

Reading the four Discussion Papers has been a great disappointment. I joined the Nuclear Fuel Waste Management Program in late 1980 as a Mining/Geotechnical Engineer involved with designing the appropriate repositories for either used fuel (UF) from CANDU reactors or fuel recycle waste (FRW) from recycled used fuel. I watched the development and progress of a multidisciplinary team performing the scientific and engineering research and development (R&D) for the disposal of nuclear fuel wastes that was directly funded by Canadians. I also watched the bulk of them being laid off in 1998 with only the Underground Research Laboratory continuing until 2003 under the funding from Ontario Hydro (OH)/Ontario Power Generation (OPG)/Nuclear Waste Management Organization (NWMO). I watched the skill sets dwindle away and I see the people passing away. Other than radium and uranium mine wastes, no nuclear waste disposal facility of any kind has been sited nor built in Canada. Sweden, Finland, France, United Kingdom and USA, just to mention a few, have sited, constructed, licensed and are operating some select disposal facilities. There is still no facility, policy nor program in Canada to do so. All I see are hollow, non-descript words saying that we have an understated and outdated Waste Management Policy. A policy without a program that includes a timely Disposal plan and schedule is a disaster. Indeed, to create a term such as “in-situ decommissioning” outside of the Waste Disposal Discussion Paper is a clear marker for the lack of a very needed coherent Policy and Program. Natural Resources Canada (NRCan) has clearly demonstrated that there is no skipper at the wheel of the ship. It is floundering aimlessly, constantly citing documents from the International Atomic Energy Agency (IAEA) to bolster their feeble words and showing their blindness to the dire need for disposal facilities to carry out the decommissioning of legacy facilities and sites.

Canada needs a Radioactive Waste Management Policy and an associated Program with clear, unambiguous language that shows what is necessary and to build confidence and credibility to show Canada knows what it is doing. Canada does not need to be a World Leader. It only needs to get on with the job. And it needs to empower the people who are given the task. Note that NRCan may ultimately become the unwitting leader of Canada’s Radioactive Waste Management programs because the utilities (OH and later OPG) have failed to progress, particularly with the social aspects of the original Used-Fuel Disposal Centre and the later Deep Geologic Repository for intermediate-level waste (ILW) and low-level waste (LLW). It makes one wonder if these failures are intentional to constantly delay the financial commitments for these nuclear utilities.

## **Modernizing Canada's Radioactive Waste Management Policy:**

**Comments from** [REDACTED]

### **OVERVIEW**

The Radioactive Waste Management Policy must clearly define the words and processes within the policy to ensure all terms are concise and well understood. The current terms in the Discussion Papers are unclear, misleading, in error and deceptive.

Radioactive Waste Management Policy has only three categories:

Waste Production

Waste Storage

Waste Disposal

Waste Production is the generation and collection of waste products from the mining, processing, fabricating, handling, decommissioning and contaminating of the derivative desired infrastructures and products. Note that decommissioning is a Waste Production activity and not a stand-alone waste production process. Waste minimization is an over-riding consideration in the Radioactive Waste Management Policy, particularly under the Waste Production category where the vast bulk of the waste is produced.

Waste Storage is the temporary and safe containment of the waste products until appropriate waste disposal facilities are built and enter operation.

Waste Disposal is the active construction, operation and ultimate closure of approved facilities to permanently and safely contain and isolate the radioactive waste for the long-term protection of the people and environment.

The Discussion Papers have many serious flaws as follows:

### **DISCUSSION PAPERS**

#### **Waste Disposal**

“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
- Geologic disposal
- Disposal stabilized in-situ”

All the above examples are stabilized geologic disposal and should be reclassified as follows:

- Surficial disposal on or in soils
- Pit or near-surface disposal in soils
- Shallow rock disposal (open pit, underground excavation, boreholes)
- Deep rock disposal (underground excavation, boreholes)

The choice of disposal method is dependent on the nature and quantities of the waste, the quality of the available geology and the natural processes and events (e.g., ground water transportation, continental glaciation).

The example “Disposal stabilized in-situ” is a complete misnomer intended to obfuscate another term called “in-situ decommissioning” as used in the Decommissioning Discussion Paper, for the purpose to mislead the leaders and the public.

The usage of broad, non-descript terms such as “Existing licensed long-term management facilities include those related to uranium mines and mills tailings, as well as the Port Hope Area initiative projects” as described in the Waste Disposal Discussion Paper should instead use the term Disposal Facilities, to ensure clarity. But the introduction of the Port Hope Area Initiative projects into the Waste Disposal Discussion Paper and not into the Waste Storage Discussion Paper clearly implies that this Project has moved from Waste Storage to Waste Disposal without appropriate public hearings presenting this case. Nowhere in the Port Hope Environmental Assessment is the word “Disposal” used. Elsewhere on-line, the subject of water treatment from the “Storage Mounds” is mentioned. So, which is it, are the Port Hope Area Initiative Mounds classified as Waste Storage or Waste Disposal and are they still an Initiative or a “fait accompli”?

“For purposes of this EA, the term “abandonment” is interpreted to mean the cessation of all forms of planned, designed human intervention at the decommissioned LTWMF for the purposes of managing or controlling potential environmental or human health and safety concerns associated with it. Abandonment of the LTWMF prior to its decommissioning (i.e., with waste materials still contained within it) is not considered viable or responsible stewardship” (Marshall et al. 2005).

