



**Written submission from the
Saskatchewan Environmental
Society**

**Mémoire de la
Saskatchewan Environmental
Society**

In the Matter of the

À l'égard de

Beaverlodge Project

Application to amend the Waste Facility
Operating Licence to allow for the removal
of 20 properties at the Beaverlodge Project
from its licence

Site Beaverlodge

Demande pour modifier le permis
d'exploitation d'une installation de gestion
des déchets pour permettre le retrait de
20 propriétés du site Beaverlodge de son permis

Commission Public Hearing

Audience publique de la Commission

October 2, 2019

Le 2 octobre 2019

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Saskatchewan Environmental Society

Comments to the Canadian Nuclear Safety Commission regarding: Cameco's application to amend the Waste Facility Operating Licence to allow for removal of 20 properties at the Beaverlodge Project from its licence

Prepared by the Saskatchewan Environmental Society

Submitted to the CNSC: 3 September 2019

INTRODUCTION

In reviewing Cameco's request to have 20 of the Beaverlodge properties released from licensing by the Canadian Nuclear Safety Commission (CNSC) we have reviewed the following documents:

- Cameco: Application to amend the Waste Facility Operating Licence to allow for removal of 20 properties at the Beaverlodge project from its licence, August 2019.
- CNSC staff: Comments on Cameco request for release of 20 Beaverlodge properties from requiring licensing, July 2019.
- Kingsmere Final Closure Report Beaverlodge Properties, March 2016
- Kingsmere Addendum to Final Closure Report and response to CNSC, April 2016
- Kingsmere Addendum #2 to Final Closure Report, Financial Requirements and Gamma for Bolger 2, November 2016
- Kingsmere Final Closure Report Beaverlodge Properties, April 2018
- Government of Saskatchewan, Reclaimed Industrial Sites Regulations/ICP Regulations.
- SENES Response to CNSC comments on QSM Part A report, 2012

Overall, we detect an unjustified attitude of assurance about the long-term future of some of these properties. We question some of the assumptions on which decisions have been made by Cameco and then supported by CNSC staff.

We first provide some general observations and concerns that are not specific to any one particular property. This is followed by comments and questions about some individual properties about which there are remaining concerns.

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GENERIC ISSUES

Our general concerns fall into the following categories:

1. Future human land use: In several cases, surveys of past and current use of specific land areas are used to evaluate public safety risk. It is assumed that current low levels of human land occupancy will remain unchanged into the indefinite future, and that contaminant levels above guidelines are therefore acceptable. As the global climate changes, we should expect populations to migrate northward, resulting in more intense land use in presently sparsely populated northern regions.

2. General absence of reference to ecological /wildlife risks: We are provided with no basis for assuming that residual contaminant levels will be insignificant to non-human organisms. This is particularly relevant for the various locations where tailings spills have been left uncovered *in situ*, this being justified on account of the contaminated area being difficult for people to access or because vegetation has become established. Neither of these factors will restrict access by animals, birds or insects. We did not find adequate reference to studies that would justify ignoring this issue.

3. Gaps in walking inspection tracks: In several properties the text reports that walking inspection tracks were 7 - 10 metres apart except where safety or accessibility made this impractical. The accompanying maps of the tracks sometimes show areas where tracks are much further apart, e.g. 100 metres. Given the apparent difficulty in carrying out a comprehensive visual inspection, what assumptions are made about the condition of the uninspected areas?

4. Downstream monitoring of water quality: In several cases no water monitoring is to be required before eventual transfer of all of the properties. In fact the wording is often ambiguous about an apparent gap in monitoring between transfer of a specific property and development of a regional monitoring program after all transfers take place. This is explained on the basis that a separate downstream water monitoring process will take place once all the properties are ready to be transferred. We understand that while, in general, it is difficult to assign responsibility for contaminants appearing in say Ace Lake or Beaverlodge Lake to a particular property, it is important to know whether a property, particularly if it is adjacent to a water body, is contributing contaminants to surface water, either by groundwater transport or by surface run off. Should this not be established before a property is transferred?

5. Crown pillar stability: Several of the properties are designated to have crown pillar stability monitored under the IC program. Will this be done simply by looking for subsidence (which would presumably indicate that a pillar has probably already collapsed), or is there some way that the condition of crown pillars can be inspected from the surface? What remedial action would be taken if it were found that a pillar was in poor condition? Most of the risk assessments say that there is a "low risk" of subsidence occurring; how is "low risk" defined in this context?

6. Hydrological information gaps: We repeat here the concern that we raised in our 2013 submission regarding the re-licensing of the Beaverlodge site at that time.

