

Log Analysis of Fractures in a Deep Borehole, Northeastern Alberta, Canada

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Abstract

With the thin sedimentary strata in Northeastern Alberta, a deep borehole (TVD 2.4 km) located outside of the western suburbs of Fort McMurray offers the unique opportunity to characterize the Precambrian crystalline basement rocks of Northeastern Alberta. The main use of this deep borehole is to provide details on the physical properties, the state of stress, and the existence of fracture porosity in the basement rocks toward the ongoing geothermal investigations undertaken by the Helmholtz-Alberta Initiative (HAI).

In July 2011, an extensive suite of geophysical logs were acquired in the borehole with 875 m depth coverage of the crystalline basement. Existing image logs reveal a number of fractured zones in the Precambrian rocks that correlate with conductive zones outlined by the resistivity logs. By analyzing the relationship of these observations with the level of radiogenic heat production in the basement rocks, they could potentially become useful indicators for the development of a geothermal reservoir in which fluid flow in fractured rocks is of importance.