Applications of Low Field NMR in the Characterization of Oil Sands Mining and Extraction

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ABSTRACT
A number of techniques have previously been developed whereby low field nuclear magnetic resonance (NMR) relaxometry is used for the characterization of oil containing cores for conventional and heavy oil reservoir characterization. These techniques were further extended in the area of bitumen formations, whereby the bitumen, water and solids content of a given core were determined and were verified against conventional extraction methods. The NMR predictions can be applied in the screening of oil field candidates for thermal recovery projects.

In this work the adaptation of these algorithms for use in the oil sands industry is presented. NMR based methods have been developed for identification of water, bitumen and solids content in ore and froth samples. The experimental procedures consist of a single NMR measurement and a single weight measurement. Proprietary algorithms manipulate the obtained NMR spectra to predict the individual components of each sample. The results to date are encouraging enough to warrant further development, while plant applications have been identified.