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Supplementary Information
Oral Presentation

Written submission from
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Renseignements supplémentaires
Exposé oral

Mémoire de
Janice Keil

In the Matter of the

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

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

Commission Public Hearing

March 2 to 6, 2020

À l'égard de

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

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

Audience publique de la Commission

Du 2 au 6 mars 2020

Canada

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The Role of Regulatory Bodies: Canadian Nuclear Safety Commission (CNSC) and Ontario Ministry of Environment, Conservation and Parks (MECP)

The license FFOL-3620.01 for the BWXT Class 1B nuclear facility operation in Peterborough, Ontario is granted by the Canadian Nuclear Safety Commission (referred to as CNSC). In this licence renewal application, BWXT is requesting to produce natural and depleted uranium fuel pellets at their Peterborough facility. According to CNSC, this requested change is within the currently licensed operating limits. The sole requirements imposed by the federal regulator is an updated environmental monitoring program (Section 15.1) and an annual commissioning report (Section 15.2)

The requirements set by the other regulatory body, the provincial Ministry of Environment, Conservation and Parks (referred to as MECP) are often considered to be secondary, even though CNSC staff at the Peterborough Open House January 23, 2020 confirmed that the federal regulations do not supersede the provincial regulations set by MECP. In accordance with the relevant provincial regulations, specifically Section 26 of O. Reg 419/05, an Environmental Compliance Approval (ECA) is valid for the site's operations with an Emission Summary and Dispersion Modelling Report (ESDM) required to confirm compliance. The latter uses AERMOD, the preferred air dispersion model that examines various criteria such as the stack height and inside diameter, the exit velocity and temperature of the plume that comes out of the stack. The Ontario regulation 419/05 of the Environmental Protection Act (R. S.O. 1990) determines the concentration of contaminant release.

Unlike the BWXT Toronto site at 1025 Landsdowne Street which has its own ECA approval number (#5460-ACWHBS) issued September 12, 2017, the Peterborough facility maintains its inherited or "grandfathered" ECA (#9339-9HDR8J) through the current owner GE-Hitachi. That ECA from March 24, 2014 was amended September 14, 2017. As CNSC Project Officer, J. Amalraj confirmed at the January 23 Open House, any significant change beyond the present scope of operations, such as the proposal to introduce pelleting in Peterborough, **would require a new and an independent ECA,** not just another ECA amendment tacked onto the original GE-Hitachi license. The Control Change Program (Section 3.5) assesses any changes made to the physical facilities, equipment, processes, procedures or practices that could adversely affect product quality, employee health and safety, the environment or the public. It is significant to note that the quality of the fuel bundles for the CANDU reactors at the Pickering and Darlington stations has a higher priority than the health and safety of the community in Peterborough.

Environmental Compliance Approval and Data Discrepancies

BWXT has completed an Environmental Review Assessment (ERA)/ Annual Compliance Monitoring Report in December 2018 for CNSC. It has also engaged in an Independent Environmental Monitoring Program (IEMP) in 2014, 2018 and 2019. On my search for a more

recent ESDM than the original one done by Conestoga-Rovers dated November 6, 2013, the provincial requirement for compliance with the ECA, the process can only be described as a cover up of obfuscation and data discrepancy by BWXT.

The company had seven years from 2013 to 2020 to bring the ESDM report up to date but it was only completed January 30, 2020. As of my meeting with a BWXT February 14, 2020, I was the only person to have access to the Emissions Summary Table other than BWXT, CNSC and MECP. In a conversation with Jamie Mugford, Issues Coordinator and Aaron Gordon, Senior Environmental Officer of the MECP Peterborough Field Office on a February 12, I was informed that the only way to obtain access to the most current modelling data would be to file a Freedom of Information Request which would take a minimum of 2-3 months to process. The timing of this report with the federal licensing hearing scheduled only five weeks later with the data inaccessible to the public, researchers and health officials is highly suspicious and appears to be intentional. A follow-up conversation with MECP February 14 provided the information about Section 4.2 of the ECA legally requiring the company to make available for inspection the Emission Summary Table.

