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Written submission from Sandy Greer

Exposé oral

Mémoire de Sandy Greer

In the Matter of the

À l'égard de

Canadian Nuclear Laboratories, Douglas Point Waste Facility

Les Laboratoires Nucléaires Canadiens, installation de gestion des déchets de Douglas Point

Application to amend the waste facility decommissioning licence for the Douglas Point Waste Facility

Demande de modification du permis de déclassement de l'installation de gestion des déchets de Douglas Point

Commission Public Hearing

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Observations on Due Diligence Needed as per Potential Adverse Environmental Effects in the Forthcoming Phase of Douglas Point Waste Facility Decommissioning

Submitted by Dr. Sandy Greer, PhD © - October 2020

PREAMBLE

The human family has entered a new era in regard to nuclear energy facilities, in which several endeavours to ensure the well-being and safety of human life and the natural environment are in the early years, hence, experimental. Here I refer foremost to decommissioning of commercial nuclear energy facilities, as well as proposed deep geological repositories (DGRs) based upon the Swedish KBS-3 design, plus the pursuits to licence Small Modular Nuclear Reactors (SMNRs), the latter which are in preliminary phases of development.

Decommissioning differs from the other above-mentioned pursuits, in my view, solely because it is essential to figure out the most life-affirming practices to deal with both radiological and non-radiological waste in out-dated and closed facilities. As for DGRs and SMNRs, they are controversial, unproven and contested by citizens who do not trust or believe that respective proponents can scientifically justify these facilities.

As a concerned citizen, I have been painfully enlightened about the lengths to which certain nuclear players will go to try and convince rural communities about the benefits of proposed DGRs. My eventual skepticism was forged as an intervenor at the two public hearings on the OPG DGR. Since then, I have continued the unpleasant task of keeping up-to-date with strategies of the Nuclear Waste Management Organization (NWMO) to try and have their way to bury high level (spent fuel bundles) nuclear waste either on prime farmland in Bruce County or in a remote area in northern Ontario, in two communities where democracy is under siege and community resistance growing.

I am aware that the high level waste will not be removed from current DPWF storage until a future decommissioning phase. But my initial two concerns in reading the Canadian Nuclear Laboratories' (CNL) submission was, first of all, seeing the assertion in **Table 14-1 DPWF Baseline Waste Strategy per Waste Classification**, in reference to High Level Waste (HLW), that it will be placed in NWMO's "HLW disposal facility" which of course refers to the proposed NWMO DGR. As for Intermediate Level Waste (ILW) its destination is more ambiguous whether "until a geological disposal facility becomes available" also refers to a proposed DGR fiercely being fought against.

THE LIMITATIONS OF MY SUBMISSION

My participation usually is undertaken not just to present a critique but, equally important, to back up my arguments based upon rigorous study of international science journals that can provide factual insights and illustrate the reasons for caution. Waiting until autumn in the hope that the University of Toronto libraries would be opened up again to do research for this public hearing, a visit to Toronto proved that they still are locked down. No one has access to the physical library computers. Only current students are given special access at their home computers to digital journals. The Head Librarian informed me, via email with apologies, that a graduate is ineligible to access these journals free of charge from a home computer because of contractual agreements by institutions with journal publishers. Private access for me is financially prohibitive. (The participant funding does not help, because I would have been obliged to pay out the money first on my credit card, which would have put me into a financial crisis, given a poverty-level pension which barely covers monthly living expenses.)

This intervention therefore will revisit a few key issues which continue to be relevant. Furthermore, so much that remains unknown relates to challenges which confront the more recent nuclear pursuits such as decommissioning.

GREAT LAKES WATER QUALITY BOARD – BACKGROUND REPORT

Upon contacting staff at the International Joint Commission (IJC) recently, they informed me that a report which was intended for completion this autumn has been delayed until at least the end of the year. My efforts to get updated information were thwarted, again. However, I would like to quote from the ***Nuclear Power Facilities in the Great Lakes Basin – Background Report – September 2019***, which mentions the theme of the final report to be presented to the IJC in the near future:

"…The consultant will describe state-of-the-art closure of nuclear facilities as well as analyze the environmental hazards and significant differences in nuclear decommissioning approaches between Canada, Europe, and the United States.

