



ORAL PRESENTATION

Day 3: 9th March 2023

Session 12: INDONESIA PAST AND FUTURE HOTSPOTS

Co-Chair: Ian Collins, Indosean Resources

Co-Chair: Colin Murray, SundaGas

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ORAL PRESENTATION

Pre-Terumbu clastic Plays in the Tuna PSC, East Natuna Basin, Indonesia

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The Tuna oil and gas field, Tuna PSC, is located in the Natuna Sea 260km north of Natuna Besar Island, Indonesia. Geologically the field is within the East Natuna basin, bounded to the north by the Nan Con Son Basin in Vietnam, to the south and east by the Sarawak Basin of Malaysia, and to the west by Natuna Arch, which separates this basin from West Natuna. The basin comprises several sub-basinal areas which formed during the Neogene as a result of extension associated with the opening of the South China Sea. Several small half-grabens occur in the northern part of the Tuna PSC forming the structural closure for the Tuna Field, where Upper Oligocene Gabus and Lower Miocene Terumbu Formation clastics form the main reservoirs.

Exploration in the East Natuna Basin began in the 1970's, mainly targeting the Upper Terumbu Formation carbonate buildups, which were easily mapped on available 2D seismic data. Initial wells were drilled in the 1970's by AGIP, followed by Mobil, Total, Amoseas and Exxon. Some discoveries were made including the supergiant D Alpha field (high CO₂ gas) discovery by AGIP in 1973, and also by Mobil at Bursa-1 (oil). However tests of carbonate buildups located further up on the Terumbu platform were generally dry and this has been attributed to the absence of top seal (Muda Formation) when hydrocarbon expulsion occurred. However, the clastics underlying the Terumbu carbonates have remained relatively under-explored partly due to poor seismic imaging on the older data, with many wells not optimally located for testing of these deeper intervals. Acquisition and processing of more recent seismic data including multiclient 2D and the 2009 3D seismic survey over the Tuna PSC has produced large improvements in imaging under the Terumbu carbonates. This has permitted more accurate mapping of the lower Terumbu, Arang and Gabus levels and facilitated dry hole analysis of many of the older wells across the area. It also yielded a number of new prospects across the Tuna PSC, some with 'bright spot' anomalies, including the adjacent Kuda Laut and Singa Laut structures in the northern part of the Tuna PSC

In 2014 Harbour Energy (formerly Premier Oil) discovered hydrocarbons in Lower Terumbu and Gabus sandstones in the Kuda Laut-1 and Singa Laut-1 wells. This confirmed the exploration potential of the clastic play in East Natuna, having already been recognized to the north at the Chim Sao and CRD fields in Vietnam. The 2014 discoveries, now known as the Tuna Field, consists of two structures separated by a NE-SW trending normal fault which juxtaposes the main reservoir of Lower Terumbu sandstones in the hanging wall (Kuda Laut) structure against the main reservoir Gabus sandstones in the footwall (Singa Laut) structure. The field has been appraised by two additional wells in late 2021 confirming the presence of rich/wet gas with a high condensate yield, but also encountering oil rims, underlying the previously discovered gas columns. The wells included conventional cores, a full wireline dataset, and three DST's to provide sufficient appraisal data to constrain resource estimates, determine development concepts and to support the submission, and subsequent approval of POD I for Tuna Field at the end of 2022.

SPEAKER BIOGRAPHY

Dono Mulyono gained a bachelor degree in Geological Engineering at Bandung Institute of Technology, in 1999 and has subsequently worked as an Exploration Geologist at Kondur Petroleum, Semco, PetroChina, Petronas and Vico covering Sumatera and East Kalimantan regions. Since 2010 has been Natuna and Tuna Sea Exploration Team Leader at Premier Oil - Harbour Energy Indonesia, where his role to deliver exploration programme in the operated blocks and new ventures opportunities in Natuna Sea.



ORAL PRESENTATION

New CGG Data Technology Initiatives - Pseudo 3D Technology and Interpretation Results for Indonesia Datasets

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The availability and coverage of legacy seismic data within Indonesia, represents a key challenge for developing existing assets and progressing new exploration initiatives. CGG has undertaken a major global data collection initiative, with the objective of developing enhanced datasets and data derivative products, through the application of high-end reprocessing technology and interpretation. A key focus area for these initiatives is Indonesia, where advanced Pseudo 3D interpolation tests have been undertaken on legacy 2D data. The resulting Pseudo 3D volumes have demonstrated significant data uplift, and enhanced capabilities for identifying and delineating depositional features. The results and observations discussed herein, are derived from interpretation of a new Pseudo 3D volume generated from legacy 2D data within the Asahan Arch area, at the southeastern extent of the North Sumatra Basin. The interpretation results have demonstrated enhanced interpretation capabilities with important implications for exploration.

