

Paradigm Shift in East Coast Canada: The Lightning of Flemish Pass Oil

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Abstract:

The Flemish Pass Basin is a Mesozoic extensional basin located 500 km offshore Newfoundland in 1000-1100 m of water. Statoil operates 5 Exploration Licences and 2 Significant Discovery Licences (SDL) covering 8500 km²; a case of genuine early access at scale with impact potential.

Five wildcat wells in central Flemish Pass have yielded four discoveries with Berriasian and upper Tithonian reservoir quality sandstones, and Kimmeridgian marine source rocks. The Mizzen O-16 (StatoilHydro 2009) discovery flow-tested 21^o API oil at 3800 bopd, resulting in the first Significant Discovery Licence in Flemish Pass in 2010. A 2011 appraisal well determined the OWC and constrained Mizzen to 100 to 200 mmbbl recoverable. However, the prevailing paradigm following the Mizzen discovery was that of Flemish Pass as a source limited basin in a heavy oil province. Its location in deep water far from shore, in an area of harsh North Atlantic conditions, yielded a rather poor recipe for commercial success.

To shift the heavy oil paradigm, Statoil embarked on a robust subsurface technical program, the key elements of which were seismic frequency spectral decomposition and true amplitude AVO integrating walk away VSP data to predict reservoir and depositional patterns, and geochemical analysis and petroleum systems modeling (PSM) to predict model hydrocarbon accumulations. The PSM comprised a robust overall geological model incorporating spatial and temporal variations in fault transmissibility. The model was calibrated to both the heavy oil and fill level of Mizzen, however it predicted medium quality 30^o API oil in the adjacent Harpoon and Bay du Nord prospects, with abundant migration in the Bay du Nord fetch area. In June 2013, the Harpoon O-85 well discovered light sweet oil in Tithonian fluvial sandstones confirming that the PSM was directionally correct toward higher quality oil. Bay du Nord C-78 spudded in July and also found 34^o API oil in high quality Tithonian reservoirs. Bay du Nord was announced as a significant discovery on September 26th and is estimated to contain more than 300 mmbbl recoverable oil. With about half a billion barrels of recoverable contingent resources proven and many potential impact prospects being matured for testing with the drill bit, the Flemish Pass paradigm has shifted toward a new light oil province.