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Oral Presentation

Written submission from Swim Drink Fish Canada/ Lake Ontario Waterkeeper

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

Exposé oral

Mémoire de Swim Drink Fish Canada/ Lake Ontario Waterkeeper

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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Submissions of Swim Drink Fish Canada/Lake Ontario Waterkeeper

Re: Relicensing hearing before the Canadian Nuclear Safety Commission for BWXT-Nuclear Energy Canada

Notice of Public Hearing, Ref. 2020-H-01

January 27, 2020

Submitted to:
Participant Funding Program Administrators cnsc.pfp.ccsn@canada.ca and the CNSC Secretariat cnsc.interventions.ccsn@canada.ca

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Executive Summary

Swim Drink Fish Canada/Lake Ontario Waterkeeper ("Waterkeeper") is a grassroots environmental organization that uses research, education, and legal tools to protect and restore the public's right to swim, drink, and fish in Lake Ontario.

The current Class IB fuel facility operating licence for BWXT is set to expire on December 31, 2020. BWXT is currently applying for a licence renewal that would include a new licence period of ten years. Waterkeeper has received participant funding to intervene in this matter, which requires the organization to prepare and deliver both written and oral submissions concerning the impacts of both BWXT facilities to local water quality and aquatic ecosystems, as well as the adequacy of BWXT's public information policies and practices for its facilities.

Waterkeeper was provided with participant funding from the CNSC in order to retain two experts to examine the PNGS and make recommendations for improvements to its operations:

- **Pippa Feinstein, JD, LLM,** counsel, case manager and public engagement expert; and
- **Wilf Ruland, P. Geo**., an experienced hydrogeologist and recognized expert on the impacts of industrial facilities on local groundwater and surface water.

General Electric Canada (GE) was has owned the land on which both BWXT facilities sit for over 100 years. It acquired the land in Toronto and Peterborough with the rise of electricity in both cities just after the turn of the last century. Since the early 1950s, GE was also an integral part of the design team that produced the earliest CANDU technologies. Both facilities have been producing fuel for the Pickering Nuclear Generating Station since 1965 and later also Darlington Nuclear Generating Station. And yet, public knowledge of the BWXT facilities and their operations remains fairly limited.

There are two potential pathways by which contaminated water could make its way into the local environment. The first is via effluent releases from the BWXT facilities into the municipal sewer system. The second pathway is more complex and involves stormwater from the BWXT facility and its stormwater catchment system. Waterkeeper urges BWXT and the CNSC to ensure additional monitoring is undertaken to evaluate whether stormwater and/or groundwater contamination is present around the BWXT locations and the extent to which it is contained (should it be present).

Waterkeeper also reviews the proposed new licence limits for the BWXT facilities to determine their adequacy – and their prudence, should pelleting operations be moved from Toronto to Peterborough over the course of the next licence period.

Finally, Waterkeeper makes a series of recommendations to improve BWXT's public engagement activities and policies.

Background

About Swim Drink Fish Canada/Lake Ontario Waterkeeper

Swim Drink Fish Canada/Lake Ontario Waterkeeper ("Waterkeeper") is a grassroots environmental organization that uses research, education, and legal tools to protect and restore the public's right to swim, drink, and fish in Lake Ontario. As a non-political registered charity, Waterkeeper focuses on research and justice issues in the public interest. It is dedicated to protecting and celebrating the Lake Ontario watershed, including the wetlands, streams, rivers, and creeks that flow into the lake.

Waterkeeper also works with communities to facilitate the use of environmental laws to protect their rights to swim, drink, and fish. The organization participates in legal processes to help ensure that environmental decisions are made on the basis of sound and tested scientific evidence by independent decision-makers and in the public interest. Waterkeeper is participating in the current BWXT Nuclear Energy Canada (BWXT) relicensing process in order to ensure the Commission Tribunal considers the public's need for a swimmable, drinkable, fishable Lake Ontario watershed when determining whether to renew the PNGS licence and add any additional licence terms.

Overview of BWXT's current relicensing application

Waterkeeper was granted funding to intervene in the public hearing to consider whether BWXT should have its licence to operate facilities in Toronto and Peterborough renewed. In particular, Waterkeeper was funded to examine potential environmental impacts of sewer discharges from BWXT facilities. While these discharges are generally diverted to local wastewater treatment plants, the ultimate receiving waters are Lake Ontario in Toronto and the Otonabee River in Peterborough. Waterkeeper was also funded to review BWXT's public information-sharing and engagement practices and policies. Thus, these two main areas of concern will constitute the focus of Waterkeeper's intervention.

BWXT has a single licence to operate facilities at two separate locations: one in Toronto that produces uranium fuel pellets from powdered uranium dioxide (UO_2); and one in Peterborough that assembles the pellets produced in Toronto into fuel bundles to power nuclear energy reactors. The Peterborough location also conducts repair work on nuclear-related equipment from off-site nuclear facilities.

BWXT is currently applying to renew its licence for another ten years. It is also requesting flexibility to potentially conduct pelleting operations at the Peterborough facility which would have the potential to constitute a significant operational change for the company. The company says in its application that it currently has no plans or business case for conducting pelleting operations in Peterborough, but that it would like to have the ability to do so, should it wish to, sometime over the next ten years.[1]

[1] BWXT relicensing application at 10.

Should the Commission approve this request for BWXT to conduct pelleting operations at the Peterborough facility, and should the company decide to conduct these operations there, the company asserts it will then reconfigure its Peterborough site and adopt the environmental monitoring regime currently used in its Toronto facilities.[2]

The legal threshold that must be met to permit licence renewals

In considering the application, the Commission is required to decide, pursuant to subsection 24(4) of the *Nuclear Safety and Control Act* (NSCA):

a) if BWXT is qualified to carry on the activity that the licence would authorize; and
b) if, in carrying on that activity, BWXT would make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

This constitutes the primary legal test by which to measure the BWXT licence application and framework against which Waterkeeper will review the CNSC staff Commission Member Document (CMD).

In these submissions, Waterkeeper will make recommendations concerning CNSC staff's new proposed licence to better ensure the BWXT facilities make adequate provision for the protection of the environment. Waterkeeper will also make a series of recommendations to assist the Commission Tribunal in fulfilling its mandate to ensure decisions are made in the public interest.

The BWXT facilities in Toronto and Peterborough

This section includes a brief discussion of the history of the facilities in Toronto and Peterborough and their current ecological and urban demographic contexts.

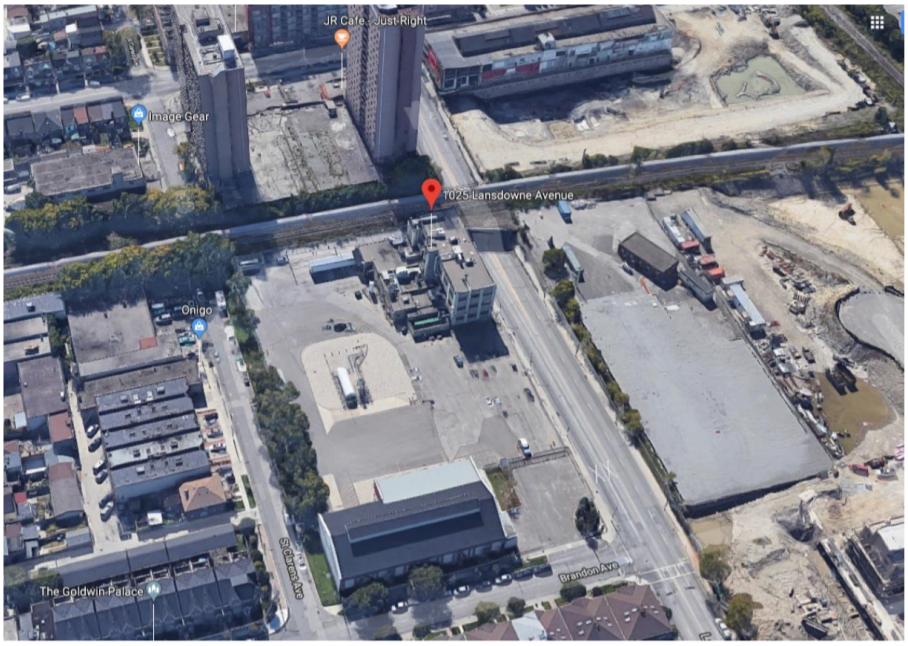
Historical context for BWXT facilities

General Electric Canada (GE) was has owned the land on which both BWXT facilities sit for over 100 years. It acquired the land in Toronto and Peterborough with the rise of electricity in both cities just after the turn of the last century. Since the early 1950s, GE was also an integral part of the design team that produced the earliest CANDU technologies.[3] Both facilities have been producing fuel for the Pickering Nuclear Generating Station since 1965 and later also Darlington Nuclear Generating Station.[4] And yet, public knowledge of the BWXT facilities and their operations remains fairly limited.

BWXT's Toronto facilities

[2] BWXT relicensing application at 10.
[3] General Electric of Canada had a design contract with Atomic Energy of Canada Limited (AECL) for organic cooled deuterium-moderated reactor by 1953. See: "Atomic Industry Reporter", Part 1, 1953.
[4] CNSC staff CMD at 2.

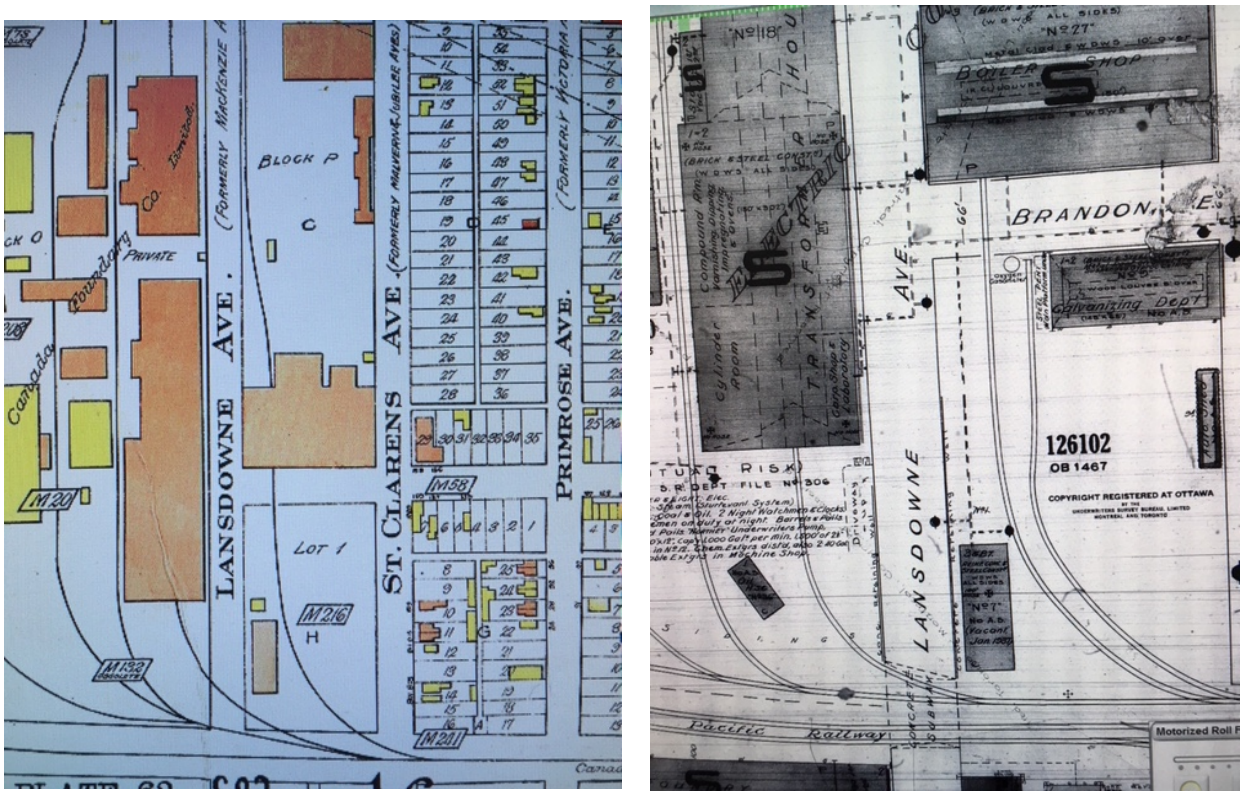
BWXT's Toronto facilities are located at 1025 Lansdowne Avenue and span a small block, with a rail line directly along its southern border. It is surrounded by residential and industrial properties.



Aerial picture of the BWXT Toronto facilities from CNSC staff CMD, at page 3.

The Toronto BWXT location consists of two buildings. One is the UO_2 pellet manufacturing premises, offices, and laboratory building which was built in 1907 and is comprised of four floors. The other was built in 1920 and is a one-storey building meant to store scraps and wastes. These buildings have generally been in operation since their construction.

There have been very significant changes to the area surrounding the BWXT facilities in Toronto from the time of their initial construction to the present. One of the most significant is the development of environmental regulations. Decades ago, it was common for rail cars carrying freight for industry in this area of Toronto to offload their product from rail cars along Dupont Avenue directly into nearby plants and factories. As the Toronto buildings were located just off of a main rail corridor, they likely received their materials directly from passing train cars feeding into the industrial premises via service lines and smaller rail cars.



The two maps above show the rail line and connecting service lines to what is now the BWXT facilities and surrounding buildings. Fire Insurance maps from 1913 (left) and 1937-48 (right), Ward 6, City of Toronto Archives, available online: toronto.ca/city-government.

More recently, with the growth and further development of the city, these smaller rail routes were abandoned. However, it remains unclear exactly when these lines were finally abandoned. BWXT employees who have worked at the Toronto location since the mid-1970s remember the facility was paved from that time.[5] Currently, BWXT receives UO_2 from Cameco's Port Hope Conversion Facility via truck.[6] However, the rail lines raise concerns over possible legacy contamination below the now-paved ground surrounding the facilities.

The activities and processes at the Toronto location appear to have remained fairly consistent for several decades, while BWXT (and its predecessor GE Hitachi – Canada, GEH-C) have been the sole suppliers of fuel pellets to both the Pickering and Darlington Nuclear Generating stations. The fuel pellet production process is simple, and manufacturing still relies on manual operation of much of the equipment. UO_2 is received in barrels, compressed into "slugs", then granulated to a fine powder. This powder is then sintered into a pellet shape and again ground down to the required size.[7]

[5] This was confirmed during Waterkeeper's site visit to the Toronto facility on January 14, 2020.
[6] CNSC staff CMD at 3.
[7] BWXT relicensing application at 8. The wording of the current BWXT licence is fairly broad. It permits BWXT to conduct the following activities at its Toronto location: "operate and modify its facility to produce UO_2 pellets; and possess, transfer, use, process, export, package, transport, manage, and store the required nuclear substances to produce the UO_2 pellets".

In contrast, the Peterborough facility is newer, more automated and its operations differ considerably from the Toronto facility.

BWXT's Peterborough facilities

BWXT's Peterborough facilities are located at 1160 Monahan Road. They are part of a larger GE 'campus' that spans a large block. It is surrounded by residential and industrial properties as well as a public school across the street to the North-west.

Aerial picture of the BWXT Peterborough facilities from CNSC staff CMD, at page 3.

Although BWXT's Peterborough location is a little younger than its Toronto counterpart, there have also been significant changes in the local community since it first became operational. The Peterborough facilities are comprised of four buildings, all of which are numbered (21, 24A, 26, and 28). These buildings were constructed between 1944 and 1982.[8]

[8] Building 21 was constructed in 1952, contains two floors of offices and the site's fuel bundling operations. Building 24 is a warehouse and was built in three stages between 1961 and 1981 and stores a variety of materials and completed fuel bundles. Building 26 was completed in 1944 and is where the facility's repair work is undertaken. Finally, building 28 serves as the main shipping and receiving docks. BWXT relicensing application at 8.

Aerial picture of the BWXT Peterborough facilities from the Environmental Protection Review Report appended to the CNSC staff CMD, at page 7.

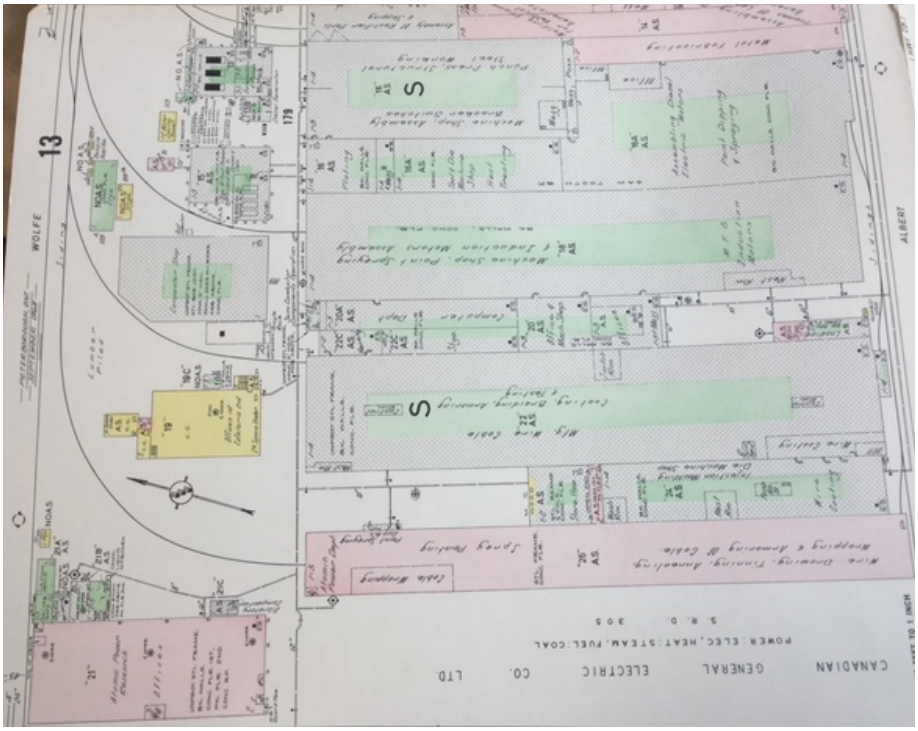
BWXT's current licence permits the following at the Peterborough location:

1) Operate and modify its facility to produce and test fuel bundles;
2) Receive, repair, modify, and return contaminated equipment from off-site nuclear facilities; and
3) Possess, transfer, use, process, import, package, transport, manage, and store nuclear substances to produce and test fuel bundles.

BWXT is not presently permitted to process UO_2 at the Peterborough site. Rather, the activities there include loading fuel pellets from the Toronto location into zircaloy tubes, sealing them, and welding and assembling fuel bundles which are later used to fuel nuclear reactors.[9] The Peterborough location also repairs nuclear equipment (namely small reactor components[10]) from other facilities. There is evidence that the location has engaged in this repair work for a number of decades, but there is virtually no publicly available description of this repair work. This repair work is not undertaken regularly, on average once every one or two years. Reactor parts are usually, if not exclusively, from Canadian facilities as the Peterborough facility specializes in CANDU technology. When components are received for repair, they are delivered by truck and the receiving building is fitted with temporary containment equipment to manage any site contamination.[11]

[9] BWXT relicensing application at 9.
[10] CNSC staff CMD at 4.
[11] Explanation provided by BWXT at site visit January 16, 2020.

Like the Toronto facility, the Peterborough location is located just north of a rail line. Historically it also had cars running to its buildings directly to the main rail line. Some of the original service rail tracks are still visible in unpaved sections along the northern fence line of the GE campus. As with the Toronto location, these old rail lines and the age of BWXT's nuclear facilities raise concerns about possible legacy waste issues.



1968 Fire Insurance map, Plate 13, available in-person at the Peterborough Public Library archives. The map shows the rail service lines and the two buildings in pink along the bottom of the image are the current main (BWXT) nuclear buildings. The one on the left is labeled "Atomic Power Research".

Ecological context for the BWXT facilities

While both BWXT locations are in the middle of urban and mixed residential, commercial and industrial areas, it is important to keep in mind the dynamic ecological systems that are inseparable from more human-dominated landscapes and waters.

Toronto

Lake Ontario provides drinking water for over 9 million people. It is the receiving water body for liquid effluent passed through the Humber Waste Water Treatment Plant (HWWTP).[12] Grenadier pond in High Park and the Humber River are other nearby ecologically significant waterbodies.

[12] Which BWXT and CNSC staff identify as the sole WWTP receiving liquid effluent from the BWXT facility (when effluent is effectively diverted to a WWTP).

High Park, 1.9 km away is a provincially-designated Environmentally Sensitive Area (particularly around Grenadier Pond and surrounding wetlands) and Area of Natural and Scientific Interest.[13] Green and greater blue herons, purple martins, barn owls, yellow-bellied woodpeckers, and even a bald eagle have been recorded in High Park.[14] Earlscourt Park, Prospect Cemetery, and numerous parkettes also surround the BWXT location.

