

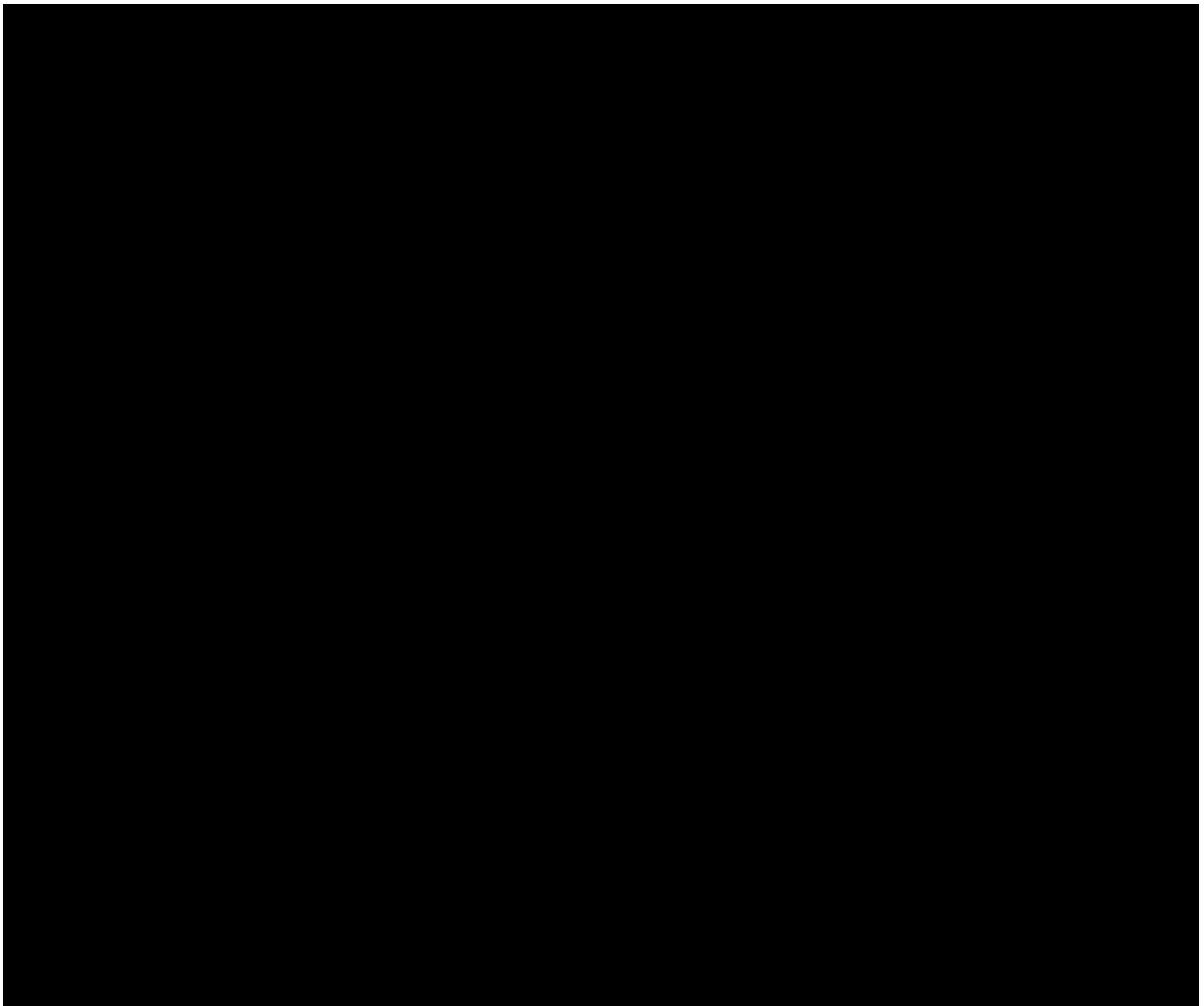
NWMO BACKGROUND PAPERS

3. HEALTH AND SAFETY

3-1 RADIOLOGICAL PROTECTION AND RADIOACTIVE WASTE MANAGEMENT

EXECUTIVE SUMMARY

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Summary

Radioactive waste is a by-product of a number of activities, such as electrical power generation, medical treatment, education, research and development, and various industrial/manufacturing activities. The waste produced is potentially hazardous to the public and to the environment if it were to be released in the process of handling, storage or following disposal. To minimize exposure to radiation, radiological protection technologies and operational procedures are put in place at the sites that will handle and store or dispose of radioactive waste.

This paper presents the radiation protection principles, technologies and operational procedures related to radioactive waste that are currently in use or are planned for managing radioactive wastes in Canada, with a particular focus on high-level waste.

The paper begins with an overview of what radiation is and why it is potentially hazardous. The three types of radioactive waste in Canada: high-level waste, low-level waste and uranium mine tailings, are described. The “defence-in-depth” concept and the use of multiple barriers are discussed as provisions for radiation protection when handling, storing and disposing of the various types of radioactive waste. The nuclear fuel cycle is described from the mining and milling of uranium ore to the decommissioning of the power generators that utilize the nuclear fuel. The waste produced at each step in the nuclear fuel cycle is listed with a brief explanation of how the public and the environment are being protected from exposure to the radioactive waste. Radioactive waste produced outside of electrical power generation typically falls into the category of low-level waste. The treatment of low-level waste in terms of radiological technologies and operational procedures are generally similar to those described in the nuclear fuel cycle. The scope of this paper does not include a discussion on naturally occurring radioactive waste (NORM).

A description is provided of the current management options for high-level waste, specifically the wet and dry storage methods. The elements of radiation protection are described as part of the Radiation Protection Programs that are in place at all nuclear facilities.

The long-term management solution for high-level waste in Canada by means of storage or disposal is currently under review. According to the mandate of the NWMO, these options: deep geological disposal, centralized storage, and on-site storage, are management options serving different societal needs that will be investigated and are presented in this paper. In addition to these, reprocessing or treatment, and a number of disposal options are also considered and briefly described. A discussion has been included on the radiation protection technologies and operational procedures that may be in place for the long-term solutions to protect the public and the environment.