Quantification of Rock Properties: McMurray Formation at Horizon

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ABSTRACT

Since December 2000, Canadian Natural has drilled and collected 859 stratigraphic cores from the McMurray Formation for evaluation of it's oil sands mine north of Fort McMurray, Alberta. The Horizon Oil Sands Project is expected to begin producing synthetic crude oil in 2008. Coring programs for oil sand mining operations produce significant amounts of data; the result of factors including the thickness of cored intervals, the number of analyses undertaken within the cored intervals, and the thorough nature of those analyses.

In addition to coring the entire McMurray Formation, the overlying Clearwater Formation, where present, is cored as well as the uppermost 15 m of the underlying Paleozoic strata. The average thickness of a cored interval on the Horizon leases is just over 100 m.

Core analysis is a key component of the geologic evaluation of the Horizon Oil Sands Project. All McMurray Formation core intervals are routinely analysed for bitumen content, particular size distribution, and soluble ion content. Special core analysis is undertaken to understand the extractability of bitumen within the ore zones.

Canadian Natural has implemented a data management workflow that allows for efficient integration of digital data. The core is initially subdivided into facies utilizing a standard classification scheme consisting of numeric codes designed for the Horizon Oil Sands Project. Subsequently, the core is logged by geologists using AppleCORE software to document a variety of geologic characteristics including the appropriate facies codes. The AppleCORE data is then digitally exported as an ASCII file. Using acQuire software as the data manager all drill hole data and core analysis data is integrated within an Oracle database. From Oracle, data is periodically transferred to MineSight for geological mine modelling. The engineering team then uses this model to design and plan an operating mine site.