.23 - 8.24 2P reserves of ONGC for previous years have been shown.

5.3. Reserves established under PSC+CBM regime

E&P activities were accelerated under PSC+CBM regime and in-place reserves have steadily increased over the years. The trend of In-place volume and Ultimate reserves of crude oil and natural gas under the PSC+CBM regime during the period 2008-09 to 2016-17 along with the growth with base year as 2008-09 is provided. In-place has recorded growth of 53% and Ultimate reserves have recorded growth of 45%. Details are as below:

Table 5.4. In-place volume trend (PSC+CBM regime)

In place	OIL+COND (MMT)	Gas (BCM)	O + OEG (MMT)	%Growth with Base Year 2008
01.04.2008	639	980	1,619	-
01.04.2009	658	982	1,640	1%
01.04.2010	814	1,148	1,963	21%
01.04.2011	821	1,209	2,029	25%
01.04.2012	817	1,255	2,072	28%
01.04.2013	830	1,292	2,122	31%
01.04.2014	972	1,318	2,290	41%
01.04.2015	975	1,460	2,436	50%
01.04.2016	995	1,362	2,357	46%
01.04.2017	1,008	1,467	2,476	53%

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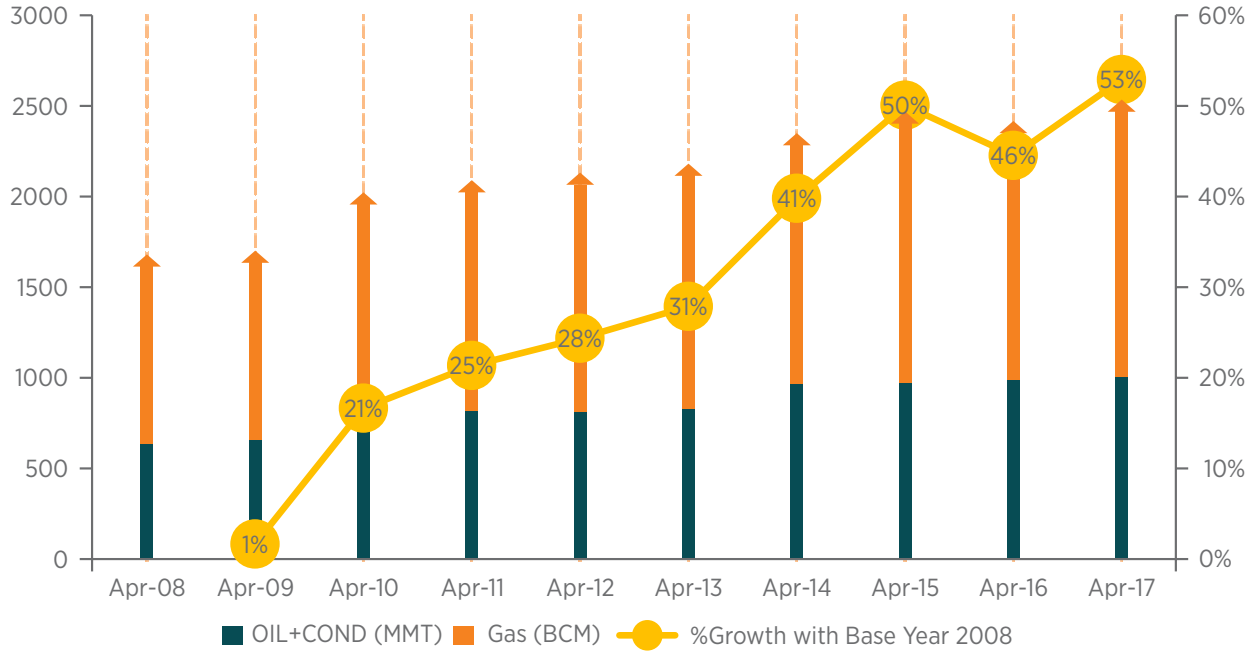

Fig. 5.1. In-place volume trend (PSC+CBM regime)

Table 5.5. Ultimate reserves trend (PSC+CBM regime)

Ultimate	OIL+COND (MMT)	Gas (BCM)	O + OEG (MMT)	%Growth with Base Year 2008
01.04.2008	172	551	723	-
01.04.2009	178	550	728	1%
01.04.2010	194	601	795	10%
01.04.2011	195	641	836	16%
01.04.2012	195	677	871	20%
01.04.2013	197	680	877	21%
01.04.2014	215	716	930	29%
01.04.2015	215	767	983	36%
01.04.2016	225	786	1011	40%
01.04.2017	228	819	1046	45%

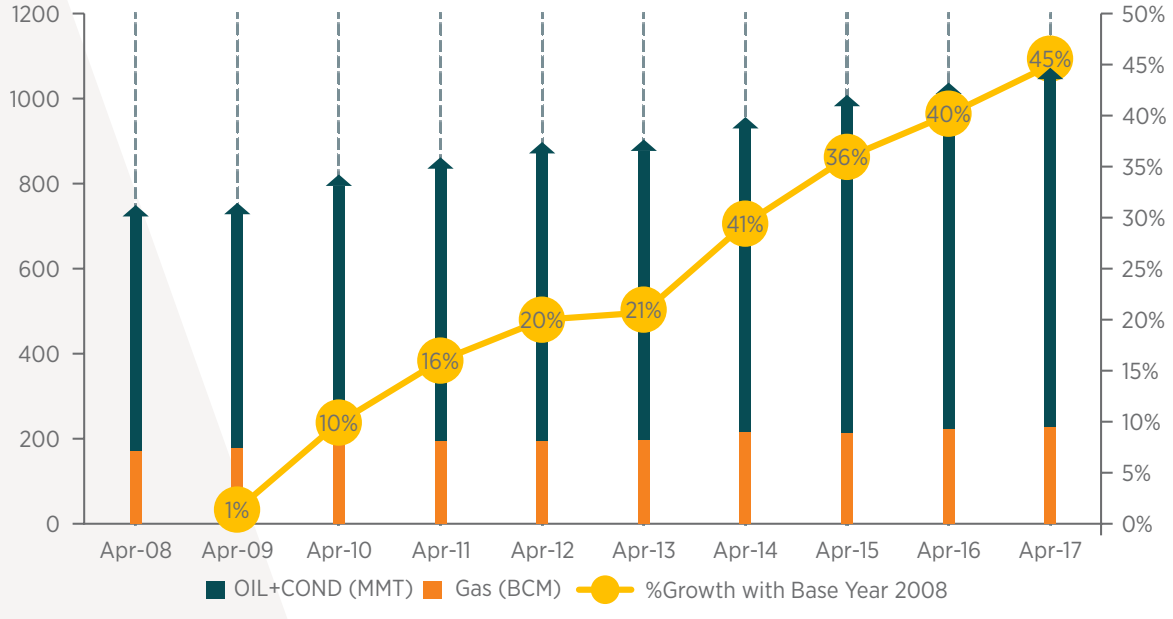

Fig. 5.2. Ultimate reserves trend (PSC+CBM regime)

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In-place volume and Ultimate reserves (PSC+CBM regime): India has 26 sedimentary basins covering an area of 3.14 million square kilometres. The sedimentary basins of India, onland and offshore up to the 200-m isobath, have an areal extent of about 1.79 million sq. km. In the deepwater beyond the 200-m isobath, the sedimentary area has been estimated to be about 1.35 million sq. km. Major basins where hydrocarbon potential has been established under the PSC regime are Assam- Arakan, Cambay, Cauvery, Krishna Godavari, Mahanadi, Mumbai and Rajasthan. In-place volume and ultimate reserves in the prospective sedimentary basins of India, various bidding rounds are provided below.

Table 5.6. Distribution of In-place volume and Ultimate reserves in sedimentary basins of India

Basin	In-Place (O+OEG in MMT)	Ultimate (O+OEG in MMT)
Krishna Godavari	966.239	581.156
Mumbai	504.889	129.453
Rajasthan	385.711	112.466
CBM	280.090	108.247
Cambay	148.059	43.562
Cauvery	78.957	24.588
Assam-Arakan Shelf	74.671	20.551
Mahanadi	37.067	26.221

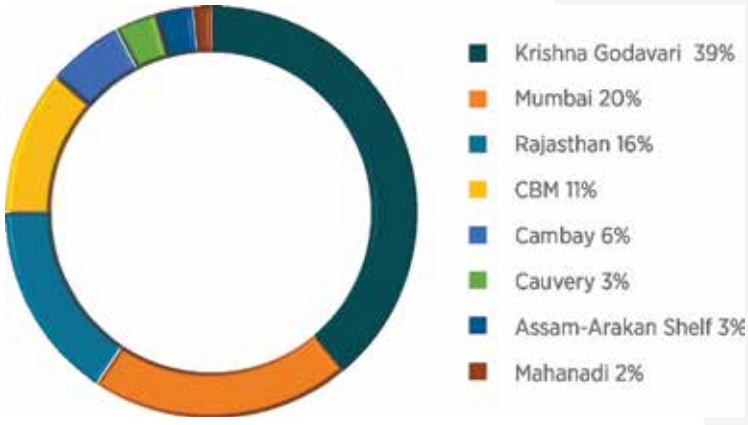

Fig. 5.3. Basin-wise In-place volume (O + OEG (MMT)) Distribution under PSC & CBM Regime as on 01.04.2017

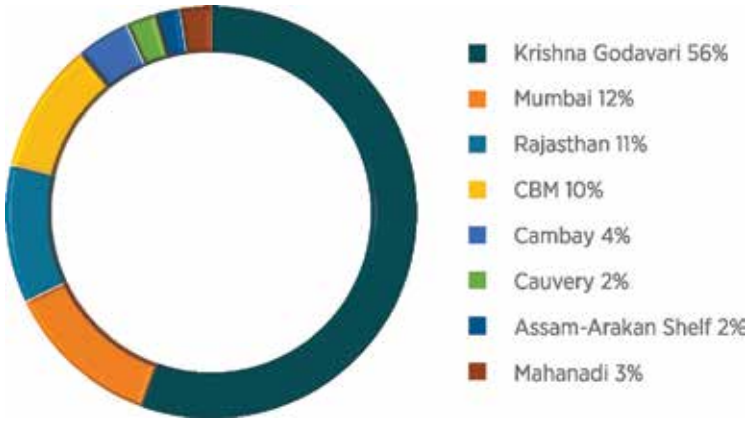

Fig. 5.4. Basin-wise Ultimate Reserves (O + OEG (MMT)) Distribution under PSC & CBM Regime as on 01.04.2017

Cambay

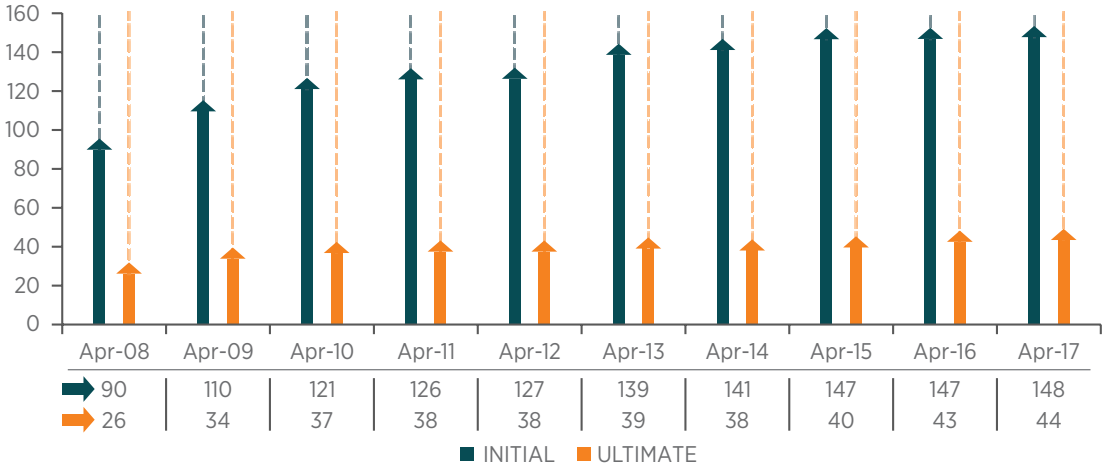

Fig. 5.5. Reserves established in Cambay

Assam-Arakan

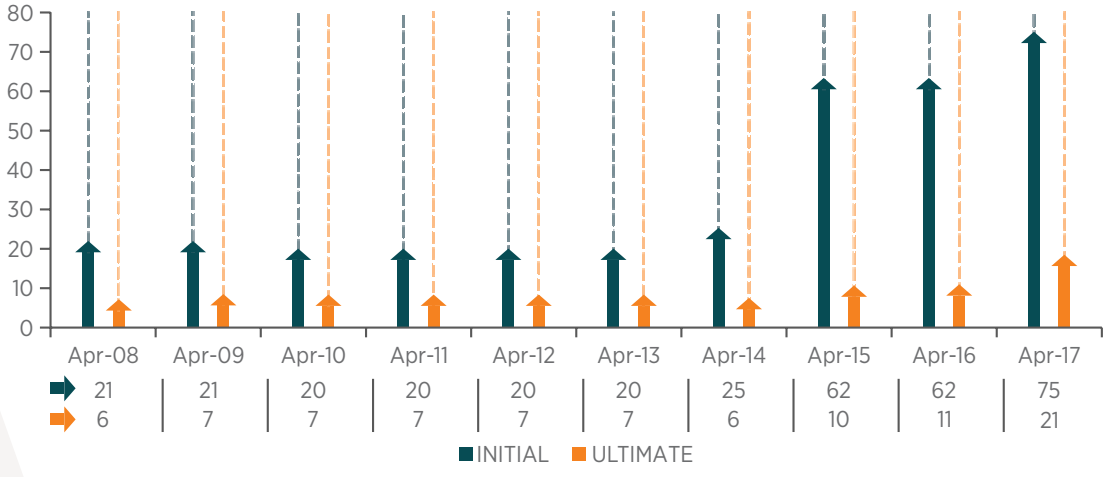

Fig. 5.6. Reserves established in Assam-Arakan

Cauvery

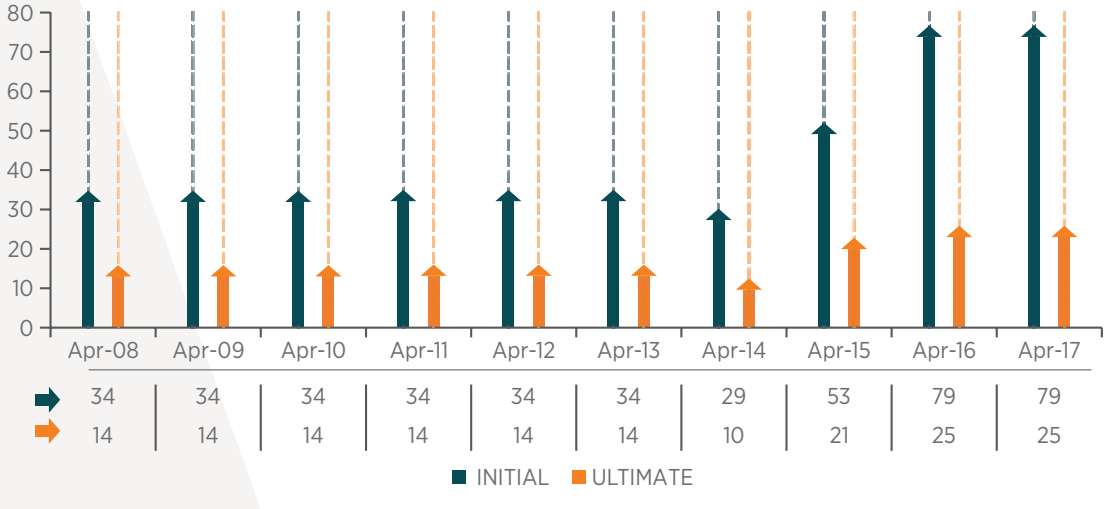

Fig. 5.7. Reserves established in Cauvery

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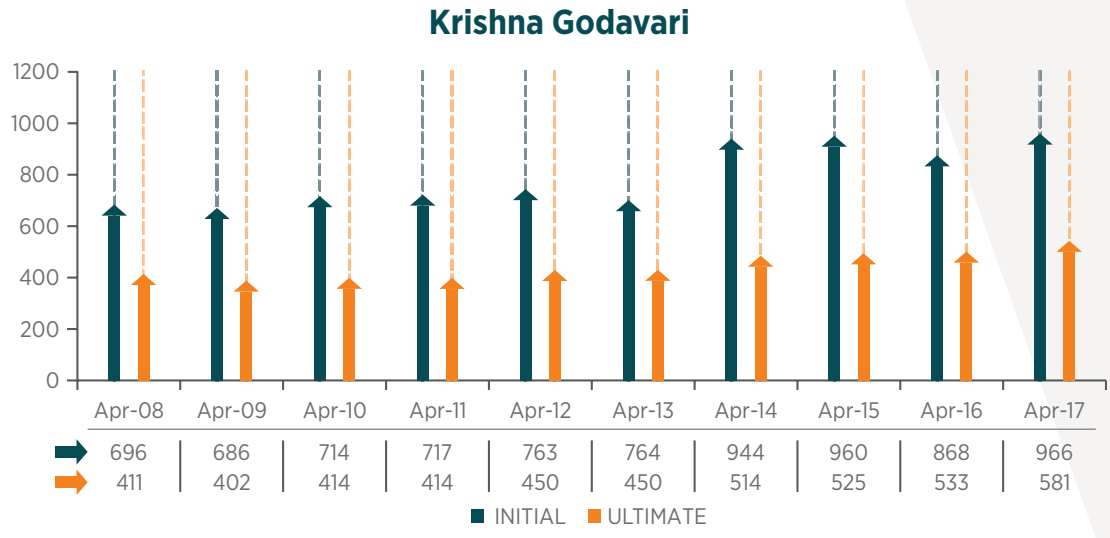

Fig. 5.8. Reserves established in Krishna Godavari

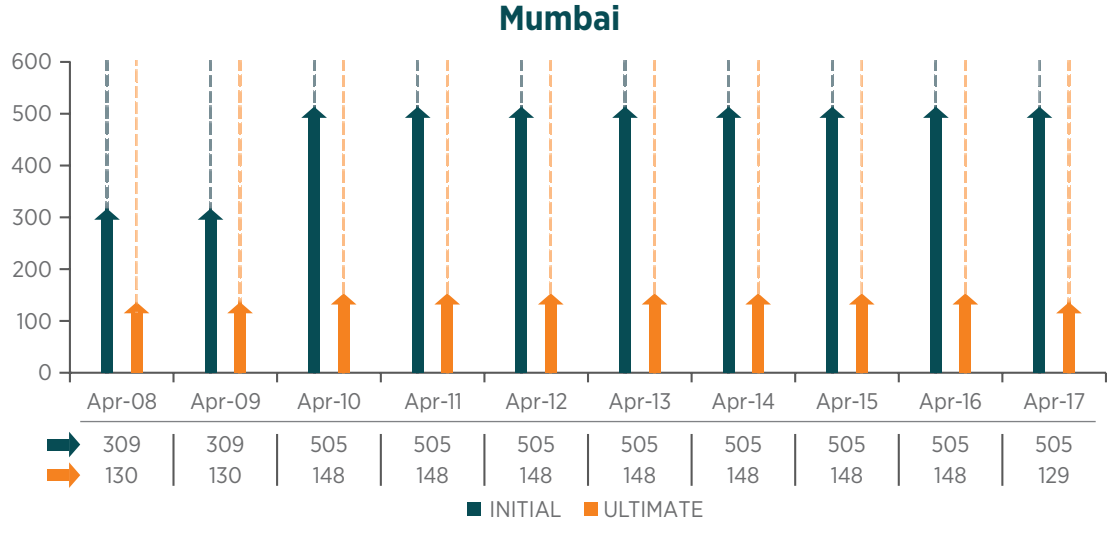

Fig. 5.9. Reserves established in Mumbai

(NB : The M&S Tapti field has been shut-in since March 2016 and is under abandonment. Balance Reserve is Zero. Therefore, EUR is changed to Cummulative Production for 2017).

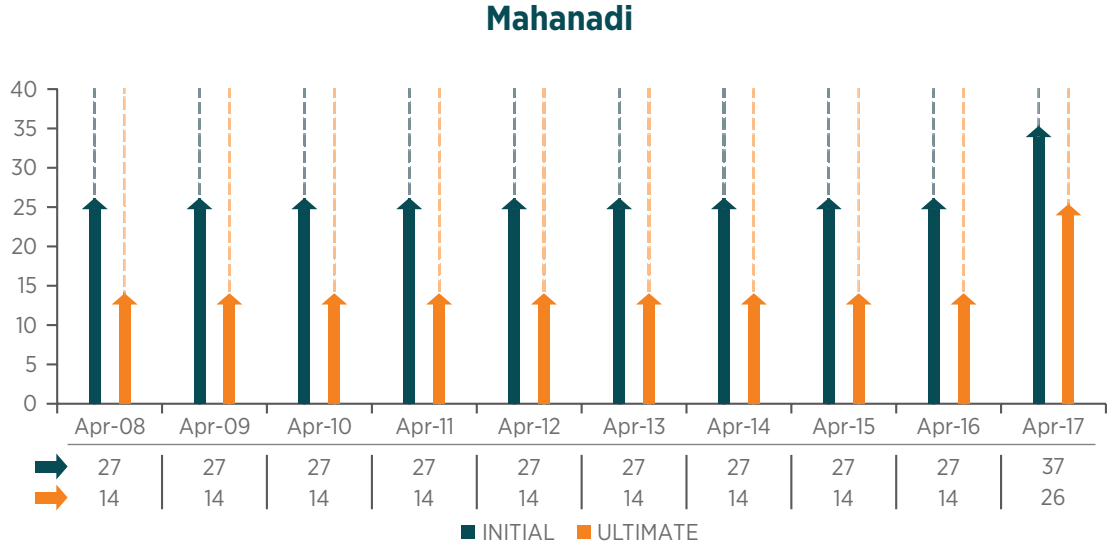

Fig. 5.10. Reserves established in Mahanadi

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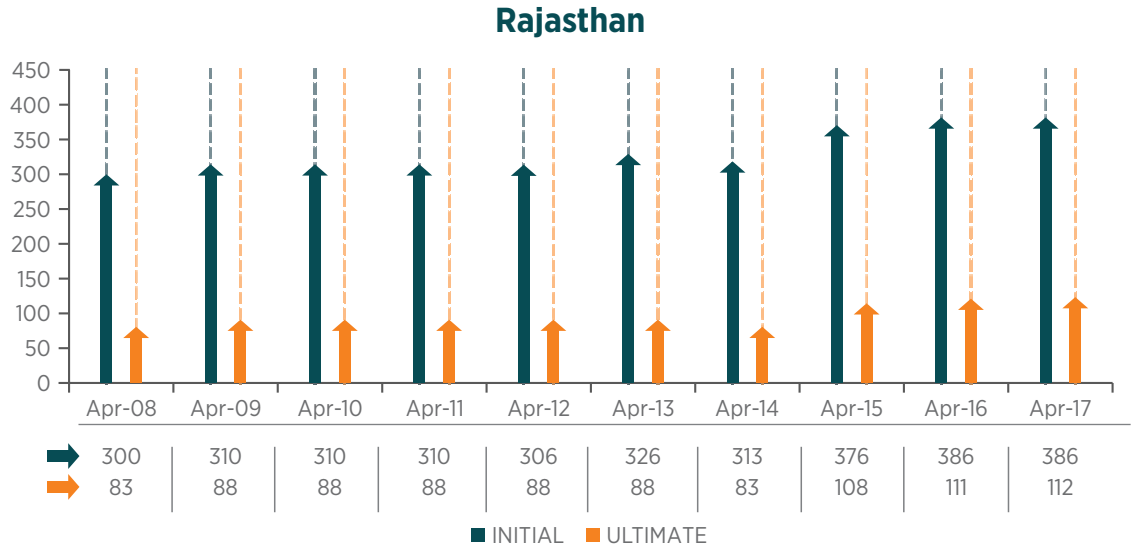

Fig. 5.11. Reserves established in Rajasthan

Table 5.7. Distribution of In-place volume and Ultimate reserves in various bidding rounds

BIDDING ROUND	In-Place (O + OEG (MMT))	Ultimate (O + OEG (MMT))
CBM	280.090	108.247
Field	700.334	208.660
Pre-NELP	457.121	138.263
NELP I	800.807	513.314
NELP II	9.806	1.462
NELP III	88.519	54.182
NELP IV	69.794	5.692
NELP V	39.895	2.693
NELP VI	29.318	13.732
Total	**2475.68**	**1046.244**

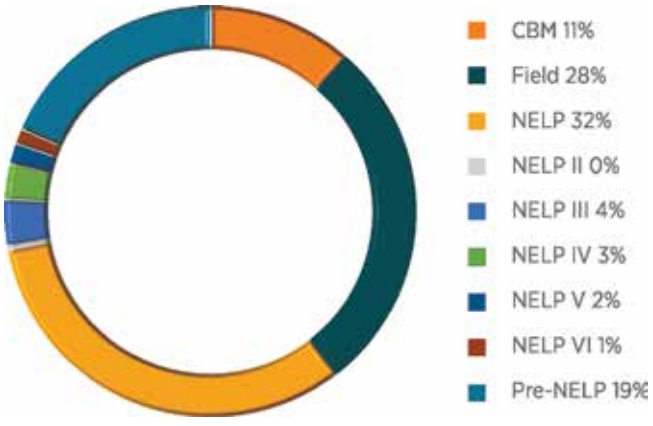

Fig. 5.12. Bidding Round-wise In-place volume (O + OEG (MMT)) distribution (PSC & CBM regime as on 01.04.2017)

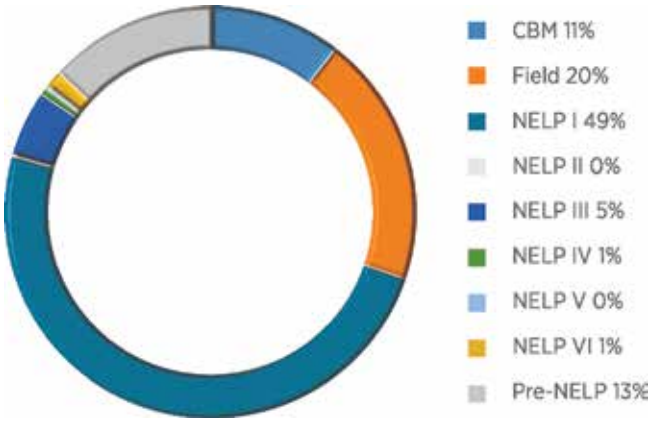

Fig. 5.13. Bidding Round-wise Ultimate reserves (O + OEG (MMT)) distribution (PSC & CBM Regime as on 01.04.2017)

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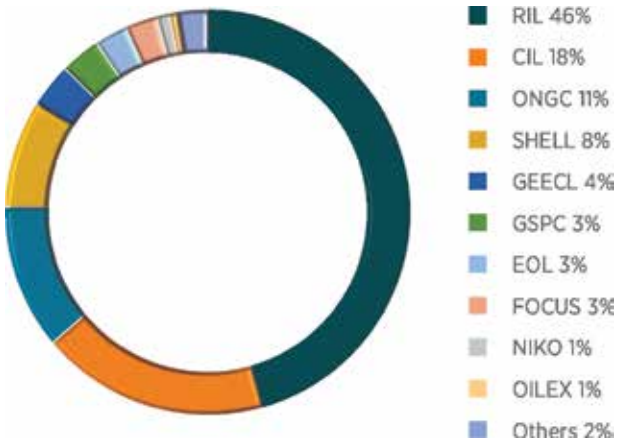

Fig. 5.14. Operator-wise Ultimate Reserves (O + OEG (MMT) Distribution under PSC & CBM Regime as on 01.04.2017

Table 5.8. Contribution to accretion of In-place and Ultimate reserves (FY 2016-17)

Blocks	In-place Accretion (MMT)	Ultimate Accretion (MMT)	Details
KG-DWN-98/3	78.934	43.565	MC approval of DoC of D-29 & D-30 and D-55
KG-DWN-98/2	19.143	7.154	MC approval of DoC of Cluster-I discoveries (D1,E1 & F1)
AA-ONN-2001/1	12.772	9.47	MC approval of Doc of Khubal
NEC-OSN-97/2	10.015	12.407	MC approval of DoC of D#32
KG-ONN-2003/1	1.599	-	MC approval of FDP of Nagayalanka-1z and Nagayalanka-SE-1 discoveries.
AAP-ON-94/1	0.164	0.394	MC approval of RFDP of Dirok-1
CB-ONN-2004/3	0.067	0.027	MC approval of FDP of UBER-2
WAVEL	0.01	-	MC approval of revised reserves.
CB-OS/2		0.215	MC approval of revised reserves for Lakshmi and Gauri fields
KG-OSN-2004/1		0.869	MC approval of FDP of 5 Gas Discoveries (Chandrika, Saveri, Alankari, NL#2 & Malhar#1 along Discovery area of Sarangi-1)
Raniganj East		0.77	Revised as per SCR Approval for FDP
RJ-ON-90/1		0.981	MC approval of Mangala RFDP

5.4. Reserve Replacement Ratio (RRR)

The RRR (Reserve Replacement Ratio) is a metric to assess the operating performance of an oil and gas exploration and production company. It is the amount added to its reserves divided by the amount extracted. As discoveries are made and reserve estimates are revised every year it is a practice to calculate RRR over several years.

A reserve replacement ratio if greater than 1 indicates stable demand condition environments and suggest that reserves are added up along with simultaneous draining out of reserves through continued production. The trend of Reserve Replacement Ratio (RRR) of crude oil and natural gas under the PSC+CBM regime during the period as on 01.04.2008 to 01.04.2017 is provided in Table 5.9.

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Table 5.9. Trend of Reserve accretion, Production and RRR under PSC+CBM regime

PSC +CBM	Reserve accretion			Production			RRR		
As on	OIL+COND MMT	GAS BCM	O+OEG (MMT)	OILCOND MMT	GAS BCM	O+OEG (MMT)	Oil	Gas	O+OEG
01.04.2008	0.85	39.73	40.58	5.09	7.73	12.81	0.17	5.14	3.17
01.04.2009	5.76	-0.71	5.05	4.67	8.09	12.76	1.23	-0.09	0.40
01.04.2010	16.20	50.56	66.76	5.26	21.99	27.25	3.08	2.30	2.45
01.04.2011	0.57	39.83	40.40	9.68	26.77	36.46	0.06	1.49	1.11
01.04.2012	0.00	35.92	35.92	10.53	21.61	32.14	0.00	1.66	1.12
01.04.2013	1.71	3.24	4.96	11.64	14.49	26.13	0.15	0.22	0.19
01.04.2014	17.37	35.50	52.88	12.08	9.50	21.57	1.44	3.74	2.45
01.04.2015	0.80	51.71	52.51	11.82	8.92	20.74	0.07	5.80	2.53
01.04.2016	9.82	18.67	28.49	11.36	8.23	19.59	0.86	2.27	1.45
01.04.2017	2.70	49.62	52.32	10.53	6.87	17.40	0.26	7.22	3.01

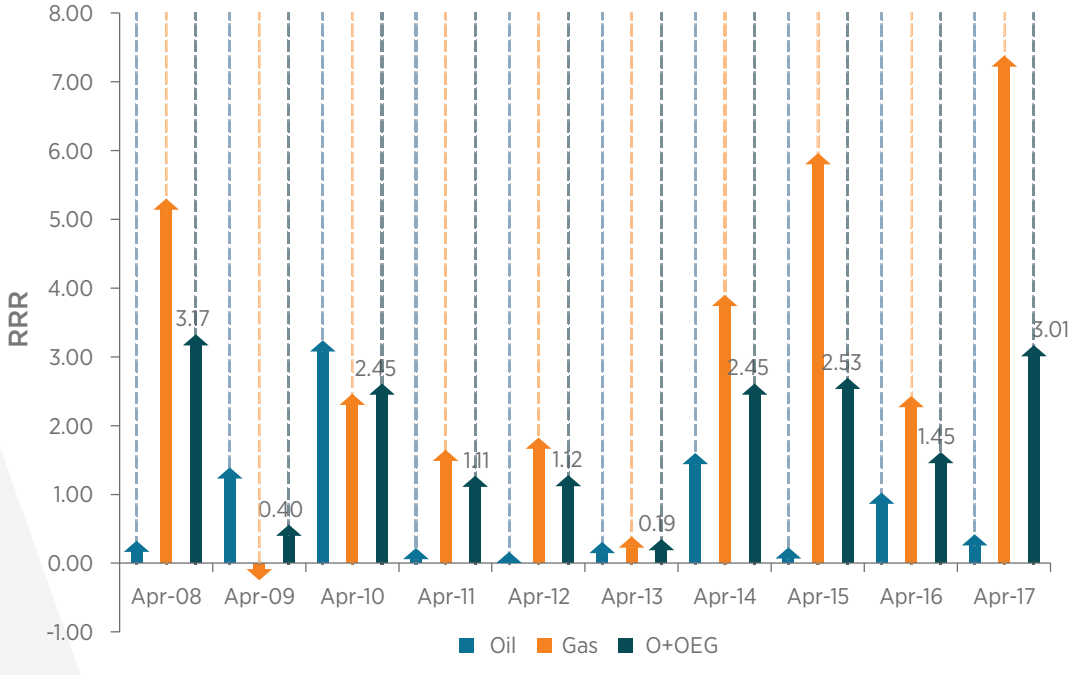

Fig. 5.15. Reserve Replacement Ratio (RRR) of Oil, Gas and O+OEG 01.04.2008 to 01.04.2017 under PSC+ CBM contract regime

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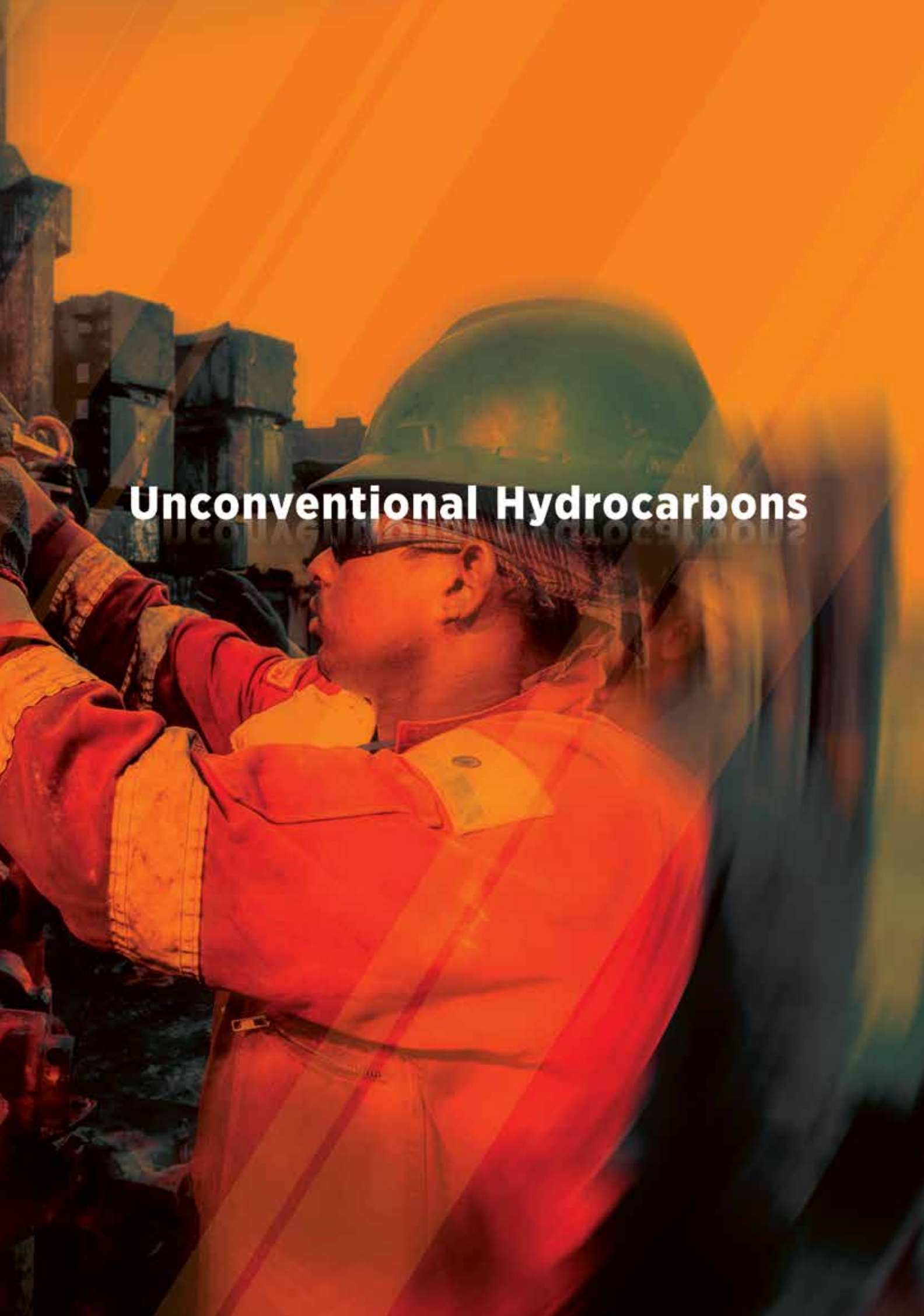

Unconventional Hydrocarbons

Unconventional Hydrocarbons

6.1. Coal Bed Methane

Coal Bed Methane is predominantly methane gas generated during formation of coal and adsorbed in coal. India, being the third largest coal producer and having the fifth largest proven coal reserves in the world, holds significant prospects for exploration and exploitation of CBM. The prognosticated CBM resource in the coal bearing area identified for CBM (26,000 sq. km.) is about 92 TCF (2,600 BCM).

