

Geotechnical Characterization of a Sedimentary Sequence for a Geological Repository

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ABSTRACT

Ontario Power Generation (OPG) is currently conducting site characterization program for a Deep Geologic Repository (DGR) for the long-term management of operational Low and Intermediate Level Radioactive Wastes at the Bruce Nuclear site near Tiverton, Ontario. The proposed repository will be located at approximately 680 m depth in a sedimentary sequence of carbonates, shales and evaporites. The host horizon will comprise argillaceous limestones of Cobourg Formation underlain by the Sherman Fall Formation. To support the understanding of the geomechanical properties of Paleozoic bedrock formations in southern Ontario and the regional rock stress conditions around the Michigan Basin, information from over 700 geomechanical test measurements collected at 29 sites and in-situ stress measurements from 25 sites in southern Ontario and northern U.S. were assembled and reviewed.

1 INTRODUCTION

Ontario Power Generation (OPG) is proposing the development of a Deep Geologic Repository (DGR) for the long-term management of Low and Intermediate Level Radioactive Waste (L&ILW) from OPG owned nuclear generating facilities. A Site characterisation program is currently underway to determine the suitability of the Bruce Nuclear Site as the location to construct the underground repository. As part of the site characterization work, information regarding the geomechanical properties of the sedimentary formations intersected at the DGR and regional in-situ stresses was assembled and reviewed.

This compilation of available rock strength and in-situ stress data from Southern Ontario and surrounding Great Lake region was used to establish input parameters for preliminary engineering analyses of the DGR facility. These parameters will be verified or modified by data from on-going site-specific field and laboratory investigations. The Bruce site Geoscientific Site Characterisation Plan and the activities associated with the L&ILW DGR work program are described in detail by Jensen et al. (2007).

This paper provides a summary of the compilation of the geomechanical rock properties for Ordovician rock formations relevant to the DGR concept as they occur in southern Ontario, and on in-situ rock stresses within the Appalachian and Michigan Basins. This work is a portion of a much larger database on the subject collected by OPG as a part of the DGR project. Figure 1 shows the stratigraphy of bedrock formations beneath the proposed DGR site.

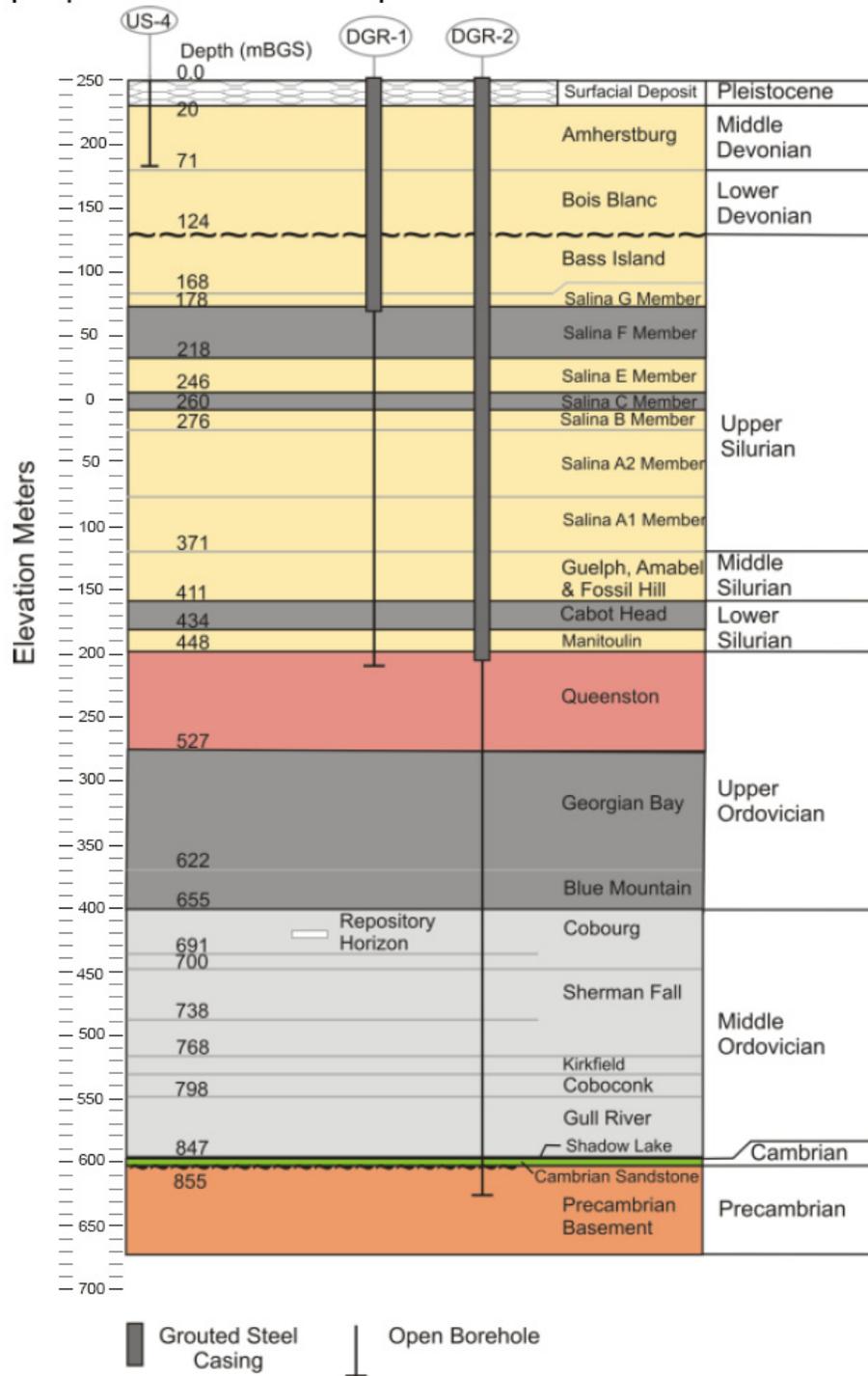


Figure 1. Bedrock stratigraphy with deep boreholes DGR-1 and DGR-2