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# Written submission from the Citizen's Against Radioactive Neighbourhood

In the Matter of

**Application to consider a 1-year licence renewal from Cameco Corporation (Cameco) for its Cameco Fuel Manufacturing Inc. (CFM) facility**

Public Hearing - Hearing in writing based on written submissions

**December 2021**

# Mémoire de Citizen's Against Radioactive Neighbourhood

À l'égard de

**Demande de renouvellement de permis d'un an, présentée par Cameco Corporation (Cameco) pour son installation de Cameco Fuel Manufacturing Inc**

Audience Publique - Audience fondée sur des mémoires

**Décembre 2021**

Canada

**CITIZENS AGAINST RADIOACTIVE NEIGHBOURHOODS**

# INTERVENTION TO THE CNSC REGARDING CAMECO FUEL MANUFACTURING'S ONE YEAR LICENCE RENEWAL

**November 16, 2021**

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Citizens Against Radioactive Neighbourhoods (CARN) provides this intervention in solidarity with Port Hope, another community where a nuclear processing facility operates in a downtown, residential community, close to parks, playgrounds, houses, schools, waterways, businesses, hospitals, and walking trails without any buffer zones.

We make the following submissions to the Canadian Nuclear Safety Commission (CNSC) for this licensing matter.

## 1. Radiation Protection and ALARA

When nuclear processing factories - like BWXT (formerly GE-H and GE) were built in Toronto and Peterborough, and Cameco in Port Hope - society didn't really know any better, but there really are no excuses now. Nuclear facilities shouldn't be allowed in neighbourhoods where people live, without buffer zones. Almost all other such nuclear factories around the world are surrounded by some exclusionary zones and are not in the middle of towns and cities.

In the International Atomic Energy Agency's (IAEA) "Manual for Siting Nuclear Facilities"**,** it states:

> Special attention shall be paid to vulnerable populations and residential institutions (e.g. schools, hospitals, nursing homes and prisons) when evaluating the potential impact of radioactive releases and considering the feasibility of implementing protective actions.

The CNSC is vested with regulating in alignment with the principle of ALARA, which stands for As Low As Reasonably Achievable. It shouldn't mean allowable risk, allowable harm. It should be an honest attempt to reduce exposure to the public by placing nuclear facilities away from populations, especially vulnerable populations, in cities and towns, and exposing as few people for the least possible time.

As CNSC Staff confirmed when questioned by a CNSC Commissioner at another licensing hearing regarding when the CNSC's Radiological Protection Guidelines for the public were last updated to incorporate new scientific knowledge, a staff member at the CNSC answered:

"So they were enacted in 2000. The dose limits haven't been changed since that time…"[1] But the accepted "science" has changed since then. She added that they were just in the process of making some changes in the guidelines for nuclear workers though, to protect the lens of the eye to reflect updated scientific knowledge.

In the time since 2000, and even before then, scientific understanding has changed a lot around the dangers of radiation generally and uranium specifically (incidentally, it is undemocratic that stakeholders have no free access to updated ICRP manuals.) The International Commission on Radiological Protection (ICRP) is presently in the process of updating its guidelines.

CNSC staff said they follow guidelines put out by the ICRP and the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR).

From the ICRP draft report on Cancer risk from Exposure to Plutonium and Uranium (Feb. 27th, 2020):

> In addition to the chemical toxicity of uranium, all uranium isotopes emit alpha particles on radioactive decay, which are classified as carcinogenic to humans by the International Agency for Research on Cancer (IARC, 2001, 2012).
>
> Inhalation is the principal means of intake of uranium in the uranium fuel cycle, and the chemical form of intake is important in determining the organ/tissue-specific doses received, in particular, by the lung, insoluble forms of uranium residing for a longer time in the lung and giving a higher cumulative dose.
>
> Incorporated long-lived radionuclides such as isotopes of plutonium and uranium which can be tenaciously retained in the body may continue to irradiate tissue for many years after intake.
>
> A large uncertainty is usually associated with estimated internal doses following inhalation. The reliability of estimated intakes and doses depends notably on the quality of measurements, …… Generally, these factors are not well known and estimates of internal doses are subject to substantial uncertainties.
>
> The information from current epidemiological studies of uranium exposure is insufficient to reliably quantify dose-response relationships. More studies are needed before any estimate of risk and detriment can be envisaged.

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[1] CNSC BWXT Hearing Transcript, March 5th, 2020, pg 463-464.

As stated by UNSCEAR:

> There is no reason to consider that alpha particles from uranium will have different relative effectiveness from alpha particles of similar energy emitted by other radionuclides (e.g. 222Rn and 239Pu [M12])
>
> 285. Uranium worker data have often been limited to studies of male Caucasians. Quantitative generalization to women or other population groups is therefore uncertain. No occupational studies have attempted to examine genetic, epigenetic or metabolic susceptibility factors for uranium related diseases. Worker studies also provide no information about children, who may be more susceptible to the effects of uranium exposure than adults.[2]

Furthermore, as stated by the World Health Organization (WHO) International Agency for Research on Cancer:

> Because cancer is thought to originate from a single cell (ie. monoclonal) that has completed the process of malignant transformation, it is unlikely a threshold exists for alpha particle-induced lung cancer.