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). As per the policy, Ministry of Petroleum & Natural Gas (MoP&NG) became the administrative body and Directorate General of Hydrocarbons (DGH) was made the nodal agency for development of CBM in country. An MoU has been signed between Ministry of Petroleum & Natural Gas (MoP&NG) and Ministry of Coal (MoC) for creation of arrangement and procedures for CBM exploration and exploitation activities in India. The MoU provides a framework for the parties to act in a cooperative and cogitative manner and in consistency with the statutory rules and regulations in place.

CBM blocks were carved out by DGH in close interaction with Ministry of Coal, GSI & CMPDI. Under CBM Policy, 4 CBM rounds were accomplished resulting in 33 CBM blocks (including 3 blocks on Nomination/FIPB route) which covers 16,613 SKM out of the total available coal bearing areas for CBM exploration of 26,000 sq. km. These CBM blocks were carved in those coalfield areas where mining was not envisaged for next 15-20 years. Total prognosticated CBM resources for awarded 33 CBM blocks, is about 62.4 TCF (1767BCM), of which, so far, 9.9 TCF (280.34 BCM) has been established as Gas in Place (GIP).

The total available coal bearing area (26,000 sq. km.) is spread in Gondwana sediments of 12 states of India viz. Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Assam, Odisha, Rajasthan, Tamil Nadu, Telangana and West Bengal. However, the Gondwana sediments of Eastern India host the bulk of India's coal reserves and all the current CBM producing blocks. In eastern India, the most potential areas of CBM development are situated in Damodar Koel valley & Son valley. In Damodar Koel valley CBM projects are ongoing in Raniganj Coalfield as Raniganj South block, Raniganj East block and Raniganj North block, in Jharia coalfield as Parbatpur block and in Bokaro Coalfield as Bokaro CBM block. The Son valley consists of Sonhat North, Sohagpur East and Sohagpur west CBM blocks.

As on March 2017, CBM production is around 1.45 MMSCMD from 4 CBM blocks which includes incidental production from 1 CBM block Jharia which is operated by M/s ONGC and commercial production from 3 CBM blocks namely Raniganj South, Raniganj East & Sohagpur West. The projected CBM production is expected to be around 3.4 MMSCMD by 2018-19.

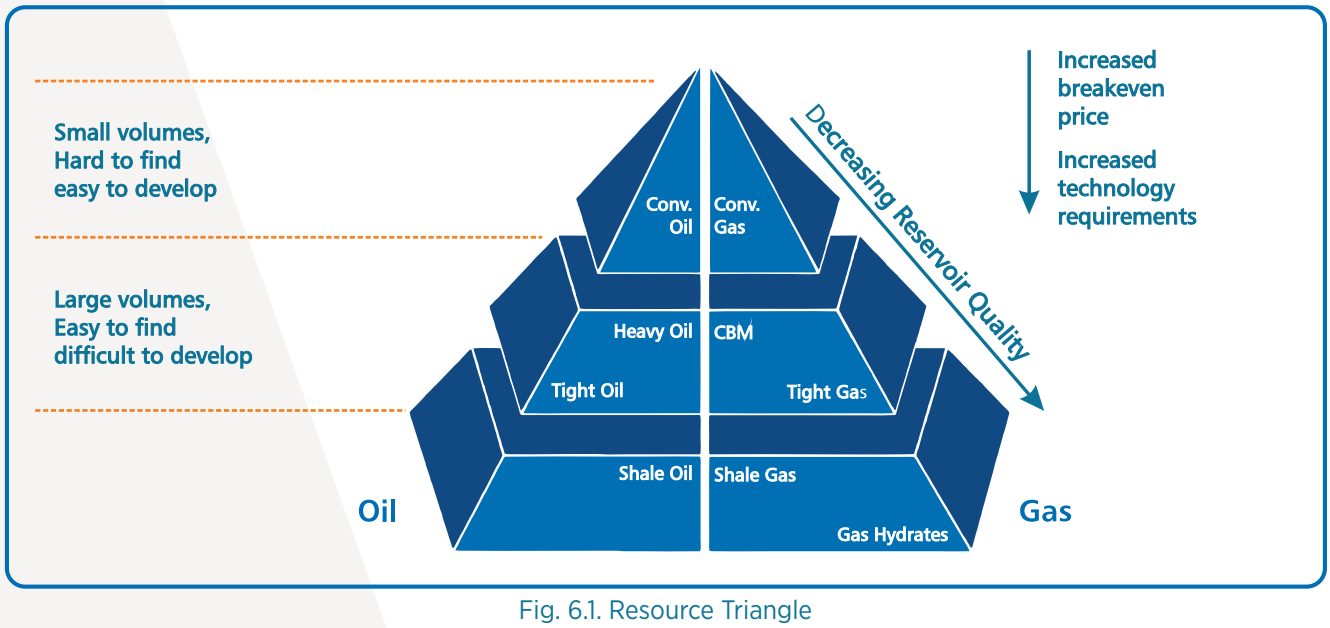

Fig. 6.1. Resource Triangle

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Table 6.1. State-wise distribution of CBM resources in India

No.	State	Prognosticated CBM Resource (in BCM)	Prognosticated CBM Resource (in TCF)	Established CBM Reserves (in TCF)
1	Jharkhand	722.08	25.5	1.916
2	Rajasthan	359.62	12.7	0
3	Gujarat	351.13	12.4	0
4	Odisha	243.52	8.6	0
5	Chhattisgarh	240.69	8.5	0
6	Madhya Pradesh	218.04	7.7	3.65
7	West Bengal	218.04	7.7	4.33
8	Tamil Nadu	104.77	3.7	0
9, 10	Telangana & Andhra Pradesh	99.11	3.5	0
11	Maharashtra	33.98	1.2	0
12	North East	8.50	0.3	0
Total CBM Resource		**2599.48**	**91.8**	**9.9**

Table 6.2. In-place CBM Reserves

No.	State	Block Name	Operator	Awarded Area (sq. km.)	GIIP (in TCF)	Recoverable Reserves (in TCF)
1	West Bengal	RG(E)-CBM-2001/1	EOL	500	2.15	0.993
2	West Bengal	Raniganj North	ONGC	350	0.26	0.066
3	West Bengal	Raniganj South	GEECL	210	1.92	1.34
4	Madhya Pradesh	SP(W)-CBM-2001/1	RIL	500	1.96	0.670
5	Madhya Pradesh	SP(E)-CBM-2001/1	RIL	495	1.69	0.620
6	Jharkhand	BK-CBM-2001/1	ONGC	95	1.06	0.130
7	Jharkhand	Jharia	ONGC	85	0.52	0.107
8	Jharkhand	NK-CBM-2001/1	ONGC	340	0.34	0.052
Total				**2575**	**9.9**	**3.978**

Table 6.3. Snapshot of CBM in India

CBM policy formulated in:	1997
MoU signed between MoP&NG & MoC	09.09.1997
Total CBM rounds conducted	4
No. of CBM blocks awarded in 4 rounds	33
Coal bearing area identified for CBM	26,000 Sq. Km.
Area covered under 33 blocks	16,613 Sq. Km. (64%)
CBM resources in the 26,000 sq km area	2600 BCM (91.8TCF)
CBM resources (from 33 Blocks)	1767.06 BCM (62.4 TCF)
Established CBM reserves (GIP)	280.8 BCM (9.9 TCF)
Commercial production commenced	July 2007
Total No. of wells drilled	831
Investment made	US$ 1.8 Billion
Present Gas Production (March 2017)	1.45 MMSCMD from 4 CBM blocks
No. of CBM blocks in development/production Phase	8
No. of CBM blocks in exploration phase	3
No. of CBM blocks under relinquishment	15
No. of CBM blocks relinquished	4
No. of CBM blocks awaiting PEL	2
No. of CBM blocks under arbitration	1
Annual CBM production in FY 2016-17	564.592 MMSCM

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Table 6.4: Status of CBM Blocks (as on 01.04.2017)

No.	Block	Coal field	State	Contractor (PI%)	Date of signing contract	Present area (sq. km.)	Present Status
CBM BLOCKS OFFERED ON NOMINATION/FIPB ROUTE							
1	Raniganj (South)	Raniganj	West Bengal	GEECL (100)	31.05.2001	210	Production Phase
2	Raniganj (North)	Raniganj	West Bengal	ONGC (74)-CIL (26)	06.02.2003	311.8	Development
3	Jharia	Jharia	Jharkhand	ONGC (90)-CIL (10)	06.02.2003	65.1	Development
CBM ROUND-I							
4	RG(East)-CBM-2001/I	Raniganj	West Bengal	EOL (100)	26.07.2002	500	Production
5	SP(East)-CBM-2001/I	Sohagpur	Madhya Pradesh	RIL (100)	26.07.2002	495	Development
6	SP(West)-CBM-2001/I	Sohagpur	Madhya Pradesh	RIL (100)	26.07.2002	500	Production
7	BK-CBM-2001/I	Bokaro	Jharkhand	ONGC (80)-IOC (20)	26.07.2002	74.1	Development
8	NK-CBM-2001/I	North Karanpura	Jharkhand	ONGC (55)-IOC (20)-PEPL (25)	26.07.2002	271.5	Development
CBM ROUND-II							
9	SH(N)-CBM-2003/II	Sonhat	Chhattisgarh	RIL (100)	06.02.2004	825	Under Relinquishment
10	BS(1)-CBM-2003/II	Barmer Sanchor	Rajasthan	RIL (100)	06.02.2004	1045	Under Relinquishment
11	BS(2)-CBM-2003/II	Barmer Sanchor	Rajasthan	RIL (100)	06.02.2004	1020	Under Relinquishment
12	SK-CBM-2003/II	South Karanpura	Jharkhand	ONGC (100)	06.02.2004	70	Under Relinquishment
13	NK(W)-CBM-2003/II	North Karanpura	Jharkhand	ONGC (100)	06.02.2004	267	Under Relinquishment
14	ST-CBM-2003/II*	Satpura	Madhya Pradesh	ONGC (100)	06.02.2004	714	Relinquished
15	WD-CBM-2003/II*	Wardha	Maharashtra	ONGC (100)	06.02.2004	503	Relinquished
16	BS(3)-CBM-2003/II*	Barmer Sanchor	Rajasthan	ONGC (70)-GSPC (30)	06.02.2004	790	Relinquished
CBM ROUND-III							
17	SP(N)-CBM-2005/III	Sohagpur	Madhya Pradesh	R-Infra (55)-RNRL (45)	07.11.2006	609	Exploration
18	SR-CBM-2005/III	Singrauli	Madhya Pradesh	DIL (90)-Coal Gas Mart (10)	07.11.2006	330	Under Relinquishment
19	RM-CBM-2005/III	Rajmahal	Jharkhand	Dart Energy (35)-GAIL (35)-EIG (15)-TATA Power (15)	07.11.2006	469	Under Relinquishment
20	GV(N)-CBM-2005/III	Godavari	Telangana	Coal Gas (10)-DIL (40)-Adinath (50)	07.11.2006	386	Under Relinquishment
21	BB-CBM-2005/III	Birbhum	West Bengal	British Petroleum (100)	16.11.2006	248	Under Relinquishment

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No.	Block	Coal field	State	Contractor (PI%)	Date of signing contract	Present area (sq. km.)	Present Status
22	MR-CBM-2005/III	Mand Raigarh	Chhattisgarh	Dart Energy (35)-GAIL (35)-EIG (15)-TATA Power (15)	07.11.2006	634	Under Relinquishment
23	TR-CBM-2005/III	Tatapani Ramkola	Chhattisgarh	Dart Energy (35)-GAIL (35)-EIG (15)-TATA Power (15)	07.11.2006	458	Under Relinquishment
24	BS(4)-CBM-2005/III	Barmer Sanchor	Rajasthan	REL (45)-RNRL (45)-Geopetrol (10)	07.11.2006	1168	Under Relinquishment
25	BS(5)-CBM-2005/III	Barmer Sanchor	Rajasthan	REL (45)-RNRL (45)-Geopetrol (10)	07.11.2006	739	Under Relinquishment
26	KG(E)-CBM-2005/III	Kothagudem	Telangana	REL (45) – RNRL(45) - Geopetrol (10)	07.11.2006	750	Under Relinquishment
CBM ROUND-IV							
27	AS-CBM-2008/IV	Assam	Assam	Dart Energy (10)-OIL (90)	29.07.2010	113	Under Relinquishment
28	MG-CBM-2008/IV	Mannargudi	Tamil Nadu	GEECL (100)	29.07.2010	667	Under Arbitration
29	RM(E)-CBM-2008/IV	Rajmahal	Jharkhand	EOL (100)	29.07.2010	1128	Exploration
30	TL-CBM-2008/IV	Talcher	Odisha	EOL (100)	29.07.2010	557	PEL awaited
31	IB-CBM-2008/IV	Ib Valley	Odisha	EOL (100)	29.07.2010	209	PEL awaited
32	SP(NE)-CBM-2008/IV	Sohagpur	Madhya Pradesh & Chhattisgarh	EOL (100)	29.07.2010	339	Exploration
33	ST-CBM-2008/IV*	Satpura	Madhya Pradesh	Dart Energy (80)-Tata Power (20)	29.07.2010	714	Relinquished

**Exit option exercised by Contractor & approved by GoI*

6.2. Shale Gas and Oil

6.2.1. Shale Gas/Oil – Activities by ONGC

Table 6.5 Wells completed as on 01.04.2017

Basin / State	Wells completed in 2013-14	Wells completed in 2014-15	Wells completed in 2015-16	Wells completed in 2016-17
Cambay/ Gujarat	JMSGA*, GGAF, SKBH	GGAH, KLXF, GNSGA*	GNSGC* GNSGB*, & GNSGD*, KRAF,	WDAV; MYAF; LNBY & NKXY
KG/Andhra Pradesh	MSAC, SUWAA		WPG-AA	
Cauvery/ Tamil Nadu	ASAE	PDAB	TVAU	
A&AA/ Assam	GKBO	LDG		
Total	**7**	**5**	**6**	**4**

**Exclusive shale gas/oil wells*

Release of Locations: Three pilot shale gas/oil locations (WRSGA, LJSGA & PLSGA) in north Cambay basin have been released.

Drilling: Cambay Basin:

a. Completed drilling of Dual Objective wells, MYAF (MY-15 in Mahelaj area, 3200 m), WDAV (Wadu-56 in Wadu area, 2500 m), LNBY (LN-132, Mehsana area, 2600 m) and NKXY (NK-459, Mehsana area 2485 m) in north Cambay Basin.

b. Collected total 20 conventional cores in Cambay Shale section for shale specific studies. The well NKXY is an additional well for shale gas / oil assessment in Linch Ext. I ML.

Hydro Fracturing:

a. JM#55 (JMSGA): Carried out HF in Object-III (2475-2485 m) by placing 35 MT of proppant and 178 m^3 of frac fluid. Oil indication was observed during post HF activation, completed the well by lowering GLV. Cumulative oil knocked out till 31.03.2017 – 2.35 m^3 and water 83.05 m^3. Further activation is in progress.

b. GN#708 (GNSGA): Prepared well for Hydrofracturing of Object–II (3725-3781 m) in Nov. 2016.

c. GN#712 (GNSGB): Formulated plan for preparing well for HF of Object-I (3740-3776m). Work Over Rig to be deployed shortly.

Visit/ Discussions with Domain Experts

a. Subject Matter Expert from Colorado School of Mines, USA visited COD, Shale Gas offices, Vadodara in December 2016 and reviewed old and new G&G data of Cambay and KG onland basins especially cores, logs and petrophysical data and advised on the additional studies to be carried out in these basins.

b. Technical interaction/discussions were held with Director-Strategic Business Unit Tight Oil, Cairn India Ltd. on HF of unconventional reservoirs.

c. One-day workshop regarding HF and completion was held with M/s. Halliburton.

d. Technical discussions were held with industry experts of M/s Weatherford.

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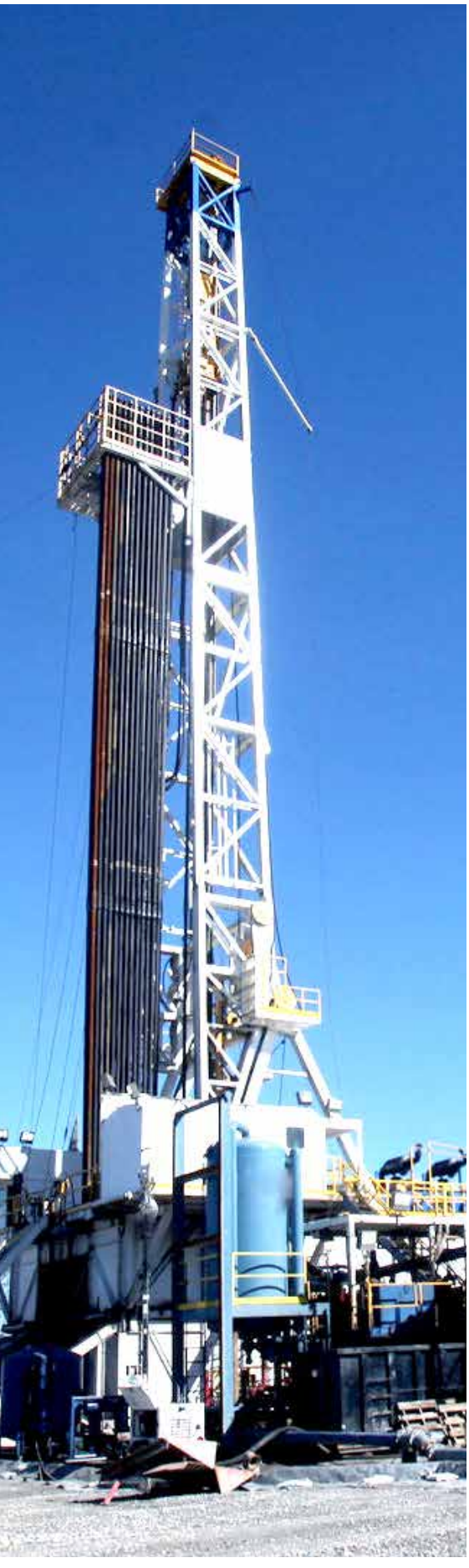

Environment Clearance:

a. Fresh applications uploaded for obtaining Environmental Clearances for drilling of shale gas/oil wells in Cambay, KG and Cauvery basins.

b. Terms of Reference for KG and Cauvery received in April'16 and that for Cambay Basin received in December' 16. For KG Basin, field data collection completed, EIA reports and public hearing in the three districts completed. EIA report along with PH details submitted to MOEF&CC. Process for field data collection for preparation of EIA reports in Cambay basin initiated.

Results Obtained So Far:

a. Drilled wells have given information about various properties of the shale formations. Most of the blocks in the four basins (Cambay, KG, Cauvery, A&AA) are prospective for shale oil. Area prospective for shale gas in most of the blocks is likely to be limited. Results from ongoing studies and data from the planned testing/ hydro-fracturing in the existing and future exclusive wells will be necessary before any conclusion and quantification of shale gas and oil prospectivity and resources.

b. Till date, two deep zones, one each in JMSGA and GNSGA, have been tested conventionally and no influx was observed. Hydro-fracturing was carried out in July 2015 in one of the identified intervals (Object-II) of well JMSGA. The well-produced 191 m^3 of liquid which included 19 m^3 of oil and 172 m^3 of water during different stages of extended testing (13 months). It established Shale Oil Reservoir for the first time in an Indian Basin. Taking cue, Object III was perforated and hydro-fractured. Cumulative liquid knocked out from Object-III (2475-2485 m) till date – Oil: 2.35 m^3 and water: 81.5 m^3. Further activation in progress.

c. Oil indication is encouraging and prevalence of unconventional petroleum system in the Broach sub-basin seems to be an attractive proposition for shale oil exploration. A proper quantitative estimation of oil-in-place will require the results from other wells which have been drilled in the same area of Cambay basin and which are identified for hydrofracturing.

6.2.2. Shale Gas and Oil: Activities by OIL

I. JAISALMER PML, RAJASTHAN: Well No. Dandewala-28 (Loc. RJBF):

Spudded-in on: 19.08.2016 | **Rig down:** 11.12.2016
Conventional coring: Total 04 (four) runs of coring completed in the range of 2557.00-2754.48m MD within Baisakhi-Bedeshir Shale Section.

Core Analysis: Canister Core gas desorption, Residual/Crush Gas, Gas composition, Spectral Gamma Ray, CT scanning, Rock Eval Pyrolysis, VRo analysis, Cluster Analysis have been completed till March 2017

II. DIBRUGARH PML, ASSAM:

Released Location: DIBK | **Status**: Arranging for spudding the location during third week of April 2017 | Target Shale for Coring: Kopili Formation

III. DUMDUMA PML, ASSAM

Released Location: DHS | **Status**: Plinth ready for spudding the location Target Shale for Coring: Barail Coal Shale Sequence

IV. CHABUA PML, ASSAM:

Released Location: CAC | **Status:** Plinth preparation is in progress
Target Shale for Coring: Kopili Formation

V. DEOMALI PEL, ARUNACHAL PRADESH:

RELEASED LOCATION: DML-2 | **Status:** Awaiting for Forest Clearance
Target Shale for Coring: Disang shale

VI. JAIRAMPUR EXTN. PEL, ARUNACHAL PRADESH:

Released Location: JRB | **Status:** FC awaited for drilling the location
Target Shale for Coring: Upper Tikak Parbat Formation

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6.3. Gas Hydrates

Gas Hydrates can be an unconventional future energy source world over. World over the production of gas from gas hydrates are at R&D stage. USA, Japan, Russia, China, Germany and Korea are deeply involved in developing a technology to exploit these proved Gas hydrates reserves.

In India, Gas hydrate research and exploratory activities are being steered by the Ministry of Petroleum & Natural Gas under National Gas Hydrate Program (NGHP). The presence of Gas Hydrate is established in Krishna Godavari, Mahanadi, Gulf of Mannar and Andaman Basin.

NGHP-Expedition-01 exploration program carried out in 2006 for mapping gas hydrates zones in Krishna-Godavari, Kerala Konkan, Mahanadi and Andaman offshore. Total 39 holes at 21 sites were drilled and established the physical Presence of gas hydrate in Krishna Godavari, Mahanadi and Andaman Basin in clay dominated complex geologic settings.

NGHP-Expedition-02 was approved in 15th Steering Committee held in Oct '2013 and 17th Steering Committee approved the expenditure of USD 101.12 Million Rs 616.95 Crores for the NGHP-Expedition-02 in Jan'2015. The cost of NGHP Expedtion-02 is shared by OIDB (50%), ONGC (20%), OIL (10%), GAIL (10%) and IOCL (10%). ONGC was mandated to execute NGHP-02 by hiring suitable vessel and integrated services.

NGHP-02 commenced on 3rd March 2015 and has been completed on 28th July 2015. Total 42 wells drilled at 25 sites in Krishna Godavari and Mahanadi area in sand reservoirs for gas hydrates. LWD was completed in 25 wells in 4 areas A, B C & E. Coring, wire line logging was carried out in 17 wells in areas 'B' 'C' & 'E'.

NGHP-02 has discovered significant gas-hydrate-bearing sand reservoir system in the Krishna Godavari B, C and E area. Area A, which is in the Mahanadi deep water basin, has several sand zones devoid of gas hydrates. Identified two distinct gas hydrate accumulations in Krishna Godavari Basin, one is approximately 20 to 100m thick, layer-type, depths 400 m and other accumulation is a fracture-type unit of variable thickness at shallow levels.

To assess and firm up, an appropriate way forward strategy for NGHP-Exp-03, International experts in the field of Gas Hydrates exploration and development from USA and Japan were appointed as honorary members of Advisory Committee constituted by Director General, DGH, India for National Gas Hydrate Program.

The first meeting of Advisory Committee of international experts along with representatives from various organisations like AIST, Japan and University of Bergen, Norway with Indian NGHP scientists from ONGC, DGH, OIL, IOCL, NIO, NGRI, NIOT, GSI, NCL Pune and IIT Kanpur was held in 1st week of December 2016 at New Delhi.

Advisory committee members emphasized to build a strong technical capacity for sustained project support by way of providing staffing requirements and continued development of domestic R&D capabilities through domestic and international partnerships for India. The various activities as suggested by an advisory committee are planned/initiated.

Various studies have been taken up by national & international organizations for NGHP-Exp-03. Pressure core study is carried out by AIST, Japan & USGS, USA. AIST has completed study on Pressurized core samples collected during NGHP-Expedition-02, the report has been circulated to advisory committee NGHP members for their valuable inputs/suggestions.

Major outcome from the AIST studies are the samples collected during NGHP-Exp-02 contain high methane concentration (>99.9) of mainly microbial

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origin, Structure-I gas hydrates. The permeability increases 10-100 times during hydrate dissociation and the overall grain size distribution in area B&C is mainly clayey silt to silty sand with intercalated sands while the overall gran size in Area E is mainly silty clay with very fine lamination of sand.

6.3.1. Research projects under NGHP

Two NGHP R & D projects under direct funding by OIDB were approved in 15th steering committee and Ist installment of funds to the executing organizations has been released.

The first NGHP R&D project of KDMIPE, ONGC with IIT-Kanpur entitled "Modeling and Simulation of Methane Extraction from Gas Hydrates via Simultaneous Depressurization and CO_2 injection", was taken up with aim to design of a simulator with all dynamic variables and estimate methane release per unit time.

The second project of NGRI entitled, "Carbon dioxide & Methane Hydrate phase stability in sandy and clay environment: Laboratory studies" approved under NGHP funding was formulated to carry out the CO2 phase stability experiments using synthetic sand & clay particles and to find out the rate of methane yield due to depressurization.

6.3.2. NGHP Expedition-03

The Expedition-03 aims at carrying out pilot production testing will be carried out after a thorough study of the data collected, planning and designing a suitable production testing method, understanding of environmental impacts of attempting a pilot production testing.

The challenges faced for commercial exploitation of gas from Gas Hydrates are more or less similar all over the world. Extracting methane from gas hydrate in marine environments is relatively a new path. Japan and China has taken a lead in this direction and recently carried out pilot production testing. Though the methane gas production rate from Gas Hydrates were low in both countries results but has proved the exploitation process. From the progress being made by the Indian NGHP steps are under way to mitigate anticipated challenges in the Indian context. The NGHP expeditions are an appropriate line of research investigation which could help the country move forward by harnessing this yet elusive resource.

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Supplementary Information

Supplementary Information

7.1. Contribution to Government Exchequer

7.1.1. Profit Petroleum

During the Financial Year 2016-17, Profit Petroleum of Rs. 6,074 Crores was contributed to Government Exchequer from the E&P operations under PSC regime. The cumulative profit petroleum earned up to 31st March 2017 was of the order of Rs. 81,062 Crores.

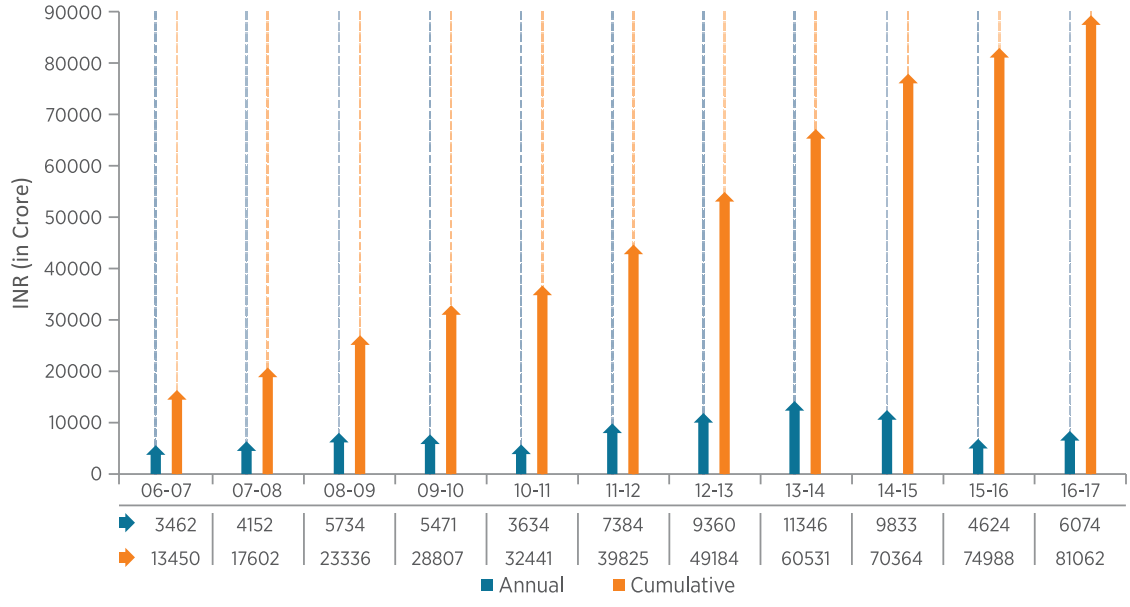

Fig. 7.1. Year-wise earned Profit Petroleum

7.1.2. Royalty

During the Financial Year 2016-17, Royalty received by central Exchequer was of the order of Rs. 4,824 Crores. The cumulative Royalty contributing to central exchequer till 31st March 2017 amounted to be Rs. 49,862 Crores.

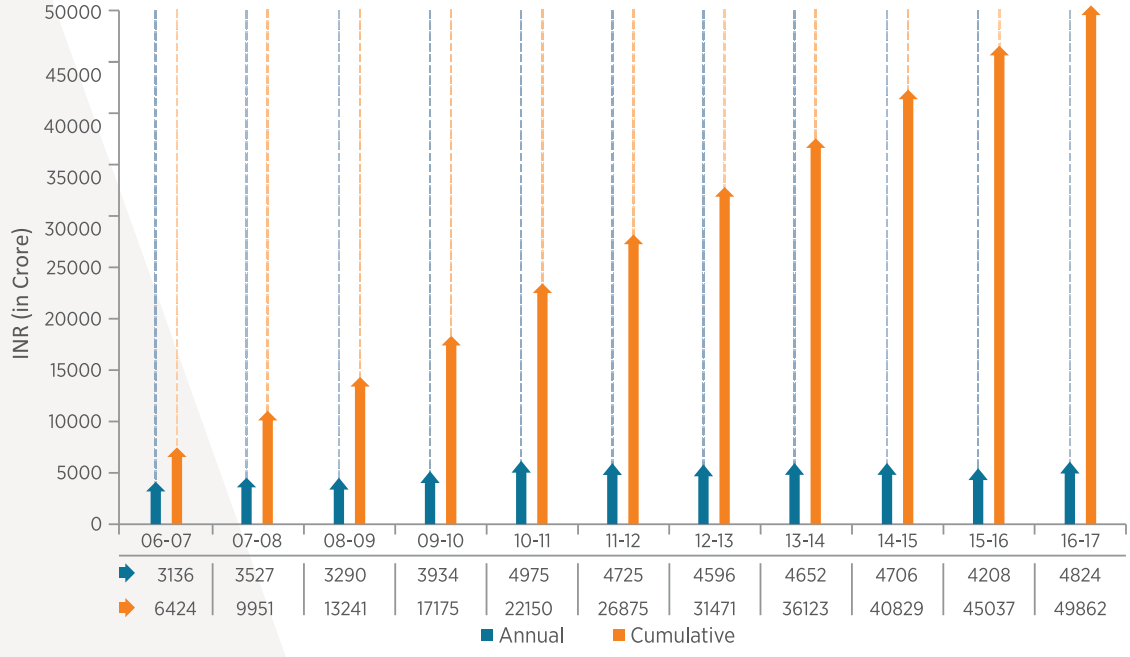

Fig. 7.2. Year-wise Royalty received by Central Governemnt

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7.2. Memorandum of Understanding

Status of active MoUs signed between MOP&NG/DGH & National and International Organisations in the area of upstream E&P sector is provided below.

