From: Dr. Sandy Greer
Sent: June 30, 2019 11:55 PM
To: Consultation (CNSC/CCSN)
Subject: Dr. Sandy Greer's submission on REGDOC-2.11.1 draft
Attachments: A Citizen Response to CNSC draft of REGDOC-2.11.1.docx

To whom it may concern:

Please notify me, at your earliest convenience after the July First long weekend, that you have received this submission.

Warm regards, Dr. Sandy Greer

A Citizen Response to CNSC Draft of Volume I: Management of Radioactive Waste – REGDOC-2.11.1

Submitted by Dr. Sandy Greer, PhD ©

PREAMBLE

The intention of my citizen response is to encourage CNSC to demand much more transparency from the Canadian nuclear industry, in regard to the risks and dangers of of radionuclides rather than minimize such dangers in communications with the wider public. The CNSC itself must provide the guidance for transparency in its regulations, as well as demonstrate it in all other communications.

My comments, therefore, will address specific passages chronologically throughout the draft document for REGDOC-2.11.1, where requests for clarity about radionuclides could be inserted by CNSC. The closing comment will critique lack of transparency about risks and dangers to human health and the environment in the new (?) definition in the Glossary for 'radioactive waste,' and suggest a fuller definition.

In this preamble, I also want to take the opportunity to declare my disappointment with the CNSC, as per its lack of support to add "radionuclides" to 'Chemicals of Mutual Concern.' The CNSC elaborated on the reasons for its rejection, at the request of the federal Ministry of Environment and Climate Change Canada (ECCC), in the September 2017 publication ***Assessment of the relevance of the inclusion of radionuclides as a chemical of mutual concern under Annex 3 of the Canada-United States Great Lakes Water Quality Agreement***.[1]

CNSC justifies its rejection of the CMC category for radionuclides by arguing:

"Radionuclides are currently among the most heavily regulated substances in the world. Canada has an independent national nuclear regulatory body (i.e., the CNSC), the mandate of which is to ensure Canada's nuclear industry is protective of the environment and the health and safety of persons. …

"The [CNSC] report concludes that radionuclides are not recommended as a candidate CMC for further evaluation under Annex 3. However, it identifies opportunities to improve the public availability of, and access to, release and monitoring data associated with the nuclear fuel cycle in Canada, and the need to improve coordination and collaboration among various stakeholders on science priorities, research, surveillance and monitoring activities in the Great Lakes basin ecosystem" [Executive Summary, p.ii, 2017].

[1] Publications.gc.ca/site/eng/9.850283/publication.html

WHY CMC STATUS RELATES TO RADIOACTIVE WASTE

Important to emphasize – and why radionuclides ought to be added as officially recognized CMCs – is evident in examining *why* radionuclides *are* "among the most heavily regulated substances in the world." The fact is, radionuclides are among the most lethal substances in the world, particularly in their range of forms created from anthropogenic activities and, by the way, the CNSC definition for "radioactive wastes" needs to acknowledge the reality of potential risks and dangers.

Interestingly, later in the aforementioned CNSC assessment, **Table 13: Comparison of risk- management activities associated with a CMC classification to the current status of such activities within Canada for radionuclides** provides a list of what currently is in place as well as opportunities for improvement.

To its credit CNSC identifies two areas for its own improvement under the following two respective sub-headings for risk-management:

1) Exchange information on monitoring, surveillance, research, technologies and measures for managing CMCs.

Opportunity for improvement: The CNSC considers this to be an area that could benefit from additional improvements, and initiatives are currently under development to achieve this goal. There is a need to improve public access to data regarding releases of radionuclides and the results of environmental monitoring collected and reported by various government agencies.

2) Coordinate and collaborate with various stakeholders on science priorities, research, surveillance and monitoring activities in the Great Lakes basin ecosystem.

Opportunity for improvement: This will continue to be an area marked for continuous improvement, especially with respect to coordination of whole lake research and surveillance activities due to the logistical difficulties and costs associated with such activities.

The CNSC, indeed, in its role "to ensure Canada's nuclear industry is protective of the environment and the health and safety of persons" [Executive summary, p. iii, 2017], has the ongoing responsibility to make improvements – and most particularly improvement to public access to data.

The reason why the Chemicals of Mutual Concern identification ought to be supported, rather than rejected, resides in the purpose of this binational initiative by the International Joint Commission in its GWLQA **Annex 3**. I quote from **C. Science**:

"The Parties, in cooperation and consultation with State and Provincial Governments, Tribal Governments, First Nations, Métis, Municipal Governments, watershed management agencies, other local public agencies, and the Public, shall coordinate on science priorities, research, surveillance and monitoring activities, as appropriate, including:

5.** coordinating research, monitoring, and surveillance activities as a means **to provide early warning for chemicals that could become chemicals of mutual concern [my bold][2]

To sum up, CNSC does need to do better to make its own studies much easier to access; but doing so is not enough. The CNSC, if it were to support adding radionuclides to CMCs would thereby demonstrate that it is more receptive to improving the documentation of baselines, etc. by including a range of research techniques, such as field studies and laboratory studies – carried out by a wider number of sources beyond the CNSC, and broaden methodologies – because computer models are sorely limited.

