HEARING DAY 2

Cameco Corporation: Application for a licence to operate the Key Lake Operation

The first day of the public hearing on this application was August 9th. The public was invited to participate either by oral presentation or written submission on Hearing Day Two. September 4th was the deadline set for filing by intervenors. The Notice of Public Hearing 2001 01-H11 was published on June 4, 2001.

Commission Members present for Day One of this hearing included: Mr. Graham, Dr. Giroux, Dr. Barnes and myself. Ms MacLachlan was absent. As such, Ms MacLachlan will participate in the question period today but she will not participate in the decision.

The presentations were made on Day One by both the applicant, Cameco Corporation, under CMD 01-H22.1, 01-H22.1A and by Commission staff under CMD 01-H22. I note that both the applicant, Cameco Corporation, and the CNSC staff are present today. I will begin by an oral presentation by Cameco Corporation as outlined in Document CMD 01-H22.1B and I turn it back to Cameco

01-H22.1B

Oral presentation by Cameco Corporation

MR. CHAD: Good morning, Madam Chair, Members of the Commission. I am Gary Chad, Senior Vice President, Law and Regulatory Affairs and Corporate Secretary of Cameco Corporation, the applicant in these proceedings. I'm here today in support of Cameco's application for a licence to operate the Key Lake Operation. With me today are John Jarrell our Vice President, Environment and Safety and Mike Wittrup our Director of Environment.

In response to a Commission request for further information made at the Day One hearing held on August 9th, I will ask Mr. Jarrell to make a presentation to the Commission on the fish toxicity issue at Key Lake. We would be pleased to answer any questions the Commission may have for Cameco later after Mr. Jarrell's presentation.

Thank you.

MR. JARRELL: Thank you.

For the transcript record, my name is John Jarrell. I'm Vice President of Environment and Safety.

As Gary mentioned, we are here today to provide some supplementary information to our original presentation on Day One Hearing which was held on August the 9th.

Specifically what we would like to do this morning is provide some background information on the year 2000 fish toxicity reported in our original submission. We would like to address questions which arose from that submission and provide an update of 2001 follow up work.

As indicated on August 9th, we believed the presence of toxicity in near-field receiving water is a seasonal phenomenon. It appears to be associated but likely not entirely caused by cyclical pH depression in these waters.

To frame this issue, it can be pointed out that in late 1993, Key Lake effluent failed a routine semi-annual rainbow trout toxicity test. Greater than 50 per cent of the trout -- of the 10 trout fingerlings died during the 96 hour test and less than two of ten died in the control sample, which is the criteria for that control.

Through a fair degree of effort,

which I might add, was used as a reference case in subsequent studies of such investigations done in Canada, we were able to trace the toxicity to an excessive organic loss from the solvent extraction circuit. We solved that problem and we expanded the test regime to include routine toxicity testing of the receiving environment as well as the effluent.

The standard 96 hour trout test, however, is not a practical test for control purposes at a remote mine site. Fortunately, what we were able to do was to develop a correlation between a 15-minute bacteria luminescent toxicity test and the standard rainbow trout toxicity test. Such a correlation is not common, but it worked out quite well in this particular case. This is called a Microtox test and it is performed on site at the Key Lake analytical laboratory.

The Key Lake mill practices batch release of effluents. Each batch is nominally about 5,000 cubic metres and is composite sampled for licensed parameters as well as for Microtox toxicity, both as it fills the pond and as that pond is discharged. Thus toxicity testing is used extensively at Key Lake. Typically one to one and

a half ponds per day are released. Trout toxicity testing is done quarterly or more frequently as required.

This picture taken this summer shows the effluent release point into the near-field receiving environment. Treated effluent is discharged to a small shallow lake which contains the equivalent of about one month's worth of treated effluent. The discharge from this small lake is the point where we commenced routine receiving environment toxicity tests as mentioned two slides back.

This slide shows that receiving environment sample location where the creek which drains Wolf Lake passes under the road near the entrance to the mine site. This water is sampled daily for Microtox toxicity and at least quarterly using the trout test.

