WASTE DISPOSAL

- In Canada, waste owners are responsible for the funding, organization, management and operation of disposal facilities, locations or sites, as well as all applicable steps of waste management, required for their radioactive waste.
- Disposal is the final step in the management of radioactive waste, and refers to the placement of radioactive waste without intention of retrieval. Waste management and disposal activities are subject to national policy requirements as well as a regulatory framework for safety.
- Decisions on disposal approaches may vary from country to country, depending on factors such as national policy, geography, waste types, volume, Indigenous and public engagement, environmental and socioeconomic factors.
- As you read this discussion paper, please consider the following questions:
  1. What do you feel are important policy considerations that should influence the choice of disposal approaches by waste owners and should be considered as part of Canada's radioactive waste policy?
  2. What should be the roles and responsibilities of government, the regulator, and waste owners with regards to radioactive waste disposal facilities, including:
     - Funding,
     - Closure of a disposal facility and its institutional control, and
     - Indigenous and Public Engagement and involvement in site selection and post-closure?

Why is radioactive waste disposal important?

In Canada, radioactive waste is safely managed to protect people and the environment now and in the future, while respecting security and international obligations. The radiological, physical, chemical and biological characteristics of the waste vary depending on how it is generated. These differences result in a variety of approaches for the management and disposal of the waste. Disposal of radioactive waste is important as it is the final step in the management of radioactive waste, and refers to the placement of radioactive waste without intention of retrieval. Its aim is to safely contain and isolate the waste by means of natural and engineered barriers for adequate protection of people and the environment.

Approaches to radioactive waste disposal

There are a number of approaches to the disposal of radioactive waste. In general, as the level of radioactivity of the waste increases, so does the associated level of hazard and the degree of isolation and containment required to dispose of it. Waste is typically classified[1] according to the degree of containment and isolation required to ensure safety with consideration given to the hazard potential of different types of waste and the timeframe associated with the hazard.

Examples of the different types of disposal facilities include:

- Specific landfill disposal
- Near surface disposal
- Facilities constructed in caverns, vaults or silos below ground level
- Borehole disposal
- Geological disposal
- Disposal stabilized *in-situ*

Waste characteristics (e.g. physical, radiological and chemical properties), volumes, geology, Indigenous and public engagement, roles of communities (interested stakeholders) hosting the disposal site(s) are important factors to consider when selecting a disposal approach. A range of environmental, social and economic factors may also need to be considered depending on the approach chosen.

The life cycle of a disposal facility generally has the following phases: site selection, site preparation (including characterization and design), construction, operation, closure and decommissioning of ancillary facilities, and post-closure. Post-closure might include a period of verification (or monitoring and surveillance) to assess a facility's performance, release from licensing or institutional control. Institutional control involves the control of residual risks at a site after it has been decommissioned and/or closed. Institutional controls can include active measures (those requiring activities on the site such as water treatment, monitoring, surveillance and maintenance) and passive measures (such as land use restrictions or markers).

Radioactive Waste Disposal in Canada

Canada's approach to radioactive waste management is founded upon the Government of Canada's *Policy Framework for Radioactive Waste*. Natural Resources Canada (NRCan) is the lead Department responsible for federal radioactive waste policy matters.

Canada's existing radioactive waste policy is based on the 'polluter pays' principle which means that it is the responsibility of waste owners to fund, manage and develop plans for their waste, for the short and long-term, including disposal and all applicable steps of waste management (e.g. waste handling, processing, storage, transportation and disposal). The policy also requires that radioactive waste management activities are carried out in a safe, environmentally sound, comprehensive, cost-effective and integrated manner. There may be instances in Canada where the waste producer is not necessarily

[1] REGDOC-2.11.1, Waste Management, Volume I: Management of Radioactive Waste

the waste owner, and in such a case, an appropriate arrangement is made between the waste producer and owner to ensure that funding and plans are in place to manage the waste generated.

If institutional controls are required following closure of a disposal facility, location or site, the waste owner is responsible for developing those plans for the post-closure. The waste owner is also responsible for implementing those plans and ensuring that funding is in place to maintaining institutional control, unless that responsibility was transferred to a third party.

To protect the public and the environment from the hazards of radioactive waste, all waste management and disposal activities are subject to Canada's national policy requirements and a regulatory framework for safety.

In Canada, all radioactive waste is currently managed safely in facilities, locations and sites licensed by the Canadian Nuclear Safety Commission (CNSC). Licensees are responsible for the operation of their facilities and must comply with established safety requirements of the *Nuclear Safety and Control Act* under the regulatory oversight of the CNSC. The CNSC licences and regulates nuclear facilities and activities.

Under the *Nuclear Fuel Waste Act*, Canada has a plan for the safe, long-term management of used nuclear fuel known as Adaptive Phased Management, which involves the siting of a deep geological repository.

Existing licensed long-term management facilities include those related to uranium mines and mills tailings, as well as the Port Hope Area Initiative projects. Uranium mines and mills tailings are a specific type of radioactive waste generated during the mining and milling of uranium ore and the production of uranium concentrate. In addition to tailings, mining activities typically result in the production of large quantities of waste rock as workings are excavated to access the ore body. The wastes contain long-lived activity that does not decrease significantly over extended time periods. In general, long-term management in engineered surface and near-surface facilities adjacent to mines and mills is the only practical option for these wastes, given the large volumes of waste generated in mining and milling operations.

The Port Hope Area Initiative consists of two long-term engineered containment mounds for historic low-level radioactive waste in the southern Ontario municipalities of Port Hope and Clarington. Historic low-level radioactive waste originates from the radium and uranium refining and processing operations carried out from the 1930s to the 1980s. The Government of Canada has accepted the responsibility for the cleanup and safe, long-term management of this waste.

International Context

As an International Atomic Energy Agency (IAEA) member state Canada is committed to developing policies guided by international best practices and IAEA guidance.[2] IAEA safety standards are consensus standards at an international level and provide guidance to Member States in developing their national framework; they are meant to be adapted to the national context of each Member State.

[2] IAEA guidance on disposal is found in IAEA Safety Standards – No. SSR-5: *Disposal of Radioactive Waste*

Decisions on disposal approaches may vary from country to country, depending on factors such as national policy, geography, volume, Indigenous and public engagement, and environmental and socio-economic factors.

The IAEA also assists its Member States by providing guidance on elements of a national radioactive waste management policy[3]. According to the IAEA, a country's national policy may also include the following considerations as part of the elements of its national policy as it relates to disposal, only if deemed appropriate, and may or may not be explicitly present in the national policy to indicate:

- the State's intention to inform the public about proposed plans for radioactive waste management, and to consult concerned parties and members of the public to aid in making related decisions;
- whether the State's disposal facilities would only accept radioactive waste of national origin or waste from other States as well (import/export of radioactive waste);
- consideration for radioactive waste to be managed in such a way as to avoid imposing an undue burden on future generations. This means, the generations that produce the waste are to seek and apply safe, practicable and environmentally acceptable solutions for its long-term management and disposal[4].

We need to know

1. What do you feel are important policy considerations that should influence the choice of disposal approaches by waste owners and should be considered as part of Canada's radioactive waste policy?

2. What should be the roles and responsibilities of government, the regulator, and waste owners with regards to radioactive waste disposal facilities, including:

    - Funding,
    - Closure of a disposal facility and its institutional control, and
    - Indigenous and Public Engagement and involvement in site selection and post-closure?

[3] IAEA Nuclear Energy Series – No. NW-G-1.1: *Policies and Strategies for Radioactive Waste Management*
[4] IAEA Safety Fundamentals – No. SF-1: *Fundamental Safety Principles*