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Written submission from the Saskatchewan Environmental Society

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In the Matter of the

À l'égard de

Cameco Corporation, Beaverlodge Project

Cameco Corporation, Projet Beaverlodge

Application to amend its licence to allow release of 18 Beaverlodge Project properties from CNSC licensing

Demande de modification du permis de Cameco visant à retirer 18 propriétés du projet Beaverlodge du contrôle de la CCSN

Commission Public Hearing

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Saskatchewan Environmental Society

COMMENTS FOR THE MARCH 2022 HEARING ON CAMECO APPLICATION TO AMEND ITS LICENCE TO ALLOW RELEASE OF 18 BEAVERLODGE PROPERTIES FROM CNSC LICENSING

Prepared for submission to the Canadian Nuclear Safety Commission

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ABSTRACT

The following are comments from the Saskatchewan Environmental Society (SES) to the Canadian Nuclear Safety Commission (CNSC) on Cameco's 2021 request to remove 18 further properties from its Beaverlodge Licence.

SES first discusses a number of issues that have been raised at previous hearings and to which satisfactory responses have not been provided. These issues are relevant to the present request.

The CNSC's 2019 Beaverlodge Decision Document is then reviewed to identify questions and requests that the Commission asked Cameco to respond to in its next proposal for release of Beaverlodge properties.

The need to consider rewriting of the Performance Objectives and criteria for release is discussed, and some questions about the Institutional Control Program (ICP) follow. The adequacy of gamma radiation level restrictions is questioned, given the possibility of future increased population density and changing land use.

Issues at some specific properties are reviewed and recommendations are offered. Conclusions and a summary of recommendations are provided.

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1. ISSUES RAISED PREVIOUSLY AND STILL REQUIRING ANSWERS

For several years SES has been a keen observer of the Beaverlodge site as well as other sites in northern Saskatchewan that are in the process of decommissioning, remediation or re-licensing. Some issues which keep recurring have not been adequately responded to, including some that were raised during the 2019 Beaverlodge hearing and which are still relevant in the current situation.

a. Estimation of human exposure

In order to assess risk at locations where contaminant levels exceed guidelines, Cameco has interviewed residents of Uranium City about their current use of the land in question. Generally they find that because current residents tend to not spend more than 2 or 3 weeks a year on the site, their annual exposure to gamma radiation is well below the permissible 1 mSv/year. Cameco and the CNSC refer to a single "reasonable use scenario", a scenario that implies only an indefinite continuation of hunter gatherer use by a small number of people, and thus it is concluded that elevated levels of contaminants are acceptable.

We suggest that an alternative "reasonable use scenario" should be examined. In this alternative scenario, perhaps a few decades in the future, climate change has made southern regions of the prairies more difficult to live in. Many coastal areas of Canada have been evacuated because of sea-level rise, flooding and a sharp rise in extreme weather. Refugees from other parts of the world are crowding into Canada, and the United Nations is asking Canada to accommodate increasing numbers as many developing countries face severe consequences from climate change impacts. Suddenly northern Saskatchewan looks like a fairly attractive place to live. The warmer climate is causing changes in vegetation and habitats. The population of the region is steadily increasing, with many people able to work remotely from year-round homes in the north. At the rate that the impacts of climate change are being observed, this scenario is not just something that could happen in the distant future but is a reasonable possibility within a few decades and will become more and more likely in the centuries ahead.

Taking such a scenario into account, we suggest that risk assessment should include concern about significantly increased land use intensity in the future.

b. Cost calculations for future monitoring and maintenance

We have previously raised a concern about the way in which financial guarantees required for future monitoring, maintenance and unexpected events are calculated. We repeat what we said in 2019:

"There are four major factors that, at a minimum, cause anxiety for a non-economist in the discussion and calculation of the necessary financial guarantees.

i. First is the assumption that the average inflation rate for the past 10 years can be used to predict future inflation rates over the next 50, 75 or 1,000 years. (Suppose we had made such an assumption in 1019!).

ii. Secondly, the assumption of a constant (or average) economic growth rate over a very extended period of time is hard to take seriously. Two percent may look like a conservative figure compared to the past few years, but to assume that the economy will continue to expand *ad infinitum* at this rate surely appears unrealistic.