This close up picture also taken this summer shows Wolf Creek. It is typically one metre wide and about 10 to 30 centimetres deep. The flow rate is typically about 100 to 180 litres per second or about 9,000 to 15,000 cubic metres per day. Thus a 5,000 cubic metre per day effluent release is a sizeable proportion of the

overall flow.

This map provides some sense of the relative location of the mill, the effluent release point, Wolf Lake and its drainage. Note that the ground water flow from the vicinity of the Aboveground Tailings Management Facility, which is called AGTMF in this slide, also enters Wolf Lake. In the bottom right corner, discharge from the Deilmann and Gaertner Pit dewatering systems enters the natural environment.

The lines on this drawing represent the surface lease or CNSC licensed site boundaries. The circles represent sampling locations for the 2001 aquatic monitoring program. If you follow the mouse, basically the water discharges out of Wolf Lake to the sampling point which I showed you right at the road, to Fox Lake and then out to this David Creek system out here.

This map depicts the receiving environment, both for the treated effluent at the top of the slide and the dewatering discharge from the bottom of the slide. Again, the circles in this represent these environmental -- enhanced environmental monitoring sampling program sites.

Essentially what the water does is

it flows out through David Creek through what is called an unknown lake and then up into a larger lake called Delta Lake and then up to the Wheeler River and so on and so forth. If you look at the scale here, there is about a four kilometre, give you a sense of the overall size of this drainage path. The discharge from the dewatering system works its way out through these set of lakes out through here.

This slide summarizes the rainbow trout toxicity test data, both for treated effluent and also for the Wolf Creek discharge. It is evident from this summary that the vast majority of the trout tests have passed the test, which calls for no more than 50 per cent toxicity.

Despite our best efforts we have made a mistake in this table. The reported numbers passed test for 2000 of nine effluent and eleven for Wolf Creek represent the total number of tests, not just the number of passed test, which should have read eight and nine, instead of nine and eleven. This, of course, changes the bottom of the -- the summary at the bottom which should read 126 and 66 for the eight to nine years of reported data. So please accept my apology for

this error in our submission.

On August 9th we were asked the extent to which passed tests pass and failed tests fail. What we have done is we have summarized the data over the last three and a half years to give you a sense of what -- if you sort of look behind the scenes on this data.

It is evident I think that the vast majority of the tests showed no toxicity. It is not a case of marginal toxicity just below the 50 per cent threshold. In our written submission we attempt to explain what happened with a 53 per cent failure in 2000, which is hardly intuitive for a test with ten trout fingerlings. Suffice it to say that we have sufficient circumstantial evidence to feel that we may have had a short-term toxicity excursion in late 2000.

This slide summarizes the results of Microtox testing. We believe this data supports the view of the Microtox screening test with the corresponding pond recycle based on these results as effectively controlled toxicity of effluent is measured by standard rainbow trout tests. Whether Microtox is a good measure of receiving environment toxicity is not as clear,

what the data does suggest, I believe, is that the agent which causes or can cause effluent toxicity is not present in toxic proportions within the receiving environment.

As outlined in the presented tables, overall there has been relatively few test failures over the seven to eight years that issue has been extensively studied. We have essentially brought control to the issue of excessive organic loss, yet have recently found evidence of some toxicity near-field in the near-field receiving environment. The frequency of trout tests was increased from quarterly to monthly over the past winter then to every two weeks in May which will be carried out until October or November of this year.

We continued our study into the cause of summertime pH depression found in the waters and this study started lasted year. We initiated a toxicity identification program this September despite the lack of an outright test failure using what we believe will prove to be the sample with the highest level of toxicity that we found this year, which occurred in, I think, on September 3rd.

We have also expanded our study to investigate the potential of natural pH depression in the bogs which surround the effluent receiving environment flow path.

In conclusion, we believe Cameco has gone to considerable lengths to both better understand the impact of treated mill effluents on the near-field receiving environment and the cause of pH depression. Priority has been given in 2001 to tracking down the source of near-field toxicity discovered in the year 2000. Studies have been hampered by the ephemeral nature of this toxicity. We believe the effect is transitory or at a minimum cyclical. It is not clear to what extent the mill effluent causes or enhances the observed toxicity. But it is not a straightforward effluent toxicity issue in the receiving environment.

