

NORTHWEST TERRITORIES WATER BOARD
PUBLIC HEARING

APPLICATION FOR WATER LICENCE BY
CADILLAC EXPLORATIONS LIMITED, PRAIRIE CREEK

Fort Simpson, N.W.T.
April 21, 1981

INDEX

	<u>Page</u>
Introduction (G.B. Warner)	1

PRESENTATIONS

Cadillac Explorations Limited	
N. Guild	3
Public Health Department	
A. Fowlow	77
R. Lamothe	82
DIAND/Water Resources	
L. Cooper	87
Chief J. Antoine	100
N. Sibbeston, M.L.A.	102

INDIVIDUALS - QUESTIONS AND COMMENTS

J. Bayly	29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42
N. Guild	29, 30, 31, 32, 33, 42, 43, 44, 45, 46, 48, 49, 50, 51, 52, 53, 57, 60, 61, 62, 66, 68, 69, 70, 71, 72, 74, 75, 76, 80, 82, 93, 95, 96, 116
R. Nendick	34, 35, 37, 38, 53, 54, 55, 56, 81, 95, 97, 98, 112
M. Bath	35, 36, 37, 39, 40, 62, 63, 82
L. Morrisroe	40, 41, 42, 45, 46, 51, 52, 53, 78, 99, 110, 111, 118
D. Gamble	42, 43, 44, 45
G. Gargan	45, 46, 56, 57, 99
G. Warner	46, 80, 82, 118, 119, 120

INDIVIDUALS - QUESTIONS AND COMMENTS
(Continued)

Page

Chief J. Antoine	46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56
B. Fletcher	49, 58, 59, 60, 61, 63, 64, 65, 66, 67, 68, 113, 114, 115
W. Conisanta	49, 50, 51, 56
W. Bryant	53, 54, 81, 94, 95, 119
L. Menez	57, 58, 59, 60, 61, 90, 91, 92, 93, 94
B. Wilson	62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74
W. Dwernychuk	73
A. Lafferty	75, 76, 120
A. Fowlow	79
G. Antoine	80, 81, 82
L. Cooper	90, 91, 92, 93, 94, 95
C. Kunkel	93, 94
Chief W. Berthele	95, 96, 97, 98
I. Robertson	96, 97, 115
L. Menicoche	110, 111, 112, 113, 114, 115, 118, 119, 120
Recessed	121

NORTHWEST TERRITORIES WATER BOARD PUBLIC HEARING ON THE APPLICATION FOR WATER LICENCE BY CADILLAC EXPLORATIONS LIMITED, PRAIRIE CREEK, NORTHWEST TERRITORIES.

Mr. G.B. Warner, Chairman, Northwest Territories Water Board called the meeting to order at 7:30 p.m. on April 21, 1981.

MR. G. WARNER: Good evening ladies and gentlemen. I would like to open this Hearing on the application for water licence by Cadillac Explorations Limited for mine and mill use of water and waste disposal associated with a mine at Prairie Creek, Northwest Territories. Before I start, I would like to give you some background information on the Water Board.

Early in 1970 the Government of Canada decided that steps should be taken to protect the environment and control pollution. One piece of legislation that was passed was the Northern Inland Waters Act. Section 7 of this Act provided for the establishment of a Water Board in the Northwest Territories.

The Northwest Territories Water Board consists of not less than three and no more than nine members appointed by the Minister of Indian and Northern Affairs. These nine members are split, with three appointed by the Minister and six recommended by the Commissioner-in-Council of the Government of the Northwest Territories to the Minister for appointment.

The Northwest Territories Water Board provides for the conservation, development and utilization of water resources in the Northwest Territories. Under the Act, an application must be made to

the Board and a licence issued prior to the industrial use of any waters or the disposal of any water borne waste.

These Hearings provide an opportunity for the public to hear what the applicant is proposing and to discuss the proposed use of water. This gives everyone an opportunity to hear what the applicant has to say, and also for the Board to hear the concerns expressed by the people at the Public Hearing. The Board is here at the Public Hearing to listen. It is not a court; it is not a tribunal. It listens and hears what people have to say about the application and takes into account the concerns raised at the Hearing. It is interesting to note that it is the only piece of legislation in Canada that provides this type of opportunity to hold a Public Hearing so that environmental and other concerns can be expressed.

I would now like to introduce you to the members and staff of the Northwest Territories Water Board. On my left is Lou Menez, Fort Resolution. Next is Wayne Bryant. Wayne is the Manager of the Environmental Protection Service for the Northwest Territories. On my left is D'Arcy Arden, a well-known mining man in the Northwest Territories. On my right is Mush Mersereau, a long-time resident of the North. On his right, who is it? Arthur? Arthur Redshaw, the Assistant Director of Renewable Resources with DIAND in Yellowknife. And at the end of the table is Don Gamble who is a project man with Canadian Arctic Resources Committee and also long experienced in the North. Our staff, at the other table, is the Chief of Staff for the Northwest Territories Water Board, Jo MacQuarrie. In the middle is George Carter, our Legal Advisor. And on George's left is Andy Cullen, the Controller of Water Rights.

The procedures that we will follow at this Public Hearing are as follows. I will first ask the applicant, Cadillac Explorations Limited, to make their presentation. I will then open the meeting to questions to be directed to the applicant. Next, individuals who have submitted a formal brief will be given an opportunity to present that brief. In this case, we have a brief from the Environmental Protection Services, I believe in conjunction with Parks Canada, a brief from Fisheries and Oceans, a brief from the Settlement Council, the Village of Fort Simpson, and a brief from the Dene Nation and Metis Association. I will then open the meeting to anyone who wishes to ask a question. And finally, the applicant will be given the opportunity to respond to the points raised.

To keep discussions orderly, those in attendance who wish to ask a question are asked to raise their hand and obtain my permission before speaking. Each speaker will be asked to identify himself or herself and indicate the organization he or she represents, if any. I would also ask that you come up and speak into the microphone here at the table in front of me in order that we can ensure we have the questions on tape for the verbatim transcript of these proceedings which will be prepared after the Public Hearing.

I would now like to ask Mr. Norman Guild of Cadillac Explorations Limited for their presentation. Norman.

MR. N. GUILD: Thank you Mr. Chairman. Members of the Board, ladies and gentlemen of the audience. We've prepared a project summary for this Hearing, and the purpose of the Hearing is to obtain public response to the water licence application filed by Cadillac for the Prairie Creek

mining property. Rather than discuss only the technical aspects of the licence we have chosen to review the total project, in order that a full understanding by those present may be obtained. The cross-section of the consultants working on the project is present to answer any specific questions that might arise.

I'll introduce you to the Panel, which is quite extensive. To my left is Mr. Lawrence Morrisroe of Cadillac Explorations. We have Mr. Curt Kunkel of Alto Construction, who are going to be responsible for the surface construction work on the project. And to my right is Mr. Brian Fletcher of Golder Associates, who will be a Technical Engineer for the project. And we have Mr. Murray Bath of Kilborn Engineering who's the Project Engineer for Kilborn, responsible for our mill and mine design work. And Mr. Roger Nendick, who's also with Kilborn and Project Metallurgist. Further down the table we have two representatives from Beak Consultants, who are involved in environmental, wildlife and aquatic studies for the project, Mr. Ian Robertson and Mr. Wayne Dwernychuk. And beyond those gentlemen is Mr. Ed Morrisroe of Cadillac Explorations and Mr. Jo Horsman, who attended to the socio-economic matters related to the project. And to the far rear is Mr. Edwards, also of Alto Construction, who, in fact, is the construction contractor.

So if I could have slide number one. Do you feel that's bright enough to see or should we turn the lights on? Can the people in the back see okay?

So you can see exactly where Cadillac is in relation to Fort Simpson. And the Prairie Creek Mine of Cadillac is located 110 miles west of Fort Simpson, 60 miles northwest of Nahanni Butte, and about

110 miles north-northwest of Fort Liard, and 300 miles west of Yellowknife, and 120 southeast of its nearest mining neighbor, CanTung, which is zinc. Cadillac is adjacent to Prairie Creek, which can be seen in the photographs. It's also approximately twelve miles north of the Nahanni National Park boundary.

The South Nahanni River flows southeast to Nahanni Butte where it joins the northeasterly-flowing Liard, which in turn joins the Mackenzie here at Fort Simpson. A winter road constructed early this year now joins the property with Fort Simpson and centers northeast and south by way of the Liard and Mackenzie Highways. This road will facilitate mine and mill construction, as well as later hauling of metal concentrates to market. A small airstrip also provides year-round access to the site.

The project is described in a series of three reports to which all the aforementioned consultants have contributed. The first report, submitted to the Department of Indian and Northern Affairs in May, 1980, outlined the preliminary concepts and environmental impacts of the winter road. It was followed shortly after by a similar preliminary report covering the mining development. In 1980, in October, the final environmental evaluation was submitted which covered the state of knowledge up to that date. Included in that report was an outline of all known aspects of the development, the environmental setting and the potential impacts of the mine and the access roads. A considerable amount of work has been carried out subsequent to October, 1980, and we will endeavor in this summary to outline some of these activities.

110 miles north-northwest of Fort Liard, and 300 miles west of Yellowknife, and 120 southeast of its nearest mining neighbor, CanTung, which is zinc. Cadillac is adjacent to Prairie Creek, which can be seen in the photographs. It's also approximately twelve miles north of the Nahanni National Park boundary.

The South Nahanni River flows southeast to Nahanni Butte where it joins the northeasterly-flowing Liard, which in turn joins the Mackenzie here at Fort Simpson. A winter road constructed early this year now joins the property with Fort Simpson and centers northeast and south by way of the Liard and Mackenzie Highways. This road will facilitate mine and mill construction, as well as later hauling of metal concentrates to market. A small airstrip also provides year-round access to the site.

The project is described in a series of three reports to which all the aforementioned consultants have contributed. The first report, submitted to the Department of Indian and Northern Affairs in May, 1980, outlined the preliminary concepts and environmental impacts of the winter road. It was followed shortly after by a similar preliminary report covering the mining development. In 1980, in October, the final environmental evaluation was submitted which covered the state of knowledge up to that date. Included in that report was an outline of all known aspects of the development, the environmental setting and the potential impacts of the mine and the access roads. A considerable amount of work has been carried out subsequent to October, 1980, and we will endeavor in this summary to outline some of these activities.

With this introduction the individual activities will now be described, beginning with the mine mill. Obviously it is not possible to provide highly detailed information in this brief summary, rather, emphasis will be given to issues relevant to the water licence application and to those items we believe are of most interest to those participating in the Hearing. There will be an opportunity for questions if more information is desired concerning any particular items. We have the Panel here to deal with questions in each area.

I would like to talk about the mine mill specifically. The Prairie Creek project of Cadillac consists of an underground lead, zinc, copper, silver mine, a mill, and associated camp. Also present is an airstrip. A six year mine life is envisaged, although there is a strong possibility that this may be extended after further exploration.

Now this gives some idea of the relative size of the Cadillac Project in relation to other mines in the Northwest Territories. Cadillac has been designed to treat 1000 tons of ore a day. Pine Point is a 11,000 ton per day mine. Compared to other mines in the Northwest Territories, it's a moderate size operation. For example, as I said, Pine Point is 11,000 tons per day, whereas Terra is a small operation, around 200 tons. There are mines in British Columbia which are large by any standards and they are 75,000 tons a day. So it's a moderate size in relation to the Northwest Territories.

Now of the 1000 pounds per day mined and processed, approximately one-third will be recovered as metal concentrates and shipped to market, and one-third will be returned to the mine as backfill, and another third will be delivered to the tailings pond at the site. So,

in actual fact, one-third is going to actually end up as tailings per se.

Now this first slide here gives you an idea of the plant site. This was taken in 1976, but it's one of the best slides that we actually have. It shows the existing exploration camps at that time and the dykes that were constructed. The adit was found in that area.

MR. G. WARNER: Excuse me Norm. Take the mike with you when you go. It's on tape.

MR. N. GUILD: I'm sorry. I think that gives a reasonable idea of exactly the nature of the valley. It also gives an opportunity to show that in the area that's potentially to be developed as the tailings impact for the life of the mine. These dykes will be incorporated in a properly designed and constructed tailings pond dyke and these other dykes here will be extended and proved and run around the whole project.

So it's a compact site and a site that one can understand relatively easily. We simply mine the ore here. There will be a mill, sort of, located in this area and the waste materials, a third of which will end up in the tailings impoundment over here.

This is a slide taken in 1980 and, as you can see there, at that time there wasn't too much difference. It's just another view. You're looking up Harrison Creek here, which is a feeder tributary to Prairie Creek. There is another portal, actually, up the creek, which is the 30-50 portal, and that's the two portals on the project site.

Okay, shine the next one. This is an artist's impression of how this site will actually look when the mill is installed and in production and the tailings pond is operational. It's an artist's

conception. It can be seen that the operation is surrounded by high mountains and lies adjacent to Prairie Creek, which flows in a southerly direction. Harrison Creek enters Prairie Creek alongside the mine site, Harrison Creek up in this area. Other features which can be seen on this one, basically, are the wall mine portal. The upper portal isn't shown, but it's up in that area. We have the mill concentrator. This is where the concentrates will be stored in covered storage during the life of the mine. The tailings will be taken and contained within this area here. That's our tailings pond, our proposal for the tailings pond and this area here is where the reclaimed water will be returned and used in the mill process. It's hoped to reclaim about 80% of the water to keep in a continual cycle, with make-up water of about 20% of the water requirement. This would be fuel storage which is suitably, has embankments around it, impermeable banks to contain any spill from one of the tanks that may occur. This is a run-off settling pond established in this area to collect run-off from behind the impoundment dykes to make sure it can be acceptable before released to Prairie Creek. One other feature shown on here is the effluent treatment station. Because we're not releasing water from the tailings pond there will be some surplus water which will be returned to the mine to convey the backfill, that's the other portion of the mill solids that I mentioned, the third that's going to be used as backfill in the mill. That water will release through the mine along with some drainage water that, ground seepage water, and it will be collected and treated here prior to release from the pond. There is a plan of that on the wall and there is a slide to follow which will show more detail. One can also see the

airstrip on the property. It gives an idea of the proximity of the airstrip, in this corner here.

Now the purpose of the tailings pond is to retain the ground rock material from which the valuable components have been removed in the mill. Now it is worth dwelling on some positive features of this system, including the tailings impoundment dyke is, in fact, only 20 to 30 feet high. There are cases in some mines where these tailings impoundments are up to 100 feet high, but in this area, because of the arrangement with the space, we can create low dykes and we are excavating about ten feet from the pond in that area so we can keep our dykes low.

Another positive feature of this project is that when we did our geo-technical investigations of various sites, this site itself is proven to be underlain by somewhere between 20 to 30 feet of impermeable till. And this till forms a natural seal to that basin, and there's enough material there that we can excavate from that material and create an impervious core for facing in the impoundment dyke that you can see following the creek. So we have an essentially impervious containment area.

Another positive feature is that the ore itself, tests were run on the ore and the ore, so that the tailings themselves are non-acid generating, which is a problem that one runs into with several mines. But in this case we do not have that problem. The same with the waste rock material that is taken from the mine and it is similar. It is non-acid generating.

