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Written submission from Steve Lawrence

Mémoire de Steve Lawrence

In the Matter of

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Application for the Financial Guarantee Review and Licence Modernization Amendments

Demande pour l'examen de la garantie financière et modifications aux fins de modernisation du permis

Public Hearing - Hearing in writing based on written submissions

Audience publique - Audience fondée sur des mémoires

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The premise of whether sufficient money is available for decommissioning greatly depends on the decommissioning plan. It was a serious error to omit the decommissioning plan from the original mine and mill environmental assessments because it would have determined how the mine wastes would eventually be taken care of.

The plan is to leave the sight as close as "reasonably achievable" to what the environment was originally, with no restrictions to access. The tailings area is to be secured with an engineered cover and revegetated. The tailings contain long lived, toxic radioactive material. The tailings are going to have to be monitored into perpetuity (1997 Report from the Joint federal Provincial panel on mine development in northern Saskatchewan, concerning cumulative effects on operating mines as well as considerations for Midwest and Cigar Lake mines). Leaving the tailings essentially on the surface is not a good plan for material that is going to remain toxic for a million years.

The PreCambrian shield was once a mountain range that has been eroded almost flat. I am sure if some modelling were done to show the effects of erosional forces over that time frame, that the engineered cover, along with the tailings would be long gone, through weathering and erosion.

Reasonably achievable sounds like an economic term to make the area accessible in the short term but that thin layer of dirt and whatever else is put into that engineered cover is not reasonable over the long term. The tailings still contain about 85% of the other radioactive material that the original ore contained, including about 5% of the uranium that was not recoverable. One could consider putting the tailings back underground but the ore has been ground into a fine flower and chemically treated to mobilize and release the uranium. The ore itself is part of a sedimentary deposit formed by radioactive elements, from the PreCambrian mountain range, dissolved in ground water which has percolating down into a fault zone where it precipitated out under conditions that concentrated and and combined them with other elements to form stable mineral compounds. Before the 'treated tailings flower' could be placed underground it would need to be recombined again into stable compounds that would stand the test of time.

Modelling would still need to be done to assure erosional factors would not prevail. Monitoring the tailings needs to be done over that same period of time. Even handling and processing the tailings at the time of decommissioning would be tricky. Again we have to cover our bases for a geologic time frame. Assuming this could be done, this would be the long term decommissioning scenario that has to be budgeted for. Future generations deserve this level of oversight.

Monitoring needs to be done in a predictive, scientific manner. Impacts are predicted and follow up monitoring is done to prove or disprove these impacts. If radioactive mineralization is found where it shouldn't be, that will need to be assessed and mitigated - over the long haul and the modelling theorems revised. However there are other additional parts of the decommissioning that need to be monitored 'predictively'. You can not just 'do' the required monitoring without

assessing the results for potential impacts or the effectiveness of the measures that are being presently taken (Schindler, Kelly et al 2010 report on the tar sands development). I am talking about the water, air, land, and the ecology which is subject to emissions and pollutants during mine and mill operations and may remain impacted for some time. The 14000 series of ISO is a series of programs for environmental management. 14001 is the basic model which provides guidelines for measures that could be taken by a company but don't necessarily have to be followed and which can be adapted to suit the needs of the operator. It does not provide any assessment tools to evaluate or assess the performance of their management efforts.

When I look back at the Beak study which was conducted on Hidden Bay in 1985 and which utilized data collected since 1974 (under the watchful eye of Environmental departments of both the federal and provincial governments), there are at least four red flags that popped up. There was no consistency in how the data was collected or the way it was reported and many errors in sampling and analysis technique were identified. Based on this, they eliminated most of the anomalous data. To me if I got some particularly high levels in my data that would be cause to go back 'immediately' and redo the monitoring at that location to confirm the results. Also, the fact that they were not more elevated readings should have been a concern, because if the pollutants were not in Hidden Bay, the question should have been asked – where are they and where should they have been looking to verify this. Lake bottoms are very soft and mushy. The clamshell sampler used for grabbing up bottom sediment samples gushes water as it is brought to the surface and it would it be difficult to define horizons when it is opened up to get a quality sample from a specific layer. There are samplers now available that will take a nice clean core sample that can be brought up intact, without releasing water, so that reliable data can be measured from a particular horizon.

I believe Cameco is now using TEK-OPS corers but only since 1998. Based on the data available Beak concluded, because of the mess the data was in, that they could not discern any trends – Politicians interpreted this as no significant environmental damage had been detected and expansion went forward on new mines.