Table 7.1. "Status of active MOUs signed between MOPNG/DGH & National and International Organisations in the area of upstream E&P sector

No.	MoU signed between	Agency, Country	MoU signed on	Valid upto	Objectives
1	Japan Oil, Gas Metals National Corporation(JOGMEC) & DGH	JOGMEC, Japan	16th February 2007	15th February 2019	Exchanges of technical knowledge and information, workshops, meetings on Gas Hydrates Research and Development.
2	U.S. Geological Survey (USGS) of the Department of Interior of the United States of America & DGH	USGS, USA	16th December 2008	Open ended	Resource exploration hazards and environmental issues associated with Gas Hydrates, Field studies & research for Gas hydrate
3	Department of Energy of United States of America & MOPNG India	USDOE, USA	renewed on 6th June 2016	5th June 2021	Enhance & Accelerate Gas Hydrate exploration
4	Department of State (DOS), USA & MOPNG GOI	DOS, USA	6th November 2010	Open ended	Exchange of knowledge and expertise in the areas concerning Shale Gas resource characterization and assesment in India
5	Indian Space Research Organisation, India & MOPNG GOI	ISRO, India	1st June 2017	Open ended	To explore and identify potential opportunities of applications of space technologies and earth observation data sets inactivities related to exploration and production of conventional and unconventional petroleum and/or natural gas in India and in other regions. Mainly for ONGC projects

7.3. RTI Annual Return Information FY 2016-17

Table 7.2. RTI for FY 2016-17

Ministry/ Department/ Organisation	Quarter	Opening balance of Requests (as on start of Quarter)	No.of Requests Received during Quarter	Total no.of Requests (Column 3+4)	No.of Requests Transferred to other PAs	Decisions where Applications for Information rejected	Number of cases where disciplinary action taken against any officer in respect of administration of RTI Act
Directorate General of Hydrocarbons	First Quarter (Apr16-June16)	2	20	22	2	0 (0%)	0
	Second Quarter (July16-Sept16)	20	14	34	1	0 (0%)	0
	Third Quarter (Oct16-Dec16)	33	7	40	1	0 (0%)	0
	Fourth Quarter (Jan17-Mar17)	39	9	48	2	0 (0%)	0

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7.4. Environmental Protection, Initiatives and Clearances

Recent initiatives in environmental related matters in exploration and production in oil and gas sector.

The Ministry of Environment, Forest & Climate Change (MoEF&CC) has made the Environmental Clearance (EC) mandatory for various projects, including E&P activities in Oil and Gas sector, under the Environmental Impact Assessment (EIA) Notification of 14th September, 2006 and the Forest Clearance (FC) under the Forest (Conservation) Act, 1980, if diversion of forest land is involved. Based on experience and developments of technologies in oil and gas sector, MoEF&CC has undertaken simplification of the procedures for environment related clearances from time to time and are displayed on their website www.envfor.nic.in

Some of the recent initiatives pertaining to environment related matters in oil and gas sector are:

- Exploration and Production of oil and gas is a permissible activity under the Coastal Zone Regulation (CRZ) Notification, 2011, but permission is required from MoEF&CC based on recommendations of the State Coastal Zone Management Authority (SCZMA). A timeline of 60 days is provided to SCZMA for appraisal and recommendation of the proposal to MoEF&CC. In this regard, MoEF&CC has rolled out a new "Web portal for CRZ Clearances" in March, 2017 for online submission and monitoring of CRZ clearances. The proposals requiring CRZ clearance under CRZ notification, 2011 as well as proposals requiring both clearances i.e. EC clearance under EIA Notification, 2006 and CRZ clearance under CRZ Notification, 2011 can be submitted through this portal. (www.environmentclearance.nic.in)
- With a view to study the hydrocarbon prospectivity in the country and to generate geo-scientific data base, a National Seismic Plan (NSP) has been drawn to conduct seismic survey in "to be apprised areas" of sedimentary basins of India where no/scanty data is available. For facilitating the 2D surveys, at the request of DGH, the MoEF&CC had issued a clarification on 8th December 2015 regarding the applicability of the EIA notification, 2006 during such surveys. It has been clarified that 2D seismic survey activity is exempt from the environmental clearance process. A clarification was also issued on 3rd March 2016 regarding applicability of Forest (Conservation) Act, 1980 and it was clarified that seismic surveys do not attract the provisions of the FC act as long as seismic surveys do not involve clearing of forest and operations are restricted to cleaning of bushes and lopping of tree branches for sighting purpose. However, the survey teams were experiencing difficulties in field implementation during seismic surveys. On further request from DGH, a supplementary clarification was issued by MoEF&CC on 3rd May, 2017 that seismic surveys for oil and gas exploration which require use of small amount of explosives for purpose of generation of energy in shot holes in forest land will not attract the provisions of Forest (Conservation) Act, 1980 provided that these surveys do not involve any clearing of forest, and operation are restricted to cleaning of bushes and lopping of trees branches for purpose of sighing and the density of shot holes for such seismic activity is restricted upto 16 boreholes of maximum 6.6" diameter per 10 sq. km.. All these clarifications, have been uploaded on the DGH website also, and are expected to help in time bound implementation of various plans for 2D seismic surveys.
- As per clause 2(iii) of Forest (Conservation) Act, 1980, any forest land or any portion thereof may be assigned by way of lease or otherwise to a private person or to any authority, corporation, agency or any other organisation not owned, managed controlled by Government only with prior approval of Central Government. In this regard, Forest Conservation (FC) division, MoEF&CC has issued operational guidelines on 16th November 2016 for filling online form for seeking permission for getting forest land on lease under section 2(iii) of FC Act. The details of guidelines/ procedure for submission of application by the user agency/operator are available on website (www.forestclearance.nic.in).
- The Ministry of Petroleum and Natural Gas (MoP&NG) has launched the Hydrocarbon Exploration and Licensing Policy (HELP) in March 2016 in sync with the Open Acreage Licensing Policy (OALP) for exploration and exploitation of all hydrocarbons, while enabling the E&P operator to choose their acreage areas. DGH is engaged in a process of establishing a National Data Repository (NDR) of 26 sedimentary basins for facilitating the bidding process under the scheme. As an exercise in this endeavour, a set of maps and coordinates for areas being proposed under Open Acreage Licensing Policy in 26 sedimentary basins have been forwarded to Wildlife Institute of India, Dehradun as shape files for providing maps of protected areas like National Parks, Wildlife Sanctuaries, Tiger reserves, Marine National Parks and notified Eco-Sensitive Zones etc. The entire exercise of procuring maps of protected areas is being undertaken in advance so that such areas can be avoided or minimised during the planning of exploration and production activities and before offering the blocks. The data of protected areas will be transferred to National Data Repository of DGH.
- With a view to familiarise the operators and various stakeholders with requirements of compliance to various environment related clearances, a standard operating procedure covering environment clearance under EIA Notification, 2006, the clearances required

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under the Coastal Regulation Zone (CRZ) Notification, 2011 (Wherever part of activities in the oil and gas sector falls in CRZ areas), Forest clearance (Wherever part of activities in the oil and gas sector falls in forest areas, Wildlife clearance (Wherever part of activities in the oil and gas sector falls in protected areas and eco-sensitive zones), Consent to Establish and Consent to Operate from the State Pollution Control Board etc was formulated and uploaded to DGH website The various details such as websites for online submission of proposals, timelines, consultants accredited by Quality Council of India (QCI)/ NABET, procedure for transfer of clearances etc have also been provided.

- With rapidly increasing demand for energy, the trend world over is to supplement conventional oil and gas production with other alternative/ unconventional energy fuel sources. Promotion and use of Shale Gas/Oil is being perceived as a valuable addition to the basket of energy mix in India. Like the development of any energy resource, there are concerns about environmental footprints for the development of Shale Gas/Oil. DGH is presently engaged in process for formulation of guidelines for environment management during Shale Gas/Oil exploration and production.
- A policy frame work for early monetisation of hydrocarbon discoveries was issued by the Ministry of Petroleum & Natural on 10th Nov. 2014. The policy frame work in section 3.0 inter-alia elaborates reduction of Minimum Work Programme (MWP) because of reduction of contract area due to denial of clearances by the government agencies including MOEF and exit options in case of delay in clearances. The proposals received under this policy were assessed in DGH to ensure compliance to the requirements of the policy for decisions on exit without payment of cost of unfinished work program.
- DGH has also constituted a Core Group for consideration of cases of Excusable Delay (ED) due to demonstrable delays because getting Government approvals/ permits/ clearances including environment related clearances which are not attributable to the contractor and Force Majeure conditions. So far, more than 70 cases have been examined and recommended under the policies for extension of exploration phases of the Ministry of Petroleum and Natural Gas.
- Under the Discovered Small Fields Bid Round, 2016, a total 30 contract areas were awarded to successful bidders for oil and gas extraction. A workshop was organised for the new awardees in DGH on 26th April, 2017 and a detailed presentation was made on procedures for seeking environment related clearances. The operators are further provided the guidance, as and when queries are received in DGH.

  The Indian Coast Guard (ICG) in the central coordinating authority for enforcing the provisions of the National Oil Spill Disaster Contingency Plan (NOS-DCP) in the maritime zones of India. All the offshore E&P operators are required to maintain on board Tier-1 level oil spill response facility. Management of Oil spills in coastal areas and marine environment is another area where substantial progress has been made.

  DGH representative participated in 21st NOSDCP and Preparedness Meeting held on 5th August 2016 in New Delhi in which preparation of Local Contingency Plans, surveillance system by ports for illegal discharge, Tier -1 response time at offshore installations, well capping devices, evolving effective coordination during mock drills etc. were discussed. During the meeting, Online Oil Spill Advisory (OOSA) 3.0 software developed by Indian National Centre for Ocean Information Services (INCOIS) for prediction of oil spill trajectory, which also has the feature of indicating 'potential fishing zone', was launched. The Ministry of Environment, Forest and Climate Change is presently engaged in mapping of Environmental Sensitivity Index, which will be used for identification of "No Oil Spill Dispersant (OSD) Use" areas.

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7.5. Sedimentary Basins of India

Sedimentary basins are regions of Earth of long-term subsidence creating accommodation space for infilling by sediments. In India, based on the exploration activities carried out so far, and the resulting knowledge in terms of occurrence of hydrocarbons, the sedimentary basins have been classified into 4 categories.

India has 26 sedimentary basins covering an area of 3.14 million square kilometres. The sedimentary basins of India, onland and offshore up to the 400 m isobath, have an areal extent of about 1.79 million sq. km. In the deepwater beyond the 400m isobath, the sedimentary area has been estimated to be about 1.35 million sq. km. Thus, the total works out to 3.14 million sq. km. The 4 Categories based on prospectivity are as follows:

Category-I: Proven Commercial Productivity: Sedimentary basins with proved hydrocarbon reserves and from where commercial production has started.

Table 7.3. Category-I sedimentary basins

Basin Name	Onland Area (sq. km.)	Offshore Area (sq. km.)	Total (sq. km.)
Assam-Arakan Fold Belt and Assam Shelf	1,16,000	-	1,16,000
Cambay	51,000	2,500	53,500
Cauvery	25,000	30,000	55,000
Krishna-Godavari Offshore	28,000	24,000	52,000
Mumbai Offshore	-	1,16,000	1,16,000
Rajasthan	1,26,000	-	1,26,000

Category-II: Identified Productivity: Sedimentary basins with proved occurrence of hydrocarbons but from which commercial production has not started yet.

Table 7.4. Category-II sedimentary basins

Basin Name	Onland Area (Sq. km.)	Offshore Area (sq. km.)	Total sq. km.)
Kutch	35,000	13,000	48,000
Mahanadi-NEC	55,000	14,000	69,000
Andaman-Nicobar	6,000	41,000	47,000

Category-III: Prospective Basins: Sedimentary basins showing hydrocarbon shows which are considered prospective by geological considerations.

Table 7.5. Category-III sedimentary basins

Basin Name	Onland Area (sq. km.)	Offshore Area (sq. km.)	Total (sq. km.)
Bengal	57,000	32,000	89,000
Ganga	1,86,000	-	1,86,000
Himalayan Foreland	30,000	-	30,000
Kerala-Konkan Lakshdweep	-	94,000	94,000
Saurashtra	52,000	28,000	80,000
Vindhyan	1,62,000	-	1,62,000

Category-IV: Potentially Prospective: Sedimentary basins having uncertain potential, which requires further exploration. They include basins which bear an analogy with similar hydrocarbon bearing basins in the world and may be prospective.

Table 7.6. Category-4 sedimentary basins

Basin Name	Onland Area (Sq. km.)	Offshore Area (Sq. km.)	Total (Sq. km.)
Bastar	5,000	-	5,000
Bhima Kaladgi	8,500	-	8,500
Chhattisgarh	32,000	-	32,000
Cuddapah	39,000	-	39,000
Deccan Syneclise	2,73,000	-	2,73,000
Karewa	3,700	-	3,700
Narmada	17,000	-	17,000
Pranhita Godavari	15,000	-	15,000
Satpura-S.Rewa-Damodar	46,000	-	46,000
Spiti Zanskar	22,000	-	22,000

Deep Water Basins: The deepwater basin extends in both the East and West Coast from 400 m water depth to Exclusive Economic Zone (EEZ). They cover an area of about 13,50,000 sq. km.

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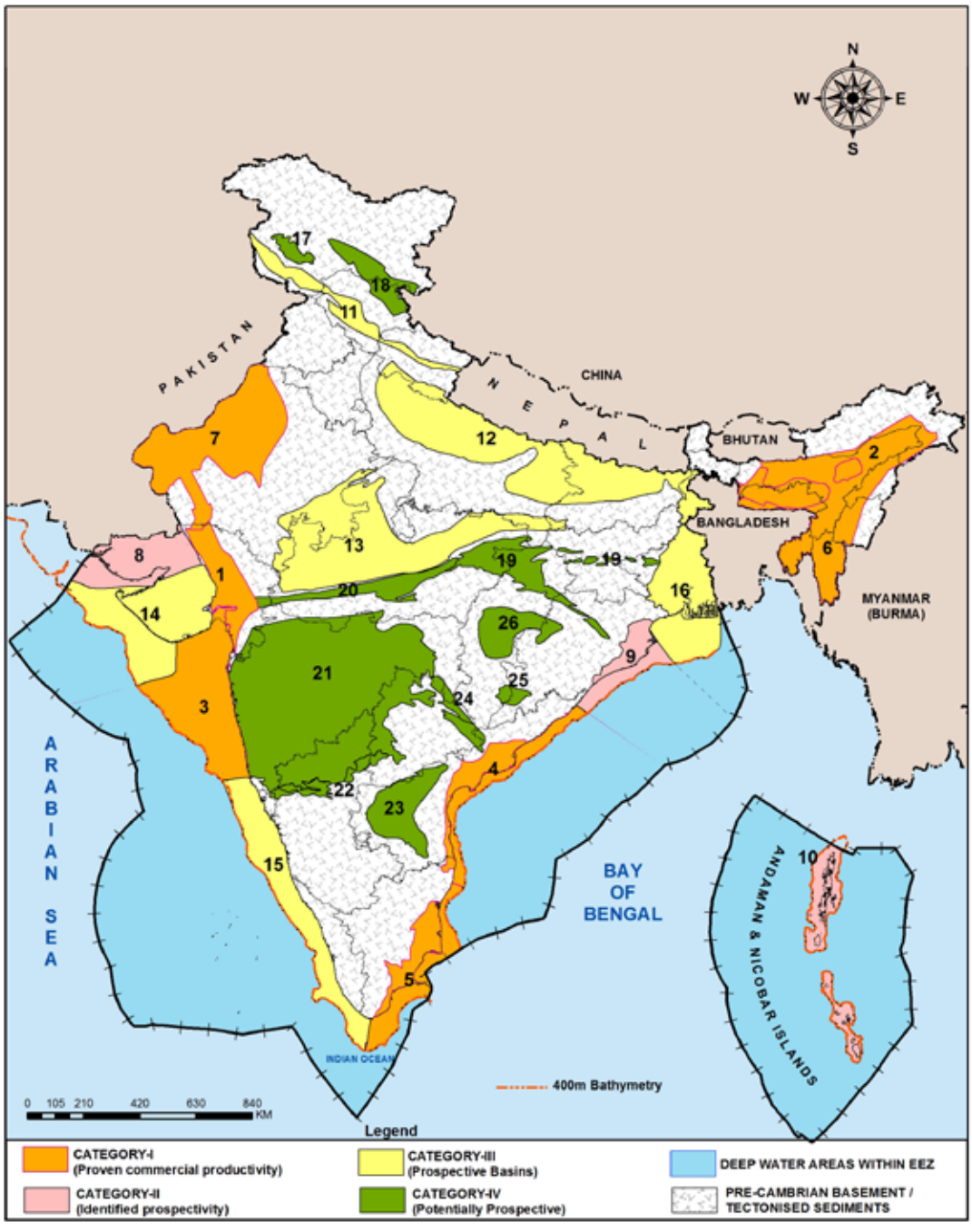

Fig. 7.3 Map of Indian Sedimentary Basins

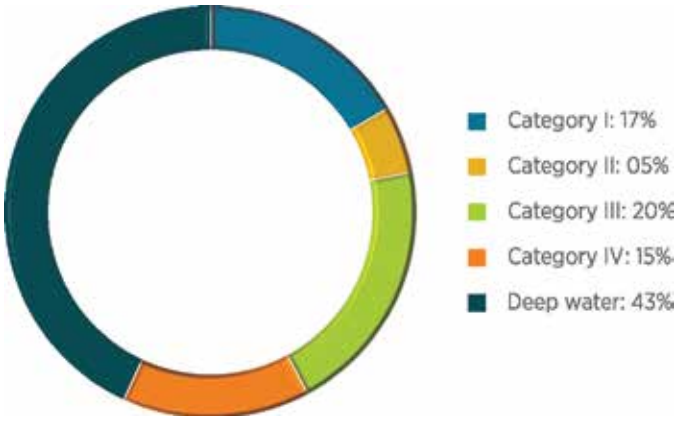

Fig. 7.4 Categories of Indian Sedimentary Basins (Area Wise)

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Appendices

Appendices

8.1. Blocks and Fields Offered under PSC and RSC regime

Table 8.1. EXPLORATION BLOCKS AWARDED UNDER PRE-NELP

NO.	BASIN	BLOCK NAME	REF. NO. ON. MAP	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
CURRENT ACTIVE BLOCKS (12 BLOCKS)								
ONLAND								
1	RJ	RJ-ON-90/1	17	CIL(35), CEHL(35)&ONGC (30)	15-05-1995	11108	7996.73	3111.27
2		RJ-ON/6	16	FEL(10),ISIL(65)&NOCL(25)	30-06-1998	5378	3202	2176
3	CB	CB-ON/7	22	HOEC(50)&GSPCL(50)	12-04-2000	492	484.36	7.64
4		CB-ON/2	23	GSPC(80), GGR(20)	12-04-2000	1618	408	1210
5		CB-ON/3	19	ESSAR OIL LTD.(100)	16-07-1998	574	430.5	143.5
6	GK	GK-ON/4	21	FEL(100)	30-06-1998	1550	775	775
7	AA	AAP-ON-94/1	14	HOEC(26.882), OIL(44.086)&IOC(29.032)	30-06-1998	870	760	110
8		AA-ON/7#	13	ACL(35)#	19-02-1999	1934	1615	319
9		AA-ONJ/2	11	ONGC(100)	07-11-2003	1595	318	1277
SUB TOTAL						**25119**	**15989.59**	**9129.41**
SHALLOW WATER								
10	CB	CB-OS/1	6	ONGC(55.26),HOEC(38.04)&TPL(6.7)	19-11-1996	3290	3230	60
11		CB-OS/2	7	CIL(40),ONGC(50)&TPL(10)	-	3315	3110	205
12	CY	CY-OS-90/1(PY3)	-	HARDY(18),ONGC(40),TPL(21)&HOEC(21)	30-12-1994	81	0	81
SUB TOTAL						**6605**	**6340**	**346**
SUB TOTAL ACTIVE BLOCKS						**31724**	**22329.59**	**9475.41**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (16 BLOCKS)								
13	AA	AA-ON/3	26	OKLAND(100)	-	3000	3000	0
14	CR	CR-ON-90/1	12	PONEI(29),EOL(16),IOC(35)&OIL(20)	30-06-1998	2570	2570	0
15	RJ	RJ-ON-90/5	15	EOL(75)&POGC(25)	-	16030	16030	0
16		RJ-ON-90/4	28	EOL(75), POGC (25)	-	16600	16600	0
17	GK	GK-ON-90/2	20	OKLAND(100)	-	11820	11820	0
18		GK-OS/5*	3	RIL(40),TIOL(50)&OKLAND(10)	16-07-1998	5000	5000	0
19		GK-OSJ/1	1	RIL(50),TIOL(25)&ONGC(25)	-	1275	1275	0
20	KG	KG-ON/1	25	RIL(40)&TOIL(60)	-	4180	4180	0
21		KG-OS/6	10	CAIRN(50)&VPL(50)	30-06-1988	8775	8775	0
22		KG-OS-90/1	27	HARDY(30), HOEC (30), NIKO (30), NAGA FERTI (10)	-	3720	3720	0
23	MB	BB-OS/5	5	ESSAR(79)&PETROM SA(21)	-	9095	9095	0
24	CY	CY-OS/2##	9	HEPI(75)&GAIL(25)	19-11-1996	5010	5010	0
25	GS	SR-OS-94/1	4	RIL(100)	12-04-2000	9150	9150	0
26	PG	GN-ON-90/3	24	HOEC(75)&MIL(25)	29-03-1993	29200	29200	0
27		CB-ON/1*	18	RIL(40),TOIL(50)&OOHL(10)	16-07-1998	6133	6133	0
28	GK	GK-OSJ/3*	2	RIL(60),ONGC(25)&OIL(15)	06-09-2001	5725	5725	0
SUB TOTAL RELINQUISHED/PFR BLOCKS						**137283**	**137283**	**0**
TOTAL AREA						**169007**	**159612.59**	**9475.41**

NOTE: #Execution of new PSC after resolution of Nagaland issue. CRL's operatorship has been terminated by GoI. ACL has requested to transfer the 65% PI of CRL to him.

##Arbitral award pronounced in favour of HEPI. Govt. challenged the arbitral award against the HEPI.

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

Table 8.2. FIELDS AWARDED UNDER PRE-NELP SMALL & MEDIUM DISCOVERED FIELD ROUNDS

NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
CURRENT ACTIVE BLOCKS (26 BLOCKS)								
ONLAND								
1	AA	AMGURI		ACL (40%) (Op.), CRL. # (60%)	23-02-2001	52.75	0	52.75
2		KHARSANG		GEO-ENPRO(10%) (Op.), OIL (40%), JEKPL (25%), GPI (25%)	16-06-1995	10	0	10
3	CB	ALLORA		GNRL (30%) (Op.), GSPCL (70%)	23-02-2001	6.85	0	6.85
4		ASJOL		HOEC (50%) (Op.), GSPCL (50%)	03-02-1995	15	0	15
5		BAKROL		SELAN (100%) (Op.)	13-03-1995	36	0	36
6		BAOLA		SUN PETROCHEMICAL (100%) (Op.)	05-04-1995	4	0	4
7		BHANDUT		OILEX (40%) (Op.), GSPCL (60%)	23-09-1994	6	0	6
8		CAMBAY		OILEX (30%) (Op.), GSPCL (55%), OILEX-NL (15%)	23-09-1994	161	0	161
9		DHOLASAN		GNRL (30%) (Op.), GSPCL (70%)	23-02-2001	8.8	0	8.8
10		DHOLKA		JTI (100%) (Op.)	20-02-1995	48	0	48
11		HAZIRA		NIKO (33.33%) (Op.), GSPCL (66.67%)	23-09-1994	50	0	50
12		INDRORA		SELAN (100%) (Op.)	13-03-1995	130	0	130
13		KANAWARA		GNRL (30%) (Op.), GSPCL (70%)	23-02-2001	6.3	0	6.3
14		KARJISAN		SELAN (100%) (Op.)	16-02-2004	5	0	5
15		LOHAR		SELAN (100%) (Op.)	13-03-1995	5	0	5
16		MODHERA		SUN PETROCHEMICAL (100%) (Op.)	23-02-2001	12.7	0	12.7
17		N. KATHANA		GNRL (30%) (Op.), GSPCL (70%)	23-02-2001	12.2	0	12.2
18		N.BALOL		HOEC (25%) (Op.), GSPCL (45%), GNRL (30%)	23-02-2001	27.3	0	27.3
19		OGNAJ		SELAN (100%) (Op.)	16-02-2004	13.65	0	13.65
20		SANGANPUR		HRDC (50%) (Op.), PRIZE (50%)	23-02-2001	4.4	0	4.4
21		UNAWA		GSPCL (70%) (Op.), GNRL (30%)	23-02-2001	5.65	0	5.65
22		WAVEL		JTI (100%) (Op.)	20-02-1995	9	0	9
SUB TOTAL						**629.6**	**0**	**629.6**
SHALLOW WATER								
23	CY	PY-1		HOEC (100%) (Op.)	06-10-1995	75	0	75
24	KG	RAVVA		CEIL (22.5%) (Op.), ONGC (40%), RAVVA (12.5%), VIDEOCON (25%)	28-10-1994	331.26	0	331.26
25	MB	MID&SOUTH TAPTI		BGEPL (30%) (Op.), RIL (30%)(Op.), ONGC (40%) (Op.)	22-12-1994	1471	0	1471
26		PANNA-MUKTA		BGEPL (30%) (Op.), RIL (30%)(Op.), ONGC (40%) (Op.)	22-12-1994	1207	0	1207
SUB TOTAL						**3084.26**	**0**	**3084.26**
SUB TOTAL ACTIVE BLOCKS						**3713.86**	**0**	**3713.86**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (2 BLOCKS)								
27	CB	MATAR		NIKO (65%) (Op.), GSPCL (35%)	23-09-1994	6.2	6.2	0
28		SABARMATI		OILEX (40%) (Op.), GSPCL (60%)	23-09-1994	5.8	5.8	0
				SUB TOTAL RELINQUISHED/PFR BLOCKS		12	12	0
SUB TOTAL RELINQUISHED/PFR BLOCKS						**12**	**12**	**0**
TOTAL AREA						**3725.86**	**12**	**3713.86**

NOTE: #Execution of new PSC after resolution of Nagaland issue. CRL's operatorship has been terminated by GOI. ACL has requested to transfer the 65% PI of CRL to him.

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Table 8.3. EXPLORATION BLOCKS AWARDED UNDER FIRST ROUND OF NELP (NELP-I)

NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
CURRENT ACTIVE BLOCKS (3 BLOCKS)								
DEEP WATER								
1	KG	KG-DWN-98/2	D2	ONGC(100)	12-04-2000	9757	2462	7295
2		KG-DWN-98/3#	D3	RIL(60),BPEAL(30) & NIKO(10)	12-04-2000	7645	6198.88	1446.12
SUB TOTAL						**17402**	**8660.88**	**8741.12**
SHALLOW WATER								
3	MN	NEC-OSN-97/2	N-15	RIL(60),BPEAL(30) & NIKO(10)	12-04-2000	14535	10406.11	4128.89
SUB TOTAL						**14535**	**10406.11**	**4128.89**
SUB TOTAL ACTIVE BLOCKS						**31937**	**19066.99**	**12870.01**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT(20 BLOCKS)								
4	NEC	NEC-OSN-97/1	N-16	GAZPROM(100)	03-10-2000	10425	10425	0
5	MN	MN-OSN-97/3*	N-14	ONGC(85) & GAIL(15)	12-04-2000	5420	5420	0
6		MN-DWN-98/3*	D7	ONGC(100)	12-04-2000	10005	10005	0
		MN-DWN-98/2*	D6	RIL(100)	12-04-2000	9605	9605	0
7	KG	KG-DWN-98/4	D4	ONGC(85) & OIL(15)	12-04-2000	9940	9940	0
8		KG-OSN-97/4	N-10	RIL(100)	12-04-2000	4020	4020	0
9		KG-OSN-97/3	N-11	RIL(100)	12-04-2000	2460	2460	0
10		KG-OSN-97/2	N-12	RIL(100)	12-04-2000	4790	4790	0
11		KG-OSN-97/1	N-13	ONGC(100)	12-04-2000	4485	4485	0
12	CY	CY-OSN-97/1	N-9	Mosbacher(20) & HOEC(80)	08-01-2001	4940	4940	0
13		CY-OSN-97/2	N-8	OIL(100)	12-04-2000	5215	5215	0
14	KK	KK-OSN-97/2	N-6	RIL(100)	12-04-2000	19450	19450	0
15		KK-OSN-97/3	N-7	ONGC(100)	12-04-2000	15910	15910	0
16	MB	MB-OSN-97/2	N-3	RIL(100)	12-04-2000	5270	5270	0
17		MB-OSN-97/3	N-4	RIL(100)	12-04-2000	5740	5740	0
18		MB-OSN-97/4	N-5	ONGC(70) &IOC(30)	12-04-2000	18870	18870	0
19	SR	SR-OSN-97/1	N-2	RIL(100)	12-04-2000	5040	5040	0
20	GK	GK-OSN-97/1	N-1	RIL(100)	12-04-2000	1465	1465	0
21	GV	GV-ONN-97/1	N-17	ONGC(40),IOC(30),CEIL(15)& CEEPC(15)	12-04-2000	36750	36750	0
22	KG	KG-DWN-98/1	D1	RIL(70) & BPEAL(30)	12-04-2000	10810	10810	0
23		KG-DWN-98/5	D5	ONGC(85) & OIL(15)	12-04-2000	8980	8980	0
SUB TOTAL RELINQUISHED/PFR BLOCKS						**199590**	**199590**	**0**
TOTAL AREA						**231527**	**218656.99**	**12870.01**

NOTE: #1148.12 Sq. km. Area converted to PML, 298 sq. km. is tentative PEL area

** PROPOSED FOR RELINQUISHMENT*

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Table 8.4. EXPLORATION BLOCKS AWARDED UNDER SECOND ROUND OF NELP (NELP-II)

NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
CURRENT ACTIVE BLOCKS (3 BLOCKS)								
SHALLOW WATER								
1	GS	GS-OSN-2000/1	N18	RIL (90), HEPI (10)	17-07-2001	8841	8241	600
SUB TOTAL						**8841**	**8241**	**600**
ONLAND								
2	CB	CB-ONN-2000/1	N29	GSPC (50), GAIL (50)	17-07-2001	1424	983.29	440.71
3		CB-ONN-2000/2	N30	NIKO (100)	17-07-2001	419	394.75	24.25
SUB TOTAL						**1843**	**1378.04**	**464.96**
SUB TOTAL ACTIVE BLOCKS						**10684**	**9619.04**	**1064.96**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (20 BLOCKS)								
4	KK	KK-DWN-2000/1	D12	RIL (100)	17-07-2001	18113	18113	0
5		KK-DWN-2000/2	D13	ONGC (85), GAIL (15)	17-07-2001	20998	20998	0
6		KK-DWN-2000/3	D14	RIL (100)	17-07-2001	14889	14889	0
7		KK-DWN-2000/4	D15	ONGC (100)	17-07-2001	26149	26149	0
8		KK-OSN-2000/1	N20	ONGC (100)	17-07-2001	16125	16125	0
9	CY	CY-OSN-2000/1	N21	ONGC (100)	17-07-2001	5920	5920	0
10		CY-OSN-2000/2	N22	ONGC (100)	17-07-2001	3530	3530	0
11	GS	GS-DWN-2000/1	D8	ONGC (100)	17-07-2001	13937	13937	0
12		GS-DWN-2000/2	D9	ONGC (85), GAIL (15)	17-07-2001	14825	14825	0
13	MB	MB-DWN-2000/1	D10	ONGC (85), IOC (15)	17-07-2001	11239	11239	0
14		MB-DWN-2000/2	D11	ONGC (50), GAIL (15) IOC (15), OIL (10), GSPC (10)	17-07-2001	19106	19106	0
15		MB-OSN-2000/1	N19	ONGC (75), IOC (15), GSPC (10)	17-07-2001	18414	18414	0
16	MN	MN-OSN-2000/1*	N23	ONGC (100)	17-07-2001	6730	6730	0
17		MN-OSN-2000/2*	N24	ONGC (40), GAIL (20), IOC (20), OIL (20)	17-07-2001	8330	8330	0
18		MN-ONN-2000/1	N31	ONGC (20), GAIL (20), IOC (20), OIL(25), SUNTERA (15)	17-07-2001	7900	7900	0
19	WB	WB-OSN-2000/1	N25	ONGC (85), IOC (15)	17-07-2001	6700	6700	0
20		WB-ONN-2000/1	N26	ONGC (85), IOC (15)	17-07-2001	12505	12505	0
21	GV	GV-ONN-2000/1	N27	ONGC (85), IOC (15)	17-07-2001	23500	23500	0
22	RJ	RJ-ONN-2000/1	N28	OIL (60), SUNTERA (40)	17-07-2001	2535	2535	0
23	AA	AS-ONN-2000/1	N32	RIL (90), HARDY (10)	17-07-2001	5754	5754	0
SUB TOTAL RELINQUISHED/PFR BLOCKS						**257199**	**257199**	**0**
TOTAL AREA:						**267883**	**266818.04**	**1064.96**

*NOTE: *PROPOSED FOR RELINQUISHMENT*

Table 8.5. EXPLORATION BLOCKS AWARDED UNDER THIRD ROUND OF NELP (NELP-III)

NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
CURRENT ACTIVE BLOCKS (4 BLOCKS)								
SHALLOW WATER								
1	KG	KG-OSN-2001/3	N38	GSPC (80), GGR(10), & JOGPL(10)	04-02-2003	1870.5	1340	530.5
SUB TOTAL						**1870.5**	**1340**	**530.5**
ONLAND								
2	AA	AA-ONN-2001/1	N39	ONGC (100)	04-02-2003	3010	2050	960
3		AA-ONN-2001/2	N40	ONGC (80) & IOC (20)	04-02-2003	5340	2680	2660
4	CB	CB-ONN-2001/1	N45	ONGC (100)	04-02-2003	215	189	26
SUB TOTAL						**8565**	**4919**	**3646**
SUB TOTAL ACTIVE BLOCKS						**10435.5**	**6259**	**4176.5**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (19 BLOCKS)								
5	KK	KK-DWN-2001/3	D18	ONGC (100)	04-02-2003	21775	21775	0
6		KK-DWN-2001/2	D17	RIL (70), BPEAL (30)	04-02-2003	31515	31515	0
7		KK-DWN-2001/1	D16	RIL (70), BPEAL (30)	04-02-2003	27315	27315	0
8		KK-OSN-2001/2*	N34	ONGC (100)	04-02-2003	14120	14120	0

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NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
9		KK-OSN-2001/3*	N35	ONGC (100)	04-02-2003	8595	8595	0
10	CY	CY-DWN-2001/1	D19	ONGC (80), OIL (20)	04-02-2003	12425	12425	0
11		CY-DWN-2001/2*	D20	RIL (70), BPEAL (30)	04-02-2003	14325	14325	0
12		CY-PR-DWN-2001/3	D21	RIL (70), BPEAL (30)	04-02-2003	8600	8600	0
13		CY-PR-DWN-2001/4	D22	RIL (70), BPEAL (30)	04-02-2003	10590	10590	0
14	KG	KG-DWN-2001/1	D24	RIL (60), BPEAL (30) & HEPI (10)	04-02-2003	11605	11605	0
15		KG-OSN-2001/1	N36	RIL (100)	04-02-2003	1100	1100	0
16		KG-OSN-2001/2	N37	RIL (100)	04-02-2003	210	210	0
17	GS	GS-OSN-2001/1	N33	ONGC (100)	04-02-2003	9468	9468	0
18	RJ	RJ-ONN-2001/1	N44	ONGC (30), OIL(40) & SUNTERA(30)	04-02-2003	3425	3425	0
19	PG	PG-ONN-2001/1	N46	ONGC (100)	04-02-2003	6920	6920	0
20	HF	HF-ONN-2001/1*	N43	ONGC (100)	04-02-2003	3175	3175	0
21	PR	PR-DWN-2001/1	D23	RIL (70), BPEAL (30)	04-02-2003	8255	8255	0
22	AA	AA-ONN-2001/3	N41	ONGC (85) & OIL (15)	04-02-2003	110	110	0
23		AA-ONN-2001/4	N42	ONGC (100)	04-02-2003	645	645	0
SUB TOTAL RELINQUISHED/PFR BLOCKS						**194173**	**194173**	**0**
TOTAL AREA						**204608.5**	**200432**	**4176.5**