Autumn and Spring see migratory birds, including song birds, throughout the city. Over the last five years, Toronto has also seen an increase in predatory birds, especially the red tailed hawks, which are increasingly adapting to the urban environment and indicate the presence of a healthy natural food chain.[15]

Brown bats, striped skunk, racoons, eastern chipmunk, eastern grey squirrel, groundhogs, Virginia opossum, house mouse, meadow vole and eastern cottontail are all identified by CNSC staff's Environmental Protection Review Report. CNSC staff also recognize Toronto is home to hundreds of bird species and name the American crow, northern cardinal, house sparrow, rock pigeon, mourning dove, and ring-billed gull.[16]

CNSC staff note that the following species at risk may be located in the area:

- Birds: barn swallow, black tern, bobolink, chimney swift, Eastern meadowlark, Least bittern, Peregrine falcon, Yellow-breasted chat;
- Fish and mussels: lake sturgeon, redside dace;
- Insects: rusty-patched bumble bee;
- Plants and lichens: broad beech fern, butternut;
- Reptiles: blanding's turtle, eastern must turtle, eastern ribbonsnake, northern map turtle, snapping turtle, spiny softshell.

According to CNSC staff, none have been recorded at or in the immediate vicinity of the BWXT location (though there does not appear to be any formalized monitoring process for identifying any of these species.

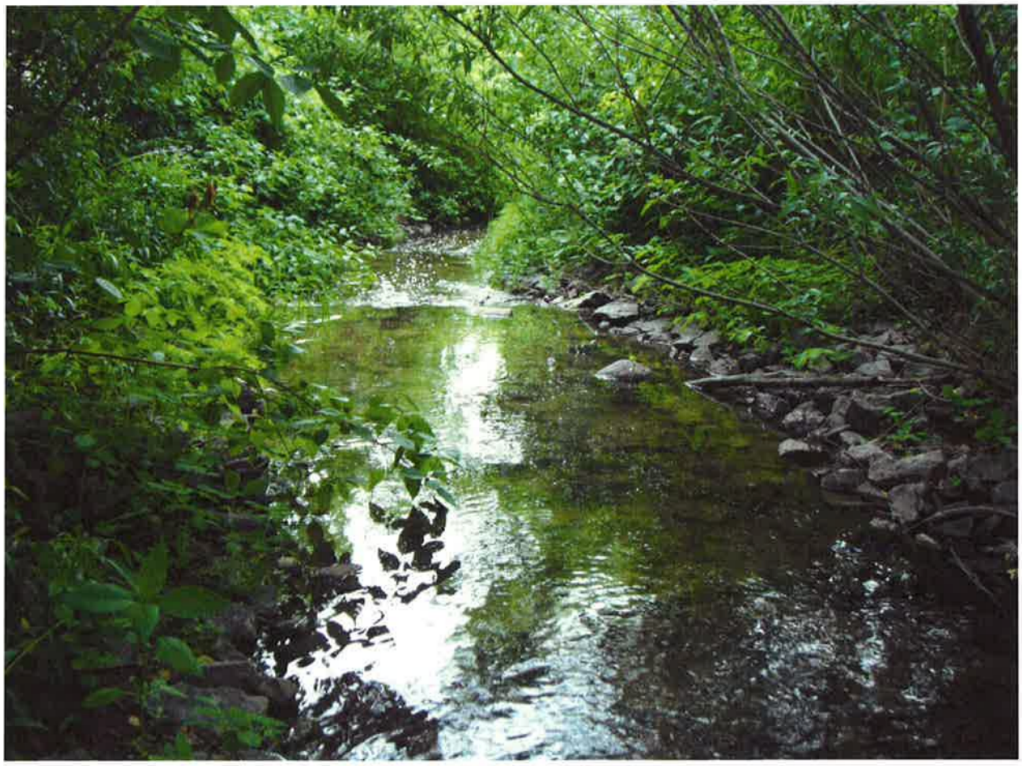
Peterborough

The Otonabee River is the receiving water body for liquid effluent passed through the Peterborough Waste Water Treatment Plant (PWWTP). Little Lake, along the Otonabee is approximately 1km away from the BWXT facility. The river is part of the Trent-Severn Waterway which ultimately feeds into Lake Ontario. The River is part of the Otonabee-Peterborough Source

[13] For reports see online: https://www.highparknature.org/wiki/wiki.php?n=RestoreAndResearch.PolicyDocuments. For citizen scientist reports of diverse species to be found at the park, see online: https://www.highparknature.org/wiki/wiki.php?n=Research.CitizenScience.
[14] See online: https://www.highparknature.org/wiki/wiki.php?n=Birds.FrontPage.
[15] Lix Braun, "Big Birds in the big city", *Toronto Sun*, March 24, 2018, online: https://torontosun.com/news/local-news/braun-big-birds-in-the-big-city.
[16] CNSC Staff CMD, Appendix at 24-25.

Protection Area and Trent Source Protection Area, drafted to protect and restore water quality to safely provide drinking water for over 129,000 people in the city of Peterborough and beyond.[17]

The Harper Creek Wetland is approximately 2.3km from the BWXT site, and cover 17.8 hectares.[18] Harper Creek is a cold water stream that runs through the wetlands and park, and supports numerous fish species including Brook Trout.[19] Jackson Park is located just to the north of the BWXT facility with Jackson Creek running from the park and pond there, through various other parkettes, until it reaches the Otonabee.



A downstream view of the Harper Creek from Stenson Storm Water Management Pond, 2010 Harper Creek Management Plan, at page 39, available online: harpercreek.ca.

Local wildlife includes whit-tailed deer, snowshoe hare, coyote, red and grey squirrel, eastern chipmunk, racoon, house mouse, eastern grey squirrel, eastern cottontail, striped skunk, and red fox. Birds include northern cardinal, wood thrush, screech owl, mourning dove, green heron, pileated and red-bellied woodpeckers, American robin, red-breasted nuthatch, downy woodpecker, black-clapped chickadee, blue jay, and house sparrow, and wood and American black ducks. CNSC staff noted that a five-lined skink lizard was seen two kilometers of the site in

[17] See online: https://www.otonabeeconservation.com/programs/water-programs/drinking-water-source-protection/, https://www.otonabeeconservation.com/wp-content/uploads/2017/07/O-P-SPA-Factsheet-Feb-2017.pdf.
[18] CNSC Staff CMD, Appendix at 27-28.
[19] See online: http://www.harperpark.ca/wp-content/uploads/2018/01/Harper-Creek-Management-Plan.pdf.

1934 and that there were no recent records of any species of concern in the immediate surrounding area and thus not considered further.[20]

Birds of prey are often sited around the municipality including red-tailed hawks, rough legged hawks, sharp shinned hawks, and broad-winged hawks.[21] Spring also brings migratory song birds to Peterborough.[22]

Urban and demographic context for the BWXT facilities

The earliest maps of the BWXT facilities in Toronto and Peterborough illustrate how industrial facilities were designated for their current locations beside residential buildings. This uneasy tension between residential and industrial properties in only growing with time.

Just to the east of the BWXT is the 'The New Dupont" development corridor, a strip of predominantly industrial land that will be transformed to include new residential and commercial buildings along each side of the rail lines.[23] While that strip of Dupont has been the subject of much city planning, development along Dupont is also stretching further west, and the immediate area around the BWXT facility is seeing a lot of development.

Urban development in Peterborough is also rapidly increasing, as Statistics Canada named the city the fast-growing census metropolitan area in 2019.[24]

Assessment of environmental impacts of the BWXT facilities

There are two potential pathways by which contaminated water could make its way into the local environment. The first is via effluent releases from the BWXT facilities into the municipal sewer system. Here, licence limits have been set too high, and while new proposed limits are lower, Waterkeeper recommends more conservative approaches. The second pathway is more complex and involves stormwater from the BWXT facility and its stormwater catchment system. There is a possibility that legacy contamination in soil or groundwater around and below the facilities could be making its way into wider stormwater sewer networks. Here Waterkeeper urges BWXT and the CNSC to ensure additional monitoring is undertaken to evaluate whether stormwater and/or

[20] 2010 Harper Creek Management Plan notes that the common five-lined skink is present in the Harper Creek watershed, online: http://www.harperpark.ca/wp-content/uploads/2018/01/Harper-Creek-Management-Plan.pdf at 52.
[21] See online: http://www.ofo.ca/site/page/view/fieldtrips.peterborougharea.
[22] Peterborough Examiner, "The wonders of bird migration in Peterborough and the Kawarthas", May 11, 2017, online: https://www.thepeterboroughexaminer.com/living-story/8170482-the-wonders-of-bird-migration-in-peterborough-and-the-kawarthas/.
[23] Christopher Hume, "Why revamped Dupont Street will likely be more than just another condo mishmash", *The Toronto Star*, August 15, 2017, online: https://www.thestar.com/news/gta/2017/08/15/why-revamped-dupont-street-will-likely-be-more-than-just-another-condo-mishmash.html.
[24] Joelle Kovach, "Peterborough now fastest-growing community in Canada", *Peterborough Examiner*, March 29, 2019, online: https://www.thepeterboroughexaminer.com/news-story/9248386-peterborough-now-fastest-growing-community-in-canada/.

groundwater contamination is present around the BWXT locations and the extent to which it is contained (should it be present).

Finally, Waterkeeper reviews the proposed new licence limits for the BWXT facilities to determine their adequacy – and their prudence, should pelleting operations be moved from Toronto to Peterborough over the course of the next licence period.

Current effluent/sanitary sewer releases and limits: Toronto

Water is used at the Toronto facility for washing off recently ground pellets as well as for washing equipment and mopping floors. All of this water is then collected and held in large containers which are treated to remove UO_2, and then measured for uranium concentration prior to release into the municipal sanitary sewer system. Each year, approximately 1,500,000L of wastewater is generated in total at the Toronto location. Annual discharges or uranium to sanitary sewers have been consistently less than 1kg between 2012 and 2016.[25]

Current licence Derived Release Limits (DRLs) for Toronto only concern uranium and are as follows:

Annual Uranium Release to Air	760g/yr
Annual Uranium Release to Sewer	9,000kg/yr

CNSC staff have asserted that these licence limits for uranium were the product of operating experience and public feedback.[26] However, there has been significant concern expressed by Waterkeeper and others since at least 2014 over the 9,000kg annual loading DRL of uranium to municipal sewers.[27] Mr. Ruland further explains that a 9,000kg annual DRL is "absurdly and dangerously high" as it would translate to 25kg of uranium being released into the sanitary sewer system – something that would "certainly have negative implications for uranium levels in treated discharges and biosolids from the downstream WWTP, and thus Lake Ontario".[28]

BWXT has explained that this DRL of 9,000kg/y was calculated by following a CNSC staff method that calculated how much uranium could be discharged into the sewers before a member of the public's exposure to it in receiving waters could constitute a 1 milisevert (mSv) dose of radiation, the maximum annual radiation dose permitted to any member of the public by the CNSC.

CNSC staff and BWXT highlight that DRLs are set much higher than any realistic release from facilities. There is an internal system of lower limits that are meant to prevent against any release that would meet the DRL threshold. Action Levels are set lower than DRLs. If releases surpass ALs, CNSC staff must be informed within 24 hours and immediately corrective action must be undertaken. Current licence ALs for Toronto are as follows:

[25] Ruland Report, at 4. Appendix I to these submissions.
[26] CNSC staff CMD at 7.
[27] Online: http://www.waterkeeper.ca/blog/25822?rq=CNSC%20Toronto.
[28] Ruland Report at 5. Appendix I to these submissions.

Release	Action Level
U in water to sewer (single batch)	6 ppm Uranium in solution
pH of water to sewer	Less than 6.65 and above 9.0
U in water (annual average)	3 ppm Uranium in solution
U in Stack Measurement	1 microgram (µg) Uranium / m^3
Facility Perimeter Air Quality Monitor	0.08 microgram (µg) Uranium / m^3

While the graduated licence limits may be a useful system for keeping releases 'as low as reasonably achievable' (ALARA), legally they indicate that only absurdly high releases (meeting or surpassing DRLs rather than ALs) would merit penalties. In other words, while DRLs would hopefully not be met or surpassed, anything short of those limits may only require 'corrective actions' to be taken by the licensee. As such, while DRLs may be only a technically hypothetical threshold, they constitute a legally significant one that has been set far too high to ensure adequate accountability of CNSC staff and BWXT.

The average concentration of uranium measured by BWXT's predecessor GE-Hitachi Canada (GEH-C) between 2012 and 2016 was 0.75 ppm (or mg/L). This measured amount is lower than applicable ALs but still considerably higher than relevant regulatory guidelines. The limit for uranium discharges to water set out in the Canadian Council of Environmental Ministers' (CCME) guideline is 0.015 mg/L and the Provincial Water Quality Objective (PWQO) is 0.005 mg/L.[29] Thus relevant federal and provincial authorities' limits for uranium have not been directly applied by the CNSC to calculate release and actionable limits. The CNSC's refusal to do is especially significant as provincial and municipal authorities appear to have left this matter solely to the CNSC's discretion.

The province has not issued an Environmental Compliance Approval (ECA) for BWXT to discharge uranium into municipal sewer systems. BWXT have explained this is because neither facility discharges directly into a natural waterbody.[30] However, the province's rationale remains unclear, and their lack of involvement constitutes a potential concern.[31]

The same may be true of the municipality. Under Toronto's sewer bylaw, it appears as though radioactive contaminants can be discharged into the municipal sewer system in any quantity, provided that quantity is permitted by a CNSC licence. It only specifies that compliance with the applicable release limit must be confirmed via sampling of the contaminated liquid(s) prior to any dilution.[32]

[29] Ruland Report at 11. Appendix I to these submissions.
[30] This was noted by BWXT staff during the Toronto site visit, January 14, 2020.
[31] Generally, section 53 of the *Ontario Water Resources Act* (*OWRA*) requires an ECA for any person to "use, operate, establish, alter, extend or replace new or existing sewage works". However, this section is subject to exceptions, one of which being that an ECA may not be required should the contaminated effluent be treated (via "privately-owned sewage works") prior to release into sewer systems (s. 53(6)(b)). The reliance on this or any other exception to the application of section 53 of the *OWRA* has not been confirmed by the provincial Ministry of Environment, Conservation, and Parks.
[32] Toronto Sewer Bylaw, Chapt 681, section 681-2.

Recommendation 1: that the province and municipality become more involved in overseeing the BWXT facility.

Fundamentally, the CNSC has an obligation to protect water quality, fish and fish habitat, and to set emissions standards that will respect all federal environmental standards.

Recommendation 2: that the Commission Tribunal pay special attention to its duty to protect water quality in a way that also respects provincial and municipal laws and regulations.

Toronto's sewer bylaw also requires Pollution Prevention (P2) Plans for industrial facilities discharging contaminants into the municipal sewer system. The bylaw requires facilities to report discharges into the municipal sewer system and develop plans to mitigate and ultimately work towards eliminating the discharge of contaminants from their facilities. While radionuclides are not included on the list of reportable substances under this regulation, other substances are.[33] BWXT has a P2 Plan for its Toronto facility and the following table contains a summary of sampling results from 2019 of releases of non-radiological substances.

Subject Pollutant	Units	Sampling Results			Sewer Use Criteria
		2019 Spring	2019 Fall	Average	
Copper	mg/L	0.02	<0.01	0.015	2
Nickel	mg/L	<0.005	0.007	0.006	2
Zinc	mg/L	0.01	0.032	0.021	2
Di-n-butyl phthalate	mg/L	0.002	0.015	0.0085	80
Nonylphenol ethoxylates	mg/L	<0.005	<0.05	0.0275	0.2
Bis (2-ethylhexyl) phthalate	mg/L	0.002	<0.002	0.002	0.012

Table from page 1 of report to the City of Toronto, December 2, 2019. Submission provided by BWXT.

Ultimately while this sampling is important, the lack of a requirement to report released radionuclides does a disservice to the municipality, making it harder to ensure that emissions of radioactive substances are properly treated and disposed of by receiving Wastewater treatment plants.

Current effluent/sanitary sewer releases and limits: Peterborough

In Peterborough, uranium-contaminated water (primarily from washing floors) is stored and tested for uranium and beryllium prior to being discharged into the municipal sanitary sewers. The Peterborough facility uses considerably less water than its Toronto counterpart, approximately 1,000L annually. Annual concentrations for uranium released from the Peterborough facility between 2012 and 2016 ranged from 0.06 to 0.29 mg/L. Annually, discharges of uranium have totaled less than 1g.[34]

Current licence DRLs for Peterborough only concern uranium and are as follows:

Annual Uranium Release to Air	550 g/yr

[33] List available online: https://www.toronto.ca/services-payments/water-environment/water-sewer-related-permits-and-bylaws/sewers-by-law/pollution-prevention-p2-program/.
[34] Ruland Report at 7. Appendix I to these submissions.

Annual Uranium Release to Sewer	760 kg/yr

No mention is made of beryllium in BWXT's licence.

Release limits for the Peterborough facility are concerning as the 760 kg/year limit is three million times the actual maximum annual releases from the facility measured between 2012 and 2016. This DRL would translate to 2 kg of uranium being released into Peterborough's sanitary sewer system every day. Such releases would pose a significant stressor to local aquatic biota as well as a contamination problem for the municipal wastewater treatment plant operations.

Current licence ALs for Peterborough are as follows:

Release	Action Level
U in water (single batch)	6 ppm Uranium in solution
U in water (annual average)	3 ppm Uranium in solution
U in Stack Measurement	1 microgram (µg) Uranium / m^3
Be in Stack Measurement	0.03 microgram (µg) Beryllium / m^3
Be in water (single measurement)	40 microgram (µg) Beryllium / m^3

Effluent discharges from the Peterborough location pale in comparison to those from the Toronto facility. CNSC staff note effluent/sewer monitoring is not one of BWXT's Peterborough facility's "principal monitoring activities", as water discharges are so "miniscule".[35] Still, the average concentration of uranium measured in discharges into sanitary sewers from the Peterborough facility between 2012 and 2016 was 0.15 ppm (or mg/L), ten times the CCME guidelines of 0.015 mg/L and 30 times higher than the PWQO of 0.005 mg/L.[36]

Further, the Peterborough facility (unlike the Toronto location) produces beryllium-contaminated water from equipment use and washing which is also tested prior to being released into sanitary sewers. While it is not mentioned in the licence itself, and no DRL is set for the substance there, the facility's Licence Conditions Handbook sets the AL for beryllium at 40 ug/L. This is almost four times the PWQO of 11 ug/L and the World Health Organization's limit of 12 ug/L.

Measured annual discharges of the substance to Peterborough's sanitary sewers between 2013 and 2016 was 1.65 ug/L and thus well within provincial and international guidelines.[37]

However, the absence of a DRL for the substance is concerning as it could adversely impact BWXT's legally accountability. Beryllium releases have spiked in the past (once measured at 65.5 ug/L).[38] However, as such a spike would not have violated specified DRLs in the facility's licence, any resulting penalties may have been less severe.

[35] CNSC staff CMD at 49.
[36] Ruland Report at 12. Appendix I to these submissions.
[37] BWXT relicensing application at 34.
[38] It should be noted that as beryllium is not radioactive, treatment at WWTPs is much simpler and more effective.

Again, the lack of any ECA from the province for sanitary sewer discharges indicates the province does not actively monitor activities at the BWXT facility. Further, Peterborough's sewer bylaw appears to contain much the same provisions as the Toronto one.[39] However, likely due to the generally smaller amounts and concentrations of discharges, BWXT does not have a P2 plan for the Peterborough facility.[40] As such there does not appear to be any active municipal monitoring of activities at the facility in Peterborough – something that may be of concern with regard to the Peterborough WWTP's ability to treat for, and safely dispose of, any uranium it may receive from the facility.

Current stormwater and groundwater contaminant pathways: Toronto and Peterborough

It is unclear to what extent contaminated stormwater or shallow groundwater from both locations may make its way to local surface water bodies, via runoff into municipal stormwater systems. CNSC staff have not made any note of stormwater monitoring at either site, nor does BWXT in their application. At the site visits of both facilities, BWXT confirmed that it has never monitored stormwater runoff from the site, asserting that both locations are contained well enough to prevent the possibility of stormwater or groundwater contamination from current operations.

This may be true, but given the age of both Toronto and Peterborough locations, it is highly likely that legacy soil or groundwater contamination issues exist directly below both facilities. It is also possible that the stormwater infrastructure for both facilities (built many decades ago) may have degraded. Compromised stormwater catchment basins and channels can serve as a conduit for the movement of legacy subsurface contaminants. Only monitoring of conditions within groundwater and existing stormwater infrastructure would determine whether there are any environmental issues in these areas.

There are apparently 49 soil sampling locations in and around the Toronto location.[41] There were also soil quality reports prepared in 2013 by the CNSC,[42] Ontario Ministry of the Environment (as it was then called),[43] and City of Toronto Public Health.[44] These reports generally found that soil samples were within reasonable background ranges, however, none of these reports included any significant assessment of potential stormwater or groundwater issues under or around the BWXT Toronto location. Soil quality is not routinely tested in Peterborough, nor has it been the subject of detailed reports. BWXT claims this is because air emissions in Peterborough are negligible.[45]

BWXT does not conduct any groundwater monitoring.[46] CNSC staff assert there are no pathways to groundwater at the Toronto facility, and do not even mention the issue when discussing the

[39] Bylaw 15-075.
[40] Confirmed by BWXT during site visit January 16, 2020.
[41] CNSC staff CMD at 49.
[42] Online: https://nuclearsafety.gc.ca/eng/pdfs/mycommunity/facilities/Toronto/GE-Hitachi-Nuclear-Energy-Canada-Inc-Toronto-Facility-eng.PDF.
[43] Online: https://archive.org/details/technicalmemoran00snsn21834/page/n1/mode/2up.
[44] Online: https://www.toronto.ca/legdocs/mmis/2018/hl/bgrd/backgroundfile-118124.pdf.
[45] BWXT relicensing application at 35.
[46] BWXT information response, December 20, 2019. See Appendix II to these submissions. There is only a very basic hydrogeological characterization of the Toronto and Peterborough facilities in the

Peterborough facility in their CMD.[47] BWXT appears to rely on the Provincial Groundwater Monitoring Network (PGMN) data which CNSC staff claim proves that uranium levels in local groundwater meets regulatory limits.[48] However, Mr. Ruland explains that PGMN monitoring wells are located far (in distance and downgradient) from the BWXT facilities and thus cannot give an accurate sense of site-specific issues or localized contaminant pathways. As such, he recommends that future communications from CNSC staff should only refer to PGMN wells as a way to determine generalized background groundwater quality in municipalities.[49]

Recommendation 3: that future CNSC staff Environmental Protection Reviews (EPRs) should clarify that PGMN wells are only a way to determine generalized background groundwater quality in municipalities.