It is also ironic that at the same time that BWXT Peterborough announced its new Community Liaison Committee to promote greater transparency and openness between the company and citizens, it was making it impossible for the public to access the data that will be used at the hearings in March. In response to the Communications Manager's statement that anyone can come down to the plant to see the table, it was necessary to state that one cannot access a document one does not know exists.

At the 20 minute long February 14 meeting with BWXT, I was only allowed to make notes about the one page of AERMOD modelling data from this table that listed the total facility emission rate, the maximum ground level and the MECP POI (point of impingement) levels of all contaminants emitted from the site. Not only is the question of where the rest of the document is remains unanswered, the discrepancy in the data provided indicates a serious lacuna. The table includes emission amounts of nitrogen oxide, barite, ethyl benzene, xylenes and trichloroethylene but it is missing the two most significant contaminants, beryllium and uranium. Even though beryllium is considered a priority contaminant by MECP, it is not listed on the January 30, 2020 document. The reason given by Communications Manager, Kathleen Augustin is that beryllium is such an insignificant emission source. This same justification of negligible air release amounts is given for why soil sampling is not conducted at the Peterborough facility compared to the annual sampling at BWXT Toronto. The current license authorizes BWXT Peterborough to produce and test fuel bundles with a facility production level of up to 1,800,000 kg of uranium dioxide per year and yet there is no ESDM data for uranium emissions.

This is in direct contrast with the November 2018 Environmental Risk Assessment (ERA) report of the BWXT Peterborough Consolidated Operations where on page 3-11 the reports done by Trinity Consultants in 2015 and GHD in 2016, both consultancy companies that worked with BWXT Toronto but not Peterborough, include both of these contaminants. In these reports, the

IEMP uranium levels in soil samples are marginally higher than Ontario standards and the beryllium levels are marginally higher than any others in Canada. With these levels, **why are beryllium and uranium emissions not included in the January 30, 2020 Emissions Summary Table as part of the most current ESDM?**

The Unique and Sensitive Site Specificity of the BWXT Plant in Peterborough

The Peterborough BWXT plant as the current tenant on the former GE-Hitachi site is **unique among all nuclear facilities in Canada.** There is no other facility that is close to an urban downtown core, surrounded by single family residential neighbourhoods and has a school directly across the road. The only other comparable example, in that it is not surrounded by industrial/ commercial zoning as all other plants, is that of Port Hope. As the Port Hope Area Initiative is the largest environmental cleanup effort in Canadian history costing a minimum of $1.28 billion CAD, that example given by the CNSC staff at the Open House should not be a model to follow in Peterborough.

If the license is renewed by the CNSC allowing for pelleting in a Peterborough, then this site under the new ECA required by the MECP must comply with the setback requirements as part of land use planning guides. (D-6, Section 1.2.1) Residential land use is considered to be **sensitive** 24 hrs a day and any building or outdoor space such as a school "where humans or the natural environment may be adversely affected by emissions generated by the operation of a nearby industrial facility" is also sensitive. Policy D-6 Compatibility between Industrial Facilities Section 4.3, renewed March 22, 2019, stipulates recommended minimum separation distances of 300 metres minimum separation for a Class III industrial facility such as the BWXT plant with a large physical size and high probability of fugitive emissions. The Prince of Wales elementary school is a maximum of 55 metres from the Monaghan and Wolfe point of impingement. Even if BWXT argues that their facility is only Class II, the minimum separation is still 70 m, exceeding the distance between the plant and Declan smokestack and Prince of Wales. In Section 4.2.3. the Ministry recommends that the category designation (Classes I-III) of existing and committed industrial land use be indicated in land use plans (which is not being done) with all potential influence areas delineated.

The MECP mandated potential influence and protection areas from the points of impingement[1], the public-plant boundary of the fence line around the GE-Hitachi-BWXT site, have to be followed. For a Class III industrial facility such as the BWXT plant, that protection zone has to be **1000 m.** (Section 4.1.1) That 1000 m radius zone in Peterborough, unlike all other existing nuclear sites in Canada, encompasses several schools, the Regional Health Care Centre and

[1] The Point of Impingement (POI) is the point at which a contaminant contacts the ground or a building. According to Section 2 of O. Reg 419/05, Acceptable Point of Impingement Concentration for a Compound of Concern, the compound shall not discharge or cause or permit the discharge of a compound of concern into the air if the compound of concern has a Ministry Point of Impingement limit and discharge results in the concentration exceeding that limit. The beryllium levels in the ground at Prince of Wales School is a case in point.

many residential neighbourhoods. **The names applied to this area implies that people and the environment is influenced and needs to be protected from the emissions of the industrial facility.** The fact that the Peterborough site is unlike any other, including the BWXT Toronto facility, dictates that the influence area to protect citizens as well as workers cannot allow any pelleting.