The fact of computer model limitations is something which I have written about in previous submissions, both to the International Joint Commission on the Great Lakes and also to the Canadian Environmental Assessment Agency. Instead of repeating a long quote citing computer scientists from Fritjof Capra's book ***THE WEB OF LIFE: A New Scientific Understanding of Living Systems***, go to print page 9 (PDF 10) in my 2016 submission to the IJC.[3]

My above-cited document also challenges the confidence which the CNSC invests in its aforementioned assessment in its section **5.1 International science and radiation safety framework**, on print page 45 (PDF 51).

While it is true that "There currently exists an extremely robust science and regulatory network both internationally and nationally for radionuclides," my own extensive and continuing international science research reveals that the understanding about potential impacts upon the environment is only in its early years. Furthermore, not everyone is in agreement with the ICRP, the latter whom itself recognizes that more and better research is an ongoing mission.

Among the international organizations not identified in the CNSC assessment paper is the International Union of Radioecology, which engages in continuing research.

Another excellent source that illustrates continuing research is the ***Journal of Environmental Radioactivity*** from which I cited the work of F. Brechnignac:

[2] https://www.ijc.org/en/who/mission/glwqa/annex3

[3] ijc.org/files/tinymce/uploaded/GLWQA/Dr._Sandy_Greer.pdf

"The symposium gathered an academically diverse group of 30 scientists to consider the still debated ecological impact of radiation on populations and ecosystems…

"Scientific research conducted in a variety of laboratory and field settings has improved our knowledge of the effects of ionizing radiation on the environment. However, ***the results from such studies sometimes appear contradictory and there is disagreement about the implications of risk assessment****… ."* [my bold] [2016, p. 22, Brechignac, F. et al].[4]

My final criticism about the CNSC's rejection to support radionuclides as CMCs in its assessment is based on what I see as what appears to be an unsatisfactory mapping of the `cumulative effects.' I refer to the following statement in its aforementioned assessment on print page 36 (PDF 42):

"Canada is not identified as being among the top-10 phosphate producing regions, and the CNSC is not aware of any significant phosphate rock and fertilizer and production on the Canadian side of the Great Lakes basin."

But, I recall during one of the two public hearings, on Ontario Power Generation's (OPG) proposed deep geological repository for low-and-intermediate level radioactive waste, that the OPG could not answer a question in the affirmative, from the Joint Review Panel, whether it had included "agricultural run-off" in its studies about cumulative effects.

All of the above, and remembering the repeated failure of the OPG to have compiled evidence satisfactory to the Joint Review Panel – at both public hearings, and also afterwards as related to requests from ECCC and the Saugeen Ojibway Nation (SON) – is why I argue strongly in this citizen response that the CNSC must demand more transparency, which includes much more rigorous data collecting, from all players in the nuclear industry who seek licences to bury radioactive waste.

REGDOC-2.11.1 – THE NEED TO MAP RADIONUCLIDES

As per the rationale detailed in my PREAMBLE, the following are specific passages where the explicit identifications of radionuclides could be requested by the CNSC, in REGDOC-2.11.1:

Under **4. General Requirements**, as per licensees managing radioactive waste, regarding "**track the waste inventory under their control**," please specify that the range of radionuclides be identified and disclosed for public information.

[4] *Journal of Environmental Radioactivity,* 156-159 (2016) 21-29, F. Brechiqnac et al

Under **5. Waste Management Program**, similarly, the licensee ought to declare full disclosure of the radionuclides in the radioactive waste hierarchy that it manages. The CNSC can request, regarding "**consider the waste hierarchy**," that the request for full disclosure be added here.

Under **6. Radioactive Waste Classification, Waste Characterization and Waste Acceptance Criteria,** subsection 6.2 **Waste Characterization** reads:

The licensee shall perform waste characterization at the various steps in the management of radioactive waste. Waste characterization shall include assessing the physical, mechanical, chemical, biological, thermal and/or radiological properties of the waste material, as applicable. The licensee must justify to CNSC the aspects that do not apply. The licensee shall maintain detailed records of the characterization performed.

Unless "waste characterization" implicitly is referring to radionuclide identification, I again ask the CNSC to request the naming of radionuclides as essentially imbedded in the characterization. Furthermore, this information must be easily accessible and rendered in clear language understandable to the wider public.

If `waste characterization' includes the naming of radionuclides, then that information is helpful in regard to all phases of the handling of radioactive waste as delineated in **7. Steps in the Management of Radioactive Waste,** and sections in this regulation document up to, and including, **10. Waste Management Disposal Facility**.