In order to properly assess stormwater and groundwater conditions at both Toronto and Peterborough locations, Mr. Ruland strongly recommends Level I and Level II environmental site assessments (ESA). Level I ESAs are generally desktop reviews of potential contaminants present on a given property. Level II ESAs require physical testing of surface and subsurface conditions.[50] As neither location appears to have had an ESA before, and as no stormwater or groundwater monitoring is conducted at either location, performing them at this point should be considered reasonable in the circumstances.[51]

Recommendation 4: Level I and Level II environmental site assessments (ESAs) should be conducted as soon as possible at both Toronto and Peterborough BWXT locations.

BWXT has noted that as the land on which both facilities rest is leased from GEH-C, and that the landowner (GEH-C) should be responsible for any groundwater or stormwater infrastructure issues (and not BWXT). This is understandable as GEH-C would have been responsible for any legacy contamination issues, having owned the site since the turn of the last century. However, GEH-C is not mentioned as a responsible party in the licence or Licence Conditions Handbook for the BWXT facility. Further both the licence and Licence Conditions Handbook hold BWXT responsible for ensuring the environmental integrity of their facilities. Ultimately, Waterkeeper concedes this matter may need to be resolved via negotiations between GEH-C and BWXT.

Recommendation 5: that BWXT and GEH-C (possibly with the assistance of CNSC staff) clarify responsibilities for conducting Level I and Level II ESAs as well as any subsequently required remediation work.

Finally, the Toronto sewer bylaw provisions concerning Combined (storm and sanitary) Sewers seems to permit discharges of radioactive substances provided discharges comply with a valid

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Environmental Protection Review appended to the CNSC staff CMD. CNSC staff Environmental Protection Review (EPR) report at 29-30, appended to CNSC staff CMD.

[47] CNSC staff Environmental Protection Review (EPR) report at 30, appended to CNSC staff CMD.

[48] This data spans 2003 – 2015. CNSC staff Environmental Protection Review (EPR) report at 29, appended to CNSC staff CMD.

[49] Ruland Report at 11. Appendix I to these submissions.

[50] *Ontario Regulation 153/04,* Parts VII and VIII.

[51] Ruland Report at 11. Appendix I to these submissions.

CNSC licence.[52] The Peterborough sewer bylaw appears to contain much the same provisions. However, it also notes that if stormwater testing is not being done at a facility within the municipality that may be discharging contaminants into stormwater system, the city can order such monitoring to take place, as well as the construction of adequate stormwater management infrastructure.[53]

Recommendation 6: that BWXT ensure the relevant Toronto and Peterborough municipal authorities aware of the results of Level I and Level II ESAs.

Recommendation 7: that if ESAs are refused, the city of Peterborough order groundwater and stormwater monitoring of the BWXT location in Peterborough.

Currently proposed release limits for a renewed BWXT licence

Rather than DRLs, new Exposure-Based Release Limits (EBRLs) have been developed for the proposed new licence for BWXT's Toronto and Peterborough facilities. The EBRLs are "technology-based performance targets" for uranium and beryllium releases to air and water. Unlike the current DRLs (which were calculated based on downstream radiation exposure to members of the public), EBRLs have been calculated taking into account CCME guidelines for the health of aquatic biota in addition to human doses.[54]

Waterkeeper commends BWXT and CNSC staff for this new, and more comprehensive approach, especially as the new methodology translates to lower release limits for both facilities. However, the new proposed limits are still too high to ensure BWXT makes adequate provision to protect the health of the environment.

Proposed EBRLs for Toronto:

Parameter	Medium	Licence release limit (annual average)
Uranium	Water	1 g/L (weekly composite)
	Air – Furnace Exhaust 1	437 µg/m^3
	Air – Furnace Exhaust 2/4	55 µg/m^3
	Air – Furnace Exhaust 5/6	52 µg/m^3
	Air- Rotoclone	65 µg/m^3
	Air – 6H68	47 µg/m^3
	Air – 4H48	97 µg/m^3

[52] Provided the licence is disclosed to the city. Toronto Sewer Bylaw, Chapt 681, s. 681.2.
[53] Peterborough Sewer Bylaw, Bylaw 15-075.
[54] CNSC staff CMD at 43.

Proposed EBRLs for Peterborough:

Parameter	Medium	Licence release limit
Uranium	Water	0.14 g/L (weekly composite)
	Air	410 µg/m^3 (annual average)
Beryllium	Water	26 mg/L (individual sample)
	Air	2.6 µg/m^3 (weekly sample)

These new EBRLs for Toronto would translate to a weekly average of 1g/L released into the municipal sanitary sewers. This is the equivalent of 1,000,00 ug/L of uranium being discharged into municipal sewers each week, despite the fact that the limit for uranium discharges to water are 15ug/L in the CCME guidelines and 5 ug/L in the PWQOs – making the proposed EBRL 200,000 times higher than the PWQO suggestion. While this would be an improvement over the 9000 kg annual limit, as it would correspond to approximately 1,500 kg per year, it is still much too high.[55]

The new proposed EBRL for uranium from the Peterborough is 0.14g/L (in weekly composite samples). This release limit is the equivalent of 140,000 ug/L which is 28,000 times higher than the PWQO for uranium. A release limit of 0.14 ug/L for the Peterborough facility would translate to 140g/year. This would still be 1,400 times higher than currently measured uranium discharges at the facility– better than the previous limit of 760 kg/year but still too high.[56]

Including licence limits for beryllium is a welcome improvement (as the substance was not included in the current BWXT licence). Still, the new proposed EBRL for beryllium is much higher than the PWQO of 11 ug/L and the WHO guideline of 12 ug/L.

EBRLs, like the DRLs they are meant to replace, are legally significant as they become licence terms for BWXT and determine the release threshold that must be met to merit penalties. Thus, while they may constitute technically hypothetical values, they legally signify some degree of acceptance. As such, more reasonable and lower EBRLs should be set.

Proposed Action Levels for Toronto:

Release	Action Level
U in water to sewer (single batch)	6 ppm uranium in solution
pH of water to sewer	Less than 6.65 and above 9.0
U in water (annual average)	3 ppm uranium in solution
U in Stack Measurement	1 microgram (ug) uranium/m^3
Facility Perimeter Air Quality Monitor	0.08 microgram (ug) uranium/ m^3

[55] Ruland Report at 5. Appendix I to these submissions.
[56] Ruland Report at 8. Appendix I to these submissions.

Proposed Action Levels for Peterborough:

Release	Action Level
U in water (single batch)	6 ppm uranium in solution
U in water (annual average)	3 ppm uranium in solution
U in Stack Measurement	1 microgram (ug) uranium/m^3
Be in Stake Measurement	0.03 microgram (ug) beryllium/m^3
Be in water (single measurement)	40 microgram (ug) beryllium/m^3

The proposed ALs for the Toronto and Peterborough locations include annual average uranium levels that are 200 times higher CCME guidelines for uranium (15 ug/L), and single batch test results for uranium are 400 times higher than CCME guidelines. These same ALs are 600 and 1,200 times higher than the 5 ug/L PWQO for uranium.[57] The proposed ALs for beryllium at the Peterborough location are almost four times the PWQO and WHO guidelines for the substance.

As these EBRLs and ALs are still so much higher than CCME and PWQO guidelines, it is clear that CNSC and BWXT are relying on downstream dilution of sanitary sewer releases to prevent harm to aquatic organisms. The Humber WWTP has an average dilution capacity of 40,000, while the Peterborough WWTP's average dilution capacity is 1,700.[58] This reliance on dilution in inconsistent with Toronto and Peterborough sewer bylaws that require the concentration of contaminated sewer discharges to be measured prior to dilution.

The new methodologies informing the calculations used to arrive at the currently proposed EBRLs and ALs also remain a source of concern for Waterkeeper for four main reasons. First, they all rely on CCME guidelines rather than the PWQOs. No scientific or technical rationale for this choice was provided, thus it is unclear why CNSC staff should prefer the less stringent value. Second, when relying on downstream dilution of sewer discharges to prevent harm to aquatic organisms, 100% of the dilution capacity of the WWTP's is assumed. This is despite the fact it has not been verified that BWXT operations would account for 100% of uranium in the municipal sewer systems. Third, annual average flows of sewage treatment plants do not take into account changes in flow due to changing seasons or significant precipitation events. Fourth, EBRL and AL calculations assume a steady rate of discharged contaminants from the facilities, measured releases and the permission to conduct "batch" sampling illustrate that release concentrations are variable.[59]

Further, little consideration seems to have been made concerning WWTPs' ability to treat uranium, or the impact of uranium discharges into receiving waters in the event of bypass events at WWTPs. Radiation cannot be removed from waste water and should uranium be removed from waste water and collected in sewage sludge over an extended period, special measures would be required to appropriately store this sludge in a waste facility licensed to contain radioactive

[57] Ruland Report at 6. Appendix I to these submissions.
[58] Ruland Report at 5. Appendix I to these submissions.
[59] Ruland Report at 10. Appendix I to these submissions.

substances. Mr Ruland reviewed annual reports from the Humber WWTP and found uranium is not a parameter being tested for in either final plant water emissions or in biosolids.[60] The same seems true for the Peterborough WWTP.[61]

Finally, Waterkeeper notes that not all wastewater collected in Toronto makes it to WWTP, thus there are numerous other pathways by which untreated water from the BWXT facility ends up in Lake Ontario. The city operates an outdated sewer system known as a "combined sewer". Stormwater and sanitary wastewater, including releases from BWXT, mix in the pipes under the city. When it rains, snow melts, there are blockages, or there are faulty connections, untreated wastewater flows directly into the lake. This happens thousands of times each year in Toronto. There is no guarantee that BWXT's emissions will be captured and treated, thus a more conservative discharge limit is warranted.

Recommendation 8: that proposed EBRLs for both Toronto and Peterborough facilities be further lowered to reduce reliance on downstream dilution and assumed average flows compared to real measured discharges.

Recommendation 9: that proposed ALs for both Toronto and Peterborough facilities be further lowered to reduce reliance on downstream dilution and assumed average flows compared to real measured discharges.

Recommendation 10: that the provincial MECP and relevant municipal authorities be consulted in the developments of more conservative EBRLs and ALs, keeping in mind provincial guidance documents such as the PWQOs as well as municipal sewer bylaws and waste water treatment capacity.

Recommendation 11: that municipal authorities review their treatment capacity for uranium as well as the sufficiency of disposal for sewage sludge that may be contaminated with uranium.

Recommendation 12: that municipal WWTPs begin monitoring wastewater and sewage sludge for uranium concentrations to understand incoming volumes, treatment efficacy, and the sufficiency of biosolids disposal arrangements.

Finally, EBRLs and ALs for water in Peterborough have apparently been developed while taking into account that pelleting may later be conducted there.[62] However, the proposed parameters for Toronto and Peterborough facilities are not provided with the same level of detail, nor are parameters for Peterborough as comprehensive as those for Toronto (e.g. they lack pH values or perimeter air monitoring limits).

Recommendation 13: at the very least, that parameters for both Toronto and Peterborough facilities include parameters for pH and perimeter air quality monitoring.

[60] Ruland Report at 12. Appendix I to these submissions.
[61] See for example: https://www.peterborough.ca/en/city-services/resources/Documents/2017-Annual-Report.pdf.
[62] CNSC staff CMD at 45.

BWXT's public information sharing activities and policies

BWXT and CNSC staff's limited conceptions of public engagement

BWXT's public engagement activities are modest, and much of the current activity is due to consistent public expressions of the desire to be better informed about facilities in Toronto and Peterborough and their potential and real impacts to human health and the environment. However, CNSC staff list these activities in their CMD and quickly deem them satisfactory.[63] When describing public engagement in their CMD, it is apparent that CNSC staff's conceptualization of what should constitute engagement is too limited. As a result, it is likely their fairly narrow definition of what public engagement means and requires that leads them to find BWXT's current engagement practices to be sufficient.

Despite BWXT's increase in public engagement activities, local residents' general awareness of the existence of both nuclear sites remains very low. There are several indicators of robust public engagement that are completely missing from any discussion of this issue in BWXT's application and CNSC staff's review of it.

First, the public is not a homogeneous entity. Different segments of the public will have an interest, need, and capacity for different types of information as well as different types of communication between themselves and BWXT.[64] Most references to "the public" seem to really be talking about local residents, who again should not be considered a homogenous group. What one local resident may want to know, and the extent to which they may want to interact with BWXT, will differ greatly from another resident and be determined by many social and economic factors. Both will differ in a myriad of ways from Civil Society Organizations (CSOs), and CSOs will differ from one another based on their own particular mandates and areas of expertise. To assume that the same engagement exercises will work for all members of an unspecified public body will lead to further inaccurate findings and assertions by CNSC staff examining the success of BWXT activities and their satisfactoriness.

Second, all engagement activities undertaken by BWXT, and assessed by CNSC staff in their CMD, focus on one-way communication *from* BWXT *to* "the public". No examples are mentioned of any communication or information-sharing *from* members of the public *to* BWXT. Nor are any discussions included in the CNSC staff CMD concerning what BWXT would do should it receive this information. Significantly, CNSC hearing and meeting processes constitute one of the more structured and meaningful avenues by which communication between BWXT and diverse stakeholders can flow both ways. However, as already discussed in this report BWXT's lack of responsiveness and information disclosures during these processes often pose a significant barrier to members of the public seeking to make use of these opportunities. Given the many years Waterkeeper and other intervenors have expressed concerns over BWXT's communications during these hearings (or the lack thereof), it is surprising that these failings are

[63] CNSC staff CMD at 72.
[64] Note: this point was the focus of the most recent federal Open Government Action Plan, which is discussed more below.

not addressed at all in the CNSC staff CMD.

Third, no mention is made in the CNSC staff CMD of interactions between BWXT and CSOs, especially CSOs that constitute regular interveners during CNSC hearing and meeting processes. As such, these organizations (which include Waterkeeper) are effectively excluded from CNSC staff's definition of "the public" and public engagement. This is a significant oversight that does a disservice to the important work these organizations do to help ensure greater transparency and accountability of BWXT operations and CNSC regulation of them.

Finally, while information-sharing is mentioned by CNSC staff in their references to BWXT engagement activities, no mention is made of data sharing which is recognized as a crucial aspect of meaningful information disclosure. This final point will be discussed in greater detail below.

Unreasonable qualifiers applied to public communication

Not only are BWXT and CNSC conceptions of "the public" and public engagement limited, but the qualifiers both rely on to determine the sufficiency of public communications also remain too limited. CNSC staff explain, "the primary goal of PIDP is ensuring information related to health, safety, security of persons, and other issues are effectively communicated to the public". However, staff continue to note communication is only required in a way that is "commensurate to public interest in nuclear facilities and the public perception of risk".

Since "the public" describes a diverse group of people, expressions of "public interest" will similarly vary. Waterkeeper cautions against any conflation of 'public mobilization' and 'expressions of interest'. In other words, members of the public should not have to advocate for access to information *en masse* in order to be deemed invested enough in receiving such information.

This is especially true with regard to BWXT facilities where half of Peterborough respondents and over half of Toronto respondents said they had never heard of BWXT or were not at all knowledgeable about the company.[65] members of the public remain largely unaware of facilities' existence, their perception of risk is similarly difficult to gauge. This is especially true when BWXT and CNSC staff assert safety without providing much more detailed explanation or data to support these assertions. The average local resident cannot be expected to inquire, understand, and then prepare further questions or challenges to the facility's and regulator's assertions, in order for BWXT or the CNSC to believe they have a significant perception of risk that merits more meaningful disclosure. Such a model places an entirely inappropriate burden on local residents, when the default assumption should favour disclosure.

Recommendation 14: that CNSC staff and the Commission Tribunal dispense with "public interest" and "public perception of risk" qualifiers on the provision of public access to environmental information concerning BWXT operations and facilities.

That being said, it is still important for BWXT to track public awareness of its facility amongst local residents. A poll was undertaken by the company in October and November of 2018 in

[65] BWXT Public Attitude Survey Summary, presented at January 16, 2020 site visit.

Peterborough and Toronto. It involved a 10-minute phone or email questionnaire. There were 149 respondents in Toronto and 203 in Peterborough. In Toronto, residents living roughly between Bloor Street and St. Clair Avenue West to the north and south and Keele Street and Dufferin Street to the west and east were contacted. In Peterborough, residents living roughly between Hopkins Street and Romaine Street to the north and south, and between the Kinsman Civic Centre and George Street to the west and east were contacted. Though, there was no specific methodological reason or rationale for setting those geographical boundaries.[66]

Recommendation 15: that BWXT ensure the geographic area chosen as a 'dialing area' include areas being monitored to verify air and soil contamination levels and areas corresponding to any internal emergency notification plans or protocols.

Recommendation 16: that future polls ask respondents be asked how they would like to receive information or be engaged by BWXT moving forward.

Recommendation 17: that businesses, schools and daycares, healthcare providers, civil society organizations, and other potential stakeholders be included in future polls in addition to residents.

The regulatory context for public engagement and information disclosure

The CNSC's provision of environmental information

The CNSC's mandate requires it to provide and ensure the provision of environmental information to members of the public. Section 9(b) of the *Nuclear Safety and Control Act* specifies that the CNSC's objectives include:

> disseminat[ing] objective scientific, technical and regulatory information to the public concerning the activities of the Commission and the effects, on the environment and on the health and safety of persons, of the development, production, possession and use [of nuclear substances].[67]

Further, the CNSC's own Participant Funding Program recognizes the importance of value-added information provided by qualified individuals and organizations representing diverse public interests.[68]

Underlying these provisions is the recognition that individuals and communities have a right to know how operations at regulated nuclear facilities may impact them, including their health and their environment.

The public has a right to a healthy Lake Ontario and information concerning the health of the lake, which is recognized in other Canadian statutes as well. The preamble of the Great Lakes Protection Act (GLPA) states that "all Ontarians have an interest in the ecological health of the

[66] *Ibid.*
[67] *Nuclear Control and Safety Act*, s 9(b).
[68] See PFP description: Canadian Nuclear Safety Commission, Participant Funding Program Eligibility Criteria, online: http://nuclearsafety.gc.ca/eng/the-commission/participant-funding-program/eligibility-criteria.cfm.

Great Lakes-St. Lawrence River Basin".[69] Ontario's Environmental Bill of Rights acknowledges that Ontarians have the right to a healthful environment.[70] However, inadequate access to information concerning the ecological footprint of nuclear generating sites and their associated waste facilities prevents the public from being able to assess how these sites may affect their right to a healthful environment, or whether such an impact can be considered acceptable.

The federal government's commitment to open data

The federal government's current Open Government National Action Plan, recognizes that this is "a moment of global importance for the open government movement",

> Rapid digital progress is increasing people's expectations for their governments. Citizens want us to show we are ready and capable, and we will look out for them… Taking action to build public trust in government institutions is of ongoing importance. Open government can be an important way to renew that trust. It can show how governments are working, how they seek to understand citizens' needs, and how they serve those needs. It can also help to keep governments honest and accountable.[71]

The core goal of the plan is to create "a governing culture that fosters greater openness and accountability, enhances citizen participation in policymaking and service design, and creates a more efficient and responsive government".[72] Open Science continues to be a special priority area for the plan, including greater public access to environmental data.

However, nuclear-related data appears to be significantly underrepresented when compared with other industries and other data concerning non radiological or non-nuclear-specific contaminants. The only other available studies concerning specific nuclear facilities on the Open Data portal date from 1978 and 1982 and concern the Douglas Point and Whiteshell reactors, neither of which are still operational. There are a handful of other studies searchable on the Open Canada Portal with information and data concerning nuclear contaminants including a few by the Canadian Radiological Monitoring Network and a study concerning radioactive content in fish collected along the West Coast of Canada.[73]

There is no BWXT or GE-Hitachi – specific nuclear data available on the Open Data. The only Google-retrievable data purporting to concern the BWXT impact to local water is that of the Independent Environmental Monitoring Program (IEMP), and Waterkeeper has regularly expressed concerns with the IEMP's monitoring locations and testing frequencies. The IEMP measured contaminants in air, soil, and water around the Toronto location in 2014, 2016, 2018, and 2019. Neither sewer nor stormwater monitoring is conducted. Testing was done at the Peterborough location in 2014, 2018, and 2019. Here as well, the locations of monitoring sites tend to be in areas where a high degree of dilution makes it difficult if not impossible to assess

[69] *Great Lakes Protection Act*, SO 2015, c 24, Preamble.
[70] *Environmental Bill of Rights*, SO 1993, c 28, Preamble.
[71] See online: https://open.canada.ca/en/content/canadas-2018-2020-national-action-plan-open-government#toc8.
[72] *Ibid.*
[73] See online: https://search.open.canada.ca/en/od/?sort=last_modified_tdt%20desc&page=1&search_text=nuclear&od-search-subjects=Science%20and%20Technology|Nature%20and%20Environment

the extent of actual facility emissions. The infrequency of sampling also makes seasonal or precipitation-related trends impossible to discern.

