

To: The Canadian Nuclear Safety Commission

Intervention re Application by Cameco for Renewal of Beaverlodge Mine/Mill Site Waste Facility Licence.

Supplementary Information re CMD 09-h2.5

Oral Presentation for November 5, 2009 in Saskatoon.

1. Some progress has been made in the Cameco Application by beginning to address remediation options for problem areas of the Beaverlodge area.

Much of the Cameco application was about “getting ready” for “getting ready.” Various references were made to plans underway, but few specifics were given. Few actions have been taken. After some prodding by the CNSC staff, and an extension of 8 month’s time, and a series of consultations, there has emerged a list of potential remedial actions. (CNSC-CMD 09-H2.C Supplementary, p.120)

It is interesting to note that the CNSC Suppl highlights the remedial options suggested, which were omitted in “Action Plan Implementation” of Cameco CMD 09-h2,1B,(p.8), and later added in Cameco, CMD 09-H2.C (p.12). But these are still a list of “options” to be considered within a range of possibilities that might be taken. Will Cameco take three years simply to clarify potential remedial action, or will it actually implement some remedial actions in that time?

Note the tentative and hedging language of the Cameco Suppl.---“ The scenarios developed in the workshop were not intended to be a definitive list from which to formulate the final remedial options. Rather, the scenario development exercise assisted in the identification of uncertainties to be addressed before a determination can be made as to the necessity or appropriateness of further remedial actions.” (p. 8) This is a classical sentence of obfuscation by grammatical nonsense and logical error!

2. The remedial actions actually taken by Cameco over the last 21 years have been too few in number. It seems to have taken a long time for the Cameco and CNSC staff to recognize the many and widespread types of radioactive and chemical contaminations from dumping 10,100,000 tonnes of mine/mill tailings into the region – sometimes directly into northern lakes, before strict guidelines and regulations were formulated. (Dale Kristoff, Sask. Ministry of Environment, April 24, 2008, p.2 – [Dale.Kristoff@gov.sk.ca](mailto:Dale.Kristoff@gov.sk.ca) )

Cameco admits that since 1985, activities have been limited to minor remedial work, modeling tasks, public engagement, and studies of environmental effects. (Cameco Suppl—CMD 09-H2.1B, p1)

3. Some of the remedial actions taken were: the construction of an engineered natural

material cover of the Fookes delta tailings facility; a concrete cap on a deserted shaft; gamma shielding with sand at Eagle 32 and K260 zones; warning signs erected; studies of downstream contamination, temporary closure of six boreholes at the base of waste rock near Ace Bay; openings to surface have been sealed; studies of water quality, marine life, and sediment quality have been carried out. (Cameco Suppl--CMD 09-H2.1B pp. 6,10, 5).

4. A CBC Documentary on "Uranium" edited by David Common , showed pictures of radioactive sand dunes, with the sand blowing into Lake Athabasca. Such radioactive contamination is a serious danger for fish and marine life in that lake. Why could not Cameco have used shielded bulldozers to remove the sand dunes back from the water's edge and establish some protective barriers? I have seen no documents that even recognize this hazard, let alone attempt to implement mitigation action.

5. It is disconcerting to learn that modeling has revealed that some areas of Beaverlodge will take hundreds of years to return to background conditions through natural recovery. (Cameco-CMD 09-H2.1B, p.1; also, CNSC-Suppl-CMD 09-H2.C, p.2)

It is discouraging to learn that selenium levels have been increasing in Beaverlodge Lake, and the selenium levels in fish flesh remain high and warrants limited ingestion by humans. (Cameco—CMD 09-H2.1B, pp. 9,13) It seems that Cameco and CNSC staff do not know how to alleviate this contamination. Mitigation in this area seems a hollow hope. Apparently, selenium is a necessary component in nature, but is toxic and dangerous if ingested in more than trace amounts.

Earlier studies reported that Lake Chubb fish in Greer and Marie Lakes were found to have cataracts in their eyes, edema, and distended abdomens. (Golder Consultants, 2000; also Senes Consultants, 2003) Staff members of CNSC and Cameco know that selenium is damaging and dangerous to fish. However, they usually refer to the quantitative measures per litre, but rarely mention the toxic nature of the chemical. In more than trace amounts it can damage animals, and more than 5 mg per day can be lethal for many humans. (Environmental Chemistry -- <http://environmentalchemistry.com/yogi/periodic/Se.html>) Fortunately, Cameco has discovered that not many people are drinking water from these particular lakes, but it is discouraging that several of our northern lakes are contaminated in such a way.

6. It is disconcerting to learn that there is an increasing concentration of radium in the waters of the lakes in the Beaverlodge area, particularly in the Fulton Creek tailings management area, and it is expected to go on for the next 25--30 years. This increase has been going on since the 1990's. It seems that the only thing staff members know is to throw barium chloride at the radium. This seems difficult to do in the natural setting, but sometimes has been undertaken in water treatment plants.

The Cameco staff believe that the increase of radium levels is due to "reductive dissolution." Barium chloride and barium sulphate may establish a sort of equilibrium with radium in the water, but then more dissolved radium may move in from underlying sediments and change the mixture. I am not sure the Cameco and CNSC staff understand

the chemistry of radium, and are quite limited in methods of so-called “mitigation.” (Cameco Suppl—CMD 09-H2. 1B., pp. 12, 13; also, Cameco- CMD 09-H2.1, pp 6, 9; also CNSC- CMD 09-H2, p.5)

The staff members of the CNSC and of Cameco report the quantities of radium found in their water tests, but they do not mention the toxicity and radioactivity of the radium. They neglect to inform themselves and the public of the nature of risk we are all dealing with.

If there are over 10 million tonnes of mine/mill tailings spread around the area, it is difficult to know how many tonnes of uranium were produced, and how many grams of radium were released. However, just one gram of radium-226 has a radioactivity of 37 billion becquerels—an enormous amount! Radium-226 has a half-life of 1600 years, and will continue giving off radioactive disintegrations for 76,000 years.

Radium is more than a million times more radioactive than the same mass of uranium. That is easy to read or to speak, but it is challenging to comprehend the implications of such high numbers and such volatility! Madame Marie Curie died prematurely from cancer resulting from her experiments with this highly radioactive metal.

Moreover, the maximum permissible body-burden for humans is 0.1 micrograms. The maximum permissible burden in the total body is 7400 becquerels. So, a very small amount of radium is enough to overdose a human, so just think what it does to fish or birds or animals! Radium is therefore a serious radiological poison, avidly seeking out bone structure, and causing bone necrosis, bone sarcomas, rapid anemia, and various types of leukemia. (Wikipedia Encyclopedia, also, CRC Handbook of Chemistry and Physics).

A CNSC staff person reports that water tests show that the incremental concentration in the future for Fox Lake and Pat Lake will be 5.1 mBq/L and 6.1 mBq/L respectively. I think the authorities are neglecting and downplaying all that radium-226 accumulated in the lakes of the Beaverlodge area.

Apart from the tentative list of potential actions, I do not believe that we have entered seriously enough into the remediation of the terrible mess left in the Beaverlodge area.

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