



**Written submission from
Melinda Rees**

**Mémoire de
Melinda Rees**

In the Matter of the

À l'égard de

**BWXT Nuclear Energy Canada Inc.,
Toronto and Peterborough Facilities**

**BWXT Nuclear Energy Canada Inc.,
installations de Toronto et Peterborough**

Application for the renewal of the licence for
Toronto and Peterborough facilities

Demande de renouvellement du permis pour les
installations de Toronto et Peterborough

Commission Public Hearing

Audience publique de la Commission

March 2 to 6, 2020

Du 2 au 6 mars 2020

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Canadian Nuclear Safety Commission

Re: Reference Number: 2020-H-01

**Public Hearing to consider the application from BWXT Nuclear Energy
Canada to renew its Class IB fuel operating licence for a period of 10 years**

Request to Intervene by Written Submission

Melinda Rees

Canadian Nuclear Safety Commission

February 3, 2020

Attention: Commission Secretariat **By email**

Dear Madam:

Re: Reference Number: 2020-H-01; Public Hearing to consider the application from BWXT Nuclear Energy Canada to renew its Class IB fuel operating licence for a period of 10 years; Request to Intervene by Written Submission

Please accept this request to the Canadian Nuclear Safety Commission (CNSC) to intervene by written submission in the above noted public hearing scheduled to take place on March 5, 6, 2020 in Peterborough. My name is Melinda Rees. My contact information is listed on a separate page at the end of this submission. I request that my contact information be retained confidentially.

My purpose in making this written intervention is to express my objection to the extension of the BWXT licence to authorize a pelleting operation at the Monaghan Road site. My interest in intervening by written submission is that I reside within 700 meters of the BWXT facility located at 1160 Monaghan Road and I am concerned about the impact on this community of the licence renewal and extension of the licence to include a pelleting operation.

Request for Extension of time to submit a written intervention

I am a member of the local public interest group “Citizens Against Radioactive Neighbourhoods” (CARN). I am informed that the CARN membership was granted an extension to February 3, 2020 to submit written submissions. My membership in CARN was confirmed to the Commission by CARN’s legal representative, Kerrie Blaise, of the Canadian Environmental Law Association.

INTERVENTION

Overview

My objection to the renewal and extension of the BWXT licence to include authorization to conduct pelleting operations at the Peterborough facility is based on the following grounds:

- A) In the CNSC CMD, the CNSC staff (“the staff”) incorrectly determined that BWXT has applied the ALARA principle to keep doses to persons ALARA over the licence period and that therefore, the Commission should approve the licence renewal and the authorization of a pelleting operation at the Peterborough facility as requested by BWXT in the application before the Commission. The Commission staff erred in making their determination that BWXT satisfactorily applied the ALARA principle because they failed to consider the social and economic factors which are part of the ALARA assessment process, contrary to paragraph 4(a) of the *Radiation Protection Regulations* and adopted a strictly quantitative approach in their judgement of reasonableness contrary to para 8 of the Regulatory Guide G-129 Revision 1, “Keeping Radiation Exposures and Doses “As Low as Reasonably Achievable (ALARA)””.¹
- B) The Commission staff failed to consider Nuclear Safety Commission data which shows that the presence of beryllium in soil samples detected through an Independent Monitoring Program has increased by 50% between 2014 and 2015 with the largest increase seen in the playground of the Prince of Wales public school, located within 55 meters of the beryllium stacks at the BWXT facility. The test results require, at a minimum, investigation of the source(s) of the beryllium contamination, intervention to prevent further contamination, remediation of the contaminated soil, investigation of the potential hazard of beryllium exposure to young children and, depending on results, testing of the affected population. In addition, the relevant authorities charged with protecting the health of young children, and the parents of those children, should be provided with notice of the test results.

A. BWXT is not ALARA compliant

In determining whether to renew the BWXT licence with authorization to conduct pelleting at the Peterborough site, the CNSC must make a finding as to whether BWXT has complied with CNSC Regulatory Guide G-129 Revision 1, *Keeping Radiation Exposures and Doses “as Low as Reasonably Achievable (ALARA)”* (hereafter “The Guide”).

The CNSC Regulatory Guide G-129 Revision 1 states at p. 1:

Paragraph 4(a) of the *Radiation Protection Regulations* requires every licensee, as part of a radiation protection program, to “keep the amount of exposure to radon progeny and the effective dose as low as is reasonably achievable, **social and economic factors being taken into account...**” (Emphasis added).