The public has a right to know about the quality of the environments of which they are a part, and meaningfully informing the public necessarily requires public access to environmental data.[74] While government and industry representatives can assert that members of the public are safe and that ecosystems are unaffected by nuclear facilities, these assurances need to be supported with publicly accessible data.

The CNSC's REGDOC 3.2.1.

REGDOC 3.2.1 it the CNSC's internal regulatory document that lists and describes the public information and disclosure requirements for all uranium mines and mills, Class I nuclear facilities, and Class II facilities that are required to develop and implement a public information and disclosure program (PIDP) as a condition of their licences.[75] This policy states the "primary goal of a public information and disclosure program… is to ensure that information related to health, safety and security of persons and the environment, and other issues associated with the lifecycle of the nuclear facilities are effectively communicated to the public."[76]

Substantively, the REGDOC requires PIDPs to: explain the document's broad and measurable objectives;[77] list its target audience (which is recommended to include local community members, political leaders, community organizations, media, intervenors, and Indigenous Peoples);[78] ensure Environmental Risk Assessments and summaries of Probabilistic Safety Assessments are posted to licensee websites, as well as samples or descriptions of information products, methods used to distribute information, how information will address perceived risks to human health, safety, and the environment, how licensees will respond to comments, requests and concerns expressed by target audience members, and timelines for disclosing information.[79] The PIDP should also include a description of the type of information made public and the criteria for determining when information should be published and note the medium of disclosure. In particular, the REGDOC suggests the following types of information be disclosed by licensees:

- significant operational developments such as labour disputes and expansion or changes in facility design or operation

[74] The public Right to Know in environmental contexts has been most developed in the US, constituting a guiding principle in recent federal and state legislation and policy, see: https://19january2017snapshot.epa.gov/www3/epahome/r2k.htm. Also, see generally the work of the Environmental Data & Governance Initiative, online: https://envirodatagov.org/environmental-data-justice/; and the Right2Know Network, online: < https://ourrighttoknow.ca/campaigns/right-to-know-network/ >. See also: Peter H Sand, "The Right to Know: Environmental Information Disclosure by Government and Industry", January 2005.
[75] REGDOC-3.2.1 *Public Information and Disclosure*, s 1.2, online: <http://nuclearsafety.gc.ca/eng/acts-and-regulations/regulatory-documents/published/html/regdoc3-2-1/index.cfm>.
[76] *Ibid* at s 2.1. Note, this was the same in the previous *Public Information and Disclosure*, Regulatory Document 99.3, March 2012, s 2.1.
[77] *Ibid* at s 2.2.1.
[78] *Ibid* at s 2.2.2.
[79] *Ibid* at s 2.2.4.

- events with offsite effects or which could result in public interest and concern or media attention
- fires
- impact of natural events such as earthquakes, floods, lightning
- serious vehicle or industrial accidents
- planned and unplanned significant interruptions of facility operations, such as disruption of isotope production.
- routine and non-routine releases of radiological and hazardous materials to the environment
- unplanned events, including those exceeding regulatory limits
- environmental monitoring reports.[80]

Robust public disclosure protocols at regulated nuclear facilities are a cornerstone of ensuring the industry's transparency and accountability. They are an important way by which more trusting relationships can develop between industry and the public, not to mention an important way in which facilities can obtain social licenses to operate in communities. Licensees often claim the safe and responsible operation of their nuclear facilities. However, providing sufficient information to the public that supports these claims is vital. Regular, proactive, and comprehensive public information-sharing also supports evidence-based and participatory decision-making processes.

BWXT's Public Information and Disclosure Protocol

The company's PIDP is posted to its website and is essentially comprised of the following points:

- Maintaining two-way communication channels with the target audience to understand and address comments, questions and concerns;
- Providing reporting on its website within 48 hours of unusual operational events with the potential for offsite consequences, or that would be of interest to the target audience;
- Providing timely reporting on its website of environmental events that trigger notification of the CNSC under Section 29 of the General Nuclear Safety and Control Regulations;
- Providing information to the target audience through BWXT NEC's website and/or other Public Information Program activities, about significant operational changes or expansions that require an environmental assessment or amendments to our facility licence;
- Posting environmental monitoring results (relevant sections of Annual Compliance Reports) on its website;
- Consulting with stakeholders to determine the type of information, and method for information sharing regarding this Public Disclosure Protocol;
- Posting this Public Disclosure Protocol on the BWXT NEC website.[81]

This list is fairly comprehensive and disclosure on the BWXT website is considerable. At the same time, there are a few improvements that could me made relatively easily.

Recommendation 18: that BWXT define its target audience in its PIDP and include at least the following: local community members, interested members of the public, political leaders,

[80] *Ibid* at s 2.3.2.
[81] Online: https://www.bwxt.com/bwxt-nec/community/public-disclosure-protocol.

community organizations, media, intervenors, and Indigenous Nations and organizations. The rationale for BWXT's definition of its target audience should also be included in its PIDP.

Recommendation 19: that BWXT include explanation of how it will respond to questions from target audience members, and timelines for doing so.

Recommendation 20: that BWXT review and reconsider its policy not to publicly disclose internal documents to members of the public and intervenors who request them.

Recommendation 21: that BWXT consider providing people with an option to receive email updates from the facilities including engagement events, new pamphlets or disclosures, and event reports.

BWXT's list of public engagement activities is as follows:

- Pamphlets for local residents;
- Social media;
- A toll-free communication line;
- Public licensing hearings;
- Issuing event notices;
- Hosting public/community meetings and open houses;
- Mailings to stakeholders;
- Providing facility tours to "selected groups";
- Volunteer at and sponsor community events;
- Meet municipal counselors;
- A Community Liaison Committee (CLC) in Toronto (there is no such CLC in Peterborough); and
- its website.[82]

CNSC staff assert Licence Conditions Handbook provisions concerning event reporting are "detailed" and based on section 29 of the *General Nuclear Safety and Control Act Regulations*.[83]

Recommendation 22: that BWXT proactively and publicly release environmental monitoring data. As much as possible, data should be provided in real time and machine readable formats.

Recommendation 23: that for all BWXT event reports it posts to it website, the company include:

a) when the incident occurred;
b) measured environmental effects (including sharing available monitoring data); and
c) a description of any mitigation and/or remediation efforts undertaken to address incidents after they occur.

Concerns over the licence renewal process

[82] BWXT relicensing application at 16, 40 - 41.
[83] CNSC staff CMD at 21.

It is worth addressing several procedural deficits in the current relicensing process. As public intervention timelines in this process illustrate, licence renewal processes have not been designed with intervenors' needs in mind. Further, the lack of any institutional infrastructure concerning access to information frustrates meaningful public input and oversight. Each issue will be discussed below in turn.

Timelines

The current licence for the BWXT facilities expires December 31, 2020. BWXT submitted its licence renewal application November 2, 2018. CNSC staff and BWXT were in contact for roughly one year, exchanging additional information so that CNSC staff could prepare their CMD by December 2019.[84]

In contrast to that longer review process, the public notice of this current hearing was only posted June 3, 2019 with applications for funding due three months later on September 3. That notice specified that the staff CMD would be available to intervenors on or around December 19, and that written interventions would be due January 18th. This effectively provided only two to three weeks for the public to review the proposed terms for a 10-year BWXT licence, as the period spanned the Christmas and New Year holidays.

Concerned about this short comment period, Waterkeeper submitted that the January 18 deadline be extended at least two months, pushing the written submission date to March and the oral hearings to June, which would still leave six months for the Commission Tribunal to render its decision in the matter. In response, the Secretariat extended the written comment period by 10 calendar days to the current deadline of January 27, 2020.[85]

Waterkeeper was notified of its funding grant on October 25, 2019, at which time it needed to re-scope its intervention and conduct preliminary research to assist with the more technical aspects of its review and prepare initial information requests. The CNSC staff CMD was only provided at the end of the day on December 20, the last Friday before Christmas holidays which began the following Monday.

The two to three weeks provided for the public to conduct its reviews stands in stark contrast to the: three months provided to organizations to prepare funding requests; almost two months provided to the Commission's participant funding committee to determine funding grants;[86] the year CNSC staff had to prepare their CMD, and nine months provided for the Commission Tribunal to determine whether it would grant the requested licence, subject to any terms it would deem necessary.[87]

[84] CNSC staff CMD at 2, and date on BWXT application.
[85] Submitted by email July 4, 2019. See Appendix II to these submissions.
[86] Note: written reasons are never provided for these decisions.
[87] In the past, the Commission Tribunal has also issued preliminary determinations without reasons to meet licence expiry dates, providing reasons for these preliminary determinations months later.

Intervenors and other members of the public should be provided with more time to prepare comments. Public interest organizations such as Waterkeeper should not have to prepare special submissions to receive additional days to prepare submissions when CNSC staff and BWXT had been communicating about the application for a year prior. CNSC staff's CMD is a valuable resource for public intervenors, and should still be provided in advance of the deadline for public comments. It should be relatively simple for the Commission to provide more time for the preparations of written interventions.

Recommendation 24: At least nine months to a year should be afforded to intervenors to prepare their submissions concerning proposed 10-year licences.

Access to Information

There is a significant lack of detailed environmental information in BWXT's relicensing application. No raw environmental release data is provided at all, nor is substantive environmental information provided concerning the characterization of surrounding ecology or geography. BWXT's application and the resources posted to its website contain no complete description or assessment of all environmental contaminant pathways from facilities. CNSC staff's CMD similarly lacks environmental data and detailed descriptions of environmental monitoring methodologies.

As these types of information are required for the technical review Waterkeeper was funded to undertake, the organization had to attempt to obtain this information directly from the licensee. CNSC staff and BWXT were professional throughout the process and Waterkeeper thanks all those contacted for their time and assistance. Both CNSC staff and BWXT representatives were generally responsive to Waterkeeper's requests, however there were several delays in receiving necessary information, other requests were denied outright.

Waterkeeper's requests for BWXT's Environmental Protection Program (EPP) and Radiation Protection Manual (RPM)[88] were denied by BWXT on the grounds that they contained proprietary information. Waterkeeper's requests for redacted copies were similarly denied. Further, there was considerable correspondence between BWXT and Waterkeeper the week before written submissions were due over whether specific calculations could be released explaining the new proposed release limits and Action Levels. A similarly demanding process (which took over a month and ultimately required an undertaking of confidentiality) was required to obtain information concerning BWXT's approach to public engagement.[89]

An institutionalized, formalized, and robust process is urgently required to assist intervenors in obtaining the information they require to perform the reviews they are funded by the CNSC to undertake. Such a process would save both intervenors and licensees a considerable amount of time. It could also better ensure more comprehensive information disclosure in the public interest,

[88] The BWXT relicensing application explained their Environmental Protection Plan and Radiation Protection Manual contained details concerning environmental monitoring aspects for both Toronto and Peterborough facilities. In particular, the Manal was supposed to include details of air quality sampling, liquid effluent sampling, soil sampling, boundary monitoring. BWXT relicensing application at 32.
[89] See Appendix II to these submissions for more detailed information concerning information requests made by Waterkeeper.

should it include a mechanism by which the refusal to information could be challenged by intervenors.[90]

Recommendation 25: The CNSC should immediately initiate a comprehensive review of access to information or interrogatory processes for future Commission meetings and hearings in consultation with stakeholders.

Recommendation 26: that the Commission tribunal and CNSC staff should protect the public right to know about the health of their communities by ensuring environmental quality information (i.e. monitoring results and methodologies) are not denied to the public on the grounds of such information being proprietary and confidential to licensees.

Recommendation 27: In the meantime, the CNSC should immediately institute the following changes concerning access to information by intervenors for future Commission meetings:

a. When notifying organizations of their funding grants, Participant Funding Program officers should also provide contact information for designated individuals representing the nuclear facilities that are subject to the meeting reviews. These representatives should be prepared to field questions and should be made aware of intervenors' timeframes and deadlines; and

b. Some CNSC staff time, and industry/proponent staff time must be designated to providing intervenor-requested information and engaging in follow-up information requests and/or site visits.

Concerns over the current licence request

Over the last decade, the Commission has significantly increased licence lengths for nuclear facilities in Canada. Waterkeeper has consistently expressed concerns over this development and the debilitating impacts it can have for public engagement in nuclear regulatory oversight as well as on the capacity of civil society organizations to maintain institutional knowledge of nuclear facilities and policies. These concerns have also been expressed by many other civil society organizations that regularly appear before the Commission.

Public involvement in hearings has proven an important means by which local communities could ensure the reasonableness of operations at these sites. For example, it was due to public mobilization during the 2010 public licence renewal hearing that previous applications to bring enriched uranium to these facilities were not permitted.[91] It was also due to public mobilization that a public meeting was held in 2014 in Toronto requiring additional public information disclosure and engagement.

Concerns over changes during this past 10-year licence term

[90] As is the case in other similar energy-related regulatory bodies including the former National Energy Board (now Canada Energy Regulator), and the Ontario Energy Board.
[91] 2010 licence decision and hearing transcripts at para 28.

Several operational changes occurred over the course of the last 10-year licence, in 2012, 2016, and 2017, some of which required licence amendments. However, the public was not funded to intervene in these hearings. This meant that over the last decade, the following changes were effectively shielded from rigorous and diverse public oversight, by not being included in public hearings: the introduction of a financial guarantee for the facility where there was none before; two changes to the facilities' owners and managing companies; and amendments to the characterization of the Peterborough location.[92]

The exclusion of the public from overseeing over these changes shows it is not in the public interest to grant another 10-year licence term that could continue to exclude the public from overseeing operational changes at the BWXT facilities.

Concerns over changes that may occur over a future 10-year licence term

The potential for changes to occur at both BWXT locations over the next 10 years is high. Already, in requesting the flexibility to introduce pelleting operations to the Peterborough, BWXT has indicated that there may be very significant operational changes over the course of another future 10-year licence. Should any such changes occur, they ought to be subject to meaningful and rigorous public review.

This request from BWXT to move is not new. In fact, BWXT's predecessor GEH-C had proposed the same possibility during the 2010 licence renewal hearings. At that time, Commission members asked the company whether it intended to move its operations to Peterborough from Toronto in order to capitalize on the increased property value of Toronto by selling its premises there. GEH-C assured the Commission it had no such plans to move at that time, and is similarly denying it in its current licence renewal application.

While the proposed change is expressed as a vague possibility, BWXT nonetheless requests pre-approval now, and without having to provide any specific plans or timelines. It asserts that should the company choose to conduct pelleting operations at its Peterborough location, it will at that time "conduct required notifications" and provide the Commission with new Peterborough location plans and environmental reviews.[93] CNSC staff has recommended that the Commission Tribunal approve BWXT's request to conduct pelleting operations in Peterborough provided that BWXT prepares and submits an updated environmental monitoring program for Peterborough and that BWXT submit a commissioning report related to the production of fuel pellets closer to the time.[94] Waterkeeper is concerned that such an approach excludes the public from a very important deliberation and decision.

A consolidated Environmental Risk Assessment (ERA) was completed in 2018 for both the Toronto and Peterborough locations which contains some description of potential future pelleting

[92] 2016 licence amendment Record of Decision.
[93] BWXT application at 11. The company asserts that should these changes occur, there would be no change to the limits of uranium held at both facilities: 700 Mg of U at Toronto facilities and 1500 mg of U at Peterborough on site at any time, with a processing limit of 150mg per month.
[94] CNSC staff CMD at 7.

operations at the Peterborough location. However, much more information on the public record is required.[95]

Recommendation 28: that no licence terms permitting the future relocation of pelleting operations in the absence of specific plans or timelines or public involvement.

The necessity for licence hearings over other public engagement mechanisms

CNSC staff cite five-year periodic safety reviews and environmental review assessments, annual compliance reports, Regulatory Oversight Reports, and periodic CNSC desktop compliance reviews and inspections to assure the public that more frequent hearings would be unnecessary.[96] However, RORs are the only document that is subject to partially-funded public review.

Commissioners over the last three years have emphasized and encouraged the use of annual ROR meetings and participant funding processes to make up for the public oversight opportunities denied by less frequent licence hearings. However, ROR meetings cannot constitute a meaningful substitution for licence hearings for several reasons. Despite BWXT and CNSC staff arguments to the contrary, there are no current public oversight processes as meaningful as licence renewals hearings.

First, RORs do not contain comprehensive information concerning individual facilities' operations or their environmental footprint. These RORs also contain virtually no environmental data, and no raw data.

Second, timelines for RORs frustrate meaningful contributions. This is true of the actual time provided for meeting proceedings as well. Relicensing hearings can take several days, concerning only the single facilities in questions and their unique licence terms. Whereas Commission ROR meetings consider between five and ten facilities, focusing on their compliance with licences over the licences themselves, all over the course of a single afternoon.

Third, the participant funding offered during Commission ROR meetings is much less for meetings compared to licence renewal hearings, implicitly recognizing that they are both less accessible and less rigorous than licence hearings.

Fourth, meetings are not located in host communities, reinforcing their considerably more limited potential as meaningful public engagement mechanisms.

Finally, with a new policy by the Commission to refuse funding to civil society organizations to attend annual commission meetings, one of the most significant benefits they had afforded (namely ensuring two-way communication and information sharing between the public and Commissioners) has ceased. This reinforced the inability of Commission ROR meetings to constitute an equivalent avenue for public input when compared with public licensing hearings.

[95] BWXT relicensing application at 33.
[96] CNSC staff CMD at 8.

Conclusion and summary of recommendations

The current Class IB fuel facility operating licence for BWXT is set to expire on December 31, 2020. BWXT is currently applying for a licence renewal that would include a new licence period of ten years. Waterkeeper has received participant funding to intervene in this matter, which requires the organization to prepare and deliver both written and oral submissions concerning the impacts of both BWXT facilities to local water quality and aquatic ecosystems, as well as the adequacy of BWXT's public information policies and practices for its facilities.

Waterkeeper was provided with participant funding from the CNSC in order to retain two experts to examine the PNGS and make recommendations for improvements to its operations:

- Pippa Feinstein, JD, LLM, counsel, case manager and public engagement expert; and
- Wilf Ruland, P. Geo., an experienced hydrogeologist and recognized expert on the impacts of industrial facilities on local groundwater and surface water.

General Electric Canada (GE) was has owned the land on which both BWXT facilities sit for over 100 years. It acquired the land in Toronto and Peterborough with the rise of electricity in both cities just after the turn of the last century. Since the early 1950s, GE was also an integral part of the design team that produced the earliest CANDU technologies. Both facilities have been producing fuel for the Pickering Nuclear Generating Station since 1965 and later also Darlington Nuclear Generating Station. And yet, public knowledge of the BWXT facilities and their operations remains fairly limited.

There are two potential pathways by which contaminated water could make its way into the local environment. The first is via effluent releases from the BWXT facilities into the municipal sewer system. The second pathway is more complex and involves stormwater from the BWXT facility and its stormwater catchment system. Waterkeeper urges BWXT and the CNSC to ensure additional monitoring is undertaken to evaluate whether stormwater and/or groundwater contamination is present around the BWXT locations and the extent to which it is contained (should it be present).

Waterkeeper also reviews the proposed new licence limits for the BWXT facilities to determine their adequacy – and their prudence, should pelleting operations be moved from Toronto to Peterborough over the course of the next licence period.

Finally, Waterkeeper makes a series of recommendations to improve BWXT's public engagement activities and policies.

<u>Summary of Recommendations</u>

Recommendation 1: that the province and municipality become more involved in overseeing the BWXT facility.

Recommendation 2: that the Commission Tribunal pay special attention to its duty to protect water quality in a way that also respects provincial and municipal laws and regulations.

Recommendation 3: that future CNSC staff Environmental Protection Reviews (EPRs) should clarify that PGMN wells are only a way to determine generalized background groundwater quality in municipalities.

Recommendation 4: Level I and Level II environmental site assessments (ESAs) should be conducted as soon as possible at both Toronto and Peterborough BWXT locations.

Recommendation 5: that BWXT and GEH-C (possibly with the assistance of CNSC staff) clarify responsibilities for conducting Level I and Level II ESAs as well as any subsequently required remediation work.

Recommendation 6: that BWXT ensure the relevant Toronto and Peterborough municipal authorities aware of the results of Level I and Level II ESAs.

Recommendation 7: that if ESAs are refused, the city of Peterborough order groundwater and stormwater monitoring of the BWXT location in Peterborough.

Recommendation 8: that proposed EBRLs for both Toronto and Peterborough facilities be further lowered to reduce reliance on downstream dilution and assumed average flows compared to real measured discharges.

Recommendation 9: that proposed ALs for both Toronto and Peterborough facilities be further lowered to reduce reliance on downstream dilution and assumed average flows compared to real measured discharges.

Recommendation 10: that the provincial MECP and relevant municipal authorities be consulted in the developments of more conservative EBRLs and ALs, keeping in mind provincial guidance documents such as the PWQOs as well as municipal sewer bylaws and waste water treatment capacity.

Recommendation 11: that municipal authorities review their treatment capacity for uranium as well as the sufficiency of disposal for sewage sludge that may be contaminated with uranium.

Recommendation 12: that municipal WWTPs begin monitoring wastewater and sewage sludge for uranium concentrations to understand incoming volumes, treatment efficacy, and the sufficiency of biosolids disposal arrangements.

