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Integrated Assessment of a Frontier Play Fairway - The North Danmarkshavn Salt Basin

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SUMMARY

This paper presents the application of an integrated approach to assessment of the North Danmarkshavn Salt Basin (NDSB) play fairway. The approach used in the assessment of the Yet-to-Find potential of the NDSB integrates a quantitative version of CRS (common risk segment) mapping, a feature-based approach to assessment of YTF potential and a couple of alternative activity based approaches to modeling the exploration and exploitation of the play fairway.

This paper presents the application of an integrated approach to assessment of the North Danmarkshavn Salt Basin (NDSB) play fairway. The NDSB is a frontier play off the North East coast of Greenland. Given the harsh, inhospitable conditions in the basin, where the basin is under year-round ice, it is important to situate resource potential in the context of an economic assessment within a reasonable exploration horizon.

The approach used in the assessment of the Yet-to-Find potential of the NDSB integrates a quantitative version of CRS (common risk segment) mapping, a feature-based approach to assessment of YTF potential and a couple of alternative approaches to activity-based modeling the exploration and exploitation of the play fairway.

The NDSB is a large (approximately 23 000 km²), very deep sedimentary offshore basin (100-300 m water depth) that is part of the East Greenland rift basin. There is limited data on the basin (a couple of seismic lines) and no wells.

As implied by the label, the basin is assumed to be dominated by structures formed through salt tectonics, more so in the axis than the margin of the basin (Hamman et al, 2005). There appears to be a thinning of Tertiary sedimentary succession in the Northern part of the basin.

The assessment uses a feature based approach where there are only postulated features. Feature density and field size distributions are based on an analysis of analogs in the Barents Sea (Nordkapp Basin) as well as World Analog data from the USGS. In order to model exploration and exploitation with only postulated prospects (features), the analysis considers two alternative approaches to modeling exploration and exploitation. In the first approach, features are assumed to cluster around one or two large prospects. The YTF assessment engine produces an estimate of size by rank. Exploration activities are assumed to have Dry Cluster Risk Tolerance (DCRT). The 'DCRY used in the assessment assumes that if two "stars" in the cluster are dry, then exploration is terminated. Exploration moves to a new cluster if the star is dry.

In the second approach, the analysis uses the total conditional (i.e., play works) yet-to-find (YTF) potential as a resource potential. The number of exploration wells drilled determine the resource potential that is discovered. The model assumes that there is an exploration horizon (15 years) to build a resource base for an effective exploitation.

Results are estimates of risks and estimates of YTF potential in part-plays as well as for the NDSB as a whole. Aggregation honors risk dependencies between part-plays. The analysis also reports stochastic estimates of the production volumes and cumulative production (recoverable reserves) as well as estimates of NPV (net present value). The assessment of YTF potential is fully documented by the CRS maps as well as the maps that are used for key inputs such as feature density and field size distributions.