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Quantifying Subsurface Uncertainty at the Hebron Asset, Grand Banks, Newfoundland

Chevron Canada Resources and our partners continue to evaluate the potential of the Hebron Asset in the Grand Banks area of Newfoundland. Chevron considers Hebron to have potential for future development, and work is ongoing to determine if there is an economic basis for moving forward.

The Hebron Asset poses some considerable technical and economic challenges not experienced by previous projects in the area. While estimates suggest the Hebron Asset could contain reserves of about 500 million barrels, the asset is complex with separate oil pools in up to three stratigraphic intervals. Reservoir properties including permeability, oil gravity, and viscosity vary significantly between different fault blocks and stratigraphic intervals. Furthermore, approximately 75% of the reserves are 20° to 25° API gravity oil.

As with many projects, subsurface uncertainty dominates the overall project uncertainty. We are addressing this uncertainty by considering multiple earth model realizations and concept-dependent reservoir model sensitivities. Earth model realizations are generated in a Monte-Carlo-like fashion whereby many tens of 3D geostatistical earth models are automatically generated given user-selected ranges of input parameters. Parameters such as structural uncertainty, variogram ranges, seismic constraints, and petrophysical deviation from input wells have been considered. We then select a number of these static models, as well as uncertainty ranges in rock and fluid properties, to be considered in the fluid-flow simulator. Uncertainty in gross rock volume, which is related to seismic interpretation and velocity uncertainty, is one of the key factors influencing the range of oil-in-place at the Hebron Asset.