Recommendation 13: at the very least, that parameters for both Toronto and Peterborough facilities include parameters for pH and perimeter air quality monitoring.

Recommendation 14: that CNSC staff and the Commission Tribunal dispense with "public interest" and "public perception of risk" qualifiers on the provision of public access to environmental information concerning BWXT operations and facilities.

Recommendation 15: that BWXT ensure the geographic area chosen as a 'dialing area' include areas being monitored to verify air and soil contamination levels and areas corresponding to any

internal emergency notification plans or protocols.

Recommendation 16: that future polls ask respondents be asked how they would like to receive information or be engaged by BWXT moving forward.

Recommendation 17: that businesses, schools and daycares, healthcare providers, civil society organizations, and other potential stakeholders be included in future polls in addition to residents.

Recommendation 18: that BWXT define its target audience in its PIDP and include at least the following: local community members, interested members of the public, political leaders, community organizations, media, intervenors, and Indigenous Nations and organizations. The rationale for BWXT's definition of its target audience should also be included in its PIDP.

Recommendation 19: that BWXT include explanation of how it will respond to questions from target audience members, and timelines for doing so.

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Recommendation 22: that BWXT proactively and publicly release environmental monitoring data. As much as possible, data should be provided in real time and machine readable formats.

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a) when the incident occurred;
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c) a description of any mitigation and/or remediation efforts undertaken to address incidents after they occur.

Recommendation 24: At least nine months to a year should be afforded to intervenors to prepare their submissions concerning proposed 10-year licences.

Recommendation 25: The CNSC should immediately initiate a comprehensive review of access to information or interrogatory processes for future Commission meetings and hearings in consultation with stakeholders.

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b. Some CNSC staff time, and industry/proponent staff time must be designated to providing intervenor-requested information and engaging in follow-up information requests and/or site visits.

Recommendation 28: that no licence terms permitting the future relocation of pelleting operations in the absence of specific plans or timelines or public involvement.

APPENDIX I

Independent Report on Hydrogeological Issues Pertaining to the Application for a 10-Year Licence Renewal for the BWXT Nuclear Energy Canada Inc. Facilities in Toronto and Peterborough, Ontario

Prepared for:

Swim Drink Fish Canada /
Lake Ontario Waterkeeper

Prepared by Wilf Ruland (P. Geo.)

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January 20th, 2020

1) Introduction

I am a hydrogeologist, and I have worked as a professional for over 30 years. I am a specialist in groundwater and surface water contamination issues, and have dealt with many such issues over the course of my consulting career.

I have given testimony as an expert witness on hydrogeological issues before the Environmental Review Tribunal, the Environmental Assessment Board, the Joint Board, the Ontario Municipal Board, the Niagara Escarpment Commission, and the Canadian Nuclear Safety Commission (CNSC). A copy of my Curriculum Vitae is available upon request.

I have done considerable nuclear-related work in the past 10 years. This experience is highly relevant to the issues being considered in this matter.

I have been retained by Swim Drink Fish Canada / Lake Ontario Waterkeeper to review (from a hydrogeological perspective) the technical documentation pertaining to the application for a 10-year licence renewal for the BWXT Nuclear Energy Canada Inc. (BWXT) facilities in Toronto and Peterborough. If approved by the Canadian Nuclear Safety Commission (CNSC) this would allow BWXT to continue operating their nuclear fuel production facilities.

The BWXT application also requests the CNSC to allow the company to carry out nuclear fuel pelleting operations at both the Toronto and/or the Peterborough facilities - they are currently only produced in Toronto. There would be no change in throughput level associated with this request.

In this report I will provide my comments on completeness and adequacy of the BWXT application and its supporting documentation, including the following:

- the description of the BWXT facilities and their surroundings including the local geology, hydrology and hydrogeology;
- current potential impacts of the BWXT operations on groundwater and the Lake Ontario environment;
- the appropriateness of the Release Limits and Action Levels for contaminants in liquid discharges from the BWXT facilities;
- possible historic legacy issues and their environmental implications;
- the adequacy of proposed water-related environmental monitoring programs (if the application for a 10-year licence renewal is granted based on the current BWXT application).

In order to carry out my review and prepare this report, I have reviewed a series of documents and the most important of these are listed as references in **Appendix 1** of this report. I also went for a site tour of each facility and met with BWXT staff, who were very helpful in improving my understanding of their facilities.

2) Overview of the Toronto and Peterborough BWXT Facilities

a) Introduction

Basic characterizations of the BWXT facilities and their surroundings are provided in the 2019 BWXT Licence Renewal Application, and in the CNSC's Commission Member Document (CMD) for this application. Additional information is available in the respective 2018 Environmental Risk Assessment (ERA) Reports for each of the facilities.

b) Site History and Development

The use of both the Toronto and the Peterborough BWXT facilities for nuclear fuel production dates back to 1965. BWXT's predecessor company was GE Hitachi Nuclear Energy Canada Inc. (GEH-C), and the properties on which the fuel production occurs in Toronto and Peterborough are in both cases still apparently owned by GEH-C.

Little information on the history of the two sites is provided in the respective Environmental Risk Assessments (ERAs) for the facilities, or in any other documents which were available to me.

Both BWXT facilities are paved throughout the area not occupied by buildings.

c) Site Topography and Drainage

Both sites are essentially flat and paved. Catch basins are present, and will be connected to a subsurface storm sewer network. No information is available about the subsurface storm sewer network for either facility.

BWXT staff indicated that any maintenance and/or monitoring of the storm sewer network is the responsibility of GEH-C, which owns the properties that BWXT's facilities are situated on. BWXT does not conduct monitoring of the storm sewer system for either facility.

d) Site Hydrogeology

No site specific information is available about site hydrogeology or any historical soil or groundwater contamination issues.

BWXT does not do any groundwater monitoring at its facilities, and it appears that environmental site assessments have not been done for either facility.

e) Facility Operations and Water Use

The Toronto facility receives steel drums of Uranium dioxide (U02) powder which is granulated, pressed into pellet form, sintered, and then ground to very precise dimensions before shipping to the Peterborough facility.

Water is used in the Toronto facility to clean pellets during the grinding process, and is used for cleaning at various locations in the facility. A total of about 1,500,000 litres/year of water are generated by the Toronto facility. All water is accumulated in large storage/treatment containers, treated, tested to confirm Uranium Action Levels are met, and if this is confirmed then the water is discharged to the sanitary sewer.

Far less water is currently used in the Peterborough facility (about 1,000 Litres/year), and all water is likewise accumulated, treated, and tested - with discharge to the sanitary sewer only proceeding if Uranium and Beryllium Action Levels have been met. If pelleting operations are moved to Peterborough, then there would be a significant increase in water usage to volumes roughly comparable to those being used in Toronto currently.

3) Water Emissions of Contaminants from the Toronto BWXT Facility

a) Uranium in Emissions of Water to Sanitary Sewer

The critical contaminant at the Toronto operation is Uranium. Prior to their discharge, water from the large storage/treatment containers is sampled and tested for Uranium. This is an environmental best management practice, as it ensures Action Level compliance for all liquid discharges from the facility.

The ERA for the Toronto facility indicates that the highest annual concentrations of Uranium in any liquid emission in the years 2012-2016 ranged from 2.44 to 2.74 mg/L, and average concentrations ranged from 0.47 to 1.02 mg/L.

Total annual Uranium discharges to sewer can be determined by multiplying the total annual liquid emissions from the Toronto facility by the average concentrations for each year. Annual discharges of Uranium to the sanitary sewer in Toronto were consistently less than 1 kg/year between 2012 and 2016 (ranging from 0.39 to 0.9 kg/year).

b) Uranium Release Limit under Current Licence

The annual Uranium Release Limit from the Toronto facility under the current CNSC-issued 2016-2020 licence is an absurd 9,000 kg/year. This is a factor of ten thousand times greater than the maximum annual Uranium release from the facility in the 2012 to 2016 period.

It is clear when one considers these figures that the Uranium Release Limit needs to be changed. It is my understanding that the Release Limit under the CNSC-issued current 2016-2020 licence is based only on radiation exposure to people - and there is of course no potential point of contact between people and water in sanitary sewer discharges until one is downstream of the wastewater treatment plant (WWTP).

The resulting Release Limit ends up being absurdly and dangerously high. It would allow an average of about 25 kg of Uranium to be released into the sanitary sewer system from the Toronto facility daily. This would certainly have negative implications for Uranium levels in treated discharges and biosolids from the downstream WWTP, and thus on Lake Ontario and its watershed.

c) Uranium Release Limit under Proposed Future 10-Year Licence

A different approach has been taken in developing the Toronto facility's Uranium Release Limit for the proposed future 10-year licence. Instead of the absurd 9,000 kg/year limit in the current licence, the proposed future Release Limit is 1 g/L Uranium in weekly composite samples of emissions from the facility - which when one does the math is a factor of 6 lower, and thus still unacceptably high.

The Release Limit concentration of 1 g/L Uranium is the equivalent of 1,000,000 micrograms/Litre (ug/L). By comparison, the Ontario Provincial Water Quality Objective (PWQO) for Uranium is 5 ug/L (or 0.005 mg/L). The proposed Uranium Release Limit for the Toronto BWXT facility has been set at 200,000 times higher than the PWQO for Uranium. This significantly exceeds the average dilution capacity of the downstream Humber waste water treatment plant (WWTP) - which is a factor of 40,000).

The documentation submitted to the CNSC in support of the BWXT licence renewal application does not provide any information on the ability of the Humber WWTP to treat Uranium, but to the extent that greater treatment is provided there will be a corresponding increase in Uranium concentrations in biosolids from the plant. Biosolids are often spread on farmland, which is not a good place for Uranium.

The proposed Release Limit of 1 g/L can also be looked at a different way. While the different units make comparisons a little challenging, when one does the math a Release Limit of 1 g/L multiplied by the annual liquid releases of about 1,500,000 L/year works out to a proposed future Release Limit of 1,500,000 g/year or 1,500 kg/year - as said, this is six times lower than the current Limit, but still far too high. It works out to an average of over 4 kg/day of Uranium which would be allowed to be discharged to the sanitary sewer without exceeding the licence's Release Limit.

Table 10 of the CMD shows the amount of Uranium released from the Toronto facility in 2011-2018. Annual releases averaged less than 1 kg Uranium annually, compared to the current Licence Limit of 9,000 kg/year (and the proposed future limit of about 1,500 kg/year).

Perhaps CNSC staff think that the comparison between the current 9,000 kg Uranium Release Limit and the actual releases (1 kg/year or less) makes the facility look good. Instead, I would suggest that all that these very high Release Limits (in both the current and proposed future Licences) serve to do is build skepticism about the regulatory regime for nuclear facilities.

I strongly recommend that CNSC should continue to work to provide improved guidance to Canada's nuclear facilities on Release Limits which are more protective of the natural environment than is provided by the current Release Limits.

d) Action Levels under Proposed Future 10-Year Licence

Action Levels have been set for the proposed licence renewal. The Action Levels are set "as low as reasonably achievable" (ALARA) and "to ensure pollution prevention principles are applied". Uranium Action Levels of 6 mg/L (single batch) and 3 mg/L (annual average) are proposed for the Toronto facility - exceedences of these Action Levels are reportable events which must be reported to CNSC within 24 hours.

Comparison of Action Levels to water quality objectives and guidelines developed for the protection of aquatic life demonstrates that these Action Levels are clearly relying on downstream dilution to prevent harm to aquatic organisms.

- The Canadian Council of Ministers of the Environment (CCME) Water Quality Guideline for the protection of freshwater aquatic life is 15 ug/L (or 0.015 mg/L) for Uranium. The Action Levels for the Toronto facility have been set at 200 times higher for annual average Uranium levels, and 400 times higher for single batch test results.

- The Ontario Provincial Water Quality Objective for Uranium is 5 ug/L (or 0.005 mg/L). The Action Levels for the Toronto BWXT facility have been set at 600 times higher for annual average Uranium levels, and 1,200 times higher for single batch test results.

The December 2018 ERA for the Toronto facility indicates on page 4-11 that downstream dilution in the Humber Wastewater Treatment Plant (WWTP) is approximately a factor of 40,000 times. I believe that the Humber WWTP has no other CNSC-regulated sources of Uranium in its influent. I was unable to find results of any testing for Uranium in treated effluent discharges from the Humber WWTP, or in the digested sewage sludge (biosolids) from the plant.

It would be worthwhile for BWXT and/or the CNSC to confirm the Uranium dilution and treatment capabilities of the Humber WWTP, by testing for Uranium in the treated effluent discharges from the Humber WWTP and in the digested sewage sludge from the plant.

4) Water Emissions of Contaminants from the Peterborough BWXT Facility

a) Uranium in Emissions of Water to Sanitary Sewer

The critical contaminants at the Peterborough operation are Uranium and Beryllium. Prior to their discharge, water from the storage/treatment containers is sampled and tested for both parameters. This report deals with each contaminant in turn.

Table 2.13 in the ERA for the Peterborough facility indicates that the highest annual concentrations of Uranium in any liquid emission in the years 2012-2016 ranged from 0.09 to 0.48 mg/L, and average concentrations ranged from 0.06 to 0.29 mg/L.

Total annual Uranium discharges to sewer can be determined by multiplying the total annual liquid emissions from the Peterborough facility by the average concentrations for each year. Annual discharges of Uranium to the sanitary sewer in Peterborough were consistently less than 1 gram/year between 2012 and 2016 (ranging from 0.06 to 0.24 g/year). This is about a factor of 4,000 lower than the Uranium discharges from the Toronto facility, which is due to the different nature of the operations.

b) Uranium Release Limit under Current Licence

The annual Uranium Release Limit from the Peterborough facility under the current CNSC-issued 2016-2020 licence is an absurd 760 kg/year. This is about factor of three million times greater than the maximum annual Uranium release from the facility in the 2012 to 2016 period.

It is clear when one considers these figures that the Uranium Release Limit needs to be changed. It is my understanding that the Release Limit under the CNSC-issued current 2016-2020 licence is based only on radiation exposure to people - and there is obviously no potential point of contact between people and water in sanitary sewer discharges until one is downstream of the wastewater treatment plant (WWTP).

The resulting release limit ends up being absurdly and dangerously high. It would allow an average of about 2 kg of Uranium to be released into the sanitary sewer system from the Peterborough facility daily. This would certainly have negative implications for Uranium levels in treated discharges and biosolids from the downstream WWTP, and thus on Lake Ontario and its watershed.

c) Uranium Release Limit under Proposed Future 10-Year Licence

A different approach has been taken in developing the Peterborough facility's Uranium Release Limit for the proposed future 10-year licence. Instead of the absurd 760 kg/year limit in the current licence, the proposed future Release Limit is 0.14 g/L Uranium in weekly composite samples of emissions from the facility - which when one does the math is a factor of about 5,400 lower.

The Release Limit concentration of 0.14 g/L Uranium is the equivalent of 140,000 micrograms/Litre (ug/L). By comparison, the Ontario Provincial Water Quality Objective (PWQO) for Uranium is 5 ug/L (or 0.005 mg/L). The proposed Uranium Release Limit for the Peterborough BWXT facility has been set at 28,000 times higher than the PWQO for Uranium.

The proposed Release Limit of 0.14 g/L can also be looked at a different way. While the different units make comparisons a little challenging, when one does the math a Release Limit of 0.14 g/L multiplied by the annual liquid releases of about 1,000 L/ year works out to a proposed future Release Limit of 140 g/year.

Table 10 of the CMD shows the amount of Uranium released from the Peterborough facility in 2011-2018. Annual releases averaged about 0.0001 kg Uranium annually, compared to the current Licence Limit of 760 kg/year - clearly the current Licence Limit (at 7.6 million times higher than actual site discharges) is absurdly high. For the Peterborough facility the proposed future Release Limit of about 140 g/year (or 0.14 kg/year) is about a factor of 1400 higher than current Uranium discharges - better, but still too high.

It is possible that CNSC staff think that the CMD's Table 10 comparison between the current 760 kg/year Uranium Release Limit and the actual releases (0.0001 kg/year) makes the facility look good. Instead, I would suggest that all that such very high Release Limits serve to do is build skepticism about the regulatory regime for nuclear facilities.

I strongly recommend that CNSC should continue to work to provide improved guidance to Canada's nuclear facilities on Release Limits which are more protective of the natural environment than is provided by the current Release Limits.

<u>d) Uranium Action Levels under Proposed Future 10-Year Licence</u>

Action Levels have been set for the proposed licence renewal. They are set as low as reasonably achievable (ALARA) and "to ensure pollution prevention principles are applied". Uranium Action Levels of 6 mg/L (single batch) and 3 mg/L (annual average) are proposed for the Peterborough facility - exceedences of these Action Levels are reportable events which must be reported to CNSC within 24 hours.

Comparison of Action Levels to water quality objectives and guidelines developed for the protection of aquatic life demonstrates that these Action Levels are clearly relying on downstream dilution to prevent harm to aquatic organisms.

- The Canadian Council of Ministers of the Environment (CCME) Water Quality Guideline for the protection of freshwater aquatic life is 15 ug/L (or 0.015 mg/L) for Uranium. The Action Levels for the Peterborough facility have been set at 200 times higher for annual average Uranium levels, and 400 times higher for single batch test results.

- The Ontario Provincial Water Quality Objective for Uranium is 5 ug/L (or 0.005 mg/L). The Action Levels for the Peterborough BWXT facility have been set at 600 times higher for annual average Uranium levels, and 1,200 times higher for single batch test results.

The consolidated ERA for the Peterborough facility indicates on page 3-8 that downstream dilution in the Peterborough Wastewater Treatment Plant (WWTP) is approximately a factor of 17,000 times. I believe that the Peterborough WWTP has no other CNSC-regulated sources of Uranium in its influent. I was unable to find results of any testing for Uranium in treated effluent discharges from the Peterborough WWTP, or in the digested sewage sludge (biosolids) from the plant.

It could be worthwhile for BWXT and/or the CNSC to confirm the Uranium dilution and treatment capabilities of the Peterborough WWTP, by testing for Uranium in the treated effluent discharges from the WWTP and in the digested sewage sludge from the plant. This testing should certainly be done if pelleting operations are shifted.

e) Beryllium Emissions from the Peterborough BWXT Facility

In Peterborough the critical contaminants are Uranium and Beryllium - Uranium was dealt with in the prior sections of this report.

Ontario has a Provincial WaterQuality Objective of 11 ug/L for Beryllium, and the WHO has a water quality guideline of 12 ug/L. BWXT used an Internal Control Level of 4 ug/L in assessing Beryllium discharges from the Peterborough facility.

Table 2.13 of the Consolidated ERA shows that average annual concentrations of Beryllium in liquid discharges from the Peterborough facility (2013-2016) were 1.65 ug/L, which is well below the various guidelines and objectives. The highest recorded Beryllium level in 2013-2016 was 65.5 ug/L but the downstream WWTP will provide very considerable treatment and dilution.

In my professional opinion, Beryllium is not a significant water quality concern for the Peterborough facility at current discharge levels.

5) Assumptions Used in Calculation of Release Limits

I have reviewed the details of how the proposed go-forward Release Limits for the Toronto and Peterborough BWXT facilities were calculated.

The calculations are straight dilution calculations, with the calculated Release Limit being the amount of Uranium which theoretically could be released into the sanitary sewer system such that an average day's volume of flow from the WWTP would dilute the discharged Uranium down to the regulatory limit being applied.

There are a number of assumptions which go into these BWXT Release Limit calculations and I will deal with each of them in turn:

a) It is assumed that the less stringent of 2 guidance values for the protection of aquatic life should be applied.

BWXT's Release Limit calculations apply the Canadian Council of Ministers of the Environment (CCME) Uranium guideline of 0.015 mg/L, instead of the more stringent Ontario Provincial Water Quality Objective (PWQO) of 0.005 mg/L for Uranium. I do not consider this to be a good or prudent way of proceeding. The BWXT facilities are in Ontario, and the Ontario PWQO should be used when setting Release Limits for facilities in Ontario.

b) It is assumed that there will be no Uranium in the Toronto sewer system except that which is coming from BWXT's facilities, given that 100% of the dilution capacity of the waste water treatment plant is being applied to the calculations. In the absence of testing of Uranium in the WWTP influent and effluent, I do not consider this to be a prudent assumption.

c) It is assumed that is reasonable to use the yearly average flow of the sewage treatment plant in the dilution calculations. I have concerns about this approach.

Depending on season and recent precipitation events, flow into a WWTP will be considerably lower on some days and considerably higher on others. A prudent dilution calculation would use the annual low flow volume, not the annual average.

d) It is assumed that the discharge of Uranium from the BWXT facilities is at a perfectly steady rate throughout the year.

I question this assumption. In fact, the discharges come in "batches" - once a storage/ treatment container is full and passes testing it is discharged to the sanitary sewer system.

6) Water Quality Monitoring at the BWXT Facilities

a) Introduction

Industrial operations like the BWXT Toronto and Peterborough facilities can have the following water-related environmental impacts:

- discharge of contaminants to groundwater;
- leakage of contaminated groundwater into a damaged storm sewer system;
- discharge of contaminants via sanitary sewer emissions.

b) No Groundwater or Storm Sewer Monitoring at the BWXT Facilities

In respond to our questions, BWXT staff confirmed that there is no groundwater monitoring done at either facility.