SPEAKER BIOGRAPHY

Jarrad Paul Grahame currently holds the position of Technical Business Development Manager with CGG Earth Data (formerly Multi-Client & New Ventures) for the Asia-Pacific region. Jarrad completed a BSc in Exploration Geophysics at Curtin University of Technology in Perth, Western Australia before joining the oil and gas exploration industry in 2010. Jarrad has extensive experience in seismic interpretation and integration of well and seismic datasets for both onshore and offshore basins, including clastic and carbonate resource plays. Jarrad has worked on basins in Australia, South-East Asia, Europe and North America, encompassing a range of tectonic environments. Jarrad is a member of PESA, SEG, SEAPEX and AAPG



ORAL PRESENTATION

Regional Biogenic Gas Potential in South Sumatra: A Case Study in the Lebong Region of Palembang Sub-Basin

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South Sumatra has demonstrated resilience in developing its petroleum resources for over a century of commercial production. Although a mature basin, enhanced secondary production operations and innovative exploration have maintained South Sumatra as an integral part of Indonesia's oil and gas industry. Strong commodity prices, an extensive network of pipelines, and an undersupplied domestic market continue to make South Sumatra a commercially attractive region for current production and further innovative exploration. This setting now supports the exploitation of previously overlooked low density (and low risk) shallow biogenic gas in proximity to underutilized gas pipelines and expanding gas markets.

The Lebong region adjacent to Palembang is an excellent example of the typical belowground Sumatra setting of this biogenic gas resource - likely more commonly present throughout the South Sumatra region than is currently recognized. Surprisingly good deliverability from limited historic production in the Lebong region, and material reserves from ubiquitous stacked shallow gas pay adjacent to actively utilized infrastructure highlights the commercial viability of this biogenic gas play, making this emerging play type a strong candidate to contribute to the GOI vision of increasing gas production to 12 Bcf/d by 2030.

SPEAKER BIOGRAPHY

Mr. Sykora is a professional geologist and an oil and gas entrepreneur with 40 years of experience in onshore and offshore petroleum exploration and business development in North and South America, Russia, Australia, Africa, Arabia and SE Asia. He has previously held exploration, business development, senior country and regional management positions with Gulf Canada, Nexen, Talisman and Bukit Energy and has been an integral part of oil and gas discoveries and developments in Northern and Western Canada, Yemen, Nigeria, Vietnam, PNG, and Indonesia. He is founder and President of Canadian International Energy Corp.



ORAL PRESENTATION

'PAY DIRT' & Other Tales from the Sunda Basin

Andy Wight¹

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The exploration boom of the latest C20th in Indonesia was a whirlwind of exciting activity, both on- and offshore. These are some memories of exploration in times when coloured pencils were used to denote seismic horizons, seismic was 2D and often mis-located, and Risk Analysis was only something for bankers. Stories of those halcyon days include a 'colourful' case history of an unconventional method of oil-finding in IAPCO's Sunda Basin PSC.

SPEAKER BIOGRAPHY

Andy has worked in the oil industry for about 40 years (now, he can't remember exactly how many) mainly in Asia and especially his beloved Indonesia. Before a UK-based period in the oil industry during the 1970's, he earned BSc geology and PhD vertebrate paleo degrees at Bristol University, with a brief interlude emigrating to Canada in 1967, then returning to hunt for Tertiary vertebrates in the middle of the Sahara desert (with imperfect timing, as it was Libyan Coup time, September, 1969!).

Abandoning his dusty fossil bones for a more oily pursuit, he took to exploration, in the N. Sea, Irish Sea, UK and Italy onshore, respectively with SAMEGA (mud-logging), Gas Council Exploration then Transworld Petroleum until Oct. 1979, when he moved, en famille, to Jakarta, where a planned two-year stay ended up lasting 23 years! During that time, he enjoyed exploring Indonesia's vast cultural and recreational activities, especially climbing the volcanoes of Java and founding 'Java Lava' climbing group. He even claims he also managed to have discovered some oil for IAPCO, in their offshore SE Sumatra block, and latterly in 50 or so other New Venture areas.

Following a series of mergers, the IAPCO company name disappeared, replaced successively by Diamond Shamrock/Maxus, YPF, REPSOL and CNOOC. With YPF-REPSOL, he was posted to Malaysia in 2003, then, after the 'YPF' title 'became silent' and the Indonesian properties had been sold to CNOOC, he moved to Madrid where he worked eight years for REPSOL in groups exploring Libya and the Far East, 'retiring' in August 2011. Soon, he was easily lured back to the Far East to consult for another three years in 'KL' for Mitra Energy Ltd., before finally retiring in 2014. He now lives in Bucks, UK with his lovely wife Gill, whilst their two children, Sarah and James, who partly grew up in Indonesia, are both now living and working in the UK.