Intervention re CNL's Proposed Near Surface Disposal Facility

Dr. J.R. Walker

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Radioactive Waste Storage

- Radioactive waste is hazardous and must be isolated to ensure the safety of humans and non-human biota.
- Canada has been storing radioactive waste since the 1940s.
- Storage costs money – construction, maintenance, remediation, security, etc. Regulatory and other societal oversight is also required.
- Future costs of these human interactions (institutional controls) represent a significant financial liability.
- Storage “in perpetuity” (e.g., tens of thousands of years) results in an extremely large financial liability.
- Public purse has to absorb these costs and liabilities.

Radioactive Waste Disposal

- Disposal facilities are solution to the safety, cost, and liability dilemma associated with radioactive waste storage.
- Disposal facilities are designed so that, at some point in the foreseeable future, the safety of humans and non-human biota is no longer dependent upon human intervention (maintenance, remediation, security, societal and regulatory controls).
- At that point in the foreseeable future (the end of the Institutional Control Period, ICP) the human interventions can cease, no further costs are incurred, the disposal of the waste will have occurred, and the financial liability is extinguished.

Disposal ≠ Storage

Storage

- Costs “in perpetuity”.
- No release from regulatory control.
- Extremely large financial liability for the public purse.

Disposal

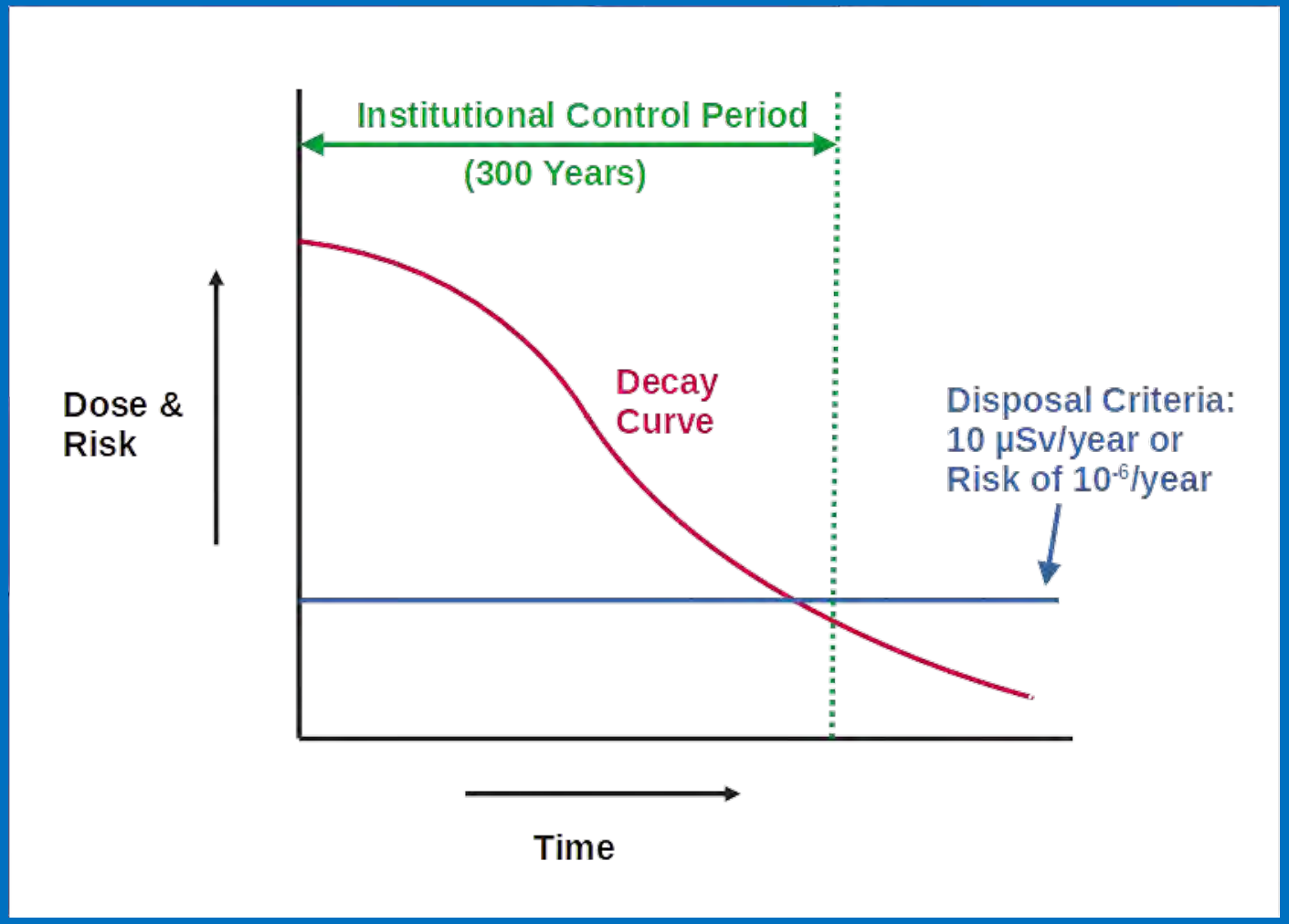
- Costs only until end of ICP.
- Release from regulatory control at end of ICP.
- Financial liability extinguished at end of ICP.