Imperative Need for Better and More Comprehensive Monitoring by MECP

As stated by Peterborough's Medical Officer of Health, Dr. Rosanna Salvaterra, there needs to be more comprehensive environmental modelling and monitoring of emissions from the BWXT plant. Presently there are many more regulatory inspections done of the Toronto site than in Peterborough: 9 in the former and only 3 in the latter in 2018, two of those conducted by CNSC and only 1 by MECP (BWXT 2018 Compliance Report, p. 13) The argument will be made that the additional inspections are needed for monitoring of the pelleting process and if that is the case, then that provides sufficient evidence for why the combination of pelleting and a sensitive site in our community is an extremely dangerous and ill-advised combination.

The impression given to the community by the data presented by both BWXT and CNSC is that effective monitoring of the health effects by both uranium dioxide and beryllium is not something that is taken seriously or assessed thoroughly by BWXT, CNSC and MECP. Some examples include:

- R2 Decan Stack is the single process uranium air emission point, but uranium is not even one of the substances covered in the the most recent ESDM emissions summary table
    - there are only liquid effluent monitoring results of uranium (p. 60)
    - the monitoring process at the Toronto plant is much more extensive and if applied to Peterborough, the dangers of having a nuclear plant in a sensitive location would be apparent
        - the soil sampling result summary in the 2018 Compliance Monitoring Report of the Toronto site consists of three categories from the plant itself radiating out to areas furthest away (it must be noted that in the Landsdowne area, the closest school, St Sebastian, is at least 2 km away)

          BWXT NEC property
          Nearby industrial/commercial lands
          Residential and parkland locations

          The relevant CCME guideline for uranium levels is 300 micrograms U/g (1 sample) for the plant itself, 33 micrograms U/g (34 samples) for the

industrial – commercial lands surrounding the plant and 23 micrograms U/g (14 samples) for the high rises and the parkland much further away.

The maximum concentration levels at Toronto site: 1.3 micrograms U/g at the BWXT plant, 11.9 for the industrial commercial area directly surrounding the facility and 1.0 for residential area approximately 1 km away

The areas immediately surrounding the plant are the ones most severely affected by the dramatic increase in uranium emissions: almost 12 times higher than at the plant itself.

In Peterborough those areas immediately surrounding the plant that will be the most affected are not industrial or commercial areas but Prince of Wales Elementary School and multiple single-family residential neighbourhoods including but not inclusive to:

- Wolfe St to N
- Paterson St to N
- Sherbrooke St to N
- Bolivar St to N
- Chamberlain St to S
- Douglas St to S
- McCannan St to S
- Parnell St to S
- Romaine St to S
- Frank St to W
- Park St to E
- Rubidge St to E

- beryllium is only being used at the Peterborough site as this is where the fuel rods are being assembled with this lightweight metal being used as brazing material

- maximum beryllium concentration in water is provided but not that of soil: it is the increasing levels of beryllium in the soil of the Prince of Wales schoolyard that has everyone worried

    - the monitoring of beryllium air emission points at the North, South and Acid stacks is not required by MECP

- soil sampling is not conducted at the Peterborough facility, but soil sampling is conducted annually at the Toronto facility (p. 62)

- the beryllium release limit in air at the point of impingement is 0.01 micrograms/m^3 but is supposed to be only 0.0010 micrograms over 24 hrs

- beryllium ventilation system failure at the Peterborough site as noted in the 2018 BWXT Annual Compliance Monitoring Report's description of the emergency preparedness program activities

- beryllium hazardous waste reduction goal not achieved (2018)

- the soil sampling results at Prince of Wales were discounted by Aaron Gordon, Senior Environmental Officer, at the MECP Peterborough Field Office in a telephone conversation with me February 12, 2020