They likewise confirmed that BWXT only leases their facilities, and responsibility for any monitoring of the storm sewer system would be with owner. They were not aware of any testing of water quality in the storm sewer network having been done, or of any environmental site assessment work having been done.

The CMD for this application indicates on page 30 that there are:

- *".. no pathways for contaminants to enter the groundwater system and no known or suspected groundwater contamination plumes or subsurface contamination related to BWXT Toronto operations."*

- *".. no pathways for contaminants to enter the groundwater system and no known or suspected groundwater contamination plumes or subsurface contamination related to BWXT Peterborough operations."*

In response to my questions BWXT staff confirmed that these statements are not based on any actual groundwater quality testing or monitoring data. I suggest that these statements in CNSC's CMD are misleading.

I can certainly accept (based on my observations during my tours of both facilities) that the two BWXT operations are clean, tightly controlled, and well-managed. There are currently no obvious pathways by which Uranium from the nuclear fuel production processes could get into the soil beneath the paved properties or into the groundwater system.

That having been said, the ERAs for the BWXT facilities indicate that nuclear fuel production has been carried out at both facilities since 1965. I know from my experience with many other industrial sites that knowledge of risks and best site management practices 55 years ago (in 1965) was inferior to today's knowledge of risks and best management practices.

It is possible that there are legacy soil or groundwater contamination issues beneath either the Toronto or the Peterborough facilities. It is also possible that the storm sewer network at either facility has degraded over time and is leaky. The combination of subsurface contamination and a leaky storm sewer network can provide a pathway for rapid movement of legacy subsurface contaminants from an industrial facility into the nearest creek or river, and from there into Lake Ontario.

It is not known whether this scenario represents a realistic concern at either BWXT facility because no work has been done to assess whether or not there is an issue.

I strongly recommend that Level I and Level II environmental site assessments (ESAs) be done for both the Toronto and the Peterborough BWXT operations. As part of each ESA, explicit attention should be paid to the state of repair of the storm sewer network and all-season sampling of the storm sewer network should be done.

The best-case scenario is that there is no problem at either facility. I am sincerely hoping that this scenario reflects the actual situation however in my role as hydrogeological technical advisor for Lake Ontario Waterkeeper it is my job to make sure all reasonable measures are being taken to protect lake water quality at industrial facilities in the Lake Ontario watershed. I firmly believe that the Level I and II ESAs which I am recommending are reasonable under the circumstances.

I should note at this point that I am aware of the references to groundwater quality monitoring results from wells which are part of the Provincial Groundwater Monitoring Network (PGMN) in the ERAs for both BWXT facilities. These references are misleading, and give the illusion of being relevant to the BWXT facilities when in fact the PGMN wells at which water quality monitoring is being done are far distant and downgradient from the BWXT facilities.

To be more precise, even if there were massive groundwater contamination at one of the BWXT facilities the PGMN wells cited in the ERAs would be highly unlikely to show any indication of a problem. Their use in the ESAs is unfortunate, and wording in future ESAs should very clearly explain that the PGMN wells are only really useful for establishing background groundwater quality in the respective municipalities.

c) Monitoring of Discharges to the Sanitary Sewer at BWXT Toronto

The liquid effluent from the Toronto BWXT facility is accumulated, treated, tested - and only released to the sanitary sewer if the testing has confirmed that treatment has successfully brought Uranium concentrations below the Internal Control Level of 3 mg/L (note that the proposed Action Level for a single batch is 6 mg/L).

Sampling of the treated batches of discharge water is also done for other parameters - I did not see any results of concern. As indicated previously, the critical contaminant for this facility is Uranium.

The Toronto ERA's Table 2.13 provides average Uranium levels in emissions for 2012-2016 - the average over the 5 years is 0.75 ppm (or mg/L). This is considerably higher that the safe levels established for aquatic life by the CCME (0.015 mg/L or the province of Ontario via the PWQO (0.005 mg/L). So it is clear that the Toronto BWXT facility is heavily relying on downstream treatment/dilution at the Humber WWTP to bring the Uranium concentrations in its discharges down to safe levels for Lake Ontario aquatic life.

I am not aware of any testing results for Uranium in Humber WWTP emissions. The WWTP's 2018 annual report does not include Uranium as a parameter being tested in either final plant emissions or in biosolids. It would be worth doing testing of the Humber WWTP's Uranium emissions for the next ERA for the Toronto facility.

d) Monitoring of Discharges to the Sanitary Sewer at BWXT Peterborough

The liquid effluent from the Peterborough BWXT facility is accumulated, treated, tested - and only released to the sanitary sewer if the testing has confirmed that treatment has successfully brought Uranium concentrations below the Internal Control Level of 3 mg/L (note that the proposed Action Level for a single batch is 6 mg/L).

Sampling of the treated batches of discharge water is also done for other parameters - I did not see any results of concern. The critical contaminants for this facility are Uranium and Beryllium. As indicated previously, it there are no changes to current processes or monitoring results then I have no concerns about Beryllium levels in the Peterborough BWXT facilty's discharges.

The Peterborough ERA's Table 2.13 provides average Uranium levels in emissions for 2012-2016 - the average over the 5 years is 0.15 ppm (or mg/L). This is ten times higher that the safe levels established for aquatic life by the CCME (0.015 mg/L) or 30 times higher than Ontario's PWQO (0.005 mg/L). So it is clear that the BWXT facility is relying on downstream treatment/dilution at the Peterborough WWTP to bring the Uranium concentrations in its discharges down to safe levels for Lake Ontario aquatic life. The WWTP should be able to provide the required treatment/ dilution, especially given the very low volumes involved (about 1000 Litres/year).

I could not find and am not aware of any testing results for Uranium in Peterborough WWTP emissions. The WWTP's 2018 annual report does not include Uranium as a parameter being tested in either final plant emissions or in biosolids. If pelleting operations are shifted to Peterborough then there would be higher Uranium levels in site discharges and considerably higher volumes of water discharged - in that event it would be worth doing testing of the Peterborough WWTP's Uranium emissions for the next ERA for the Peterborough BWXT facility.

7) Possible Shift in Pelleting Operations from Toronto to Peterborough

I do not have any particular concerns about water-related impacts related to the proposed possible shift in pelleting operations from Toronto to Peterborough given the information available to date. The consolidated ERA for the Peterborough facility appears to address the macro issues satisfactorily.

A significant concern is however that as details are worked out between CNSC and BWXT staff, there will not be an opportunity for review of these details by the public, my clients, or other public interest groups. This issue will be addressed in considerably more detail by my colleague (Ms. Feinstein).

8) Discussion

My site tour of the BWXT facilities in Toronto and Peterborough confirmed that these are clean, tightly controlled, and well-managed operations. Staff were forthcoming and helpful during our tours of both facilities and the associated meetings, and this is very much appreciated.

I have no concerns about hydrogeological impacts related to current operations, however the lack of any capacity for groundwater monitoring combined with a lack of knowledge about the state of the storm sewer network (at both BWXT facilities) is concerning given both facilities have been in operation since 1965. The potential for legacy environmental issues to be causing current off-site impacts is worth carefully evaluating.

In the meantime, I am not seeing any water-related environmental issues which would cause me to recommend against a renewal of the site licences for BWXT's Toronto and Peterborough facilities. The question of whether a 10-year renewal should be granted is one I will leave to my colleague (Ms. Feinstein) to address, as most of the issues related to this question are non-technical.

My biggest concerns about the BWXT facility-related documentation are the absurdly high Release Limits which have been applied to these facilities in the past and which are currently still in effect. The CNSC's methodology for determining Release Limits appears to be evolving, but the current Release Limits lack all credibility.

If there were releases of Uranium from either BWXT facility at anywhere near the concentrations which the term "Release Limits" implies would be permitted, then unacceptable downstream environmental impacts could be anticipated. For example the current Uranium Release Limit for the Toronto BWXT facility is 9,000 kg/year - 9 metric tonnes of Uranium yearly! Actual releases from the Toronto facility are <1 kg/year, and demonstrate how irrelevant the Release Limits really are.

BWXT has developed Action Levels for its 2 facilities which are more in keeping with achievable emissions and reasonable requirements for downstream treatment/ dilution at the Waste Water Treatment Plants. Action Levels are being met in current operations, and I see no reason why this should change in the future - even if the company's pelleting operations are shifted to Peterborough.

9) Conclusions

1) BWXT Nuclear Energy Canada Inc. (BWXT) is applying for a 10-year licence renewal for its facilities in Toronto and Peterborough. No significant changes in operations are anticipated for the requested 10-year period, except that BWXT is requesting flexibility to allow it to shift Uranium pelleting operations from Toronto to Peterborough. There would be no change in throughput associated with this change.

2) The BWXT nuclear fuel production facilities are model industrial operations - clean, tightly run, and well managed. Staff were friendly and helpful in improving our understanding of the Toronto and Peterborough facilities.

3) There is no capacity for groundwater monitoring at either BWXT facility (ie. there are no monitoring wells), and no information is available on the state of the storm sewer network which is present beneath the pavement at both sites. No groundwater or storm sewer monitoring information is available for either facility.

4) Little water is used in the Toronto facility (1,500,000 Litres/year) and even less is used in Peterborough (about 1000 Litres/year). All water is accumulated, treated and tested - with discharge only occurring if Action Levels have been met. This is an environmental best management practice, as it ensures Action Level compliance.

5) Action Levels have been established for Uranium discharges from the Toronto facility (6 mg/Litre for a single batch, and 3 mg/Litre annual average). Peterborough has the same Action Levels for Uranium, and in addition has Action Levels for Beryllium. These Action Levels are being met consistently.

6) The current Release Limits for both facilities are absurdly high, and the proposed future Release Limits are lower but still too high (especially for the Toronto facility).

7) Uranium levels in sanitary sewer discharges from both facilities are well above levels which would be considered safe for aquatic life - confirming that downstream treatment/dilution at the respective wastewater treatment plants is required.

8) The CNSC is being asked to provide BWXT with a 10-year licence renewal, even as it is also being asked to allow pelleting operations to shift to Peterborough if the company decides to do so. I do not have concerns about water-related impacts related to the proposed possible shift in pelleting operations to Peterborough given the information available to date. A significant concern is however that as details are worked out between CNSC and BWXT staff, there will not be an opportunity for review of these details by the public, my clients, or other public interest groups.

10) Recommendations

Recommendation 1)

I strongly recommend that CNSC should continue to work to provide improved guidance to Canada's nuclear facilities on Release Limits which are more protective of the natural environment than is provided by the current Release Limits.

Recommendation 2)

BWXT and/or the CNSC should confirm the Uranium dilution and treatment capabilities of the Humber Waste Water Treatment Plant (WWTP) and of the Peterborough WWTP (if pelleting operations are moved there), by testing for Uranium in the treated effluent discharges and in the digested sewage sludge (ie. biosolids)

Recommendation 3)

a) **I strongly recommend that Level I and Level II environmental site assessments (ESAs) be done for both the Toronto and the Peterborough BWXT operations.**

b) **As part of each ESA, explicit attention should be paid to the state of repair of the storm sewer network and all-season sampling of the storm sewer network should be done.**

c) **Once completed the ESAs should be made publicly available by BWXT.**

Recommendation 4)

Wording in future ESAs for both the Toronto and Peterborough BWXT facilities should very clearly explain that the provincial groundwater monitoring network (PGMN) wells are only really useful for establishing background groundwater quality in the respective municipalities.

Recommendation 5)

If the CNSC decides to grant BWXT the requested 10-year licence renewal, then it should only do so on the condition that there will be provision for full public review of all details pertaining to environmental emissions and/ or monitoring resulting from any shift of pelleting operations.

11) Signature and Professional Stamp

This independent report has been prepared in its entirety by Wilf Ruland (P. Geo.). It is based on my honest conviction and my knowledge of the matters discussed herein following careful consideration and review of the knowledge and information available to me at this time regarding the BWXT Nuclear Energy Canada Inc. (BWXT) facilities in Toronto and Peterborough, and the application to the CNSC for a 10-year licence renewal for these facilities.

This Review has been prepared for the use of my clients, Swim Drink Fish Canada / Lake Ontario Waterkeeper.

Signed on the 20th day of January, 2020

Wilf Ruland (P.Geo.)

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Appendix 1

References

References which were considered in the course of preparing this report included the following:

Arcadis Design and Consulting. December 2018. BWXT Nuclear Energy Canada Inc. Environmental Risk Assessment Report. Nuclear Fuel Pellet Operation (Toronto).

Arcadis Design and Consulting. December 2018. BWXT Nuclear Energy Canada Inc. Environmental Risk Assessment Report. Peterborough Facility.

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Canadian Nuclear Safety Commission. Draft Nuclear Fuel Facility Licence. BWXT Nuclear Energy Canada Inc. Toronto and Peterborough Facilities.

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Chapman, L.J. and Putnam, D.F. 1984. The Physiography of Southern Ontario, 3rd Edition.

Domenico, P.A. and Schwartz, F.W. 1998. Physical and Chemical Hydrogeology.

Freeze, R.A. and Cherry, J.A. 1979. Groundwater.

Appendix II to Submissions of Swim Drink Fish Canada/Lake Ontario Waterkeeper

Re: Relicensing hearing before the Canadian Nuclear Safety Commission for BWXT-Nuclear Energy Canada

Notice of Public Hearing, Ref. 2020-H-01

January 27, 2020

APPENDIX II

On July 4, 2019 Waterkeeper submits request to CNSC Secretariat for extension of the deadline for written submissions:

To the CNSC Secretariat,

I recently spoke with Adam Zenobi, Policy Officer with the Aboriginal Consultation and Participant Funding Program, about my concerns with the schedule of the upcoming relicensing hearing for the BWXT facilities in Toronto and Peterborough, ON.

The Hearing Notice (Ref. 2020-H-01) from June 3rd notes that the relicensing hearing for the facility will take place March 3-5, 2020. However, BWXT's relicensing application and CNSC staff's Commission Member Document (CMD) will only become publicly available after December 19, 2019, with submissions due to the Commission by January 17, 2020.

With the December Holidays, this timeline will mean the public will only have approximately two and a half weeks to review an application for a ten-year licence for a nuclear fuel facility (half of which is in the heart of the country's largest city). Recent media reports have also indicated that the relicensing application could include a proposal to increase the scope of operations at the Peterborough location.

This timeline effectively denies meaningful public participation, preventing impacted community members and organizations from weighing in on BWXT license conditions and operations.

I understand, the current BWXT licences will only expire in December 2020. As such, I request that the public review period be extended by at least two months, pushing the submission date to late March and public hearing to early June. Such a request for a longer public review period should be considered reasonable and achievable without undue hardship on BWXT, CNSC staff, or Commissioners.

Thank you for your consideration and I hope to hear from you soon.

Respectfully,

July 12, 2019, received notice that the January 18 deadline would be extended by 10 days.

November 15, 2019: requested copies of current licence and Licence Conditions Handbook from CNSC.

On December 8, 2019 the first round of information requests was submitted to BWXT and CNSC staff, and are as follows:

- Requests of the following from BWXT:
    - Please provide the BWXT Radiation Protection Manual mentioned in the company's licence renewal application at page 32;

- Please provide the BWXT Environmental Protection Plan (required by s. 10.1 of the company's current CNSC licence);
- Please provide all current Environmental Compliance Approvals (ECAs) concerning both the Toronto and Peterborough locations - other than those posted online already.
  - In particular, one ECA has been posted online concerning air emissions from the Toronto location (#5460-ACWHBS). If any other ECAs have been issued by the Ontario Ministry of Environment, Conservation and Parks (MECP), and are still in effect, please provide them.
  - Several ECAs for the Peterborough location have been posted online concerning air/noise and sewage releases (#0330-9HDR8J and 8032-BEJNAK) as well as several others concerning non-nuclear activities or equipment (#6149-6EMQW8, #8466-9AYK73, #9948-9GUQWP, and #7836-9HDRYN). If any other ECAs have been issued by the MECP, and are still in effect, please provide them.
- If groundwater monitoring reports are prepared, please provide the last three years' worth of reports for both Toronto and Peterborough locations. If no reports are prepared, but groundwater monitoring is conducted, please provide the last three years' worth of data;
- If stormwater monitoring reports are prepared, please provide the last three years' worth of reports for the Toronto and Peterborough locations. These should include any reports prepared for the CNSC, the City of Toronto pursuant to Sewer Bylaw Chapt. 681, and City of Peterborough pursuant to Bylaw 15-075. If no reports are prepared, but stormwater monitoring is conducted, please provide the last three years' worth of data;
- If monitoring reports are prepared concerning effluent discharges to sanitary sewers, please provide the last three years' worth of reports for both Toronto and Peterborough locations. These should include any reports prepared for the CNSC, MECP, and municipalities. If no reports are prepared, please provide the last three years' worth of data;
- If Pollution Prevention (P2) Plans have been prepared for either or both of the Toronto and Peterborough locations, please provide these plans; and
- If there is a more fulsome Public Information and Disclosure Protocol, other than the points listed on the following BWXT webpage https://www.bwxt.com/bwxt-nec/community/public-disclosure-protocol, please provide the full document.

- Requests of the following from CNSC staff:
  - Copies of the previous licences and Licence Conditions Handbooks for the Toronto and Peterborough locations (i.e. those covering the licence term immediately preceding the current licence term which began in 2010); and
  - Copies of any CNSC policy documents or guidelines concerning licence consolidation applications and procedures for Class I nuclear facilities. I was not able to find any explicit mention of licence consolidations in the *Nuclear Safety Control Act* or associated regulations or REGDOCs, and the only online resource I was able to find by the Commission concerned Class II nuclear facilities (generally medical isotope-related facilities).

On December 8, Waterkeeper also requested a site visit from BWXT at both Toronto and Peterborough locations for early January 2020. I am currently arranging this so that it can meet your availability and theirs.

December 10: BWXT confirmed receipt of email requests.

December 10 Waterkeeper requests the following information from CNSC staff:

1. Copies of the previous licences and Licence Conditions Handbooks for the Toronto and Peterborough locations (i.e. those covering the licence term immediately preceding the current licence term which began in 2010); and
2. Copies of any CNSC policy documents or guidelines concerning licence consolidation applications and procedures for Class I nuclear facilities. I was not able to find any explicit mention of licence consolidations in the *Nuclear Safety Control Act* or associated regulations or REGDOCs, and the only online resource I was able to find by the Commission concerned Class II nuclear facilities (generally medical isotope-related facilities).

CNSC immediately confirms receipt of email request.

December 16: Waterkeeper follows up with BWXT.

December 19: Waterkeeper followed up with CNSC staff concerning December 10 requests, CNSC staff assures a response will be given soon after December 24.

Responses from BWXT received Friday December 20:

1. BWXT Radiation Protection Manual – BWXT does not provide our programs or plans to the public as these are proprietary and confidential documents.
2. BWXT Environmental Protection Plan – BWXT does not provide our programs or plans to the public as these are proprietary and confidential documents. We ask that you refer to our Environmental Risk Assessment (ERA) found on our website here: https://www.bwxt.com/bwxt-nec/environmental-monitoring/environmental-reports. The ERA will provides the basis of our program.
3. Environmental Compliance Approvals (ECAs) – BWXT does not have any additional ECAs. I've indicated below which ECAs are applicable to BWXT.
    a. This is the only applicable ECA for Toronto: #5460-ACWHBS.
    b. This is the only applicable ECA for Peterborough: #0330-9HDR8J.
4. Groundwater monitoring – BWXT does not perform groundwater monitoring.
5. I will have to get back to you on items 5-7 in the New Year.
6. See 5.
7. See 5.
8. Public Information and Disclosure Protocol – BWXT does not provide our programs or plans to the public as these are proprietary and confidential documents. We ask that you refer to our Annual Compliance Reports (ACRs) found on our website here: https://www.bwxt.com/bwxt-nec/safety/our-compliance-record, as they provide detail on our public information program activities.

BWXT proposed dates for site visits of Toronto and Peterborough facilities.

On December 20, CNSC staff's CMD was made available to intervenors.

On Tuesday December 24, Waterkeeper responds to BWXT:

> Waterkeeper was granted funding by the CNSC to review two things: 1) potential environmental impacts of both BWXT locations to local waterways; and 2) the communication of potential and real environmental impacts to the public. The information we requested is required to perform the review we were funded to undertake. While we want to ensure your proprietary information remains protected, we must also underscore the need for environmental monitoring and data disclosure, and public information protocol disclosure in the public interest. Both types of information help to respect the public right to know about the health and wellbeing of their environment, which should not be considered to threaten BWXT's proprietary interests.
>
> With regard to the Radiation Protection Manual and Environmental Protection Plan, is there any way you would be able to provide redacted versions of these documents or else excerpts? We would only be interested in descriptions of environmental monitoring frequencies and methodologies, as well as any maps of the monitoring locations at BWXT sites. Hopefully, this would strike a happy middle-ground. The CNSC has supported Waterkeeper in past meetings concerning the 2018 Regulatory Oversight Report for Nuclear Generating Facilities in which it was denied such information from nuclear industry (for a summary, see Waterkeeper's recent submissions beginning on page 5 (http://www.nuclearsafety.gc.ca/eng/the-commission/meetings/cmd/pdf/CMD18/CMD19-M30-6A.pdf).
>
> With regard to the Public Information and Disclosure Protocol (PIDP), would you be able to provide a redacted version that protects proprietary information while also sharing information to help us understand how your company approaches public disclosure? ie. we are particularly interested in how you define public stakeholders and when/in what instances your require vs. recommend disclosure. Again, such selective disclosure would hopefully strike a good balance between overlapping needs for company confidentiality and public disclosure. In the past, President Velshi has been critical of companies that do not provide their PIDPs to public intervenors as they directly concern the public rights to be informed about facilities in their communities. See for example, Waterkeeper's similar concerns in past hearings concerning the Port Hope Conversion Facility and (then Member) Velshi's agreement which is documented in the hearing transcript at page 41 (http://nuclearsafety.gc.ca/eng/the-commission/pdf/2016-11-09%20-%20Hearing%20Corrected.pdf).

