Probabilistic and Play-Based Approach to Reserves Evaluation for Alberta's Oil Sands Areas

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Summary

The AER is presently revisiting its independent estimates of in-situ bitumen resources and reserves in Alberta. This review will capture ongoing increases in commercial reserves in light of advances of technology and efficiencies adopted by Alberta's oil sands producers for in-situ extraction. The review will also express resource and reserves in a geological play framework. This change will offer more granularity than the previous regulator efforts that were done at the formation level. This presentation will describe the preliminary methodologies used to express resources and reserves in a probabilistic fashion, in keeping with global best practices in resource and reserves appraisal. Previous resource and reserves estimates were single-valued and deterministic.

Introduction

The Alberta Energy Regulatory (AER), previously known as the Energy Resource Conservation Board (ERCB), ensures the safe, efficient, orderly, and environmentally responsible development of hydrocarbon resources over their entire life cycle.

The AER uses a risk-based approach to regulatory delivery in order to achieve the public-interest set by the Government of Alberta and embedded in its governing legislation. The outcomes include matters like ensuring public safety, maintaining economic competitiveness, achieving resource conservation, having orderly development, protecting the environment, and ensuring wise use of water. Good regulators use science-based evidence in a risk-management framework to find the best balance between permitting developments while protecting of society's desired outcomes. One significant input into this work at the AER is knowledge of the potential size and future value of energy resources under development. With this knowledge, the regulator can better understand risk of future development in terms of rewards from that development and find the best regulatory balance that assures protection and delivery of Alberta's policy and legislative priorities.

Alberta's deposits of bitumen are indisputably one of the largest single deposits of hydrocarbons in the world. Estimation of the size of the resource and its contained commercial reserves at the provincial scale has been a contribution of AER and its predecessors for many years. A history of bitumen-resource estimation at AER's predecessors is found in Hein et al., (2016).

Theory and/or Method

A solid, quality-checked geological framework is interpreted using geological evaluations and petrophysical assessments within discrete oil sands areas. Net intervals from zones of interest are established and used to characterize reservoir parameters and volumetric estimations. A preliminary statistical analysis methodology is applied to capture the uncertainty associated with the cut-offs assigned for net pay determination. Specifically, net pay probability curves are generated utilizing a range of possible bitumen mass fraction (Mbit) cut-offs for the evaluated wells. Percentile cut-offs are then applied to the probability curves resulting in net pay values with low, medium, and high footage probabilities. These net pay estimates are used as inputs for simulating well volumetrics. Volumetric calculations can be determined in any oil sands deposit at stratigraphic extent, geological play, or active development area scales. Areal uncertainty associated with the volumetric calculations are captured using geostatistically simulated grids and are reported as low, medium and high bitumen in-place (OBIP) estimates.

Conclusions

Exploring probabilistic reserves estimation methodologies will allow the AER to capture the uncertainties associated with bitumen net pay and volume calculations and provide more accurate reserves and resources estimates for Alberta's Oil Sands.

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