    - the reasons given included inconsistent and variable testing criteria used by different labs

    - he also stated that MECP has to apply "the most appropriate use of resources" to determine if testing should be done, insinuating that to test a school for beryllium, one of the most toxic chemicals on the plant and a known carcinogen, was perhaps a waste of taxpayer money and that the health of our children is not worth the financial expenditure

    - Gordon did backtrack in our February 14, 2020 conversation and confirmed that monitoring has to be done at Prince of Wales as it falls within the 1000 m radius

    - MECP's reasons given justify why **MECP has to be regularly involved in a constant monitoring of air, soil and water samples in the entire 1000 m area of influence around the plant**

        - ❖ to have one body do the testing with the same lab is the only way to ensure consistency of results
        - ❖ people in the community, including myself, do not trust BWXT and CNSC to do self-monitoring where the results can get "accidentally" skewed in favour of the company
        - ❖ the present scenario of BWXT submitting their IEMP data to CNSC without MECP having to oversee the results is inappropriate

Having a School Next Door Means Just Having Occupational Data Doesn't Cut It

The students at Prince of Wales Elementary School across the road from the BWXT plant are not just small adults and not workers at the nuclear plant. Thus, occupational health and safety data does not apply. The lack of research studies on the health impact of beryllium and uranium on children is due to the fact that **unlike the situation in Peterborough, nuclear plants are normally never situated close to a school.**

The potential health effects on children with their unique physiology at critical and vulnerable periods of structural and functional development are enormous. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. (Russ G. Cooper and Adrian P. Harrison, "The Uses and Adverse Effects of Beryllium on Health", National Center for Biotechnology Information (2009)) This is significant as children, being shorter than adults, are closer to the ground and may breathe dust and vapours to a greater extent. They also spend more time outdoors than adults and in not using the judgment of adults to avoid hazards (NRC 1993), sometimes eat inappropriate things including dirt.

Children also have a longer remaining lifetime in which to express damage from chemicals: in this case of BWXT, a lifetime body burden of beryllium and alpha-emitting materials in their lungs. This body burden, as emphasized constantly by researchers and scientists, is particularly relevant to cancer.

Thus, the dangerous toxicity of beryllium and uranium, the beryllium cancer cluster recorded at the GE plant, the presence of a vulnerable population of elementary school students, the 55 m proximity of the school to the MECP POI, the slowly accumulating elevated levels of beryllium in the soil of the schoolyard (Julian Aherne et al., Trent University (January 22, 2020) and the lack of epidemiological studies on the health effects on children exposed to these hazards lead to one conclusion: **this situation having a school next door to a plant producing nuclear rods is unique, unprecedented and a public health disaster in the making where all the occupational data from BWXT and CNSC just doesn't cut it.**

What We Do Know About Beryllium and Uranium

Beryllium is a known carcinogen and one of the most toxic and dangerous substances on earth (World Nuclear Association)

- Beryllium: Group 1 human carcinogen by IARC
  A1 confirmed human carcinogen (ACGIH)
  Health Hazard Rating 2.3/ 3: Very High Hazard (National Pollutant Inventory)

- Beryllium compounds exist principally as fine dust particles in the air which eventually settle over land and water – the extremely small particles may remain suspended in the air for up to 10 days (Russ G. Cooper and Adrian P. Harrison, "The Uses and Adverse Effects of Beryllium on Health", National Center for Biotechnology Information (2009)

- Exposures are higher near beryllium processing sites (CCME 2015)

Beryllium disease is not just occupational: there are "neighbourhood cases"

- Acute beryllium disease or **berylliosis**, is an acutely toxic, pneumonitis-like lung condition

- A disease first recognized by Gelman in 1938, beryllium sensitization or CBD (chronic beryllium disease) occurs when workers are exposed to particles, fumes and solutions from beryllium-containing substances (National Institute for Occupational Health and Safety)

- Once an individual us sensitized to beryllium (BeS), progression to CBD can occur even after removal of the individual from a beryllium containing environment

- **CBD (chronic beryllium disease) has been called the "unrecognized epidemic"**

    - more than 59% of beryllium particulates in the breathing zone are less than 10 micrograms in aerodynamic diameter contributing to beryllium deposition into the deepest recesses of lungs causing granulomatous scarring of lung tissue