That is a cross section of the tailings impoundment dyke. As you can see from this slide, this is the tailings pond behind. This is the dyke that will follow Prairie Creek. This is Prairie Creek. So we'd be excavating a portion of the sands and gravels here such that we are, in some areas, we'll be almost down to the clay deposit, in other areas there'll still be a bit of a buffer. But we'll still have anywhere up to 15 feet of clay beneath us. We'll take material from there, we can take material from there and place it as an impervious clay seal here. This has a minimum thickness here of eight feet thick and you'll notice how it will be sealed into the clay deposit below. So, in fact, with that as a perimeter tying all the way around, and with the clay below, we have an impervious basin.

Another feature is, that you've seen from the previous slide, Prairie Creek is flowing past this area. Now there are some existing dykes here which that sort of represents, they will be incorporated within the final fill area, and we have looked at flows in Prairie Creek and for that reason we have placed this quite thick layer of rip-rap. This is five feet minimum thickness with stones two and one-half feet thick, and we have designed them for, we've looked at this flow in Prairie Creek and, at the moment, the maximum flows are around six to seven thousand cubic feet per second and we have designed for, this is known as the maximum flood level, which is of an order of magnitude at least six greater, so there's about six and one-half thousand cfs, whereas we have designed for 38,000 cfs. So we believe we've protected this quite adequately, and you'll notice how it's keyed into the base as well. So that's quite a good slide to explain the nature of the tailings dyke.

Another feature, I guess we could flick onto the next slide. This is the engineering drawing of the artist's conception and, once again, you can see that it's a compact site so any tailings materials taken from the mill has a short distance to run. And you'll notice here we have several cells. Now we recognize that we're going to be operating during the winter, so the cell system permits one cell to be used during the winter period and that cell then ceases, the operation ceases in that cell after winter and we switch over to one of the other cells for summer operation. This allows the ice that's spread here to melt, and the idea is that these are sort of impermeable berms within the pond, water will congregate to the center area and from there we'll have a floating barge with pumps which will reclaim the water. And you notice we can contain all the pipelines and anything within these berms and also within this other berm here.

Now the tailings pond design and the plant site flood protection works have been developed on the basis of detailed engineering survey, hydrological analysis and geo-technical studies of surface and sub-surface soils in the area of concern. And a number of alternate tailings pond sites were rejected because they did not meet these engineering and environmental guidelines that we had set down.

Perhaps we could look at the next slide. This sort of shows the area where, over here is where our T2 is, but for our future expansion, if we need any more space, this is the beginning of the next slide. It continues on here, but this is known as site T3. Our site was, we've been looking at is T1 over in this area, T1, T2 site, and this is T3.

Next slide. Other sites that were rejected, and we looked at them, we had a trip today. We considered damming across this valley of Harrison Creek, alternatively damming across that valley of Harrison Creek and, even at one point, considering the damming across there. Now when we looked at the hydrology and considered the flows that were going to be flowing within these impoundments, we just felt that the integrity of the dykes would not be maintained. So these sites, this would be T1, this was rejected, this was T4 and T5 were rejected, and T2's been the one that we've been talking about, and T3 is in this direction here.

The waters from the operation, wastes from the operation, are those normally generated from any mining development, and will include sewage, garbage, air emissions from the mine and mill, mine waste rock and mine water. Sewage will be treated in a secondary sewage treatment plant, complete with chlorination facilities, and discharged to a ground disposal fill, provided that suitable permeable soils can be located. Combustible garbage will be burned and any incombustible refuse will be compacted and land filled. Emissions to the air will include mine ventilation, diesel generator exhaust, and emissions from standard mill equipment such as crushers and assay laboratory. Now dust abatement equipment is to be employed on those emissions which require it. No thermal drying or smelting operations are to be carried out. It is not expected that these wastes will generate any difficulties whatsoever with proper design and careful housecleaning.

Quantities of waste rock will not be large and this material will find use as mine backfill and in road construction. This isn't

the portion of the mill wastes we call backfill. This is rock that's taken out from the mine itself and is a larger size. But there is not too much of that in this case and, what there is, is being used on the property.

Now drainage from waste rock and from the mine, I mentioned this before, is not expected to be acidic due to the preponderance of carbonic minerals in the host rock. The host rock is dolomite and limestone which prevents this happening. However, subject to verification as to its need, we've indicated a treatment plant would be provided in order to remove any substances which might be present in unacceptable concentrations.

The question of safe storage of fuels, oil and gasoline has been given a considerable amount of study. Fuels are to be stored in an area well protected from flood waters and surrounded by impermeable dykes on an impermeable base such that, if a tank rupture occurred, the spill would be contained. Facilities for recovery of spilled material would also be provided.

Okay Kevin, next slide please. Now cut and fill stoping will be utilized as the mining method, thereby maximizing the volume of mill tailings to be returned to the mine. The mill process, which you can see on that slide, currently envisaged is a selective flotation of lead, zinc and copper concentrates employing methods and chemical reagents which are standard in the industry. The copper concentrate containing most of the silver will be shipped, primarily by air, on a daily basis, with the lead and zinc concentrates stockpiled for annual shipment over our winter road in covered trucks.

Okay, could we try the next one. Alright. This slide shows the water balance involved with respect to the water licence. And, since this Hearing is concerned principally with the water licence application, a description of the application filed for water use in July, 1980 will be given.

The application was filed to request a licence for the use of 205,000 Imperial gallons per day from either the ground or from Prairie Creek. This quantity was considered to be required for domestic needs in the camp and for industrial usage in the mill and mine. Reuse of water from the tailings pond was inherent in the calculated requirements. As I mentioned earlier, we would tend to use 80% reclaimed from the tailings pond.

Further engineering work carried out during the fall of 1980 caused a revision to be made of the estimated water requirements. It was then requested that the licence authorize the use of 250,000 Imperial gallons per day on average, but 750,000 Imperial gallons per day during short periods when unusual circumstances required it. The average water requirement is suspected actually to be less than 200,000 Imperial gallons in practice. Now current plans call for the extraction of groundwater from a well rather than from Prairie Creek. Now several wells have already been located on the property, and the one well that I was actually looking at today has probably enough capacity to supply both the mill and domestic needs. So the current thought is to utilize the groundwater on the property rather than extracting it directly from Prairie Creek.

Just before we leave this slide, I can explain it a little bit more. Here we have the mill, the ore going into the mill. It has

Okay, could we try the next one. Alright. This slide shows the water balance involved with respect to the water licence. And, since this Hearing is concerned principally with the water licence application, a description of the application filed for water use in July, 1980 will be given.

The application was filed to request a licence for the use of 205,000 Imperial gallons per day from either the ground or from Prairie Creek. This quantity was considered to be required for domestic needs in the camp and for industrial usage in the mill and mine. Reuse of water from the tailings pond was inherent in the calculated requirements. As I mentioned earlier, we would tend to use 80% reclaimed from the tailings pond.

Further engineering work carried out during the fall of 1980 caused a revision to be made of the estimated water requirements. It was then requested that the licence authorize the use of 250,000 Imperial gallons per day on average, but 750,000 Imperial gallons per day during short periods when unusual circumstances required it. The average water requirement is suspected actually to be less than 200,000 Imperial gallons in practice. Now current plans call for the extraction of groundwater from a well rather than from Prairie Creek. Now several wells have already been located on the property, and the one well that I was actually looking at today has probably enough capacity to supply both the mill and domestic needs. So the current thought is to utilize the groundwater on the property rather than extracting it directly from Prairie Creek.

Just before we leave this slide, I can explain it a little bit more. Here we have the mill, the ore going into the mill. It has

some water contained in it. This balance is in Imperial gallons a minute, so we have six Imperial gallons a minute within the ore. We require to the mill 71 Imperial gallons per minute, so that's like ten good hoses going. That's not a large amount. Now that is based on being able to reclaim about 382 gallons a minute from the tailings pond. Now the tailings pond will lose some water due to evaporation, we'll lose some water locked in with the solids in the pond. However, there will be some run-off into the pond, a small amount, and from direct precipitation, rainfall, there will be another input to the pond. So that gives us our pond water balance, and you can see we've said here seepage is zero and this is because of the impervious nature of the impoundment.

From the mill we convey the backfill that I mention to you to be used in the mine, we need water to convey that. This water will, we need 83 gallons a minute to take this backfill into the mine, and this is where we end up with a surplus. This is what we call mine effluent and it's sort of a compromise of what's left from the backfill water. There is an estimated average groundwater seepage into the mine of about 100 gallons a minute and then we have drill dust suppression and washdown water of 50 gallons a minute. If we add that plus that plus that, and then take off 23, which is the amount of water that gets retained in the backfill in the mine, we're left with an average of 210 Imperial gallons a minute.

And our intention is, for during the first year of operation, to recycle that amount of water to the pond and allow the pond to increase in size. During that period of time, or approximately that period of time, we will sample this effluent and decide exactly the

equipment that is required for the treatment plant. The concept is decided, we know basically what we plan to do, but we'd like to be able to refine it to ensure that it is actually reflecting the quality of water coming from the mine. And after the treatment plant, which we'll get into a little bit later, it will be discharged to Prairie Creek. So that is what we call water balance flow sheet for the project.

Okay, could we flick to the next one. Now, as noted earlier, water from the tailings pond is to be reused in the process. However, there is a need for a discharge from the sewage treatment plant and the mine. And Cadillac is committed to ensure that these will be of good quality after treatment and have no impact on the aquatic resources of Prairie Creek or of other downstream waters. The table indicates the quality expected after treatment which is equivalent to secondary standards for sewage and the Federal Mining Regulations for the mine effluent respectively. This represents the sewage parameters and this the treated mine water. This is the 210 gallons a minute we were talking about. This maximum value includes an additional allowance for extra seepage into the mine. It should be noted, however, that mercury, cadmium, cyanide, ammonia and nitrate levels are not specified in mining regulations, but the levels of these parameters fall within British Columbia standards for mining effluents. That's how those ones were actually developed.

Okay, could we line up the next slide. This shows the conceptual effluent treatment plant. Although mine water will be reused, together with tailings pond reclaim water, to the maximum standard possible in the mill process circuits, it will be necessary to discharge an average

of 302,000 Imperial gallons per day of excess water from the mine drainage sump to Prairie Creek. This excess water will comprise of a mixture of mine groundwater seepage, mine washdown and dust suppression water, and backfill reclaim water. It may require treatment due to the possible presence of mill reagents persisting in the backfill reclaim portion of the discharge, and a minewater treatment plant will be designed to treat mine effluent in order to oxidize cyanide and to precipitate any heavy metals which might be present. Treated effluent will be discharged either directly to Prairie Creek or to the run-off settling pond where it will combine with surface run-off and overflow to Prairie Creek.

Once again, just to outline. This is our groundwater seepage, 0 to 300, the average is 100 we've taken. Drill water is 0 to 50, backfill water is 0 to 60, to the mine through the sumps and from there it would go to the alkaline chlorination plant where we would add calcium hypo-chlorite and lime. We then take it through the plant and put it into, now we decided to go with the mechanical settlers, so we would have a mechanical settler. The settled materials would then be returned to solids to the tailings pond and the overflow, treated overflow, would go to Prairie Creek. We have a flocculation station here. That is simply to aid the settlement of any particles. We may have some suspended solids coming from the mine, in the water, the flocculation station will help to settle those out prior to release. You will note that this settling pond is the one that I showed you at the very end of the project that the water would collect and any run-off water in the area. It would be provided with an oil boom and there are, would be facilities provided to add flocculants to that area too, should that

prove to be a problem. The solids from this are returned to the tailings pond. Here we have the sewage treatment and that just represents the treatment plant, the chlorination and treated sewage to the ground or Prairie Creek.

Okay, could I get the next slide. Now this is the alkaline chlorination plant, or the treatment, that we would plan for the water exiting from the mine. Mine effluent will be collected in an underground sump where most of the suspended solids will settle out. The overflow from the sump will be pumped to a tank in the treatment plant where hydrated lime will be added to control pH. From this tank the water will overflow into three treatment tanks, in series, to give 75 minutes of residence time. Calcium hypo-chlorite will be added to the first treatment tank while the pH and the oxidation-reduction potential will be measured in the second tank. Lime and calcium hypo-chlorite addition rates will be automatically controlled according to the pH and oxidation-reduction potential. Any additional controls required to limit residual chlorine levels in the effluent would be employed.

The overflow from the third tank will flow by gravity into a Lamella thickener where metal hydroxides will settle out. Now treated effluent will overflow the thickener to the run-off settling pond or directly to Prairie Creek during the winter. The underflow from the thickener will be pumped to the final tailings pump box in the mill from where it will be pumped to the tailings impoundment area. Flocculant will be added at the overflow launder of the third treatment tank to assist settling of solids in the thickener. The pH of the effluent before it is discharged from the treatment plant will be monitored.

In the unlikely event of a prolonged power failure in the plant, the discharge gate of the run-off settling pond will be closed to stop discharge into Prairie Creek. The water quality in the pond will be monitored and the discharge gate will not be opened until metal and cyanides contents of the water meet the required standards. And there is going to be a stand-by diesel pump provided at that pond which will be capable of returning the water in the pond, if it's not suitable, to the tailings pump box so it could be returned once more to the tailings pond.

An additional factor of safety would be the ability to shut down the backfill pumps during any malfunction of the treatment plant which would eliminate the source of potentially contaminated water from the effluent, that would be the water that would be used from reclaim from the pond. Facilities would also be provided to bypass excess reclaim water directly to the treatment plant without a need to first pass through the mine. Thus effluent treatment and disposal could take place independently of mine backfilling. It's another flexibility.

During the life of the project, if it was established that a critical period existed with respect to fish migration past the mine, or if the low flows in Prairie Creek were deemed to place aquatic resources under stress, then it would be possible to discontinue effluent discharge to the Creek for any critical period by temporarily directing all the effluent to the tailings pond. However, because flow measurement and sampling of mine water required for design will not be possible until mill start-up, and in order to permit the proper design of mine water treatment facilities to be carried out, a revised strategy has been

conceived for approximately the first year of operation. This is what I mentioned earlier.

Rather than discharging mine water to Prairie Creek via the treatment plant, the facilities would be designed so as to permit mine water to be pumped via the tailings pump to the tailings pond, in other words, a closed circuit for the first, approximately the first year. Although the result in water balance under this scheme would cause water to accumulate within the pond, the available storage will be adequate for approximately one year if the tailings dam is constructed to its full height. This is the proposed scheme now. During this period, a detailed design of this treatment plant would be completed and construction undertaken. Therefore, no mine discharge would take place for approximately one year. After installation of the treatment plant, the pond level would be gradually drawn down to a working level by treatment of excess waters.

As part of our summary we had a bit of a dissertation on the winter road aspect and we're not going to address that fully at this time, but anyone who wishes to review it in the future, we're quite willing to discuss that aspect.

