

Submission to CNSC from Saskatchewan Environmental Society regarding

WNSL Phase II hold point release to proceed with the Gunnar Remediation Project “Other Site Aspects”

August 2016

The Saskatchewan Environmental Society appreciates the opportunity to review and comment on the second part of the Phase 2 Hold Point Release Decision Request in the preparations for the remediation work at the Gunnar site. We had requested such an opportunity for further public involvement in our comments to the CNSC during the original licensing review, and we are pleased that the Commission responded positively to our suggestion. We have already submitted our comments on the Tailings Remediation plan, and now present our review of the Other Site Aspects plan.

1. Long term security of the site

Our major remaining concerns are about the on-going maintenance and monitoring of the site over an indefinite future. The proposed remediation plan is predicated on the assumption that after several years of post-project monitoring, the site will become the responsibility of the Government of Saskatchewan's Institutional Control Program. We recognise that this will not happen until both the CNSC and the ICP provide their approval. However, we suggest that there is a need to consider the not-unlikely possibility that the province is deemed to lack the resources and/or expertise to manage the site in perpetuity.

The remediation plan as described is designed for a 100-year life. As the proponent points out, it would not be credible to suggest that design criteria can be met in geological time frames, although with appropriate on-going monitoring and maintenance they could be extended beyond 100 years. We contrast this with the Nuclear Waste Management Organisation planning for management of nuclear fuel waste, which assumed that the containment system needs to be secure without human intervention over the long term. There was a recognition in that process that it would be dangerous to assume that social, political and economic conditions a few hundred years into the future would be such that regular, effective maintenance could be assured. This necessitated coming up with a plan that offered a good expectation of remaining effective over many hundreds or thousands of years without human intervention. Given the nature of the wide distribution of contamination at the Gunnar site, such long-term stability would be extremely difficult to provide. But if the unavoidable risks and need for intervention were shared by a broader body, e.g. the Government of Canada, rather than being solely assigned to one small province, there would be a better chance of responsible management of the site into the long-term future.

2. Estimation of rate of erosion

Three questions arise about estimates of the rate of erosion of cover on the waste rock.

- a) The erosion analysis is presented as soil lost from the slope; not included is soil moved from one place on the slope to another – but won't the latter affect performance of the cover? It would leave "thin areas" that would be more permeable and that could alter the flow of precipitation down the slope.
- b) In the discussion of the optimization of waste rock grading and gamma cover, SRC's consultant states: 'It is not credible to suggest design criteria can be met in geological time frames, so a 100-year design was adopted'. A target soil loss of 3.5 cm in 100 years is used (Appendix H, p. 5). Going forward at this rate would translate into 35 cm of soil loss in 1,000 yrs. This represents a very significant fraction of the cover. Moreover, one wonders whether, once erosion starts, it may speed up, resulting in most of the cover being lost over a 1,000-year time frame?
- c) Assumptions about the intensity of future storm events are difficult to make in the context of climate change. The proposal plans for a 1 in 200 yr. event (climate change adjusted) that dumps 118 mm. in 24 hrs. We note that Fort McMurray received 80 mm. of rain in 2 hrs on July 31st of this year. How much more erosion damage does a given volume of rain do when it falls in 2 hours rather than 24 hours? One might anticipate that gully formation would be greater when the precipitation is more intense.

3. Fate of COPCs in Lake Athabasca

It is very positive that the rate at which contaminants, including uranium and radium, move into Lake Athabasca from the Gunnar site will significantly decrease as a result of the planned remediation. However, one has to assume that the accumulated load to the lake continues to increase, albeit at a slower rate. We would like to see a description of the fate of the uranium and radium after they enter the lake. How much ends up in sediment? In what chemical form? How much is taken up in algae? In phytoplankton? The current concentration of U in Zeemel Bay exceeds WQG. It is assumed that the reduced flow of U from Seep 1 will result in lower U concentration in the bay. But what is happening to the U currently in Zeemel Bay? Does some go to sediment? Will the load actually decrease or just increase more slowly?

4. Incomplete plans

Several important planning areas are still put off to the future. Significant among these are Failure Modes Effects Analyses (FMEAs) for contaminant loading to Zeemel Bay, for consequences of erosion of waste rock cover, for the pit, and for the waste rock design and channel. We find it difficult to evaluate the effectiveness of the proposed procedures in the absence of these FMEAs.

Also put off to the future are a monitoring and adaptive management plan for Catchment 3 and a monitoring program to assess and address residual risks associated with loading of COPCs from the pit to Lake Athabasca. We hope there will be an opportunity to review these as they are developed.

