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CAIRN

Unlocking Offshore Hydrocarbon Potential

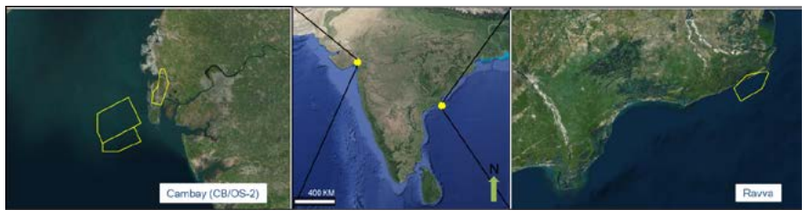

Figure-1: Offshore Development Blocks

Cairn Oil & Gas has been producing oil and gas from two of its offshore blocks i.e., Ravva located in the east coast of India and CB/OS-2 of the Cambay basin located in the west coast of India.

Ravva Block

Ravva Block PKGM-1 is located on the eastern passive margin of India and is a part of the Krishna Godavari Basin. Ravva field comprises of series of rotated fault block structure with an Oligo-Miocene reservoir sequence, hydrocarbons are trapped within multiple stacked fluvial and coastal plain reservoirs that are highly compartmentalized in nature. The producing Middle and late Miocene clastic reservoirs of Ravva consists of unconsolidated high porosity and high permeability sandstone with premium quality light hydrocarbons.

Ravva field was discovered in 1987 and put on production in April 1993. Production was successfully ramped from 3,500 boepd to a plateau of around 50,000 boepd. The production plateau was significantly extended before it declined in 2008 and the field is continuously producing for last 30+ years with a recovery factor of more than 50%, outperforming average industry standards. The success story of Ravva is attributed to the focused development strategy, regular infill drilling of the wells and sound reservoir management practices. The usage of integrated seismic interpretation, subsurface mapping and geological modelling helped in gaining improved understanding of oil and gas distributions in different stratigraphic intervals for creating a focused development strategy. Several in-fill and near-field drilling opportunities were identified, derisked and improved the chances of success of the planned well locations and drilled the wells in six phases.

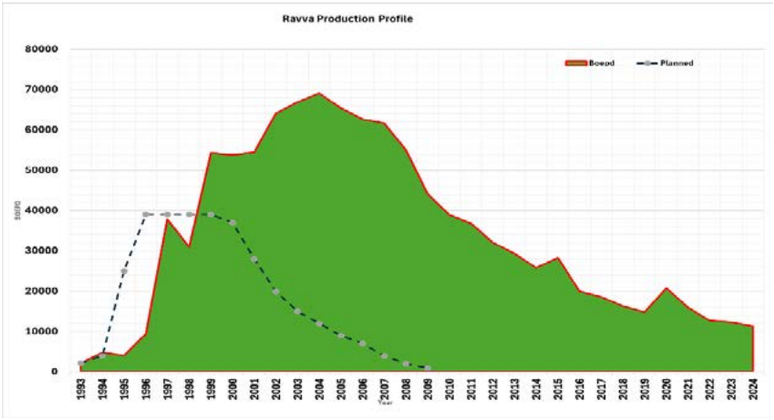

Figure-2: Ravva Actual Production profile vs Planned at start of the field life

The challenge of extending and optimising production from this mature field is addressed by integrated approach to reservoir management and studies with a state-of-the art technology applications like 3D Ocean Bottom Cable (OBC) seismic, spectral decomposition, Amplitude v/s Offset (AVO) seismic reflectivity attributes like fluid factor, the inverted elastic properties and reservoir surveillance. Along with the world-class production surveillance and optimization work, multi-disciplinary integration of geoscience, 4D seismic and engineering studies has further helped in identifying areas of unswept / sweet spots in reservoir and subsequent drilling campaigns helped in increasing and sustaining the production by tapping these high potential areas.