"This background report and the contracted report will be used by the Legacy Issues Working Group and the WQB to develop its recommendations to the IJC regarding any additional actions that the governments could take to eliminate or reduce threats to the Great Lakes from the release of radioactive contaminants as a result of decommissioning."

The above background report excerpt indicates how at least one esteemed international body, independent from the nuclear industry, is actively engaged in the daunting task of decommissioning and the many uncertainties in processes and outcomes.

FRAMING DOUGLAS POINT WASTE FACILITY WITHIN A WATERSHED

A continuing theme in my submissions on the handling of radioactive waste is an `ecosystem approach.' The International Commission for Radiological Protection (ICRP) advocated the approach some years ago, which hopefully continues to evolve.

I would like to refer readers to my 2014 submission for the proposed OPG DGR. The title is: **Uncertainty of Environmental Effects and Why Ecosystem Principles are Needed – Limitations & Flaws in Methodology Used to Determine the Significance of Adverse Environmental Effects**. It should be in the CEAA registry under the OPG DGR project.

Still relevant from my 2014 submission is the consideration of the Lake Fringe Watershed, given the fact of the DPWF exists within it.

In contrast, yet in accordance with protocol, the focus of Canadian Nuclear Laboratories (CNL) as a proponent – ergo, the oversight by the Canadian Nuclear Safety Commission (CNSC) as the federal authority - is on the Douglas Point Waste Facility (DPWF) as per a "site study" within the bounds of the Bruce Power industrial site and the immediate peripheral area. (In document CMD-20-H4.1, see Figure 1-1, Location of the Douglas Point Waste Facility in Bruce Site, on PDF page 15.)

In CNSC's' Environmental Protection Review (EPR) Report, in Section B on PDF page 118, the Authority does acknowledge still-existing biodiversity within and beyond the Bruce site.

The Saugeen Valley Conservation Authority's Lake Fringe Watershed Report Card though provides a more detailed profile to appreciate the broader ecological interactions, including a fuller list of Rare Species at Lake Fringe.cdr

The perspective that I want to emphasize is that human well-being, from the biological to the spiritual, is grounded in a healthy planetary support system. My published writing through many years has tried to awaken people in Euro-western society about the need to recognize how our disconnectedness from the natural environment is the root cause of so much destruction of life. We seriously need to restore a more holistic understanding about our roles and responsibilities within the web of life. Co-authors of ***The Systems View of Life – A Unifying Vision*** illustrate how some scientists are striving to restore awareness of all planetary life's interconnectedness:

"Since ecosystems interlink the living with the nonliving world, ecology must be grounded in not only biology, but also in geology, atmospheric chemistry, thermodynamics, and other branches of science [Capra and Luisi, 2014, p. 342]."

Even a pragmatic journal such as ***Impact Assessment and Project Appraisal*** has published articles that promote ecosystem thinking, illustrated in these two quotes:

"In Canada, there is now a collective understanding that EA must go beyond the evaluation of site-specific, direct and indirect project impacts to include issues of broader regional, cumulative and higher-tiered policy, plan, and program (PPP) development significance." [1]

"This regional context…to identify and address meta-issues that would otherwise be missed through case-by-case project-level assessment (Cooper and Sheate, 2004), and thus requires an ***ecosystem perspective*** *– adopting regional units defined by ecological relationships,* ***such as watersheds*** [my bold]*, rather than political or administrative ones."*[2]

The nuclear sector, meanwhile, seems to continue resisting the development of practices that recognize the phenomenon of `cumulative effects' from radionuclide dispersals through time in organisms and environmental media, as well as interacting with other types of toxins such as phosphorus caused by agricultural runoff. Another type of interaction is among various waste projects through time, around the Great Lakes Basin, for example, in consideration of more future decommissioning projects. Consequently, the imperative role of the CNSC is a continually manifesting work-in-progress to seek, develop and improve processes to address the perpetual human quest, ever imperfect, of trying to accommodate human cognitive constructions, such as computer modelling, to the natural world constantly in flux at multiple levels.