*NOTE: *PROPOSED FOR RELINQUISHMENT*

Table 8.6. EXPLORATION BLOCKS AWARDED UNDER FOURTH ROUND OF NELP (NELP-IV)

NO.	BASIN	BLOCK NAME	REF. NO ON MAP	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
CURRENT ACTIVE BLOCKS (4 BLOCKS)								
ONLAND								
1	AA	AA-ONN-2002/1	N47	JOGPL (20) & GAIL (80)	06-02-2004	1680	420	1260
2	CB	CB-ONN-2002/1	N52	ONGC (100)	06-02-2004	135	118	17
3		CB-ONN-2002/3	N54	GSPC(55), JEPL (20), PPCL (15) & GGR(10)	06-02-2004	285	263.71	21.29
4	CY	CY-ONN-2002/2	N56	ONGC (60) & BPRL (40)	06-02-2004	280	140	140
SUB TOTAL ACTIVE BLOCKS						**2380**	**941.71**	**1438.29**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (16 BLOCKS)								
5	GV	GV-ONN-2002/1	N50	CIL(50) & CESL(50)	06-02-2004	15550	15550	0
6	GS	GS-DWN-2002/1	D25	ONGC(100)	06-02-2004	21450	21450	0
7	RJ	RJ-ONN-2002/1	N51	OIL(60) & ONGC(40)	06-02-2004	9900	9900	0
8	KK	KK-DWN-2002/2*	D26	ONGC(80) & HPCL(20)	06-02-2004	22810	22810	0
9		KK-DWN-2002/3	D27	ONGC(80) & HPCL(20)	06-02-2004	20910	20910	0
10	MN	MN-DWN-2002/1	D29	ONGC(36), ENI(34), OIL(20) & BPCL(10)	06-02-2004	9980	9980	0
11		MN-DWN-2002/2	D30	ONGC(100)	06-02-2004	11390	11390	0
12		NEC-DWN-2002/1	D31	RIL(100)	06-02-2004	25565	25565	0
13		NEC-DWN-2002/2*	D32	ONGC (100)	06-02-2004	15465	15465	0
14	AN	AN-DWN-2002/2*	D34	ONGC(100)	06-02-2004	12495	12495	0
15	AN	AN-DWN-2002/1	D33	ONGC(100)	06-02-2004	10990	10990	0
16	KG	KG-DWN-2002/1*	D28	ONGC(70), OIL(20) & BPCL(10)	06-02-2004	10600	10600	0
17	CB	CB-ONN-2002/2	N53	JOGPL(30), GSPC(60) & GGR(10)	06-02-2004	125	125	0
18	CY	CY-ONN-2002/1	N55	JOGPL(30), GAIL(50) & GSPC(20)	06-02-2004	680	680	0
19	AA	AA-ONN-2002/4	N49	ONGC (90) & OIL (10)	06-02-2004	1060	1060	0
20		AA-ONN-2002/3*	N48	OIL(30) & ONGC (70)	06-02-2004	1460	1460	0
SUB TOTAL RELINQUISHED/PFR BLOCKS						**190430**	**190430**	**0**
TOTAL AREA						**192810**	**191371.71**	**1438.29**

*NOTE: *PROPOSED FOR RELINQUISHMENT*

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Table 8.7. EXPLORATION BLOCKS AWARDED UNDER FIFTH ROUND OF NELP (NELP-V)

NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
CURRENT ACTIVE BLOCKS (5 BLOCKS)								
SHALLOW WATER								
1	CB	CB-OSN-2003/1	N57	ONGC(100)	23-09-2005	2394	1892.0	502.0
SUB TOTAL						**2394**	**1892**	**502.0**
ONLAND								
2	RJ	RJ-ONN-2003/2	N65	FEL(10), BIL(40) & XOIL(50)	23-09-2005	13195	11796.16	1398.84
3	CB	CB-ONN-2003/1	N66	RIL (70) & BPEAL (30)	23-09-2005	635	159.60	475.40
4		CB-ONN-2003/2	N67	GSPC(50), GAIL(20), JSPL(20) & GGR(10)	23-09-2005	448	276	172
5	KG	KG-ONN-2003/1	N69	CIL(49) & ONGC(51)	23-09-2005	1697	1382	315
SUB TOTAL						**15975**	**13614**	**2361**
SUB TOTAL ACTIVE BLOCKS						**18369**	**15506**	**2863**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (15 BLOCKS)								
6	CY	CY-ONN-2003/1	N70	NIKO(100)	23-09-2005	957	957	0
7	KK	KK-DWN-2003/1	D35	RIL(100)	23-09-2005	18245	18245	0
8		KK-DWN-2003/2	D36	RIL(100)	23-09-2005	12285	12285	0
9	GS	GS-OSN-2003/1	N58	ONGC(51) & CE7L(49)	23-09-2005	5970	5970	0
10	AA	AA-ONN-2003/2	N60	GPI(30), NTPC(40), CRL(15) & Brownstone (15)	23-09-2005	295	295	0
11		AA-ONN-2003/3	N61	OIL(85) & HPCL(15)	23-09-2005	275	275	0
12	AA	AA-ONN-2003/1	N59	JOGPL(10), JSPL(35), GSPC(20) & GAIL(35)	16-12-2005	81	81	0
13	GV	GV-ONN-2003/1	N62	CEIL(24), CE1L(25) & ONGC(51)	23-09-2005	7210	7210	0
14	RJ	RJ-ONN-2003/1	N64	ENI(34),ONGC(36) & CIL(30)	23-09-2005	1335	1335	0
15	DS	DS-ONN-2003/1	N68	GGR(100)	23-09-2005	3155	3155	0
16	MN	MN-DWN-2003/1*	D38	RIL(55) NIKO(15) & BPEAL(30)	23-09-2005	17050	17050	0
17	AN	AN-DWN-2003/1*	D39	ONGC(100)	23-09-2005	9970	9970	0
18		AN-DWN-2003/2*	D40	ENI (40), ONGC(45) & GAIL(15)	23-09-2005	13110	13110	0
19	VN	VN-ONN-2003/1	N63	ONGC(100)	23-09-2005	3585	3585	0
20	KG	KG-DWN-2003/1	D37	RIL(60), BPEAL(30) & HEPI(10)	23-09-2005	3288	3288	0
SUB TOTAL RELINQUISHED/PFR BLOCKS						**96811**	**96811**	**0**
TOTAL AREA:						**115180**	**112317**	**2863.2**

*NOTE: *PROPOSED FOR RELINQUISHMENT*

Table 8.8. EXPLORATION BLOCKS AWARDED UNDER SIXTH ROUND OF NELP (NELP-VI)

NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
CURRENT ACTIVE BLOCKS (11 BLOCKS)								
SHALLOW WATER								
1	GS	GS-OSN-2004/1	1	ONGC (100)	02-03-2007	6589	6037	552
2	CB	CB-OSN-2004/1	2	FEL(10) & NEWBURY (90)	02-03-2007	2616	0	2616
3	PR	PR-OSN-2004/1	5	CIL(35), ONGC(35) & TATA(30)	02-03-2007	9417	0	9417
4	KG	KG-OSN-2004/1	6	ONGC (100)	02-03-2007	1131	0	1131
SUB TOTAL						**19753**	**6037**	**13716**
ONLAND								
5	MZ	MZ-ONN-2004/1	7	OIL(85) & SHIV-VANI(15)	02-03-2007	3213	0	3213
6	RJ	RJ-ONN-2004/2	20	OIL (75) & GEOGLOBAL (25)	02-03-2007	2196	2185.76	10.24
7	CB	CB-ONN-2004/1	22	ONGC(50), GSPC(40) & HERAMEC (10)	02-03-2007	32	22.27	9.73
8		CB-ONN-2004/2	23	ONGC(55), GSPC(45)	02-03-2007	423	140.51	282.49

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NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
9		CB-ONN-2004/3	24	ONGC(65), GSPC(35)	02-03-2007	113	102.22	10.78
10	KG	KG-ONN-2004/1	28	OIL(90) & GEOGLOBAL(10)	02-03-2007	549	195.54	353.46
11	CY	CY-ONN-2004/2	31	ONGC (80) & BRPL(20)	02-03-2007	375	0	375
SUB TOTAL						**6901**	**2646**	**4255**
SUB TOTAL ACTIVE BLOCKS						**26654**	**8683**	**17971**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (41 BLOCKS)								
12	KK	KK-DWN-2004/1	D1	ONGC(45), CIL(40) & TATA(15)	02-03-2007	12324	12324	0
13	KG	KG-DWN-2004/1	D10	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	11951	11951	0
14		KG-DWN-2004/2	D11	ONGC(60), GSPC(10), HPCL(10), GAIL(10) & BPRL(10)	02-03-2007	11851	11851	0
15		KG-DWN-2004/3	D12	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	6205	6205	0
16		KG-DWN-2004/4	D13	RIL(70) & BPEAL (30)	02-03-2007	11904	11904	0
17		KG-DWN-2004/5	D14	ONGC(50), GSPC(10), HPCL(10), GAIL(10), OIL(10) & BPCL(10)	02-03-2007	11922	11922	0
18		KG-DWN-2004/6	D15	ONGC(60), GSPC(10), HPCL(10), GAIL(10) & OIL (10)	02-03-2007	10907	10907	0
19		KG-ONN-2004/2*	29	GSPC (40), GAIL (40) & PETROGAS (20)	02-03-2007	1140	1140	0
20		KG-DWN-2004/7	D16	RIL (70) & BPEAL (30)	02-03-2007	11856	11856	0
21	MN	MN-DWN-2004/1*	D17	RIL (70) & BPEAL (30)	02-03-2007	9885	9885	0
22		MN-DWN-2004/2*	D18	RIL (70) & BPEAL (30)	02-03-2007	11813	11813	0
23		MN-DWN-2004/3*	D19	RIL (70) & BPEAL (30)	02-03-2007	11316	11316	0
24		MN-DWN-2004/4*	D20	RIL (70) & BPEAL (30)	02-03-2007	8822	8822	0
25	NEC	NEC-DWN-2004/1*	D22	SANTOS (100)	02-03-2007	7790	7790	0
26		NEC-DWN-2004/2*	D23	SANTOS (100)	02-03-2007	8706	8706	0
27		MN-DWN-2004/5	D21	RIL (70) & BPEAL (30)	02-03-2007	10454	10454	0
28	RJ	RJ-ONN-2004/3	21	OIL(60), GEOGLOBAL(25) & HPCL (15)	02-03-2007	1330	1330	0
29		RJ-ONN-2004/1*	19	GSPC(22.225), GAIL(22.225), HPCL(22.22), HALLWORTHY(PANAMA)(11.11), NITINFIRE (11.11), & BPCL (11.11)	02-03-2007	4613	4613	0
30	MZ	MZ-ONN-2004/2**	8	NAFTOGAZ(10), RNRL(10), GEOPETROL(10) & REL(70)	02-03-2007	3619	3619	0
31	AA	AA-ONN-2004/1**	9	OIL(85) & SHIV-VANI (15)	02-03-2007	144	144	0
32		AA-ONN-2004/4**	12	ADANI ENTERPRISES(35), APIPL(20), NAFTOGAZ(10) & JPIP(35)	02-03-2007	95	95	0
33		AA-ONN-2004/3	11	ESSAR OIL (10), EEHL (90)	02-03-2007	1252	1252	0
34		AA-ONN-2004/2	10	OIL (100)	02-03-2007	218	218	0
35		AA-ONN-2004/5*	13	ESSAR ENERGY(90) & ESSAR OIL (10)	02-03-2007	46	46	0
36	CB	CB-ONN-2004/4	25	ONGC(50), GSPC(40) & HERAMEC(10)	02-03-2007	70	70	0
37		CB-ONN-2004/5**	26	ADANI ENTERPRISES(35), ADANI PORT(20), NAFTOGAZ (10) & WELSPUN (35)	02-03-2007	75	75	0
38	CY	CY-DWN-2004/1	D4	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	10302	10302	0

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NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
39		CY-DWN-2004/2	D5	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	12059	12059	0
40		CY-DWN-2004/4	D7	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	12025	12025	0
41		CY-PR-DWN-2004/2	D9	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	9994	9994	0
42		CY-DWN-2004/3*	D6	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	12017	12017	0
43		CY-PR-DWN-2004/1*	D8	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	13451	13451	0
44		CY-ONN-2004/1*	30	ONGC (80) & BPCL(20)	02-03-2007	214	214	0
45	MB	MB-OSN-2004/1	3	GSPC(20), IOC(20), GAIL(20), HPCL(20) & PETROGAS (20)	02-03-2007	1520	1520	0
46		MB-OSN-2004/2	4	PETROGAS(20), GAIL(20), IOC(20), GSPC(20) & HPCL(20)	02-03-2007	741	741	0
47	PA	PA-ONN-2004/1	14	ONGC (100)	02-03-2007	2537	2537	0
48	GV	GV-ONN-2004/1	15	ONGC (100)	02-03-2007	8354	8354	0
49	SR	SR-ONN-2004/1*	16	PRIZE PETROLEUM (10) & JAIPRAKASH ASSOCIATES LTD. (90)	02-03-2007	13277	13277	0
50	DS	DS-ONN-2004/1*	27	GEOGLOBAL RESOURCES (BARBADOS) (100)	02-03-2007	2649	0	2649
51	VN	VN-ONN-2004/2*	18	ONGC (100)	02-03-2007	4466	4466	0
52		VN-ONN-2004/1*	17	ONGC (100)	02-03-2007	5801	5801	0
SUB TOTAL RELINQUISHED/PFR BLOCKS						**279715**	**277066**	**2649**
TOTAL AREA:						**306369**	**285749.30**	**20619.70**

*NOTE: *PROPOSED FOR RELINQUISHMENT **PSC TERMINATED BY MoP&NG*

Table 8.9. EXPLORATION BLOCKS AWARDED UNDER FIFTH ROUND OF NELP (NELP-V)

NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	CONSORTIUM (Participating Interest %)t	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
CURRENT ACTIVE BLOCKS (14 BLOCKS)								
SHALLOW WATER								
1	MB	MB-OSN-2005/1	S-1	ONGC (80) & GSPC (20)	22-12-2008	2811	1561	1250
2		MB-OSN-2005/2	S-2	ADANI WELSPUN EXPLORATION LTD. (100)	22-12-2008	1191	0	1191
3		MB-OSN-2005/3	S-3	ONGC (70) & ESSAR (30)	22-12-2008	2810	1125	1685
SUB TOTAL						**6812**	**2686**	**4126**
ONLAND								
4	PA	PA-ONN-2005/2	3	ONGC (100)	22-12-2008	2552	0	2552
5	WB	WB-ONN-2005/2	5	ONGC (100)	22-12-2008	3792	0	3792
6		WB-ONN-2005/3	6	ONGC (100)	22-12-2008	4001	0	4001
7		WB-ONN-2005/4	7	ONGC (75) & OIL (25)	22-12-2008	3940	0	3940
8	SR	SR-ONN-2005/1	11	DEEP ENERGY(10),DEEP INDUS(70), KANVEL FINANCE (10) & SAVLA ELECTRONICS (10)	22-12-2008	789	0	789
9	RJ	RJ-ONN-2005/1	14	HOEC (33.34), BPRL (33.33) & IMC (33.33)	22-12-2008	1424	273	1151
10	CB	CB-ONN-2005/3	19	MERCATOR PETROLEUM (100)	22-12-2008	48	0	48
11		CB-ONN-2005/5	21	OMKAR NATUAL RESOUR. (100)	22-12-2008	83	0	83
12		CB-ONN-2005/9	25	MERCATOR PETROLEUM (100)	22-12-2008	170	38	132
13		CB-ONN-2005/10	26	ONGC (51) & GSPC (49)	22-12-2008	270	0	270

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NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	CONSORTIUM (Participating Interest %)t	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
14	CY	CY-ONN-2005/1	29	GAIL (40), GSPC (30) & BENGAL ENERGY INTERNATIONAL(30)	22-12-2008	946	0	946
SUB TOTAL						**18015**	**311**	**17704**
SUB TOTAL ACTIVE BLOCKS						**24827**	**2997**	**21830**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (27 BLOCKS)								
15	KK	KK-DWN-2005/1	D-14	BHP BILLITON (26) & GVK (74)	22-12-2008	14675	14675	0
16		KK-DWN-2005/2*	D-15	ONGC (90) & GSPC (10)	22-12-2008	19234	19234	0
17	KG	KG-DWN-2005/2	D-17	BP EXPLORATION (50) & RIL (50)	22-12-2008	1949	1949	0
18		KG-OSN-2005/1	S-7	ONGC (60), GSPC (20) & HMEL (20)	22-12-2008	2810	2810	0
19		KG-OSN-2005/2	S-8	ONGC (80) & HMEL (20)	22-12-2008	1881	1881	0
20		KG-DWN-2005/1	D-16	ONGC (70), IOCL (20) & GSPC (10)	22-12-2008	1727	1727	0
21	AN	AN-DWN-2005/1	D-19	ONGC (90) & OIL (10)	22-12-2008	11837	11837	0
22	CB	CB-ONN-2005/8**	24	VASUNDHARA RESOUR (100)	22-12-2008	133	133	0
23		CB-ONN-2005/2*	18A&B	IOCL (100)	22-12-2008	81	81	0
24		CB-ONN-2005/4*	20	ONGC (51) & GSPC (49)	22-12-2008	31	31	0
25		CB-ONN-2005/6	22	OMKAR NATUAL RESOUR. (100)	22-12-2008	102	102	0
26		CB-ONN-2005/7*	23	IOCL (100)	22-12-2008	199	199	0
27		CB-ONN-2005/11	27	QUEST (20), QQVS (40), SREI (20), VIPL(10) & PRIM (10)	22-12-2008	257	257	0
28	GV	GV-ONN-2005/3	10	ONGC (80) & TATA PETRO (20)	22-12-2008	2227	2227	0
29	MB	MB-DWN-2005/2	D-6	BHP BILLITON (26) & GVK (74)	22-12-2008	3660	3660	0
30		MB-DWN-2005/3	D-7	BHP BILLITON (26) & GVK (74)	22-12-2008	3097	3097	0
31		MB-DWN-2005/4	D-8	BHP BILLITON (26) & GVK (74)	22-12-2008	3408	3408	0
32		MB-DWN-2005/5	D-9	BHP BILLITON (26) & GVK (74)	22-12-2008	3169	3169	0
33		MB-DWN-2005/7	D-11	BHP BILLITON (26) & GVK (74)	22-12-2008	3324	3324	0
34		MB-DWN-2005/9	D-13	BHP BILLITON (26) & GVK (74)	22-12-2008	3138	3138	0
35		MB-OSN-2005/5*	S-5	ONGC (70) & GSPC (30)	22-12-2008	2402	2402	0
36		MB-OSN-2005/6*	S-6	ONGC (80) & GSPC (20)	22-12-2008	2820	2820	0
37	AA	AA-ONN-2005/1	1	ONGC (60), OIL (30) & ACL (10)	22-12-2008	363	363	0
38	PA	PA-ONN-2005/1	2	ONGC (100)	22-12-2008	1096	1096	0
39	RJ	RJ-ONN-2005/3*	16	GSPC (60) & ONGC (40)	22-12-2008	1217	1217	0
40		RJ-ONN-2005/2*	15	OIL(60), HOEC(20), HPCL & Mittal Energy Ltd.(20)	22-12-2008	1517	1517	0
41	PR	PR-ONN-2005/1*	28	ONGC (80) & TATA PETRO. (20)	22-12-2008	1807	1807	0
SUB TOTAL RELINQUISHED/PFR BLOCKS						**88161**	**88161**	**0**
TOTAL AREA:						**112988**	**91158**	**21830**

*NOTE: *PROPOSED FOR RELINQUISHMENT **PSC TERMINATED BY MoP&NG*

Table 8.10. EXPLORATION BLOCKS AWARDED UNDER EIGHTH ROUND OF NELP (NELP-VIII)

NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
CURRENT ACTIVE BLOCKS (14 BLOCKS)								
SHALLOW WATER								
1	GK	GK-OSN-2009/1	S-1	ONGC (40), GSPC (20), AWEL (20) & IOC (20)	30-06-2010	1264	747	517
2		GK-OSN-2009/2	S-2	ONGC (40), AWEL (30) & IOC (30)	30-06-2010	1242	376	866

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NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
3	CY	CY-OSN-2009/2	S-20	OIL (50) & ONGC (50)	30-06-2010	1621	0	1621
4	KG	KG-OSN-2009/2	S-23	ONGC (90) & APGIC (10)	30-06-2010	1471	0	1471
5		KG-OSN-2009/3	S-24	CIL (100)	30-06-2010	1988	0	1988
6		KG-OSN-2009/4	S-25	ONGC (50), OIL (30), NTPC (10) & APGIC (10)	30-06-2010	835	0	835
SUB TOTAL						**8421**	**1123**	**7298**
ONLAND								
7	AA	AA-ONN-2009/4	4	OIL (50) & ONGC (50)	30-06-2010	84	0	84
8	VN	VN-ONN-2009/3	9	ONGC (100)	30-06-2010	1250	788	462
9	CB	CB-ONN-2009/1	11	SINTEX OIL & GAS (100)	30-06-2010	113	0	113
10		CB-ONN-2009/3##	13	HCIL (100)	30-06-2010	71	0	71
11		CB-ONN-2009/4	14	ONGC (50) & GSPC (50)	30-06-2010	58	0	58
12		CB-ONN-2009/6##	16	HCIL (100)	30-06-2010	177	0	177
13		CB-ONN-2009/7	17	SINTEX OIL & GAS (100)	30-06-2010	144	0	144
14		CB-ONN-2009/8	18	JPIL (87) & JPPL (13)	30-06-2010	136	0	136
SUB TOTAL						**2033**	**788**	**1245**
SUB TOTAL ACTIVE BLOCKS						**10454**	**1911**	**8543**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (18 BLOCKS)								
15	AA	AA-ONN-2009/1*	1	JOGPL (47), JEKPL (17) & JODPL (36)	30-06-2010	2217	2217	0
16		AA-ONN-2009/2*	2	JOGPL (47), JEKPL (17) & JODPL (36)	19-07-2010	1740	1740	0
17		AA-ONN-2009/3*	3	ONGC (50) & OIL (50)	30-06-2010	84	84	0
18	KG	KG-DWN-2009/1	D-6 (A&B)	BGEPIL (30), OIL (15), ONGC (45) & APGIC (10)	30-06-2010	1800	1800	0
19		KG-OSN-2009/1	S-22	ONGC (80), APGIC (10) & NTPC (10)	30-06-2010	1472	1472	0
20	CY	CY-OSN-2009/1	S-19	Bengal Energy International Inc (100)	30-06-2010	1362	1362	0
21	CB	CB-ONN-2009/2*	12	SINTEX OIL & GAS (100)	30-06-2010	68	0	68
22		CB-ONN-2009/5*	15	NTPC (100)	30-06-2010	165	165	0
23	AN	AN-DWN-2009/1*	D-7	ONGC (70) & OIL (30)	30-06-2010	4981	4981	0
24		AN-DWN-2009/2*	D-8	ONGC (60) & OIL (40)	30-06-2010	3995	3995	0
25		AN-DWN-2009/3*	D-9	ONGC (60) & OIL (40)	30-06-2010	3992	3992	0
26		AN-DWN-2009/5*	D-11	ONGC (90) & GSPC (10)	30-06-2010	4002	4002	0
27		AN-DWN-2009/13	D-19	ONGC (70), NTPC (10), GAIL (10) & GSPC (10)	30-06-2010	4007	4007	0
28		AN-DWN-2009/18	D-24	ONGC (60), OIL (30) & GAIL (10)	30-06-2010	4040	4040	0
29	MB	MB-OSN-2009/3	S-5	BHP (100)	30-06-2010	1492	1492	0
30		MB-OSN-2009/6	S-8	BHP (100)	30-06-2010	1876	1876	0
31		MB-OSN-2009/7	S-9	BHP (100)	30-06-2010	1865	1865	0
32		MB-DWN-2009/1	D-1	CIL (100)	30-06-2010	2961	2961	0
SUB TOTAL RELINQUISHED/PFR BLOCKS						**42119**	**42051**	**68**
TOTAL AREA:						**52573**	**43962**	**8611**

*NOTE: *PROPOSED FOR RELINQUISHMENT **PSC TERMINATED BY MoP&NG*

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Table 8.11. EXPLORATION BLOCKS AWARDED UNDER NINTH ROUND OF NELP (NELP-IX)

NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
						(in sq. km.)		
CURRENT ACTIVE BLOCKS (15 BLOCKS)								
SHALLOW WATER								
1.	GK	GK-OSN-2010/1	S-1	ONGC (60), OIL (30) & GAIL (10)	28-03-2012	1361	0	1361.00
SUB TOTAL						**1361**	**0**	**1361.00**
ONLAND								
2.	A A	AA-ONN-2010/2	2	OIL(50), ONGC(30) & GAIL(20)	28-03-2012	396	0	396.00
3.		AA-ONN-2010/3	3	OIL(40), ONGC(40) & BPRL(20)	28-03-2012	171	0	171.00
4.	VN	VN-ONN-2010/1##	4	Deep Energy LLC(10) & KGN Industries(90)	28-03-2012	3776	0	3776.00
5.		VN-ONN-2010/2##	5	Deep Energy LLC (10), Deep Natural Resources Limited (15) & Safak WSB Energy Pvt. Ltd. (75)	28-03-2012	4909	0	4909.00
6.	RJ	RJ-ONN-2010/2##	8	FEL (10) & Birkbeck Investments Ltd. (90)	28-03-2012	535	0	535.00
7.	CB	CB-ONN-2010/1	9	ONGC (100)	28-03-2012	782	0	782.00
8.		CB-ONN-2010/3##	11	Deep Energy LLC (10) & KGN Oil & Gas Pvt. Ltd. (90)	28-03-2012	534	0	534.00
9.		CB-ONN-2010/4	12	Pratibha Oil & Natural Gas Pvt. Ltd.(100)	28-03-2012	61	0	61.00
10.		CB-ONN-2010/5	13	Pan India Consultants (20) & Frost International Ltd. (80)	28-03-2012	49	0	49.00
11.		CB-ONN-2010/6	14	ONGC (80) & IOCL (20)	28-03-2012	39	0	39.00
12.		CB-ONN-2010/8	16A&B	BPRL(25), GAIL(25), EIL(20), BFIL(20) & MIEL(10)	30-08-2012	42	0	42.00
13.		CB-ONN-2010/9	17	ONGC (100)	30-08-2012	120	0	109.36
14.		CB-ONN-2010/10##	18	Sankalp Oil & Natural Resources Ltd. (100)	27-06-2012	122	0	122.00
15.		CB-ONN-2010/11	19	BPRL (25), GAIL (25), EIL (20) BFIL (15) & MIEL (15)	28-03-2012	131	0	131.00
SUB TOTAL						**11667**	**0**	**11656.36**
SUB TOTAL ACTIVE BLOCKS						**13028**	**0.00**	**13017.36**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (4 BLOCK)								
16.	MB	MB-DWN-2010/1	D-2	BGEPIL (50) & BHP (50)	10-09-2012	7963	7963	0.00
17.	MB	MB-OSN-2010/2*	S-4	OIL (50), HPCL (30) & BPRL (20)	30-08-2012	3411	3411	0.00
18.	A A	AA-ONN-2010/1	1	PPCL(20) & ABGEL (80)	30-08-2012	401	401	0.00
19.	GK	GK-OSN-2010/2*	S-2	ONGC (90) & GAIL (10)	28-03-2012	1625	1625	0.00
SUB TOTAL RELINQUISHED/PFR BLOCKS						**13400**	**13400**	**0**
TOTAL AREA :						**26428**	**13400.00**	**13017.36**

Table 8.12. CONTRACT AREAS AWARDED UNDER DISCOVERED SMALL FIELD ROUND-2016

NO.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ . AREA	PRESENT AREA
					(in sq. km.)		
CURRENT ACTIVE BLOCKS (30 BLOCKS)							
SHALLOW WATER							
1	MB	MB/OSDSF/B37/2016	SUN PETROCHEMICAL (100%) (Op.)	27-03-2017	124	0	124
2		MB/OSDSF/B9/2016	ADANI WELSPUN EXPLORATION LTD. (100)	27-03-2017	183	0	183
3		MB/OSDSF/B15/2016	BPRL (100)	27-03-2017	41	0	41
4		MB/OSDSF/B127E/2016	BPRL (100)	27-03-2017	39.3	0	39.3
5		MB/OSDSF/B80/2016	HOEC(50), AEPL (50)	27-03-2017	56.02	0	56.02
6	GK	GK/OSDSF/KD/2016	IOCL (100)	27-03-2017	46	0	46
7	KG	KG/OSDSF/GSKV1/2016	KEI-RSOS Petroleum & Energy Pvt Ltd (100)	27-03-2017	24.2	0	24.2
SUB TOTAL					**514**	**0**	**514**

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ONLAND							
8	AA	AA/ONDSF/HILARA/2016	PPCL (100)	27-03-2017	9.6	0	9.6
9		AA/ONDSF/LAXMIJAN/2016	MEIL (100)	27-03-2017	8.9	0	8.9
10		AA/ONDSF/PATHARIA/2016	VBIPL (100)	27-03-2017	19.15	0	19.15
11		AA/ONDSF/BARSILLA/2016	RIPL (29), BDNEPL (29), DFPL (23), MIPL (19)	27-03-2017	6.22	0	6.22
12		AA/ONDSF/CHARAIDEO/2016	OILMAX (100)	27-03-2017	11.5	0	11.5
13		AA/ONDSF/DIPLING/2016	RIPL (29), BDNEPL (29), DFPL (23), MIPL (19)	27-03-2017	28.17	0	28.17
14		AA/ONDSF/DUARMARA/2016	OILMAX (100)	27-03-2017	8.91	0	8.91
15		AA/ONDSF/JERAIPATHAR/2016	IOCL (100)	27-03-2017	10.1	0	10.1
16		AA/ONDSF/KHEREM/2016	HOEC (40), OIL (40), PPCL (20)	27-03-2017	16.45	0	16.45
17	CB	CB/ONDSF/ELAO/2016	PFHOGPL (100)	27-03-2017	9.98	0	9.98
18		CB/ONDSF/SOUTH PATAN/2016	SACFZE (100)	27-03-2017	9.88	0	9.88
19		CB/ONDSF/KHAMBEL/2016	MEIL (100)	27-03-2017	9.78	0	9.78
20		CB/ONDSF/KAMBOI/2016	NIPPON POWER LTD (100)	27-03-2017	2.35	0	2.35
21		CB/ONDSF/WEST BECHRAJI/2016	NIPPON POWER LTD (100)	27-03-2017	9.15	0	9.15
22	CY	CY/ONDSF/NEDUVASAL/2016	GEMLPL (100)	27-03-2017	10.01	0	10.01
23		CY/ONDSF/KARAIKAL/2016	BPRL (100)	27-03-2017	10.4	0	10.4
24	KG	KG/ONDSF/ACHANTA/2016	PFHOGPL (100)	27-03-2017	9.63	0	9.63
25		KG/ONDSF/ BHIMANAPALLI/2016	PFHOGPL (100)	27-03-2017	15.1	0	15.1
26		KG/ONDSF/KORAVAKA/2016	KEI-RSOS Petroleum & Energy Pvt Ltd (100)	27-03-2017	9.9	0	9.9
27		KG/ONDSF/ SANARUDRAVARAM/2016	PPCL (100)	27-03-2017	9.35	0	9.35
28	RJ	RJ/ONDSF/BAKHRI TIBBA/2016	BPRL (100)	27-03-2017	13.4	0	13.4
29		RJ/ONDSF/SADEWALA/2016	BPRL (100)	27-03-2017	10.3	0	10.3
30	VN	VN/ONDSF/NOHTA/2016	IOCL (100)	27-03-2017	15	0	15
SUB TOTAL					**263**	**0**	**263**
TOTAL AREA :					**777**	**0**	**777**

8.2. PEL and PML areas in Nomination and PSC regime

Table 8.13. Basin-wise distribution of PEL areas under operation (Pre-NELP & NELP blocks) (as on 01.04.2017)

Location Type	Basin	Pre-NELP	NELP I	NELP II	NELP III	NELP IV	NELP V	NELP VI	NELP VII	NELP VIII	NELP IX	Grand Total
Deep Water	Krishna Godavari (2)		7593									7593
Deep Water Total			**7593**									**7593**
Shallow Water	Cambay(4)	60					502	2616				3178
	Cauvery(4)	0						9417		1621		11038
	Krishna Godavari (6)				493			1131		4294		5918
	Kutch(3)									1383	1361	2744
	Mahanadi(1)		4128.89									4128.89
	Mumbai(5)								4126			4126
	Saurashtra(2)			600				552				1152
Shallow Water Total		**60**	**4128.89**	**600**	**493**		**502**	**13716**	**4126**	**7298**	**1361**	**32284.89**
Onland	Assam-Arakan Fold Belt(1)							3213				3213
	Assam-Arakan Shelf(11)	1706			3620	1260				84	567	7237
	Bengal(3)								11733			11733
	Cambay(52)	1337.09		419.35	0	0	645.8	278.89	533	451	1213.36	4878.49
	Cauvery(3)					140		375	946			1461
	Ganga(1)								2552			2552
	Krishna Godavari(2)						315	353.46				668.46
	Kutch(1)	775										775
	Rajasthan(6)	2000.1					1398.84	10.24	1151		0	4560.18
	Satpura-South Rewa-Damodar(1)								789			789
	Vindhyan(3)									462	0	462
Onland Total		**5818.19**		**419.35**	**3620**	**1400**	**2359.64**	**4230.59**	**17704**	**997**	**1780.36**	**38329.13**
Grand Total		**5878.19**	**11721.89**	**1019.35**	**4113**	**1400**	**2861.64**	**17946.59**	**21830**	**8295**	**3141.36**	**78207.02**

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Table 8.14. Company-wise distribution of PEL areas under operation (Pre-NELP & NELP blocks) (as on 01.04.2017)