I'll move on to more the wildlife and aquatic resources aspects now. Since March, 1980, Beak Consultants have been responsible for the portion of the Prairie Creek Environmental Assessment dealing with terrestrial and aquatic resources. Preliminary work in 1980 was based on three sources of information: literature, site visit by the study team members in April, 1980, and discussions with government personnel. Later surveys of both the winter road and mine/mill area in

July and August of 1980 provided the basis for a more complete assessment as reported in the Environmental Evaluation of October, 1980. Additional work was carried out in January and March of this year and is on-going in order to expand the information gathered to date.

The terrestrial studies have several distinct elements, but the principal focus has been the potential impact of the project on ungulates, that is sheep, moose and caribou, and their habitats. The key element in the analysis is vegetation. The earlier investigations utilized existing information and site visits to identify the main vegetation zones and identify the chief plant species, whereas the on-going 1981 program will better define the plant communities during the summer period. This process will involve mapping the vegetation from aerial photographs, confirming the interpretation in the field, and sampling and analyzing the vegetation with a series of ground plots. Coupled with browse surveys and food habitat estimations in the literature, a preliminary habitat map will be constructed.

Few big game species were observed during Beak's first reconnaissance in April, 1980, however a general picture emerged with respect to wildlife capability by reference to wildlife resource maps, literature and consultation with persons familiar with the area.

Could you flip over this one. No, we flip over one more. Yes, okay. Detailed field studies were initiated in July, 1980, with the objective of determining summer distribution and abundance. During the July survey, Dall's Sheep proved to be the most abundant ungulate with 64 animals observed within a six mile radius of the study area centered in the mine. The right side area represents this area here,

and all in all there were about 44 Dall's Sheep observed in this area, and there was about 20 in this area. At that time there was two caribou also noticed. There were only scattered observations of caribou and moose throughout the study area, but it was recognized that winter would provide a superior time for the surveys of this species. Could you flip over to the next slide there. That was one caribou that we did see.

Wildlife surveys in early July, 1980, were also intended to provide information on raptors and waterfowl. Now raptors are birds of prey. Cliffs in the study area, could we just flip over, this is one of the cliffs near the mine site. They were flown to determine the presence of cliff-nesting raptors. Now no nests were found near the mine site and two Golden Eagle nests were found, but they were in the Nahanni Range and they were two to four kilometers north of the winter road.

Could you flick one more slide. That's the helicopter that we used for flying our surveys. Now wetlands also within two kilometers of the proposed road were surveyed with the prime interest being the identification of possible utilization by Trumpeter Swans. Although six were observed, there was no sign of breeding activity.

Now the on-going 1980-81 program has the following objectives: to identify major wildlife species present in the study area, and their population, size and distribution, and to identify rare and endangered wildlife species and/or species sensitive to industrial disturbance on a local or regional basis. There are several other aspects that we're looking at, but it's an on-going program to better identify the data base that we'd be working from.

Could I have the next slide. This sort of shows some of the information that has been determined in January and March of this year. Winter aerial surveys of the mine/mill study area were conducted in January, 1981, and a further aerial survey of this area, plus the winter road corridor, was conducted in March, 1981. Survey results are presently being assessed but some preliminary observations can be made.

Now I'll summarize that a little bit better. Basically, we did not find a great number of Dall's Sheep or caribou in July, 1980, and we recognized that was not the winter period so we have now been in in the winter period, and in January, and in March, and basically what we found was even fewer this time. Now we found about 40 in all, and they had moved in sort of this direction. I think there was one other, one caribou, it doesn't show up there. There was one other caribou, one caribou was identified in that study.

Along the road corridor some caribou and moose were observed, but the relationship between these observations and location of the road and vegetation remains to be analyzed. What was identified - there was about ten moose in this whole 40 mile area and there were additional three moose down in that area.

Further surveys will be conducted in the portion of the study area around the mine/mill complex. In spring, these surveys will attempt to determine if there are any areas utilized for lambing by Dall's Sheep or for calving by caribou. In summer, coincident with vegetation work, surveys will be made of grizzly bear dens to identify the distribution relative to the project area. Should on-going studies identify unresolved impacts, Cadillac is committed to develop suitable mitigative measures.

Could you give me slide 9A. The other portion is the aquatics. Aquatic studies were also undertaken in April and July, 1980. The field program had the objective of assessing fish habitat and utilization of available habitat by resident and/or migratory fish in terms of species composition and relative abundance. Analysis of water samples and of trace metals in fish tissue were also undertaken to define baseline conditions. Sampling sites included Prairie Creek and Harrison Creek near the minesite and several streams in the proximity of the winter road. This shows electroshocking in process in Prairie Creek.

Okay, the next slide. In addition to fisheries, a study was made of the benthic invertebrate communities, that is, bottom dwelling insects of the above mentioned aquatic systems. This data complements water quality information and enables an assessment to be made of the time factor in water quality studies, since communities of invertebrates that develop in a given area do so over an extended period of time. Therefore, basic community structure is a reflection of water quality prior to the time of sampling. Benthic invertebrate studies indicated that aquatic insect populations in Prairie Creek near the mine site were relatively sparse. Other streams along the winter road contain larger populations, with the greatest number of organisms being collected in a tributary to the Ram River and Fish Trap Creek.

Fish habitat within Prairie Creek was relatively similar at various sampling locations. Due to low productivity, lack of in-stream and stream-side cover, and limited pool formation, it is believed that utilization by fish is minimal. A few Arctic Grayling, Whitefish, Dolly Varden Char and Slimy Sculpin were captured from Prairie Creek.

Although no barriers were noted downstream from the mine site and the South Nahanni River, the lengthy areas of steep gradient and lack of holding areas are believed to discourage fish movement to the upper reaches of Prairie Creek. Fish populations in aquatic systems associated with the winter road range from zero fish capture at some locations to a comparatively diverse capture in the Tetcela River.

Trace metal analysis in Sculpin and Dolly Varden Char revealed no excessive concentration of either cadmium, copper, arsenic, lead, mercury or zinc in muscle tissues. Similarly, baseline water quality sampling of Prairie Creek, groundwater at the minesite, and streams along the winter road demonstrated no unusual conditions.

Before I move off this slide, it gives an idea of where the plant is planned, that's the tailings pond area. There were aquatic sampling stations set up at M1, M2, M4, M3 and then M5, and there was some benthic work done there. Water quality was also taken upstream of the project, downstream of the project, on Harrison Creek, samples of the minewater were taken, samples of the groundwater from bore holes were taken, and samples of stream sediments were also taken and analyzed upstream and downstream.

Okay, can you give me the next slide. Winter fisheries work was undertaken in March, 1981. Based on observations made, it appeared that the Grainger River, and that's the Grainger River, and the Tetcela River possess an over-wintering potential due to the presence of flowing water under ice and high dissolved oxygen levels. However, all small streams, including the tributaries to the Grainger and Tetcela, and the Sundog Creek and Ram River tributaries crossed or paralleled by

the winter road were completely frozen and, therefore, have no over-wintering potential.

Can you give me one more. Fish Trap Creek had water under the ice but very low dissolved oxygen. Prairie Creek contained flowing water in March, with a high dissolved oxygen, and must be considered as having some over-wintering potential, particularly in deep pools in the downstream reaches.

Fisheries studies scheduled for the spring of 1981, and they have started, are designed to determine Grayling utilization of those systems judged to have spawning potential. Two surveys will be undertaken, one just at break-up and one after. Gill nets will be set upstream and downstream, the crossings on key tributaries and on Prairie Creek. If possible, sampling will also be undertaken with an electro-shocker, like you saw earlier. Water quality in all the systems will be determined during both surveys. During the first spring survey the ice bridges or remnants will be examined to evaluate whether they may constitute a barrier to fish migration and their effect on stream biophysical characteristics. Life history will be collected from all captured fish. As well, additional benthic invertebrates studies scheduled for the spring include sampling of Prairie Creek and Harrison Creek. Spring studies will better define the existing aquatic data base for the project area and will provide a sound basis for comparisons during mining operations.

Another important aspect of the project is, of course, reclamation. It is, of course, of significant interest to Northern residents and government agencies to know what the mine will look like

and what impacts the operation will have on the environment after mine shut-down. The objective of the reclamation program at Cadillac will be to restore the land to a condition which will be aesthetically pleasing and safe, and which will pose no threat to the water quality of Prairie Creek.

Final reclamation at the mine site will encompass stabilization of unstable rock slopes, provision of permanent and well-protected surface drainage ways, further rip-rapping, if necessary, of dykes along Prairie Creek and Harrison Creek in order to protect against flood waters, sealing of abandoned mine portals, removal of buildings, equipment, vehicles, fuels, etc., and the establishment of a vegetative cover on disturbed areas. Seed plots will be established during the operating period of the mine in order to determine suitable seeds and their nutrient, water and long-term survival requirements. Reseeding of areas not subject to on-going disturbance would be initiated prior to shut-down. On the basis of studies carried out to date, the only residual impact anticipated after mine abandonment would be the visual presence of the tailings impoundment. However, over time, the visibility of this landscape alteration will diminish as reclamation efforts take effect. At no time during or after the period of mine operation are any significant deleterious effects upon the Nahanni National Park expected to occur.

Reclamation, waste disposal, environment management and contingency planning will be the direct responsibility of an environmental supervisor resident at the site. Therefore, these matters will receive the full-time attention of a technical person who will liaise

with other mining personnel, government and the public to ensure environmental protection.

An additional section that we provide in our summary was on socio-economics and, once again, I won't address that at this time, but we are open to discussion of it at any other time.

So I'd really like to come to a conclusion now. So, in conclusion, this Hearing has been called to review the water licence application filed by Cadillac Exploration Limited for their proposed mining development adjacent to Prairie Creek. We have outlined not only the technical aspects of the application, but also the development plans, the practices for water management and waste disposal, the environmental baseline studies which have been conducted and are continuing. We feel that the project is environmentally sound and, provided that construction and operation of facilities are carried out as recommended by the panel of consultants, the mine will have negligible negative impact on the water resources of the project area in both the long and short term. Similarly, we are confident that the wildlife and other resources of the region can be protected and, should current studies demonstrate the need, mitigative programs will be developed in cooperation with the appropriate government agencies. The framework has been laid to give flexible and positive opportunities to Native Northerners, other Northern residents, and local businesses. Cadillac is committed to proceed under the principles that have been outlined and, on this basis, we believe the project will be an asset to the North and be a significant contributor to its prosperity.

Thank you.

MR. G. WARNER: Thank you very much gentlemen. Could we have the lights please. While we're blinking in the bright light, the Board is pleased to recognize the presence here tonight of Chief Jim Antoine, the Chief of the Fort Simpson Dene Band; Mr. Nick Sibbeston, our M.L.A. for Mackenzie-Liard; Ralph Rea, Secretary Manager; and Orest Watsyk, the Mayor of Fort Simpson. Thank you very much for coming gentlemen. It's a pleasure to have you.

So we will now proceed with the next step in our public hearing process, and ask anyone who has any questions of the applicant on their presentation, or on other matters related to this water licence application, to do so. I would remind you to please come to the forward mike to do so and identify yourself, by name, for the sake of our tapes. Yes.

VOICE FROM AUDIENCE: Mr. Chairman, will we have an opportunity to ask questions again after we've heard other submissions?

MR. G. WARNER: Yes, there will be a final wrap-up. However, anything that directly relates to this submission or the licence of the applicant, this is the time to do it. But we won't cut off questioning. Yes, John.

MR. J. BAYLY: Mr. Chairman, my name is John Bayly and I'm acting as Counsel for the Dene Nation and the Metis Association, and I have a number of questions for this panel. I'd rather expected a Mr. Guild to be on panel as the Hydrologist, but I gather he's not here. Is that correct?

MR. N. GUILD: I'm Mr. Guild.

MR. J. BAYLY: Oh, you hadn't introduced yourself, or you did it so quickly that I didn't get your name. My questions then are directed, in the first instance, to you. Mr. Guild, I wonder if you could outline for the Board your qualifications in the science of river hydrology?

MR. N. GUILD: Basically I am a water resource engineer. I've had experience on several mining developments of this nature in doing hydrology studies for them, and primarily my experience has been in the estimating of flows, run-offs, precipitations in creeks. I, myself, am not experienced in the actual bed movements. In other words, I wouldn't say I'm a specialist in that aspect of river hydrology, which I think is what you're referring to. Is that right?

MR. J. BAYLY: I just wanted some background because I was interested in what river hydrology studies, other than this one, you may have done in the Mackenzie Drainage Basin.

MR. N. GUILD: Okay. I, myself, have done none in the Mackenzie River Basin. We have done river hydrology studies. My main experience has been in areas in British Columbia.

MR. J. BAYLY: I take it then that you have read the available literature and studies on river hydrology that have been done in relation to other projects in the Mackenzie Drainage Basin. Have you?

MR. N. GUILD: Yes. We've endeavored to collect all available information, and we believe that we have collected all, and we have studied that information to the best of our ability.

MR. J. BAYLY: I take it then that you are acquainted with the work done by Mr. Chuck Howard, with Unis, which was done for the Environment Protection Board when they studied rivers proposed to be crossed by the Canadian Arctic Gas Pipeline.

MR. N. GUILD: I'm not intimately familiar with that study, no.

MR. J. BAYLY: I wonder then if you are acquainted with the range of water shed parameters and dimensionalists flood frequency curves that he's developed in his study?

MR. N. GUILD: Well we've looked at the ones that were developed by Dillon, and I'm not sure whether they're exactly similar to the ones that Howard has, but they're the same dimensionalist thing. Those were looked at. I can't confirm that they're the same ones.

MR. J. BAYLY: When you were calculating maximum flows, did you look at this stream as having particular characteristics that you were able to compare it with other streams from this area, or areas with similar precipitation, gradients and drainage basin?

MR. N. GUILD: Yes, well the method that we utilized for this development of flows in Prairie Creek, we utilized existing data on Prairie Creek that was available. We also looked at it from the point of view of these dimensionalist factors, we compared it similar to developing of aggression curve, as per Dillon, and that takes in those factors. And we also looked at this as a basin in relation to other basins that we were familiar with and developed with the Herschfield formula, but you have to use some dimensional, there's a co-efficient that has to be plugged into that equation and that's the co-efficient that, by our judgment, and that we used for the calculation of some of the flows.

MR. J. BAYLY: In the streams that you were familiar with, that you had compared this with, I would take it were in British Columbia. Were they?

MR. N. GUILD: There were some in that area and some in the Yukon, the other side of the divide.

MR. J. BAYLY: I've noticed in the Department of the Environment's submission that they suggested you'd used rainfall data more appropriate to British Columbia. Is that the case?

MR. N. GUILD: No, it's not. I was going to ask them a question on that too. I haven't had a chance to discuss their comment on that.

MR. J. BAYLY: Can you tell me where you got your rainfall data?

MR. N. GUILD: Yes, the rainfall data was taken, we had one year of data, which isn't much, at the site, and we compared it to existing data at Tungsten and Fort Simpson. In fact we looked at several other stations but we felt, in the end, that Tungsten and Fort Simpson were ones that we could correlate better to. So no, it's using data from the area, as close as we could.

MR. J. BAYLY: Now in determining maximum flood levels, can you tell me whether you used on-site measurement or evidence to determine what the maximum flood levels would be?