Our studies continue and we have every intention of keeping regulatory agency staff fully informed of our process. Both myself and Mark Wittrup are here today to answer any questions you may have either about this presentation, intervenor comments or any other issues you wish to discuss either now or later in

the proceedings.

Thank you for your attention.

THE CHAIRPERSON: Thank you.

With the permission of the Commission Members, I would like to go to the staff presentation before we open the floor for questions.

That said, I would like to call on Mr. Pereira for the oral presentation by CNSC staff as outlined in CMD Document 01-H22.A.

Mr. Pereira.

01-H22.A

Oral presentation by CNSC staff

MR. PEREIRA: Thank you, Madam Chair.

For the record, my name is Ken Pereira. I'm the Director General of the Directorate of Fuel Cycle and Materials Regulation.

The Cameco Corporation is applying for a uranium mill operating licence to continue operating the existing uranium mill and supporting facilities at Key Lake, Saskatchewan. At the Day One Hearing in August 2001, CNSC staff presented

CMD 01-H22, which identified the scope of the activities to be covered under the licence, as well as the staff's evaluation of the company's policies and programs.

The applicant has proposed no changes to the existing scope of the operation presently licensed by the CNSC. While the applicant has applied for a five year licence, CNSC staff recommended that the licence be issued for a 27-month period.

In CMD 01-H22, CNSC staff reported on the outcome of an evaluation in September 2000 of Cameco's Environmental Protection Program at the Key Lake Operation. At the time of the Day One Hearing in August, CNSC staff reported that a number of action notices and recommendations still required resolution. In a subsequent submission, Cameco has provided acceptable responses to three of the action notices and acceptable commitments to address the four other action notices and two recommendations.

CNSC staff has submitted supplementary CMD 01-H22.A for this hearing. It provides information requested by the Commission on fish toxicity test results. The CNSC staff has

received and reviewed two intervenor CMDs that were submitted for this hearing. One from Ms Shiell and the other from Mr. Adamson. CNSC staff is available to respond to any further questions that the Commission may have regarding the requested renewal of the licence for this facility.

THE CHAIRPERSON: Thank you.

The floor is now open for questions from Commission Members with regards to the applicant and CNSC staff presentations.

Dr. Barnes.

MEMBER BARNES: Yes, a question to staff. On the data presented in a table on page 4 of 01-H22.A, could you explain that sampling structure a little bit more, specifically why in so many cases no sample was taken of the effluent sample presumably at the same time that a sample was taken at Wolf Creek?

MR. PEREIRA: I will invite Mr. Courtney to respond.

MR. COURTNEY: My name is Peter Courtney. I'm the Project Officer for Key Lake.

I believe the reasons the samples weren't taken is that they weren't required. A

lot of the samples that have been taken and are shown in this table are for verification and they are follow up on a toxic test event. So they have been taken for verification. There wasn't any requirement to match these samples on either side.

THE CHAIRPERSON: Dr. Barnes.

MEMBER BARNES: As you probably appreciate from the sort of questions I tend to ask in these, I am concerned that when sampling programs are set up they are done so, not only for compliance, but to ensure that really the data that come out are reasonably robust and we can draw some conclusions. In dealing with complex environmental issues, we often can end up with no conclusions by having an inadequate sampling base.

So I'm intrigued here when we have two incidents in which there is sampling during July 4th to the 16th in that first data and then the toxicity test data for incident two in December of the year 2000, that in total there are ten sampling dates, six in July/August, four in December and in only two of those cases are there essentially double tests done on the same day.

So although it may not be required, I wonder what is the rush now for in a

sense treating the effluent or sampling the effluent some days and then a Wolf Creek sample on other days. For example, in July 4th where there clearly was a problem, percent of trout fingerlings dead after 96 hours, 100, the effluent was sampled at that time, that might give a cause to essentially sample both the following week but no sample was taken of the treated effluent.

So if one is concerned about toxicity and being concerned about whether there is a correlation that some of the toxicity might be coming from the effluent, irrespective of requirement, I would have thought the logical approach would have been to make sure that you sampled both the effluent and Wolf Creek. But there seems to be no attempt to do this so I'm puzzled.