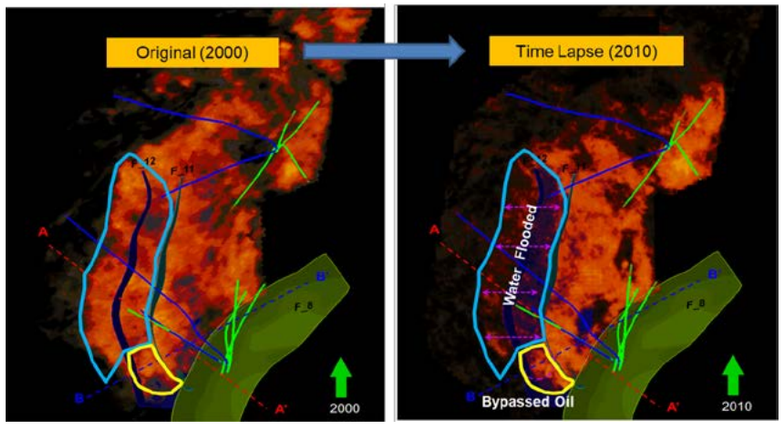

Figure-3: Bypassed oil identification through 4D seismic

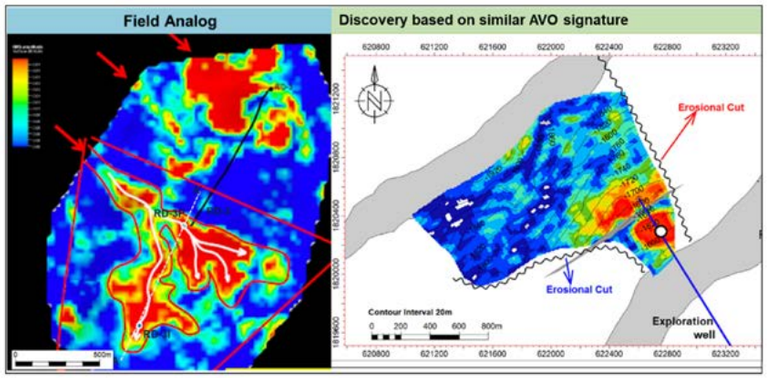

Figure-4: Exploration prospect matured on the basis on proven field data

With the success of AVO seismic reflectivity attributes and multi-disciplinary integration of geoscience in the main field area, near field exploration opportunities were identified and matured. This has led to a successful discovery in the previous drilling campaign and helped in increasing R&R of Ravva.

Additionally, more near-field exploration and infill wells maturation and execution planning are in progress for the production growth in the Ravva offshore in near future.

CB/OS-2 Block

CB/OS-2 Block is situated in the Cambay Graben, one of several failed rifts in the region. The basin fill consists of shallow marine clastics deposited during Palaeocene through recent times. The main producing intervals are of Early Miocene age and consists of unconsolidated high porosity and high permeability sandstone with premium quality light hydrocarbons.

The CB/OS-2 block is sub-divided into Lakshmi and Gauri fields. The CB/OS-2 development in the Cambay Basin, have been a key success story of brown field development, transitioning from a depleting gas field to an oil producing asset through effective application of innovative technologies. In CB/OS-2 block, one of our significant challenges was the development of thin, oil sands in a Miocene section beneath existing thick gas reservoirs. Due to the masking effect by overlying thick gas sands, imaging and mapping of vertically stacked discrete and interbedded oil reservoir is quite difficult with conventional seismic techniques. In order to remove the