MR. N. GUILD: Yes, we made use of the actual data that had been collected from the flood gauge, or the flood recorder, that's actually on Prairie Creek.

MR. J. BAYLY: And were you dealing with one in five, one in ten, one in a hundred year flood conditions, or what degree?

MR. N. GUILD: The actual flood flows that, the perimeter dykes that you can see around, that I showed around the actual property, they were designed for one in a hundred year period, and a three feet freeboard on top of that, and then the actual tailings impoundment itself, for that we looked at what we call the maximum probably flood, which is an extrapolation of all the data available, to come up with supposedly the maximum

conceivable flood that would come in that area and, as it is with the tailings impoundment, the level that we have recorded where we believe the maximum flood will be, there's still nine feet above that to the top of our tailings impoundment.

MR. J. BAYLY: Are you aware of a flood in the early sixties, at the exploration period of this mine project, which washed over the camp at the Cadillac site?

MR. N. GUILD: Yes.

MR. J. BAYLY: Can you tell me whether a report was done on that flood?

MR. N. GUILD: I'm not aware of the report, if it was done.

MR. J. BAYLY: Were you involved with the project at that time?

MR. N. GUILD: No, I was not.

MR. J. BAYLY: I wonder, Mr. Guild, if you could check for us to find out if there was a report done and, if so, if you could inform both the Board and the Dene Nation and Metis Association?

MR. N. GUILD: Yes. I'll certainly double check on your behalf, but as I say we did ask for every available piece of information there was and we were informed that there were no reports of it.

MR. J. BAYLY: Turning now to the question of some of the chemicals which are to be used in the project. I don't know the appropriate person to address these questions to so perhaps, Mr. Guild, you could suggest who they should be addressed to.

MR. N. GUILD: Probably Roger Nendick or Murray Bath of Kilborn but Roger Nendick, I would say, would be the gentleman to address them to.

MR. J. BAYLY: I'll be addressing a number of questions, Mr. Chairman, so perhaps Mr. Nendick could find a microphone so that his answers can be recorded. Is that more easily heard?

MR. G. WARNER: How is that at the back? Can you hear Mr. Bayly now? Well the only thing I can do is suggest that you move closer, in the aisles if you like. We don't have a public address system here, so if you'd like to move closer there are seats right across the front, there's ten or a dozen seats right across the front. Feel free to come up here and use them if you like.

MR. J. BAYLY: I'll try and speak up Mr. Chairman. I realize my back is to the people in the room.

MR. G. WARNER: Turn your table if you like, John.

MR. J. BAYLY: Mr. Nendick, do I have the pronunciation of your name correct?

MR. R. NENDICK: Nendick, with an "N", Nendick.

MR. J. BAYLY: Nendick. Mr. Nendick, I understand that sodium cyanide is an essential chemical for the processing of the concentrates at this mine. Is that correct?

MR. R. NENDICK: That is correct.

MR. J. BAYLY: Can you tell me how the sodium cyanide is to be shipped to the mine site?

MR. R. NENDICK: Sodium cyanide is generally packaged in drums of about 200 pounds by a supplier. Most cyanide used in Western Canada comes from England from ICI Chemicals. It's in the form of tablets. It's packed in sealed steel drums with a plastic liner inside. We would ship these in pallets of four drums to a pallet, for handling by a mechanical fork-lift truck type of arrangement.

MR. J. BAYLY: Does that come then in a solid or a liquid form?

MR. R. NENDICK: It comes in a solid form.

MR. J. BAYLY: On what sort of trucks would you propose to ship this material?

MR. R. NENDICK: Could I refer this to somebody else?

MR. M. BATH: The intention would be to ship reagents, such as sodium cyanide, to the minesite on the returning concentrate transport trucks. These would be conventional gravel type trucks.

MR. J. BAYLY: And perhaps just before you return to your seat, Mr. Bath, would any special securing devices or precautions be taken to make sure that drums weren't damaged on the trip up? And if so, what would they be?

MR. M. BATH: Normal securing precautions, as in any good trucking practice, would be employed to make sure that loads didn't shift or that loads weren't damaged in transit.

MR. J. BAYLY: How much sodium cyanide would you require to be stored on site at any one time during the production phase of the mine?

MR. M. BATH: Because of the winter road access to the mine, sufficient sodium cyanide, and sufficient of all the chemicals, required on the site to tide over the nine months summer period would have to be stored on site. I can't give you the tonnage figure off the top of my head, but that figure is easily calculated and could be made available.

MR. J. BAYLY: Am I correct that you would be using half a ton of sodium cyanide per day?

MR. M. BATH: That figure sounds extremely excessive. I don't believe it's correct but, as I said, I would need to check that.

MR. J. BAYLY: The figure that you give in your mining questionnaire to the Water Board is an average of one pound per ton of ore processed, and you project 1000 tons of ore processed per day.

MR. M. BATH: Subsequent test work has allowed the figure to be somewhat reduced from one pound per ton. We're now talking of a figure of approximately .8 pounds per ton, which would mean 800 pounds per day.

MR. J. BAYLY: So you would require 800 pounds per day for nine months stored on site during normal production times?

MR. M. BATH: That is correct.

MR. J. BAYLY: I'm assuming then that you took the national average when you prepared the first portion of the submission, which is 1 pound per ton, and have since reduced that based on the kind of ore you expect to be processing. Is that correct?

MR. M. BATH: That's correct. The reduction is based on specific test work. I might add that typically it's found that when a mining property comes into production, reagent levels predicted from laboratory tests are very frequently reduced in actual practice. This is a feature of the scale-up necessary in the development of minerals processing. One could expect, although I cannot state categorically that this would be so, that one can expect that the .8 pounds per ton could be further reduced.

MR. J. BAYLY: When one thinks of sodium cyanide, I think one commonly thinks of gold mining and I'm assuming though that it is necessary for the processing of one of the other minerals that you expect to be mining here.

MR. M. BATH: That's correct. Sodium cyanide's function is as a mineral depressant to assist in the separation of the three separate concentrates which will be produced at this operation.

MR. J. BAYLY: So it's required for all three minerals, the silver-copper concentrate as well as the lead and the zinc?

MR. M. BATH: It's required in the process. Inevitably all three minerals are exposed to the sodium cyanide. Its function is more specific, but each of the three ~~types of~~ minerals is exposed to it. Yes.

MR. J. BAYLY: Mr. Bath or Mr. Nendick, I wonder if you're acquainted with the January 1981 report Overview of Cyanide Treatment Methods prepared by Ingalls and Scott of the Mining Division of EPS?

MR. M. BATH: I believe Mr. ~~Scott~~ might be more familiar with that than I am, and perhaps I could pass the microphone to him.

MR. J. BAYLY: Certainly.

MR. R. NENDICK: Was this paper published at the CanMet proceedings in Ottawa?

MR. J. BAYLY: I believe it was, yes.

MR. R. NENDICK: I've not read it ~~but~~ have a copy on order.

MR. J. BAYLY: What method, if any, are you proposing for the treatment and reduction of sodium cyanide into less toxic chemicals, either in the tailings process or at some other stage?

MR. R. NENDICK: This is the alkaline chlorination process that has been described briefly in the summary and would be installed toward the end of the first year. During the first year we would impound all solutions. Towards the end of the first year we would install an alkaline chlorination process which destroys free cyanide and reduces the heavy metal content of solutions prior to discharge.

MR. J. BAYLY: When you say destroys free cyanide, what compounds are produced when it has been reduced?

MR. R. NENDICK: Generally it depends how far the reaction is allowed to proceed. Generally cyanates, you can take it as far as breaking it down as far as carbon and nitrogen, but that's not generally done. The intermediate stages of cyanates are generally innocuous.

MR. J. BAYLY: Can you tell me where else this treatment method has been successfully used?

MR. R. NENDICK: There are, in flotation plants, because of the lower level of cyanide employed, generally the process is not used. The only flotation plant I'm aware of that it's being used routinely is Western Mines on Vancouver Island. It's used quite commonly in gold processing plants where the cyanidation, cyanide levels are much higher. The Baker Mine, which is just starting up, we installed a process very similar to this there. It will be used at Carrollin Gold Mines in Hope, British Columbia which will be discharging into Steel Head River. Yes. Northair Mines north of Squamish in British Columbia is using the process. The best example actually is the Western Mines on Vancouver Island. They were the first people to install it and did most of the pioneering work on it. It was also prior to that used in the electroplating industry where they have very high cyanidic concentrations.

MR. J. BAYLY: Has it been used for large volumes of material in any of these mining projects you've referred to that are on stream?

MR. R. NENDICK: The Western Mines would be a comparable size, if not slightly larger, than the system we are proposing.

MR. J. BAYLY: Has it been used in sub-Arctic climates?

MR. R. NENDICK: I don't think so, not as a matter of routine. I know that Cyprus Anvil Mines have used it occasionally when they've encountered

problems, but they don't do it as a matter of routine. Cyprus Anvil in Faro, Yukon Territory.

MR. J. BAYLY: I have some questions now on the subject of trucking and again, Mr. Guild, if I can ask for your assistance as to who these questions should be addressed to.

MR. N. GUILD: To Murray Bath.

MR. J. BAYLY: Perhaps, Mr. Bath, you'd be good enough to come to the microphone. There are a number of these questions.

MR. G. WARNER: On the matter of trucking, Mr. Bayly, and for those present, without restricting the generality of the discussion tonight and the Cadillac Operation, we would ask that questions be mostly restricted to the application in question of use of water and disposal of tailings. However, I think you can proceed at this time if you wish.

MR. J. BAYLY: I understand that, Mr. Chairman, and I've tried to tie as many of the questions as possible to trucks and water courses and river crossings, all of which are at least within the general jurisdiction of the Water Board if not specific to this application.

MR. M. BATH: Mr. Bayly, I may not be the correct person to answer these questions but I suggest you go ahead with them and I will perhaps pass them on to someone else.

MR. J. BAYLY: Mr. Bath, feel free to cry for help if I've asked the wrong person. Mr. Bath, can you outline for us the trucking season for the concentrates?

MR. M. BATH: The trucking season will be the three winter months of probably December, January, February, or mid-December to mid-March typically.

MR. J. BAYLY: During that period, how much material has to be shipped out, approximately, in tons?

MR. M. BATH: Approximately 100,000 tons of lead and zinc concentrates.

MR. J. BAYLY: How much can be shipped out per truck using the kind of trucks you would contemplate using?

MR. M. BATH: Of the order of 20 tons per truck.

MR. J. BAYLY: How many trucks would you expect to be using in this part of the operation?

MR. M. BATH: If I remember correctly, the daily average density of trucking movements is approximately 40 per day during that trucking season. 40 trucks in each direction.

MR. J. BAYLY: Would that be then 80 trucks in use at all times?

MR. M. BATH: It depends on the round trip time, the total number of trucks in the fleet which would be employed, but in any 24 hour period approximately 40 trucks would have to pass in each direction of the winter road.

MR. J. BAYLY: Can you tell me the distance, in miles, to the B.C. Railhead you'd be going towards if you used the Liard Highway?

MR. M. BATH: I need some help on that.

MR. L. MORRISROE: To the B.C. Rail from the minesite?

MR. J. BAYLY: Yes, sir.

MR. L. MORRISROE: It would be approximately 300 miles to the B.C. Railsite from the mine.

MR. J. BAYLY: And what is the distance to the Hay River Railhead?

MR. L. MORRISROE: 360 miles.

MR. J. BAYLY: In terms of the markets to be served, are the markets closer to the British Columbia or the Northwest Territories Railhead? Perhaps that's a better question for you, Mr. Morrisroe.

MR. L. MORRISROE: Repeat you, John.

MR. J. BAYLY: Where are your markets and would one railhead be closer to them than the other?

MR. L. MORRISROE: Well the Fort Nelson Railhead is closer than Enterprise by approximately 60 miles.

MR. J. BAYLY: I'm assuming though that your customer isn't the railroad, but your ultimate customer is served by

MR. L. MORRISROE: Mr. Bayly, at the present time I can't tell you that. Some of these concentrates, if they go to Fort Nelson, will probably go overseas to Japan. And if they go to Enterprise they'll go to Trail and to Idaho.

MR. J. BAYLY: Then whether they take the Liard Highway or the Mackenzie Highway will depend less on distance than on to whom you are selling the concentrates. Is that correct?

MR. L. MORRISROE: It will depend mostly who we sell the concentrate to. Both facilities may be used. Lead may go to Fort Nelson and the zinc may go to Enterprise. It's not yet been decided.

MR. J. BAYLY: With regard to supplies of chemicals, of food, of equipment, do you contemplate that the supplies will largely come from the B.C. or the Northwest Territories Railhead?

MR. L. MORRISROE: They'll come from the Northwest Territories Railhead.

MR. J. BAYLY: In your pre-start-up work, can you tell me whether you've had trucking accidents, particularly whether you've had any adjacent to and water courses?

MR. L. MORRISROE: We've had nothing close to a water course. We only had the one accident with any fluids. It was a tank truck and we lost approximately 700 gallons of gasoline.

MR. J. BAYLY: Could you give me the date of that and where that occurred please?

MR. L. MORRISROE: I haven't got that with me but it can be made available to you.

MR. J. BAYLY: If you would. Is it the case that there was a truck carrying steel that went off the road adjacent to a river?

MR. L. MORRISROE: Not to my knowledge.

MR. J. BAYLY: Those are the questions I have, Mr. Chairman. Thank you very much gentlemen.

MR. G. WARNER: Thank you, Mr. Bayly. Further questions of the applicant? Don.

MR. D. GAMBLE: I wonder if I could just follow through questions that were started by Mr. Bayly. Is it fair for me to describe the site of this mine as being on a flood plain?

MR. N. GUILD: Yes.

MR. D. GAMBLE: And so, in fact, what you're building here, in addition to just dykes, are river training structures, and can you just run through these summaries for me once again, what data you had available for both stream flow and for precipitation, and where that information came from, and what the duration was of the data?

MR. N. GUILD: Okay. Precipitation data at the mine site, we had one year's data, which is very limited as you can guess, and so we used that data and we correlated it with data from longer term stations at Tungsten and at Fort Simpson.

MR. D. GAMBLE: How long was the data that you had from those places?

MR. N. GUILD: The data at these stations were between eight to eleven years. Now with respect to the flood flows, we utilized the Prairie Creek data which was about five years in its extent.

MR. D. GAMBLE: Would you describe this sort of history for this kind of data as being the normal types of things that you would project from or is this a little bit sparse?

MR. N. GUILD: I would have preferred to have some more years of record. However, invariably, in these types of developments whether here, Yukon, or B.C., we are often faced with these situations whereby there is sparse data and we have to extrapolate or do our best from it.

MR. D. GAMBLE: So in relation to other situations you've been involved in, is this sparse or is it about the same as you've run into? Some of your other experiences?

MR. N. GUILD: We've certainly run into ones that are even sparser.

MR. D. GAMBLE: And you described the design for this as being the one in a hundred year flood?

MR. N. GUILD: There's two designs involved in this. There's the design for the tailings impoundment itself.

MR. D. GAMBLE: Yes.