Criteria for Disposal / Release from Regulatory Control / Clearance / Abandonment — Individual Dose Limits and Risks

- Canada:
  - Nuclear Substances & Radiation Devices Regulations: 10 µSv/year
- Others:
  - International Atomic Energy Agency (IAEA): 10 µSv/year
  - United Kingdom: 10^{-6} deaths or heritable effects per year
  - Atomic Energy Control Board (predecessor to CNSC): 10^{-6} fatal cancers and serious genetic effects per year

NB: 10 µSv/year is approximately equal to an annual risk of 10^{-6} cancers or heritable effects (International Commission on Radiological Protection).

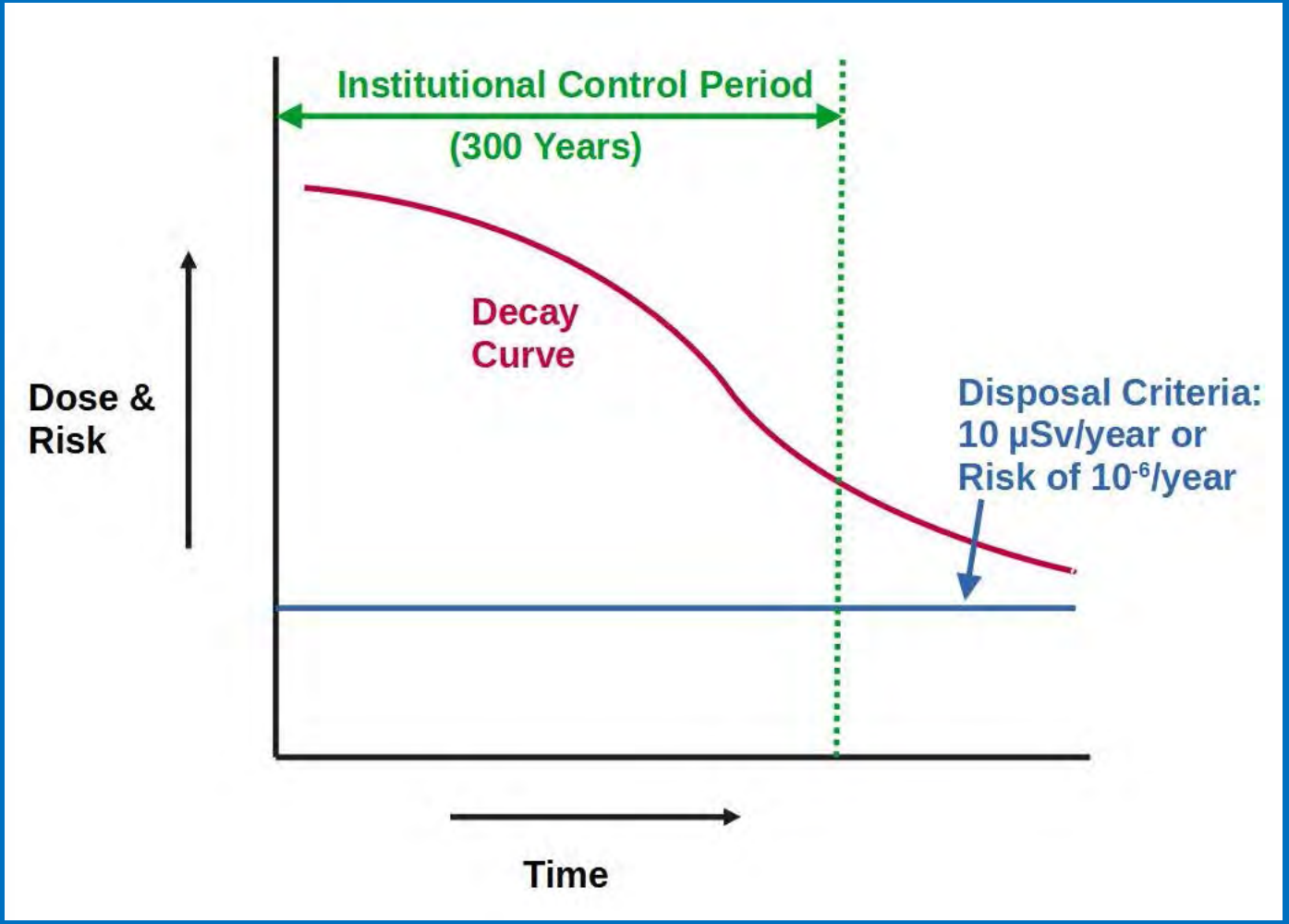
Near Surface Disposal of Low Level Waste



Human societies are fragile—it is not possible to rely on institutional controls beyond a few hundred years (usually taken to be 300 years).