January 2, CNSC staff provides response to Waterkeeper queries:

> Please see attached the requested copy of the CMD from the 2010 GEHC hearing for the previous licence renewal for Toronto and Peterborough facilities. I have also included the Record of Proceeding so that the intervenor can see the reasons given by the Commission on this matter.
>
> Part Two of this CMD contains :
>
> - preceding licences for Toronto and Peterborough before the current licence period. Please note, there was no LCH for the preceding periods at that time.

- The Licence change table contains the rationale and the basis on which staff recommended to the Commission, a decision on a single licence.
- The record of proceeding details what the Commission deemed as part of their decision to issue a single licence to these facilities.

January 6, BWXT provided remaining responses to December 8 requests:

With regard to the Radiation Protection Manual and Environmental Protection Plan, we recommend you view our Annual Compliance Reports and Environmental Risk Assessments (hosted on our website www.nec.bwxt.com) as these documents provide information on our monitoring frequencies and some information on methodologies.

As for the Public Information and Disclosure Protocol (PIDP), we are preparing a summary document for you which you should have in the next few days.

Information on items 5-7 from your initial request are listed below:

5. Stormwater Monitoring - BWXT NEC does not have sampling results or reports for stormwater monitoring in Peterborough or Toronto.
6. Sanitary Sewers – BWXT NEC has monitored six times in the past three years in Toronto and all of our most recent results are summarized in the attached report. We do not have similar for Peterborough.
7. Pollution Prevention (P2) Plans – Please see report for Toronto attached. We do not have a P2 plans for Peterborough.

January 14 Waterkeeper requests during site visit in Toronto:

1. Access to the full Public information and Disclosure Protocol (PIDP)
2. A copy of the report concerning BWXT's 2018 public opinion survey
3. Confirmation of true meaning of negative concentration values in tables from the Environmental Risk Assessments for BWXT facilities.

January 16, Waterkeeper requests during site visit in Peterborough:

1. Confirmation of which aquatic species used to calculate new licence limits and Action Levels;
2. Copy of the summary of the public opinion survey, as access to the original report is denied by BWXT.

January 16, BWXT confirms PIPD online is the same as the company's internal policy. BWXT also sent links to incident reports online:

As promised, following is a link to the public disclosure from August of 2018 that we discussed:
https://www.bwxt.com/media/47b5ac44-c444-412d-a71c-de02d2d966bc/60NtKQ/BWXT%20Nuclear%20Energy%20Canada/TO.Power%20Outage.Aug.2018.pdf

Other disclosures can be found on our Public Disclosure Protocol webpage (if you scroll down below the protocol, you will see a series of links): https://www.bwxt.com/bwxt-nec/community/public-disclosure-protocol

January 17, Waterkeeper submits additional query:

1. How were the Release Limits and Action Levels in the draft License Conditions Handbook derived? I am assuming they were derived on the basis of CSA standards N288.1 and N288.8, but confirmation or correction would be appreciated.

BWXT confirms receipt of email.

January 20, Waterkeeper follows up on past requests and clarifies them:

> Over the weekend Wilf was able to review the CSA documents that seem to have been used to calculate the liquid release limits and action levels for both Toronto and Peterborough facilities. However, they are apparently very difficult documents to navigate (over 500 pages and without comprehensive indexes). I am aware that to date, we have requested clarification concerning: 1) which aquatic species were used to inform the new concentration-based licence limits; and 2) whether it was CSA standards N288.1 and N288.8 that informed the new concentration-based limits. Would it be possible to broaden these requests by instead asking for a detailed explanation more generally of how currently proposed release limits and action levels were calculated?

January 20, BWXT provides following response:

> The release limits in CNSC Staff CMD 20-H2 were proposed considering the most limiting endpoint concentrations amongst (1) radiological (DRL's based on N288.1), (2) chemical toxicity, and (3) protection of aquatic life. For chemical toxicity the endpoint concentration used was the Health Canada Maximum Acceptable Concentration value for uranium in drinking water of 0.020 mg/L [1]. For protection of aquatic life, the endpoint concentration was the CCME Canadian Water Quality Guideline (CWQG) value for long term exposure of 0.015 mg/L [2]. From [3], aquatic species used by CCME to determine the long-term CWQG included species of fish, invertebrates, aquatic plants and algae which are listed in the reference. It is noted that although these release limits are an important component, Action Levels and Internal Control Levels are set much lower and are what are used to control releases from the facility. Action Levels are set and implemented so that deviations from normal operations can be identified and investigated. Internal Control Levels are set lower still. The Action Levels are currently being updated in accordance with CSA standard N288.8.
>
> [1] Health Canada (2017) Guidelines for Canadian Drinking Water Quality – Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa Ontario
> [2] Canadian Council of Ministers of the Environment (CCME). 2016. Canadian Environmental Quality Guidelines. Retrieved from http://ceqg-rcqe.ccme.ca/en/index.html#void.
>
> [3] Canadian Water Quality Guidelines for the Protection of Aquatic Life – Uranium, CCME 2011

January 21, Waterkeeper followed up with BWXT requesting:

> more explanation concerning how the water quality guidance of 0.020 mg/L and 0.015 mg/L used by BWXT was translated to a Release Limit of 1 g/L (= 1000 mg/L), which is a

factor of 50,000x or 66,700x higher? (200,000x higher than uranium limit in the PWQO - 0.005 mg/L)

BWXT responds the same day providing the following:

The calculation considers the treated water discharge volume from the Toronto facility, and the annual wastewater treatment plant flow.

January 22, Waterkeeper responds:

I've spoken with Wilf and we are still looking for more explanation concerning how the water quality guidance of 0.020 mg/L and 0.015 mg/L used by BWXT was translated to a Release Limit of 1 g/L (= 1000 mg/L), given that it differs so significantly from CCME guidelines and PWQOs. In particular, exactly what calculations are being made to arrive at these limits, what considerations are being given and how exactly are they all being accounted for? As we are being funded to assess the reasonableness of these new limits, from a environmental public interest perspective, a thorough understanding of the exact calculations is necessary for our work. We are following up this last time to provide BWXT the opportunity to comment on (and hopefully further explain) this issue before we finalize the technical aspects of our written submissions.

Waterkeeper also follows up re: when BWXT will respond to Waterkeeper's January 16th request for the power point presentation concerning the public opinion survey presented while we were at Peterborough? Pippa Feinstein offers to undertake to keep it confidential, along with the wording of the actual questions used in the poll.

BWXT responds later that same day:

Wastewater from the Toronto facility is directed through the sewer system to the Humber Treatment Plant, which has an annual volume of 9.5e10 L/year [1] ($Flow_{wwt}$). The average annual BWXT Toronto plant treated water discharge is 1.4e6 L/year [2] ($Flow_{discharge}$). The bounding endpoint concentration is 0.015 mg/L (EC_b).

Effluent concentration (at the point of release) corresponding to bounding endpoint concentration = (EC_b * $Flow_{wwt}$ * 1e-3 [g/mg])/$Flow_{discharge}$ = 1 g/L

The calculation for Peterborough is the same with $Flow_{discharge}$ = 1.4e6 L/year*, and $Flow_{wwt}$ = 1.3e10 L/y (half of Peterborough waste water treatment plant design capacity in [3]), yielding a result of 0.14 g/L.
*Assumed same as Toronto to bound current operations and potential pelleting.

It is further noted that lower levels are also established;

Action Level – 6 mg/L (single tank)
Action Level – 3 mg/L (annual average)
Internal Control Level 3 mg/L (single tank)

[1] BWXT NEC. Environmental Risk Assessment Report – Nuclear Fuel Pellet Operation. December 2018. https://www.bwxt.com/media/13b54fa8-019b-4581-bb6b-2709f3785318/AniVPg/BWXT%20Nuclear%20Energy%20Canada/Annual%20Compliance%20Reports/351384%20RPT%20ERA%20Report%20Toronto%20-%20December%202018.pdf

[2] Annual Compliance Reports, 2013-2018 https://www.bwxt.com/bwxt-nec/safety/our-compliance-record
[3] *https://www.peterborough.ca/Living/City_Services/Environmental_Services/Environmental_Protection/Waste_Water_Treatment_Plant.htm*

BWXT undertakes to get back to Waterkeeper shortly on the public attitude survey.

January 23, BWXT agrees to send presentation with Pippa Feinstein's promise of confidentiality.

Pippa Feinstein sends letter undertaking confidentiality January 24, and BWXT provides PDF of presentation.

APPENDIX III

Curriculum Vitae of Wilf Ruland

(Professional Geoscientist)

Address: Wilf Ruland (P. Geo.)
766 Sulphur Springs Road
Dundas, Ontario
L9H 5E3
Tel: (905) 648-1296 E-mail: deerspring1@gmail.com

Education:

1988 Master of Sciences in Earth Sciences,
University of Waterloo.
Supervisor: Dr. John Cherry

Master's project focussed on the hydrogeological properties of fractured clay deposits in Lambton County. 15 courses provided a broad background in hydrogeology.

1982 Honours Bachelor of Science in Geography and Geology,
McMaster University.

30 courses provided a broad background in natural science, geography and geology.

Experience:

Since 1988 Environmental Consultant, as head of own consulting firm (Citizens' Environmental Consulting).

Active as advisor and consultant on issues related to groundwater or surface water contamination or depletion for private citizens, citizens' groups, environmental groups, First Nations, companies and public agencies from across Ontario.

Specialization in addressing landfill-related groundwater and surface water contamination problems through review of hydrogeological impact studies, field investigations, and participation in public meetings and hearings.

Ongoing contracts include investigations of water contamination at landfills near St. Catharines, Brockville, Kingston, Waterloo, and Windsor.

Other significant areas of work include review of pit and quarry proposals and applications for Permits to Take Water, investigations of well interference resulting from quarries, and groundwater contamination emanating from major industrial properties and gas stations.

Experience: continued

1988-1993 Research Associate, Waterloo Centre for Groundwater Research,
University of Waterloo

Work included research into the hydrogeology of fractured clays and into the impacts of landfills on groundwater.

1983-1985 Hydrogeologist, Ingenieur-Geologisches Institut, Westheim, Germany.

Work included hydrogeological field work, supervision and evaluation of drilling programs, supervision and evaluation of pumping tests, research and preparation of hydrogeologic reports, and supervision of environmental monitoring for a major railway construction project.

Publications, Papers and Research Reports:

Worthington, S.R.H., Smart, C.C., and Ruland, W.W. 2012. Effective Porosity of a Carbonate Aquifer with Bacterial Contamination: Walkerton, Ontario, Canada. Published in the Journal of Hydrology, Vol. 464-465 (2012), p. 517-527.

Ruland, W.W. 2005. Presentation on Source Water Considerations and the Walkerton Setting. Presented at the Canadian Water Network's Walkerton Water and Public Health Training Workshop, May 28 - June 2, 2005.

Worthington, S.R.H., Smart, C.C., and Ruland, W.W. 2002.
Assessment of Groundwater Velocities to the Municipal Wells at Walkerton. Paper presented at the 3rd Joint IAH-CNC/CGS Conference, October 20 - 23, 2002 in Niagara Falls, Ontario.

Worthington, S.R.H., Smart, C.C., and Ruland, W. 2001.
Karst Hydrogeological Investigations at Walkerton. Report prepared for and submitted as evidence at the Walkerton Inquiry.

Ruland, W.W., Schellenberg, S.S., and Farquhar, G. 1993.
The Fate of Landfill Leachate in Waste Water Treatment Plants and in Groundwater at Attenuation Landfills. Report prepared for the Ontario Ministry of Environment and Energy.

Ruland, W.W., Cherry, J.A., and Feenstra, S. 1991.
The Depth of Fractures and Active Ground Water Flow in a Clayey Till Plain in Southwestern Ontario. Published in the Journal of Ground Water, Vol. 29, No. 3, p. 405-417.

D'Astous, A.Y., Ruland, W.W., Bruce, R.J., Cherry, J.A., and Gillham, R.W. 1989. Fracture Effects in the Shallow Groundwater Zone in Weathered Sarnia Area Clay. Published in the Canadian Geotechnical Journal, Vol. 26, No. 1, p. 43-56.

Fracture Depths and Active Groundwater Flow in a Clayey Till in Lambton County, Ontario. 1988. Unpublished M.Sc.Project, University of Waterloo.

Cherry, J.A., MacQuarrie, K.T.B., and Ruland, W.W. 1987.
Hydrogeologic Aspects of Landfill Impacts on Groundwater and Some Regulatory Implications. Paper presented at the PCAO/MOE Seminar on Landfill Regulations May 13, 1987.

Wilf Ruland (P. Geo.) - Partial List of Consulting Experience:

1) Investigations/Reviews of Landfill-Related Water Contamination:

Niagara Road 12 Landfill, near Grimsby, Ontario.
- Peer Review for the Niagara Road 12 Litizen Liaison Committee (2008-2010).

Humberstone Landfill in Welland, Ontario.
- Peer Review for the Humberstone Public Liaison Committee (since 2007).

City of Owen Sound's Derby Landfill site, near Owen Sound, Ontario.
- investigation and review for the Ledingham family (2004-2006)

Town of Northeastern Manitoulin and the Islands Landfill, near Little Current, Ontario;
- investigation and review for Mr. Raeburn Smith and Mrs. Virginia Smith (2004 - 2013).

Rennie and Brampton Street Landfill Sites, Hamilton, Ontario;
- Peer Review for the Rennie/Brampton Citizens' Liaison Committee (2001-2005).

Town of Thessalon Landfill Site, near Thessalon, Ontario;
- investigation for Mr. Mark Petingalo and Mrs. Wendy Petingalo (in 2000).

City of Brockville Landfill Site, Brockville, Ontario;
- review for Brockville Public Liaison and Monitoring Group (since 1997).

Fletcher Tile Landfill Site, near Chatham, Ontario;
- investigation for Citizens Opposed to Landfill Development (1996-1997).

Bracebridge Landfill Site, Bracebridge, Ontario;
- investigation for Dr. David Kent (1995-1996).

Waterloo Sanitary Landfill Site, Waterloo, Ontario;
- review for Waterloo Waste and Water Watchers (since 1995).

Innisfil Landfill Site, Innisville, Ontario; investigation for Mrs. Helen Hodgson (1995 - 1999).

Tom Howe Landfill Site, near Hagersville, Ontario;
- review for the Mississaugas of the New Credit First Nation (since 1994).

Wolfe Island Waste Disposal Site, Wolfe Island, Ontario;
- investigation for Ms. Theresa James (since 1994).

Bensfort Road Landfill, near Peterborough, Ontario;
- investigation for Mr. Gary McCarrell and Mrs. Lori McCarrell (1991-1993).

Orillia Landfill Site, in Orillia, Ontario; investigation for Citizens Acting Now (1991).

Storrington Landfill near Kingston, Ontario;
- investigation for Storrington Committee Against Trash (1990-1997).

Glenridge Quarry Landfill in St. Catharines, Ontario;
- review for Glenridge Landfill Citizens' Committee (1989-2016).

Warwick Landfill near Watford, Ontario;
- investigation for Watford Warwick Landfill Committee (1989-1996).

Brow Quarry Landfill near Dundas, Ontario;
- investigation for Greensville Against Serious Pollution (1988-1989).
-
Essex County Landfill No. 3 in Maidstone Township, Ontario;
- reviews for Maidstone Against Dumping and Maidstone Township (1988-2008).

Town of Cobourg Landfill, in Haldimand Township, Ontario;
- investigation for Mr. Joe Sherman (1988-1991).

2) Reviews of Proposals to Site New or Expand Existing Landfills

Peer Review of (amended) Terms of Reference for the Walker Environmental Group Southwestern Landfill proposed, to be situated near Ingersoll, Ontario;
- review for the OPAL Alliance (2013/2014).

Review of the proposed Capital Region Resources Recovery Center and Landfill;
- review for the Citizens' Environmental Stewardship Association - East of Ottawa (2013).

Proposal to massively expand the Richmond Landfill near Napanee, Ontario;
- review for the Concerned Citizens Committee of Tyendinaga Twp. (2004 - 2006).

Proposal to expand and significantly alter the Edwards Landfill
(including excavation of hazardous wastes, and relocation of other wastes) near Cayuga, Ontario;
- review for Haldimand Against Landfill Transfers (2004 - 2006)

Proposal to massively expand the Warwick Landfill near Watford, Ontario;
- Peer Review for the Township of Warwick (1998-2008).

Proposal to site a landfill near Cochrane, Ontario;
- review for the Fournier Action Committee (1997 -1999).

Proposal to site a landfill in the abandoned Adams Mine Site near Kirkland Lake;
- review for the Coalition of Temiskaming Concerned Citizens (in 1995).

Proposal to site a landfill in the Taro East Quarry near the Niagara Escarpment
in Stoney Creek, Ontario;
- review for Stoney Creek Residents Against Pollution (in 1995).

Proposal to develop a perimeter-berm landfill around the Lake Ontario Steel Company Limited property in Whitby, Ontario; Peer Review for the Lasco Berm Liason Committee (1991-1995).

Proposal to build a landfill in a Class 2 Wetland near Cayuga, Ontario;
- review for Haldimand-Norfolk Organization for a Pure Environment (1989-1990).

Proposal to site a landfill in the Acton Quarry near Milton, Ontario;
- review for Protect Our Water and Environmental Resources (in 1989).

3) Review of Landfill Closure and End Use Plans

Closure Plan for the Wolfe Island Landfill Site (since 2012); review done for Ms. Theresa James.

Closure Plan for the Tom Howe Landfill Site; review done for the Mississaugas of the New Credit First Nation (2005, and 2009/2010).

Closure Plan for the Richmond Landfill near Napanee, Ontario;
for the Concerned Citizens Committee of Tyendinaga Twp. (2007).

End Use Plan for the Glenridge Quarry Naturalization Site (formerly the Glenridge Laandfill), for the Glenridge Landfill Liaison Committee (2002).

Closure and post-Closure Care Plan for the Brockville Landfill Site, for the Brockville Public Liaison and Monitoring Group (2000-2001).

Closure and End Use Plan for Essex County Landfill No. 3, for Maidstone Against Dumping (1996).

Closure Plan for the Cobourg Landfill. For Mr. Joe Sherman (1990s).

Closure Plan for the Brow Quarry Landfill. For Greensville Against Serious Pollution (1990s).

4) Other Landfill-Related Projects

Peer Review of proposal to expand the Clean Harbors Hazardous Waste Landfill Facility near Sarnia, Ontario (2010-2015); for the Township of St. Clair.

Investigation and review of groundwater and surface water contamination being caused by a cement kiln dust landfill near Bath, Ontario. Negotiated an agreement with Lafarge Cement to remediate the existing landfill and use an industry-standard design on a go-forward basis. For Lake Ontario Waterkeeper (2007-2010).

Member of the Expert Panel (appointed by the Minister of the Environment) to look into potential health and environmental impacts from the Taro East Landfill in Stoney Creek, Ontario (in 2000). The final report of the Expert Panel was released in October 2000, and the Addendum Report was released in December 2000.

Technical advisor to private citizens who successfully prosecuted the City of Hamilton (which pleaded guilty) for contamination by PCB-laden leachate of Redhill Creek (in 2000).
The resulting $450,000 fine was a record for fines paid under such prosecutions.

5) Reviews of Waste Management Master Plan (WMMP) Studies

Region of Region of Waterloo Management Master Plan (WMMP);
- review for the Waterloo Landfill Liaison Committee (2013).

Region of Haldimand-Norfolk Waste Management Master Plan (WMMP);
- review for the Mississaugas of the New Credit First Nation (1995-1996).

South Simcoe County Waste Management Master Plan;
- review for the South Simcoe Waste Action Network (1994-1995).

Leeds and Grenville Waste Management Master Plan;
- review for Sabourins Crossing Residents Against Megadumps (in 1994).

Pembroke and Area Waste Management Master Plan;
- review for the Snake River/Micksburg Anti-Dump Association (1991-1992).

Northumberland County Waste Management Master Plan;
- review for Mr. and Mrs. J. Sherman (1989-1991).

Wellington County Waste Management Master Plan;
- review for the Concerned Alma Citizens (1988-1991).

6) Nuclear-Related Peer Review Work

Review of the proposed license renewal for the Pickering Nuclear Generating Station.
- review for Lake Ontario Waterkeeper (2018).

Review of the proposed in-site decommissioning of the Nuclear Demonstration Project (NPD) Reactor on the Ottawa River near Rolphton, Ontario.
- review for the Algonquin Anishinabeg Nation Tribal Council (2018).

Review of the 2016 Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities, Including Cameco's Port Hope Conversion Facility.
- review for Lake Ontario Waterkeeper (2017)

Review of the proposed Near-Surface Disposal Facility for Low Level Nuclear Wastes at the Chalk River Laboratories site, near Chalk River Ontario.
- review for Ottawa River Keeper (2017).

Review of the decommissioning plans for the Deloro Mine Site near Deloro, Ontario.
- review done for Lake Ontario Waterkeeper (2017).

