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Safe and Sustainable by Design: Canadian Nuclear Laboratories Cask Facility

Canadian Nuclear Laboratories (CNL) is Canada's premier nuclear science organization with priorities on restoring and protecting Canada's environment, supporting clean energy for today and the future, and contributing to the health of Canadians. Enabling and delivering on each of these priorities requires the use of shielded transfer systems and shielded packages for on-site transfers and off-site transportation. To support a multi-decade mission, a new major nuclear facility called the CNL Cask Facility has been designed and will be constructed at the Chalk River Laboratories (CRL) site in Ontario, Canada.

The CNL Cask Facility will primarily be used to support the lifecycle management of the Intermediate-Level Waste and High-Level Waste owned by the Government of Canada. The design of the facility incorporates established and modern approaches to optimizing safety for the workers, as well as protection of the public and the environment. The evolution of the conceptual, preliminary, and detailed design also incorporated key elements to align with the Government of Canada's Greening Government Strategy, the Canada Green Building Council's Zero Carbon Building Design Standard, and the National Research Council's Guideline for Whole Building Life Cycle Assessment. With rapidly changing expectations and standards, the Cask Facility pioneered key approaches for integrating safety and sustainability; a benchmark that will support the future design of other major nuclear waste management enabling facilities at the CRL site.

This paper will provide an overview of the CNL Cask Facility, with a focus on how the design was evolved and progressed to balance lifecycle operational efficiency, along with optimized functionality for safety and alignment with key sustainability objectives and targets. This paper will include a particular focus on how the design of the Cask Facility incorporated lifecycle carbon accounting analyses, energy modelling, and climate resilience planning into key decisions to finalize the design.

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