



A PRESENTATION TO THE CANADIAN  
NUCLEAR SAFETY COMMISSION

Day Two of Hearings, at LaRonge, Saskatchewan,

Re: The Cluff Lake Decommissioning Project.

By: Dr. Bill Adamson, Saskatoon, Sask.

Uncertainties in the Comprehensive Study Report

I find several instances of uncertainty and deficiency in this Study Report.

(1) Cogema used concrete vaults in 1980--83 to store uranium tailings for a second phase of milling. These vaults cracked and spilled their contents, which included materials possessing 7,600 becquerels per gram of radium, which will be decaying into radium by-products for thousands of years. There were two serious spills. I have heard also reports that staff members were set to clean up this highly radioactive spil without special radioactive gear. ( By a woman from Beauval in 1983. See also the SE inspectors reports of Nov. 1982, and April 1983). My understanding is that in 1987--1988 these tailings were still being milled.

At the First Day Hearings, Mr. Natagmagon says." . . . in the case of the radiation protection safety area, improvements were observed and are due to management of dose and the cessation of

operations." (Transcript, p. 34) Again, he says "Cogema has made and is expected to make adequate provision . . . for the health and safety of persons. . ." (Transcript , p. 43) does this estimate include the details of the SE inspectors' reports of November 1982 and April 1983? Or, is he working out of the maxim of "Oyt of sight, out of mind"? Then he adds, "technical components of environmental, radiological and quality assurance are still being worked out." (Transcript p. 42).

It is some 172 pages later in this document that Cogema mentions this serious incident of the vault spills. It mentions that it needed to address "public concerns" expressed earlier about the current status of the temporary tailings vault storage. (p. 10--2).

It claims that the area was cleaned up at the time, but concerns were raised about the adequacy of the cleanup. The response is: "A detailed gamma survey will be conducted of the area to verify that all contaminated material was cleaned up, and that the decommissioning objectives specified in section 7 are satisfied. A soil and vegetation sampling will also be taken in the leach vault storage area to supplement the gamma survey that existing reclamation poses no danger to wildlife." (p. 10--12).

Alpha radiation is a very significant spinoff from radium radioactivity and Cogema does not even mention it, let alone telling of recent testing for it in the affected area. Note also that the future tense is used regarding the survey for gamma and soil/vegetation surveys. " A detailed gamma survey will be conducted." That is not satisfactory! The survey and testing and remediation needs to be done NOW, before the Study Report is deemed satisfactory and a decommissioning Licence is issued.

## (2) A Contaminated Pipeline.

In 1997 and 1998 Snake Lake experienced an increase in radium (Ra-226) because a contaminated pipeline was used for the diversion of freshwater around the Tailings Management

Area. (p. 6--15)

Imagine Cogema being so careless as to let that type of contamination carry on for two years! That sort of carelessness shatters its credibility. At the outlet of Snake Lake the radium concentration in February of 1998 reached a maximum of 0.15 Bq/L in contrast to the normal range of 0.02 to 0.04 Bq/L. No wonder that sediments of Snake Lake and the nearby Island Lake have been highly contaminated (p. 6--48), thereby changing the composition of zooplankton communities and communities of invertebrates. (p.6--47)

With an operational record like this, the proposals by Cogema need to be carefully scrutinized and critiqued.

### (3) Over use of Computer Modelling.

One of the problems with this Comprehensive Study Report is an over-use of desk-chair computer modeling with theoretical constructs, instead of current, actual field tests for post mining contamination. Frequently, the computer models are based on tests from previous years, or compared to past projections.

Experienced in chemistry and uranium mining issues, Dr. Donald G. Lee, chairperson of the earlier Joint Federal--Provincial Panel --Midwest and Cigar Lake, November 1997, wrote: ". . . however, experience has taught us that it is not wise to confuse modeling studies with reality and have, therefore recommended that the performance of these facilities be carefully monitored to ensure that consolidation is occurring and that containment migration is below acceptable limits. " (Cumulative Observations p.9)

For instance, the Comprehensive Report states that contamination by molybdenum, nickel, uranium, and selenium will subside to background conditions in 50 to 100 years. This is an insult regarding the care of the environment!