Operator	No. of Blocks	Pre-NELP	NELP I	NELP II	NELP III	NELP IV	NELP V	NELP VI	NELP VII	NELP VIII	NELP IX	Grand Total
Oil and Natural Gas Corporation Ltd.	32	1337	7295		3620	140	817	2336.89	15805	4209	2291.36	
Oil India Ltd.	7							3576.7		1705	567	**5848.7**
Focus Energy Ltd.	5	2775					1398.84	2616			0	**6789.84**
Gujarat State Petroleum Corporation Ltd.	5	1207.32		419.35	493	0	170.4					**2290.07**
Cairn Energy India Pvt. Ltd.	4	0.1						9417		1988		**11405.1**
Deep Energy Llc	4								789		0	**789**
Reliance Industries Ltd.	4		4426.89	600			475.4					**5502.29**
Hindustan Oil Exploration Company Limited.	3	110							1151			**1261**
Bharat Petro Resources Ltd.	2										173	**173**
Essar Oil Ltd.	2	129.77							1685			**1814.77**
Harish Chandra (India) Ltd.	2									0		**0**
Mercator Petroleum Private Limited.	2								180			**180**
Sintex Oil & Gas Pvt. Ltd.	2									257		**257**
Adani Welspun Exploration Ltd.	1								1191			**1191**
Assam Company Ltd.	1	319										**319**
GAIL (India) Limited.	1								946			**946**
Hardy Exploration & Production (India) Inc.	1	0										**0**
Jay Polychem (India) Ltd.	1									136		**136**
Jubilant Oil & Gas Private Limited.	1					1260						**1260**
Niko Resources Limited.	1			0								**0**
Omkar Naturals Resources Pvt. Ltd.	1								83			**83**
Pan India Consultants	1										49	**49**
Pratibha Oil and Natural Gas Pvt. Ltd.	1										61	**61**
Sankalp Oil and Natural Resources Ltd.	1										0	**0**
Grand Total	**85**	**5878.19**	**11721.89**	**1019.35**	**4113**	**1400**	**2861.64**	**17946.59**	**21830**	**8295**	**3141.36**	**78207.02**

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Table 8.15. PELs operated by OIL as on 01.04.2017

NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF PEL	AREA (Sq Km.)	TOTAL AREA (Sq. Km.)
NOMINATION BLOCKS						
1	Assam-Arakan	Tinsukia	OA-6	01.04.02	471	
2		Namchik	OA-10	01.05.05	195	
3		Jairampur Extn.	OA-11	01.04.06	23.25	
4		Dibrugarh	OA-14	01.04.02	427	
5		Deomali	OA-17	18.02.05	113.5	**1229.75**
NOMINATION TOTAL						**1229.75**
PRE-NELP / NELP BLOCKS						
1	Rajasthan	RJ-ONN-2004/2	20	21.01.08	10.24	**10.24**
2	Assam-Arakan	AA-ONN-2009/4	4	09.12.11	84	
3		AA-ONN-2010/2	2	29.12.14	396	
4		AA-ONN-2010/3	3	12.12.13	171	**651**
5	Mizoram	MZ-ONN-2004/1	7	22.05.07	3213	**3213**
6	Krishna -Godavari	KG-ONN-2004/1	28	16.02.08	353.46	**353.46**
7	Cauvery	CY-OSN-2009/2	S-20	02.08.10	1621	**1621**
PRE-NELP / NELP TOTAL						**5848.7**
GRAND TOTAL PELS OPERATED BY OIL						**7078.45**

Table 8.16. PELs operated by ONGC as on 01.04.2017

NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF PEL	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)
NOMINATION BLOCKS						
1	Assam - Arakan	Sibsagar District	UA-1	01.04.02	**87.05**	
2		Golaghat District	DH-4	20.01.01	**54.4**	
3		Bhagty Bhandari	NG-1	28.04.06	**620**	
4		Singphan	NG-2	28.04.06	**320**	
5		Dimapur	NG-3	28.04.06	**650**	**1731.45**
6	Himalayan Foreland	Kangra-Mandi	HP-1	10.11.03	**1828**	**1828**
TOTAL ONLAND NOMINATION BLOCKS						**3559.45**
OFFSHORE BLOCKS						
8	Gujarat-Kutch Offshore	GK-DW-1	K-5	01.10.04	**16557**	**16557**
9	Mumbai Offshore	BB-OS-DW-I	B-9	28.12.04	**7537**	
10		BB-OS-DW-II	B-10	28.12.04	**8950**	**16487**
11	K-G Offshore	KG-OS-DW-III	KGO-7	15.05.03	**1190**	**1190**
TOTAL OFFSHORE NOMINATION BLOCKS						**34234**
TOTAL NOMINATION BLOCKS						**37793.45**
PRE-NELP / NELP BLOCKS						
12	Cambay	CB-OS/1	6	19.11.06	**60**	
13		CB-ONN-2001/1	N45	19.08.03	**0**	
14		CB-ONN-2002/1	N52	18.10.04	**0**	
15		CB-OSN-2003/1	N57	05.12.05	**502**	
16		CB-ONN-2004/1	22	20.10.07	**0**	
17		CB-ONN-2004/2			**268.12**	
18		CB-ONN-2004/3	24	17.05.07	**10.78**	
19		CB-ONN-2005/10	26	20.11.09	**270**	
20		CB-ONN-2009/4	14	06.09.11	**58**	
21		CB-ONN-2010/1	9	16.03.13	**782**	
22		CB-ONN-2010/6	14	16.02.13	**39**	
23		CB-ONN-2010/9	17	01.02.14	**109.36**	**2099.26**
24	Cauvery Onland	CY-ONN-2002/2	N56	31.08.04	**140**	
25		CY-ONN-2004/2	31	30.05.08	**375**	**515**
26	Assam-Arakan	AA-ONJ/2	11	07.11.08	**1277**	

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NO.	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF PEL	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)
27		AA-ONN-2001/1	N39	01.05.03	960	
28		AA-ONN-2001/2	N40	29.07.03	2660	**4897**
29	Purnea	PA-ONN-2005/2	3	23.12.09	2552	**2552**
30	Vindhyan	VN-ONN-2009/3	9	30.06.10	462	**462**
31	Gujarat - Kutch -	GS-OSN-2004/1	1	25.04.07	552	
32	Saurashtra Offshore	GK-OSN-2009/1	S-1	05.08.10	517	
33		GK-OSN-2009/2	S-2	05.08.10	866	
34		GK-OSN-2010/1	S-1	04.05.12	1361	**3296**
35	Mumbai Offshore	MB-OSN-2005/1	S-1	27.01.09	1250	**1250**
36	K-G Offshore	KG-DWN-98/2	D2	12.04.00	7295	
37		KG-ONN-2003/1	N69	08.02.07	315	
38		KG-OSN-2004/1	6	25.05.07	1131	
39		KG-OSN-2009/2	S-23	30.07.10	1471	
40		KG-OSN-2009/4	S-25	02.08.10	835	**11047**
41	Bengal	WB-ONN-2005/2	5	23.12.09	3792	
42		WB-ONN-2005/3	6	23.12.09	4001	
43		WB-ONN-2005/4	7	23.12.09	3940	**11733**
TOTAL PELs IN PRE-NELP/NELP						**37851.26**
GRAND TOTAL PELs OPERATED BY ONGC						**75644.71**

Table 8.17. PELs under Pre-NELP Exploration and NELP: Blocks with Pvt./JV companies (as on 01.04.2017)

NO.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF PEL	AREA (Sq. km..)	TOTAL AREA (Sq. km..)
1	RIL	K-G Offshore	KG-DWN-98/3	D3	07.06.00	298	
2		Mahanadi-NEC Offs.	NEC-OSN-97/2	N15	07.06.00	4128.89	
3		Gujarat-Saurashtra	GS-OSN-2000/1	N18	16.08.01	600	
4		Cambay	CB-ONN-2003/1 (A&B)	N66	05.06.06	475.4	**5502.29**
5	CAIRN	Krishna Godavari	KG-OSN-2009/3	S-24	05.08.09	1988	
6		Palar offshore	PR-OSN-2004/1	5	24.04.07	9417	**11405**
7	ESSAR	Cambay	CB-ON/3	19	11.02.03	129.77	
8		Mumbai offshore	MB-OSN-2005/3		04.02.2009	1685	**1814.77**
9	HOEC	Assam - Arakan	AAP-ON-94/1	14	28.11.00	110	
10		Rajasthan	RJ-ONN-2005/1	14	13.07.09	1151	
11		Cambay	CB-ON/7	22	-	0	**1261**
12	FOCUS	Rajasthan	RJ-ON/6	16	21.08.99	2000	
13			RJ-ONN-2003/2	N65	28.01.06	1398.84	
14		Gujarat-Kutch	GK-ON/4	21	19.04.03	775	
15		Cambay	CB-OSN-2004/1	2	28.05.07	2616	**6789.84**
16	Deep Energy	Satpura-South Rewa-Damodar	SR-ONN-2005/1		24.10.2016	789	**789**
17	CRL*	Assam-Arakan	AA-ON/7	13	27.03.01	319	**319**
18	GSPC	Cambay	CB-ON/2	23	23.11.00	1202.43	
19			CB-ONN-2000/1	N29	17.07.01	425	
20			CB-ONN-2002/3	N54	29.07.04	0	
21			CB-ONN-2003/2	N67	01.04.06	170.4	
22		Krishna Godavari	KG-OSN-2001/3	N38	12.03.03	493	**2290.83**
23	JOGPL	Assam-Arakan	AA-ONN-2002/1	N47	07.04.04	1260	**1260**
24	GAIL	Cauvery	CY-ONN-2005/1	29	03.03.10	946	**946**
25	Adani Welspun	Mumbai offshore	MB-OSN-2005/2	S-2	04.02.09	1191	**1191**
26	Mercator Petr.	Cambay	CB-ONN-2005/3	19	03.06.10	48	
27			CB-ONN-2005/9	25	03.06.10	132	**180**
28	Omkar Natural	Cambay	CB-ONN-2005/5	21	07.10.09	83	**83**

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NO.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF PEL	AREA (Sq. km..)	TOTAL AREA (Sq. km..)
29	SINTEX Oil & GAS	Cambay	CB-ONN-2009/1	11	15.10.10	113	
30			CB-ONN-2009/7	17	04.01.11	144	**257**
31	JPIL	Cambay	CB-ONN-2009/8	18	22.10.10	136	**136**
32	PAN India / Frost Int. Ltd.	Cambay	CB-ONN-2010/5	13	-	49	**49**
33	Pratibha Oil & gas	Cambay	CB-ONN-2010/4			61	**61**
34	BPRL/ GAIL	Cambay	CB-ONN-2010/8	16 A&B	01.03.08	42	
35			CB-ONN-2010/11	19	15.03.13	131	**173**
TOTAL PELs BY PVT./JV COS.							**34507.73**

*CRL's operatorship has been terminated by Government. ACL has requested to transfer the PI.

Table 8.18. Company-wise PEL areas

Company/Operator	PEL Area	
	Sq. Km.	(%)
Oil and Natural Gas Corporation Ltd.	75644.7	64.53%
Oil India Ltd.	7078.45	6.04%
Adani Welspun Exploration Ltd.	1191	1.02%
Assam Company Ltd.	319	0.27%
Bharat Petro Resources Ltd	173	0.15%
Cairn Energy India Pvt. Ltd.	11405.1	9.73%
Deep Energy Llc	789	0.67%
Essar Oil Ltd.	1814.77	1.55%
Focus Energy Ltd.	6789.84	5.79%
GAIL (India) Limited.	946	0.81%
Gujarat State Petroleum Corporation Ltd.	2290.83	1.95%
Hindustan Oil Exploration Company Limited.	1261	1.08%
Jay Polychem (India) Ltd.	136	0.12%
Jubilant Oil & Gas Private Limited.	1260	1.07%
Mercator Petroleum Private Limited.	180	0.15%
Omkar Naturals Resources Pvt. Ltd.	83	0.07%
Pan India Consultants	49	0.04%
Pratibha Oil and Natural Gas Pvt. Ltd.	61	0.05%
Reliance Industries Ltd.	5502.29	4.69%
Sintex Oil & Gas Pvt. Ltd.	257	0.22%
Grand Total	**117230.98**	**100.00%**

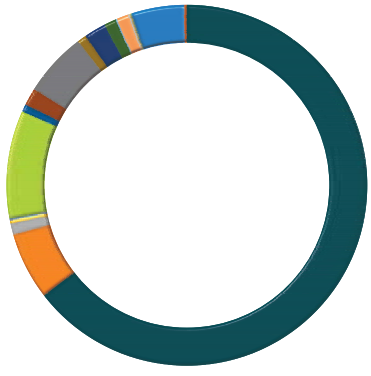

Table 8.19. State-wise PEL distribution

Onland/Offshore	Location Area	PEL Area	
		Sq. km.	(%)
Offshore	Eastern Offshore	29867.89	25.48%
	Western Offshore	44244	37.74%
Offshore Total		**74111.89**	**63.22%**
Onland	Andhra Pradesh	668.46	0.57%
	Arunanchal Pradesh	331.75	0.28%
	Assam	3396.45	2.90%
	Chhattisgarh	789	0.67%
	Gujarat	5654.25	4.82%
	Himachal Pradesh	1828	1.56%
	Madhya Pradesh	462	0.39%
	Mizoram	5873	5.01%
	Nagaland	1590	1.36%
	Rajasthan	4560.18	3.89%
	Tamil Nadu	1461	1.25%
	Tripura	2220	1.89%
	West Bengal	14285	12.19%
Onland Total		**43119.09**	**36.78%**
Grand Total		**117230.98**	**100.00%**

Table 8.20. Nomination ML areas operated by ONGC and OIL in India

NO.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	VALID DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
1	ONGC	Assam-Arakan	Adamtila		24-11-14	23-11-31	4	
2			Adamtila Extn.		03-03-12	02-03-32	63	
3			Agartala Dome (AD-1)		01-05-09	30-04-29	15.75	
4			Agartala Dome (AD-4)		01-01-98	31-12-17	32.58	
5			Agartala Dome Extn.-II		01-02-06	31-01-26	160.86	
6			Agartala Dome Extn.-III		30-03-11	29-03-31	60	
7			Badarpur		01-08-09	31-07-19	2.3	
8			Banamali		17-12-02	16-12-22	50	
9			Banaskandi		21-07-97	20-07-17	15	
10			Baramura Extn.-IV		01-02-06	31-01-26	150.25	
11			Baramura Field		01-10-13	30-09-33	10.75	
12			Bhubandar		22-12-02	21-12-22	6	
13			Borholla		17-06-98	16-06-18	32.12	
14			Cachar District		04-01-13	03-01-20	732	
15			Changmaigaon		07-02-04	06-02-24	10	
16			Changmaigaon East		30-01-06	29-01-26	15	
17			Changpang ML		14-03-07	13-03-27	12	
18			Charaideo-Nahorhabi		30-01-06	29-01-26	14	
19			Charaideo-Nahorhabi Extn.		26-09-11	25-09-31	41	
20			Charali		20-03-99	19-03-19	51.64	
21			Charali Ext.-I		20-05-98	19-05-18	45	
22			East Changmaigaon Extn.		01-12-11	30-11-31	35	

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NO.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	VALID DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
23		Assam-Arakan	East Lakhibari		23-07-03	22-07-23	8.5	
24			East Lakhibari Extn.		10-10-13	09-10-20	49	
25			Geleki		16-08-10	15-08-30	27.94	
26			Geleki Ext.- II		14-12-01	13-12-21	2.65	
27			Geleki Ext.-I		23-11-09	22-11-29	5.01	
28			Gojalia block		07-02-06	06-02-26	271.17	
29			Golaghat Extn. II-A		09-12-09	08-12-24	85	
30			Kalyanpur		13-04-07	12-04-27	40	
31			Kasomarigaon		09-12-09	08-12-25	76	
32			Khoraghat		26-07-09	25-07-24	3	
33			Khoraghat Ext. - I		17-07-00	16-07-20	83	
34			Konaban Field		04-03-14	03-03-34	33.0046	
35			Kunjaban		14-07-08	13-07-28	288	
36			Laiplingaon Extn.		26-09-11	25-09-23	30.45	
37			Laipling-Gaon		13-10-03	12-10-23	26	
38			Lakwa		29-09-08	28-09-28	172.49	
39			Manikya Nagar (RO-15)		01-01-98	31-12-17	0.8	
40			Manikyanagar-Sonamu-ra Extn-I		01-02-06	31-01-26	138.55	
41			Mekeypore-Santak-Na-zira		30-01-06	29-01-26	77	
42			Mekeypore-Santak-Na-zira-Bihubar Extn.		26-09-11	25-09-31	50	
43			Mekrong		19-09-97	18-09-17	16	
44			Namber		05-09-99	04-09-19	26	
45			Namti		09-11-07	08-11-27	35.55	
46			North Patharia		30-03-12	29-03-29	60	
47			North Rudrasagar		30-01-06	29-01-26	149	
48			Panidihing		19-05-04	18-05-24	34	
49			Rokhia (RO-19)		26-02-12	25-02-20	0.58	
50			Rokhia (RO-2)		14-11-08	13-11-28	5.04	
51			Rudrasagar		30-05-09	29-05-29	70.5	
52			SE Geleki		30-01-06	29-01-26	20.5	
53			SE Geleki Extn.		26-09-11	25-09-31	28	
54			Sector - VC		30-11-14	29-11-34	497	
55			Sonari		01-08-09	31-07-26	30	
56			Sundalbari-Agartala Dome		13-12-10	12-12-26	301	
57			Tichna block		07-02-06	06-02-26	195.41	
58			Titabar		24-12-08	23-12-23	10	
59			Tulamura		20-11-09	19-11-29	84	
60			West Charali		23-03-12	22-03-32	12	
61			West Tripura		04-01-13	03-01-20	1327.58	**5927.9746**
62		Cambay	Ahmedabad Ext.-I		22-02-01	21-02-21	17.29	
63			Ahmedabad Ext.-II		29-07-08	28-07-28	5.98	
64			Ahmedabad Ext.-III		11-11-11	10-11-31	34.75	

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NO.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	VALID DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
65		Cambay	Ahmedabad Ext.-IV		08-10-98	07-10-18	10.21	
66			Ahmedabad Ext-V		08-05-00	07-05-20	17.75	
67			Ahmedabad-Bakrol		05-08-09	04-08-29	30.16	
68			Akholjuni		27-07-00	26-07-20	81.25	
69			Anklav Ext.-I		15-02-02	14-02-22	61	
70			Ankleshwar (Main)		15-08-01	14-08-21	38.98	
71			Ankleshwar Ext.-I		26-05-05	25-05-25	17.43	
72			Asmali ML		15-06-98	14-06-17	43.26	
73			Balasar		08-06-13	07-06-30	12	
74			Balol		25-05-90	24-05-30	24	
75			Balol Extn.-I		26-12-13	25-12-18	5.83	
76			Bechraji		31-08-11	30-08-28	37.11	
77			Bechraji Ext.-I		29-03-04	28-03-24	3.06	
78			Cambay		14-12-04	13-12-24	2.6	
79			Chaklasi-Rasnol		06-12-07	05-12-27	42	
80			Chaklasi-Rasnol Extn.-I		16-11-10	15-11-27	168	
81			Chanasma		28-09-96	27-09-16	2.81	
82			Chandrora		16-02-04	15-02-24	1.39	
83			Charada		06-10-14	05-10-19	10.6	
84			Charada Mansa		23-10-12	22-10-27	187.5	
85			Charada Mansa Extn.-I		20-09-08	19-09-28	12.5	
86			Dabka		01-05-13	30-04-33	21.67	
87			Dabka Ext.-I		23-08-08	22-08-28	12.85	
88			Dabka Ext.-II		30-06-09	29-06-24	0.56	
89			Dabka Ext.-IV (D#6)		20-02-97	19-02-17	1	
90			Dabka Ext.-V (D#38)		29-06-99	28-06-19	2	
91			Dahej		06-02-05	05-02-25	18.52	
92			Dahej Ext.-I		17-04-14	16-04-34	90.9	
93			Dedana (ML)		04-11-96	03-11-16	5.44	
94			Degam		25-03-08	24-03-25	15.47	
95			East Sobhasan		28-06-02	27-06-22	22.42	
96			Elav		30-03-90	29-03-10	10.37	
97			Gamij		26-06-15	25-06-35	39.16	
98			Gamij Ext. - II		04-04-01	03-04-21	116.22	
99			Gamij Ext.-I		25-03-97	24-03-17	81.22	
100			Gamij Ext.-III ML		08-02-02	07-02-22	15.41	
101			Gandhar		07-01-05	06-01-25	11.78	
102			Gandhar Ext. - IX		20-08-02	19-08-22	40.91	
103			Gandhar Ext.-I		08-10-06	07-10-26	32.75	
104			Gandhar Ext.-II (Denwa)		08-07-06	07-07-26	54.3	
105			Gandhar Ext.-III		24-02-07	23-02-27	235.38	
106			Gandhar Ext.-IV		30-08-14	29-08-34	36.75	
107			Gandhar Ext.-V		22-03-96	21-03-16	29.43	
108			Gandhar Ext.-VI (G#388)		22-01-97	21-01-17	44.47	

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NO.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	VALID DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
109		Cambay	Gandhar Ext.-VII(G#155)		24-04-99	23-04-19	25.82	
110			Gandhar Ext.-VIII		16-08-00	15-08-20	7.23	
111			Gandhar Extn.-X		19-06-09	18-06-17	9	
112			Gandhar Extn.-XI		19-06-09	18-06-19	7.2	
113			Gandhar Extn.-XII		19-06-09	18-06-25	29	
114			Geratpur		20-08-00	19-08-20	18.31	
115			Halisa		30-01-98	29-01-18	143.44	
116			Hirapur		24-10-97	23-10-17	87.92	
117			Jakasna(ML)		02-06-01	01-06-21	9.8	
118			Jambusar-Dabka		25-03-08	24-03-23	101.5	
119			Jotana		26-07-00	25-07-20	39.5	
120			Jotana Ext.-I		28-11-06	27-11-26	57.7	
121			Jotana Ext.-II		16-06-97	15-06-17	0.87	
122			Jotana-South		10-03-08	09-03-24	23	
123			Jotana-Warosan		24-06-05	23-06-25	38.05	
124			Kadi		18-08-08	17-08-28	64.49	
125			Kadi Asjol		28-08-03	27-08-23	0.72	
126			Kadi Ext-III		02-02-99	01-02-19	16.07	
127			Kadi Extn.-IV		13-11-03	12-11-23	5.28	
128			Kadi Extn.-V		22-11-10	21-11-27	13	
129			Kalol (Main)		13-05-04	12-05-24	35.84	
130			Kalol Ext.-I		04-08-06	03-08-26	159.92	
131			Kalol Ext.-II		11-04-09	10-04-29	15.5	
132			Kalol North-East		15-03-10	14-03-30	9.44	
133			Kalol West Ext.-II		20-09-07	19-09-22	20	
134			Kalol West Extn.-I		03-02-06	02-02-22	54.25	
135			Kalol West ML		21-11-03	01-11-23	14.53	
136			Kamboi		25-12-07	24-12-18	2.35	
137			Kasiyabet		12-09-09	11-09-29	5.06	
138			Kathana		20-11-08	19-11-28	16.95	
139			Kathana Ext.-I		15-03-04	14-03-24	16.99	
140			Kharach		23-03-15	22-03-35	0.77	
141			Kim Ext. - I		04-01-02	03-01-22	56.11	
142			Kim(ML)		10-03-97	09-03-17	18.33	
143			Kosamba		03-01-08	02-01-28	19.17	
144			Kosamba Extn.-I		01-03-03	28-02-23	39	
145			Kudara		28-06-02	27-06-22	2.6	
146			Kural (ML)		03-04-01	02-04-21	83.49	
147			Langhnaj ML		23-07-02	22-07-22	17.92	
148			Langhnaj-Wadasma		05-02-01	04-02-21	13.84	
149			Lanwa		09-12-02	08-12-22	30	
150			Lanwa Ext.-I		16-12-16	15-12-36	2.15	
151			Limbodra		21-12-05	01-12-25	15.75	
152			Limbodra Ext.-I		25-03-98	24-03-18	14.96	

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NO.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	VALID DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
153		Cambay	Linch		16-10-13	15-10-33	43.73	
154			Linch Ext.- I		18-03-07	17-03-17	34.25	
155			Linch Ext.-II		24-03-07	23-03-17	13.35	
156			Malpur (ML)		04-06-07	03-06-27	1	
157			Mansa		26-07-95	25-07-15	58.72	
158			Matar		01-10-09	30-09-29	66.5	
159			Mehsana City		08-08-96	07-08-16	8.85	
160			Mehsana City Ext.-II		18-07-15	17-07-35	7.58	
161			Motera		14-08-16	13-08-21	15.69	
162			Motera Ext.-I		25-03-97	24-03-17	23.65	
163			Motera Ext.-II		25-03-98	24-03-18	26.02	
164			Motwan		04-07-99	03-07-19	42.2	
165			N. Kadi Ext.-I (New)		03-05-13	02-05-29	61.43	
166			N. Sobhasan Pt. A+B		25-01-99	24-01-19	12.05	
167			Nada		19-02-09	18-02-29	9.85	
168			Nada Ext.-I		03-09-98	02-09-18	6.12	
169			Nandasan - Langnaj		27-04-06	26-04-26	61.9	
170			Nandasan Ext.-I		18-07-15	17-07-35	26.39	
171			Nandej		25-03-97	24-03-17	0	
172			Nandej East		26-06-15	25-06-35	20.92	
173			Nandej Ext.-I		08-02-02	07-02-22	56.18	
174			Nawagam Ext. - III		31-08-00	30-08-20	56	
175			Nawagam Ext.-I		21-03-03	20-03-23	2.77	
176			Nawagam Ext.-II		26-11-99	25-11-19	14.66	
177			Nawagam Main		28-03-07	27-03-27	72.23	
178			Nawagam South Ext.-I		21-11-03	20-11-23	30.88	
179			Nawagam South Ext.-II		21-11-03	20-11-23	43.94	
180			Nawagam South Ext.-III		13-12-05	12-12-25	53.71	
181			North Sobhasan Ext.-I		12-03-01	11-03-21	56.85	
182			North Sobhasan Ext.-II		17-11-01	16-11-21	23	
183			Olpad - Dandi Ext. - I		01-01-04	31-12-23	94.4	
184			Olpad (A)		24-11-02	23-11-22	2.75	
185			Padra Field		03-09-13	02-09-33	172.24	
186			Pakhajan Ext.-I		10-01-15	09-01-20	18	
187			Pakhajan Extn. - II		16-09-02	15-09-22	38.5	
188			Pakhajan(ML)		21-08-07	20-08-27	6.25	
189			Paliyad-Kalol-Limbodra		26-06-15	25-06-35	161.48	
190			Patan-Tharad		04-09-13	03-09-33	13.619	
191			Rajpur		26-06-15	25-06-35	6.76	
192			Rajpur Ext.-I		02-02-99	01-02-19	8.7	
193			Rupal		29-10-04	28-10-24	14.06	
194			Sanand		10-05-09	09-05-29	81.36	
195			Sanand Ext.-I		30-04-13	29-04-33	18.51	
196			Sanand Ext.-II		23-03-99	22-03-19	10.37	

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NO.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	VALID DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
197		Cambay	Sanand Ext.-III		11-11-11	11-11-31	19.3	
198			Sanaokhurd		30-12-96	29-12-16	23.29	
199			Sanganpur ML		05-06-02	04-06-22	6.97	
200			Santhal		09-06-14	08-06-34	19.46	
201			Siswa		12-02-00	11-02-20	37.78	
202			Sobhasan		20-08-13	19-08-33	35.89	
203			South Dahej		12-11-08	11-11-25	27	
204			South Patan		16-06-97	15-06-17	6.99	
205			South Wamaj ML		28-06-02	27-06-22	18.29	
206			Umra		10-08-07	09-08-27	8.44	
207			Umra Ext.-I		19-10-14	18-10-34	9.93	
208			Umra Extn.-II		13-03-03	12-03-17	34.43	
209			Valod		07-11-07	06-11-17	8.58	
210			Valod Extn.-I		22-11-10	21-11-27	110	
211			Valod Extn.-II		10-09-13	09-09-33	30.27	
212			Varsoda-Halisa		29-08-08	28-08-25	155	
213			Varsoda-Halisa Extn.-I		22-11-10	21-11-28	169	
214			Vasad-Kathol Ext.-III		08-07-11	07-07-29	103.175	
215			Viraj		26-07-00	25-07-20	17.49	
216			Wadu		26-05-10	25-05-30	15.41	
217			Wadu Ext.-I		19-05-97	18-05-17	55.17	
218			Wamaj		25-03-97	24-03-17	19.44	
219			West Mewad(ML)		11-10-00	10-10-20	13.2	
220			West Sobhasan		23-04-03	22-04-23	9.6	**5720.784**
221		Cauvery Off-shore	PBS-1-1 Extn.		01-04-09	31-03-25	96.83	**96.83**
222		Cauvery On-shore	Adichapuram		13-04-07	12-04-27	2.3	
223			Adiyakka Mangalam		27-05-99	26-05-19	17.8	
224			Greater Bhuvanagiri		15-12-07	14-12-27	14	
225			Greater Kali		21-07-10	20-07-30	36	
226			Greater Kamalapuram		26-12-04	24-12-24	22	
227			Greater Kovilkalapal		15-05-07	14-05-27	33.61	
228			Greater Narimanam		27-01-06	26-01-26	54	
229			Kali		01-06-01	31-05-21	19	
230			Kali-6		01-01-04	31-12-23	1.6	
231			Kamalapuram-I		27-05-99	26-05-19	23.5	
232			Kamalapuram-II		04-05-94	03-05-14	3.5	
233			Kanjirangudi		13-10-03	12-10-23	68	
234			Karaikal		10-09-08	09-09-28	2	
235			Kizhavalur		27-05-99	26-05-19	3.6	
236			Kuthalam		01-06-01	31-05-21	91	
237			Kuthalam-13		12-02-04	11-02-24	12	
238			Kuthanallur		26-02-04	25-02-24	6.25	
239			L-I		31-12-12	30-12-19	948.16	

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NO.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	VALID DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
240		Cauvery On-shore	L-II		31-12-12	30-12-19	1542.02	
241			Mattur		04-05-94	03-05-14	3	
242			Nannilam-I		26-04-13	25-04-33	4.7	
243			Nannilam-II		27-05-99	26-05-19	1	
244			Neyveli		15-03-08	14-03-28	3.84	
245			PBS-1-1		01-10-03	30-09-23	9	
246			Perungulam-periyapa-ttinam		15-07-97	14-07-17	75	
247			Pundi		27-05-99	26-05-19	1	
248			Ramanathapuram		21-11-12	20-11-19	493.21	
249			Tiruvarur-19		12-02-04	11-02-24	2	
250			Tulsapatnam		27-05-99	26-05-19	3.7	
251			Vadatheru		31-12-07	30-12-27	15.18	
252			Vijayapuram #13		03-11-02	02-11-22	2	**3513.97**
253		K-G Offshore	G-1 Field		05-09-03	04-09-23	105	
254			Godavari		24-01-08	23-01-28	111.5	
255			GS-15 & 23		04-09-98	03-09-18	80	
256			GS-29		30-10-09	29-10-29	35	
257			GS-29 Extn.		07-12-11	06-12-27	137.62	
258			GS-49		22-10-09	21-10-29	52.5	
259			GS-49 Extn.		06-09-13	05-09-33	77.68	
260			Vainateyam		20-09-08	19-09-23	221	
261			Vainateyam Extn.		11-01-11	10-01-29	78	
262			Vasistha		15-02-08	14-02-28	119	
263			Yanam		19-11-09	18-11-29	268.5	**1285.8**
264		KG-Onshore	Achanta		28-11-08	27-11-28	14.1	
265			Addvipalem-Ponna-manda		30-07-96	29-07-16	95	
266			Bantumilli Extn.		05-01-09	04-01-19	155.67	
267			Chintalapalli Extn.		12-11-09	11-11-19	18.56	
268			Elamanchali		21-02-11	20-02-31	6	
269			Endamuru-4		30-04-03	29-04-23	6	
270			Endamuru-7&9		19-05-03	18-05-23	7.3	
271			Endamuru-I		03-04-12	02-04-19	3	
272			Enugupalli		06-07-00	05-07-20	7	
273			Godavari On-land		01-01-13	31-12-19	2176	
274			Kaikalur-3		10-09-06	09-09-26	9	
275			Kavitam		12-10-07	11-10-27	156.35	
276			Kesanapalli		18-07-12	17-07-32	3.7	
277			Kesavadasupalem		30-07-02	29-07-22	26.5	
278			Lakshmaneswaram		30-07-02	29-07-22	23.5	
279			Lingala		21-12-09	20-12-24	7.6	
280			Lingala Ext. & Kaikalur-12		30-07-02	29-07-22	30	
281			Mahadevapatnam		28-11-08	27-11-28	138.89	

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NO.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	VALID DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
282		KG-Onshore	Malleswaram		22-11-11	21-11-31	241.18	
283			Mandapeta		22-08-15	21-08-35	40	
284			Mandapeta West		01-06-04	31-05-24	20	
285			Mandapeta-19		01-05-98	30-04-18	6	
286			Manepalli Extn.		12-11-09	11-11-24	10	
287			Medapadu		08-07-12	07-07-32	16.6	
288			Mori-1		07-04-11	06-04-31	6.5	
289			Mori-5		05-06-14	04-06-20	1.56	
290			Nandigama		31-01-00	30-01-20	55	
291			Pasarlapudi-8		27-06-12	26-06-27	5.5	
292			Pasarlapudi-9		23-07-12	22-07-32	6.6	
293			Penumadam-1		03-04-12	02-04-22	9.6	
294			Penumadam-2		01-07-04	30-06-24	3.2	
295			Razole-1 & 2		23-01-08	22-01-26	18.85	
296			Srikatpalli		30-07-02	29-07-22	163	
297			Suryaraopeta		30-07-02	29-07-22	56	
298			Tatipaka-Pasarlapudi		14-02-14	13-02-34	62	
299			Turputallu		21-11-12	20-11-19	39.58	
300			Vadali		20-04-10	19-04-20	4	
301			West Godavari		01-01-13	31-12-19	1278.32	**4927.66**
302		Kutch Offshore	GK-28		10-10-11	09-10-27	1242.5	
303			KD-Field		01-04-11	31-03-26	430	**1672.5**
304		Mumbai Off-shore	Around D-1 Field		14-09-09	13-09-25	1167	
305			B-119 / B-121		15-05-97	14-05-17	113.4	
306			B-173A		01-06-98	31-05-18	51.95	
307			B-55		30-06-99	29-06-19	135.85	
308			Bassein Field Extn. (SB-II)		15-06-05	14-06-31	22.55	
309			BOFF		03-01-13	02-01-20	11595	
310			C-37 (BOFF I, II & III)		12-09-07	11-09-27	469	
311			C-Series Fields		01-04-06	31-03-26	3620	
312			D-1 Field		31-07-05	30-07-25	25.6	
313			D-18		01-01-05	31-12-24	194	
314			D-33 (BOFF I, III, SWBH)		05-09-06	04-09-26	603	
315			Extn. of NW-Mumbai High		17-11-08	16-11-28	2480	
316			Heera		20-11-04	19-11-24	448.05	
317			Mumbai High-South		09-01-06	08-01-26	802	
318			Mumbai High-SW		01-04-06	31-03-26	1064.71	
319			Mumbi High-NW		01-04-06	31-03-26	1567.67	
320			Neelam		14-11-09	13-11-29	213	
321			North Heera		04-12-07	03-12-22	121	
322			North Tapti Field		09-01-06	08-01-26	68.14	
323			Ratna & R-Series		30-03-16	29-03-36	1005	