Perhaps I could put the first question then, to explain this strategy of sampling, to the applicant and then for a comment from staff.

MR. JARRELL: I also asked that question of the designers of the program. The answer I was given essentially was two-fold. One, there is obvious residence time considers between

the two sample points and the other reason I was given was that in order to spread this thing out as much as possible to broadly cover the whole summer period. That was in the year 2000 and in the year 2001, of course, we took a different tactic.

I should also point out that when we did get these toxic results, what we did is we resampled these or we retested these things to see if this toxicity existed and it didn't. That is one of the problems we have had is that if you take the same water and sample it again or put it to another trout toxicity test, you don't get the same response. So it truly is a very transitory response. So that is my understanding. I will ask Mark Wittrup if he could add to that as well.

MR. WITTRUP: Mark Wittrup.

I don't have anything to add to that.

THE CHAIRPERSON: Dr. Barnes, would you like the staff to respond?

MEMBER BARNES: Well, just before staff does, I think, Mr. Jarrell, what you tried to -- what you showed, unless I am incorrect, was that when the effluent is discharged into a fairly

small holding lake or pond you pointed out that in fact the impact was quite noticeable in that little creek. You showed the photograph of the creek going under the road. You told us what the volume of discharge normally was and that when you discharged the effluent, it had a fairly quick response. Yet, this is contrary to what I have just heard that there is a lag.

But even if there is a lag, you must know roughly what the time frame of that lag might be and therefore you would adjust the sampling strategy. I mean if you are trying to show that there is -- there is obviously a potential environmental effect from the effluent. Right. And if you are trying to understand if there is a correlation on that, on the impact of the biota, the fish, you would try to look at both aspects and if there is a lag effect, you would try to understand the duration of that lag effect and therefore adjust the sampling program sufficiently.

MR. JARRELL: I agree with you. I think the lag time, roughly speaking, of course, doesn't act as sort of -- there is probably some shortcircuiting, but basically it's a 300,000

cubic metre lake, so it's about a month's worth of effluent. So in theory, if it was well mixed, it would be about a one month lag. It's probably less than that because I am sure there is some shortcircuiting that occurs on that. I guess it was that kind of a lag period.

I think the other thing to remember, in the year 2001 the backbone of this program back last year essential was the Microtox, not the rainbow trout. Once we found the rainbow trout toxicity in the summer, that's when we really started to kick the rainbow trout into high gear.

THE CHAIRPERSON: Would you wish to have the staff comments at this time?

Mr. Pereira.

MR. PEREIRA: I will invite Dr. Thompson to comment.

DR. THOMPSON: Two reports were submitted to CNSC staff. One after the December effluent toxicity incident, then another report following up on the other events.

In our review of the reports, we found that there were some Quality Assurance and Quality Control issues with some of the work being

conducted and staff commented that those issues had to be resolved in order to get reliable information.

At the time that there was some indication of toxicity from the effluent, the laboratory doing the work conducted toxicity identification in evaluation tests essentially on samples that were found to be non-toxic or had been manipulated in some fashion so the result were essentially not usual at all.

So we did send back comments to Cameco indicating that in the future those issues had to be resolved for us to have data with which to assess the situation.

Having said that, we have also been involved in looking at the protocols that Cameco put in place to assess the situation at Wolf Creek. We made recommendations that given that the trout toxicity tests are conducted off site and should the results be toxic, then essentially if you haven't planned to do follow-up work, you don't have those effluent samples or the water samples. So we recommended that Microtox be used as a surrogate and should the Microtox results indicate toxicity then that samples be

taken and that additional work be conducted on those samples in an attempt to identify the reasons for toxicity.

This work is now being conducted by Cameco and we don't have the results of the investigations that are currently underway to look at the water samples that caused some toxicity in September.

THE CHAIRPERSON: Dr. Barnes.

MEMBER BARNES: Could I just get clarification from Dr. Thompson? Are you content then that the sampling strategy now imposed, imposed in 2000, is adequate for the toxicity tests?