Move forward to 2006. I was looking for some background info and found some of my assumptions were wrong. I assumed that pretty much all the uranium could be extracted at the mill but apparently at least 5% remains in the tailings. I also assumed that since Uranium was a heavy metal, it would settle out in the settling ponds before mill water was released to the environment – it seems that is also not the case. It is my understanding that once reintroduced into the environment, uranium will have potential impacts in its receiving environment for billions of years.

In 2006 the CNSC found that uranium and uranium compounds were entering into the environment at uranium mine and milling operations in concentrations that may have immediate or long term effects on the environment and biodiversity. At that time the effluent being released into the environment (Horseshoe) at the Rabbit Lake operations had averaged out at 1.7 metric tonnes of uranium per year. Also molybdenum, selenium and likely many other elements. They asked them to clean up their act and in 2007 CNSC Annual Report, the findings stated Cameco had managed to cut the uranium released back to 238 kg. – about an 80% reduction.

From 2006 to 2013 the reduction in uranium has actually averaged out to about 61%, according to Cameco. This means that over the 16 years to 2013, about 20 metric tonnes of uranium, as well as quantities of other elements, have passed into the environment at this one location. I don't know what results have been since 2013. the point is, if this had been a one time release event there would have been hell to pay. It also concerns me that this much was being passed into the receiving environment and no concerns were being raised. We can collect a lot of data, but if it is not analyzed, it is of no use. If they have not done it already, they need to do a mass balance analysis, using sediment sampling, to see if the amount of these materials entering the receiving body is remaining there or is moving on. If it is not there, they need to revise their modelling and confirm where it has actually ended up. I am assuming they are monitoring the runoff from waste and ore piles and leachate from the tailings. I think they should be measuring total loading into the environment, and not using surface water objectives which measure concentrations. Concentrations depend on volume of water, and in the case of radioactive elements, may not be a good measure of impact on the environment – dilution spreads the effects over a wider area. If the monitoring of emissions into the air and water are accurate, we will know the load onto the environment and should be able to predict impacts. If the impacts are other than those expected, their model needs correcting. If we are going to flood mine pits and open up treatment areas we need to know if predictive modelling has been carried out and what results are. We also need to know what happened to the stuff that got away before we can close the file. If we are going to make the area around the mines accessible to traditional food gathering we have to know that the surface environment is safe. I have heard stories that animal life is much more scarce in the region surrounding the mines, or that Northern Pike eggs have been found deformed around Key Lake, or the caribou no longer migrate down to the Wollaston Lake area, or much below the territorial border for that matter. Is this true and what efforts have been made to determine the cause – mortality from?, or simply the amount of activity around mines, or some other factor. Is all the alpha emissions from mine and mill ventilation and wind blowing off ore and waste piles a possible contributing factor?

We need to look at pathways for radionuclides and heavy metals – air, surface water, ground water, vegetation, effects due to ingestion by humans, wildlife, and fish, public health, epidemiological studies of all miners, past, present and future. We should be looking at all the physical and chemical linkages to help determine aerial extent, frequency, duration and certainty in predictions.

To me, what is even more important than what is going on in the present, is the fate of our tailings - the accuracy of our predictions in the present reflect on our predictions for the future. Also the actions and practices of the operators reflects on what we can expect and I feel the need for very strong oversight on how the proponent carries out this whole process. The big difference between the quality of the material in mill tailings and those wastes from a reactor is our mill tailings are not as radioactively hot or excited. Both are radioactively toxic for a very long time (geologic). The difference in the way we propose to handle them is: NWMO wants to bury the nuclear waste deep underground where, "hopefully", they will never be able to find their way back into the environment; the mines want to leave the very fine, more chemically mobile mill waste on the surface where it will certainly be exposed to the environment. Probably disposing of the mill waste into a surface tailings area is the most economical, efficient and safest way to handle the waste in the short term, but over the long term it is a recipe for disaster

and we are just delaying the release of all this material into the general environment around the mines. Yes, in the short term we can design the capping of the tailings to drain runoff away from the tailings.

I don't know what proponent's vision of their (soon to be ours) tailings area is, but my vision is, best case scenario, even if we managed the tailings and maintained them for hundreds of thousands of years, is that we would find the bedrock around them worn away and be forced to move the tailings to another site to forestall the ultimate destruction, by erosion, of the tailings facility.

Steve Lawrence