Decay Curve is below the Disposal Criteria by the end of the Institutional Control Period. Hence, emplaced radioactive material is Low Level Waste.

Not Near Surface Disposal of Low Level Waste



Decay Curve is not below the disposal criteria by the end of the Institutional Control Period.

Hence, emplaced radioactive material is *not* Low Level Waste and this is *not* a Near Surface Disposal Facility.

Inventory and Waste Acceptance Criteria of Proposed Engineered Containment Mound (ECM)

- CNL's Environmental Impact Statement (EIS) provides the "Licensed Inventory" of the proposed ECM, comprising 31 Radionuclides.
- CNL's EIS also provides the Waste Acceptance Criteria (WAC):

Limits for Bulk Waste & Non-Leachate Controlled Waste Packaged Waste	•100 Bq/g for alpha emitting radionuclides •1,000 Bq/g for long-lived beta/gamma emitting radionuclides (half life >cesium-137) •10,000 Bq/g for short-lived beta/gamma emitting radionuclides (half life ≤ cesium-137) •100,000 Bq/g for tritium
Limits for Leachate Controlled Packaged Waste	•400 Bq/g for alpha emitting radionuclides •10,000 Bq/g for long-lived beta/gamma emitting radionuclides (half life >cesium-137) •10,000 Bq/g for cesium-137 •10,000 Bq/g for strontium-90 •10,000,000 Bq/g for tritium

- CNL's proposal contains no technical equipment nor management system to verify compliance with the Waste Acceptance Criteria.
- WAC ignores important radionuclides in the inventory (eg, C-14, Tc-99).

Time to Reach Canada's Disposal Criteria

- Using the WAC limits and the limiting activity concentrations for disposal given in the Canada's Nuclear Substances and Radiation Devices Regulations (Bq/g), the time to reach disposal criteria can be calculated, for example:

Radionuclide	Time to Reach Disposal Criteria (Years)
Cesium-137	498
Hydrogen-3	199
Iodine-129	3.13×10^{8}
Plutonium-239	2.88×10^{5}
Radium-226	13,830
Strontium-90	385
Uranium-235	6.09×10^{9}

Waste Acceptance Criteria are Insufficiently Protective

- For example, there are 19 radionuclides in “Leachate Controlled, Packaged Waste” that are unambiguously captured by the WAC.
- Of these 19 radionuclides, at the concentrations permitted by the WAC, only one radionuclide (Tritium) decays sufficiently to meet Canada’s disposal criteria by the end of the ICP.
- The other radionuclides take hundreds, thousands, or millions of years to meet Canada’s disposal criteria.
- The WAC are insufficiently protective — permitting material to be emplaced that is unsafe for near surface disposal. This material is intermediate level waste and requires underground disposal.

Notable Technical Deficiencies

- Radiological inventory remains unacceptably hazardous well beyond the design life of the Engineered Containment Mound (550 Years).
- No inventory management system in place to comprehensively verify that waste packages and unpackaged waste comply with stated WAC.
- Many important radionuclides not captured by WAC (eg C-14, Tc-99).
- Waste Acceptance Criteria are insufficiently protective — permitting emplacement of ILW that is unsafe for near surface disposal.
- Safety is dependent upon the actions of a regulator who is postulated to exist in the far distant future, beyond the time period in which institutional controls can be relied upon.

Concluding Remarks (1 of 3)

CNL's proposal is not a disposal facility for low level radioactive waste:

- Proposal is an Engineered Containment Mound comprising a large and unverified quantity of intermediate-level waste;
- Failure to control and verify the inventory means the safety of the ECM will depend upon active management (security, maintenance, remediation, regulatory controls, etc.) into the far distant future ("in perpetuity");
- Since disposal does not occur, the financial liability cannot be extinguished; and
- The cost of active management into the far distant future will continue to be a burden on the public purse and represents a very large long-term financial liability.

Concluding Remarks (2 of 3)

- CNL's proposal is in clear noncompliance with IAEA Safety Standards, e.g., no inventory management system, need for institutional controls into the far distant future.
- Compares unfavourably with near surface disposal facilities in other middle-income and high-income countries, e.g., Bulgaria, France, Spain.

Concluding Remarks (3 of 3)

- It is clear from international examples that compliant near surface disposal facilities can be successfully designed, built, and operated.
- It is important for Canada's reputation that our first low level radioactive waste disposal facility withstand comparison to those successfully built and operated by our international partners.
- Approval of CNL's proposal may cause both Canadians and our international partners to question Canada's ability to safely manage our nuclear program and our radioactive wastes.