At p. 3, the Guide states:

The ALARA concept takes into consideration relevant social and economic factors. These could include for example, the financial impact of protection measures as balanced against the benefit obtained. **The views of the public are also relevant.** (Emphasis added).

Also at p. 3 the Guide states:

...the CNSC **may** consider that an ALARA assessment beyond the initial analysis, is not required in the following circumstances:

1. The individual occupational doses are unlikely to exceed 1 mSv per year,
2. dose to individual members of the public is unlikely to exceed 50 uSv per year, and
3. The annual collective dose (both occupational and public) is unlikely to exceed 1 person-Sv.

At p. 7, the Guide deals with the judgement of reasonableness, stating:

In implementing the ALARA principle, it must be determined whether the effort to reduce doses are worthwhile. Some problems may be resolved using cost-benefit analysis or other quantitative techniques. **However, it may be inappropriate to solely consider quantitative arguments in judging reasonableness.** (Emphasis added).

It is submitted that CNSC staff:

- i. Failed to consider social and economic factors,
- ii. Failed to consider the views of the public and
- iii. Incorrectly restricted their assessment of ALARA to quantitative arguments in judging reasonableness.

In the circumstances of this application, which is to renew the BWXT operating licence for ten years and to authorize a pelleting operation at the BWXT Peterborough site, the CNSC must exercise its discretion to consider the full extent of the ALARA principle beyond the initial analysis, and find that BWXT has not satisfactorily applied ALARA over the licence period.

i. Social and Economic Factors

There are widely recognized limitations to the ALARA principle respecting the protection of the public from harmful radiation:

- ALARA is based on the assessment of an average, collective dose. This ignores individual variability. In particular, it ignores the risk to vulnerable populations such as women and children.
- ALARA is a costs/benefits trade-off between the economic concerns of a corporation versus the social and health concerns of the public. Decisions by an oversight body that are based on a narrow view of ALARA may not be viewed by the public as legitimate especially where the costs are perceived as accruing mostly to the community and the benefits appear to accrue mostly to the corporation.
- Economic concerns are often viewed as relevant only to the corporation or industry whereas the public may also have concerns regarding a negative economic impact

arising, for example, from reduced property values or concerns about the economic cost of long term health and environmental damage.

- Social factors are often downplayed but may reasonably include health, safety and environmental concerns.

Social Factors

Site Location

The CNSC staff report and the BWXT submission make no reference to social factors in the judgement of ALARA compliance. The judgement of the staff and BWXT is entirely restricted to a quantitative assessment.

This may be because the CNSC staff consider that the occupational and public doses are unlikely to exceed the levels set out in the Guide at p. 3. This approach is not adequate.

The safety of the dose limits are based on average adult and occupational exposures. The acceptable dose limit for children is not included in this calculation – this is why the IAEA site evaluation criteria (quoted above) require special consideration where the site is located close to a school.

Further, the BWXT submission (at p. 25) acknowledges that there have been four radiation protection-related action level exceedances over the licence period. This is confirmed in the staff report to the CNSC at pp. 35 – 36. The application acknowledges that there are external and internal radiation hazards at the plant (p. 22) which result from the storage and use of radioactive products and “loose uranium which may enter the body by inhalation, ingestion or absorption”. Nonetheless, the staff report adopts the BWXT assertion, finds that there have been “...very little annual releases of any radioactive material into the environment” and concludes that BWXT has applied ALARA over the licence period.

This is a strictly quantitative assessment which is not appropriate or correct where there have been exceedances and those exceedances have taken place within meters of a children’s playground. Site proximity in these circumstances is a social factor which the staff should have considered - yet the issues inherent in the location of the BWXT plant are conspicuously ignored in the staff report and the BWXT submission.

It is submitted that site location is a social factor which the Commission must consider when assessing ALARA compliance because a) the Radiation Protection Regulations require consideration of social factors (see above) and b) because the site evaluation criteria of the International Atomic Energy Agency (IAEA) also requires it.

Canada is a member of the International Atomic Energy Agency (IAEA). The mandate of the IAEA is to “establish or adopt...standards of safety for protection of health and minimization of danger to life and property”ⁱⁱ. Canada is a member state of the IAEA. The IAEA published

updated site evaluation criteria in 2019. The criteria were developed through a process of international consultation. The standards represent an international consensus on what is required for protection and safety and are in widespread use around the world. The updated site evaluation criteria apply to all nuclear facilities including “nuclear fuel fabrication facilities”. Section 6 covers the “Evaluation of the Potential Effects of the Nuclear Installation on the Region”. Requirement 26 of Section 6 is quoted below:

Requirement 26: Population distribution and public exposure

The existing and projected population distribution within the region over the lifetime of the nuclear installation shall be determined and the potential impact of radioactive releases on the public, in both operational states and accident conditions, shall be evaluated and periodically updated.