[1] (e.g. Dubé, 2003; Duinker and Grieg, 2006; Harrison and Noble, 2008) cited in ***IAPA,* 27(4)**, December 2009, pages 258-270

[2] (Kennet, 2002; Dubé, 2003, Cooper and Sheat, 2004; Dalal-Clayton and Sadler, 2005) cited in ***IAPA,*27(4)**, Dec. 2009, p. 258-270

OTHER PROBLEMS IN DETERMINING ENVIRONMENTAL EFFECTS

The CNSC EPR Report is very detailed, and diligently identifies a variety of possible adverse impacts on the environment triggered by decommissioning activities but, nevertheless, reaches the conclusion – stated repeatedly in the document – as in the Executive Summary on PDF page 58:

"The information provided in this EPR Report also supports CNSC staff's conclusion that, taking into account all proposed mitigation measures and their proper implementation, the proposed decommissioning activities are not likely to cause significant adverse effects on the environment and the people at or around the DPWF"

To reach this conclusion, CNSC staff identify the adoption of the federal guidance document titled: ***Projects on Federal Lands: Making a determination under section 67 of the Canadian Environmental Assessment Act, 2012***

The first of several problems is that the Canadian Environmental Assessment Act never clearly defined "significant adverse effects on the environment." Secondly, significant adverse effects on the environment only are determined AFTER mitigation measures have been implemented and give evidence of being ineffective, which seems like the opposite approach to eliminating or minimizing potential dangers before it is too late.

Third, the above-mentioned federal guidance document states in a disclaimer that its approach is not mandatory and, furthermore: "leaves the approach of how to conduct these determinations up to individual Authorities" – for example, the CNSC. Fourth, in the CNSC EPR, within **Appendix 1: Environmental Effects Evaluation Form**, on PDF page 119, Section D lists the criteria for "effective and established mitigation measures" followed by the statement: "Any mitigation measure that does not meet this definition falls under the category `other mitigation measure' (MM) and requires closer analysis and planning."

Next, in the CNSC EPR, **Section E3: Other mitigation measures,** a statement reads: "This section is empty as there are no potential environmental effects associated with mitigation measures that do not meet the definition of `effective and established.'"

But, in the more detailed pages of the CNSC EPR, several potential environmental dangers are named honestly, both by CNL and also by CNSC. These dangers are said to possibly require added mitigation measures which look to me as being contradictory in being included in **Section E2** titled: **Established and effective mitigation measures (EEMM)**." In other words, a couple of examples here suggest that not

everything which might need consideration is necessarily "established" practice but instead will require further consideration as needed. (Section E2, by the way, is wrongly identified in the document as Section G2.)

The first example is in **Section 3.2.3 Hydrogeological Environment**, which points out an anomaly in groundwater that usually flows towards Lake Huron, noting: "the groundwater table near the DPWF is strongly influenced by the operation of the Inactive Drainage System sump pumps that surround the foundations of the Reactor and Service Buildings." Sub-section 3.2.3.1 Effects on Groundwater, then reads: "…excavation activities during the removal of those underground structures will likely impact groundwater [PDF, p. 89]. Sub-section 3.2.3.2 Mitigation Measures explains that despite previously successful directing of groundwater away from structures and buildings, CNL recognizes the need for further assessments to understand the water table better in order to evaluate additional measures [PDF p. 90].

A second example is under **Section 3.2.4 Aquatic Environment**. In sub-section 3.2.4.1 Effects on Surface Water and Sediment Quality, it reads that despite releases of radiological and hazardous contaminants "found to be below regulatory limits" that: "During decommissioning activities at the DPWF, there could be potential effects to surface water quality and sediment quality of Lake Huron from liquid wastes or storm water runoff [PDF p. 90]. Sub-section 3.2.4.3 Mitigation Measures similarly mentions routine measures but, again, despite such barriers characterized as EEMM in Section E2, it reads: "Additional barriers, such as berms, dikes and silt fences, will be considered". Regarding the latter, it seems logical and preferable to install them sooner than later, to avoid potentially too much runoff, given the increasing occurrence of extreme weather events, despite not yet existing at the CNL Lake Huron location – prior to the onset of the pertinent decommissioning activity.

Perhaps a third, and final, example that "other mitigation" not necessarily `established and effective' actually is being proposed is evident in the CNSC footnote on PDF p. 97, in its willingness to "evaluate the existing effluent monitoring plan" as per the need for possible enhancement "before any decommissioning activities can begin." The same footnote number also is seen in relation to "radiological air monitoring" on PDF p. 95.