Just a reminder here that IARC states that inhaled and ingested uranium is a type one carcinogen, and that the American Conference of Industrial Hygienists call it a Group A confirmed human carcinogen. Large amounts of stored uranium also gives off sizable amounts of gamma radiation. There is no safe dose of radiation.

Very tiny inhalable particles of ceramic uranium dioxide are being emitted from CFM and breathed in by people going about their daily lives in Port Hope. These particles are even more insoluble than unbaked uranium dioxide, which in itself can be held in the body for a very long time. These particles continuously emit radiation as they decay— gamma, beta and, periodically, alpha particles, which are the most damaging type of radiation once inside the body. They have been described as deep penetration bombs to cells and mitochondria. Even just as a heavy metal bound to DNA, uranium is genotoxic.

Northern Arizona University biochemist Diane Stearns has established that when cells are exposed to uranium, the uranium binds to DNA and the cells acquire mutations, triggering a whole slew of protein replication errors, some of which can lead to various cancers. Stearn's research, published in the journals Mutagenesis and Molecular Carcinogenesis, confirms what many have suspected for some time – that uranium can damage DNA as a heavy metal,

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[2] https://www.unscear.org/docs/publications/2016/UNSCEAR_2016_Annex-D-CORR.pdf SOURCES, EFFECTS AND RISKS OF IONIZING RADIATION

independently of its radioactive properties. 'Essentially, if you get a heavy metal stuck on DNA, you can get a mutation,' Stearns explained."[3]

In a peer reviewed study, Genetic Radiation Risks: a neglected topic in the low dose debate, Chris Busby, Inge Schmitz-Feuerhake (professor of experimental physics and researcher into the biological effect of ionizing radiation), and Sebastian Pflugbeil (medical physicist) note:

> Internal exposure to uranium by inhalation…has been associated with significantly high genotoxicity resulting in anomalously high excess levels of chromosome damage and birth defects in a number of different groups….For internal exposure to substances like Sr-90 and uranium, which both have high affinity for DNA, the concept of dose is meaningless.[4]

Alexandra Miller, radiobiologist from the American Armed Forces Radiobiology Research Institute (AFRRI) has a mountain of biological evidence showing that there are many anomalies in the behavior of uranium in vivo and in vitro that cannot be accounted for by conventional risk models. Uranium is a radioactive heavy metal. She has shown that there is a synergistic effect between uranium's radiotoxicity and its chemical toxicity as a heavy metal. Even cells not immediately "hit" by radiation, exhibit a bystander response and are damaged.[5]

"Miller points out that recommended safe radiation limits – promulgated by UN agencies and adopted by countries – are not based on these new findings and, thus, do not protect against low-dose radiation from DU, and by extension, natural uranium."[6]

That CFM is also now able to process and store enriched uranium, as well as natural and depleted uranium is just adding insult to injury to an already terribly contaminated community. 1.2 billion dollars have been ear-marked to try and clean up the radioactive contamination of Port Hope but still industry pollutes, and our regulator still licenses it to pollute. (This is yet another unacknowledged subsidy to the nuclear industry.)

Tiny particles of air pollution, such as the ones that can escape the hepa filter can travel up to the brain through the nasal passages. They can cross the placental barrier. There is also gamma radiation from the large amounts of uranium being stored at CFM and at Cameco's Port Hope Conversion Facility. A storage facility for Cameco's Port Hope Conversion Facility is only 500

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[3] http://www.scienceagogo.com/news/20060307010324data_trunc_sys.shtml

[4] 4. Schmitz-Feuerhake I, Busby C, Pflugbeil S. Genetic radiation risks: a neglected topic in the low dose debate. *Environ Health Toxicol*. 2016;31:e2016001. Published 2016 Jan 20. doi:10.5620/eht.e2016001

[5] Online: https://www.researchgate.net/publication/317496883_Radiation_exposure_from_depleted_uranium_The_radiation_bystander_effect
https://www.sciencedirect.com/science/article/pii/S0041008X17302600?via%3Dihub

[6] Online: https://climateandcapitalism.com/2015/02/08/pentagon-pollution-5-deadly-impact-depleted-uranium/

meters from CFM, which leads me to wonder why these two facilities are under separate licences at all. How can you tease apart what radiation pollution comes from what factory?

## 2. Estimated Radiation Doses to the Public

CARN notes that even though there are deficiencies in the ICRP risk model, especially for internal radioactive exposures, and that it is not an exact science and based on outdated approaches, it is still important to consider estimated radiation doses to public. CARN undertook this analysis using date on the canada.ca site.