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NO.	COMPANY / OPERATOR	BASIN	BLOCK NAME	REF. NO. ON MAP	EFFECTIVE DATE OF ML	VALID DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
324		Mumbai Off-shore	S&E of Bassein		01-04-06	31-03-26	1447.31	
325			Single PML MH Field		24-10-10	23-10-30	1953.83	
326			South Bassein		01-10-87	30-09-27	743	
327			SW BH Extension		03-01-13	02-01-20	482	
328			Vasai East		01-04-06	31-03-26	103.69	
329			West of Bassein		01-04-06	31-03-26	835	**31331.75**
330		Rajasthan	Bakriwala		10-01-01	09-01-21	1	
331			Chinnewala Tibba		15-10-03	14-10-23	114.86	
332			Ghotaru Ext. - I		10-01-01	09-01-21	564.6	
333			Manherra Tibba		01-05-14	30-04-34	24	
334			South-Kharatar		25-03-11	24-03-31	180.39	**884.85**
335		Vindhyan	Nohta-Damoh-Jabera		10-02-15	09-02-22	1150	**1150**
ONGC Total								**56512.1186**
1	OIL	Assam- Arakan	Baghjan		14-05-03	13-05-23	75	
2			Borhapjan		07-08-01	06-08-20	87	
3			Borhat		13-08-13	12-08-33	81	
4			Chabua		12-06-02	11-06-22	189	
5			Dholiya		02-08-01	17-10-22	131	
6			Dibrugarh		21-01-98	20-01-18	186	
7			Digboi		14-10-01	13-10-21	49.33	
8			Dum-Duma BK-A		26-11-09	25-11-29	98.42	
			Dum-Duma BK-B		26-11-09	25-11-29	311.96	
			Dum-Duma BK-C		26-11-09	25-11-29	85.47	
			Dum-Duma BK-D		26-11-09	25-11-29	10.36	
9			Hugrijan		10-01-01	09-01-21	725.2	
10			Mechaki		19-05-03	18-05-23	195	
11			Mechaki Extnension		06-07-10	05-07-30	9	
12			Moran		10-01-01	09-01-21	429.42	
13			Moran Extn.		01-11-06	31-10-26	560	
14			Nahorkatiya		04-02-04	03-02-24	1.42	
15			Nahorkatiya Extn.		10-01-11	09-01-31	165.76	
16			Ningru		27-11-03	26-11-23	540.67	
17			Ningru Extension		04-06-03	03-06-23	75	
18			Sapkaint + Dumduma Extn (NF)		24-12-07	23-12-27	105	
19			Tinsukia		02-08-01	06-12-21	250	
20			Tinsukia Extension		17-05-03	16-05-23	185	**4546.01**
21		Rajasthan	Baghewala		30-05-03	29-05-23	210	
22			Dandewala (Jaisalmer)		01-01-16	31-12-35	250	**460**
OIL TOTAL PML AREA								**5006.01**
ONGC TOTAL PML AREA								**56512.1186**
NOMINATION (OIL+ONGC) TOTAL PML AREA								**61518.1286**
Pvt. / JV TOTAL PML AREA								**8741.1**
GRAND TOTAL OF MLS AWARDED IN THE COUNTRY (NOC'S & PVT. / JV COMPANIES)								**70259.2286**

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Table 8.21. ML areas under operation in PSC regime (as on 01.04.2017)

NO.	OPERATOR	BASIN	BLOCK/FIELD NAME	FIELD NAME	PRE-NELP/ FIELD/ NELP	REF NO. OF MAP	ML EFFECTIVE DATE	ML AREA (Sq. Km.)	TOTAL AREA (Sq. km..)
1	CAIRN	K-G Offshore	Ravva	Ravva	Field		28-10-1994 (On) 07-07-1997 (Off)	331.26	**3756.94**
2		Gulf of Cambay	CB-OS/2	Lakshmi	Pre-NELP		07-07-1998	121.06	
3				Gauri			-	52.7	
4				Ambe			-	107.47	
5				CBX			-	33.28	
6		Rajasthan	RJ-ON-90/1	DA1	Pre-NELP		20-06-2005	1859	
7				DA2			15-11-2006	430.17	
8				DA3			06-11-2007	822	
9	ONGC	Cambay	CB-ONN-2002/1	West Patan	NELP		30-03-2015	17	**67.1**
10			CB-ONN-2001/1	Nadiad – 1	NELP		19-08-2003	26	
11			CB-ONN-2004/1	Karan nagar - 1	NELP		24-03-2016	9.73	
12			CB-ONN-2004/2	Vadatal-1	NELP		20-03-2015	14.37	
13	Shell-RIL-ONGC	Mumbai Off.	Mid & South Tapti	Mid & South Tapti	Field		22-12-1994	1471	**2678**
14			Panna	Panna	Field		22-12-1994	430	
15			Mukta	Mukta	Field		22-12-1994	777	
16	GEOENPRO	Assam-Arakan	Kharsang	Kharsang	Field		21-10-1997	10	**10**
17	ACIL	Assam-Arakan	Amguri	Amguri	Field		01-11-2003	52.75	**52.75**
18	HOEC	Cambay	Asjol	Asjol	Field		09-04-1996	15	**124.94**
19			N. Balol	N. Balol	Field		21-03-2002	27.3	
20			CB-ON/7	Pramoda & Palej	Pre-NELP		21-09-2005	7.64	
21		Cauvery Off.	PY-1	PY-1	Field		06-10-1995	75	
22	Sun Petrochemical	Cambay	Baola	Baola	Field		12-12-1996	4	**16.7**
23			Modhera	Modhera	Field		19-05-2007	12.7	
24	JTI	Cambay	Wavel	Wavel	Field		20-02-1995	9	**57**
25			Dholka	Dholka	Field		20-02-1995	48	
26	NIKO	Cambay	Hazira	Hazira	Field		23-09-1994	50	**74.25**
27			CB-ONN-2000/2	NS-A	NELP		24-03-2004	20.22	
28				Bheema			27-09-2004	4.03	
29	SELAN	Cambay	Lohar	Lohar	Field		13-03-1995	5	**189.65**
30			Indrora	Indrora	Field		13-03-1995	130	
31			Bakrol	Bakrol	Field		13-03-1995	36	
32			Karjisan	Karjisan	Field		23-11-2005	5	
33			Ognaj	Ognaj	Field		05-08-2008	13.65	
34	GNRL	Cambay	Kanawara	Kanawara	Field		04-02-2003	6.3	**34.15**
35			Dholasan	Dholasan	Field		27-02-2006	8.8	
36			Allora	Allora	Field		16-05-2003	6.85	
37			N. Kathana	N. Kathana	Field		11-06-2003	12.2	
38	HYDROCARBON-RES. DEV.-PPC	Cambay	Sanganpur	Sanganpur	Field		27-02-2002	4.4	**4.4**
39	OILEX	Cambay	Cambay	Cambay	Field		23-09-1994	161	**167**
40			Bhandut	Bhandut	Field		23-09-1994	6	
41	GSPCL	Cambay	Unawa	Unawa	Field		19-05-2003	5.65	**89.32**
42			CB-ONN-2000/1	Ingoli/SE-01 Field	NELP		05-09-2005	15.71	
43			CB-ONN-2003/2	Ank-21	NELP		25-02-2014	1.6	

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NO.	OPERATOR	BASIN	BLOCK/FIELD NAME	FIELD NAME	PRE-NELP/ FIELD/ NELP	REF NO. OF MAP	ML EFFECTIVE DATE	ML AREA (Sq. Km.)	TOTAL AREA (Sq. km..)
44			CB-ONN-2002/3	Mirroli	NELP		25-02-2014	3.29	
45			CB-ONN-2002/3	Sanand	NELP		20-03-2015	18	
46			CB-ON/2	Tarapur#1	Pre-NELP		12-02-2009	7.57	
47				Tarapur#G	Pre-NELP		03-03-2014		
48				Tarapur#6	Pre-NELP		09-06-2015		
49		KG Off.	KG-OSN-2001/3	DDW	NELP		11-08-2010	37.5	
50	FOCUS	Rajasthan	RJ-ON/6	SGL	Pre-NELP		23-06-2010	176	**176**
51	HARDY	Cauvery Off.	CY-OS-90/1	PY-3	Pre-NELP		20-07-1998	81	**81**
52	RIL	KG Off.	KG-DWN-98/3	D-1&3	NELP		02-03-2005	339.4	**1148.12**
53				D-26			17-04-2008	49.72	
54				D-2,6,19&22			21-06-2012	229	
55				D-34			30-09-2013	530	
56	ESSAR	Cambay	CB-ON/3	ESU	Pre-NELP		23-04-2007	7.81	**13.73**
57				EEU			21-10-2016	1.41	
58				ENS			09-11-2016	2.93	
59				ENP			13-12-2016	1.58	
Total of MLs awarded in PSC regime									**8741.05**

Table 8.22. Trend in production of crude oil and natural gas in PSC regime during the period 2004-05 to 2016-17

YEAR	GAS (MMSCM)	% age Growth over previous year	Oil+Condensate (TMT)	%age Growth over previous year
2004-05	6783.79		4300.48	
2005-06	7357.63	8%	4552.24	6%
2006-07	7039.70	-4%	4829.91	6%
2007-08	7727.39	10%	5086.92	5%
2008-09	8090.04	5%	4674.29	-8%
2009-10	21985.12	172%	5262.53	13%
2010-11	26774.49	22%	9681.99	84%
2011-12	21608.96	-19%	10526.96	9%
2012-13	14490.88	-33%	11640.05	11%
2013-14	9497.09	-34%	12076.41	4%
2014-15	8911.95	-6%	11785.22	-2%
2015-16	8234.64	-8%	11355.98	-4%
2016-17	6872.14	-17%	10532.43	-7%

Table No. 8.23. ONGC 2P Reserves of Crude oil under Nomination Regime (in MMT)

As on	Oil Initial In Place (OIIP)	Acrretion of OIIP	Estimated Ultimate Reserves	Ultimate Acrretion	Balance Recoverable Reserves
01.04.2013	4752.00	113.49	1358.36	30.86	463.43
01.04.2014	4802.80	50.81	1368.12	9.76	451.94
01.04.2015	4828.21	25.40	1391.57	23.45	453.97
01.04.2016	4876.43	48.22	1403.81	12.24	444.64
01.04.2017	4939.00	62.57	1417.81	13.99	437.28

Table No. 8.24. ONGC 2P Reserves of Natural Gas under Nomination Regime (in BCM)

As on	Gas Initial In Place (GIIP)	Acrretion of GIIP	Estimated Ultimate Reserves	Ultimate Acrretion	Balance Recoverable Reserves
01.04.2013	1943.87	53.72	1113.43	35.37	534.83
01.04.2014	1996.01	52.14	1137.52	24.09	535.95
01.04.2015	2033.03	37.26	1163.89	26.37	540.58
01.04.2016	2083.74	50.71	1162.23	-1.66	518.03
01.04.2017	2138.92	55.18	1199.43	37.21	533.45

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Table 8.25. Salient Features of Main Regimes in Indian Oil and Gas Industry

The prominent features of the four regimes viz. Nomination, Pre-NELP Exploration, Pre-NELP Discovered, NELP and HELP rounds is as below:

Item	Nomination	Pre-NELP Exploration Blocks
Bonus	NA	No signature or production bonus
Royalty	For Crude Oil: 20% for onshore 10% for offshore 10% for deep water Natural Gas: 10% for all onshore and offshore	No royalty payment OR No royalty payment No custom duty
Government of India (GoI) interest	Government owned	Government of India or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost OR ONGC or OIL will have a participating interest of between 25% to 40% in the JV from the date of signing of contract, thereby sharing the exploration cost in proportion to their participating interest
Pricing of Crude Oil and Natural Gas	As per prevailing rate and subsidy arrangement	International market price for oil produced The pricing formula for associated gas would be on a cost plus basis, while for non-associated gas it would be related to the international price of fuel oil, the exact relationship being negotiable. The price payable for both associated and non-associated gas would not exceed the price paid to the producing National Oil Companies (exclusive of cess, taxes and royalty) OR The pricing formula for gas would be on internationally accepted principles Arrangement for marketing of the gas produced would be negotiable between GoI and the Company OR The JV will have freedom to make arrangements for marketing the gas
Sharing of profit	In the pattern of shareholding	Profit oil shall be bid based on sliding scale tied to post tax rates of return or multiples of investment recovered
Minimum expenditure	NA	No minimum expenditure commitment No ring fencing of blocks for corporate tax purposes
Operatorship	NOC (ONGC/OIL)	Company will be operator for exploration and appraisal period Time of transfer of operatorship to GoI or its nominee during development and production phase is negotiable OR Operatorship is negotiable Time of transfer of operatorship to ONGC/OIL during development and production phase is also negotiable OR NA

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	Pre-NELP Discovered Fields (Small or Medium or Discovered)	NELP (1999 -2016)	HELP(since 2017)
	Signature/production bonuses payable by companies to ONGC and OIL OR Signature/production bonuses payable by coventures	No signature, discovery or production bonus	No signature, discovery or production bonus
	All statutory levies including royalty, cess, customs duties, etc. payable by Contractor OR All statutory levies, including royalty, cess, customs duties, sales tax, etc. payable by Coventure	Royalty : For Crude Oil- 12.5% for onshore 10% for offshore 5% for deep water For Natural Gas- 10% onshore 10% offshore 5% for deep water ad valorem applicable to all companies No custom duty on imports for Petroleum Operations Income Tax holiday of 7 years for Mineral Oil	Royalty : For Crude Oil- 12.5% for onshore 7.5% for Shallow water 5% for Deep water 2% for Ultra Deep water For Natural Gas- 10% for onshore 7.5% for Shallow water 5% for deep water 2% for Ultra Deep water No royalty for first 7 year in Deep and Ultra Deep Water. No custom duty on imports for Petroleum Operations
	ONGC/OIL would have no participating or carried interest in the Contract. NOCs not allowed to bid OR ONGC/OIL will have up to 40 % Participating Interest OR ONGC/OIL will have up to 40 % Participating Interest in medium size fields ONGC/OIL would have no participating or carried interest in the Contracts of small fields. NOCs not allowed to bid for small size fields	No State participation or any carried interest NOCs to compete for acreage with Private	No State Participation or any carried interest, NOCs to compete for acreage with Private
	First right of refusal to Government of India in respect of purchase of crude oil produced. International market price for oil produced OR In case of natural gas, related to international price of fuel oil for Non associated gas and determined on a cost plus basis for associated gas OR Domestic market would have the first call on natural gas produced, arrangements for marketing of gas produced would be negotiable between GoI and Company. The pricing would be based on internationally accepted principles	International Crude Oil price at arm's length Gas pricing requires approval of GoI	Full Marketing and pricing freedom subject to floor price as per Article 19.2 and 19.3 of Model Revenue Sharing Contract (MRSC)
	Sharing of the profit oil shall be bid, based on a sliding scale tied to post tax rates of return or multiples of investment recovered and shall be specified in each Contract OR NA OR Sharing of the profit oil/gas would have to be indicated in the offer, based on a sliding scale tied to post tax rates of return or multiples of investment recovered as in the Rounds of bidding for exploration blocks	Sharing of Profit Petroleum with Govt. on biddable pre-tax investment multiple NELP I to VI: Step ladder based system of Investment multiple for GoI Share NELP VII to IX: Linear based system of Investment multiple for GoI Share	Profit Sharing has been replaced by Revenue Sharing
	Percentage of annual production of crude oil expected to be allocated for recovery of costs should be indicated in the offer OR Preferential treatment to companies taking up exploration blocks under round the year bidding scheme of the Government of India OR Flexibility of negotiations: The terms and conditions are indicative and companies can state in their bids the specific assumptions made in respect of these terms. While the Govt. of India has a flexible approach to these terms, it reserves to itself the right to accept or reject any bid in its sole discretion	No ring fencing of expenditures Tax Incentives for Site Restoration Fund Scheme (SRFS)	No minimum. Companies to bid for work programme LDs (Liquidity Damage) value specified
		As per Article 7 of PSC	Operator required minimum qualification experience

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Table 8.26. Details of Fiscal Terms under which blocks were offered under various Pre-NELP Exploration Rounds in India

Item	Round,1991	Round,1993	Round,1993
Bonus	No signature or production bonus	No signature or production bonus	No signature or production bonus
Royalty	No royalty payment	No royalty payment No custom duty	No royalty payment
GoI interest	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost
Pricing of crude oil and natural gas	International market price for oil produced. The pricing formula for associated gas would be on a cost plus basis, while for non-associated gas it would be related to the international price of fuel oil, the exact relationship being negotiable. The price payable for both associated and non-associated gas would not exceed the price paid to the producer National Oil Companies (exclusive of cess, taxes and royalty)	International market price for oil produced. The pricing formula for associated gas would be on a cost plus basis, while for non-associated gas it would be related to the international price of fuel oil, the exact relationship being negotiable. The price payable for both associated and non-associated gas would not exceed the price paid to the producer National Oil Companies (exclusive of cess, taxes and royalty)	International market price for oil produced. The pricing formula for gas would be on internationally accepted principles. Arrangement for marketing of the gas produced would be negotiable between the GoI and the Company
Sharing of profit	Profit oil shall be bid based on sliding scale tied to post tax rates of return or multiples of investment recovered	Profit oil shall be bid based on sliding scale tied to post tax rates of return or multiples of investment recovered	Profit oil and profit gas share based on sliding scale tied to post tax rates of return or multiples of investment recovered
Minimum expenditure	No minimum expenditure commitment No ring fencing of blocks for corporate tax purposes	No minimum expenditure commitment No ring fencing of blocks for corporate tax purposes	No minimum expenditure commitment during the exploration period No ring fencing of blocks for corporate tax purposes
Operatorship	NA	Company will be operator for exploration and appraisal period. Time of transfer of operatorship to GoI or its nominee during development and production phase is negotiable	Company will be operator for exploration and appraisal period. Time of transfer of operatorship to GoI or its nominee during development and production phase is negotiable

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	Round,1994	Round,1994	JV Exploration Program,1995
	No signature or production bonus	No signature or production bonus	No signature or production bonus
	No royalty payment	No royalty payment	No royalty payment/cess payment
	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost	ONGC or OIL will have a participating interest of between 25% to 40% in the JV from the date of signing of contract, thereby sharing the exploration cost in proportion to their participating interest
	International market price for oil produced. The pricing formula for gas would be on internationally accepted principles. Arrangement for marketing of the gas produced would be negotiable between the GoI and the Company	International market price for oil produced. The pricing formula for gas would be on internationally accepted principles. Arrangement for marketing of the gas produced would be negotiable between the GoI and the Company	International market price for oil produced. The JV will have freedom to make arrangements for marketing the gas
	Profit oil and profit gas share based on sliding scale tied to post tax rates of return or multiples of investment recovered	Profit oil and profit gas share based on sliding scale tied to post tax rates of return or multiples of investment recovered	Sharing of Profit petroleum based on sliding scale tied to post tax rates of return or multiples of investment recovered
	No minimum expenditure commitment during the exploration period No ring fencing of blocks for corporate tax purposes	No minimum expenditure commitment during the exploration period No ring fencing of blocks for corporate tax purposes	No minimum expenditure commitment during the exploration period No ring fencing of blocks for corporate tax purposes
	Company will be operator for exploration and appraisal period. Time of transfer of operatorship to GoI or its nominee during development and production phase is negotiable	Company will be operator for exploration and appraisal period. Time of transfer of operatorship to GoI or its nominee during development and production phase is negotiable	Operatorship is negotiable Time of transfer of operatorship to ONGC/OIL during development and production phase is also negotiable

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Table 8.27. Details of Fiscal Terms under which blocks were offered under various Pre-NELP Field Rounds in India

Item	Small fields,1992
Bonus	Signature/production bonuses payable by companies to ONGC and OIL
Royalty	All statutory levies including royalty, cess, customs duties, etc. payable by Contractor
GoI interest	ONGC/OIL would have no participating or carried interest in the Contract. NOCs not allowed to bid.
Pricing of crude oil and natural gas	First right of refusal to Government of India in respect of purchase of crude oil produced. International market price for oil produced.
Sharing of profit	Sharing of the profit oil shall be bid, based on a sliding scale tied to post tax rates of return or multiples of investment recovered and shall be specified in each Contract
Minimum expenditure	Percentage of annual production of crude oil expected to be allocated for recovery of costs should be indicated in the offer

Table 8.28. Progressive Modifications of Terms & Conditions in Different NELP Rounds

Item	NELP-I to V	NELP-VI
Categorization of blocks	Blocks categorized as Deepwater blocks, shallow offshore blocks and onland blocks. No sub-categorization of blocks.	Each category is sub-categorized as Type A and Type B.
Exploration phases	Three exploration phases	Two exploration phases
Work Program	No mandatory work program	Mandatory work specified in the NIO for some of the blocks.
Bid Evaluation Criteria	1. Technical Capability 2. Financial Capability 3. Work Program 4. Fiscal Package	1. Technical Capability 2. Work Program 3. Fiscal Package
Investment Multiple and GoI share	Stair-step based system of Investment multiple for GoI Share	Stair-step based system of Investment multiple for GoI Share
Part Relinquishment	Part area relinquishment, after phase –I and after phase-II	Part area relinquishment, after phase–I
Liquidated Damages	No Liquidated Damages (LD) specified. Penalties for unfinished work program computed case-to-case basis.	No Liquidated Damages (LD) specified. Penalties for unfinished work program computed case-to-case basis.
Bank Guarantee	Bank Guarantee @ 35% of Annual work program.	Bank Guarantee @ 35% of Annual work program.
Bid Bond	No Bid bond to be furnished at the time of submission of bids.	No Bid bond to be furnished at the time of submission of bids.

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	Medium fields,1992	Discovered fields,1993
	Signature/production bonuses payable by coventures	Signature/production bonuses payable by coventures
	All statutory levies, including royalty, cess, customs duties, sales tax, etc. payable by Coventure	All statutory levies, including royalty, cess , customs duties, etc. payable
	ONGC/OIL will have up to 40% Participating Interest	ONGC/OIL will have up to 40% Participating Interest in medium size fields ONGC/OIL would have no participating or carried interest in the Contracts of small fields. NOCs not allowed to bid for small size fields.
	First right of refusal to Government of India in respect of purchase of crude oil & natural gas produced International market price for oil produced and in case of natural gas, related to international price of fuel oil for Non-associated gas and determined on a cost plus basis for associated gas	First right of refusal to Government of India in respect of purchase of crude oil produced. International market price for oil purchased by GoI Domestic market would have the first call on natural gas produced; arrangements for marketing of gas produced would be negotiable between GoI and Company. The pricing would be based on internationally accepted principles
	NA	Sharing of the profit oil/gas would have to be indicated in the offer, based on a sliding scale tied to post tax rates of return or multiples of investment recovered as in the rounds of bidding for exploration blocks
	Preferential treatment to companies taking up exploration blocks under round the year bidding scheme of the Government of India.	Flexibility of negotiations: The terms and conditions are indicative and companies can state in their bids the specific assumptions made in respect of these terms. While the Govt. of India has a flexible approach to these terms, it reserves to itself the right to accept or reject any bid on its sole discretion

	NELP-VII	NELP-VIII & IX
	Sub-categories Type A and Type B continued New category Type S with small onland blocks of size less than 200 sq. km. introduced For Type S blocks, Technical capability is not considered for pre-qualification or evaluation.	Type A & B classification among onland, shallow water and deep water blocks removed. Category Type S continued.
	Two exploration phases	Two exploration phases
	Mandatory work specified in the NIO for some of the blocks.	Mandatory work specified in the NIO for some of the blocks.
	1. Technical Capability 2. Work Program 3. Fiscal Package	1. Technical Capability 2. Work Program 3. Fiscal Package
	Linear based system of Investment multiple for GoI Share	Linear based system of Investment multiple for GoI Share
	Part area relinquishment, after phase–I	No part area relinquishment after phase-I
	No Liquidated Damages (LD) specified. Penalties for unfinished work program computed case-to-case basis.	Liquidated Damages (LD) specified upfront for unfinished work program
	Bank Guarantee @ 35% of Annual work program.	One time BG introduced @ 7.5% of total committed work program.
	No Bid bond to be furnished at the time of submission of bids.	Bid bond to be submitted at the time of submission of bids.

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Table 8.29. Fiscal Terms of Offering: Nomination vs. Pre-NELP Exploration

Item	Nomination	Round,1991
Bonus	NA	No signature or production bonus
Royalty	Royalty : For Crude Oil: 20% for onshore,10% for offshore, 10% for deep water Natural Gas: 10% for all onshore and offshore	No royalty payment
GoI interest	Government owned	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost
Pricing of crude oil and natural gas	As per prevailing rate and subsidy arrangement	International market price for oil produced. The pricing formula for associated gas would be on a cost plus basis, while for non-associated gas it would be related to the international price of fuel oil, the exact relationship being negotiable. The price payable for both associated and non-associated gas would not exceed the price paid to the producer National Oil Companies (exclusive of cess,taxes and royalty)
Sharing of profit	In the pattern of shareholding	Profit oil shall be bid based on sliding scale tied to post tax rates of return or multiples of investment recovered
Minimum expenditure	NA	No minimum expenditure commitment No ring fencing of blocks for corporate tax purposes
Operatorship	NOC (ONGC/OIL)	NA

Table 8.30. Fiscal Terms of Offering in Pre-NELP Exploration rounds

Item	Round,1994
Bonus	No signature or production bonus
Royalty	No royalty payment
GoI interest	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost
Pricing of crude oil and natural gas	International market price for oil produced. The pricing formula for gas would be on internationally accepted principles. Arrangement for marketing of the gas produced would be negotiable between the GoI and the Company
Sharing of profit	Profit oil and profit gas share based on sliding scale tied to post tax rates of return or multiples of investment recovered
Minimum expenditure	No minimum expenditure commitment during the exploration period No ring fencing of blocks for corporate tax purposes
Operatorship	Company will be operator for exploration and appraisal period. Time of transfer of operatorship to GoI or its nominee during development and production phase is negotiable

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Pre-NELP		
	Round,1993	**Round,1993**
	No signature or production bonus	No signature or production bonus
	No royalty payment No custom duty	No royalty payment
	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost
	International market price for oil produced. The pricing formula for associated gas would be on a cost plus basis, while for non-associated gas it would be related to the international price of fuel oil, the exact relationship being negotiable. The price payable for both associated and non-associated gas would not exceed the price paid to the producer National Oil Companies (exclusive of cess,taxes and royalty)	International market price for oil produced. The pricing formula for gas would be on internationally accepted principles. Arrangement for marketing of the gas produced would be negotiable between the GoI and the Company
	Profit oil shall be bid based on sliding scale tied to post tax rates of return or multiples of investment recovered	Profit oil and profit gas share based on sliding scale tied to post tax rates of return or multiples of investment recovered
	No minimum expenditure commitment No ring fencing of blocks for corporate tax purposes	No minimum expenditure commitment during the exploration period No ring fencing of blocks for corporate tax purposes
	Company will be operator for exploration and appraisal period. Time of transfer of operatorship to GoI or its nominee during development and production phase is negotiable	Company will be operator for exploration and appraisal period. Time of transfer of operatorship to GoI or its nominee during development and production phase is negotiable

	Round,1994	**JV Exploration Programme,1995**
	No signature or production bonus	No signature or production bonus
	No royalty payment	No royalty payment/cess payment
	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost	ONGC or OIL will have a participating interest of between 25% to 40% in the JV from the date of signing of contract, thereby sharing the exploration cost in proportion to their participating interest
	International market price for oil produced. The pricing formula for gas would be on internationally accepted principles. Arrangement for marketing of the gas produced would be negotiable between the GoI and the Company	International market price for oil produced. The JV will have freedom to make arrangements for marketing the gas
	Profit oil and profit gas share based on sliding scale tied to post tax rates of return or multiples of investment recovered	Sharing of Profit petroleum based on sliding scale tied to post tax rates of return or multiples of investment recovered
	No minimum expenditure commitment during the exploration period No ring fencing of blocks for corporate tax purposes	No minimum expenditure commitment during the exploration period No ring fencing of blocks for corporate tax purposes
	Company will be operator for exploration and appraisal period. Time of transfer of operatorship to GoI or its nominee during development and production phase is negotiable	Operatorship is negotiable Time of transfer of operatorship to ONGC/OIL during development and production phase is also negotiable

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Table 8.31. Fiscal Terms of Previous Rounds of Offering (Field round vs. NELP)

No.	Item	Small fields,1992	Medium fields,1992	Discovered fields,1993	NELP (1999 till date)
1	**Bonus**	Signature/production bonuses payable by companies to ONGC and OIL	Signature/production bonuses payable by coventures	Signature/production bonuses payable by coventures	No signature, discovery or production bonus
2	**Royalty**	All statutory levies including royalty, cess, customs duties, etc. payable by Contractor	All statutory levies, including royalty, cess, customs duties, sales tax, etc. payable by Coventure	All statutory levies, including royalty, cess , customs duties, etc. payable	Royalty : Oil- 12.5% for on-shore,10% for offshore, 5% for deep water; Gas- 10% onshore, 10% offshore, 5% for deep water ad valorem applicable to all companies No custom duty on imports for Petroleum Operation Income Tax holiday of 7 years for Mineral Oil
3	**GoI interest**	ONGC/OIL would have no participating or carried interest in the Contract. NOCs not allowed to bid	ONGC/OIL will have upto 40% Participating Interest	ONGC/OIL will have upto 40% Participating Interest in medium size fields ONGC/OIL would have no participating or carried interest in the Contracts of small fields. NOCs not allowed to bid for small size fields.	No State participation or any carried interest, NOCs to compete for acreage with Private
4	**Pricing of crude oil and natural gas**	First right of refusal to Government of India in respect of purchase of crude oil produced. International market price for oil produced.	First right of refusal to Government of India in respect of purchase of crude oil & natural gas produced International market price for oil produced and in case of natural gas, related to international price of fuel oil for Non-associated gas and determined on a cost plus basis for associated gas	First right of refusal to Government of India in respect of purchase of crude oil produced. International market price for oil purchased by GoI Domestic market would have the first call on natural gas produced, arrangements for marketing of gas produces would be negotiable between GoI and Company. The pricing would be based on internationally accepted principles	International Crude Oil price at arm's length Gas pricing requires approval of GoI
5	**Sharing of profit**	Sharing of the profit oil shall be bid, based on a sliding scale tied to post tax rates of return or multiples of investment recovered and shall be specified in each Contract	NA	Sharing of the profit oil/gas would have to be indicated in the offer, based on a sliding scale tied to post tax rates of return or multiples of investment recovered as in the Rounds of bidding for exploration blocks	Sharing of Profit Petroleum with Govt. on biddable pre-tax investment multiple NELP I to VI :Step ladder based system of Investment multiple for GoI Share NELP VII to IX: Linear based system of Investment multiple for GoI Share
6	**Minimum expenditure**	Percentage of annual production of crude oil expected to be allocated for recovery of costs should be indicated in the offer	Preferential treatment to companies taking up exploration blocks under round the year bidding scheme of the Government of India	Flexibility of negotiations: The terms and conditions are indicative and companies can state in their bids the specific assumptions made in respect of these terms. While the Govt. of India has a flexible approach to these terms, it reserves to itself the right to accept or reject any bid in its sole discretion	No ring fencing of expenditures Tax Incentives for Site Restoration Fund Scheme (SRFS)
7	**Operatorship**				As per Article 7 of PSC

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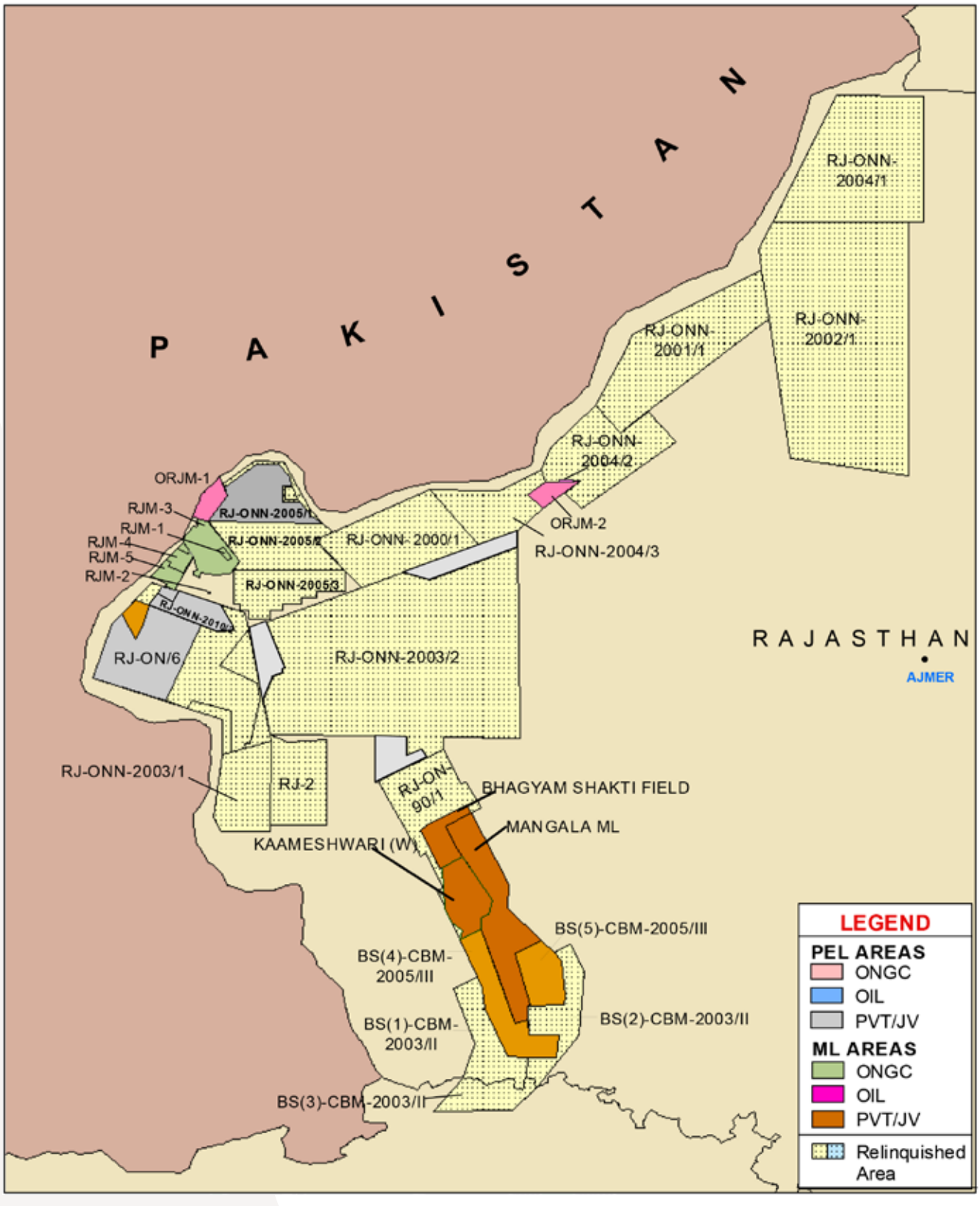
8.3. Maps of Awarded Acreages

