

NUCLEAR WASTE WATCH

A Network of Organizations Concerned about Radioactive Waste in Canada

Position Paper on Nuclear Waste Management - November 2003

Nuclear power in Canada had its origins in the allied nuclear weapons program, the Manhattan Project, that resulted in the nuclear bombing of Hiroshima and Nagasaki. Until 1965, Atomic Energy of Canada Limited (AECL) produced plutonium for the American nuclear weapons. This activity left its own deadly legacy of radioactive waste at the Chalk river Nuclear Laboratories in the Ottawa Valley.

In the 1960s, AECL, Ontario Hydro and their private sector partners built several unsuccessful prototype power reactors including the NPD, Gentilly-1 and WR-1 reactors. These were followed by the Douglas Point reactor at Bruce. These were followed quickly in the 1970s by Ontario Hydro's larger-scale Pickering A and Bruce A stations (4 reactors each). In the 1980s AECL built single CANDU 6 reactors for both Hydro Quebec (Gentilly 2) and New Brunswick Power (Point Lepreau). The last nuclear plant to be built in Canada was Ontario Hydro's Darlington Nuclear Generating ordered in 1973, and with its last reactor operational in 1993.

The environmental impacts of the nuclear fuel chain, of which nuclear power is a part, include uranium mining and refining emissions; thermal effluent from cooling water outflow; airborne radioactive emissions; waterborne radioactive emissions; low and intermediate level radioactive waste; and spent fuel from reactors.

Most of the high level radioactive waste (about 30,000 tonnes^a) is currently being temporarily stored in water-filled pools, or dry storage containers at each nuclear facility where they were produced. These highly toxic radioactive wastes are extremely long-lived:

In total, spent fuel contains roughly 350 nuclides, about 200 of which are radioactive. Its level of activity per unit mass declines to that of natural uranium and its associated radioactive decay products after about one million years.¹

It is generally accepted that high level radioactive waste must be kept isolated from the environment for very long periods of time, in the order of hundreds of thousands of years. However, current storage methods require strict institutional controls, which cannot be assumed to be reliable beyond several hundred years. For that reason, the Canadian nuclear industry (and other national nuclear programs) have proposed so-called "permanent disposal" options which theoretically would protect the natural environment even in the absence of institutional controls.

These proposals have been challenged as being intentionally 'out-of-sight/out-of-mind', developed and promoted in order to solve a public relations problem rather than deal with a technical problem. The lack of an agreed-upon radioactive waste management solution is widely perceived as the most serious reason for public opposition to nuclear power.

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. Canadian Environmental Assessment Agency, *ibid.*

In 1977, the federal government appointed a committee of three men to make recommendations on the management of radioactive waste. After only four months of review and with no formal public consultation, the committee published its findings (known as the Hare Report after its Chairman, Kenneth Hare). They recommended in favour of deep geological disposal.² Evidence of the inadequacy of the report was revealed in its proposed timeline, which recommended that an operating waste site would be in place between 1995 and 2000. The report was widely viewed as a pro-nuclear propaganda piece designed to allay public fears about radioactive waste management at a time of aggressive nuclear power expansion in Canada.

Several other inquiries were under way during the same period which dealt in part with radioactive waste management. The Ontario Royal Commission on Electric Power Planning (known as the Porter Commission after its Chairman) issued its report on nuclear power in September 1978. Amongst other things, the report recommended that if there was not satisfactory progress on radioactive waste management by 1985, “a moratorium on additional nuclear power stations would be justified”.³ At the same time, the National Committee on National Resources and Public Works was also conducting a review of the Hare Report. Yet the federal and Ontario governments did not wait for their recommendations of these bodies.

The Canadian and Ontario governments, led by Atomic Energy of Canada Limited (AECL) initiated the Canadian Nuclear Fuel Waste Management Program in 1978, which focused on deep geological disposal in the granite landforms of the northern Canadian Shield. About \$700 million was spent on research activities on nuclear fuel waste disposal, notably at the Underground Research Laboratory that was established in Lac Du Bonnet, Manitoba for test purposes.

Atomic Energy of Canada Limited (AECL) and Ontario Hydro continued with this program over the next decade, but it was not until October 1989 that an environmental assessment panel was appointed to consider the question of safety and acceptability of nuclear fuel waste burial in a generic context. This is discussed in more detail below.

BACKGROUND FOR NWW POSITION POINT #1

1. The government should guarantee a full panel environmental assessment on a full range of radioactive waste management concepts once the Nuclear Waste Management Organization (NWMO) has made its recommendation in November 2005. The process should be adequately funded by the proponents in order to allow public interest intervenors to obtain independent technical expertise.