To finish, the CNSC EPR did point out other issues of concern. The dilemma regarding barn swallows was handled respectfully, despite offering no reassuring resolution. As for other wildlife, what distressed me was the presentation of **Table 2.2: Summary of the DPWF ERA conclusions**, on PDF page 75, which summed up CNL's 2019 Environmental Risk Assessment (ERA) declaring "no adverse impacts" on human life

or non-human biota. Worse, in the category for noise, was the dismissive assumption: "No adverse impacts expected from physical stressors, although noise effects on wildlife were not assessed due to lack of benchmarks." This assertion, therefore, is meaningless and false, in the absence of benchmarks. Furthermore, why do benchmarks not exist? Perhaps the assessment of noise upon often unseen wildlife is too challenging. But what comes to mind is, noise disruptions on nonhuman species could undermine birthing and care of the young, hence, in sum a threat to various species' survival in the bioregion.

To return to the issue how to evaluate "significant adverse environmental effects," perhaps what is closer to the truth is to carry out a process to address an existing guidance document for this pragmatic reason cited by CNSC on PDF page 40:

"This determination is required before the Commission can exercise its power under the NSCA to authorize a project located on federal Lands."

IS RELIANCE ON B.P. ENVIRONMENTAL MONITORING ADEQUATE?

My final concern in this submission is that I disagree with CNSC's approval of CNL giving over responsibility regarding its own Environmental Monitoring Program (EMP) to Bruce Power. Doing so is mentioned a few times in the CNSC EPR report, with this rationale outlined in **Section 2.3.3 Environmental Monitoring Program**:

"In 2016, CNL conducted a gap analysis and determined that, given the very low levels of contaminants in airborne and waterborne releases, there is no regulatory requirement for an EMP at the DPWF. CNSC staff accepted this gap analysis, and, therefore, do not require a site-specific EMP for the current licence period.

"Given that the potential risk from airborne and waterborne releases is expected to remain low to negligible during the proposed decommissioning activities (as per the analysis in section 3), CNSC staff would not require a site-specific EMP over the proposed licence period either [PDF page 76]*."*

(A single exception, however, is identified in the ***Licence Condition Handbook***, on PDF page 163. CNL does conduct EMP at DPWF "limited to only effluent monitoring.")

The CNSC's rationale continues, noting that Bruce Powers (B.P.) EMP is compliant with CSA Standard N288.4, *Environmental monitoring programs at Class 1 nuclear*

facilities and uranium mines and mills and, moreover, B.P.'s EMP "reflects the influence of releases from all facilities within the Bruce nuclear site" including DPWF.

Two major problems challenge the above-mentioned CNSC's acceptance.

First of all, despite CNSC's rationale about the EMP also states that "the potential risk from airborne and waterborne releases is expected to remain low to negligible during the proposed decommissioning activities," this CNSC assertion seems to contradict a number of specifically identified potential dangers listed in its EPR Report, two of which I named in a previous section of my submission titled "OTHER PROBLEMS IN DETERMINING ENVIRONMENTAL EFFECTS."

Secondly, I actually read most of a long **2018 ENVIRONMENTAL PROTECTION REPORT** produced by Bruce Power, to investigate how it describes its own EMP. I was unpleasantly surprised to discover several causes of gaps in data, from equipment breakdowns to technological limitations. Furthermore, some studies are not exclusive and bounded to the Bruce site. Below are a few examples described in the 2018 report.

"The elevated levels of cesium observed in Bruce A, Baie du Doré, and Scott Point (2007-2008), may be attributed to boiler tube leak at Bruce B and the predominant northern flow of Lake Huron's near shore current… It is possible that the increase seen at Bruce B (indicator site) for 2016 could be attributed to water draining activities during the vacuum building outage [PDF page 149]*."*

The above example illustrates that the authentic source of irregular noticeable increases in contaminant releases cannot always be verified definitively, even when specific causes are possible, such as equipment breakdown and also power outages, intentional or otherwise. For example, higher than normal 2018 airborne tritium concentrations were surmised in the report as attributed to "longer than average outage days at Bruce A and Bruce B [PDF page 132]."