MR. N. GUILD: And that is termed the maximum probably flood and that does not have a time frame on it. It's supposed to be the maximum conceivable flood that can actually flow in Prairie Creek. Now the dykes around the plant site are actually designed for the one in one hundred year flood.

MR. G. WARNER: May I ask you gentlemen to identify yourselves please?

MR. D. GAMBLE: My principal concerns right here are the dykes around the tailings pond area. Now is it, when you say maximum probable flood, is that the worst case that you can conceive of, using the existing data you have? Taking the worst precipitation, the worst conditions in the stream itself, break-up and so on. Is that right?

MR. N. GUILD: Yes, that's correct.

MR. D. GAMBLE: What's the difference between that and the standard project flood?

MR. N. GUILD: Can I ask you what you mean by the standard project flood?

MR. D. GAMBLE: That was going to be my next question for you. No, but the standard project flood, as I understand it, is one that is normally used for pipeline crossings of rivers and it's the one that was recommended, for instance, of the crossings for the Arctic Gas Pipeline, if my memory serves me correct.

MR. N. GUILD: Normally, we either work with a flood that is one in ten year, or one in 50, or one in 100 year. In B.C. we have to often work with one in 200 year floods, and it depends on the specific area and the specific requirements of the area that we're working in. And within this area we worked to the one in 100 year flood which would be, I guess, the closest to your reference of the standard design flood.

MR. D. GAMBLE: Okay.

MR. N. GUILD: And in this project that was of the order of magnitude of like 18,000 cfs, cubic feet per second, and our maximum probably, to put it in perspective, we calculate to be 38,000. So it was more than double the standard flood.

MR. D. GAMBLE: Okay. When a project like this would be abandoned, who would be responsible for maintaining these river training structures?

MR. N. GUILD: That's a question I do not have an answer for directly. It depends on the jurisdiction involved and, however, the intention is, from the outset, to design them in such a way that they obviously do not require on-going attention.

MR. D. GAMBLE: Okay, those are all my questions.

MR. L. MORRISROE: Don, in order to help clear up, the flood situation in 1970, we were on the property at that time, and that was approximately the 18th of August and we had a snow storm, there was about twelve inches of snow on the mountains. Then it started to rain and it rained 18 inches in 36 hours. So we had the rain plus twelve inches of snow, you know what I mean, that came down. That was the time that we had the flood. We had no dykes at that time in front of the camp there that you people saw there today. And the highest the water came up was the kitchen floor there where you eat today. It didn't flood it, but it got to there. And the people that hauled the supplies in that spring, they left the drums and so forth right down on the river bed below the kitchen and that's how that got flooded down in through the Park, those supplies. But it never flooded the camp. And that's the biggest flood that we've had since we've been in there since 1966. And that's the purpose then we put the dyke in, plus we opened it up down below so that the water could spread out, before it was very confined.

MR. G. WARNER: Thank you Mr. Morrisroe. There's a question from the back of the room. Would you come forward please? Yes, come forward please. Do you have a question?

MR. G. GARGAN: I have a question. What do you mean by the waterline or pipeline?

MR. G. WARNER: I don't know that I understand your question. Would you say it again please?

MR. G. GARGAN: What do you mean by the waterline or the pipeline?

MR. L. MORRISROE: I think he's talking about the high water line.

MR. G. WARNER: Go ahead. Would you answer that then Mr. Morrisroe.

MR. L. MORRISROE: Go ahead Norman. He's talking about the high water line.

MR. N. GUILD: Are you referring to the pipeline from the pond to the mill?

MR. G. GARGAN: I don't know if I'm good enough to tell you. What you mean by pipeline or waterline?

MR. L. MORRISROE: Well, we haven't got into any pipeline or any waterline at all tonight. The only water line we've talked about is on the banks of the river. The high water marks we're hoping for the hundred year period.

MR. G. WARNER: Okay. Jim. Yes.

CHIEF J. ANTOINE: First of all I'd like to welcome the members of the Board on behalf of the Dene people that I represent in this area, and I'd also like to say that this is the first time that we'll be appearing and making any statements to the Water Board, and that just listening to our Counsel today and listening to the duties of the Water Board, the Water Board has, as far as I'm concerned, a very important job because as everybody knows the Dene people in this valley here, we're going to be negotiating with the Federal Government on behalf of our Dene aboriginal rights and today we found out that the Federal Government appointed a negotiator so that is a step that we've been waiting for, so we're going to begin. It may sound that I'm out of context here but what I'm getting at is that in

the mandate from our people that we have to negotiate, one of the main things is water. That has to be negotiated with the Federal Government. The duties of the Water Board here, right now, is acting on our behalf and whatever actions or decisions or any kind of positions that you have taken are being watched very carefully by all the Dene along this valley.

The reason I'm saying that, Prairie Creek flows into the South Nahanni and South Nahanni flows into Liard and it flows into the Mackenzie River. As you know a lot of Dene live along the Mackenzie River. Here we talk about sodium cyanide and stuff like that that is going to be maybe ten feet from the flow of Prairie Creek and that causes a lot of concern to myself and to a lot of people here who have found out about it. Today's the first time that we have seen the pictures or any type of information in regards to exactly where these tailings ponds are going to be. I just want to say that it's really a concern to us because a lot of people use the river. You go anyplace along the river, you tie up and you make tea with the water right from the river. What if there's cyanide in there? What's going to happen to the people? I'd like to ask the experts over there, what's going to happen?

As far as people from Nahanni tell us, and Mr. Morrisroe just stated, that there are occasions when there are flash floods in the smaller creeks in the mountains and these happen very quickly. From the Dene people that know the mountain, our information from them is that if it just rains for a day, the mountains and all these creeks just swell up and you don't know exactly how high it's going to go. What's going to happen if there's a flood and it overruns the dyke and washes all the

cyanide down the river? What's going to happen? What's going to happen to the river? Can one of the experts tell us?

MR. N. GUILD: Obviously, I'll start this off by saying that the principle of studying the hydrology in the area, and also looking at the river flows and designing the facilities the way they are, is to design dykes such that they will not be overtopped. There has been, as we've mentioned, the considerable amount of work involved in that, and we have taken into account the fact that we know there are these flash storms that come. This is one of our concerns why we didn't, in fact, locate the tailings impoundments in Harrison Creek because we were aware of that. So those factors we believe have been addressed, and the dykes themselves also have a freeboard on them over and above the hundred year storm design. In fact, the extra three feet would almost carry the maximum probable flood, that I had been talking about earlier, which is twice again the one in 100 year. So we've endeavored to take those things into account in design because we recognize that there are storage components behind there that in no way do we wish to enter the waters of Prairie Creek.

CHIEF J. ANTOINE: Okay, another question. I've been in the mountains a few times and realize that the rivers and little creeks in the mountains make their own channel every year and that they're pretty strong and if there's a huge volume of water, swift moving water, such as Prairie Creek, which swells up, there's nothing you can do as it's starting to erode your dykes, there's nothing you can do about it. Especially in the spring-time when with the run-off and ice and trees and stuff like that coming down.

MR. N. GUILD: I'll start off, and I'll let Brian Fletcher just tell you how he has considered the training works, but in actual fact the dykes, as well as being containment dykes for the tailings pond, they're actually river training structures. And by designing the face of them and size of the rip-rap, this is the method in which you contain and prevent the erosion. Perhaps Brian you'd like to mention the considerations that went into that. Brian Fletcher.

MR. B. FLETCHER: Yes, do you recall the picture of the dyke that Mr. Guild had on the screen?

CHIEF J. ANTOINE: Yes, I recall.

MR. B. FLETCHER: Those embankments have been designed, as has been said quite often tonight, for the maximum probable flow in Prairie Creek. That takes care of the height to which water will go. The thickness and the heaviness of the rock that goes into the face of those embankments has an average thickness, or an average diameter if you like, of rock of about 2½ feet.

CHIEF J. ANTOINE: Can you just make it short please.

MR. B. FLETCHER: The minimum thickness is five feet at the top and it comes down to about 15 feet at the bottom. Okay? It's a very heavy armour that's on the outside of those embankments and will withstand any kind of flow in Prairie Creek. That's what it's been designed for.

MR. W. CONISANTA: Native language presentation.

CHIEF J. ANTOINE: William Conisanta is the Sub-Chief for Nahanni Butte and he could understand English but then if you make it short. If you make it too long he loses some so

MR. B. FLETCHER: Right.

MR. N. GUILD: Brian, I think you should explain to them. I don't think they understand what rip-rap is.

CHIEF J. ANTOINE: Yes, I understand what rip-rap is.

MR. N. GUILD: You understand that? Okay.

MR. W. CONISANTA: Native language presentation.

CHIEF J. ANTOINE: William Conisanta here. I'm going to be interpreting for him.

MR. W. CONISANTA: Native language presentation.

CHIEF J. ANTOINE: William has just stated that if anybody is going to benefit from his area, that the Dene from Nahanni Butte should benefit first. And he's saying that nobody from Nahanni Butte has work with Cadillac and if anybody's going to be chosen to go over there, they should be the first ones there because that's their area and they've been using it for as long as he can remember, in that whole area there, and he says that if anybody's going to benefit from Cadillac then they should be the first ones. Another thing is that all the Dene know that everybody that's involved in Cadillac are really talking up a storm just so that they could make a lot of money for themselves and after they're all finished making money they're just going to forget about the Dene. He says that in this case here, if anything's going to happen in our area, it should be us that would benefit first.

He's not finished yet.

MR. W. CONISANTA: Native language presentation.

CHIEF J. ANTOINE: He's talking about the National Park and things like that, but then I just told him that this Hearing is only for the mining, the mining aspect of Cadillac Mines, so he just stated that the people from

Nahanni are not happy at all with the whole operation in Cadillac Mine, basically because they're not informed about what's good about it and that if there's going to be any work done in the mine and these people could do it, they want to be the first ones out there on the job.

MR. W. CONISANTA: Native language presentation.

CHIEF J. ANTOINE: He asked a question. How long are you going to be at that site? How long are you going to be mining? Can you tell us?

MR. L. MORRISROE: At the present time the reserve shows six years, but the company is optimistic that it'll be many more years.

MR. W. CONISANTA: Native language presentation.

CHIEF J. ANTOINE: He's just making a statement that after they're finished that mine site, what's going to happen to the tailings pond? Is it just going to be left there with all the poison in it? What's going to happen?

MR. N. GUILD: Yes, the tailings material will remain there in perpetuity. It will be the inert material as shown in that. There's a sample of it on the table and it's not poisonous.

MR. W. CONISANTA: Native language presentation.

CHIEF J. ANTOINE: Okay, he says he thinks you're lying.

MR. N. GUILD: I'm not.

MR. L. MORRISROE: I can see his point. He says he thinks we're lying. In the meantime, I met him in Nahanni Butte and I spoke to him earlier and I told him we were going to give the people employment and we come in there for a nose count, how many people would be available. He gave me an idea that he thought there might be 20 boys that would be available, and our social-economic study, we've agreed on between the company and the Northwest Territorial Government, and we've stated that we're going

to give these boys the first opportunity. In a short time, as soon as construction gets in full gear, we're going to put in an employment situation, we want to interview these boys and we want to start them in on a training program in a very short time. And we've put this on paper to the Government. I visited Nahanni Butte and I also told him what we were going to do. So I think that we've covered everything, it's just a matter that we've got to go forward, and we've got to make a believer out of him.

CHIEF J. ANTOINE: Translation.

MR. L. MORRISROE: I want you people in the Dene Nation to understand we want to hire you people for the simple reason that you're close to the work, we don't have to take you people in and out so far and, at the present time, there's a shortage of people and so we want you to understand we're looking to hire you people and, as I told Jim earlier, we've got to work together. We want to hire you and we want you people to support us with this employment situation.

CHIEF J. ANTOINE: Okay. Personally I've got another question here. We've been going through your application, your presentation to Water Board, and in there there's mention of uranium and thorium. How does that fit in? Is that going to be into your wastes too? There is about 3.2 parts per million uranium and something like 2 point something thorium. These are radio active materials and it states that you are going to be using it, or you're going to be disposing it.

MR. N. GUILD: Do you want to address that Roger or just to clarify it? Is this in the application to the Board?

CHIEF J. ANTOINE: Yes, the official application.

MR. L. MORRISROE: Anybody got a page on that?

MR. N. GUILD: It's okay, I have it here. It's okay, I have it here.

MR. R. NENDICK: What it actually states, radio active minerals present in negligible quantities. Analysis of tailings shows uranium at 3.2 parts per million and thorium less than 2 parts per million. That is non-dangerous. You'll probably find that the gyprock in the walls here contains more radio activity than that. There's radio activity present everywhere and that is not a serious quantity of uranium.

CHIEF J. ANTOINE: Yes, but together they contain about 5.2. I don't know what's the level that's acceptable.

MR. W. BRYANT: Excuse me. You mention that the report says 3.2 parts per million of uranium? If that's so, I think that's pretty high. I think maybe analysis should read parts per trillion or billion.

MR. R. NENDICK: That 3.2 parts per million is still a very low figure for uranium, that's 3.2 grams per ton.

MR. W. BRYANT: I know what it is.

MR. R. NENDICK: Yes.

MR. W. BRYANT: That's not low.

MR. R. NENDICK: We can check whether that's parts per million or parts per trillion.

CHIEF J. ANTOINE: Yes. Okay. I don't know, like from Legal Counsel the, he indicated that there was a debate whether between 4 and 5 parts per million is, it was debated in Ottawa someplace to be the danger level. So if uranium is 3.2 and thorium is 2, then that makes 5.2 parts per million together, and that's pretty high if my information is correct. And that is also going to be in the tailings pond?

MR. R. NENDICK: That will be present in the solids in the tailings pond, if this figure of 3.2 parts per million is correct. There's some reason to suppose it might be 3.2 parts per trillion. That is not a dangerous level, to my mind. Uranium in the tailings pond, the tailings pond is not acid-generating, it would not be soluble. It would really just stay there, generally inert. It will not react.

MR. W. BRYANT: Well, sir, I think that you should check your lab analysis. Now if it is 5.5 ppm, I don't think it really is, but if you've got that high a concentration that's something to be very worried about. I mean, for mines we're dealing with a concern if we have copper levels of 1 part per million. Uranium at 5. You know, you may have a uranium mine there.

MR. R. NENDICK: We're talking of the solids here and not of the water.

MR. W. BRYANT: Well we're talking about total, total concentration, total mass, total radio activity.

MR. R. NENDICK: There's a significant difference between being present in the solids and being present in the solution.

MR. W. BRYANT: Well not when you're talking about radio activity.

MR. G. WARNER: I think it's probably the best course, to clarify this matter, whether it's parts per million, and we can pursue it again, Jim, at the Technical Advisory Committee and we'll keep you informed on it.

CHIEF J. ANTOINE: Right. I stated earlier that the people around here, Dene people, and those down the river from here are all concerned about this whole operation because of the cyanide and the radio activity and so forth because the people use the river, the fish from it, and the

game from it, very extensively. I don't know where you people come from but up here we really use the country a lot and we're really concerned about what we're drinking. I don't know where you guys are from, but up here we live off the land. We eat the food right off the land and we'd like to keep our water pure. And this Mackenzie River, the Liard, and right up the Nahanni River, it's the purest river system, I think, left in the world and then you're putting a tailings pond not even 20 feet from it with all this stuff in it. You know, that really makes me greatly concerned about that.

