Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 19-H100.5

File/dossier : 6.01.07
Date : 2019-08-26
Edocs pdf : 5980049

Oral Presentation

Submission from the Concerned Citizens of Renfrew County and Area

In the Matter of

Saskatchewan Research Council, SLOWPOKE-2 Reactor

Request by the Saskatchewan Research Council to authorize the decommissioning of the SLOWPOKE-2 reactor

Commission Public Hearing

September 26, 2019

Exposé oral

Mémoire de Concerned Citizens of Renfrew County and Area

À l'égard de

Saskatchewan Research Council Installation nucléaire SLOWPOKE-2

Demande du Saskatchewan Research Council afin d'autoriser le déclassement du réacteur SLOWPOKE-2

Audience publique de la Commission

Le 26 septembre 2019

Canada

This page was intentionally left blank

Cette page a été intentionnellement laissée en blanc

Saskatchewan Research Council (SRC) - SLOWPOKE-2 Reactor Facility

Licence amendment to authorize the decommissioning of the SRC SLOWPOKE-2 Reactor

Submission by Concerned Citizens of Renfrew County and Area (CCRCA)

Introduction

CCRCA is a non-governmental, volunteer organization working for the clean-up and prevention of radioactive pollution from the nuclear industry in the Ottawa Valley.

Our interest in the decommissioning of the SRC SLOWPOKE-2 Reactor is two-fold:

- a large proportion of the SRC reactor decommissioning waste is destined for storage, and possible eventual disposal, at the Chalk River Laboratories (CRL), located in the Ottawa Valley; and
- incomplete decommissioning of the SRC SLOWPOKE-2 could set a poor precedent for other reactors awaiting decommissioning, such as the shut-down NRX and NRU reactors at CRL.

Management of decommissioning waste destined for CRL

Although the highly-enriched uranium-235 SRC SLOWPOKE-2 reactor fuel would be "repatriated" to the United States, other reactor components – notably, the beryllium neutron reflectors – would be sent to CRL.

The Detailed Decommissioning Plan (DDP) says:

14. FINAL DISPOSITION

- The SRC SLOWPOKE-2 spent fuel will be shipped to the licenced facility at the Savannah River Site in Georgia, USA, for final storage.
- The remaining solid and liquid radioactive waste will be transferred to CNL waste management area in Chalk River, ON in sealed containers for the long-term storage.

Shipping spent fuel to “Georgia, USA” (actually, South Carolina, USA) and other radioactive waste to Chalk River hardly constitutes “Final Disposition”. It merely transfers radioactive waste from Saskatoon to other locations, which may not (at least in the case of CRL) have an approved plan and capacity for long-term management of reactor decommissioning wastes.

While CRL has Canada’s only licenced commercial radioactive waste storage facility, the individual structures where commercial wastes are presently stored cannot contain and isolate longer-lived reactor wastes for the duration of their radioactive hazard. These wastes include a large variety of fission and activation products produced when uranium-235 atoms split and emit neutrons.

To adequately plan for long-term management, detailed information is required on the radioactive isotopes found in decommissioning wastes, their half-lives, their mobility in the environment, and their toxicity to humans.

The DDP is focused exclusively on packaging of the wastes for transport. This requires demonstration of and compliance with limits on gamma radiation associated with different packages. Radioactive isotopes that primarily emit other types of radiation (alpha, beta) pose well-documented health risks to humans if they are taken up in the body. They pose few transport risks (unless there is an accident) but must be isolated for the duration of their hazard.

The DDP lacks information on the types of radiation emitted by the SRC SLOWPOKE-2 decommissioning wastes, the half-lives of the radionuclides in the wastes, their potential mobility in the environment, and their uptake by humans. Hence, no consideration is given to their long term management.

Without such consideration there is no assurance that the Government of Canada (which owns CRL) and Canadian taxpayers will not bear the costs of managing these wastes for an indefinite time into the future. SRC’s own liability – in the form of its “financial guarantee” – will disappear with the removal of the wastes. But the wastes themselves will remain.

One could argue that the additional burden of the SRC SLOWPOKE-2 wastes represents a trivial quantity compared to the large quantities of waste already at CRL: Hence, long-term management costs can be ignored. This would be

irresponsible. But this is the stance of the nuclear industry, and also, sadly, of the nuclear regulator.

The Commission will doubtless issue SRC a decommissioning licence in the absence of an adequate long-term management plan, as it has for other SLOWPOKE reactors. Doing so will impose a burden on future Canadians.

It is our view that issuance of a licence will create unreasonable risks to the health and safety of Ottawa Valley residents, to our local environment, and to the Ottawa River.

The Commission should consider alternatives to shipping the SRC SLOWPOKE-2 wastes to Chalk River. Should the wastes simply be abandoned where they are at the SRC? Clearly, that would not be an acceptable long-term solution. But leaving them in place until there is an acceptable long-term management plan certainly makes sense. "Deferred decommissioning" is common practice.
To summarize - as long the Commission continues to issue decommissioning licences in the absence of long-term plans and strategies for managing decommissioning wastes, it is acting irresponsibly.