"In 2018, the Meteorological Tower data collection process has faced multi-faceted recurring issues. The process of dialing into the tower modems to collect data appears to be failing on a regular basis [PDF page 124]*."*

"For some radionuclide/media combinations, technological limitations currently limit the capacity to collect the desired radionuclide measures. In cases where monitoring data were not available for a particular exposure media, environmental monitoring data were used to explicitly define radionuclide concentrations in the intermediate media as far along the exposure pathway as possible. In some cases, the availability

of reliable data in 2018 was such that concentrations of a specific radionuclide could not be defined for any media along a specified exposure pathway [PDF page 118]."

The above are only a selection of further examples in the 2018 B.P. report which honestly identified a range of limitations to gathering sufficiently representative and accurate data which, moreover, can be severely compromised by the unexpected. Added to the above was the identified need for "the availability of reliable sampling and analytical techniques," to which was added this fact: "[my bold] ***Despite the incorporation of best available practices, not all radionuclides can be reliably monitored in all media***."

Two further comments, however, in the 2018 B.P. report illustrated a less flexible perspective from Bruce Power which might be obstructive to dealing with an alteration in the condition of the Bruce site once decommissioning of DPWF begins. For example, in **Section 9.2 Uncertainties and Assumption in the Exposure Assessment – All Biota**, the report reads: "Bruce Power does not plan on sampling additional biota for the purpose of augmenting its radioactivity in tissue measurements for Environmental Risk Assessment… sampling and analyzing additional species will not change the conclusion that there is no risk to non human biota, nor will it affect the design (or improvement) of radiological environmental monitoring [PDF page 231]."

I was disappointed by what I believe is an overly rigid self-righteous position, given the reality that the planet, including the region of the Bruce site, is confronting a future of multiple unknown and unpredictable climate circumstances, and flexibility is key to demonstrate the humility and grace to be open-minded to a more adaptive stance.

A more worrisome example of what I characterize as an over-confidence that I have observed as endemic to the nuclear industry overall follows upon what the B.P. report author(s) declare here: "Over forty (40) years of operations of the Bruce site and continued monitoring and assessment has provided empirical evidence of little to no risk to the local environment [PDF page 212]." That sentence closes this paragraph:

"…Bruce Power acknowledges the need to address the cumulative environmental effect of multiple stressors when and where it is warranted. The science behind the determination of cumulative effects is at its infancy: there is no consensus on a definition of `cumulative impact' and assessment methods are largely absent. Understanding cumulative impacts to a system first begins by evaluating its individual stressors. Bruce Power has done this and none of the individual stressors poses an unreasonable risk to the environment. Thus it is unlikely that the

combination of single stressors with low to no risk will result in a cumulative impact or approach an unreasonable risk."

Personally, I consider the above interpretation of `cumulative effects' as very limited.

Moving along to my submission completion, however, the paragraph immediately following the above is noteworthy as a final cautionary suggestion why I absolutely do not believe that DPWF should be permitted to continue giving over its responsibility to conduct an EMP to Bruce Power. See this next statement:

"The effluent releases from KI North [referring to Kinectrics] *are maintained below the applicable limits and the risk to the environment is very low. Therefore, an EMP is not required for the facility* [PDF page 212]."

Ouch! Does that closing opinion indicate a future reluctance of Bruce Power as per how thorough it will conduct its Bruce site EMP inclusively of the various DPWF buildings once the decommissioning process begins, in what will be a series of lengthy phases during which any assumed certainties can change at any time throughout this period?

Meanwhile, climate change is the wild card, with its handmaiden of extreme weather events.

To sum up this section, I hope that my analysis regarding important, and telling, passages in the 2018 B.P. Environmental Protection Report is helpful in CNSC deciding whether the DPWF ought to renew its own EMP. Also valuable, in my view, was the discovery about the various things that can go wrong in the pursuit of gathering data which, ultimately, can compromise the accuracy and integrity of data collections to ensure both human and environmental safety, which is interwoven.

CLOSING WORDS:

I hope that this modest intervention will complement the contributions from other intervenors, respectively, who each have their special knowledge and experience to address the fuller and complex issues of the decommissioning trajectory to come. I also am preparing a power-point presentation for my oral intervention at the public hearing online, hoping that the digital technology system works for all participants.

Thank you for this opportunity to express my concerns on serious matters that will impact future generations. Blessings.