The Nuclear Fuel Waste Act (“the Act”) came into force on November 15, 2002. The Act created the Nuclear Waste Management Organization (NWMO) and specifies that within three years (i.e. by November 2005), that it would recommend to the Minister of Natural Resources one of three possible approaches for the management of nuclear fuel waste: (a) “deep geological disposal in the Canadian

²A.M. Aikin, J.M. Harrison & F.K. Hare, *The Management of Canada’s Nuclear Wastes*, Energy Mines and Resources Canada, Report EP 77-6, August 31, 1977.

³Royal Commission on Electric Power Planning, *A Race Against Time: Interim Report on Nuclear Power in Ontario*, September 12, 1978, p. xiii.

Shield” based on Atomic Energy of Canada Limited’s plans; (b) “storage at nuclear sites”; and (c) “centralized storage, either above or below ground” (see section 12 of the Act).

The Act stated that the NWMO would have to include “a program for public consultation” as part of its implementation plan for each approach, but it did not specify any democratic or accountable decision-making process once a recommendation has been made by the NWMO. This leaves a serious accountability gap.

Moreover, of the possible waste management options, only deep geological disposal was reviewed by the Seaborn environmental assessment panel. That environmental assessment panel was appointed in October 1989 to consider the question of safety and acceptability of nuclear fuel waste burial in a generic context (i.e. without a specific site proposal). After eight years of deliberation, the panel released a report in March 1998 (known as the Seaborn Panel Report after the Chairperson, Blair Seaborn). The report was at best ambivalent about the nuclear industry’s generic concept proposal. The final report stated,

From a technical perspective, safety of the AECL concept has been on balance adequately demonstrated for a conceptual stage of development, but from a social perspective, it has not. As it stands, the AECL concept for deep geological disposal has not been demonstrated to have broad public support. The concept in its current form does not have the required level of acceptance to be adopted as Canada’s approach for managing nuclear fuel wastes.⁴

The central question the Panel was asked to address was “has the AECL concept been demonstrated to be safe and acceptable?”. The panel concluded that it had not.

Our call for environmental assessment review is reasonable and sensible. There is no need to act hastily, since on-site storage is adequate for many decades. Moreover, we are making a decision that will impact the environment and health of our descendants for hundreds of thousands of years.

BACKGROUND FOR NWW POSITION POINT #2

2. The Seaborn Panel called for the Board of Directors of the NWMO to include independent “key stakeholders”. Instead, the government mandated the NWMO Board to be comprised solely of representatives of the nuclear power industry. The nuclear industry strongly supports deep geological disposal of radioactive waste, and thus the ability of the NWMO to make an objective decision is questionable.

Foremost among the 15 recommendations of Seaborn Panel Report in 1998 was that the government create an independent nuclear fuel waste management agency (NFWMA) at “arm’s length” from the nuclear utilities and from AECL, with a board of directors appointed from among “key stakeholders”.

In its December 1998 response to the Seaborn Panel Report, the Canadian government supported creation of a NFWMA, but decided to place the nuclear industry⁵ in sole charge of the agency, rather

⁴. Canadian Environmental Assessment Agency, *ibid.*, p. 2.

⁵. The three Canadian nuclear utilities: Ontario Power Generation, Hydro Quebec, and New Brunswick Power.

than placing “key stakeholders” on the agency’s board of directors as recommended by the panel.⁶ The government’s decision was broadly condemned by environmental and community groups across the country.⁷

A leaked secret Cabinet document that was made public in March 1999⁸ revealed that the government was manipulated by its own federal department dealing with nuclear issues (Natural Resources Canada - NRCan). The cabinet was apparently given vague warnings by NRCan that the government could be liable for the expenses of radioactive waste disposal if it took broader responsibility in the nuclear waste agency. This became the rationale for granting the nuclear utilities sole control over the agency that would become the Nuclear Waste Management Organization.

Shortly after the Nuclear Fuel Waste Act came into effect in November 2002, the Nuclear Waste Management Organization (NWMO) came into existence. The NWMO Board of Directors is comprised solely of representatives from Ontario Power Generation, Hydro Québec, and New Brunswick Power.

The government’s decision to ignore the recommendation of the Seaborn panel on this process question opens the NWMO to a perception of bias, has possibly set the stage for a divisive social confrontation over the management of high level radioactive waste.

BACKGROUND TO NWW POSITION POINT #3

3. A basic principle of waste management is that it should be first reduced at source. This requires a binding early phaseout of nuclear power in Canada -- waste reduction at the source. Early nuclear phaseout means that no major refurbishment will be conducted on reactors at the end of their current lifespans.

By the end of 1996, Canadian reactors had produced about 29,400 metric tonnes of high level radioactive waste -- about 1.2 million spent CANDU fuel bundles.⁹ If all of the existing 22 reactors in Canada were to operate for their projected forty year lifespans, about 3.6 million spent fuel bundles would be produced by the end of 2033.¹⁰ It is questionable whether CANDU reactors will last 40 years. An independent analyst has suggested that a reasonable estimate for the CANDU lifetime without extensive shutdown and refurbishment is 27 years.¹¹ However, rehabilitation and refurbishment programs

⁶ Natural Resources Canada, *Government of Canada Response to Recommendations of the Nuclear Fuel Waste Management and Disposal Concept Environmental Assessment Panel*, December 1998, p. 8.