6.8. Information on the existing and projected population distribution in the region, including resident populations and (to the extent possible) transient populations, shall be collected and kept up to date over the lifetime of the nuclear installation. **Special attention shall be paid to vulnerable populations and residential institutions (e.g. schools, hospitals, nursing homes and prisons) when evaluating the potential impact of radioactive releases and considering the feasibility of implementing protective actions.** ⁱⁱⁱ (Emphasis added)

Economic Factors

There is no indication in the staff report that the legitimate economic concerns of the community have been taken into consideration in determining ALARA compliance.

These costs include:

- Long term health costs to the community if research subsequently indicates that the 1 mSV/year regulatory standard is not adequate to protect children. It is important to remember that this community is still dealing with the long term health costs associated with GE Hitachi operations on this site. The CNSC must require an investigation and report on this issue before making a finding on BWXT ALARA compliance.
- Environmental remediation costs to the community in the event that environmental contamination to soil, water or air quality or damage to non-human biota becomes apparent over time. Again, there is legitimate public concern over this issue because of the legacy of this site. Again, the CNSC must require an investigation and report on this issue before making a finding on BWXT ALARA compliance.
- Property values: the BWXT licence renewal and expansion request has generated unprecedented levels of community concern as documented by the number of written interventions to the Commission. There is a risk that the pelleting operation could negatively impact property values. Property owners in Peterborough are aware of the

economic impact of contamination issues in Port Hope. This is a legitimate concern that should be investigated by the Commission as part of its overall assessment of ALARA compliance, especially if the pelleting operation is approved.

Beryllium Contamination

In addition to the social and economic costs noted above, beryllium exposure has to be considered in the ALARA determination. Although beryllium, as used in the fuel bundle process is not a radioactive substance, it is a highly toxic and hazardous by-product of that operation. (See below for data respecting beryllium contamination in the immediate vicinity of BWXT). As such, its presence cannot be discounted in the judgement of reasonableness in the ALARA determination. The economic factors which have to be considered therefore include the cost of remediation of the beryllium contamination. The social costs include the cost of investigation into the effects of beryllium exposure on children and the mitigation of the health impacts of that exposure.

Views of the Public

The Guide states that the views of the public are relevant to a consideration of the social and economic factors which go into assessing whether or not ALARA has been properly applied.

In this case, the BWXT application to renew their licence and add pelleting to their operations has generated widespread public concern. The public perception of the history of this site is that government bodies charged with protecting the public interest failed to do so in connection with GE Hitachi Nuclear Energy Canada. This perception is grounded in well documented fact.^{iv} This history justifies the public perception that BWXT's expansion into pelleting will replicate this experience.

BWXT, the Commission staff and indeed the Commission must be aware that the community is deeply opposed to the location of a pelleting operation immediately adjacent to a school. What is "reasonably achievable" and therefore ALARA compliant in this context has to mean "what is the acceptable level for the annual radiological dose to children" with the ancillary issue of what is the acceptable level of beryllium exposure to children when that exposure is a by-product of the processes which produce the radiological dose. The failure of the staff report to acknowledge this issue in its report to the Commission reinforces the public perception that the CNSC is a captive regulator - because if indeed there is no reason to be concerned about the radiation dose or beryllium exposure for children in the immediate vicinity of a pelleting operation at the plant, then presumably the staff report would have addressed this before concluding that BWXT has satisfactorily applied ALARA.

The perception that neither BWXT nor the Commission staff take public concerns seriously is exacerbated by the lack of openness and transparency displayed by BWXT throughout the licencing process. The BWXT application references a number of reports that apparently support

BWXT's contention that doses and exposure are maintained ALARA but these reports are not available to the public – for example, the Peterborough Facility Safety Analysis, the Business Management System Manual, the Licenced Activity Quality Assurance Program Manual, the HAZOP study of the Toronto facility, the Peterborough facility Safety Analysis Manual, the Radiation Protection Manual – even the Public Information and Disclosure Program document is not available to the public for review.