Both of these issues point to the huge uncertainty about what sum needs to be put aside now to guarantee the ability to cover costs that will be incurred many decades and centuries into the future.

iii. And thirdly, to a non-economist it is mysterious why the 1.58% inflation rate has been *added* to the 2% presumed growth rate rather than subtracting it in calculating the future value of the investment. Admittedly this is a complex issue and there is presumably a rationale to explain it. However, logic would seem to suggest that the value of our investment increases only to the extent that the interest *exceeds* inflation. Is this not true? We can assume that present costs for travel, materials, wages etc. will increase over time with inflation, thus decreasing the value of an uninvested 2019 dollar, and that we can overcome that problem only by investing that dollar at a rate that is higher than the inflation rate.

Although I am uncomfortable with the assumptions that have been made and am unconvinced that we will have a guarantee of future costs being covered, I am not in a position to offer more appropriate assumptions. I would suggest that we have to recognise that the economic future is very uncertain, and that we should not try to give the impression that the existence of "financial guarantees" actually *guarantees* anything. **We must admit that we are leaving behind unknown risks and uncertainties for future generations - and that perhaps, despite present good will, - the maintenance and monitoring and caring for unforeseen events may flounder because of inadequate resources.**

c. <u>Risk to non-humans</u>

We have not seen data to support the conclusion that gamma radiation levels measured one metre above the ground will adequately reflect the risk to small animals. We do not appear to be measuring ground-level alpha levels. This concern is particularly relevant to those areas that are not currently monitored for gamma because of difficulty in access. While difficulty in access may well, for the time being, deter human use of such areas, small animals and other organisms will not experience restricted access**. It will also be important to consider ecosystem changes that may result in habitat changes for some species, resulting in changes in their vulnerability.**

d. Hot spots and averaging of data

The current Beaverlodge Site Closure document (2021) again bases estimated gamma exposure on measurements taken on 10X10 metre areas that are then averaged over a one ha. area. **It is unclear how the one-hectare areas are chosen, whether they overlap, and just where the hot spots are. It would seem that some of the elevated radiation levels get hidden in the averaging as far as the public is concerned. Is the public informed of the locations of hot spots?**

e. Responsibility for the distant future

Considerable care has been devoted to ensuring that current users of the Beaverlodge lands can safely pursue their present lifestyle. However, it is not clear to what extent Cameco and the CNSC extend the same sense of responsibility for land users in the distant future. And of course this is difficult to do, given all the unknowns about the future, including the unknown efficacy of regulatory systems and record-keeping into the next millennium. **This suggests a need to leave these properties in a condition that will not be dependent on uncertain future intervention. An undue reliance has been placed on the ICP's ability to carry out maintenance and monitoring tasks thousands of years in the future.**

2. RESPONSES TO RECOMMENDATIONS IN THE 2019 DECISION DOCUMENT

The 2019 Beaverlodge Decision Document included some recommendations for items that should be addressed by Cameco in future proposals. We note, for example, questions about the lifetime of grout used in closing drill holes and about chemical toxicity of uranium. There was also a suggestion by the Commission that the land use study used in the 2019 project was not fully representative of land users. Noting that areas with radiation hot-spots will require administrative controls, the Decision Document recommends that Cameco and Saskatchewan should collaborate in determining a mechanism for such control. We would ask for a report on the progress on this task.

We suggest it would now be helpful if a summary of the CNSC's 2019 recommendations and requests were provided, along with a description of how each has been responded to in the current Cameco submission.

3. PERFORMANCE OBJECTIVES

This is a difficult issue. Decisions were reached several years ago about criteria that would be used to determine the eligibility of properties for release to the ICP. The Framework document says that if nothing more could reasonably be done to mitigate risk beyond natural recovery, it is appropriate to apply for transfer to the ICP. The key word is "reasonably", a term that is very open to interpretation. At a 2012 Remedial Options Workshop, local residents were presented with a list of potential remediation options along with the expected cost and benefits of each. There was previously an indication that the workshop ran out of time, and that not all options were fully explored. However, the

workshop results were used to develop the Path Forward, which presented the following criteria for release of a site:
The site is to be:

- Safe, for unrestricted public access,
- Secure, with acceptable long-term risks, and
- Stable/improving, with environmental conditions on the site and downstream stable and naturally recovering as predicted.