1. RAJASTHAN BASIN



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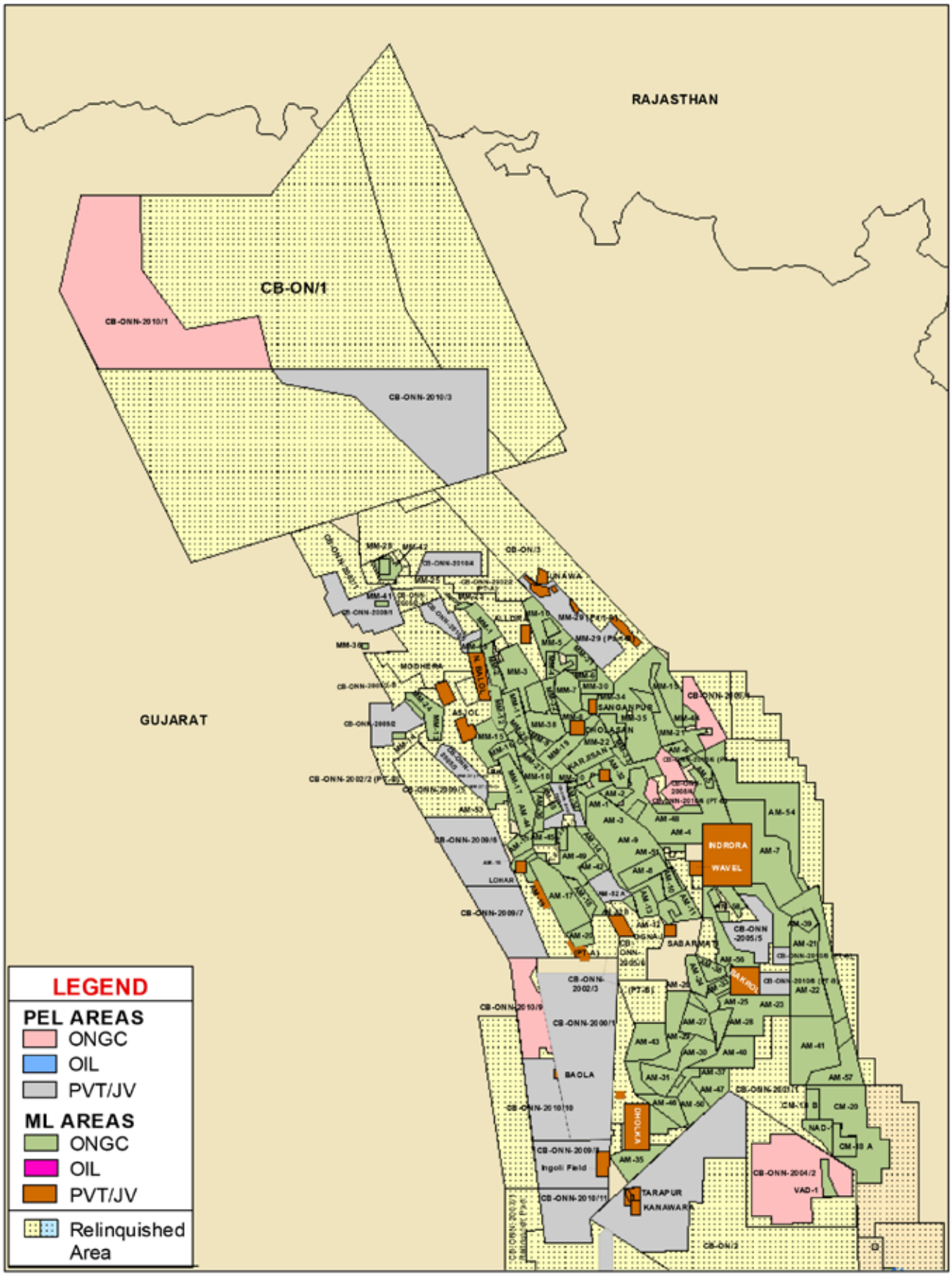
2. NORTH CAMBAY BASIN



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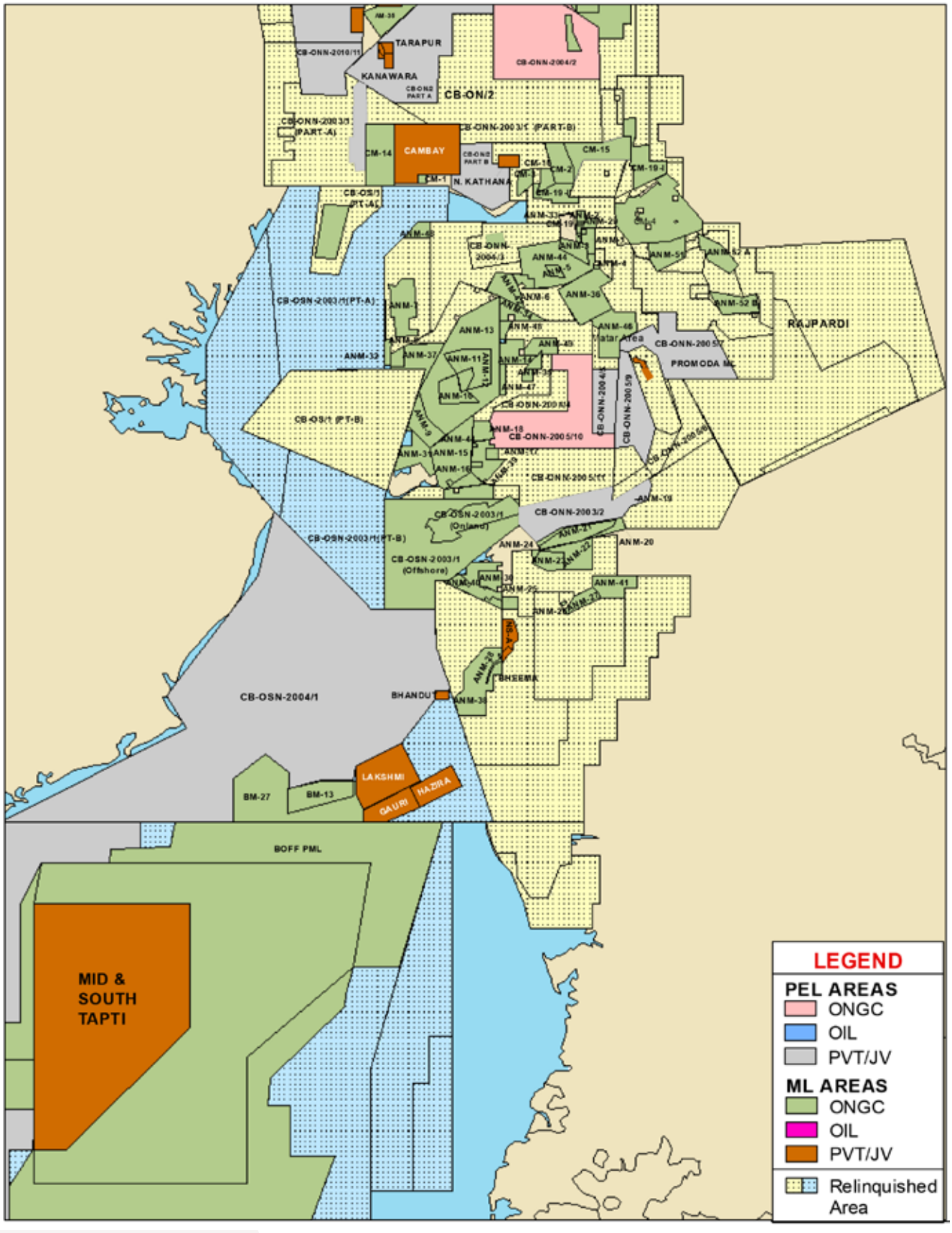
3. SOUTH CAMBAY BASIN



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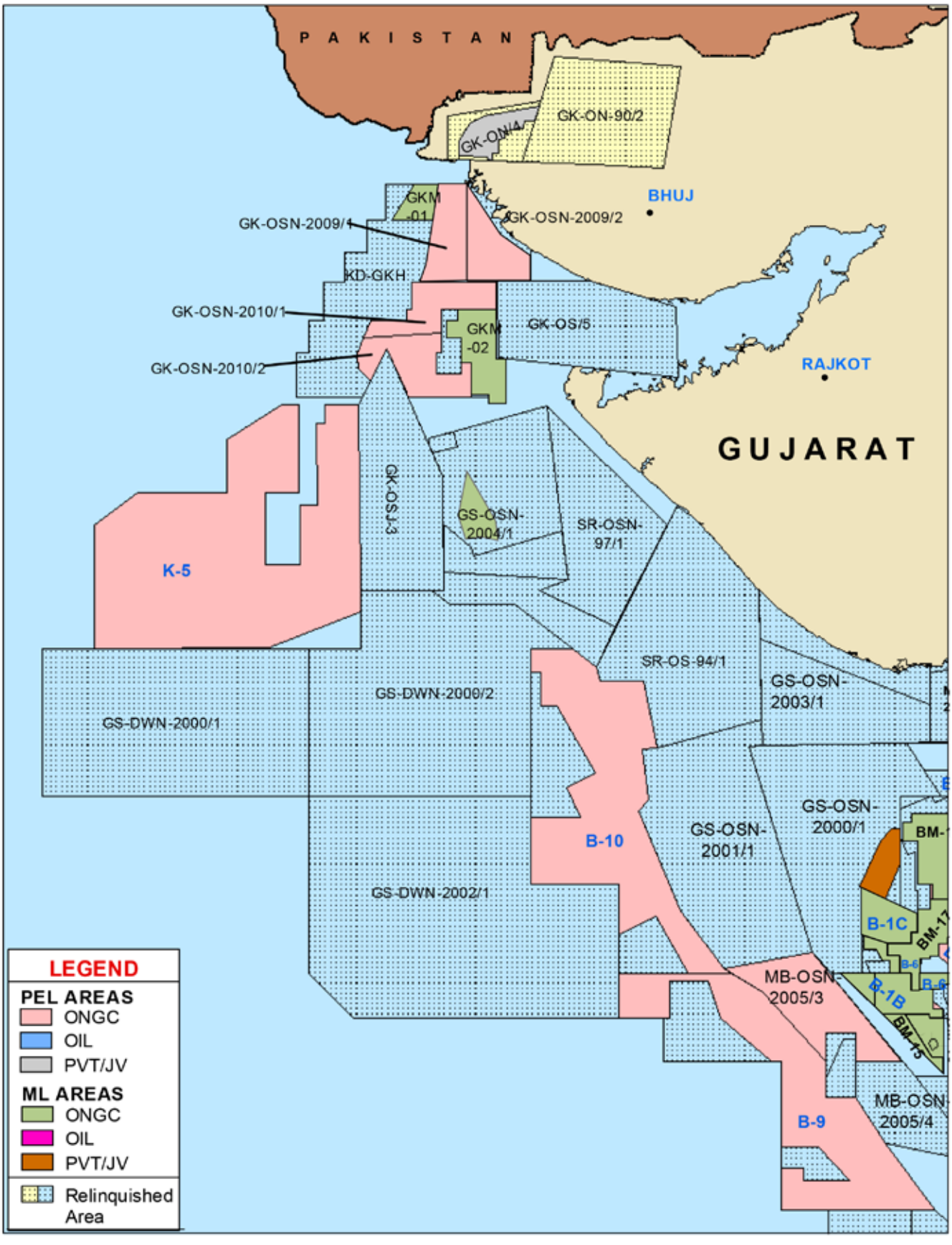
4. KUTCH-SAURASHTRA BASIN



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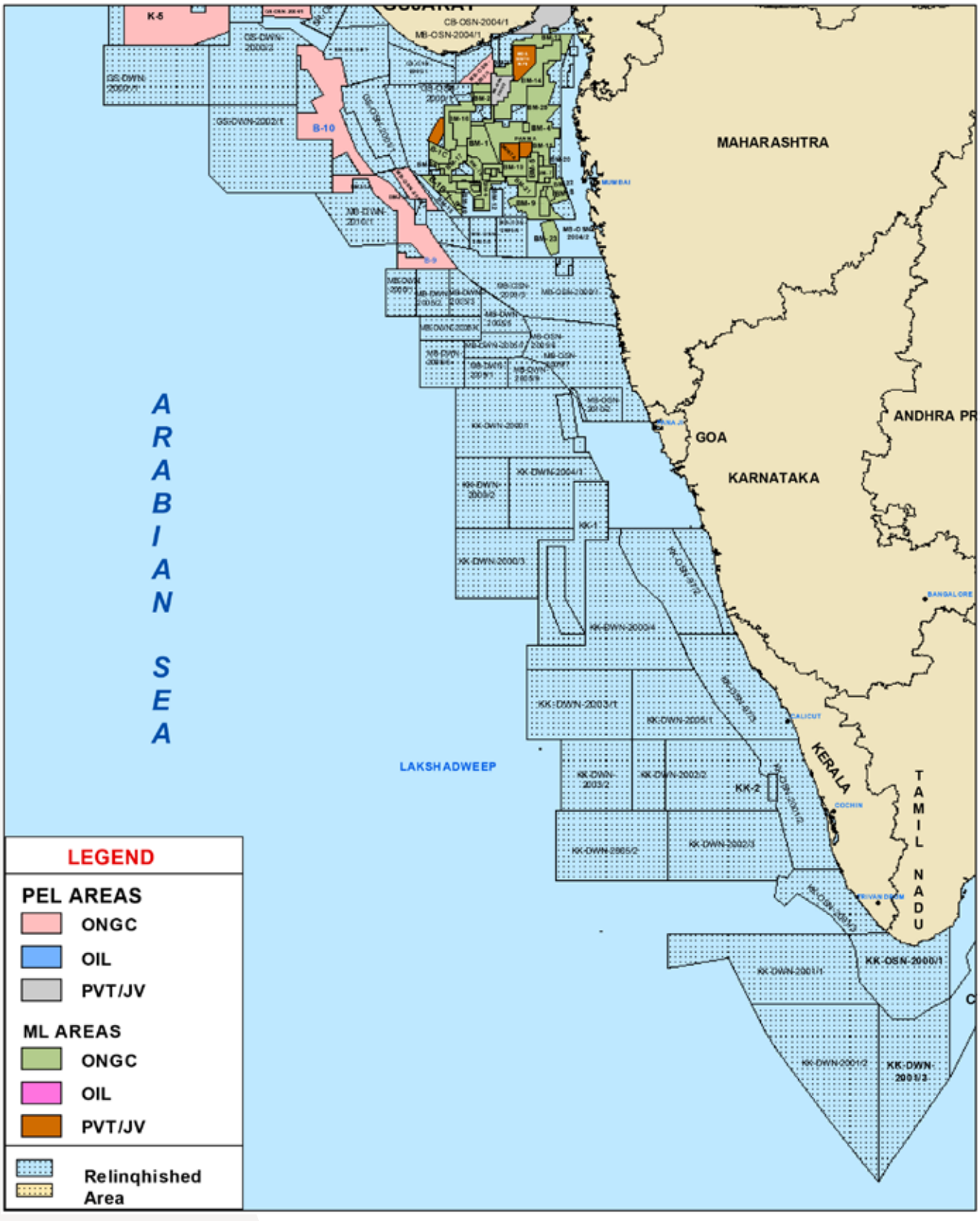
5. MUMBAI OFFSHORE & KERALA - KONKAN BASIN



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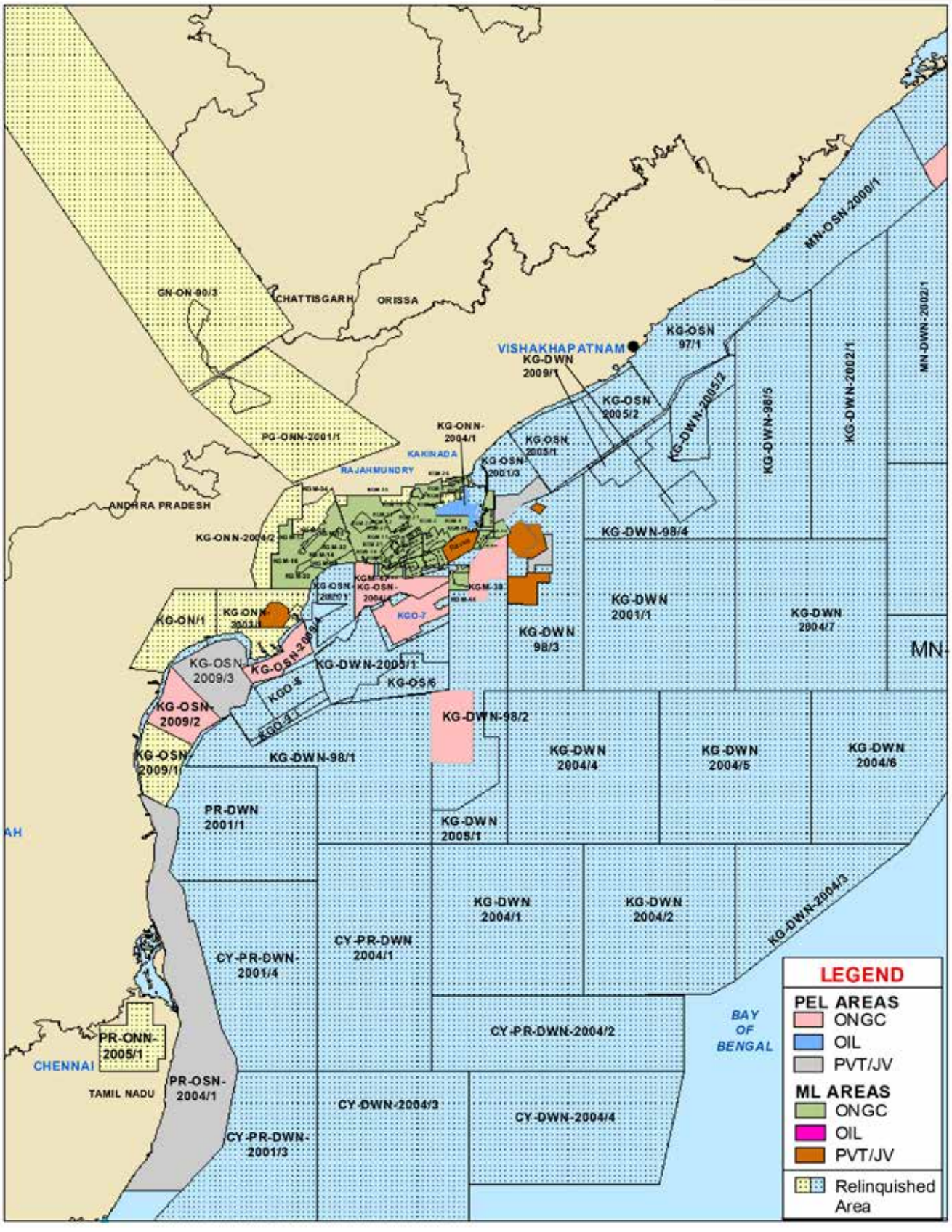
6. KRISHNA-GODAVARI BASIN



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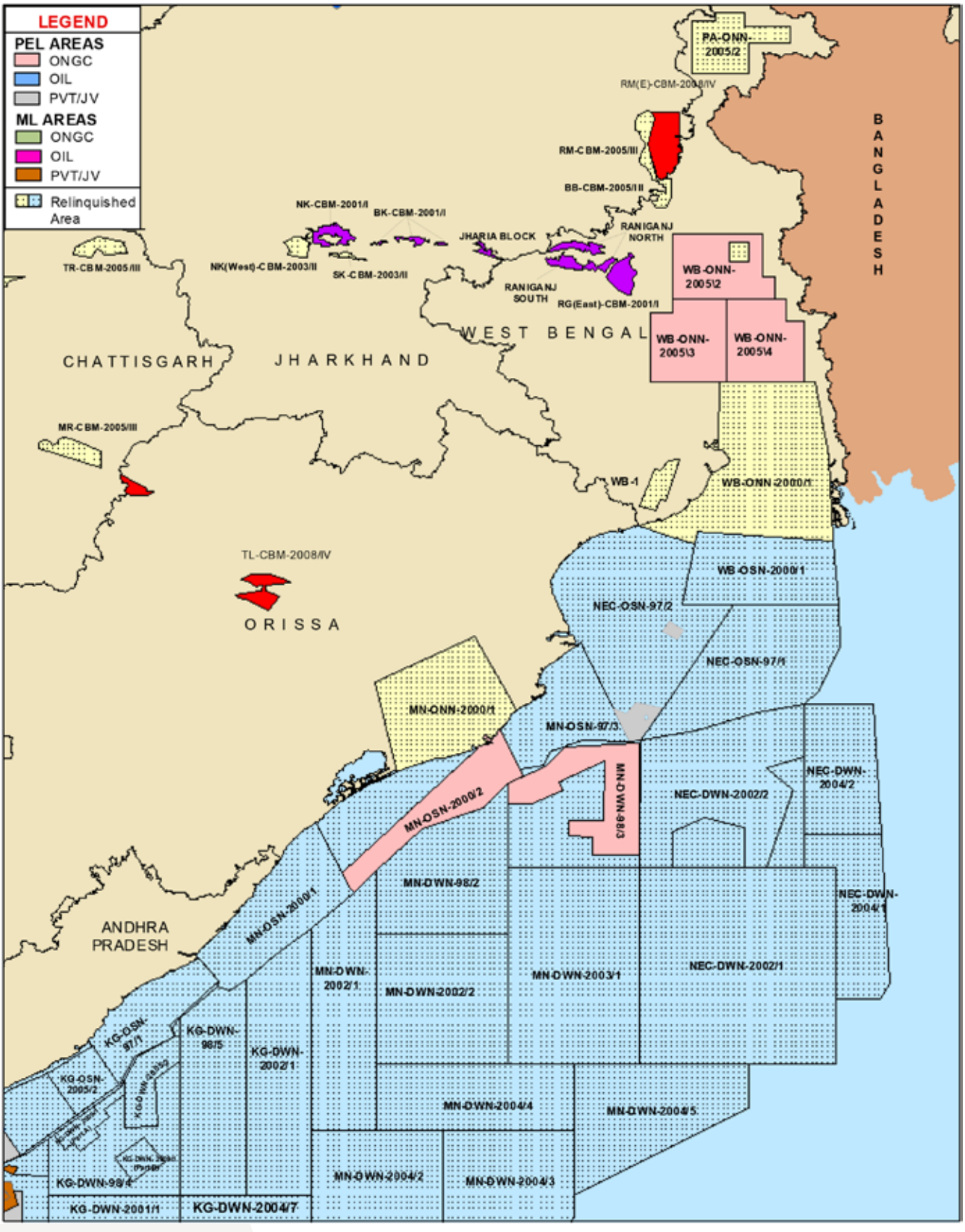
7. MAHANADI - NEC - BENGAL - DAMODAR BASIN



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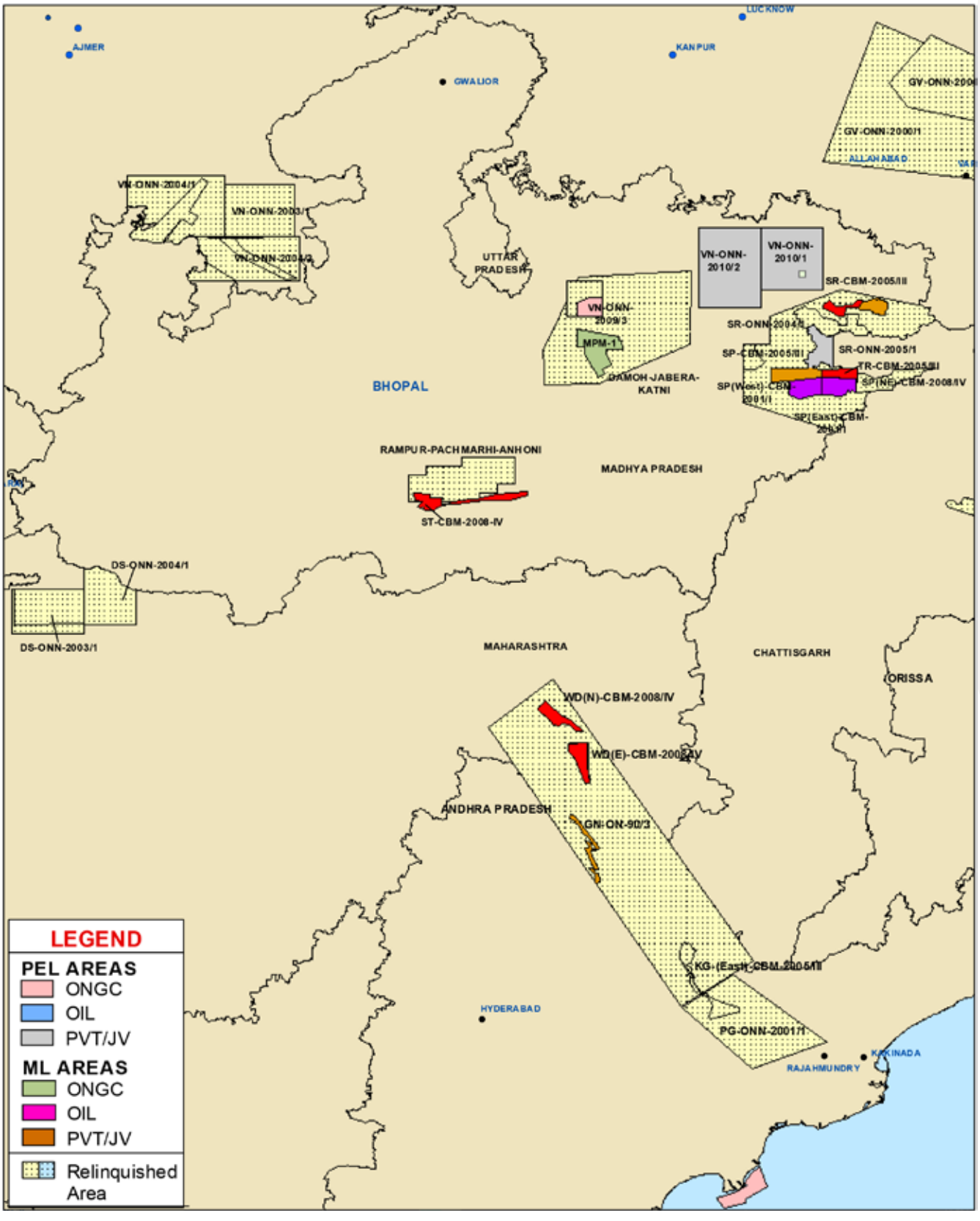
8. SATPURA - PRANHITA GODAVARI BASINS



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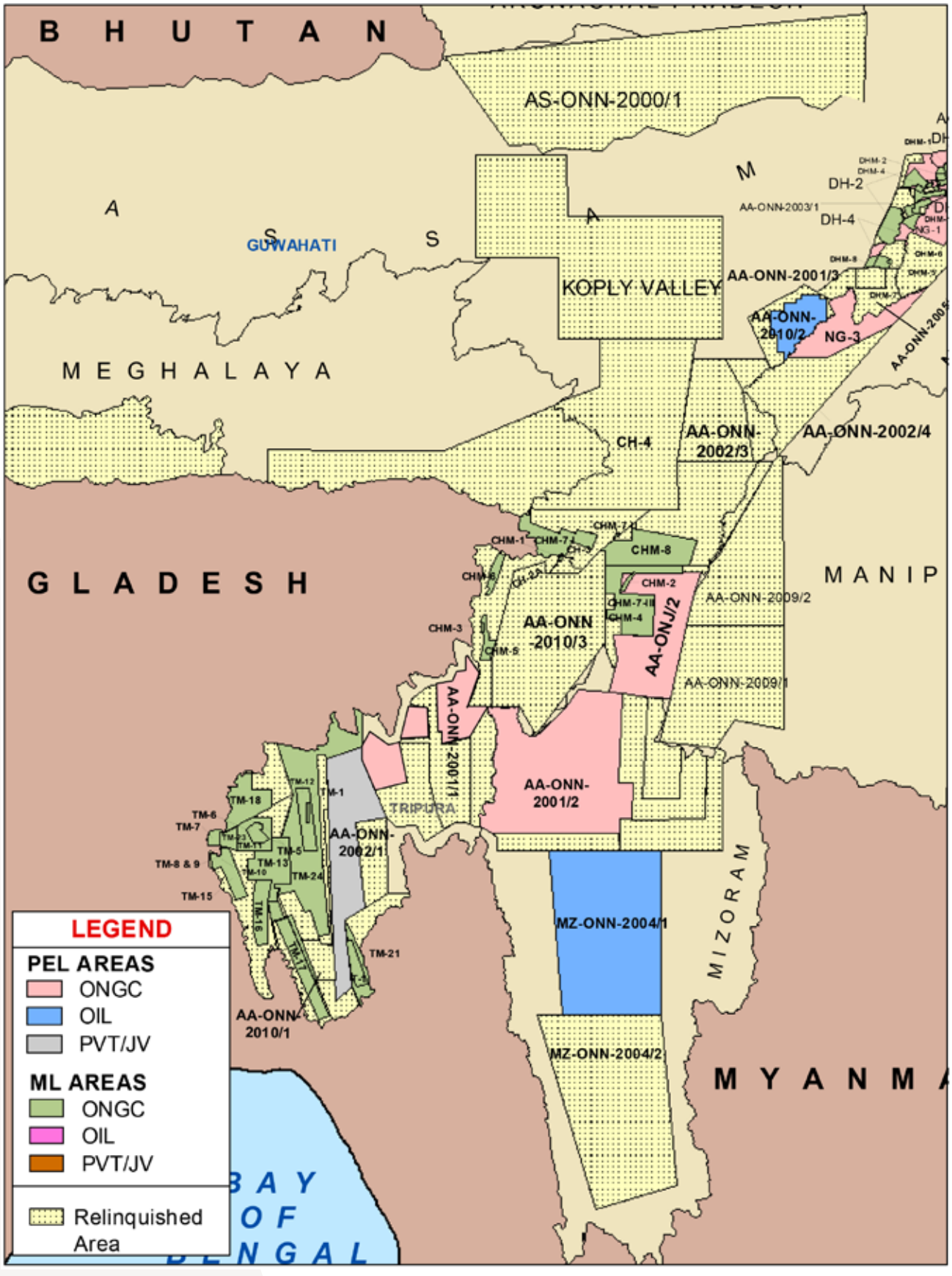
9. ASSAM - ARAKAN BASIN



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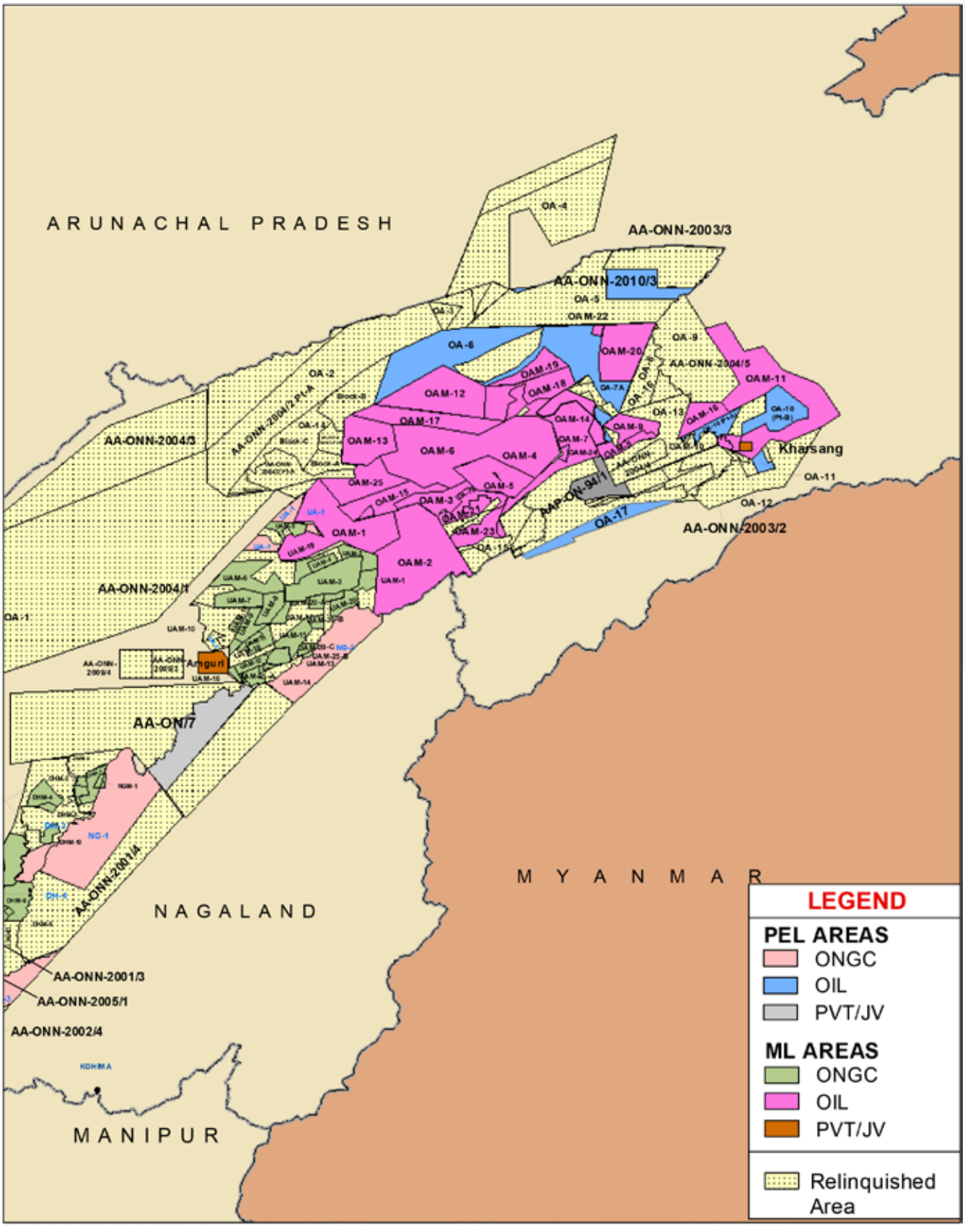
10. ASSAM-ARAKAN SHELF BASINS



