

AN EVALUATION OF POTENTIAL EFFECTS OF SEISMIC EVENTS
ON A USED-FUEL DISPOSAL VAULT

by

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ABSTRACT

Atomic Energy of Canada Limited (AECL) has been assessing the concept of nuclear fuel waste disposal in a vault excavated at a depth ranging between 500 to 1000 m within a plutonic rock mass of the Canadian Shield. Earthquakes are one of the naturally occurring phenomenon that could affect the stability of a disposal vault. A literature review indicates that most of the Canadian Shield has been seismically stable since the end of Precambrian time. The analyses of the observational data base about the effects of earthquakes on underground structures show that deep underground structures in competent rock are more stable than surface structures. Using the attenuation relationships from the literature, rock mechanics analyses are carried out to calculate the expected seismic stresses at a potential vault site. The results of these analyses indicate a very low increase in the stress level compared to the strength of the host rock. The analyses also show that occurrences of slab failures and 'pop-ups' are possible as a result of large magnitude earthquakes if they occur nearby while the vault is open.

The report includes preliminary data from the 1988 November Saguenay earthquake. A survey conducted of the effects of this earthquake shows no detectable damage at underground mines in Ontario and Quebec.