It may be time for the CNSC to re-consider the adequacy, or the wording of these criteria, particularly the third one. The provision that the environmental conditions on the site be stable and *recovering as predicted* means that a site such as HAB2, with Ra 226 levels predicted to remain ten times above guidelines for the indefinite future, is regarded as stable and improving. **The fact that the predicted improvement is almost immeasurably slow, and that the contaminant level will remain almost unchanged at a very high level for centuries, does not appear to concern the regulator. The contamination level is more or less stable (at a very high level) and it is extremely slowly improving. Therefore, the stable/improving criterion is met. We are not satisfied with this situation.** Presumably it has been concluded that no *reasonable* options for remediation exist**. Again, we suggest that the word 'reasonable' is too vague to be part of a regulatory statement.**

The second condition, that the site be secure, with acceptable long-term risks, again presents a semantic problem. Long-term risks acceptable to whom? What percentage of the present population has to consider the risk acceptable? Who is the proxy for the future occupants of the land? **'Acceptable' is not a scientific term.**

The first condition, the requirement that the site be safe for unrestricted public access, leaves open the question of how the public can be warned about remaining hazards into the indefinite future. There has been much discussion elsewhere, particularly around plans for high level waste management, about the feasibility of creating warning systems that will last for millennia. The precautions, restrictions, avoidance of radiation hot spots and limiting the time spent on the site, are much less dramatic here, but still require attention. **We need to clarify just how the sites are to be made safe for unrestricted access.**

4. ICP REGISTRY

At the time of writing, the Registry on the public website of Saskatchewan's Institutional Control Program shows no entries since 2012. Does this imply that the properties released to the ICP in 2019 have not yet been transferred? If so, what is causing the delay, and who is currently responsible for these properties? **We suggest that the CNSC ask the ICP for an updated report on the status of the properties released in 2019 and that this information be reported to the public.**

5. GAMMA BACKGROUND

The CNSC staff report (p31/137) notes that a background level of 0.14 µSv/hr is assumed for the entire site. Year-round exposure to this level would seem to result in a dose of 1.226 mSv/yr, which is already slightly above the guideline for the public. Presumably our bodies do not distinguish between background levels and levels due to mining/milling activity, so we should be looking at the combined exposure from both sources**. As estimated background levels apparently already lead to exposure over the guideline for anyone who might live year-round in the region, in allowing an additional 1 µSv/hr over background, we are permitting a level of exposure to a year-round land-user of about nine times the guideline. This may well be significant with future land use changes. We suggest that the exposure level for potential future year-round occupants be taken into account in determination of safe levels of gamma radiation.**

6. COMMENTS ON SPECIFIC PROPERTIES

a. HAB Mining Area

Water quality measured at the outflow of Pistol Lake is stated to be suitable for traditional recreation use and would "likely pose no risk to a visitor."

However, we note particularly Fig 3.1-2 in the Cameco submission which shows a **Ra226 level associated with HAB2 that is projected to remain ten times the guideline into the indefinite future. It is interesting that the CNSC staff report does not comment on the implications of this. We question whether this is an acceptable condition, given unknown future land use. We recommend that HAB2 not be released until this problem is resolved.**

b. Dubyna Area

The EMAR1 property on the west shore of Dubyna Lake included 2 drill holes with artesian potential. As these are now sealed, we need to know whether the underground water will seek an alternative route to the surface, possibly outside the Beaverlodge site. Water quality measured just downstream of the lake appears fairly satisfactory (although uranium levels are projected to remain a bit above guidelines). **But it would be interesting to see what the contaminant levels are in the lake itself and in its sediment, given that mine water was discharged into the lake. We question whether potential groundwater pathways are sufficiently well understood to project future behavior of underground water when previous exit routes have been blocked.**

c. Lower Ace Creek Area

Eight properties in this area are proposed for release**. Some hard-to-access tailings spills have been left in situ "to avoid greater environmental damage". The data and rationale for this decision are not provided. Please provide this analysis.**

As was the situation at Pistol Lake, Watson Lake on the ACE14 property is deemed to be unlikely to pose risk to occasional visitors (from short-term consumption of drinking water). This ignores the possibility of more intense land use in the future.

On the ACE1 property there are areas of spilled tailings that exceed gamma exposure guidelines, but this is considered acceptable given the "reasonable land use scenario" that has been adopted. (See above).

A similar situation is found on ACE9 where a steeply-sloped and heavily vegetated area did not meet gamma guidelines but was not remediated. We will see similar **compromises being made on several of the Beaverlodge properties, based on the assumption that no one, now or in the future, will spend more than 45 days on the property. We do not consider this a valid assumption.**

ACE1 also includes 2 raises that had previously been covered with waste rock and which now appear to be under water. This again elicits the question of underground movement of flooded mine water which could potentially emerge to the surface at some distance from the site. How well is the groundwater hydrology in the area understood?
The CNSC staff report notes gamma levels up to 3 µSv/hr above background on the ACE MC property, but as exposure doses were calculated based on levels averaged over 1 ha, this was deemed acceptable.

