



Contribution ID: 28

Type: ORAL

Valuable Knowledge from Canada's Underground Research Laboratory (1980-2014) to Support the Development of a Safe Geological Disposal Facility

A comprehensive research and development program of geologic characterization and large-scale geotechnical experiments in granite was undertaken at Canada's Underground Research Laboratory (URL) starting in 1980 to evaluate the concept of permanent disposal of used CANDU® fuel in a deep geological repository (DGR) constructed in Canadian Shield granite. Before the underground facility was permanently closed in 2010, the URL was a member of the International Atomic Energy Agency (IAEA) Network of Centers of Excellence for underground laboratories. Much collaborative research with international organizations was undertaken at the URL. Currently, even after the demolition of the surface facility at the URL in 2014, collaboration with international organizations is still continuing through the Enhanced Sealing Project (ESP). The ESP consists of instrumentation and monitoring of a full-scale shaft seal installed to permanently seal the access shaft for Canada's URL. The purpose of the seal is to limit the mixing of the saline groundwater below fracture zone and fresh groundwater above it. The ESP is a unique opportunity to observe the performance of a full-scale composite shaft seal, relatively comparable to that likely to be installed at an actual DGR on closure, during the period of groundwater recovery after a repository is closed. Currently the ESP is jointly funded by CNL (Canada), POSIVA (Finland), and ANDRA (France) and monitoring is planned to be continued until the end of 2016. Over its lifespan, Canada's URL experienced major organizational and employment changes. Many experts have left the organization for other opportunities, retirements, or other reasons. Organizational continuity is important, but it was not the case in Canada's URL. Many of the technical lessons learned from the URL have been lost in the transition of used fuel disposal management responsibilities between different organizations. The current DGR design, such as the one in Finland, includes up to 100 years of operation before it will be permanently closed. Consequently, successful demonstration of transferring knowledge from one generation or organization to the next will be critical part of a safe operation of a DGR. This paper is part of initiatives to minimize further knowledge loss at Canada's URL. It describes some technical lessons learned from Canada's URL (1980-2014) that can be used to support the development of a safe geological disposal facility for disposal of highly radioactive waste.

Country/ int. organization

Canada/ Canadian Nuclear Laboratories (CNL)

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