5. Miscellaneous questions

- a) Specifically how will waste rock be screened for use as cover material? There's an unclear distinction between 'pH-impacted rock that is destined for the GMT' and 'contaminated rock that will go to the landfill'. What if it is both contaminated and pH-impacted?
- b) What will be the Impact of putting pH-impacted soil and waste rock into GMT? Will the increased acidity affect the chemistry and mobility of the tailings?
- c) CNSC had questioned the adequacy of a 0.5 m cover for the waste rock and had asked about the possibility of using fine borrow material to deal with the inadequate supply of medium-textured material. SRC's response suggests that the 0.5 m cover is satisfactory because it reduces the U load by 56% (rather than minimizing it). It's still unclear whether *supplementing* the planned cover with fine borrow (rather than *replacing* coarse with fine) has a down-side. Could we improve the performance by adding some fine material above, below or mixed with the coarse material? The limitations of the erosion analysis (Att. 2, p.2) are noted with concern.
- d) Looking at the stability assessment of the waste rock piles and the plug between the pit and the lake (Appendix E, p.3) – does the friction angle change when the material is wet?
- e) U and Ra are entering the pit via both surface and groundwater. At what level does the groundwater enter – well above chemocline? How stable is the chemocline? How is the concentration at various depths changing with time? We assume that virtually all the water leaving the pit via the plug is from the surface layer, so won't the concentration of Ra in the pit remain unchanged or slowly increase? Does the flow of water in and out of the pit affect conditions below the chemocline? When concentrations of U and Ra in the pit are listed, how are they handling the non-uniformity with depth? Are the figures averages of concentrations above and below the chemocline?
- f) After the channel through the WR pile is constructed, surface run-off from Catchment 3 will no longer percolate through the EWRP, but won't this runoff still contain contaminants from Catchment 3 which will flow along the channel into Zeemel Bay? Will the Catchment 3 flow still run through the open ditch before entering the new channel through the WR? Does the ditch leak? Would a Permeable Reactive Barrier in the ditch capture such contamination before it enters the WR channel? It is assumed that COPC flows to Zeemel Bay are associated with the WRP footprint and not the sub-catchment area. What is this based on, given that Catchment 3 is known to be contaminated? By what route are U and Ra getting into Zeemel Creek other than via Seep 1 (EIS, App U, Table 7.1)?
- g) The schematic representation of the underground workings (Fig. 3) is quite unclear. We realise that very limited information was available about the underground mine, but the existence of this drawing suggests that there may be more knowledge of the extent and location of the underground work than has been indicated in the text. We would appreciate seeing what is known about the underground mine and would like an interpretation of the schematic drawing.

Based on the above concerns and questions, we offer the following recommendations:

Recommendations

- a. Design life: The Saskatchewan Environmental Society recommends that CNSC ask SRC to consider how Gunnar site remediation plans would change if the design objective were site stability for 500 years instead of the proposed 100 years. A 100 - year design objective places the Government of Saskatchewan in a position where further remediation of the Gunnar site is likely to become necessary in the 100 to 200-year time frame. This would constitute a level of intervention and financial obligation not anticipated by the current Institutional Control Program.
- b. Remedial objectives: In previous submissions we have expressed concern that the Site Specific Remedial Objectives which SRC is proposing to use are not sufficiently ambitious. We are therefore pleased to see that SRC will be adopting the Saskatchewan Environmental Quality Guidelines and the Guidelines for Canadian Drinking Water Quality as the basis for an assessment of remediation success at Gunnar over the long term. Furthermore, we suggest that CNSC use the SEQG and CDWQ guidelines as one of the important measuring sticks by which to assess remediation outcomes when considering any future application for transfer of the Gunnar site into the Institutional Control Program.
- c. Overall approach: Within the 100-year design horizon being planned for, the Saskatchewan Environmental Society finds the 'overall approach' that SRC proposes to take to site remediation to be sound. We support SRC's plan to reduce loadings to the Gunnar pit by removing low pH material at the Acid plant, remediating contaminated waste, and reducing the loading from the waste rock piles. We approve of the SRC proposal to consolidate contaminated soil/waste rock demolition debris into one landfill, and their plan to consolidate and cover non-contaminated demolition debris. We also support SRC's proposed plan for a gamma reduction cover over general site areas that have elevated gamma radiation levels.
- d. Waste Rock: The Saskatchewan Environmental Society supports the SRC proposal not to place waste rock in the Gunnar pit, but rather to re-establish the historic channel and to grade and cover the waste rock piles. However, we remain concerned that the proposed cover on the East and West waste rock piles will prove insufficiently thick and that its sides will be eroded over time. Moreover, the proposed average slope of 5.0H:1.0V may prove vulnerable to an increase in frequency and intensity of severe precipitation events in the future, despite planned efforts at vegetation and microtopography. We are also concerned that the projections being made about slope integrity do not adequately take account of potential impacts associated with significant 'soil