Judging Reasonableness in Determining ALARA compliance

In the circumstances of this licencing application, it is appropriate that the Commission exercise its discretion, as set out in the Guideline, to go beyond a strictly quantitative analysis in its assessment of “reasonableness” in the implementation of ALARA by BWXT. For the reasons set out above, there are compelling social and economic factors which must be considered in the BWXT ALARA assessment. As noted, the site location is a social factor and community concerns about the site location are supported by internationally recognized IAEA safety standards. There is strong public concern about the licence renewal and the pelleting operation and it is appropriate for the Commission take this into account in its determination as to whether BWXT has achieved ALARA. It is submitted that the site location issue (to reiterate: BWXT operates in a dense residential neighbourhood within meters of an elementary school) requires the Commission to refuse to renew the licence and the extension of the licence or, in the alternative, to refuse to renew the licence without stringent conditions to protect the public and address community concerns.

Recommendation to the Commission

It is submitted that the BWXT Radiation Program is not adequate to address safety concerns to the general public, and vulnerable populations within that public, given that the BWXT Radiation Protection Program applies the ALARA principle primarily from an engineering perspective and does not take into account economic and social factors of concern to the surrounding community. The Commission's staff adopted the same approach and erred in concluding that BWXT correctly applied the ALARA principle to keep doses to people ALARA over the reporting period. The lack of consideration of social and economic factors is also relevant to decision on whether BWXT is competent to achieve ALARA in the context of the pelleting operation. It is respectfully submitted that the Commission should decline to approve the licence renewal and expansion into pelleting at the Peterborough facility. In the alternative, if the Commission decides to approve the licence renewal and expansion, the Commission must request additional staff reports respecting the social and economic factors cited above and must then renew the licence subject to conditions which address those factors.

B. Beryllium Contamination

On January 22, 2020, the CNSC published the results of an Independent Environmental Monitoring Program^v (IEMP).

The report shows that concentrations of beryllium which is used in the BWXT production process and steadily increased in soil samples taken in the vicinity of BWXT since 2014.

The increase in soil concentrations is likely driven by increases in air concentrations. This is concerning because beryllium is highly toxic if inhaled.

Of particular concern is that the highest values for beryllium contamination were found in the Prince of Wales elementary school playground, located approximately 45 meters to the west of the cluster of three BWXT beryllium stacks. There have been no studies of the effects of exposure to beryllium on children. Existing studies appear to be limited to the effect of occupational or other exposures on adults.

The BWXT submission (pp 36, 37) shows significant spikes in beryllium emissions to air and water throughout the licence period. At least one significant occupational exposure limit exceedance is reported in the staff report (p. 41). Soil sample test results for beryllium are not mentioned in either the BWXT submission or the staff report. However, the staff report confidently concludes (at p. 46) that “beryllium air emissions from the Peterborough facility during the current licence period have resulted in negligible discharges to the environment.”

The sample results remain below levels at which intervention would be required under existing regulations. As noted above, the regulatory standards are not based on research into the health effects of beryllium exposure on children because no such research exists. However, the steady increase in concentrations requires further investigation, evaluation and intervention.

The beryllium soil sample IEMP results raise some very serious questions:

- i) What are the health risks to children of beryllium exposure?
- ii) Have parents been informed by the CNSC about the test results at Prince of Wales?
- iii) Have residents in the surrounding neighbourhoods been informed?
- iv) Has the Medical Officer of Health been informed?
- v) Has the school board been informed?
- vi) Has the CNSC calculated the levels of airborne beryllium that is required to produce such a substantial increase in soil sample test results?
- vii) Will area residents and children receive beryllium lymphocyte proliferation tests (BeLPT)? (Note that beryllium sensitization can occur with short term exposures).
- viii) Why is BWXT permitted to locate three stacks which release its most dangerous emission 45 meters from an elementary school playground, in the middle of a residential neighbourhood and right beside a public thoroughfare?

It is submitted that until there has been an investigation into the source of these emissions, an intervention to prevent further emissions and clean-up of the contaminated soil, it is

premature to allow the BWXT licence to be renewed and extended. In the alternative, if the Commission decides to permit renewal and expansion, the Commission must impose conditions on renewal and expansion that prevent further beryllium emissions and include health and environmental protection and remediation.

I thank the Commission for its consideration of this intervention.

Melinda Rees

ⁱ Regulatory Guide “**Keeping Radiation Exposures and Doses “As Low as Reasonably Achievable (ALARA)”**”

ⁱⁱ **IAEA Safety Standards for protecting people and the environment**; Site Evaluation for Nuclear Installations, Specific Safety Requirements No. SSR-1, 2019

ⁱⁱⁱ Ibid p. 27

^{iv} https://www.cbc.ca/cbcdocs/pov/m_episodes/town-of-widows

^v https://nuclearsafety.gc.ca/eng/resources/maps-of-nuclear-facilities/iemp/bwxt-peterborough.cfm#sample_map.