Precedents for incomplete decommissioning of other nuclear reactors

The final step in decommissioning is issuance of a "Licence to Abandon". This final step is preceded by preparation of an "end-state" report. This report should show clearly that any remaining radionuclides, in total, do not exceed the "Unconditional Clearance Levels" found in Schedule 2 of the *Nuclear Substances and Radiation Devices Regulations*. If the intent is to abandon still-radioactive waste in place, this would create a "facility for the long-term disposal of nuclear waste" and would trigger a separate licencing process and a review under the *Impact Assessment Act*.

Demonstrating that the requirements of Schedule 2 of the *Nuclear Substances and Radiation Devices Regulations* are met is extremely challenging, owing to the wide variety of nuclear substances created during reactor operation. Indeed, it appears that these requirements have been ignored in issuance of past licences to abandon SLOWPOKE reactors, and that these requirements will likely again be ignored in the case of the SRC SLOWPOKE-2.

Irradiated concrete in the reactor pool is the main problem in this regard.

The SRC SLOWPOKE-2 DDP calls for extraction of five concrete core samples, four from the reactor pool floor (which received the highest neutron irradiation) and one from the pool wall. The DDP says these samples will be analyzed for "radionuclides that are primary contributors to the clearance index." It provides the following list: europium-152, scandium-46, cesium-134, cobalt-60, europium-154, manganese-54, zinc-65, potassium-40 and iron-59.

Missing from this list are tritium, carbon-14, chlorine-36, and calcium-41.

These lighter radioisotopes are among those that pose the greatest health hazard to humans if ingested. Most are very long-lived and difficult to measure. For example, irradiated concrete contains calcium-41, a bone seeker, with a half-life of approximately 100,000 years. Accurate measurement of calcium-41 is very challenging. Is it therefore acceptable to ignore this radioactive substance?

Here is a lengthy extract from a paper by the Danish researcher Xiaolin Hou, entitled "Radiochemical analysis of radionuclides difficult to measure for waste characterization in decommissioning of nuclear facilities." *Journal of Radioanalytical and Nuclear Chemistry* 273, no. 1 (2007): 43-48:

> Due to large volume involved, graphite and biological shield concrete make up a considerable low-medium radioactive waste. The radioactivity in these materials comes from many nuclides such as 3H, 14C, 36Cl, 41Ca, 60Co, 55Fe, 63Ni, 90Sr, 99Tc, 129I, 133Ba, 137Cs, 152Eu, 154Eu, and some transuranics. Of these radionuclides, gamma-emitters such as 60Co, 133Ba, 152Eu, and 154Eu can be easily determined by gamma-spectrometry. However, the beta- and alpha-emitters have to be separated individually from matrix and other radionuclides before measurement… Most beta-activity in the nuclear waste from reactor is contributed from 14C, 3H, 55Fe, 63Ni, and 41Ca. Due to high mobility and long half-lives of 36Cl, 129I and 99Tc, and high radiation toxicity of transuranics, the determination of these radionuclides in radioactive waste is also important for decommissioning and waste disposal. 14C, 3H, 36Cl, 63Ni, 90Sr, 99Tc and 129I are pure beta-emitters, except 90Sr, others are low energy beta-

> emitters. 41Ca and 55Fe decay by electron capture, while most transuranics are alpha-emitters. It is, therefore, necessary to decompose the sample and separate the individual radionuclide from matrix elements and other interfering nuclides before measurement of their radioactivity. During decommissioning, besides graphite and concrete, many other materials, such as cooling water, lead, aluminum, and steel, which were activated in the reactor or contaminated, have to be measured for the radioactivity inventory.

In the case of the University of Alberta SLOWPOKE, a decision was made to simply do radiological surveys of the reactor pool floor prior to abandonment. According to CMD 18-H101,

> The pool floor had a maximum end value of 0.54 µSv/h, that is slightly above the clearance level of 0.5 µSv/h. However, the reactor pool was filled with cellular concrete and capped with reinforced concrete, thereby providing adequate shielding and preventing access to the pool floor.

It appears that, in the absence of a detailed radioisotope inventory, and with results of a radiological survey indicating excessive gamma radiation in the reactor pool floor, the University of Alberta SLOWPOKE was nonetheless filled with more (presumably non-radioactive) concrete.

The CNSC Staff CMD simply notes that this took place, and the Commission issued a Licence to Abandon.

Effectively this created a permanent, unlicenced, facility for the long-term disposal of nuclear waste.

This could be considered a form of reactor entombment, which is considered by the International Atomic Energy Agency to be unacceptable for planned reactor decommissioning.

Will the Commission now do the same for the SRC SLOWPOKE-2?