movement on the slopes' (as opposed to 'net loss' of soil from the slopes). We recognize that SRC is still working on the final landform configuration. We therefore recommend that more work be done to ensure the slopes and the cover of the waste rock piles will not be compromised, including increasing the thickness of the cover. We also suggest that SRC be asked to design the landform configuration for daily and hourly precipitation levels that reflect in today's terms what is considered a 1 in 500-year rainfall event. North America is already experiencing a growing number of exceptionally intense precipitation events, and as the atmosphere warms in the century ahead, there is a significant risk these will become more and more frequent.

- e. Record-keeping: It is going to be crucial that information about the history and condition of the site be maintained and accessible in perpetuity. Today's electronic records on Gunnar are likely to become difficult to pass on to future generations as new information technology is constantly evolving, and the transfer of key information into updated forms cannot be guaranteed, particularly over hundreds of years. We therefore suggest that CNSC, NRC, the Saskatchewan Ministry of Environment and the Saskatchewan Ministry of the Economy (and the institutions they transition into) maintain indefinitely in their records 'paper copies' of materials associated with the Gunnar site, as in our assessment this will increase the likelihood of pertinent information being passed on to future generations. We also recommend that the CNSC consult with the FSIN and the Metis Nation about ways in which knowledge of the Gunnar site can best be passed from generation to generation.
- f. Signage and deterrents: The Saskatchewan Environmental Society recommends that CNSC ask SRC and the Saskatchewan Ministry of Environment to give additional thought to how future generations will be warned not to inhabit the Gunnar site and to avoid consuming fish from contaminated waters. In the short term, annual maintenance of signage will help, but there is a high risk these arrangements will break down over decades and centuries. The possibility of using some form of physical barriers might be considered as an additional deterrent.
- g. Cost-sharing: The Government of Canada's failure to shoulder its fair share of the costs for the current remediation work at the Gunnar site is very troubling, particularly when the Government of Canada's actions, combined with its lack of regulation at the time of mine closure, are primarily responsible for current problems at the site. We again urge CNSC, as the federal regulator, to actively engage Natural Resources Canada senior staff on this matter, and to make recommendations on the issue of appropriate funding to the Minister of Natural

Resources Canada. Those recommendations should become a matter of public record.

- h. Long-term monitoring and maintenance: In addition to the current remediation work, there is the important matter of long term monitoring and maintenance, particularly when the site enters the Institutional Control Program. The Saskatchewan Environmental Society recommends that a special funding arrangement be facilitated by CNSC for the ongoing monitoring and maintenance of Gunnar and other decommissioned/remediated uranium mine sites in Saskatchewan at which the original mining of the uranium was initiated primarily by the actions of the Government of Canada. In these instances, we recommend that the costs of ongoing monitoring and maintenance of the sites be shared equally between the Government of Saskatchewan and the Government of Canada in perpetuity. This should be a condition of these sites entering the ICP. The plan we suggest would recognize the federal government's ongoing responsibility for the legacy it created, and would increase the likelihood that adequate monitoring, maintenance and remediation will be done at these sites in the centuries to come. The policy would apply to the Gunnar, Beaverlodge and Lorado sites. We find it unacceptable that the current plan is for the long term costs of monitoring, maintenance and future remediation to be borne solely by the Saskatchewan government and its taxpayers.
- i. Follow-up information which we recommend CNSC request:
- We suggest CNSC set a deadline for SRC to submit and implement a monitoring and adaptive management plan related to Catchment 3.
 - We suggest CNSC set a deadline for SRC to prepare Failure Mode Effect Analysis for: (i) contaminant loading to Zeemel Bay, (ii) significant erosion of the waste rock cover, and (iii) the plug between the pit and the lake.
 - We suggest that CNSC ask SRC over the course of the coming months to respond to the questions we have raised in this brief.

In closing, we want to commend SRC staff for their genuine efforts to reach out to and confer with stakeholders interested in the outcomes at the Gunnar site, and we want to commend CNSC staff for their impressive engagement efforts. SRC staff and CNSC staff have been diligent and good to work with. The consultative workshops that CNSC organized around the Gunnar remediation work have been excellent, and are a very desirable model for use in future CNSC review processes.

Thank you again for the opportunity to participate in this review process.

Sincerely,

Ann Coxworth

Saskatchewan Environmental Society

Peter Prebble