    - CBD follows either high or very low levels of exposure: specific delayed hypersensitivity immune response within a few months to several decades (20-25 years) after exposure

        - For this, the ambient air levels of beryllium are normally very low (0.0003-0.0002 micrograms/m^3 (International Agency for Research on Cancer [IARC]) compared to MECP POI Limit of 0.01 Ng/m^3 and same for EPA air quality standard for beryllium over a 30- day average

- Beryllium exposure is not just occupational: several cases of home contamination by beryllium reported to US Congress (NIOSH 1995)

- "neighbourhood" cases gained considerable interest in the 1940's. Several non-occupational cases in individuals living in the close vicinity of beryllium plants were reported (Section 5.2). By 1966, a total of 60 "neighbourhood" cases had been reported In the USA, 27 of which were related solely to contact with worker's clothes, 18 to air contact alone, and 13 to clothes plus air contact. **There were at least 3 children among these cases. (**Hardy et al., 1967)

- Eleven cases of chronic beryllium disease with symptoms similar to those found in beryllium workers were diagnosed among residents in the close vicinity of a beryllium production plant in Ohio, USA (Eisenbud et al., 1949; Eisenbud, 1982). In a retrospective investigation, Eisenbud et al. (1949) concluded that 10 out of the 11 non-occupational cases lived within **1.2 km of the plant and that no members of their households had worked in the plant.**

- In one instance reported by Lieben & Williams (1969), the individuals affected lived far away from the beryllium plant but had regularly visited a graveyard **situated across the street from the plant** (NIOSH 2011)

- L.A. Maier and colleagues describe a series of cases of CBD diagnosed between 1972 and 2002 among residents of a community surrounding a beryllium manufacturing facility- of the 8 cases, 5 were definite and 3 were probable to be attributed to environmental exposure and not to occupational exposures
(Mark T. McCloskey, Virginia Buchner, William R. Field, Brian L. Scott, "Recent Advances in Understanding the Biomolecular Basis of Chronic Beryllium Disease", PubMed (2009-01-01)

- Family members of workers are also at risk if work clothing was carried home (ATSDR): in 1991 a case of chronic beryllium disease due to secondary contamination was reportedly caused by a family member's exposure to beryllium from a worker's clothing (nap.edu)

- Beryllium has been found in the lungs and urine of non-occupationally exposed individuals … with higher concentrations reported in the vicinity of beryllium processing plants (World Health Organization, "Concise International Chemical Assessment Document 32: Beryllium and Beryllium Compounds" (2001))

- Neighbourhood cases with indirect general population exposure outside beryllium-producing or beryllium processing plants are also noted in Chapter 9 of the document "Environmental Health Criteria 106 Beryllium" jointly published by the World Health Organization, UN Environment Programme, International Programme on Chemical Safety (IPCS) and the International Labour Organization (1990)

- It is likely that beryllium can be transferred from the mother to an infant in breast milk or that it can cross the placenta (Kracher (1999) in ATSDR: Agency for Toxic Substances and Disease Registry [Atlanta, GA], Public Health Statement for Beryllium (September 2002)

Low and very low levels of beryllium cause disease

- Low, seemingly trivial exposures to beryllium may be important in causing beryllium disease" (nap.edu)

- Studies support concerns regarding the risk of low-level beryllium exposures with the important question posed of risk associated with lower levels of beryllium exposure **well below current OSHA standards**
  Carrie A. Redlich, MD, Chronic Beryllium Disease: Risk from Low-Level Exposure", American Journal of Respiratory and Critical Care Medicine (Vol. 177, 2008), pp. 936-7.

