

IN SITU MEASUREMENT OF STRESS STATES IN BEDDED SALT AND ASSOCIATED SEDIMENTARY ROCK IN RELATION TO DEPTH

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ABSTRACT (EXECUTIVE SUMMARY)

This interim report documents the field study conducted by Serata Geomechanics Inc. (SGI) for SMRI to measure virgin ground stress states in Michigan Basin bedded halite and associated hard rock strata as a function of the depths below ground surface, and the octahedral shear strengths of the strata.

Access to these strata at depth was provided by lateral and vertical testholes drilled from the eastern and northern edges of a "dry" salt mine, operated at Goderich, Ontario by Domtar Chemicals Group, an SMRI member.

Stress measurements were conducted in the A-2 and F halite strata -- at depths below ground surface of approximately 550 m (1800 ft) and 305 m (1000 ft) respectively -- and in the F grey dolomite in between. Planned stress testing in the A-2 shaley-dolomite -- also in between the A-2 and F salt beds -- did not occur. The A-2 level vertical test hole passed through a geologic anomaly that rendered it untestable. This study applied a new method of stress measurement, the Serata borehole dilatometer probe/diametral deformation method, as defined in Ref. 1. This method was required because it has the capability to measure principal stress magnitudes and orientations, $\{P_o, Q_o\}$, in both soft/ductile rock, such as rock salt, and hard/brittle rock, such as the F grey dolomite, a capability not available with earlier stress measurement methods, such as overcoring and hydrofracturing.

As of the date of this report, the research project is complete through Task 2 (on site testing), and Task 3 (field data analysis for stress determination) is underway. This interim report documents the research project in terms of objectives, methodology, field results, and strategy of data analysis. The full results of the data analysis task will be presented in the written final report, forthcoming, and orally at the SMRI Spring 1987 meeting.