The EXC URA7 property is said by Cameco to have hosted no mining or milling activities, and therefore it has been assumed that all gamma levels on this property are natural background. However, the 2021 Final Closure Report (p 125, 141/275) notes that empty barrels and remnants of building structures were found on the site. Where would these have come from if not from the earlier uranium operations? It appears that radiation levels on this property were not actually measured, so we don't know whether or not they exceeded the assumed 0.14 µSv/hr background level or to what extent the levels are indeed entirely natural. We request clarification of the historic use of EXC URA7 and a gamma survey of the property before release is approved.

Incidentally, we note what is presumably a typo in the URA4 description. The Cameco submission (p. 39, 42/61) describes the property as being located northwest of Beaverlodge Lake. The map indicates that it is north-east of the lake.

d. <u>Verna/Bolger area</u>

As in other properties, short-term consumption of drinking water from Up and Zora Lakes is reported to be unlikely to pose risk to humans. We again question the assumptions about future land use.

On the ACE7 property a portion of the waste rock pile extends into Verna Lake but is not considered a significant source of Ra, U or Se. We would like to see the justification for this assumption.

e. Tailings Management Area

The GC2 property contains tailings spills that have been covered where accessible. Cameco reports that an assessment was made of whether remediation was needed on inaccessible areas. They do not comment on the conclusions they reached or how these conclusions were reached.

7. CONCLUSIONS AND RECOMMENDATIONS

We recognize that Cameco and the CNSC face very difficult challenges in addressing historic problems that have resulted largely from past ignorance on the part of industry, governments and the general public. While it is unfortunate that the cost of remediating past mistakes now falls on the current generation who have a better understanding of the problems, and better tools for analyzing them, this does not justify us passing the responsibility forward to our great- great- grandchildren and their descendants. Cleaning up after oneself is just one of the costs of doing business.

The following is a summary of actions we suggest should be undertaken with respect to the properties being considered for release. Most of them are motivated by the need to take responsibility not only for the well-being of current land users, but also of those who may use the land more intensively in the future.

1. Areas where there were spilled tailings but which have not been surveyed because of difficulty of access should be surveyed and remediated where appropriate. Disturbed vegetation will recover. Properties that include such areas should not be released from CNSC oversight until this is done.

2. Human risk assessment should be re-calculated with changed assumptions about what constitutes a "reasonable" future land use scenario.

3. It should be publicly acknowledged that the huge uncertainty about future economic, social, and political conditions mean that it is not possible to guarantee that proposed monitoring and maintenance will actually be carried out in the distant future. We need to determine that the risk of regulatory failure is recognized and taken into account in decision-making. This may mean investing in further levels of remediation that have so far been considered to be non-cost-effective.

4. Details should be provided about how the public will be responsibly informed into the distant future about remaining hazards and precautions needed in interacting with the environment.

5. Performance objectives should be re-examined with the goal of clarifying subjective, vague language. "Reasonable" and "acceptable" are not scientific terms. CNSC should consider whether they really want to accept that an on-going contaminant level that falls within the predicted range, even though it is many orders of magnitude above guidelines, is a valid measure of safety.

6. The quality of underground water in flooded mines should be published. The potential routes by which contaminated water could reach the surface, even at some distance, should be examined.

7. We have not seen data to support the conclusion that gamma radiation levels measured one metre above the ground will adequately reflect the risk to small animals. It will be important to consider ecosystem changes that may result in habitat changes for some species, resulting in changes in their vulnerability.

8. We suggest that the CNSC and the ICP provide an updated report on the status of the properties released in 2019 and that this information be reported to the public.

9. Given that the Ra226 level associated with HAB2 is projected to remain ten times the guideline into the indefinite future, we recommend that HAB2 not be released until this problem is resolved.

10. Contaminant levels in Dubyna Lake sediment should be published prior to a decision to release the EMAR property.

11. The EXC URA7 property is said by Cameco to have hosted no mining or milling activities, and therefore it has been assumed that all gamma levels on this property are natural background. However, the 2021 Final Closure Report (p 125, 141/275) notes that empty barrels and remnants of building structures were found on this site. It appears that radiation levels on this property were not actually measured, so we don't know whether or not they exceeded the assumed 0.14 µSv/hr background level or to what extent the levels are indeed entirely natural. We request clarification of historic use of EXC URA7 and a gamma survey of the property before release is approved.

12. We suggest it would now be helpful if a summary of the CNSC's 2019 Decision Document recommendations and requests were provided, along with a description of how each has been responded to in the current Cameco submission.