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GEOCHEMICAL INVESTIGATIONS OF GRANITIC CORE SAMPLES FROM BOREHOLES AT THE UNDERGROUND RESEARCH LABORATORY SITE NEAR LAC DU BONNET, MANITOBA

by

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ABSTRACT

A study of core samples from the Underground Research Laboratory site in the Lac du Bonnet Batholith shows that the granite in the vicinity of the proposed underground laboratory can be divided into three main types: pink granite, greenish-grey granite, and grey granite. The three types of granite usually occur in the following sequence that can be related to the crystallization history of the batholith: 1) pink granite in the upper portions of the boreholes, 2) greenish-grey granite between the pink and grey granite and 3) grey granite in the deeper portions of the boreholes. Deep brownish-red hematite-rich and cream-coloured clay-rich granitic subzones occur within the pink granite around fractures.

The compositions of some minerals from the rock matrix and fracture fillings from the various granitic rocks are presented. The grey granite, pink granite and the subzones of the pink granite are characterized according to subtle bulk compositional differences. The grey granite shows low oxidation of iron, which increases in pink and deep red granite. The oxidation ratio for iron in clay-rich granite does not show any consistent trend.

The integration and interpretation of preliminary subsurface water chemistry data, clay mineral stability relations and oxygen isotope ratios suggest that the clay minerals may be equilibrated with modern groundwaters.

Rubidium and potassium show strong positive correlation while strontium shows modest to weak correlation with calcium. The behaviour of rubidium and strontium suggests that fission products such as cesium and strontium, if mobilized from a vault, can be absorbed by potassium-and calcium-bearing minerals.

Some borehole geophysical logs exhibit characteristics that correlate to some of the geochemical properties of the core.

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