In 2018, CFM estimate dose to public was 30μSv/a, in 2019, 27 μSv/a, in 2020, 20μSv/a . This compared to Pickering in 2020, which was (apparently according to the industry and regulators) 1.2μSv/a, Darlington, .04μSv/a, and Bruce, 1.8μSv/a. The nuclear powerplants have exclusionary zones around them, but CFM is right next to residences in a small city (and BWXT in Peterborough is 25 meters away from a primary school playground.)

And since the people of Port Hope also have to deal with the effects of Cameco's Port Hope Conversion facility, we will report them here. For Site #1 at the waterfront, the estimated public dose was reported as 142 μSv/a, in 2018, 80 μSv in 2019 and 129 μSv in 2020. At their storage facility 500 m from CFM, it was, 173μSv in 2018, 127 μSv/a in 2019, and 117 μSv/a in 2020.

How does the CNSC estimate the addition of the potential health risks of gamma radiation coming from the large amounts of uranium being carried through the streets? The particles of radioactive contaminants being stirred up by extensive soil mitigation? How about effects of trichloroethylene and volitile organic carbons (VOC)'s being released into the air from the treat and release of legacy water contamination? What about contaminated surface water which seeps into Gage Creek and Lake Ontario after "weather events." What about polluted groundwater? A look at Cameco's Environmental Review Assessment (ERA) shows that (VOC's and uranium contamination have gone up in the most recent data set. They are well above screening criteria. Uranium and trichloroethylene are also above screening criteria in surface water.

The effects of pollution are cumulative: disease doesn't run around with a neat little label of origin attached. We must take a precautionary approach when we know that these substances are dangerous . We must not treat human suffering, ill health and the pollution of nature as externalities. There are human and societal costs to pollution. How much does ill health cost society? How much more do we pay in unacknowledged subsides to the nuclear industry?

## 3. Accidents and Climate Change

The nuclear industry calls misadventures at the plants incidences or events. Things don't always go as planned. This is why such industries do not belong in the downtown.

Accidents and emergencies can happen at any nuclear facility, and numerous have occurred at Cameco's facilities. For instance, in 2020, CMF had a rupture in a hydrogen tank.

On Nov. 6th, 2021, Cameco's PHCF exceeded their daily sanitary sewer emission levels. The same was reported on Oct. 31st. On July 31st, they reported an exceedance of dust criteria for Environment and Climate Change Canada and the Ministry of Environment, Conservation and Parks. We ask about the health of those who were walking outside near there on that day. How can the CNSC ensure their health and safety? We cannot depend on assurances that emissions are constantly at a "safe" amount despite the average levels.

On June 4th, there was a discharge of uranium in exhaust line and on Aug 28th 2020, a build up of algae on the cooling water intake screens from Lake Ontario. These are just a few of many examples.

Cameco's CFM and Cameco's Port Hope Conversion facility are on a flood plain. In an age of climate change, this is so unwise. A lot of Cameco's events involve "weather events". We ask that the CNSC closely examine the impact of climate change on licenses. This must be expressly considered in licensing documents, including licensee applications with accompanying studies, and clearly set out in CNSC licensing decisions.

We make this request based on a number of climate-induced events which have already impacted Cameco's activities. On Cameco's website, we see that in 2022, Cameco is requesting a 20 year license renewal for its CFM facility, with a 24% increase its production limits! This is particularly problematic for a radioactive industry on a flood plain with the unpredictable weather of climate change. Ten years is far too long. It should phased out and be decommissioned as soon as possible.

The CNSC needs to take the stewardship of the environment and the health of people seriously. That is its mandate. It needs to look at the big picture. We don't think that this can happen when the CNSC reports to the Minister of Natural Resources, who reports to Parliament. The CNSC needs to report to Ministry of the Environment. There has been a breakdown in trust. The CNSC often takes a far too narrow view when executing their perceived responsibilities.

## 4. Other Reflections and Concerns

In making this intervention, CARN also notes its concerns on the following matters – all of which we submit, have received inadequate attention in the licensing documents:

- Huge amounts of uranium substances being transported on the streets and the accompanying potential for accidents, especially in extreme weather.
- Community stigma, conflict and costs in a society faced with the continued effects of industrial pollution.

- Effects on property values, lack of financial security, and insurance
- Domination of much of the waterfront by Cameco
- The potential for accidents (ie. look at historical events) and whether the CNSC can guarantee the public is safe?
- Lack of adequate security surrounding these plants
- Continued pollution of freshwater
- Fugitive emissions from old buildings

Cameco would never be allowed to exist in such a town today. It only exists there because of a historical mistake. How can the CNSC continue to justify the toxic burden imposed by the ongoing emissions upon the populace living in the vicinity of this polluting facility? on top of the toxic burden of legacy waste.? Especially on women, children, and fetuses, who are especially vulnerable to radiation pollution?

As a society, we must take a more responsible, precautionary approach, when it comes to the health and well-being of people and our natural environment.

Thank you for your time.

Jane Scott, on behalf of Citizens Against Radioactive Neighbourhoods