The Report goes on to state that sediment quality

will improve so that benthic communities will improve in 50 years! This also is most unsatisfactory! (p. 9--18). Then it goes on to give data for sediment quality improvement over the initial 2000 years of a 3000 year simulation! The modeling becomes even more ridiculous when it predicts that arsenic and zinc intake in the fish and water from Sandy or Cluff Lake for two hypothetical trappers will improve over a 10,000 year span. (p. 9--34) The Report suggests water quality levels for Snake Lake, Island Lake, and Cluff Lake for 2000 years of a 10,000 year simulation! (p. 9--16). The authors must think the members of the public to be very gullible!

#### (4) Radiation

Dr. Ward Whicker, a radio-biologist from Colorado State University, has emphasized the need to assess the effects of alpha radiation on the somatic and genetic cells of non-human biota. He writes: "Another fundamental problem is that we have very little data on the actual or relative concentrations of alpha-emitting radionuclides in the tissues responsible for reproductive performance in the vast number of plants and animals that we are trying to protect." (Nov. 26/03 E-mail).

He also states that scientists now have new tools of microbiology by which to do such testing, but neither corporations or regulatory agencies are willing to spend the money to do such testing.

Cogema has not even mentioned this phase of testing for genetic damage to plants and animals, and deals very little with the effects of alpha radiation on the environment. Most of its references are to gamma radiation. It does mention a study of the mineral absorption by lichen, but does not explore the genetic effects of alpha radiation. (p. 6--22).

A recent development has been the release of a scientific paper sponsored by Environment Canada and Health Canada entitled "Priority Substances List II, Assessment Report, Release of

Radionuclides from Nuclear Facilities (Impact on Non-Human Biota), July 2001."

It has stressed at some length the need for assessing the effect of radiation on plants, animals, and fish. Some of the scientists recommend that the relative biological effectiveness (RBE) should be up to 40 rather than 5. This report was read and approved by international radiobiologists--Woodhead and Pentreath (UK), Whicker and Koch (USA), Amiro and Hynes (Canada), Larson and Bergman (Sweden).

Cogema, in its Comprehensive Study Report, mentions this proposal of a higher RBE rating for alpha radiation, but ignores it. It continues to use the RBE rating of 5, (p. 9--26; p. 9--30) This action is unscientific and unsatisfactory. This avoidance of dealing with alpha radiation is unacceptable. The later proposal for a licence for mining the Cigar Lake Project by Cameco uses an RBE rating of 40. (pp 53, 60, 66)

So, which rating is the CNS Commission going to insist upon? Or, will it allow this "waffle" to continue?

The Cluff Lake Report states: "Absorbed doses rates to selected species of animals and plants were estimated for beta and gamma exposures from the radioactivity in the surrounding water and sediment, and for alpha and gamma exposures from radioactivity incorporated into the plant or animal tissue." (p. 5--8)

Again, there were no actual or recent field tests, but only predictions and estimates plus literature based benchmarks. The Report mentions that the highest radon concentrations were measured near the mill and tailings area. (pp. 6--21;6--32; 6--35) It also mentions that high levels of gamma radiation are expected to be remediated by removal of contaminated materials to a management facility or covered by clean glacial till. (p. 8--27) It adds that continued monitoring of radon will be required until radon levels dissipate to background levels. (p. 8--31; 9--37). So, what will Cogema do if the radon

levels remain high? How do you mitigate alpha radiation and its effects?

#### (5) Tailings

Many of the 2.6 M m<sup>3</sup> of tailings are deposited in the Claude Pit. Some 66 piezometers have been installed in the area of the TMA and Liquids Pool, to show water hydraulic conductivity. (p. 6--27) Cogema also used these water samples to test for their chemistry. Down grade from the TMA and Liquids Pool there were increased concentrations of chemicals like arsenic (.003 cf. to baseline of 0.0016), lead (0.070 cf baseline of 0.017), nickel (0.020 cf 0.011), radium (0.021 cf. 0.086), and uranium (30 cf. to 13.6).

So, some were two or three times as concentrated as normal within the tailings pore water chemistry. (p. 6--3) The later processing of higher grade ore in 2001--2002 increased these levels even more--about four times the mean grade. (p. 6--14).

Cogema's method of controlling the contamination from tailings is to dewater the pits, to fill them over with glacial till, to slope for rain runoff, and then to plant vegetation over them. It sounds simple and manageable and inexpensive.