MR. R. NENDICK: We are aware of that, and that is why there are plans for the water treatment plant before any water is discharged into the river. The Prairie Creek, which has been described as a very, very pure river, to give you some idea of the relation, it carried per year 24,000 pounds of heavy metals in solution. We will be adding to that 500 pounds, in other words, a very, very small increase in that amount.

CHIEF J. ANTOINE: Okay, there's only one question here that I don't think was answered. What will happen to the water if there was overflow of your dyke? With all that cyanide in it. What's going to happen to the rivers?

MR. R. NENDICK: I think we've

MR. G. WARNER: Will you identify yourself please.

MR. R. NENDICK: I think the geo-technical people have addressed the problem of dyke failure.

CHIEF J. ANTOINE: Yes, I know that quite a bit but what's going to happen? Like the whole river system, it's going to pollute the whole river system right down the Mackenzie? What's going to happen?

MR. R. NENDICK: We have engineered that that is extremely remote. We indicated about one in 200 years.

CHIEF J. ANTOINE: Well what if it did, would it pollute the whole river? Is it going to pollute the whole river system if somehow it overran and the dam busted and everything like that? You know, what's going to happen?

MR. R. NENDICK: If that were to happen there would be low level cyanide concentrations enter the river. They will be considerably diluted by the clear water there and, it's my opinion, that it would be unlikely that any serious damage would occur.

CHIEF J. ANTOINE: I don't think so.

MR. R. NENDICK: But I think the amount of care that has been taken in dam design and construction renders that extremely remote.

MR. W. CONISANTA: Native language presentation.

CHIEF J. ANTOINE: William Conisanta again. He's just stating that he finds it very hard to believe that explanation and he's just restating that after six years is up, he's very concerned about what's going to happen to all the waste disposal and everything like that. Are you just going to leave us with that? Is that the only thing we're going to benefit out of it? He's just making a statement.

So that's all we have right now. Thank you.

MR. G. WARNER: Thank you Chief Antoine, Sub-Chief Conisanta. Father Menez.

MR. G. GARGAN: Ladies and gentlemen.

MR. G. WARNER: Would you like to sit up here and talk into the microphone?

MR. G. GARGAN: No, it's okay.

MR. G. WARNER: Okay.

MR. G. GARGAN: Ladies and gentlemen. You government guys, you just come in here once in awhile. Sitting, sitting, sitting like this. You got example, spit it out. I don't see why you get up once in awhile.

MR. G. WARNER: Thank you. Further questions of the applicant? Lou. Yes, sorry, I had forgotten you.

FR. L. MENEZ: Mr. Guild, I'd like to address a question about the tailings pond. Is it fair to say that the whole project is based on the quality of one material, the clay? It means that you are not able to contain the tailings, you are not able to make that tailing pond leakage proof, you will not be able to go ahead with the project. Is that so? And the reason why you can go ahead with the project is because you believe that the clay you are using will be impervious. Could you explain a little bit more about the quality of the type of clay you have. How thick it is? How deep it is? And so on.

MR. N. GUILD: Yes, I'll answer the first part and then I'll ask Brian Fletcher of Golder's to describe the clay in detail. If the clay had not been present in the tailings pond area, we would not have located the tailings pond on the flood plain. We would have endeavored to locate another tailings pond site to permit the project to go ahead, but certainly the pond would not be located where it is. The clay itself is between 20 to 30 feet deep and, because of its impervious nature, we can create a completely impervious pond, and I'll ask Brian to maybe just give you a few details on the actual clay and its impermeability. Brian Fletcher.

MR. B. FLETCHER: The permeability of the clay is measured by the rate at which water will flow through it. And the tests that I've conducted so far on these materials indicate a permeability varying between about 10^{-9} and 10^{-10} centimeters per second. Now what that means is that for water to go from the tailing pond through that eight foot seal will take something between 7000 and 70,000 years. That's about four orders of magnitude less pervious than probably the best concrete that you can make. We're obviously assuming that the thing is constructed using that clay.

FR. L. MENEZ: How can you be so sure that the nature of the clay there is equal all over that area that you call the tailing pond? That's about 25 acres. Is it all over the same quantity and quality of clay?

MR. B. FLETCHER: Sorry, are you finished?

FR. L. MENEZ: Yes, go ahead.

MR. B. FLETCHER: The manner in which those kinds of materials is deposited historically, presumably that clay was deposited there seven or eight thousand years ago. It's going to be very similar laterally, or in a horizontal plane. And the drilling that we've done through that clay, all the way through it from the top right through to the base of the clay, under which there is gravel, indicates that, or at least we've not detected any seams of gravel or sand or even silt in it. It's a nearly uniform deposit. Now even if it isn't, even if it isn't, if we have a mix of about 10% of that kind of material with particles that size in something that's more coarse or more pervious, then the behavior of mass of the material is determined by the finest fraction, in other words, the clay fraction.

FR. L. MENEZ: Okay. Although you said that type of clay is all over the place in a lateral form, you still found in one corner, I believe, a type of soil or sub-soil that didn't have too much clay, to the point that you had to retreat the limit of your tailings pond. So the question is, who is telling you that perhaps in some place there is a type of ground of the same nature and before you know, all your tailings will be going to Prairie Creek.

MR. B. FLETCHER: Yes, okay. That eventuality is covered in our original report in so far as the entire base of that tailing area has got to be covered with clay. If we encounter an area where there isn't clay, then there will be a layer of clay put on there, compacted, covered with another material so it's protected. In other words, the entire base of the tailings pond, and the sides, will be covered with an impervious clay seal.

FR. L. MENEZ: I read in one of your reports that going through some drilling you came across some artesian flood of water coming out of the ground. Is not a danger that perhaps due to the fact that the tailings will bring some heat to the bottom of the tailing pond that the frozen clay, or semi-frozen clay, will give passage to the groundwater in some form because it is under pressure, and you will have perhaps the bottom of the tailings pond that could be disturbed in one place or another, but sufficiently so that your tailings would be going to Prairie Creek or Prairie Creek coming to the tailing pond, then could flood everything.

MR. B. FLETCHER: The artesian pressures that were measured there were not very great. They amounted to a head of water about two or three feet above the base of the tailing pond. Now that's not very much. In other words, it would take only about a foot and a half of earth material on

top of that to neutralize that pressure. So no, there is not a danger that there will be an uplift on the base of the tailing pond due to that artesian pressure. As a matter of fact, the existence of the artesian pressure will be of assistance in terms of long-term, now mind you, we're looking thousands of years down the line, that artesian pressure will reduce the rate of flow of water from the tailing pond, which is a rate we have no need to be concerned with in any event. Did I answer your question?

FR. L. MENEZ: Yes, well once the pressure, because the pressure from the artesian well would not last forever and once it has appeared then the tailing will go down the hole.

MR. B. FLETCHER: There aren't any holes for it to go down through.

FR. L. MENEZ: Now I would have a second question. When I was at the site this afternoon I noticed that the tank farm is not inside the dyke system. Am I correct?

MR. N. GUILD: No. You mean the existing tank farm?

FR. L. MENEZ: No, no, the one you are going to build.

MR. N. GUILD: Yes it is. The dyke is actually continued on across Harrison Creek to the tank farm area. There's actually also fill proposed for that area, so the tanks will be raised on fill too.

FR. L. MENEZ: That perhaps is beside the point, but the front tank will be just under the slope of the mountain.

MR. N. GUILD: It would be beside the others.

FR. L. MENEZ: And you remember we were looking at that part of the mountain, and we noticed there was already quite a bit of erosion that was taking some effect on the slope itself. We noticed there was a

great danger of perhaps a part of the top of the hill or of the mountain falling down on that area and covering or breaking the tanks, or even the dykes and so on, and opening the whole thing to a flood.

MR. N. GUILD: Yes, you mentioned that to me and I sort of indicated to you that Golder's had looked at that and I'll let Brian sort of mention what his feelings are on that right now.

MR. B. FLETCHER: The risk of a failure on that slope large enough to cause distress to the tank farm, I think, would be extremely remote. There isn't any indication of a long-term, or even a short-term, or even just no evidence of past occurrences of that sort that would take place. The top of the rock, for example, is very evident on the existing surface so there isn't likely going to be a large scale failure there.

FR. L. MENEZ: Okay, thank you.

MR. G. WARNER: Thank you. I think this may be a good time for a break and a stretch but, before we do, I would like to explain about the interpreter. I apologize for not having simultaneous interpretation and translation here tonight. We have all the equipment, as you can see, but no interpreter due to illness. Also, could I remind everybody who hasn't registered at the door to do so. Also, there are copies of the presentations, the written presentations, available at the side. Let's have a 15 minute break.

MR. G. WARNER: I guess we're ready to go again, ladies and gentlemen. If I could have your attention please. Well we will resume with any further questions to the applicant, and then proceed on to the written interventions by others, and verbal discussions and more questions from anyone. At this time, any other questions of the applicant please? Go ahead.

MR. B. WILSON: I wonder if I could just ask a few questions to clarify points in the proposal of the submission to the Water Board. Norm, on page 5 of the submission, indication that the tailings pond is going to retain ground rock material from the milling process. Do you have any figures that would indicate percent recovery on the milling process?

MR. N. GUILD: I don't have those on the top of my head. You mean the actual percent recovery of solids in the

MR. B. WILSON: Yes, specifically in the milling process going to be removing copper and zinc.

MR. N. GUILD: Yes. I'll let Murray answer that one.

MR. M. BATH: The metal recoveries of the major economic metals are of the order of 80% each.

MR. B. WILSON: 80?

MR. M. BATH: 80.

MR. B. WILSON: So I would assume then that 20% of lead and zinc and copper and probably higher percentages of other metals that are not effectively being mined would then be deposited in the tailings with the waste rock.

MR. M. BATH: That's generally true, yes.

MR. B. WILSON: Okay, so maybe I could then assume that, in fact, the rock sample is not quite as benign as was indicated earlier in discussion, that in fact it does contain some very toxic materials.

MR. M. BATH: The metals which escape the recovery process or the minerals which escape the recovery process and report to the tailings are generally those in the highly oxidized form. In other words, they have already undergone natural weathering to a high degree and they can, therefore, be said to be in a stable form in which further weathering is unlikely to take place in the tailings pond.

MR. B. WILSON: Okay, maybe I should have said potentially toxic then.

MR. M. BATH: They could only be considered potentially toxic under acid conditions. We have explained, I believe, that we do not believe acid conditions will exist in the system because of the nature of the rest of the tailings which is basically dolomite and limestone, these will preserve alkaline conditions under which the oxide metal minerals are not expected to go into solution.

MR. B. WILSON: There's been considerable discussion about the construction of the tailings pond and the embankments that will contain it. I would assume that there will be, from time to time, erosion processes going on and that the proponent will take steps to maintain the integrity of the impoundments.

MR. B. FLETCHER: Yes, in any construction of this sort, over the first two or three years of operation, at which incidentally is a non-danger time for the tailings since the tailings will be deposited below stream level at that point, that two or three year period gives you ample time to assure the integrity of the system over the long term, because there

are going to be areas which are not completely covered and areas which, you know, which are probably more safe than they need to be.

MR. B. WILSON: You indicated earlier I'm sorry.

MR. B. FLETCHER: And there's clearly going to be a maintenance program going on all the time.

MR. B. WILSON: You indicated earlier, as well as this constant maintenance, that in fact the tailings impoundments are acting as a river training structure, and I would assume from that that there will, in fact, be constant erosion processes taking place because the impoundment is situated in a flood plain, it is adjacent, very close to a stream bed. In fact, there are infrequent flood episodes in the area which will put some amount of stress on the impoundment and that, in fact, it will be necessary to check on the integrity of the tailings impoundment structure.

MR. B. FLETCHER: Could you define for me what you mean by stress?

MR. B. WILSON: Erosion, that's stress. Erosion, the effects of water flow directly alongside, or in fact directed somewhat towards the structure itself.

MR. B. FLETCHER: In other words, we're not talking about a mechanical condition, we're talking about the removal of material. Is that what? Correct?

MR. B. WILSON: Yes, as a result of water flow.

MR. B. FLETCHER: Okay, well we have to get our definitions straight here. There will, or there may, be erosion. That's what the maintenance program is designed to take care of. However, in the very long term, the integrity of the embankment, as it's designed, should be assured because the design is extremely safe in terms of river training works.

MR. B. WILSON: Maybe you could then define what you mean by

MR. G. WARNER: We do need your names gentlemen.

MR. B. WILSON: Sorry Glenn. I wonder if you could then define what you mean by very long term? I think we have to realize here that this tailings impoundment does represent, as far as we're concerned, virtually a permanent structure at this site.

MR. B. FLETCHER: Well I'm talking about long term in terms of permanence. In other words, the mine should not have to go back into that site on a periodic basis after abandonment.

MR. B. WILSON: What you're suggesting then that even after abandonment, and after all maintenance activities cease on that impoundment, that it will be permanently, structurally sound.

MR. B. FLETCHER: That's what we're designing for.

MR. B. WILSON: I would only suggest that it's a very steep-sided V-shaped valley with extreme variability in stream flow and it's very hard, very difficult, to talk about that degree of confidence limit over that length of time. The longer you project into the future, the wider your confidence limits become on any prediction, and this is really, this is very much a predictive exercise that you are undertaking here.

MR. B. FLETCHER: I'm not sure what the steepness of the valley sides have to do with an engineered design of stream training works.

MR. B. WILSON: I'm referring to the impact of large flood episodes. If, in fact, the water is constrained to a fairly narrow channel, then that is going to increase the water stress occurring on the impoundments and, therefore, the erosion processes taking place.

MR. B. FLETCHER: It increases the velocities which increases the size of the particle that the water will carry. It doesn't increase any stress on the embankment.

MR. B. WILSON: Let me leave that one for a minute. You've indicated in your water balance calculations a fairly considerable amount of input from precipitation and, by extension, from run-off. Again, looking at the long-term, this is going to continue, this continued water input. What is the potential for that tailings pond filling up with run-off water and overflowing sometime in the future, after abandonment?

MR. N. GUILD: The idea ultimately on abandonment of the tailings pond is that the area would be leveled such that an area such as a pond doesn't exist. In other words, it would be a continuous embankment from the existing creek wall and, as we said, during reclamation, we intend to revegetate the area and we would be creating, as required, swales and in an effort to direct any sort of run-off off the hillside to an area where we would then, I guess, we would also provide some rip-rap protection down the face of the embankment and the side of the embankment area to Prairie Creek. So the intention is that there's not actually a hole going to be left there to collect water as a pond. It would simply be protecting a land fill site from natural erosion.

MR. B. WILSON: While Brian Fletcher's at the front, just one further question with respect to seepage, you've calculated a figure of one cubic foot of seepage per day, I believe, approximately. Would you like to comment on your ability to test this calculation you've made actually in practice?