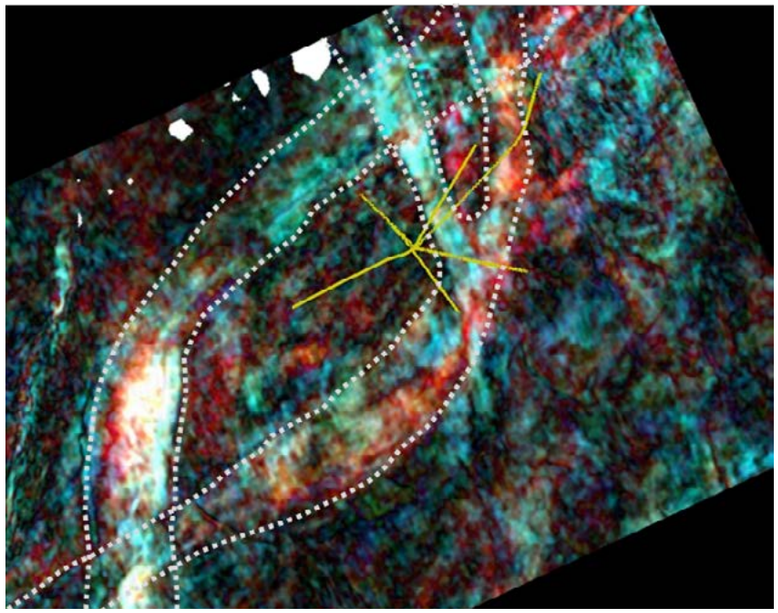

Figure-5 : Delineation of sand fairways through spectral decomposition technique

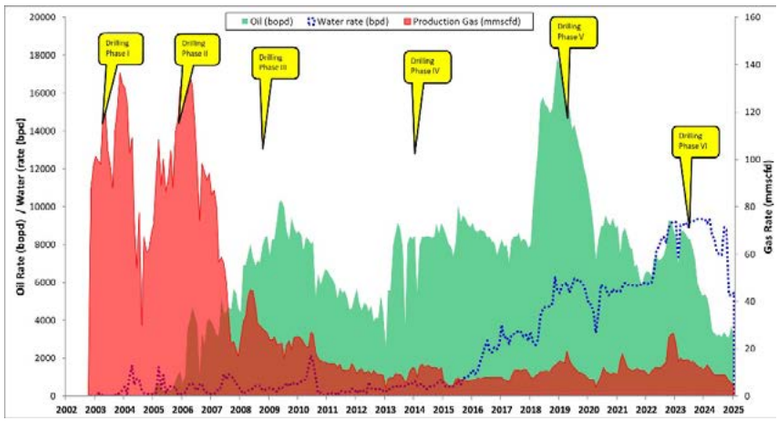

Figure 6: CB Production profile

Figure-4: Exploration prospect matured on the basis on proven field data

masking effect, Q-PSDM reprocessing was undertaken that helped in effective compensation of masking effect of the shallow gas sands. Q-PSDM helped in compensating the phase, frequency and amplitude losses, and seismic attributes coupled with spectral decomposition technique, especially Continuous Wavelet Transform (CWT) approach helped in delineating the geomorphology of individual sand reservoirs optimally. Advanced technology like geostatistical inversion study has been carried out recently for improved reservoir and fluid characterization towards identification of infill opportunities for the production growth in the Cambay offshore.

Multiple infill campaigns using above applications have helped in targeting the deeper oil reservoirs, thereby historically increasing the oil production from ~ 10000 bopd to 18000 bopd post 2017-18 campaign. With current decline (~10000 boepd) in the field operator is planning to drill further infill wells guided by the seismic studies described in the previous section.

Last infill drilling campaign has executed extended reach well to tap into high potential reservoirs farther away from the platforms. This has enabled in tapping to proven pools in the block and increase overall EUR of the block.

Future infill campaign opportunities and near field exploration opportunities are being looked into to increase the life of the field.

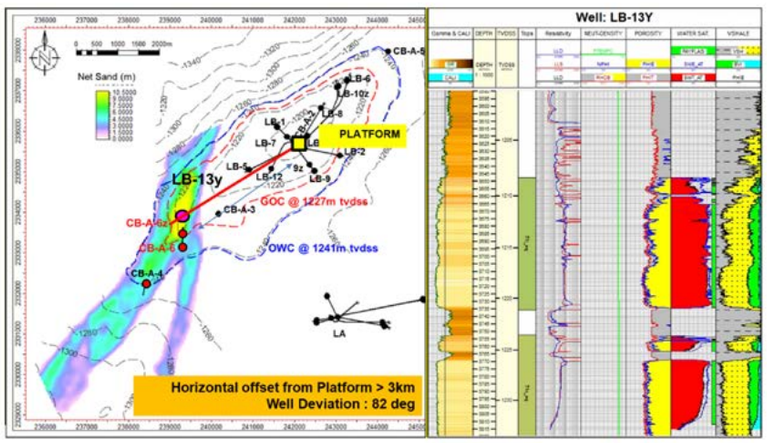

Figure 7: ERD well drilled successfully in the block

EXPLORE INDIA WITH CAIRN

Cairn Oil & Gas, part of Vedanta Limited, is India's largest private oil and gas exploration and production company, contributing about a quarter of India's domestic production. With a world-class resource base, Cairn has an interest in 62 blocks in India spread over 60,000 square kilometres with gross 2P (Gross Proved Plus Probable Reserves) and 2C (Gross Contingent Reserves) of 1.4 bn boe.

Cairn has producing assets across Rajasthan, Andhra Pradesh, Gujarat, and Assam, and has spearheaded several technological innovations with high-reward prospects, over the last 30 years of its operations. The company has a vision to contribute 50% of domestic production, executing one of the largest exploration projects in India across its diversified portfolio comprising conventional and unconventional projects such as Tight Oil & Gas, Deep & Shallow Water, ASP and CBM, reinstating the faith in the country's hydrocarbon potential.

Cairn is committed to achieving Net Zero by 2030 by prioritising environmental resilience and is driving transformative social impact at scale. It has become the first Indian company to sign the United Nations Environment Programme's methane reporting and reduction initiative – OGMP 2.0.

30 YEARS OF ENERGISING INDIA

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