DR. THOMPSON: With the help of Microtox tests which are done on site-- it's a 15-minute test with a longer period if necessary-- the turnaround is quick enough that action can taken, large volumes of samples can be taken and shipped off site to a lab that can conduct the identification, evaluation tests.

So to my knowledge, the protocol in place now is adequate to follow up on the situation.

THE CHAIRPERSON: Dr. Giroux.

MEMBER GIROUX: I believe I was the one who raised the question at a previous meeting about the details of the toxicity tests, and I would just like to express my appreciation, both to staff and to the applicant, for the detailed reports that we received.

I think it clarifies the situation and is very instructive in terms of understanding the basic things that you are doing.

The only comment I would make, I think, without presuming our decision later, is that you keep us informed of developments. Especially if there are further problems and failures in the tests, I think we should be informed through some vehicle at the meetings.

Thank you.

THE CHAIRPERSON: To that, I would suggest, Mr. Pereira that the Significant Development Report would be a way to keep us informed of these issues.

MR. PEREIRA: Yes.

THE CHAIRPERSON: Mr. Graham.

MEMBER GRAHAM: Thank you.

A couple of questions I have. First of all, Wolf Lake, that is where the

drainage from the forest ponds go, the four ponds drain out into Wolf Lake. Is Wolf Lake to be drained at the time of decommissioning and the sediment processed or not? Is that lake to be drained and something done with that at decommissioning?

THE CHAIRPERSON: That's a question to the applicant?

MEMBER GRAHAM: Yes.

MR. JARRELL: Actually, the conceptual decommissioning plan, Mr. Graham, actually to bury the contaminated sediments in that lake is basically to fill it in.

MEMBER GRAHAM: To fill it in.

MR. JARRELL: It's a very small lake. So that what we costed out in the conceptual decommissioning process is to actually remove the lake and to basically bury those sediments. That's the current thinking.

The main -- I wouldn't say contaminant, but the main effect on that lake has been actually some precipitation of gypsum or calcium sulphate into that lake. If I could just go back a little bit into some of this toxicity thing, one of the difficulties, which we perhaps

didn't make as clear as we could is that this is really a very ephemeral thing we are dealing with.

As soon as we find toxicity what we do is we resample that water to see if we can elicit the same response. If we can't, we collect a sample right away and run it through the same tests and we don't get the same results. What we did this year is I think perhaps we got a little bit smarter. What we did is we started to collect duplicate samples so that if we have a failure on one then we have another backup sample that we can test at the same time.

So I think our fundamental problem here is the fact that we are dealing with a very, very elusive thing and something which I believe is not related to this Microtox which is sort of another reason that it makes this somewhat complicated.

Thank you.

MEMBER GRAHAM: One other question then just as a follow through. Before the effluent gets to Wolf Lake it comes from those four ponds, and those are the ones, I believe, are they the ones with the betonyte lining?

MR. WITTRUP: Mark Wittrup. No,

they are lined with high-density polyethylene.

MEMBER GRAHAM: We learned, I think at the last meeting, the first day hearing, that you were having some problems with some of the lining, the ventilator, whatever it was. Maybe it's another name, but I am wondering is that where you were having the problems?

MR. JARRELL: No, it wasn't, Mr. Graham. What we were talking about in the Day 1 hearing was the waste rock or the special waste rock piles as opposed to these monitoring ponds. It's quite a different issue here.

The issue, I think, with the waste rock piles was the betonyte liners and the condition of those. They didn't have anything to do with these four monitoring ponds that discharge into Wolf Lake.

MEMBER GRAHAM: So these are working well. There is no problem. Over at the waste rock then, with the betonyte lining, has that been resolved and is that effluent -- have you got it under control?

MR. JARRELL: We have always maintained control of that. I think the issue is one of -- it's a longer term issue. Those waste

rock piles are within what we call the cone of depression which, you may recall, we talked about which is just dewatering cone around the Deilmann facility. So we collect any seepage from those waste rock piles. In the long haul the plan is to remove that material and basically use it as a diluent in the processing to reduce the ore grade down to 4 per cent.

So there is a long-term solution for that. What there is is in the shorter term there is containment of any contaminants from these waste rock piles.