MR. B. FLETCHER: Well I think, as you intimated yourself, it's virtually impossible to test seepages of that small a magnitude over the area through which that seepage is likely to occur. A cubic foot per day is an extremely slow rate of seepage, as you know. Just to put it in perspective, it would take, at that rate, a week to fill up your bathtub. Now over 3000, or nearly 4000 feet of embankment length and 40 feet of height, that's not very much. No, you can't measure that.

MR. B. WILSON: What if it was 100 cubic feet per day? Would you know?

MR. B. FLETCHER: Even 100 cubic feet per day would be very difficult to detect.

MR. B. WILSON: Could you then indicate what maybe you could detect, what seepage rate?

MR. B. FLETCHER: From an embankment like that, the only way you could detect it would be by detecting the quality of water near the perimeter of the embankment that may be seeping through it and comparing that to the quality of water that you would normally expect there. But as far as measuring it is concerned, it would be extremely difficult. If I could carry on. If you were suspicious that there was a large amount of water seeping through the embankment, and if you had some notion about where that might be happening, you could go to the lengths of installing prisometers and possibly some other sorts of instrumentation which could pick up flows.

MR. B. WILSON: Okay. My understanding then is that you have designed for and calculated that seepage will not exceed one cubic foot per minute, but, in fact, if it was considerably higher than that rate you would not likely pick it up. Is that correct? Simply because there is

no place for that seepage to collect other than to go right into the Prairie Creek itself and not be noticed.

MR. B. FLETCHER: Did you mean one cubic foot a day?

MR. B. WILSON: Yes.

MR. B. FLETCHER: Okay, I'm not sure that I followed your question. What you're basically asking me, if I could put the question back to you, is can we detect seepage of the order of one foot a day. Is that the question you're asking?

MR. B. WILSON: No, I'm simply saying that that is what you expect but, in fact, if it is considerably higher, in fact orders of magnitude higher, you wouldn't know that in fact you had a considerable seepage problem.

MR. B. FLETCHER: You wouldn't, you wouldn't know from physical indications, no. You just simply can't see flows of that order or even 100 cubic feet a day, even 1000 cubic feet a day, you would not physically see.

MR. B. WILSON: That's fine. On page 6, to go on to another matter, you indicate potential discharge of sewage to a ground disposal field and you indicate deposition of incombustible refuse in a land fill site. Can you indicate please where those sites are likely to be? Specifically, are they likely to be in the flood plain?

MR. N. GUILD: Okay, the ground disposal field for the sewage treatment plant, if we prove it out, would be behind the dyke system on the flood plain. The land fill site for the garbage would not be. It's on an elevated bench in the area of T3 and we do not believe that's

MR. B. WILSON: T3, further downstream on Prairie Creek?

MR. N. GUILD: Yes.

MR. B. WILSON: In the flood plain?

MR. N. GUILD: No.

MR. B. WILSON: An elevated level?

MR. N. GUILD: It's on an elevated bench above where the flood waters of Prairie Creek would come. I'm using T3 as a reference point.

MR. B. WILSON: Okay. Above your calculation of the maximum possible flood?

MR. N. GUILD: Above our calculation of the maximum possible flood.

MR. B. WILSON: Okay. Also on page 6

MR. G. WARNER: Will you identify yourself.

MR. B. WILSON: You indicate that, in general, facilities for recovery of spilled material will be provided. I take it that, in this particular paragraph I'm referring to, you're talking about on-site recovery. Part of my question is directed towards recovery of spills that get into Prairie Creek. Do you have any contingency plans whatsoever to contain and recover inadvertent spills which reach Prairie Creek?

MR. N. GUILD: In our environmental evaluation that we submitted to the Department of Indian Affairs we outlined a general plan of attack for spills of that nature. We recognized, at that time, that once Cadillac has appointed a Mine Manager for the project it would be necessary to review with him and have him develop more specific plans. So we have identified some general guidelines at this point in time, but we intend to develop more specific requirements over the next period of months.

MR. B. WILSON: I believe you indicated, or it was indicated, in the IEE that the potential existed for deploying oil booms in rivers and creeks.

MR. N. GUILD: That was one, along with mentioning that in seven areas fuel spills could be burned or we could recover by pumping or the use of absorbing materials and even skimmers. In other words, the sort of

format for various different methods were proposed and it would be a matter of identifying each area of concern for the project and making a decision depending on the level of the problem what would be applied. And that is the proposed plan.

MR. B. WILSON: Okay, well I would suggest that such contingency plans in fast flowing waters are, would hardly be effective and, in fact, suggest from experience that the incidents of potential spills or accidents is likely to be highly positively correlated with high water flows which would mitigate against any possibility of containment and clean-up.

On page 7 you indicated that in the new licence application you've requested water use of up to 750,000 Imperial gallons per day during short periods. Could you indicate what you mean by short periods?

MR. N. GUILD: The intention of that figure was to permit us to have an additional supply of water if our reclaim barge, for example, the pumps sort of had a failure and we couldn't return that amount of water. Now we feel that because the site can be relatively remote that we'd be thinking periods of two weeks in case we had a problem with getting equipment in. So that's the sort of order of magnitude on an intermittent basis that that might occur.

MR. B. WILSON: Okay, thank you. On page 9 of your submission you indicate that you'll be constructing a run-off settling pond to which treated effluent may be discharged. I wonder if you could indicate to me what the retention time, or more specifically, what the turnover time would be in that pond? In other words, is there a significant holding period

associated with discharge of effluent to that pond before it is then discharged to the creek?

MR. N. GUILD: Okay. You're referring actually to the portion where we say that mine effluent, after passing through the treatment plant, could be discharged to that settling pond and out to the creek.

MR. B. WILSON: Or directly to the creek. My question relates to that settling pond.

MR. N. GUILD: The settling pond itself has been designed more for a higher flow that could come from surface run-off in the area and it was designed on the basis of, it will be designed on the basis of about a ten hour retention time for a much higher flow than this mine effluent.

MR. B. WILSON: By this you mean something, you mean by this, like a 95% turnover time? Is that what you mean by retention time? Something along those lines?

MR. N. GUILD: Well by retention time I mean that the flow through period at the peak flow is going to be about ten hours.

MR. B. WILSON: So we could not expect there to be any real polishing effluents, volatilization of chlorine, oxidation of cyanide, occurring in that pond.

MR. N. GUILD: No, that was not the purpose of that pond. In other words, we contend that the treatment plant that we will provide will treat the effluent sufficiently that it can be released from the treatment plant.

MR. B. WILSON: Will that run-off settling pond have impervious dykes as are designed into the tailings dykes?

MR. N. GUILD: That settling pond itself, now we have to excavate material in that area to create the pond, and that pond, by virtue of the

fact it has to collect run-off from the area, should be provided with some liner in the same manner in which the fuel tank storage area would be.

MR. B. WILSON: Thank you. On page 10 you indicate that you have the capability, in an emergency situation, to block off all discharge of effluents to Prairie Creek and store effluents in the tailings pond until such time as the emergency situation, whatever it may be, can be corrected. I would assume that your storage capabilities are directly related to how long the tailings pond has been used. Could you indicate to the Board what your capabilities are in this regard?

MR. N. GUILD: Obviously in initial years of the pond, for example, we are proposing to recycle the first year's production of mine effluent and tailings. Now that will require the entire pond, in fact we will be using, we will still have a freeboard on it, but we'll be filling the pond completely up. So from that point on to the six year life of the pond it's a decreasing factor relative to the number of years.

MR. B. WILSON: So that in year five, four or five or even six, you would expect to have a very limited capability in this regard.

MR. N. GUILD: We're going to be down to a matter of two months, probably, towards the end, that we could tide ourselves over.

MR. B. WILSON: Okay, thank you.

MR. N. GUILD: Always bear in mind we have a freeboard allowance in there.

MR. B. WILSON: Okay, this is always maintaining your freeboard allowance of three feet or one meter or whatever?

MR. N. GUILD: Yes, that is correct.

MR. B. WILSON: Thank you. Just a couple of very quick questions on the biology section, flipping over to page 17. It's indicated here that analyses of trace metals in fish tissue were undertaken to define baseline conditions. Would somebody care to address the question, or the concern, as to whether the analysis of two fish constitutes a baseline?

MR. N. GUILD: Okay. Perhaps Wayne Dwernychuk could give us his comment.

MR. W. DWERNYCHUK: Two fish do not really constitute a baseline, however

MR. B. WILSON: I'm sorry Wayne, I've got a cold and I'm a little hard of hearing tonight.

MR. W. DWERNYCHUK: Two fish do not essentially constitute a baseline. We attempted to gain considerably more, however, population sizes at that particular time were so low that no others were available. But these considerations are being looked at and additional studies will be directed in that direction this spring and summer.

MR. B. WILSON: Okay, so this is a misprint, it is not intended that the analysis of fish tissue represent a baseline as indicated in the submission.

MR. W. DWERNYCHUK: Well for those fish where analyses were undertaken, well the analyses were undertaken in order to establish some form of a baseline and, with the samples that we did extract, that was the only baseline that essentially was available.

MR. B. WILSON: But what you have defined is not being a baseline, it is not adequate to represent

MR. W. DWERNYCHUK: No, we don't think it's adequate at this particular point in time.

MR. B. WILSON: Thank you. One very quick final question from page 20. It's indicated that there will, in fact, be an environmental supervisor resident at the site. I wonder if you could tell me whether, in fact, there will be a person on site whose sole responsibility will be matters of an environmental nature?

MR. N. GUILD: From almost day one in working with Kilborn in creating the manpower schedules for this project, Kilborn have built into it a sole position of Environmental Supervisor for the project. And it is important that there is an individual who actually has a sole responsibility of looking after that area and we recognize that and that is the intention.

MR. B. WILSON: Could you just very briefly give me some idea of what that person's responsibilities would be?

MR. N. GUILD: Yes. The way I see it, anyway, is that one, he has a responsibility to maintain the monitoring programs that are going to be imposed on the project, the collection of the data. He also has a responsibility of being, as we have termed, the on-scene coordinator for any spills. He also has to be responsible for creating a spill contingency plan, participating in it, keeping it updated and making sure materials are available to handle spill problems on-site, knowing existing contractors and, in general, police the operations at the project site from an environmental point of view.

MR. B. WILSON: Thanks Norm. Thank you, Mr. Chairman. I'm sorry to have dragged that out for so long.

MR. G. WARNER: Further questions of the applicant at this time? If not, I'm going to depart a bit from the procedure I described. We learned a

lot of things at the Public Hearing in Good Hope on the Esso Resources application, and one that comes to mind now is that the people in the community were not given an opportunity to speak early in the Hearing and would rather make their points and perhaps miss some of the technical details. So I'm going to reverse the procedure and take the verbal interventions first. Mr. Sibbeston, our M.L.A., would you like to lead off, Nick? Pass. Okay, Agnes Lafferty. Is Agnes here?

MS. A LAFFERTY: My name is Agnes Lafferty and I guess we're at two different ends of the stick here. You guys are talking about all the good points and the danger that will not occur, but I am at the other end of the line. And I'm looking at all the bad sides, and I see you throwing all this poison around, talking about it in pounds and tons, and I just can't go for it. I think we're in real danger. I feel like you're handing me a death sentence in very short years. And there's also been an earthquake in Fort Wrigley just recently and it's along the same mountain line. Have you people thought about this?

MR. N. GUILD: Earthquake design is part of the geo-technical design of the tailings impoundment, it's a fundamental part of it and, as you recognize, it has considerable importance and we believe that we have addressed that adequately in our design.

MS. A. LAFFERTY: Do you believe your tailings structure is going to hold up under an earthquake? It must be pretty powerful.

MR. N. GUILD: North America is divided into earthquake zones and, depending on the zone in which the structure is in, it has specific criteria and guidelines set down for designing structures. And we have followed those guidelines in our design.

MS. A. LAFFERTY: Well I don't think you can, when earthquakes bust down mountains and all, I don't see how you can say that your structure's going to hold up. I think you guys do tell lies.

MR. N. GUILD: Can I address one of your first questions too with respect to the number of pounds etc., etc. that we are discharging into creeks. These figures can be very misleading because, as Roger mentioned, in Prairie Creek already there are 24,000 pounds a day of, sorry, 24,000 pounds a year of these heavy metals actually in the creek, and when we mention that we are putting in 500 pounds, you have to bear that in mind in relation to what's existing in the creek, and this is one of the reasons why we have to do these baseline water quality studies to identify the existing quality of Prairie Creek prior to our discharge and then the guidelines are set and parameters set that we have to meet and it's then the responsibility of, in this case I believe, the Department of Indian Affairs, to have us take samples, submit them and they can compare them directly and if we're in violation then they tell us.

MS. A. LAFFERTY: After it's too late for us?

MR. N. GUILD: No. I think you find when we start monitoring, we have to monitor every week and that goes on for six months until such time as the government agencies are satisfied that everything is okay and then the program can be relaxed to say bi-weekly or monthly.

MS. A. LAFFERTY: Well, the government might be pleased but I don't think we will be as a people down here. Another thing I'd like to mention is, I heard on the radio a couple of days ago how the United States has wasted so much water that they're very low now and within 20 years they're coming to Canada to ask for water. Now won't it be a real laugh

if they come down here and the Mackenzie is already polluted. You guys would get pretty thirsty.

MR. G. WARNER: Thank you Agnes. Aline Fowlow. Is Aline here?

MS. A. FOWLOW: This is going to be only a short presentation from the part of the Public Health Department of Fort Simpson, and I'm going to read it so it's going to be shorter.

My name is Aline Fowlow and the other nurse working with me is Anne Pearson and she shares the view with me. We had only a short time to prepare this, so it's not going to be very technical or it's not going to be research either.

Public Health in general is concerned with the environment and the occupational health which will influence the health of the individuals in the community. As Public Health Nurses from Simpson, as well as of Nahanni Butte, we are naturally concerned with the impact that an improper use and waste disposal may have on our communities. If the environment is polluted with heavy metals contamination of radio active materials, through consumption of water contamination of the Prairie Creek, Nahanni River and the Mackenzie River, through consumption of fish and game, this will without say affect the individual healths. You must realize that citizens of Nahanni Butte are using, at present, untreated water from the Nahanni River whereas here in Fort Simpson we have a water plant. We are concerned by potential health hazards that even minimum particles of deadly heavy metals and chemicals dissipate into the large amounts of waste discharged daily, especially pertaining to the ponds or the floods into Prairie Creek polluting the river systems with no possible return. Without any scientific research on our part,

but based on the information received tonight, and the briefs that we have read from the Department of Environment and by the one by the Dene Nation and Metis Association of the Northwest Territories, we have some serious concerns by the impact on the environment that Cadillac Exploration may have on the population's health. Although we realize the possible economic benefits that such an exploration may bring to the North, we are requesting that you take into consideration our concerns regarding the repercussions on the health of our community. It is difficult for us here being non-expert in the field to have any recommendations. However it feels, it's very hard, I think the information, I may say personally it's difficult for me to find that this is a completely safe operation.

I think that's all I have to say.

MR. G. WARNER: Thank you very much Aline.

MR. L. MORRISROE: Mr. Warner, may I just

MR. G. WARNER: Yes, go ahead, Mr. Morrisroe.

