

Goliat Discovery – A Knowledge-Based Approach and Persistence and the First Commercial Oil Development in the Norwegian Arctic

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ABSTRACT

The history of the first commercial oil discovery and development in the Barents Sea, made by Eni Norge, dates back to 1997 when the license acreage was awarded. The first well was drilled in September 2000 and discovered 43 m of oil column in the Upper Triassic part of the Realgrunnen Subgroup. The Goliat play is a four-way rollover down-faulted structure with fluvial deltaic Norian sandstones sourced by Upper Jurassic shales. The Goliat structure is located on the southern edge of the Hammerfest Basin and in the initial interpretations Goliat was considered to be too far away from the main kitchen area to the west of the Hammerfest Basin, especially in comparison with other larger structures closer to the basin axis. The Goliat discovery in 2000 came after 20 years of exploration drilling in the Barents Sea with just one commercial discovery, i.e. the greater Snøhvit gas field (brought on stream in 2007), over 54 exploration wells at that time. As a consequence, the discovery of Goliat came as a great surprise for the Norwegian oil industry and resulted in the widespread acceptance of Norsk Agip/Eni Norge's innovative geological concept of "long-distance" migration and oil entrapment at the "basin margins/borders". Of particular importance are the results of the third well in Goliat drilled in 2005. In addition to the discovered hydrocarbon column of 68 m in the Realgrunnen reservoir, the well penetrated an oil column of 80 m in the fluvial to deltaic sandstones of the Middle Triassic Kobbe Formation, which was the secondary well target but subsequently became the main oil pool in the Goliat Field. The oil in the Kobbe Formation is sourced from Lower and Middle Triassic shales. The results of the third well were a "game changer" for the Goliat discovery. The oil discovery in the Kobbe Formation opened a new play concept in the Hammerfest Basin and provided a solid basis for a viable development, the first oil development in the Norwegian Arctic. Today, the Goliat Field is operated by Eni Norge with a 65% interest, in partnership with Statoil 35%. Goliat is the first oil field to come on stream (March 2016) in the Norwegian part of the Barents Sea. Located at 71°30' North, the field is also the world's northernmost offshore development. Recoverable reserves are estimated to be 174 million BOE and according to the current development scheme the field will be produced through 22 wells all of which are tied back to the Goliat FPSO. Goliat represents a valuable legacy for Eni Norge. The Goliat Field is the result of a challenging, long and successful exploration and appraisal campaign of Eni Norge in the Norwegian Arctic. The established and refined play model for Goliat has been applied to make the additional oil discoveries of Nucula in the eastern vicinity of Hammerfest Basin and Johan Castberg in the Bjørnøya Basin. Historically, top seal failure, leakage and oil biodegradation were the major risk parameters in shallow buried structures in Barents Sea. With the build-up of deep geologic knowledge, Eni Norge is now able to tackle the additional risk elements, such as locally unpredictable reservoir facies distribution and complex migration pathways that have been somewhat underestimated in the initial play models. Over the years, the company has built an important database and a knowledge-based approach to the exploration of the Barents Sea. The use of the latest technologies, dedicated R&D projects and the drilling

of appraisal wells to confirm the hydrocarbon accumulations have allowed the company to grow its reserve base through exploration and, ultimately, to increase daily production substantially when the Goliat Field came on stream in March 2016.