However, it seems that Cogema ignores the research connected with the JEB tailings pit in respect to McClean Lake, McAthur River and others. Dr. Donald Lee, Chairperson of the Joint Federal-Provincial Panel stated:

"Theoretical solutions should not be accepted in lieu of experimental data for these purposes. The chemistry of tailings deposits is so complex that theories can be used only as a rough guide for the design of processes." (Cigar Lake, p. 26). He recounted an incident where the arsenic concentrations of tailings pore water actually increased with time rather than decreasing.

What if the concentrations of arsenic, nickel, uranium and molybdenum in the ground water remain constant or even increase? Cogema needs to

be much more specific in its forward planning and decommissioning in order to deal with the serious dangers that may come out of the seepage from 2.6 M m<sup>3</sup> of toxic tailings!

Cogema adds weakly, "If infiltration or pore water contaminat concentrations are greater than predicted, contaminant transport modeling revisions will be undertaken." (p. 10--4)

#### (6) Sediments

There is a serious situation remaining with the contaminated sediments in the surrounding water systems near the Cluff Lake mine and mill area. Cogema acknowledge increased levels of uranium and radium in Snake Lake and Island Lake, (p. 6--46) and of elevated concentrations of metals and arsenic in the waters of Cluff Lake. (p. 6--45)

It recognizes that in Island Lake and Snake Lake there has been damage to the zooplankton and benthic communities. Nickel has proved a risk to the phytoplankton in Island Lake, (p. 6--51), and also molybdenum has proved a risk to zooplankton and northern pike in that lake. (p. 6--43)

So, these contaminants will affect the whole food chain among aquatic organisms, including the accumulation of selenium in fish tissues of northern pike and white sucker. (p. 6--51) Indeed, mallard ducks have been found to be affected by this sediment ingestion. (p. 9--30)

In fact, deformities in fish are being observed. Back in 1998 a scientist (Limly) had recommended studies of these deformities be undertaken. (p. 6--52) Hence, four years later, Cogema has implemented a study for assessing "the incidence of terratogenic deformities which are known to result from chronic selenium exposure." (p. 10--12) Cogema does not reveal any of its observations or discoveries on this topic to this date.

Has the CNSC received any facts or details about the effects on fish of the selenium poisoning in this watershed? If not, how can it proceed to authorize

and approve this decommissioning proposal?

The dredging of the shallow waters of Snake Lake is mentioned, but quickly written off as unfeasible. (pp. 8--12;9--1). This possibility deserves a second consideration.

The shallow Wascana Lake in the City of Regina was recently dredged and deepened some 30--40 feet. Clearly, Cogema needs to dredge the contaminated sediments in the shallow Snake Lake with only one metre of water involved. Over 22 years the Cluff Lake mine has produced some 62 million pounds of uranium yellowcake. (p. 2--1) at an average price of \$10 per pound it equals an intake of \$620,000,000. Cogema needs to use some of these proceeds to clean up its mess and its contamination in Saskatchewan, and not simply ship all its profits to the parent company AREVA in France! The CNSC needs to show some intestinal fortitude in demanding a significant cleanup of this Project.!

The only proposal of Cogema regarding the contaminated sediments is to do nothing, and hope that nature will restore itself. It calls this "natural" or "passive" recovery! (pp. 9--20;9--21). This is the type of "decommissioning" which Cogema is recommending, and which is quite unsatisfactory.

The Report states: "An adverse effect on biota would also be determined to be significant if recovery of a local population would not occur within several generations, after the removal of the source of contamination." (p.9--22).

Again, it states: The cumulative assessment indicated that ecological risks for most aquatic biota are ameliorated within approximately 10 years for molybdenum, with uranium recovery occurring somewhat more slowly after approximately 50 years. Risks to sediment dwelling organisms decline more slowly, requiring approximately 50 years for molybdenum, and approximately 100 years for uranium." (p. 9--25)

Cogema takes the long view! It states: "Substantial



improvements in sediment quality are predicted within the first 50 years, with even the upper range predictions (95 percentile) for sediment uranium and molybdenum reaching the high end of regional background conditions by 100 to 150 years. (p. 9--21).

It becomes clear that Cogema does not care about the environment of Saskatchewan, and has taken a "do nothing" approach to decommissioning. It states: "Within 100 years, all contaminants are anticipated to be back at background levels." (p. 9--12) This approach is unacceptable!