Important to declare here is the reality, as time progresses and as science incrementally improves, the more that information is transparent and known not just within the nuclear industry yet, imperatively, more readily accessible to the wider public of stakeholders, the more quickly and more effectively actions can be carried out, in order to minimize harm, as per whatever unknown incidents happen in future.

As an aside to mapping radionuclides, regarding **10.2 Site characterization for a waste management disposal facility**, as of this date which is the evening of June 30, 2019, the updated regulation document appears not to have yet been presented to the Commission nor published. Regarding REGDOC-1.2.1, I severely criticized the nuclear industry feedback which advocated for more leniency in regulations, a position in contrast to my own feedback's advocacy for more rigour. I only can assume that the revised REGDOC-1.2.1 will be available when forthcoming licence applicants read it. I will be interested what the final revised version requires of licence applicants.

Returning to the need to map radionuclides, full disclosure of their identification ought to be known prior to, under subsection **10.3 Design of a waste management disposal facility**, when this draft of REGDOC-2.11.1 reads:

The licensee shall base the design of a disposal facility upon:

*… **characteristics and inventory of the radioactive material to be emplaced**…*

Again, as an aside to mapping radionuclides, subsection **10.4 Construction and commissioning of a waste management disposal facility** begins:

The licensee shall construct the disposal facility in accordance with its design. The licensee shall have sufficient evidence that the closure design will function as intended before construction activities commence.

My question is, how is the acquisition of "sufficient evidence" humanly possible when the deep geological repositories (DGRs)being proposed in Canada are a conceptual design only. (The controversy about whether other repositories exist elsewhere is too complicated for this paper, although I have engaged in this debate elsewhere.)

To be fair, I do recognize that the federal government has mandated that a series of steps be carried out by the Nuclear Waste Management Organization, which has been given the mandate to find a willing host community to bury high level radioactive waste. Therefore, it is incumbent upon the CNSC and also NWMO to pursue an interdisciplinary journey of scientific and technological studies to make this happen. Nevertheless, among concerned citizens who have done our own in depth research, I believe we have legitimate concerns to raise about yet unproven DGRs to bury some of the most lethal substances created in anthropogenic activities on the planet.

GLOSSARY DEFINITION FOR `RADIOACTIVE WASTE'

I question how "new" the CNSC definition for "radioactive waste" actually is, as shown in the **Glossary** of the draft for REGDOC-2.11.1, which reads in part:
…The following are new terms that are being defined in this draft for public consultation. Following public consultation, the final versions of the terms and definitions will be submitted for inclusion in the next version of REGDOC-3.6.

However, only one definition appears in draft REGDOC-2.11.1 **Glossary**, as follows:

Radioactive waste
Any material (liquid, gaseous, or solid) that contains a radioactive nuclear substance, as defined in section 2 of the NSCA, for which no further use is foreseen. In addition to containing nuclear substances, radioactive waste may also contain non-radioactive hazardous substances, as defined in section 1 of the General Nuclear Safety and Control Regulations.

Thank you for inviting public consultation, regarding which my two criticisms are, first of all, it is not currently accurate to include the phrase "**for which no further use is foreseen**."

The phrase "**for which no further use is foreseen**," in fact, is an integral part of the definition given by the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, and cited on a web page of the European Nuclear Safety Regulators Group [5], but no less inaccurate today.

Controversial or not, international debate has been active in recent years (probably longer) in regard to the wisdom behind constructing and eventually closing off deep geological repositories, with no possibility of access to reuse radioactive waste.

One current web page of ***Science****Daily* at the top shows this definition: "Radioactive waste is waste type containing radioactive chemical elements that does not have a practical purpose," in contrast to further down, under section `Related Stories,' has a list of several articles that can be clicked and opened, about various contemporary explorations and experiments to reuse nuclear waste.[6]

A further specific example of reuse of radioactive waste is cited on a web page of the Nuclear Energy Institute (NEI), the policy organization of the nuclear technologies industry based in Washington, D.C., and reads in part:

"Some countries like France reprocess and recycle nuclear fuel, extracting elements still capable of generating energy for use in new fuel. The United States currently does not, but some advanced reactor designs…in development would be able to run on used fuel. [7]

Meanwhile, the phrase "**for which no use is foreseen**" appeared as far back as 1982 in *RADIOACTIVE WASTE MANAGEMENT GLOSSARY*, presented in Vienna as a Technical Document Issued by the International Atomic Energy Agency (IAEA), here:

"radioactive waste: Any material that contains or is contaminated with radionuclides at concentrations of radioactivity levels greater than the `exempt quantities' established by the competent authorities and for which no use is foreseen."

My final comment is to ask you to be more fully accurate regarding your current definition for `radioactive waste.' Identify specifically either that the radionuclides are hazardous (as you refer to non-radioactive substances) or, alternatively, that the waste is "contaminated with radionuclides," to be transparent about the risks and dangers.

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[5] www.ensreg.eu/print/247

[6] https://www.sciencedaily.com/terms/radioactive_waste.htm

[7] https://www.nei.org/fundamentals/nuclear-waste