In reviewing the Quantitative Site Model (QSM) in 2012, D. Kristoff of Saskatchewan's Ministry of Environment commented on the lack of data on minewater characterization. Cameco's response at that time (via SENES) acknowledged the lack of success in collecting site-specific minewater samples and the decision to use data from flowing boreholes to represent minewater. Kristoff also drew attention to the situation at the Hab mine site where it appeared that much of the Beatrice outflow had been disappearing from below a waste rock pile into the old underground workings. The QSM

records the fact that the Hab mine was quite wet over its operating period and that minewater may still be discharging to the surface via various openings – *but that this cannot be verified*. The Flowing Borehole Closure Report (February 2010) discussed changing water levels in the Ace/Fay shaft. It noted that *there was not sufficient information to confirm connections between the underground workings and surface water bodies and drainage systems*.

These observations raised the issue of the uncertainties around the underground movement of contaminated water. Some of the contamination was simply from the flooding of underground mine workings, but some was from the tailings that had been disposed of in old mines. Clearly some of this minewater had been making its way to the surface through flowing boreholes, many of which were then in the process of being closed off. What still seems to be unclear is whether there are longer or slower underground pathways that could bring further contamination to the surface in the future at more distant locations. As the existing boreholes are sealed off, we need to consider the alternate pathways that the minewater will find when those exit routes are no longer available. The Flowing Borehole Closure Report commented with respect to the Ace/Fay shaft, “Given the extensive underground mine development, flow that was reporting to the surface via boreholes prior to packing may have numerous alternative pathways within the underground workings and natural faults.” It is not clear that we know enough about the underground workings and the regional underground hydrology to be sure that any new exits to the surface will necessarily be close to the mine footprint. Nor can we know what timeframe is appropriate to assume for new pathways to be established.

It would be appropriate now to provide an update of knowledge about the underground hydrology of the site, what has been learned since 2013.

7. Calculation of financial guarantees: 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) 2% economic growth rate over a very extended period of time is hard to take seriously. This 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. It is hard to take seriously the claim that an investment of one cent now will cover the costs to replace stainless caps on mine openings 1200 years from now.

- iii. And thirdly, to a non-economist it is mysterious why the 1.58% inflation rate has been added to the 2% growth rate (presumably the interest on investments) 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.

I would like to see the whole calculation and its basis of assumptions reviewed by a couple of independent economists, with the results of such a review being made public before any decision to release the properties is made by the CNSC.

iv. A fourth concern about financial guarantees is triggered by a statement in Cameco's submission (p. 55, (59/62)) which says "*As the obligations and liabilities associated with this site have been accepted by the Crown **there is no need to maintain a financial assurance** for the maximum potential failure event for these properties*". Less conviction about this is communicated by Kingsmere 2018, p. 105 (107/119), which warns that "*As the financial liability for the former Beaverlodge Mine and Mill lies with the Government of Canada, a financial assurance **may not be required**. However, an acknowledgement of liability based on the unforeseen event above should be received by the Province of Saskatchewan from the Government of Canada as properties are being transferred.*"

The need to clarify in legal documents which future expenses are whose responsibility is reinforced in light of Saskatchewan's past difficulty in persuading the Government of Canada to pay its share of the costs of remediation of an old uranium site (Gunnar). This clarification must be written in unambiguous language.

8. Ensuring maintenance of long-term responsibility: Quite apart from the huge uncertainty about future financial needs and availability, we need to consider the likelihood that future social and political changes could well make our present regulatory systems irrelevant or non-functional. Some of the properties to be transferred will require that future land use restrictions be adhered to under Institutional Control for the indefinite future. How can we be assured that the tools and resources for such restriction will be there a hundred years from now? What is the mechanism to ensure that the knowledge of required future maintenance tasks will not only still be available and readily accessible, but will also be in a position to enforce action? How can we guarantee that funds currently designated for care of these sites will not end up being shifted to some other purpose? Obviously such questions cannot be answered with any assurance.

SPECIFIC SITE ISSUES

HAB 3: The CNSC Staff report notes elevated U and Ra levels in Pistol Lake, a portion of which is on this property. Water monitoring is to continue until transfer, but there is no requirement for this to continue during the period between this transfer and final release of all the properties (at which time apparently a water-monitoring program will be discussed). Is this gap in water monitoring appropriate? The underground mine was allowed to flood – have we looked for potential impacts on groundwater that has not yet reached the surface and which may eventually emerge some

distance away? In particular, do we know what alternative escape routes groundwater may find after known boreholes are sealed?