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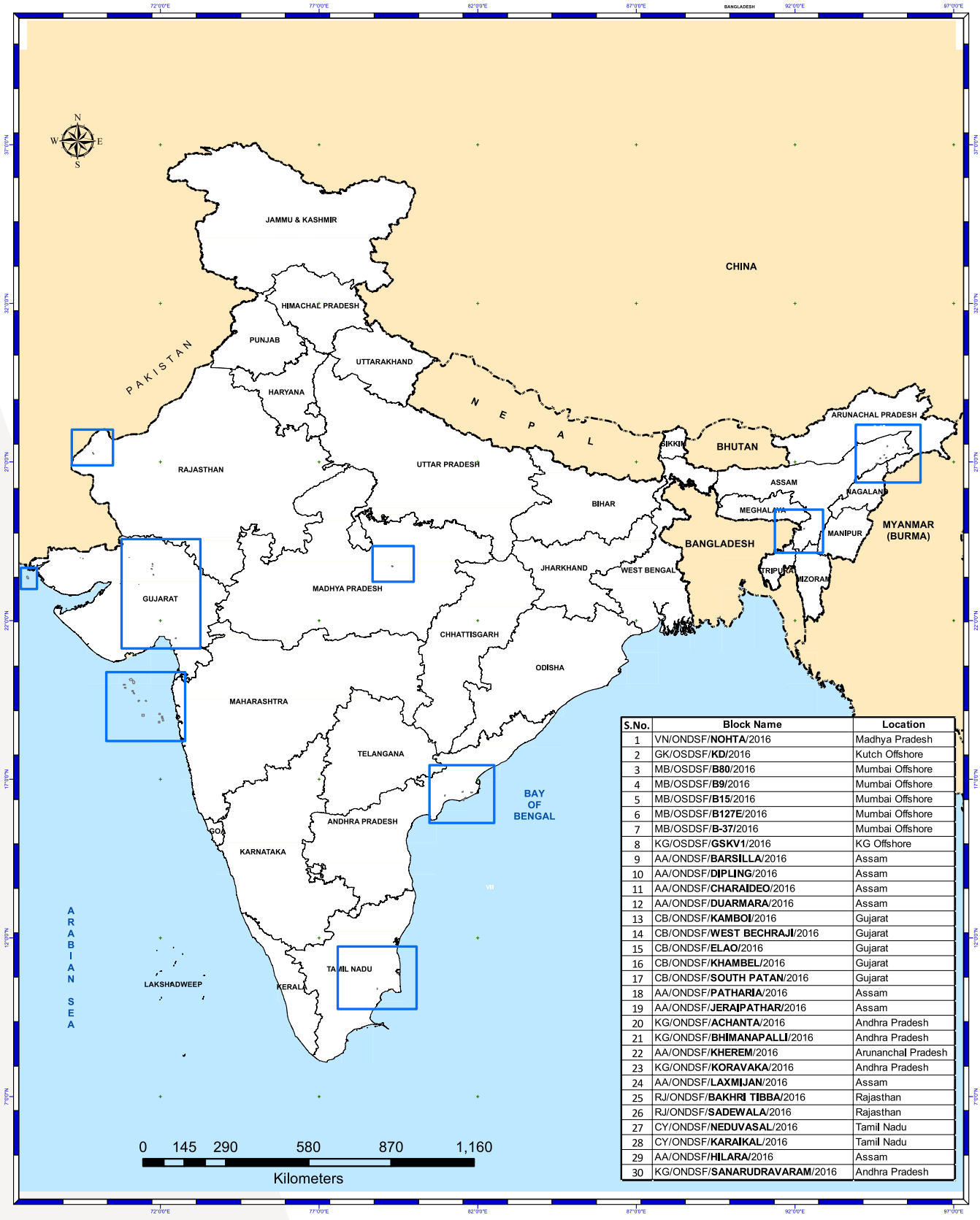
DSF Blocks Awarded under DSF Round-2016



S.No.	Block Name	Location
1	VN/ONDSF/**NOHTA**/2016	Madhya Pradesh
2	GK/OSDSF/**KD**/2016	Kutch Offshore
3	MB/OSDSF/**B80**/2016	Mumbai Offshore
4	MB/OSDSF/**B9**/2016	Mumbai Offshore
5	MB/OSDSF/**B15**/2016	Mumbai Offshore
6	MB/OSDSF/**B127E**/2016	Mumbai Offshore
7	MB/OSDSF/**B-37**/2016	Mumbai Offshore
8	KG/OSDSF/**GSKV1**/2016	KG Offshore
9	AA/ONDSF/**BARSILLA**/2016	Assam
10	AA/ONDSF/**DIPLING**/2016	Assam
11	AA/ONDSF/**CHARAIDEO**/2016	Assam
12	AA/ONDSF/**DUARMARA**/2016	Assam
13	CB/ONDSF/**KAMBOI**/2016	Gujarat
14	CB/ONDSF/**WEST BECHRAJI**/2016	Gujarat
15	CB/ONDSF/**ELAO**/2016	Gujarat
16	CB/ONDSF/**KHAMBEL**/2016	Gujarat
17	CB/ONDSF/**SOUTH PATAN**/2016	Gujarat
18	AA/ONDSF/**PATHARIA**/2016	Assam
19	AA/ONDSF/**JERAIPATHAR**/2016	Assam
20	KG/ONDSF/**ACHANTA**/2016	Andhra Pradesh
21	KG/ONDSF/**BHIMANAPALLI**/2016	Andhra Pradesh
22	AA/ONDSF/**KHEREM**/2016	Arunanchal Pradesh
23	KG/ONDSF/**KORAVAKA**/2016	Andhra Pradesh
24	AA/ONDSF/**LAXMIJAN**/2016	Assam
25	RJ/ONDSF/**BAKHRI TIBBA**/2016	Rajasthan
26	RJ/ONDSF/**SADEWALA**/2016	Rajasthan
27	CY/ONDSF/**NEDUVASAL**/2016	Tamil Nadu
28	CY/ONDSF/**KARAIKAL**/2016	Tamil Nadu
29	AA/ONDSF/**HILARA**/2016	Assam
30	KG/ONDSF/**SANARUDRAVARAM**/2016	Andhra Pradesh

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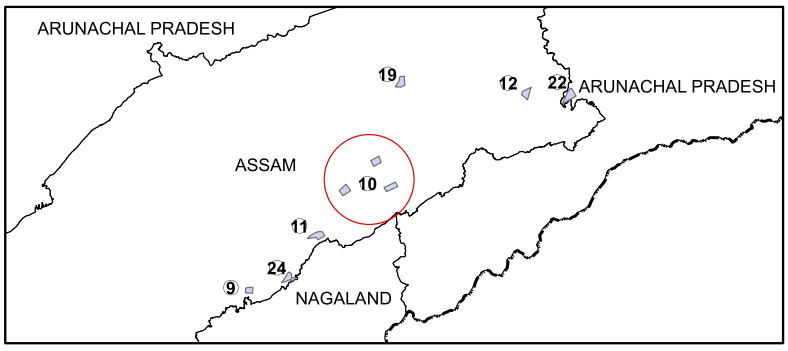

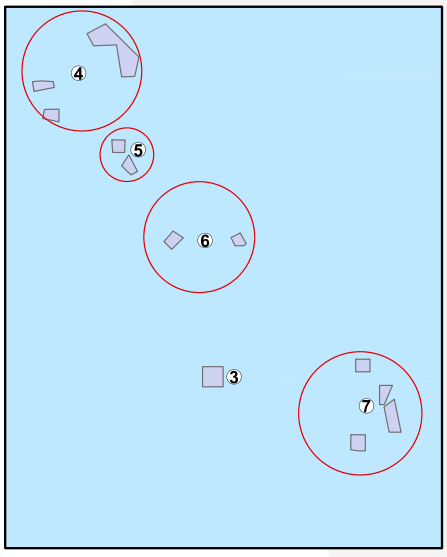

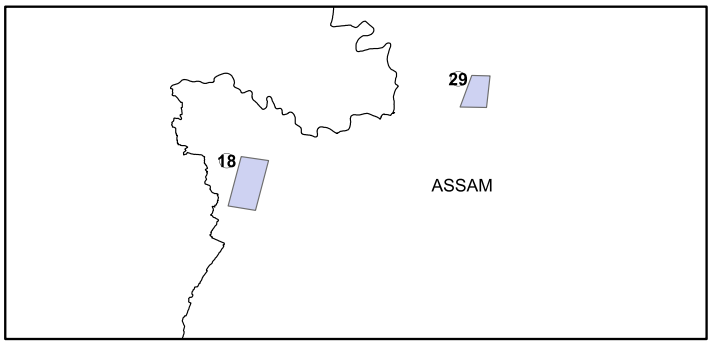

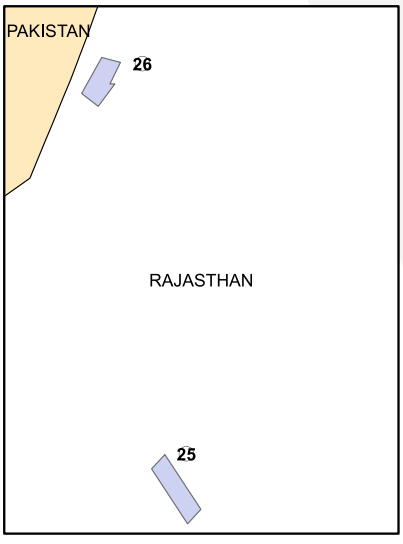

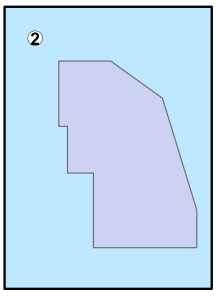

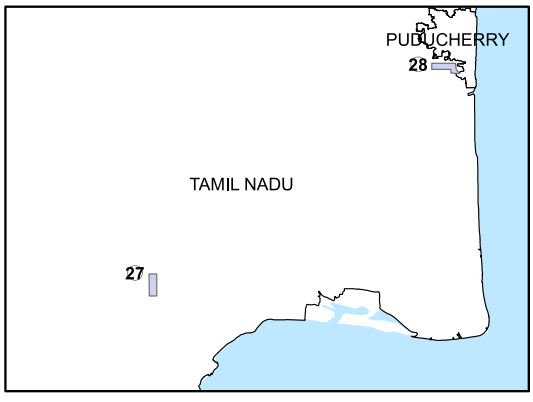

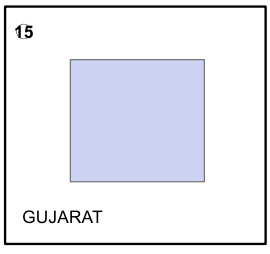

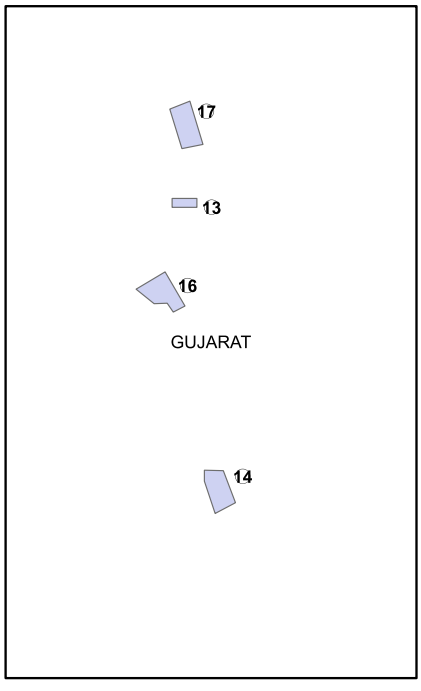

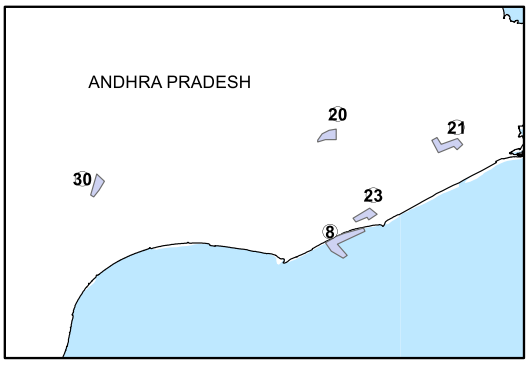

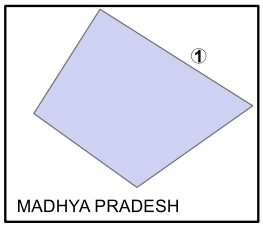

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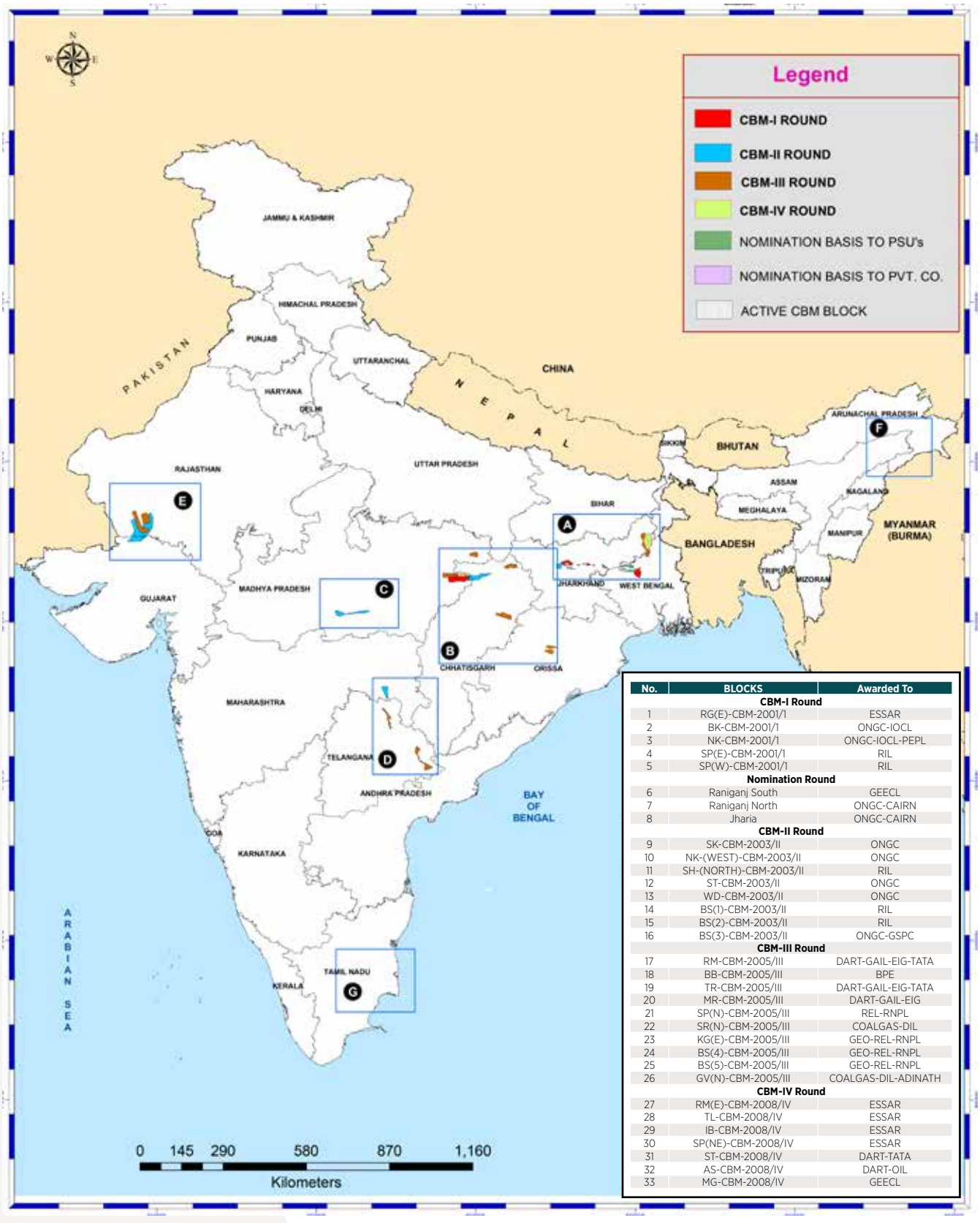
CBM Round-I-II-III-IV



No.	BLOCKS	Awarded To
	CBM-I Round	
1	RG(E)-CBM-2001/1	ESSAR
2	BK-CBM-2001/1	ONGC-IOCL
3	NK-CBM-2001/1	ONGC-IOCL-PEPL
4	SP(E)-CBM-2001/1	RIL
5	SP(W)-CBM-2001/1	RIL
	Nomination Round	
6	Raniganj South	GEECL
7	Raniganj North	ONGC-CAIRN
8	Jharia	ONGC-CAIRN
	CBM-II Round	
9	SK-CBM-2003/II	ONGC
10	NK-(WEST)-CBM-2003/II	ONGC
11	SH-(NORTH)-CBM-2003/II	RIL
12	ST-CBM-2003/II	ONGC
13	WD-CBM-2003/II	ONGC
14	BS(1)-CBM-2003/II	RIL
15	BS(2)-CBM-2003/II	RIL
16	BS(3)-CBM-2003/II	ONGC-GSPC
	CBM-III Round	
17	RM-CBM-2005/III	DART-GAIL-EIG-TATA
18	BB-CBM-2005/III	BPE
19	TR-CBM-2005/III	DART-GAIL-EIG-TATA
20	MR-CBM-2005/III	DART-GAIL-EIG
21	SP(N)-CBM-2005/III	REL-RNPL
22	SR(N)-CBM-2005/III	COALGAS-DIL
23	KG(E)-CBM-2005/III	GEO-REL-RNPL
24	BS(4)-CBM-2005/III	GEO-REL-RNPL
25	BS(5)-CBM-2005/III	GEO-REL-RNPL
26	GV(N)-CBM-2005/III	COALGAS-DIL-ADINATH
	CBM-IV Round	
27	RM(E)-CBM-2008/IV	ESSAR
28	TL-CBM-2008/IV	ESSAR
29	IB-CBM-2008/IV	ESSAR
30	SP(NE)-CBM-2008/IV	ESSAR
31	ST-CBM-2008/IV	DART-TATA
32	AS-CBM-2008/IV	DART-OIL
33	MG-CBM-2008/IV	GEECL

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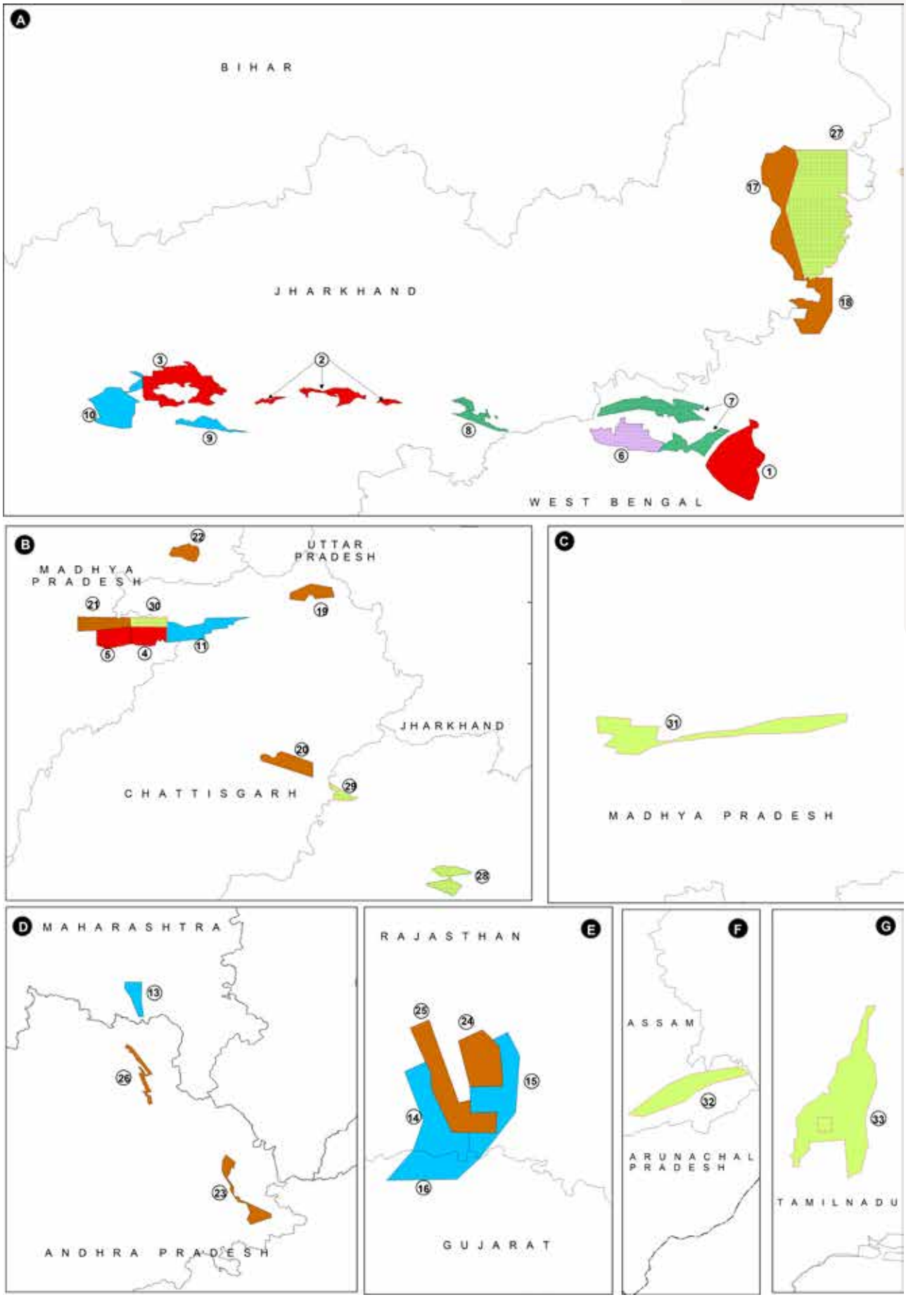

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8.4. INDIAN COMPANIES IN E&P SECTOR

8.4.1. Public Sector Undertakings (PSUs)

Andhra Pradesh Gas Infrastructure Corp. Pvt. Ltd.

2nd Floor, #5-9-58/B, FatehMaidan Road, Basheerbagh
Hyderabad - 500 004, Andhra Pradesh, India
Ph: 040-67304930
Facsimile: 040-67304951
E-mail: info@apgic.in
Website: www.apgic.in

Hindustan Petroleum Corp. Ltd.

Petroleum House, 17, Jamshedji Tata Road,
Mumbai - 400020, Maharashtra, India
Ph: 022-22863900
Facsimile: 022-22872992
E-mail: corphqo@hpcl.in
Website: www.hindustanpetroleum.com

Bharat Petroleum Corp. Ltd.

Bharat Bhavan,
4 and 6 Currimbhoy Road,
Ballard Estate,
Mumbai - 400001, India
Ph: 022-22713000/4000
Facsimile: 022-22713874
Website: www.bharatpetroleum.co.in

Indian Oil Corporation Ltd.

Corporate Office,
3079/3, J B Tito Marg, Sadiq Nagar,
New Delhi – 110049, India
Ph: 011 – 26260000
Facsimile: N/A
E-mail: N/A
Website : www.iocl.com

Bharat Petro Resources Ltd.

Regd. Office: Bharat Bhavan,
4 and 6 Currimbhoy Road,
Ballard Estate,
Mumbai - 400001
Ph: 022-22713000, 022-22714000
Fax: 022-22713874

NTPC Limited

NTPC Bhawan, SCOPE Complex,
Institutional Area, Lodhi Road,
New Delhi – 110003
Ph: 011-24360100, 24387000, 24387001
Facsimile: 011-24361018
E-mail: info@ntpc.co.in
Website: www.ntpc.co.in

Engineers India Limited

EI Bhavan, 1, Bhikaiji Cama Place,
New Delhi - 110 066, India
Ph. : 011-26762121
Facsimile : 011-26178210,
E-mail :eil.mktg@eil.co.in
Website :www.engineersindia.com

Oil & Natural Gas Corpn. Ltd.

Vasant Kunj II, New Delhi, Delhi - 110070
P.D.U.U.B,05 Nelson Mandela Marg
Mobile: 092192 80123
Ph: 011-26752021, 26122148
Facsimile: 011-26129091
E-mail: N/A
Website: www.ongcindia.com

GAIL (India) Ltd.

16, Bhikaiji Cama Place,
R.K. Puram, New Delhi – 110066, India
Ph: 011-26172580. 26182955
Facsimile: 011-26178210, 26194715
E-mail: N/A
Website: www.gailonline.com

Oil India Ltd.

Duliajan – 786 602, District – Dibrugarh
Assam, India
Ph: 0374-2800427
Facsimile: 0374 - 2800433
E-mail: oilindia@oilindia.in
Website: www.oil-india.com

Gujarat State Petroleum Corporation Limited GSPC

Bhavan, Behind Udyog Bhavan, Sector - 11,
Gandhinagar - 382 010, Gujarat, India
Ph: 079-6670 1005
Facsimile: 079-2323 6375
E-mail: info@gspc.in
Website: www.gspcgroup.com

Prize Petroleum Co. Ltd.C/o HPCL, 3rd Floor UCo

Bank Building Parliament Street New Delhi-110 001, India
Ph: 011-23312996
Facsimile: 011-23737898
E-mail: prizepetroleum@prizepetro.com
Website: www.prizepetroleum.com

Bharat PetroResources Limited

Maker Towers, 'E' Wing, 9th Floor,
Cuffe Parade, Mumbai – 400 005
Ph: +91-22-22175600
Facsimile No.: +91-22-22154364
Email: ajay.kumar@bharatpetroresources.in

Indian Oil Corporation Limited

7th floor, Indian Oil Bhawan,
#1, Sri Aurobindo Marg, Yusuf Sarai,
New Delhi – 110 016
Facsimile No.: 91 11 26859276
Ph: 91 11 26518230
Email: uss@indianoil.in

Prize Petroleum Company Limited (PPCL)

3rd Floor, UCO Bank Building, Sansad Marg,
New Delhi -110001
Facsimile No.: 91 11 23737898
Ph: 91 11 23312996
Email: vgulati@hpcl.in

Oil India Limited (OIL)

Plot No. 19, Sector-16A, Noida-201301,
Uttar Pradesh
Facsimile No.: 91 120 2488310
Ph: 91 120 2419000 / 2419200
Email: oilinida@oilinida.in, do@oilinida.in

8.4.2. International Companies

Bengal Energy International Inc.

Suite 2000,715, 5th Ave SW
Calgary, AB, T2P 2x6 Canada
Ph: +1-403-205-2526
Facsimile: +1-403-263-3168
E-mail: info@bengalenergy.ca
Website: bengalenergy.ca

BG Exploration and Production India Ltd.

BG House, Hiranandani Business Park
Lake Boulevard, Powai,
Mumbai – 400 076 India
Ph: 022 4032 5000
Facsimile: 022 4005 8930
E-mail: N/A
Website: www.bg-group.com

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BP India Services Pvt. Ltd. (CBM)

B.P. India Services Pvt. Ltd
15th Floor, Dr. Gopal Das Bhawan
28, Barakhamba Road
New Delhi, DH, 110001
Phone : 011-43755000
Fax : 011-43755001
E-mail: N/A
Website: www.bp.com

BP Exploration (Alpha) Limited

Unit No 71 & 73, 7th Floor, 2nd North Avenue
Maker Maxity, BandraKurla Complex, Bandra (E)
Mumbai – 400051, India
Ph: 022 7177 7000
Facsimile: 22 7177 7001
E-mail: N/A
Website: www.bp.com

Vedanta Ltd. (CIL)

DLF Atria Building,
Jacaranda Marg - N Block,
DLF City Phase II, Gurugram – 122 002,
Haryana, India
Ph : 0124 4593000, 0124 4141360
Facsimile : 0124 414 5612
Email: investor.complaints@cairnindia.com
Website: www.cairnindia.com

South Asia Consultancy FZE (SACF)

402, Orange Mall, Above HDFC Bank
Nr. Chandkheda Bus Stand,
Ahmedabad – 382424, Gujarat
Telephone No.: 91 079 23251243
E-mail: dsrajput@southasiaconsultancy.com,
dsrajput1977@gmail.com

Dart Energy (India) Pty. Ltd. (CBM)

Unit No. 804 & 805
Tower-B, Global Business Park
Mehrauli Gurgaon Road
Gurgaon- 122002, Haryana
Ph: 0124-4990300
Fax: 0124-4990501

Deep Industries Ltd.

Opp. Suryanarayan Bunglows,
Sabarmati Kalol Highway, N.H. No. 8, Motera,
Ahmedabad – 380005, India
Ph: 079-27571128
Facsimile: 079-26862077
E-mail: info@deepindustries.com
Website: www.deepindustries.com

GGR Oil & Gas (India) Private Limited

Plot No. 273/2, Sector 7A
Gandhinagar, Gujarat – 382007, India
Ph: 079-23243684
Facsimile: 079-23243684
E-mail: info@geoglobal.com
Website: www.geoglobalresources.com

ENI India Ltd.

Eros Corporate Tower, Nehru Place
New Delhi -110019, India
Ph: 011-46551000
Facsimile: 011-41608778
E-mail: N/A
Website: www.eni.it

Geopetrol International Inc.

DLF Jasola Tower – A,
624, 6th Floor, DDA District
Center Jasola, Delhi - 110025
Ph: 011-41755008
Facsimile: 011-41755009
E-mail: N/A
Website: www.geopetrol.net

Geopetrol International Inc. (CBM)

DLF jasola Tower – A,
624, 6th Floor DDA District
Center Jasola Delhi-110025
Ph: 011-41755008
Facsimile: 011-41755009
E-mail: N/A
Website: www.geopetrol.net

Gujrat Natural Resources Limited (GNRL)

2nd Floor, V V Mansion, # 6-3-885/7/B/4,
Somajiguda, Hyderabad - 500082
Andhra Pradesh, India
Ph: 040 23332525/4646/5656
Facsimile: 040 23332323
E-mail: www.gnrl.in
Website: gnrl.in

Hardy Exploration & Production (India) Inc.

V Floor, Westminster Building
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Reliance Industries Limited

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8.5. Abbreviations

DGH	Directorate General of Hydrocarbons
2D	2 Dimension
3D	3 Dimension
AOC	Assam Oil Company
API	American Petroleum Institute
ASP	Alkaline Surfactant Polymer
ATCS	Automatic Tube Cleaning System
AVO	Amplitude Versus Offset
BCM	Billion Cubic Meter
BHT	Bottom Hole Temperature
BOC	Burma Oil Company
BOPD	Barrels of Oil Per Day
BPCL	Bharat Petroleum Corporation Limited
CBM	Coal Bed Methane
CCD	Centrifugal Cutting Driers
CCEA	Cabinet Committee of Economic Affairs
CCS	Carbon Capture Storage
CCSP	Carbon Capture and Storage Program
CCU	Carbon Capture Utilization
CMPDI	Central Mine Planning and Design Institute
CRP	Control Riser and Platform
CRZ	Coastal Regulation Zone
CSR	Conductor Slot Recovery
CSS	Cyclic Steam Stimulation
CWI	Carbonated Water Injection
CWT	Continuous Wavelet Transform
DA	Development Area
DFN	Discrete Fracture Network
DoC	Declaration of Commerciality
DRDO	Defence Research and Development Organization
DST	Drill Stem Testing
E&P	Exploration and Production
EAC	Expert Appraisal Committee
EC	Environment Clearance
ECD	Equivalent Circulating Density
EIA	Environment Impact Assessment
EPS	Early Production System
ESS	Expandable Sand Screen
EWPL	East West Pipeline
FC	Forest Clearance
FDP	Field Development Plan
FHGG	Fast Hydrating Guar Gum
FIVs	Formation Isolation Valves
FPSO	Floating Production Storage and Offloading
G&G	Geology and Geophysics
GAIL	Gas Authority of India Limited
GCM	Geo Cellular Modelling
GEM	Gas Export Manifold
GGS	Gas/Group Gathering Station
GIP	Gas In Place
GIPIP	Good International Petroleum Industry Practices
GSPC	Gujarat State Petroleum Corporation Limited
HCPV	Hydrocarbon Pore Volume
HGS	Hollow Glass Sphere
HPHT	High Pressure High Temperature
ICB	International Competitive Bidding
ICG	Indian Coast Guard
INCOIS	Indian National Centre for Ocean Information Services
IOCL	Indian Oil Corporation Limited
IOR-EOR	Improved Oil Recovery- Enhanced Oil Recovery
JIP	Joint Industry Project
JOGMEC	Japan Oil, Gas and Metals National Corporation
KDMIPE	Keshava Deva Malviya Institute of Petroleum Exploration
KLPD	Kilo Litres Per Day
LCM	Lost Circulation Material
LCMD	Lakh Cubic Meters per Day
LD	Liquidated Damages
LKM	Line Kilometer
LWD	Logging While Drilling
MC	Management Committee
MCA	Multi Channel Analyzer
mD	Milli Darcy
MEOR	Microbial Enhanced Oil Recovery
MMbbls	Million Barrels
MMBO	Million Barrels of Oil
MMSCF	Million Standard Cubic Feet
MMSCMD	Million Standard Cubic Meters per Day
MMT	Million Metric Tonne
MoC	Ministry of Coal
MoD	Ministry of Defence
MoEF&CC	Ministry of Environment , Forest and Climate Change
MoHA	Ministry of Home affairs
MoP&NG	Ministry of Oil and Natural Gas
MoU	Memorandum of Understanding
MPD	Managed Pressure Drilling
MPT	Mangala Processing Terminal
MT	Magnetotelluric/Thousand Tonnes
MWP	Minimum Work Program
NDR	National Data Repository
NELP	New Exploration Licensing Policy
NGHP	National Gas Hydrate Program
NIOT	National Institute of Ocean Technology
NoCs/Pvt/JV	National Oil Company/Private/Joint Venture
NOS-DCP	National Oil Spill - Disaster Contigency Plan
O+OEG	Oil plus Oil Equivalent Gas
OALP	Open Acreage Licensing Policy
OIDB	Oil Industry Development Board
OIL	Oil India Limited
ONGC	Oil and Natural Gas Corporation Limited
ONGD	Oil and Natural Gas Directorate
OOSA	Online Oil Spill Advisory
PCI	Potential Commercial Interest
PDB	Paraffin Deposition Bacteria
PEL	Petroleum Exploration License
PHPA	Partially Hydraulised Polyacrylamide
PLEMs	Pipeline End Manifold
PML	Petroleum Mining Lease
PSC	Production Sharing Contract
PSDM	Post Stack Depth Migration
PSI	Pounds per Square Inch
PSUs	Public Sector Undertaking
PVT	Pressure Volume Temperature
RCA	Reservoir Connectivity Analysis
RDG	Raageshwari Deep Gas
RIL	Reliance Industry Limited
RRR	Reserve-Replacement Ratio
SACEP	South Asia Co-operative Environment Program
SBM	Synthetic Oil Based Mud
SCAL	Special Core Analysis
SCMD	Standard Cubic Meter per Day
SKM	Square Kilometer
SOBM	Synthetic Oil Based Mud
SRFS	Site Restoration Fund Scheme
STOIIP	Stock Tank Original Oil-Place
TCF	Trillion Cubic Feet
TMT	Thousand Metric Tonnes
TPD	Tonnes Per Day
TVDSS	True Vertical Depth Sub Sea
UAT	User Acceptance Test
US DOE	United States Department of Energy
USGS	United States Geological Survey
VSP	Vertical Seismic Profiling
WAG	Water Alternating Gas
WARP	Weighting Agent Reduction Particle
WP&B	Work Program and Budget
WSO	Water Shut off

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