Contaminated soil with beryllium is the worst- case scenario and Prince of Wales Elementary School has it

- Higher than normal levels of beryllium may be in soil and children eat a lot of dirt- like lead chips it appears sweetened so would be even more attractive to kids

- Organic substances in soils are known to bind beryllium easily, particularly in alkaline soils with high PH [such as in Peterborough] (Kabata-Pendias and Pendias 2000 in Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (Beryllium) 2015)

- "Very young children may be exposed to beryllium via soil eating and unwashed hands" (The Uses and Adverse Effects of Beryllium on Health)

- Beryllium that is found in excess of 3 times the natural background levels is most likely to be in soil and presents a special hazard for young children. Hand-to-mouth activity and eating contaminated dirt will result in oral exposure to beryllium
  www. Atsdr.cdc.gov/ToxProfiles/tp4-c6.pdf, Section 6.6 Exposures of Children

- Advice given to families to reduce the risk of exposure to beryllium: **the number one thing is to prevent children from eating dirt** as well as not bringing home objects that may be contaminated with beryllium (Section 1.7 ATSDR Beryllium Public Health Statement)
  Agency for Toxic Substances and Disease Registry (ATSDR), "Toxicological Profile for Beryllium" (September 2002, updated June 2015)

Uranium is a toxic radiogenic chemical (CDC) and alpha emitter: Alpha emitters outside the body are harmless but damaging and cancer-causing once they are in contact with living cells and exceedingly dangerous when ingested or inhaled (Gordon, p. 12)

- Uranium dioxide is chemically toxic. Inhalation of any dust particles can be hazardous

- Amount of uranium particulates will increase by a factor of several thousand into the air and breathed into the lungs of kids at Prince of Wales according to Dr. Edward Gordon in his CARN submission to the CNSC hearing
    - 2018 grams of uranium into the air – PTBO 0.002 vs Toronto 6.3 (3150 x higher)
    - 2018 grams of uranium into water – PTBO 0.01 vs Toronto 940 (ratio 94,000 x higher)

- It is a very fine powder that lodges into the deepest recesses of lungs – extremely small species of uranium oxide dust are able to lodge deeply in lung tissue

- Uranium dioxide powder usually 6 microns but with HEPA filter as on Monaghan St stack, particles can get down to 0.5-2 microns – as Health Canada has determined, PM 2.5 (smaller than 2.5 microns) are especially dangerous with "**children particularly sensitive to the health effects of breathing such fine particulate matter"**
  Health Canada, "Guidance for Fine Particulate Matter (PM 2.5) in Residential Indoor Air" (1999)- also WHO 2005, US EPA 2009

- Insolubility: particles can remain in place for a very long time: many years or even over a lifetime, creating a body burden to individual who inhaled the dust **with children bearing the highest body burden**

    - Insoluble means it is generally more toxic to lungs through inhalation exposure because of the longer retention time in the lung tissue (ICRP 1994)

    - Human and animal studies have shown that long-term retention in the lungs of large quantities of inhaled insoluble uranium particles can lead to serious respiratory effects (S. Keith et al, "Toxicological Profile for Uranium, ATSDR)

    - Highest levels of uranium are found in the bones, liver and kidneys – **retention of uranium in kidney with children having relatively inefficient secretion and thus greater potential for renal toxicity**

    - **Since the skeletons of children are growing with a higher rate of bone formation, it is possible that a higher fraction of circulating uranium will be deposited in bone than in adults** (atsdr.cdc.gov p. 240)

- Uranium dust bombards living cells with alpha particles that are known to be cancer-causing: cancer of bone, liver and lung cancer from exposure to alpha particles (CDC)

- CNSC itself states that alpha emitters are extremely effective cancer-causing agents and are 20 x more damaging than beta particles or gamma rays

- Alpha radiation from uranium is designated a human carcinogen (ATSDR 2008)

- American Conference of Industrial Hygienists (ACGIH) considers insoluble and soluble uranium compounds Confirmed A1 Human Carcinogens

- Internally deposited radionuclides that emit alpha particles [such as uranium] are carcinogenic to humans (**International Agency for Research on Cancer [IARC] 78 (2001))**
  Cathy Vakil, M.D and Gordon Edwards, Ph.D., Statement of Concern: Children Should Not Have to Inhale Uranium Particulates (February 10, 2020)

- For a 1-micron particulate residing in place, the absorbed dose to the surrounding small volume of tissue with a radius of 30 microns is 22.5 (Dr. Gordon Edwards, "Health Implications of Pelleting Operations at the BWXT-PTBO Plant (February 3, 2020) p. 20)

Prevalence of cancer is dependent on DNA damage from the alpha emitters

- Common example of melanoma, a type of skin cancer where the sun can induce cancerous DNA damage in skin cells (Scientific American Feb 24, 2015)
  - as recommended by public health agencies, people can take action and apply sunblock lotion
  - **children at Prince of Wales cannot opt out of attending school to avoid uranium exposure in order to limit DNA damage**

Soil ingestion by children another concern, this time with uranium

- Ingestion of soil by children considered a potentially important pathway through dermal contact (through skin into blood)

- Young children could receive greater depleted uranium exposure when playing within a conflict zone because of hand-to-mouth activity that could result in high depleted uranium ingestion from contaminated soil. This type of exposure needs to be monitored and necessary preventative measures taken (World Health Organization)

A possible much more dangerous future with BWXT: SMRs on the horizon?