Kingsmere March 2016, p. 20 (31/187) fig 3 shows the walking inspection track. It appears that the south western side of the property was missed, presumably because of inaccessibility. Note that additional boreholes were discovered in the 2015 inspection – what are the chances that more would be found if yet another inspection were to take place?

It is suggested that monitoring under IC should include checking the crown pillar condition. How will this be done? Also the state of vegetation is to be inspected; what might such inspection reveal and how would any changes be interpreted?

HAB 2A: Kingsmere 2018, p. 95 (97/119) says that “ Cameco concludes that...the ecological risks are sufficiently managed to acceptable levels”. What evidence has been presented to CNSC to support this conclusion?

According to CNSC staff (CNSC staff p. 24 (31/118) the steel-capped mine opening will need engineering inspection every 50 years, presumably for ever. How will Saskatchewan ensure that this will happen? Even more problematical is the requirement to replace the steel cap after 1200 years. To assume that any regulatory authority will be in a position to undertake this task in the year 3039 is hardly realistic.

Cameco proposes that the estimated 2018 cost of \$2500 (which sounds minimal) to replace each stainless steel cap in 1200 years can be covered by an investment of \$0.01. The assumptions behind this conclusion must be challenged. Kingsmere 2018, p. 95 (97/119) indicates a low/medium risk of premature failure of the cap, which would mean an earlier replacement requirement with associated financial implications.

As noted above in our general comments, there is a need to clarify the future responsibilities of the Government of Canada. Kingsmere 2018 p. 105 (107/119) warns that “As financial liability for the former Beaverlodge mine and mill lies with the Government of Canada a financial assurance may not be required”.

JON-ES: Kingsmere 2018, p.85 (87/119) notes an overall residual risk of premature vent-raise cap failure as med/low, with severity consequence rated major. As drainage from this property ends up in Beaverlodge Lake this could raise issues beyond the actual property.

Kingsmere 2018 p. 79 (81/119) reports that gamma levels averaged over 1 ha reached a maximum of 1µSv/hr above background. To achieve this average would indicate that individual locations within some of the 1 hectare areas were above 1 µSv/hr. Have these spots been addressed?

BOLGER 2: Kingsmere March 2016, p.83 (94/187) and CNSC staff p.30 (36/118) report that the 2014 gamma survey showed that someone would have to spend 2 weeks on the part of the site with elevated gamma levels of 1-3 µSv/hr in order to exceed the allowable public dose limit. Although present land occupancy indicates that such residency is currently unlikely to take place, we cannot assume that it will remain so in the future. The likelihood of future land use changes has been generally ignored in public safety evaluation.

Kingsmere March 2016 also points out p. 86 (97/187) that elevated levels of U and Ra226 in waste rock on this property indicated an increased potential for leaching of those elements, an indication that was confirmed by shake flask extraction tests. The implications of this observation need to be

described. We note in the same document p. 89 (100/187) that the suggested IC inspection and monitoring requirements do not include any radiation monitoring – why is this the case, given the potential for leaching?

URA MC: Kingsmere March 2016, p. 115 (126/187) reports that boreholes adjacent to this property “exhibit, or have potential to exhibit, flowing artesian conditions in which groundwater associated with flooded underground mine workings have been reported to the surface”. These boreholes have been grouted. Presumably this groundwater will now seek an alternative route which needs to be identified. This property is currently used by humans up to 40 hrs/yr, a not insignificant time which may well increase.

EXC ACE 1: Kingsmere March 2016, p. 127 (138/187) reports that spilled tailings were covered with 60 cm of waste rock, leaving some areas (p. 129 (140/187) with excess gamma levels of 1-3 $\mu\text{Sv/hr}$. Areas that had established vegetation were left undisturbed. The area is apparently very wet and hard to access, but is close to the Uranium City airstrip. There are exposed, vegetated tailings (p. 131 (142/187)) in the SE corner of property. However, suggested Inspection under IC (p. 134 (145/187)) doesn't include radiation monitoring, which seems strange. Big gaps in the walking inspection track p. 128 (139/187) exist in the SE and NW parts of property. Parts of this blank area seem to coincide with the uncovered tailings area.

ACE 10: Kingsmere March 2016 p.137 (148/187) says in the text that visual inspection was conducted by walking a pattern with a separation of approximately 7-10 m between tracks unless access was a problem. However the accompanying map indicates 100 m separation between sections of the track. What are the implications of such gaps?