MEMBER GRAHAM: So that effluent is not going into Wolf Lake or not going out. It's being contained.

MR. JARRELL: That's correct. It's around the Deilmann tailings facility, not around the above-ground tailings facility or the mill itself which is a separate watershed.

MEMBER GRAHAM: One other question, Madam Chair.

In the hearing Day 1 of McArthur River application, I think I asked the question of exposed dose, of the record of the levels you had of exposed dose of one millisievert per week for

workers, or five per quarter. I was given the information that at McArthur River that was not exceeded. The answer more or less led to ask the question: What about at this facility? Has it been exceeded?

MR. JARRELL: No, it hasn't. I think the issue that we discussed in that original Day 1 presentation was there was a requirement on us from our licence at the end of year one to assess what we got as far as dose relative to predictions.

One of the difficulties we had was that we did not attain that 4 per cent ore grade through the whole year. So we had to prorate that number and the issue that we got back from the staff was essentially to reexamine that data once we had a full year's of data. But all data we have collected to date indicates we are on track.

MEMBER GRAHAM: Would CNSC staff like to comment on that?

MR. PEREIRA: I will ask Mr. McCabe to comment.

MR. McCABE: Thank you.

Rick McCabe. Yes, the projections were based upon the 4 per cent grade that was

anticipated for milling in the Key Lake Mill. They did not achieve that grade so what we did was a linear extrapolation of that to get the 4 per cent grade. That's not bad from our point of view, but we decided just to go ahead and require them to add further information and confirm that those projections were on target.

We are comfortable with that and they are at the moment well within the range of predictions.

MEMBER GRAHAM: Thank you.

THE CHAIRPERSON: I have a question for the applicant. With regards to the impact on sampling of weather and winter, is there any particular issues that come up because of that that could affect the results or the variation?

MR. WITTRUP: Just a clarification. The variation in specific sample?

THE CHAIRPERSON: The variation in results that could be traced back to difficulties in sampling techniques or separation of ice and water, whatever.

MR. WITTRUP: Generally no, not in the winter. For instance, in the pond release area the sampling is done in heated sheds. The

water itself, of course, doesn't freeze. It just comes from the plant. So it might get a little crust on, but the sampling itself is done in a heated shed and the Wolf Creek sampling site generally flows all year, the water coming from the effluent discharged maintains the channel so that sampling there isn't a problem.

What becomes a problem is often going out and sampling, not in the dead of winter because you can drill holes through the ice and get clean samples. The problem is generally on the shoulder seasons, when you have freeze up or break up. But generally all of the Environmental Effects Monitoring Programs are done in ice-free conditions and all of the water sampling. In general monitorings are done from a safe location, recognizing that there is a health and safety risk involved as much as anything.

Does that answer your question, Madam Chair?

THE CHAIRPERSON: Yes, thank you very much.

01-H22.2/H22.2A

Written submissions from Maisie Shiell

At this point, I would like then to move to the written submissions. We have a written submission from Mrs. Shiell that is outlined in two documents, H22.2 and H22.2A.

I now open the floor for questions or comments from the Commission Members with regard to this written submission.

Ms MacLachlan.

MS MacLACHLAN: From a procedural perspective, I would just like to make the comment for the record that the reference back to the transcripts for the application for Rabbit Lake and McArthur River should be linked to the discussions on the Environmental Monitoring Program, especially the Environmental Effects Monitoring Program.

Having said that, I would also like it restated for the record, the issue on page 2 raised by Mrs. Shiell with respect to radionuclides and the rationale for them not being monitored or measured in benthic invertebrates. She makes the allegation that they are just estimated measurements in the water in the sediment.

I am wondering if we can have

restated for the record why radionuclides are not measured, first of all.

MR. PEREIRA: I will ask Dr. Thompson to respond.

DR. THOMPSON: Radionuclide concentrations in benthic invertebrates are calculated based on sediment concentrations and a bioaccumulation factor. They can't be measured directly in benthic invertebrates because we don't have the biomass necessary to -- we don't have enough organisms to be able to meet the requirements for the chemical analyses for those radionuclides.

MS MacLACHLAN: Thank you.