- Presently BWXT puts together CANDU nuclear rods for the Pickering and Darlington power plants but this license application calls for the production of fuel pellets for CANDU from uranium dioxide powder. As natural uranium is not suitable for reactors, it has to be converted to uranium dioxide
  ATSDR (Agency for Toxic Substances and Disease Registry) Toxicological Profile for Uranium (Feb. 2013)

- As the demand for CANDU fuel rods is in decline (Pickering is slated to close in 2024), then BWXT may, in order to do enough business for their bottom line, begin to produce small nuclear reactors (SMRs) which use U-235 enriched uranium, the most radioactive of all the three types of uranium (depleted, natural and enriched) The present provincial government is pushing SMRs for small scale electricity and process heat applications.

Conclusion: Public Trust and a Toxic Legacy

The legal mandate of the Canadian Nuclear Safety Commission is the protection of human health. The precautionary principle is an imperative concept that recognizes in that protection of health the need to limit exposure and to keep hazards as low as reasonably achievable (ALARA). Thus, I as a member of CARN, Citizens Against Radioactive Neighbourhoods, am calling on the CNSC commissioners to do the following:

- acknowledge the unique and unprecedented site location of the BWXT-Peterborough plant and to frame all examination of this matter under that lens. This is the only site in Canada close to a downtown core, surrounded by residential neighbourhoods with a school directly across the road.

- withhold any licensing decision until complete and thorough environmental monitoring of the 1000 m area of influence around each point of impingement is completed by a neutral, third-party and independent body such as MECP. That includes air, soil and water testing.

- refuse the application to do uranium dioxide pelleting in Peterborough. A substantial change to BWXT's operations in this direction can only be construed as an act of reckless endangerment of the citizens of Peterborough, particularly the students of Prince of Wales Elementary School.

- have the MECP enforce the protection areas around the points of impingement along the fence line of the plant to the full extent of the law

- demand full transparency and public disclosure of data that has any impact on health and the environment. As my experience has demonstrated, BWXT appears to be engaged in a cover up replete with stonewalling in their unwillingness to make data public. This does not engender public trust in a community dealing with a toxic legacy of General Electric with its incredibly notorious and negligent workplace safety culture. BWXT has already failed to achieve its social license.

As a health and safety whistleblower on infractions committed by my employer, the Toronto Catholic District School Board, I was left with both a suspension that has been ongoing for 18 years and severely incapacitating respiratory diseases as a result of exposure to a contaminant

in my school. Exactly like those who suffer from beryllium disease, my lungs show evidence of the nodules, the ground glass opacities, the honeycombing, the scarring and the myriad of high-resolution CT scans, more than probably everyone in this room combined (with the exception of the former GE workers). In fact, one of the severe lung diseases I have, hypersensitivity pneumonitis, mimics berylliosis.

As a teacher with over 35 years of experience, I am mandated under the Ontario Education Act to protect the students in my care. Even though I have never met any of the students from Prince of Wales Elementary School, they are citizens, neighbours and fellow members of the community we all call home and thus, I will protect them in any way I can. I refuse to let them suffer from this lung disease that has monumentally changed my life, a disease that can cause my death from pneumonia at a moment's notice.

I refuse to let these young and vibrant future generations of our community have their health destroyed by BWXT just as GE did with the hundreds of workers that are dying or have died as a result of the toxic legacy of this city. The whistle was blown then, and it is blowing now. It is up to the CNSC to hear it and to act in the interest of human health for all of us, the past, present and future generations in Peterborough.

Signed: Janice Keil, OCT
Peterborough, Ontario

Dated: February 18, 2020