ACE 2: Kingsmere March 2016, p. 143 (154/187) shows that this property contained a tailings pipeline. Sixty cm. of waste rock has been placed over accessible spills, while vegetated areas were left undisturbed. Concern about the permanence of this cover and the accessibility of the vegetated areas is raised because the road from the Uranium City airport to the Beacon Bible Camp intersects the ACE 2 property, possibly making it vulnerable to exploration by curious kids. Again, curiously, recommended inspection p. 151 (162/187) under IC doesn't include radiation monitoring. No water quality monitoring prior to transfer is planned although the property borders Ace Lake. They note that downstream monitoring will be dealt with separately but no details are provided.

EAGLE 1: Kingsmere March 2016, p. 62 (73/187) indicates that the flooded 12-zone pit, which is beside the road, appears to have no surface connection with regional water bodies. However (p. 73 (84/187)) uranium and Ra concentrations in the pit water don't meet guidelines. If the pit were to overflow, this contaminated water would go to a wetland area. For an overflow to take place would require a significant increase in water volume in the pit, a situation that could occur with the projected future changes in precipitation patterns. What about groundwater connections to flooded pit?

A 2001 survey (p.67, (77/187)) showed one spot with 10.74 $\mu\text{Sv/hr}$ gamma. It appears this was just covered with 30 cm of till. Is this considered adequate?

RA 6 and RA 9: No water quality monitoring is suggested as part of the IC inspection plan prior to transfer of all Beaverlodge properties although waste rock piles on this property extend into both Beaverlodge and Martin Lakes. Noting that the grate on the Martin Lake side adit will need replacement in 75 years, we would like to see SMER's plan for keeping track of this over the next 75 years – and presumably every 75 years thereafter. It is reported Kingsmere March 2016 p. 51 (62/187)

that a 2010 gamma survey on the Beaverlodge Lake side showed a 4.26 µSv/hr reading on waste rock on the old access road. There is no reference to this being remediated.

URA 3: Kingsmere 2018 p. 44 (46/119) concludes that premature failure of the steel raise cap is very unlikely but is described as being of major severity for Public Health and Safety. It is interesting that while their modelling identifies the overall residual risk as medium/low, they suggest that more realistically it could be regarded as negligible. This seems to suggest that their faith in their risk assessment is limited and that they feel free to contradict its conclusions when these are inconvenient. This is another property where a steel cap is predicted to need replacement after 1200 years. The virtual impossibility of successfully planning for this event, both in terms of ensuring that it happens and the likelihood of needed funds being available, has been discussed earlier.

URA 5: In Kingsmere 2018, p. 55 (57/119) we read, "Based on observed conditions in 2016, the property contains legacy tailings which will require future monitoring to verify that IC land use restrictions are being adhered to". Saskatchewan's plan for controlling land use for several centuries to come needs to be reviewed before transfer is approved. Also the basis for the conclusion that no maintenance will be required should be explained. Small, heavily vegetated areas with 1-3 µSv/hr excess gamma levels are considered little risk to public as they are accessible only by foot. The risk to wildlife does not seem to be discussed.

EXC URA 5: Waste rock slope failure is projected to pose medium/low overall risk, and yet it is claimed that no maintenance will be required. Although the slope is to be inspected, presumably there is no budget allocation for maintenance, leaving any required maintenance to be covered by the unforeseen events fund. This points to the need to clarify the distinction between foreseen and unforeseen events, and likewise between unforeseen events and "maximum failure events".

Again we have small areas, relatively heavily vegetated, with elevated gamma levels, (Kingsmere 2018, p. 52, (54/119) where there is a suggestion that this presents a "low" environmental risk, but we do not see the basis for that conclusion.

CONCLUSION

We have raised several questions about the future management of the Beaverlodge properties as they are released from CNSC licensing requirements. Some of these questions simply reflect apparent information gaps and we will hope to receive answers.

Others are more fundamental, dealing with issues of major uncertainties about the distant future – uncertainties about geo-political systems, about climate and population movement, about movement of groundwater, about regulatory capacity, about economics. These questions are often difficult to respond to. Nevertheless they must be addressed as decisions are made about how best to protect future humans and other living beings from the impacts of past industrial developments.

While some of the properties that Cameco seeks to have released appear to be in a condition where they can be effectively managed under the IC Program or free-released, we suggest that those identified as requiring long-term management should remain the responsibility of the best-equipped regulatory body available, i.e. the CNSC. Examples of such properties are HAB 2A, JON-ES, BOLGER 2, EXC ACE 1, ACE 2, EAGLE 1, RA 6 & 9, URA 5.

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- Cameco: Application to amend the Waste Facility Operating Licence to allow for removal of 20 properties at the Beaverlodge project from its licence, August 2019.
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