In that same vein and on that same issue, I would like staff to comment on the additional comment made by Mrs. Shiell, and I quote -- she is referring back to measurement of radionuclides. She says:

> "The reason Mr. Courtney gave me for not using sediment as a trigger was that it was too difficult to obtain a meaningful impact because the bio-availability from the

water and the sediment is not known. This might load an unnecessary cost on the corporation".

Would you care to comment on that, please?

DR. THOMPSON: Of course, I don't know what Mr. Wittrup told Mrs. Shiell, but essentially the program is designed to be able -- as we explained earlier in the case of McArthur River -- the program is designed to provide the best information, to extract the best information we can from the Environmental Effects Monitoring data. Essentially the information, the direct information on benthic community effects is more relevant in terms of assessing the significance of those effects and this information, in combination with information on chemical contaminants in sediment, can be used then to determine which contaminant, or which contaminants, may be causing those effects.

So it's the weight of that evidence that can best be used to make decisions on risk management.

Having just the triggers, or even

if we had direct measurements in benthic invertebrates, we would still need some method of extrapolating from chemical measurements in benthic invertebrates to potential significance or potential environmental effects.

So the assessment would be even more theoretical than an assessment based on actual data collected in the field.

MS MacLACHLAN: Thank you.

THE CHAIRPERSON: Other questions? Dr. Barnes.

MEMBER BARNES: Just to clarify, Dr. Thompson, on your point of insufficient biomass for the invertebrates. What are the actual technics then for analysing that material?

DR. THOMPSON: The radionuclides are measured at the Saskatchewan Research Council. I am not familiar with the actual methods or the volumes. I think maybe Cameco would be in a better position to answer that question.

THE CHAIRPERSON: Cameco, please.

MR. WITTRUP: Mark Wittrup. It's been an ongoing source of, I won't say contention, but we have been asked about the ability to do radionuclides in biological samples since the

earliest days of the panel and it's been a continual dialogue with the Saskatchewan Research Council.

The problem is that the relative levels of radionuclides in the tissue, be it benthic invertebrates or fish or whatever, is very low relative to the counting equipment that they have available to them. What they do is they dry the sample, hash it and create a pellet out of it and then put it in and count the activity, in effect concentrate the sample in order to generate a measurable signal.

Of course it has to be robust enough signal that you don't have a very long counting period because you start to build up errors, and the smaller the sample, the longer the counting time, the bigger the errors until the error bar far outstrips even the sample making it totally meaningless.

Generally, they would like to see 400 grams of wet weight material and, you can appreciate the difficulties in getting that much benthic invertebrate material. Then you come to benthics. What do you sample? Do you sample the whole bug, as had been suggested by Environment

Canada? Do you open them up and scrape the ichor from the inside and collect enough of that to sample? Collecting 400 plus or minus grams of that is a considerable task and a considerable impact on the bug population.

So we run into a number of practical problems in getting just the biomass to do it. So as Dr. Thompson has correctly pointed out, we do indirectly. In fact, the University of Saskatchewan toxicological group has been working on refining that particular method of determining a dose to benthic invertebrates. Dr. Thomas and Dr. Lever have recently published a paper looking at that very issue and working on the geometry of the bugs and the amount of stomach content they are likely to have with respect to the poor water concentration and the sediment concentration.

So there is a lot of work going on to refine the very technics that Dr. Thompson has talked about, but it's not a very easy or intuitive just to measure directly, but we do do the waters and we do do the sediments.

THE CHAIRPERSON: Thank you very much.

01-H22.3

Written submission from W.R. Adamson

We will now move to the written submission from W.R. Adamson as noted in CMD document H22.3.

The floor is now open for comments or questions from the Commission Members on this written submission.

--- Pause

THE CHAIRPERSON: There are no questions with regards to this written submission.

This completes the record for the public hearing on the matter of the application by Cameco Corporation for a licence to operate the Key Lake Operation.

The Commission will deliberate and will publish its decision in due course. The decision will be posted on the CNSC Web site as well as distributed to participants.

This brings to the end this hearing No. 5. We will take a five-minute break while participants have an opportunity to find their places and we will go to Item No. 6 in five minutes. That will be 11:08.

Thank you.

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