⁷ See for example: Submission from Irene Kock on behalf of Nuclear Awareness Project to the Uranium and Radioactive Waste Division, Natural Resources Canada, Re: Federal Oversight on Nuclear Fuel Waste Management, February 28, 1999.

⁸ Natural Resources Canada, *Memorandum to Cabinet: Response to the Federal Environmental Assessment Panel on the Nuclear Fuel Waste Management and Disposal Concept*, October 1998.

⁹ Canadian Environmental Assessment Agency, *Nuclear Fuel Waste Management and Disposal Concept: Report of the Nuclear Fuel Waste Management and Disposal Concept Environmental Assessment Panel*, February 1998, p. 12.

¹⁰ Canadian Environmental Assessment Agency, *ibid.*

¹¹ Ralph Torrie and Richard Parfett, *Phasing Out Nuclear Power in Canada: Toward Sustainable Electricity Futures*, Campaign for Nuclear Phaseout, July 2003, p. 1.

could extend the lifespans of these plants to an extent as yet undetermined, resulting in an undetermined and open-ended amount of radioactive waste being produced.

A basic principle of waste management is that waste should be reduced at source as a first priority. This will require a binding early phaseout of nuclear power in Canada. Early nuclear phaseout means that no major refurbishment will be conducted on reactors at the end of their current lifespans. Such phaseout agreements have already been put in place in countries such as Germany and Belgium where significant nuclear capacity currently exists.

Nuclear phaseout would set the stage for a planned implementation of energy alternatives, while enhancing the possibility of social consensus on radioactive waste disposal. Production of an undetermined and unlimited amount of radioactive waste makes it even more unlikely that any community would be willing to accept a waste storage or disposal facility.

BACKGROUND TO NWW POSITION POINT #4

4. The Nuclear Fuel Waste Act should be amended to guarantee that Canada will not accept high level radioactive waste of foreign origin. The Act should also prohibit the import of reactor fuel if the spent fuel is to remain in Canada.

Despite recommendations from environmental groups, the Nuclear Fuel Waste Act does not prohibit the importation of high level radioactive waste (spent fuel) from foreign reactors. This opens up the possibility of Canada becoming a dumping ground for foreign waste, adding another level of uncertainty to any waste management proposal.

The Canadian government has approved in principle the possible use of mixed oxide (mox) plutonium fuel in Canadian reactors. The fuel is being manufactured using plutonium from Russian and American nuclear warheads. A fuel test using American and Russian plutonium is currently being conducted near Pembroke, Ontario at the Chalk River Laboratories of Atomic Energy of Canada Limited (AECL). The controversial test shipments of plutonium were opposed by environmental and community groups, First Nations and municipal governments. The federal government commitment included an agreement to allow the spent fuel waste to remain in Canada in perpetuity.

BACKGROUND FOR NWW POSITION POINT #5

5. Neither the technical nor social case for deep geological disposal of radioactive waste has been demonstrated. Any waste management option must be based on monitorable and retrievable storage. Waste management facilities should be hardened for security purposes.

No country in the world has yet devised an acceptable solution to the problem of long-term management of high level radioactive waste, although several (notably the United States at Yucca Mountain) are advancing towards the industry-favoured solution of deep geological disposal despite strong public opposition.. While the nuclear industry would like to pretend that this is only a “social” problem, it is also a complex, intractable technical problem, given the incredibly long hazardous life-times of radioactive wastes.

Given the technical and social uncertainties about various aspects of deep geological disposal, it is advisable to for the foreseeable future to place high level radioactive waste in some form of monitorable and retrievable storage, at least until a social consensus has been achieved on all technical issues. This will be contingent upon the conclusive achievement of a nuclear phaseout as noted in Point #3.

BACKGROUND FOR NWW POSITION POINT #6

6. Acceptance of a radioactive waste facility must be based on informed consent, through referenda in all affected communities. Even the decision to continue with storage at existing nuclear sites should be subject to this process. If the NWMO supports a centralized waste management option (deep geological disposal or centralized storage, above or below ground), there will be risk to communities along the transportation route, as well as the proposed host community. Host and transport route communities should have equal decision-making power.

In the first position point, Nuclear Waste Watch recommended that a environmental assessment panel review be guaranteed on a full range of waste management concepts. However, the principle of informed and voluntary consent in all affected communities should be accepted and guaranteed by the federal government.

ENDNOTES

^a Note that this backgrounder was produced in 2003; the stockpile of irradiated nuclear fuel is now more in excess of 50,000 tonnes and as of 2020 the nuclear industry is projecting 70,000 tonnes by the time the industry expects a deep geological repository to be available.