Review of the Port Hope Area Initiative (PHAI(involving remediation of widespread low-level radioactive wastes, with deposition into 2 specially designed landfills in the Port Hope Area;
- review for Lake Ontario Waterkeeper (2016).

Review of the proposed Deep Geologic Repository (DGR) for low- and intermediate level nuclear wastes;
- review for the Canadian Environmental Law Association (2013)

Review of the Draft Environmental Impact Statement for the proposed Darlington 'B' New Nuclear Power Plant Project;
- review for Lake Ontario Waterkeeper (2010-2012).

Review of the proposed remediation of the Cameco Nuclear Waste Processing Facility in Port Hope, Ontario;
- review for Lake Ontario Waterkeeper (starting in 2010).

Review of the Draft Guidelines for the Environmental Impact Statement for the proposed Darlington 'B' New Nuclear Power Plant Project;
- review for Lake Ontario Waterkeeper (2008).

7) Other Investigations/Reviews of Groundwater Contamination

Review of clean-up of an area of contamination at a former Ontario Hydro Transformer Station;
- review conducted for Ms. Kathy MacLeod (2014).

Contamination by petroleum hydrocarbons of a greenhouse property from an adjacent Hydro One maintenance center in Kenora, Ontario;
- investigation for the Schmidt Family (2008)

Impacts of residual contamination on a former industrial property, which is now the site of St. Mary's High School;
- investigation for Environment Hamilton (2002 - 2004).

Contamination by petroleum hydrocarbons and volatile organic chemicals (VOCs) from a former service center near High Park, Toronto;
- investigation for Mr. Gerard Kennedy, MPP (in 2002).

Contamination of municipal water supply wells by E-coli bacteria in Walkerton, Ontario;
- investigation for Concerned Walkerton Citizens (2000 - 2002).

Contamination by petroleum hydrocarbons and volatile organic chemicals (VOCs) from an Imperial Oil fuel and liquid transfer facility in Kapuskasing, Ontario;
- investigation for the Schlechter family (in 2000).

Contamination by petroleum hydrocarbons from a Gulf Canada gas station in Port Loring, Ontario;
- investigation done for People Against Contaminated Water (PACW); (1999 - 2001).

Contamination by petroleum hydrocarbons from a gas station in Bamberg, Ontario;
- investigation for the Bush and Fink families (1997 - 1998).

Groundwater contamination in Cambridge, Ontario caused by Ciba-Geigy Canada Ltd;
- investigation conducted for Thomas Construction Company Ltd. (1993 - 1997).

Groundwater contamination from the Bristol Aerospace Plant near Lockport, Manitoba;
- investigation for Mrs. Elizabeth Andresen and Miss Ursula von Krogh (in 1993).

Extensive/review of water contamination in Elmira, Ontario caused by Uniroyal Chemical Ltd (subsequently renamed Crompton Corp. and now Chemtura Canada Co;
- investigation for various clients, most recently the Region of Waterloo (since 1989).

8) Permits to Take Water and Drinking Water Systems

Review of an application for a Permit to Take Water to allow draining of a 25 hectare lake on the Carmeuse Canada Lime Inc. property situated near Ingersoll, Ontario.
for the OPAL Alliance (2014).

Preparation of applications to the Ministry of the Environment to upgrade the drinking water systems for Camp NeeKauNis near Waubaushene, Ontario (since 2012).

Review of an application for a Permit to Take Water for a Water Bottling Operation (to be operated by CJC Bottling Limited), with water to be taken from a well which feeds the headwaters of Colborne Creek; for the Concerned Citizens of Northumberland (2001 - 2004).

Review of an application for a Permit to Take Water for a municipal water supply project (for the Village of Woodville), with water to be taken from pumping wells near 5 families' homes;
- for the Mariposa Aquifer Protection Association (2000 - 2004).

Review of an application for a Permit to Take Water for a Water Bottling Operation
(to be operated by Artemesia Springs Limited), with water to be taken from a springwell which feeds a headwater stream of the Rocky Saugeen River;
- for the Water Protection Coalition of South Grey (1999 - 2001).

Review of an application for a Permit to Take Water for a Water Bottling Operation
(to be operated by Aquafarms 93 Limited), with water to be taken from a spring and 3 pumping wells situated near the headwaters of the Beaver River;
- for Ms. Samantha Wickens and other local residents (in 1999).

Preparation of an application for a Permit to Take Water for a fish farming operation
(to be operated by Van Aqua Inc.), with water to be taken from a pumping well near the Town of Burford in Brant County; for Mr. Peter Van Kruistum (in 1988).

9) Reviews/Investigations Related to Impacts of Major Water-Takings

Impacts of ongoing pumping of municipal supply wells K50/K51 in Wilmot Township;
- review for Wilmot Center Monitoring Program Public Liaison Committee (since 2003).

Impacts of ongoing dewatering of the Canadian Gypsum Company mine near Hagersville Ontario;
- review for residents of 3rd Line, Six Nations Indian Reserve (1999-2003).

10) Reviews/Investigations related to Impacts from Pits, Quarries, and Mines

Review of Environmental Impact Statement (EIS) for the proposed Marathon PGM-Cu Mine Project which has been put forward by Stillwater Canada Inc. (SCI).
- review for Northwatch (ongoing 2013-2014).

Investigation of potential impacts from the Miller Braeside Quarry near Braeside, Ontario;
- review for Friends Addressing Concerns Together in McNab/Braeside (since 2008).

Investigation of potential impacts from the unlicensed Nichol Quarry near Hagersville, Ontario;
- review for the Mississaugas of the New Credit First Nation (2007-2011).

Impacts of the proposed expansion of the Nelson Aggregates Quarry near Mount Nemo, Ontario;
- review for Protecting Escaparment Rural Land (2005-2007).

Cumulative impacts of the proposed Halminen Quarry and Lafarge Quarry near Buckhorn, Ontario;
- review for Friends of Life in the Kawarthas (2004 - 2006).

Impacts of the proposed expansion of the Graham Brothers Aggregates Limited gravel pit near Caledon;
- review for Dr. David Sylvester (2000 - 2001).

Impacts of the proposed Nichol Gravel Limited quarry near Hagersville, Ontario;
Quarry operated in violation of MNR and MOE regulations for many years;
- review for the Mississaugas of the New Credit First Nation (1999 - 2011).
- Impacts of well interference from the Canadian Gypsum Company mine near Hagersville;
- investigation for several families on the Six Nations Reserve (1999 - 2003).

Impacts of well interference from the Dunnville Rock Products Quarry near Dunnville;
- investigation for Mr. Ken Ricker and Mrs. Ethel Ricker (1997 - 2000).

Impacts of water takings asssociated with the Acton Quarry near Acton, Ontario;
- review for Protect Our Water and Environmental Resources (1997-2007).

Impacts of a quarry proposed adjacent to Mitchell Lake, near Victoria Road, Ontario;
- review for the Northern Victoria Ratepayers Association (1997 - 1999).

Impacts of a quarry, proposed to be located on the Bruce Peninsula;
- review for Mr. Ziggy Kleinau (1996).

Impacts of a proposed gravel pit, to be sited near Grippen Lake, Ontario;
- review for Township Residents Against Pit Pollution (1995 - 1998).

Impacts of a gravel pit to be built in an Earth Science Area of Natural Interest (ANSI);
- review for Ms. Jeanette Mazur (1995 - 1996).

Impacts of the proposed Seeley and Arnill Quarry near Orillia, Ontario;
- review for Mr. David Lowry (1993 - 1997)

Impacts of a proposed expansion of the Walker Brothers Quarry, near St. Catharines;
- review for Mrs. Ronnie DeMeel (1992).

Impacts of six (6) proposed gravel pit operations in Oro Twp., Ontario;
- review for Dr. E.J. Beaton and Dr. A.C. Beaton (1990 - 1992).

11) Participation in Public Hearings

A hearing pertaining to the proposed sale of a County landfill site (which was never constructed) with a stale-dated 20 year old approval, to a private firm. The proposed site appears now to be part of a wetland complex which may be provincially significant.
- before the Environmental Review Tribunal
- Decision pending.

A hearing into a proposed rural subdivision in the Hamlet of Hartington, involving a 30% increase in the number of wells and septics systems in an area of inadequate and impaired groundwater supply;
- before the Ontario Municipal Board;
- Decision dated November 15, 2018.

A hearing into a proposed 10-year license extension for the Cameco Nuclear Waste Processing Facility in Port Hope, Ontario including proposed remediation of contamination by radionuclides of the Cameco property and the Port Hope Harbour;
- before the Canadian Nuclear Safety Commission;
- Decision dated February 27, 2017.

A hearing into the appeal of deficient monitoring, contingency, and closure plans for the badly leaking Richmond Landfill near Napanee, Ontario.
- before the Environmental Review Tribunal; Decision dated December 24, 2015.

A hearing into the proposed massive expansion of a quarry and proposed development of an asphalt plant on the Braeside Ridge, in the middle of a potential Provincially Significant Wetland complex and uphill of numerous residential wells.
- before the Ontario Municipal Board;
- Decision dated October 27, 2015.

A hearing into the proposed Deep Geologic Repository, designed to accept low- and intermediate-level nuclear waste, and to be situated at the Bruce Nuclear Plant;
- before the Canadian Nuclear Safety Commission;
- Decision dated May 6, 2015.

An application to site a quarry in a Provincially Significant Wetland Complex near Duntroon, Ont;
- before the Ontario Municipal Board;
- Decision dated August 24, 2012.

A hearing into the proposed Darlington 'B' New Nuclear Power Plant Project;
- before the Canadian Nuclear Safety Commission;
- Decision dated August 17, 2012.

An application to develop a quarry in the Niagara Escarpment Plan area near Duntroon, Ontario;
- before the Joint Board;
- Decision dated June 18, 2012.

An application to develop a gravel pit in the Municipality of Grey Highlands, Ontario;
- before the Ontario Municipal Board; Decision dated April 30, 2008.

An application to massively expand the Dufferin Aggregates Milton Quarry;
- before the Joint Board;
- Decision dated June 8, 2005.

An application for conversion of 81 cottages into permanent homes adjacent to a World Biosphere Reserve, Class 1 Wetland and Wilderness Area in Turkey Point;
- before the Ontario Municipal Board;
- Decision dated August 13, 2002.

An application to develop a quarry near Mitchell Lake and Victoria Road, Ontario;
- before the Ontario Municipal Board;
- Decision dated January 22, 1999.

An application to develop a gravel pit adjacent to a Class 1 Wetland along the shore of Lake Katchewanooka near Lakefield, Ontario;
- before the Ontario Municipal Board;
- Decision dated June 4, 1998.

An application to develop a quarry near Kinmount, Ontario;
• before the Ontario Municipal Board;
• Decision dated August 18, 1995.

An act (Bill 62) to amend the Environmental Protection Act to phase out landfilling in the Niagara Escarpment Plan Area;
• before the Standing Committee on the Administration of Justice;
• Bill 62 received Royal Assent June 23, 1994.

An application to expand the Eastview Road Landfill Site near Guelph, Ontario;
• before the Environmental Assessment Board;
• Decision EP 92-02 dated September 22, 1993.

An application to develop six (6) gravel pits on the Oro Moraine in Oro Twp.;
• before the Ontario Municipal Board;
• Decision dated July 23, 1993.

An application to expand the Storrington Landfill Site;
• before the Environmental Assessment Board;
• Decision EP 91-01 dated March 31, 1993.

An amendment (No. 52/89) to the Niagara Escarpment Plan to delete waste disposal sites as a permitted land use in lands protected by the Plan;
• before a Niagara Escarpment Commission Hearing Officer;
• Decision dated Oct. 22, 1991.

An appeal against a zoning bylaw and a proposed plan of subdivision (which allowed construction of a golf course on a Class 1 Wetland);
• before the Ontario Municipal Board;
• Decision dated August 29, 1990.

An application to expand the Seeley and Arnill Aggregates Ltd. gravel pit in Oro Twp.;
• before the Ontario Municipal Board;
• Decision dated May 29, 1990.

An application to expand Essex County Landfill No. 3;
• before the Environmental Assessment Board;
• Decision EP 89-02 dated December 12, 1989.

An application to expand the Town of Cobourg landfill;
• before the Environmental Assessment Board;
• Decision EP 89-01 dated October 16, 1989.

APPENDIX IV

Pippa Feinstein BA (Hons), JD
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Education

- **LLM** (2019), Osgoode Hall Law School, Toronto ON
  - Faculty of Graduate Studies Entrance Scholarship (2018-9)
  - Hon. Willard Z. Estey Teaching Fellowship (2018-9)
- **Certificate in Alternative Dispute Resolution** (2015), York University, Toronto, ON.
- **JD** (2013), University of Alberta, Edmonton, AB.
  - Suzanne Mah Award for Community Leadership and Commitment to Human Rights (2013)
- **BA (Honours)** (2009), McGill University, Montreal, QC.

Work Experience

- **Lawyer and legal educator in sole practice** (May 2014 - Present) Toronto, ON.
  - Provide legal representation to grassroots community groups, and more established charities and not-for-profit organizations. Areas of practice include not-for-profit law, access to information, environmental and energy law, and alternative dispute resolution.
- **External Research Expert** (May 2017 – June 2018), Toronto, ON.
  - The National Inquiry into Murdered and Missing Indigenous Women and Girls, Winnipeg, MB.
- **Community Mediator, Bylaw and Private Complaints** (August 2015 – present)
  - Conflict Resolution Service, Dixie Bloor Neighbourhood Centre, Mississauga, ON.
- **Community Mediator, Criminal Court Diversion** (January 2016 – present)
  - Conflict Resolution Service, Warden Woods Community Centre, Scarborough, ON.
- **Law Foundation of Ontario Public Interest Articling Fellow** (2013-2014)
  - Lake Ontario Waterkeeper, Toronto, ON.
  - Selected as one of seven law students (the only student in environmental law) to be funded by the Law Foundation of Ontario to article with a non-profit organization.

Selected Publications

- Sarah Hamill & Pippa Feinstein, **"The Silencing of Queer Voices in the Litigation over Trinity Western University's Proposed Law School"** (2018) 34:2 Windsor Y B Access Just 156.
- Pippa Feinstein, **"The Canadian Nuclear Safety Commission: Case Study"** (January 2018)
  - Written for Voices-Voix Canada, available at voices-voix.ca.
- **"An Ontario model public sewage alert"**, (January 2018) Toronto, ON.
  - Written for the Canadian Freshwater Alliance and an ad-hoc group of Canadian and US environmental non-profit organizations concerned about the lack of real-time public notification of sewage releases to waterbodies in the Great Lakes watersheds.
- Pippa Feinstein, **"National Energy Board vs. Canadian Nuclear Safety Commission: Comparing ethical standards behind closed doors"** (September 26, 2016)
  - Drafted for Lake Ontario Waterkeeper and picked up in the Globe and Mail and Toronto Star, available at waterkeeper.ca.
- Pippa Feinstein, **"Loyalty Oaths and the Public Service: Case Study"**
  - Written for Voices-Voix Canada, available at voices-voix.ca. These case studies document ways in which the federal government curbs political dissent in Canada.
- Pippa Feinstein, **"The National Energy Board: Case Study"**

- Written for Voices-Voix Canada, available at voices-voix.ca.
- Pippa Feinstein, **"Federal Judicial Appointments: Case Study"**
  - Co-authored with Megan Pearce for Voices-Voix Canada, available at voices-voix.ca.
- Pippa Feinstein, **"An LSC Interactive Frequently Asked Questions (FAQ) Document for the National Inquiry into Violence against Indigenous Women"**
  - Written for the Legal Strategy Coalition on Violence Against Indigenous Women, available at leaf.ca/LSC.
- Pippa Feinstein, **"A Guide to Canadian Border Security Agency (CBSA) Enforcement in Edmonton"** (August, 2015)
  - Written with input from community organizations and CBSA employees as an accessible resource for those in Edmonton without immigration status.
- Pippa Feinstein & Megan Pearce, **"Dismantling Democracy: Stifling debate and dissent in Canada"** (May 2015)
  - Report co-written for Voices-Voix Canada, available at voices-voix.ca.
- Pippa Feinstein & Megan Pearce, **"Review of Reports and Recommendations on Violence Against Indigenous Women in Canada"** (February 25, 2015)
  - Report written for the Legal Strategy Coalition on Violence Against Indigenous Women, available at leaf.ca/LSC.
- Pippa Feinstein & Megan Pearce, **"What does it take to protect Indigenous women from violence?"** (December 11, 2014)
  - Op-ed co-written for rabble.ca.

Selected Presentations and Workshops

- **"Queer international legal theory and "queer visibility": challenging mainstream international law and predominant global legal orders"** (forthcoming, March 29, 2019) Toronto, ON.
  - 12th Annual Toronto Group Conference for the Study of International, Transnational, and Comparative Law, "Resistance to International Law and the Global Legal Order".
- **"Understanding and using Canadian access to information law"** (February 13, 2019) Toronto, ON.
  - Tools for Change's capacity-building workshop series. These workshops are provided to increase the skill sets of engaged members of the public, grassroots organizations, students, and more established NGOS advocating for social, environmental, and economic change.
- **"Adding formal legal processes to the advocate's toolkit"** (November 15, 2018) Toronto, ON.
  - Tools for Change's capacity-building workshop series.
- **"Submissions on the current state and future of national energy data"**, (May 29, 2018) Ottawa, ON.
  - Invited to address the House of Commons' Standing Committee on Natural Resources, based on the submissions I prepared for the National Energy Board Modernization Expert Panel.
- **"Updates concerning sewage bypass public alerts in Ontario"**, (November 13, 2017) Toronto, ON.
  - The People's Great Lakes Summit, organized and hosted by the Canadian Environmental Law Association.
- **"Understanding and addressing conflict in groups"** (March 21, 2017) Toronto, ON.
  - Tools for Change's capacity-building workshop series.
- **"An introduction to legal structures, internal infrastructure, and strategic planning for art collectives"** (March 8, 2017) Toronto, ON.
  - Scarborough Arts' pilot program providing capacity-building residencies for art collectives.
- **"The contribution of socio-cultural difference to conflict"** (October 14, 2016) Toronto, ON.
  - Alternative Dispute Resolution Institute of Canada Annual Conference.
- **"Backgrounder for the Assembly of First Nations Pre-Inquiry Forum"** (February 4, 2016) Enoch Cree Nation, AB.

    - Missing and Murdered Indigenous Women & Girls – AFN Pre-Inquiry Forum.
- **"Legal Strategies to address violence against Indigenous women and girls"** (May 9, 2015) Saskatoon, SK.
    - Sallows-Fry Conference, "A Canadian Crisis: The Criminalization & Imprisonment of Indigenous Women & Those with Disabling Mental Health Issues".
- **"The Secret Power of Facts: how collecting and sharing information empowers people to protect the environment" (**February 22, 2014) Ottawa, ON.
    - Canadian Association of Environmental Law Students' Societies (CAELS) Annual Conference.

Selected list of cases

- **Pickering Nuclear Generating Station Licence Renewal,** June 2018, Canadian Nuclear Safety Commission.
- **Deloro Mine Site Remediation Licence Renewal,** October 2017, Canadian Nuclear Safety Commission.
- **National Energy Board Modernization Public Consultation**, 2017, Natural Resources Canada.
- **TransCanada Energy East and Eastern Mainline Project Applications,** 2016 - 2017, National Energy Board.
- **Pickering Waste Management Facility Licence Renewal,** April 2017, Canadian Nuclear Safety Commission.
- **Port Hope Area Initiative Commission Update Report,** November 2016, Canadian Nuclear Safety Commission.
- **Cameco Port Hope Conversion Facility Licence Renewal,** November 2016, Canadian Nuclear Safety Commission.
- **Darlington Nuclear Generating Station Licence Renewal,** November 2015, Canadian Nuclear Safety Commission.
- **SRB Technologies Licence Renewal,** May 2015, Canadian Nuclear Safety Commission.
- **Ontario Power Generation Rate Increase Application,** June 2014, Ontario Energy Board.
- **Toronto Island Airport Expansion Application,** December 2013, Toronto City Council.
- **Enbridge Line 9B Reversal Application**, October 2013, National Energy Board.

Community Engagement Experience

- **Member,** Voices-Voix Editorial Collective (2015 – present)
    - I identify issues for, and draft, new case studies for the Voices Documentation Project. The project is geared towards educating members of the public about threats to Canadian democracy.
- **Chair, Social Action Committee,** First Narayever Congregation (2016 – 2018)
- **Board Secretary and Director,** Scarborough Arts (2014 – 2016)
- **Winner,** Second Annual West Coast Environmental Law Twitter Moot (2013)
    - This was an initiative that sought to increase public engagement with and understanding of issues in environmental law. I represented the Centre for Indigenous Environmental Resources (CIER).
- **Legal Clinic Student** (2012-2013), University of Alberta Faculty of Law 'Low Income Individuals and the Law' Clinical Placement and Seminar, Edmonton, AB.
- **Delegate** (2011)**, VP External** (2012)**,** University of Alberta Oil Sands Student Delegation, Edmonton, AB.
- **Co-leader/Coordinator** (2010 – 2012), 'Edmonton REDdress Project', Edmonton, AB.
- **Researcher and Project Leader** (2010 – 2013), Pro Bono Students Canada, Edmonton, AB.
- **Delegate,** (2009), Delegation and politician-shadowing program, Equal Voice, Ottawa, ON.

Called to the Ontario Bar June 2014. Member in good standing of the Law Society of Ontario.