Again, in the first day Hearings, Mr. Natamagon states: "The elements of the environmental protection program should provide reasonable precautions to adequately protect the environment in accordance with the approved project." (Transcript, p. 39) Later he adds, "Cogema has made and is expected to continue to make adequate protection for the environment ." (Transcript, p. 43)

Is he saying that the CNSC staff condone this approach of letting the selenium, molybdenum, nickel and uranium continue in the sediments and watershed for 100 to 150 years till nature restores itself? If so, this is a scandalous care of the environment!

Hopefully , the Commission members will not condone such actions, but will require some definite clean-up measures to be taken.

#### (7) Disappointment and Lack of Commitment

I am very disappointed and discouraged that the Minister of Environment would brush this matter aside so quickly, without allowing a Panel Review where the citizens could work with more time and more depth to secure many more facts and clarifications.

I agree with the statement made by Mining Watch Canada which comments on the "key areas" identified in the Report but "nowhere are there

specific commitments of any kind. It is essential that such details be made explicit before the decommissioning is undertaken: what are the planned monitoring procedures, sampling densities, schedules, etc.; who will execute them; who will pay for them; what authorities will be responsible; what is the range of eventualities; and what measures can be taken in response?" (p. 2)

From the interchanges which took place in the Day One Hearings, it appears that there is an assumption that Cogema will keep on testing for water contamination, metals being transported, and conditions of radioactivity. Then it is assumed that CNSC staff will continue to monitor reports and to make inspections over some five years and possibly ten years more. There is a complex little statement made about the difference between the licensing process versus the use of the compliance process. (Transcript, pp. 99--100) After the Decommissioning Licence is issued, how much power and authority do the CNSC staff have? And what are the powers to be delegated later to a Director General, Directorate of Nuclear Cycle and Facilities Regulation?

Some of these questions and uncertainties may behind a series of questions asked by Commission Member Barnes, such as "How long then is it that you (Cogema) anticipate having a responsibility for the site before you pass it on to the provincial government? (Transcript, p66) Also, Commission Member Graham said: "The two questions I have relating to that is the ongoing monitoring after the decommissioning. Is that budgeted? It is not mentioned." (Transcript, p. 49)

Mr. Howden adds: "Our view is that the key things we want to review in the initial follow-up time is validation of contaminants, such as molybdenum, uranium and selenium, as well there is further work required on waste rock characterization. So, we wanted to look at that. The view we took is: Is the site behaving as predicted initially?" (Transcript , p. 113)

#### (7.) Caring for the Mine and Mill Workers

Much is said in the Comprehensive Study Report concerning the contamination of the sediment and water by metals, toxic substances, and radioactivity and how they affect fish, benthic creatures, zooplankton, ducks, beaver, moose and lichen.

Little is said about the health and welfare of the miners and mill workers after 22 years, as a result of the Cluff Lake Mining. It is said that radiation doses were kept low and will lessen when operations cease. But what have been the long term effects of the radiation? Given the "latency period" of 10--15 years, how many of the workers have died from lung cancer?

#### (8) The Public Left Out

Citizens of the Public are invited to make presentations and interventions. However, none of such interventions were even mentioned in the First Day Hearings in Ottawa. The questions, issues, and concerns were not even acknowledged. Interventions are given, questions are asked, issues are raised, but there is never any responses or answers given in reply. The whole interchange was between the Proponent and CNSC staff, with a few clarifying questions by Commission Members. It is a "closed shop."

Now, it turns out, that there are action plans, quality assurance plans, detailed commissioning plans, various revisions, more details, all coming in just prior to the Day Two Hearings. In several instances the CNSC staff are still working on their reviews. Another condition is to be added to the licence at the last minute on Day Two.

This means that there is a whole body of data and detail to which citizens do not even have access. It is a "closed shop." There is no appropriate or plausible public consultation. What interventions that are made are mostly ignored, and no responses given to the questions raised.

#### (9) Conclusions

There are many deficiencies and glaring problems

in the Comprehensive Study Report for the Decommissioning of Cogema's Cluff Lake Mining Operation. The CNSC Board and Staff are going to need to clarify a number of issues, and to require a number of remediation measures before a Decommissioning Licence is ever issued.

Bill Adamson  
Saskatoon, SK.  
May 27, 2004