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Oral presentation

Written submission from the Canadian Coalition for Nuclear Responsibility

In the Matter of the

Ontario Power Generation Inc.

Application to extend the operation of Pickering Nuclear Generating Station Units 5 to 8 until December 31, 2026

Commission Public Hearing

June 2024

Exposé oral

Mémoire du Regroupement pour la surveillance du nucléaire

À l'égard d'

Ontario Power Generation Inc.

Demande visant à prolonger l'exploitation des tranches 5 à 8 de la centrale nucléaire de Pickering jusqu'au 31 décembre 2026

Audience publique de la Commission

Juin 2024

Canada

To Whom it May Concern:

The Canadian Coalition for Nuclear Responsibility (CCNR) wishes to intervene in the CNSC hearings to deal with OPG's request to allow the continued operation of the four Pickering B reactors until the end of December 2026. That is two years beyond the current end of life, set at the end of December this year, 2024.

In addition, Gordon Edwards, president of the CCNR, wishes to make an oral intervention during the hearings to be held later this year.

The CCNR urges CNSC not to grant permission for this life extension of the four Pickering B reactors. These are old reactors. They were built half a century ago and have not been refurbished. All other operating power reactors in Canada have either been refurbished, are being refurbished, or are scheduled to be refurbished in the foreseeable future.

Refurbishment is carried out mainly for safety reasons; if the cooling system is allowed to degrade beyond acceptable levels, the safety of the plant and of the surrounding population is at risk. That is because adequate cooling of the nuclear fuel is required at all times, both during operation and after shutdown, to prevent spontaneous over-heating of the fuel leading to core damage accompanied by radioactive releases.

When OPG decided not to refurbish the Pickering B reactors two decades ago it was understood at the time that these four reactors would have been shut down many years ago. Instead, they have been operated well beyond their expected and planned end-of-life, with one extension after another being granted by the regulator. And here we are again, with one more proposed two-year extension. Meanwhile, the principal in-core components of the cooling system – the pressure tubes – are getting older and older and becoming increasingly degraded.

Only recently has OPG expressed an interest, finally, in refurbishing the Pickering B reactors. But the currently proposed extension of the operating life of these reactors would be without any prior refurbishment.

CCNR urges CNSC not to allow any further extension of the operating life of these reactors unless and until they are refurbished.

One of the main jobs to be performed during refurbishment is to replace the old, degraded, highly radioactive pressure tubes and calandra tubes and

replace them with brand new tubes. The material in the old tubes cannot be reused or recycled for other purposes but must be stored in perpetuity as long-lived radioactive waste. These highly radioactive tubes are among the most radioactive components of the so-called “refurbishment waste”. In the core area, there is nothing more radioactive than used pressure tubes except for the irradiated nuclear fuel itself.

During operation, CANDU pressure tubes are subjected to many years of bombardment with fast neutrons under conditions of high temperature and very high pressure, Because of these stressful conditions, pressure tubes undergo elongation (they are stretched longitudinally), swelling (the diameter expands) and sagging (they droop in the middle).

The metal walls of the pressure tubes become increasingly brittle due to hydriding, which is the on-going forced incorporation of hydrogen atoms – or, more correctly, deuterium atoms – into the crystalline structure of the metal. This makes the metal much more susceptible to cracking or fracturing when stressed rather than elastically rebounding as was the case when it was new. Such degraded pressure tubes are more likely to leak or even burst with little or no warning.

If a pressure tube bursts inside the core of the reactor, the superheated water inside (at about 300 degrees Celsius) will flash into superheated steam. The resulting overpressure will expel moderator water from the calandria vessel and will create a pathway for radioactive gases and vapours to escape from the core into the reactor building and perhaps into the atmosphere outside the plant.

Here is just one example of why another life extension should not be granted. A detailed report on pressure tube degradation written by OPG staff in 2015 points out that elongation of the Pickering B pressure tubes has progressed already to such a point that the end fittings (attached to each pressure tube) may be forced off the bearings that have been engineered to provide necessary support. If this happens, the integrity of the entire pressure tube may be seriously jeopardized. Moreover, during cooldown, the pressure tube will “lock” (because of the end fitting having fallen off its bearings, preventing the pressure tube from contracting again as the temperature drops) thereby creating intolerable stresses on the pressure tube that may well cause it to break apart in the middle or otherwise self-destruct.

The necessary correction to this problem would necessitate repositioning the “fixed end” of these pressure tubes so as to provide more travel time before the end fitting falls off the bearings. But this will require a very prolonged shutdown, with work being conducted in a highly radioactive environment, and with no easy way to determine which pressure tubes are most at risk.

If CNSC is to do its job, putting safety first, it would have to require OPG to carry such corrective repositioning of the fixed ends of all pressure tubes that are at risk of undergoing unacceptable elongation that could lead to end fittings slipping their bearings.

A much more sensible option is to simply require refurbishment with full replacement of pressure tubes.

This scenario, and other safety concerns related to excessive hydriding, diminished fracture toughness, and unacceptable overpressurization of the primary cooling system due to a complete failure of feed water to the steam generators on the secondary side, will also be detailed in our oral presentation.

Thank you,

Gordon Edwards, PhD, President,
Canadian Coalition for Nuclear Responsibility.