Marshall, Macklin Monaghan Limited. 2005. Port Hope Project. Environmental Assessment Study Report. Low-Level Radioactive Waste Management Office LLRWMO-03710-ENA-12003.

## **Waste Storage**

Waste Storage is broader than the restrictive term “Waste Storage Facilities” entitling the Discussion Paper.

“Figure 1: Location of Radioactive Waste Management Sites in Canada” is solely associated with this Waste Storage Discussion Paper and is too general to be meaningful. The locations of all the sites should be labelled according to waste function: Production, Storage and/or Disposal of UF/HLW, ILW and LLW as defined by the Canadian Nuclear Safety Commission (CNSC). Also, the American term Spent Fuel in Figure 1 should be replaced by the traditional Canadian term Used Fuel. World Nuclear News has also drifted away from the term “spent fuel” to “used fuel.” This Figure should be corrected and should be attached to each amended Discussion Paper to ensure clarity.

## **Decommissioning**

As mentioned previously, decommissioning is a Waste Production process. It is not, and should not be, a Waste Disposal process and should not be confused as such by poor language. Great pains are made to define the term “In-situ Decommissioning” in which “... some or all of the radioactive contaminants are disposed of in place, which may result in the creation of a waste disposal site.” If it is disposed in place, then it “is” a disposal site, not “may create a disposal site.” The discussion of “In-situ Decommissioning” should be retitled as “In-situ Disposal” and should be solely discussed under the Waste Disposal process.

The discussion of decommissioning research and development (R&D) legacy sites uses the weak argument that their initial design and construction did not consider decommissioning as part of the design process. This does not prevent the taking of proper action to remediate this historical omission. Proper engineering plans and designs for remediation options should be undertaken and be impartially reviewed and evaluated before any decision for In-Situ Disposal is ruled upon to eliminate bias. The current unavailability of an operating disposal facility should not be a consideration as this does not pertain to other non-R&D legacy facilities.

Waste minimization is briefly discussed since decommissioning will, not may, produce radioactive and other hazardous wastes which must also be disposed, not hidden under the guise of the weaker term, managed.

## **Waste Minimization**

As mentioned previously, waste minimization is an underlying goal of the Waste Production process, including decommissioning, storage and disposal. Overall, the Discussion Paper is reasonable with one omission: Containment. After the waste is segregated to its final processing

state, it must be contained (e.g., packaging for storage, clay-lined pits, disposal chambers, etc.) to prevent the waste from coming into contact and contaminating other materials, especially by water flow.

## **RECOMMENDATIONS**

### **Language**

The authors of the Discussion Papers clearly demonstrate a lack of clarity in Waste Management and cannot set a straight path forwards, creating broad, non-descriptive terms to suit whatever agenda they wish. Proper words and definitions, plus a clear, united aim towards Waste Disposal in Canada, are needed to create a proper modern Radioactive Waste Management Policy and for its effective communication. The authors should take a page from [REDACTED] the original director of the Nuclear Fuel Waste Management Program (NFWMP), when he sat down with his staff to clearly define the terms to be used under this R&D program. There were no ambiguities.

### **Waste Production, Storage and Disposal**

No matter how the radioactive waste is produced in Canada (mining, milling, refining, reactors, R&D, medical and non-medical isotopes, decommissioning, etc.), the Policy must elucidate a clear path forward towards disposal, else management cannot be achieved. This should include tentative start and end points for all waste streams, including their times and locations. These are called plans. Do not shy away from plans. The public and utilities work with them every day. Confidence cannot be gained in policies without illustrative plans with time lines and sources of funding. Since Canada invokes the “user pay” principal, this should not be a significant problem.

The longer waste disposal is delayed, the greater will be the costs for interim storage including the unnecessary proliferation of “in-situ” disposal sites for legacy R&D reactors and their associated ILW and LLW. Ultimately, they may require re-excavation by future governments who may be required to live up to higher standards.

The greatest cost for delayed Waste Disposal is the potential extremes associated with Waste Minimization including its costs. Delay in disposal requires increased storage plus its continuing care and maintenance plus the continuing care and maintenance of non-decommissioned facilities. This also invokes the process of reducing and containing the volume of the contaminated wastes to levels beyond what should be considered practicable. The cost trade off

should consider the ratio of the cost for the safe removal of the waste volume from the environment versus the cost for the excavated ground volume (soil or rock) and their associated operations for each volume.

One of the greatest problems associated with the legacy wastes at CRL and WL are the quantities and assays of the deposited ILW and LLW on the waste management sites. Preliminary estimates of the volumes and radionuclide content of LLW and ILW to 2008 (Baumgartner 2011) are ranked as preliminary in that the current inventory is incomplete, partly due to very limited waste-characterization practices in the past (i.e., limited to either needing or not needing radiation shielding), limited compilation of waste-receipt records in a comprehensive database and the loss of waste-receipt records in a fire at CRL predating 1956. An arbitrary quantity of Used Fuel was added to the CRL inventory in lieu of this knowledge. This lack of knowledge undermines any safety case for “in-situ” disposal of the legacy wastes at the CRL and WL sites.

██████████ 2011. Preliminary estimates of AECL’s current and future low- and intermediate-level radioactive wastes. Atomic Energy of Canada Limited Report 361101-01613-REPT-001 Rev. 4.