MR. L. MORRISROE: There's one thing I want everybody in the area to realize, like our sewage, which is from 200 people, when it goes through a treatment plant it comes out so pure that you could drink it. Now for an example, here in Fort Simpson your sewage all goes raw into the river. You people look awful healthy here, you know, and we pointed out tonight the amount of metal we're putting in the river, over and above what's there, is very minor. So I want you people to realize that everything we've done in our program here, we did everything to make it the best so there won't be any pollution for you people. I think everybody tonight, a lot of the people here are thinking and talking about these

tailings ponds breaking. Those tailings ponds, they're not poisonous. If the whole thing went down the river there'd be very little damage, if anything. The cyanide and everything is broken down to that extent. So I just wanted to point it out if everybody realized that or hadn't read the brief. Thank you.

MR. G. WARNER: Thank you.

MS. A. FOWLOW: May I reply to this?

MR. G. WARNER: Certainly.

MS. A. FOWLOW: I must say I have been impressed by the scientific presentation and have also been very interested and it seems that it shows quite a lot of concern about the environment. The difficulty on our part, and I call myself a lay person, is this, is to judge the effectiveness of your system and how soundproof is it. Is that the word? How soundproof is it? Can you ~~give me~~ guarantee that while the six year operation you're going to have there, there won't be any pollution from your part? I realize, on the other hand, that with all the pollution surrounding us, whether it's in the North or the South, it's almost impossible to keep our environment from pollution at the moment, and I don't know what's going to happen in the many generations in the future. But I agree with what you've said.

MR. G. WARNER: Okay. Thank you. Just one additional thing on that point. Perhaps you may not be aware, but this Water Board has established waste water guidelines that are very strict for any new licensees in the Northwest Territories and that will be applicable to Cadillac Mines as well.

Lorayne, Lorayne Menicoche, are you ready for your verbal presentation? You'll wait. Gerald Antoine.

MR. G. ANTOINE: My name is Gerald Antoine, but you can just call me Gerry, I'm the representative for the Mackenzie-Liard Region and the Region consists of nine communities. I don't have any lengthy presentation, but I'd like to question Mr. Warner in regards to the standards. You said that you had set a strict standard, but I'm just wondering if any of you live downstream from Cadillac Mine? In regards to water. And if you drink the water?

MR. G. WARNER: No, none of the members of this Water Board live downstream from Cadillac.

MR. G. ANTOINE: Okay, I guess the point that I'm trying to make is that I'm concerned for the different people that live downstream from Cadillac Mine. It may seem soundproof, but it's only talk, and I agree with the lady that had expressed a great concern in regards to the contamination of the water. Most of this water is drinking water for the inhabitants that stay downstream from Cadillac Mine and one thing that I'm really concerned with is the water. One thing I would like to stress is in regards to the presentation that Chief Antoine had presented to the Board. His question hasn't really been answered in regards to what would happen to the water if the different chemicals had gone into the water system. I was just wondering who would answer or elaborate more in regards to the question.

MR. N. GUILD: I believe that Roger Nendick had answered that question. However, I can ask him to repeat and elaborate if he can, but I can certainly repeat what he originally said.

MR. G. ANTOINE: I think he was just more or less concerned with how strong the dykes were.

MR. R. NENDICK: Could you repeat your concern, please?

MR. G. ANTOINE: The question is that if the cyanide had gone into the water system in Prairie Creek, what sort of effects would it have on the fish and the plant life that the different animals live on?

MR. R. NENDICK: The design of the system is such that cyanide will not conceivably enter the Prairie Creek. If the inconceivable did happen, then it would depend on the amount that entered. Generally cyanide oxidizes very rapidly, dilution effect. It's very difficult to answer the question because the system is designed that it doesn't enter.

MR. G. ANTOINE: I know, but I'm just saying what would happen?

MR. R. NENDICK: If it does, it would depend on the quantity that entered. Barring an absolute disaster, it would probably dilute it so rapidly there'll be no significant effect.

MR. G. WARNER: Go ahead, Wayne.

MR. W. BRYANT: Maybe to add to what Gerry was saying here. Let's look at a worst case scenario of a truck load bringing your cyanide drums to the mine site. The truck overturns near a water course. What would be the impact of all that cyanide? For example, are these drums breakable? Will the powder get into the water?

MR. R. NENDICK: The cyanide is shipped in steel drums, like 45 gallon oil drums, with a sealed lid. Inside the cyanide is sealed in a plastic bag. In the worst case scenario of a truck load overturning, it would depend on if the drums broke. If the drums broke, cyanide would enter the system. It would be diluted and oxidized certainly within the immediate area. If that did happen, then there would presumably be some fish killed.

MR. M. BATH: I'd just like to add a little to Roger's reply to that question. Since the whole trucking operation takes place during the winter, when the roads and the water courses over which the winter road passes are frozen, any spill would not enter a flowing river directly but be deposited on top of ice or snow. Since the cyanide is shipped in a dry pellet form within the plastic bags within the sealed drums, it should not prove particularly difficult to clean up this spill and return it to safe containers.

MR. N. GUILD: Just one further point on that. As part of one of our contingency drafting plans in the environmental evaluation, we looked at such a cyanide spill on frozen ground and procedures were recommended in there for handling it, and basically it gets returned, it gets collected and returned to the mill for reprocessing.

MR. G. WARNER: Gerry, just to answer your first question, the Board does not have membership in the area you speak of, and what we've done at Good Hope and Resolute and Eskimo Point is to appoint a member of this area, at the request of the Dene Band or the community, to our Technical Advisory Committee so that this person would have direct input into any water quality standards set for the mine. We're certainly willing to do that for the people of Mackenzie-Liard, to have someone to sit with the Technical Advisory Committee. I'll write to you, or you can write to me, and we'll make the appointment.

MR. G. ANTOINE: Okay, sure. I don't have any more.

MR. G. WARNER: Albert Horesay, is Albert here? He left. Rene Lamothe.

MR. R. LAMOTHE: I never had an opportunity to read your submission, I just picked it up on the table as I came in. I'm not representing anyone

other than myself, my own interests. I want to try and put my finger on, I think, four nerves that I've felt in the meeting tonight.

The first one is credibility. I think you'll have to bear with us that industrial people all over the world have a credibility problem when they say things. I think of the people of White-dog Reserve, Minimata Disease in Japan, those kinds of things. So that's just a reality that exists. We have a hard time believing that what you say is true. We have no resources whereby to verify whether or not your scientific data will stand up or not. And I don't think you can answer that any better than I can. It's a reality that exists and perhaps it's an unfortunate one. But up until now, and I mean right now, I haven't seen anyone try in the industrial community to live that down through corrective measures where errors do exist. There was a classic example on the radio this morning. I don't know how many thousands of gallons of radio active water was dumped into a manhole to spill into the Sea of Japan, and the company that owned the radio active plant didn't even report the spill to the Government of Japan, and the Government of Japan found out indirectly and had to shut down the fishing industry in the Sea of Japan. The company made an apology, but we say well, what does that have to do with Cadillac Mines. Anyway, for some people the ocean is only knee deep and for others it has no bottom.

The second nerve that I feel that everyone has ignored to a great extent, or talked around or not addressed, is the reality of the politics of the region here, I mean the Northwest Territories, and of this time. That brings direct bearing on the area of your socio-economic plan. You looked very briefly at it, I don't know if that's

the whole thing. I hope it's not. If it is, it's more honest than what Arctic Gas did when they wanted to put through the pipeline a few years ago but, because they put out reams, books this size, on socio-economic studies and it was afterwards summarized into, I think, twelve pages or something, anyway. I want to put before you a deficit that will be accrued to the people of this area in the area of socio-economic realities by virtue of you developing a mine at the Cadillac site or the mine at that site, Prairie Creek. And that is, the people of Liard and Nahanni and Fort Simpson and Jean Marie and Wrigley, this area, and by that I mean the Dene people. I'm saying that not out of a racist type of thing but because the relationship to the land is very different on the part of the Dene people, and that is a sociological fact, than it is on the part of people who are not of Dene extraction. That's a historical reality, you know, nobody can do anything about that. It's just there.

So the impact to the Dene community anyway is going to be that the Dene will lose a sense of ownership and control over their own land and no amount of jobs are going to counterbalance that reality. No amount of training and six years of salaries is going to do anything for that, nothing can replace that. And the only thing that can really resolve that difficulty, as far as I'm concerned, is if the political reality is settled first. The Chief from here indicated that finally the Government has appointed a negotiator for the Dene, to negotiate with the Dene over the land, and has placed the onus on this Board as being responsible to husband the water resource of Dene land until such time as a proper settlement is arrived at between the Dene and the Crown. But ignoring all that reality, Cadillac wants to put a mine in there.

And the process is in effect. And I know for a fact too that the Water Resources Board here is told by the Minister, because of pressure by people like you from behind the scenes and your lobbies in Ottawa, are told, you know, look it you guys, you're advisory board people here, now you get on with the job and give them the licences and smooth out the ruffled feathers and we got to get on with developing. We know this for a fact, we know for a fact that every licence, every application for land use in the Northwest Territories is automatically given to the company that applies for it by the Department of Indian Affairs. We know that there is a process set up whereby the Dene and the Band Councils and the Village Councils can pass resolutions opposing those applications, but we know too that, from the Director of Northern Affairs in Yellowknife, that those things are not taken into account. That every application that comes through is approved. Okay, that's the third part.

The fourth nerve that has not been addressed, I think, so far is the right to benefit from the resources. The people, I don't know, this is my nerve maybe, but I feel very strongly that if I abuse my area of the earth so much that I can't live here anymore, then I should die with my area of the earth. I should not have the right to go and make my life on somebody else's land. I should not have the right to go and abuse somebody else's part of the world. And I'm not saying by that, well I am, I'm talking to the differences of values that are being perceived here as well, even among yourselves as professionals, the Environmental Protection Service and your people have been talking and asking each other, what do you mean by, define that word for me, even

among yourselves you have different values. Can you begin to perceive how vast is the difference in value between an industrial community and a hunting community?

And I want to emphasize how you yourself unwittingly have placed yourself in the position of the insensitive industrialist. In spite of the fine scientific work you apparently have done, in listening to what other people have said, you've indicated that the whole tailings pond would not do all that much damage going down the river. You said that just a little while ago. That being the case, what's the purpose of all of this? That being the case, what's the purpose of the tailings pond? I don't think there are honest truthful statements being made on your part in relationship to this. Not as fully as I would have liked to have heard.

I feel, myself, quite disappointed that things couldn't work out better for everyone concerned and I think possibly they could if people were more honest with themselves about the motives for their actions and that kind of a thing. 'Cause ultimately, no matter how much money some people make somewhere, it's not going to do them any benefit if the rest of humanity doesn't benefit in a very real way, an integral way. I don't see how Cadillac Mines can build community in the Territories so it can't be of any real socio-economic benefit to us. I can see where it can be a financial benefit to some shareholders and I think that's the truth of it. And the rest, I think, to a great extent is window dressing. That's all I have to say.

MR. G. WARNER: Thank you Rene. Mr. Cooper.

MR. L. COOPER: Mr. Chairman, members of the Water Board, ladies and gentlemen. Speaking on a strictly environmental view, the Regional Water Resources Division of the ~~Northwest~~ Territories Northern Affairs Program of Department of Indian Affairs and Northern Development carried out an assessment of the application by Cadillac Exploration Limited to construct their proposed silver, lead, zinc and copper mine adjacent to Prairie Creek. And briefly, the following are the results of this assessment and conclusions drawn by ~~the~~ Resources Division in Yellowknife.

With regards to the water source. The selection of ground-water as the source of all water from the mill, mine and camp eliminates one potentially major concern which is possible water shortages during low flows in Prairie Creek. With the system as proposed the creek may now experience a net gain of water as it passes the mine and mill site rather than a net loss.

With regards to tailings disposal. The tailings disposal area as proposed appears adequate to permanently contain all tailings solids resulting from the operation during the presently indicated life of the mine. Proposed protection measures to prevent danger to the tailings pond during extreme flood events would appear to be adequate as well. It must be pointed out, however, that for the proposal to be considered completely adequate by our Division, a tailings dam must be constructed and flood protected to an elevation equal to the maximum possible flood plus one meter. Further construction could be at the discretion of the proponent providing it is consistent with sound engineering practice.

As tests carried out on mill tailings indicate them to be non-acid generating we do not anticipate long-term problems with

leaching of metals from the alkaline tailings. Providing it is constructed as designed, seepage from the tailings pond is expected to be negligible, as has been discussed in some detail.

With regards to effluent treatment. The minewater will constitute the only source of liquid effluent from the project with the exception of treated domestic sewage. The proposal for treatment of minewater is, we believe, adequate again but we offer the following cautions.

Number one, with regards to chlorine, the chemical used to oxidize cyanide in the treatment system is itself very toxic to aquatic life and, therefore, extreme care must be taken to ensure there is no, or almost no, residual chlorine in effluent to Prairie Creek. In the design of the alkaline chlorination treatment system the company should include a method for destroying any excess chlorine after treatment of the minewater.

B, although considerable recycling is planned in the mill, the company should further reduce effluent to Prairie Creek, investigate the possibility and practicability of recycling as much of the treated effluent as possible for use in the mill. If not harmful to the process, such recycling should be practiced.

Thirdly, at times of very low flow in Prairie Creek, such as in late winter, effluent even of the quality proposed might prove harmful to aquatic life after long periods of exposure. To avoid this possibility Cadillac might, unless effluent quality is of very good nature, take advantage of storage in the tailings pond for the short time when extremely low flows might occur, subsequently releasing this stored water

after treatment at such times as increased flows provide protection to aquatic life. This has been discussed in some length as well. It is not anticipated that this would occur every year and perhaps would not occur at all if effluent quality proves high enough, but the capability should, nevertheless, be provided.

For all mechanical treatment plants, regardless of efficiency, there should be a catchment pond. Therefore, again, the provision for a catchment pond should be made to prevent the discharge of untreated effluent to Prairie Creek.

And fifth, the company should make serious efforts to minimize its useage of all reagents in the mill circuitry and particularly the useage of cyanide which causes problems not merely by its own toxicity but can create problems by holding certain metals, particularly copper, in solution. The best way of removing contaminants from effluent is not to put them there in the first place.

With regards to the domestic sewage. The proposal of treatment of domestic sewage is technically adequate but care must be taken in the operation of mechanical sewage treatment plants or they can degenerate into mere holding tanks where the sewage sits in for a while and then discharges in a less than desirable condition. Sewage treatment operators must be trained to operate the plant properly and to recognize and correct problems as they occur. A final but important point on the sewage treatment plant is that if chlorinated it must not be discharged directly to Prairie Creek. Discharge to the proposed catchment pond at the lower end of the mill and campsite would provide time for dissipation of residual chlorine before discharge to the creek.

I suppose sub-surface discharge, or below ground discharge, would also provide that same period. It follows also that excess chlorination of treated sewage is to be strictly avoided. Stringent maximum allowable chlorine levels in effluent to Prairie Creek will serve to discourage any excessive chlorination.

With regards to flood protection. This was examined and we found it to be acceptable as proposed.

With regards to fuel and reagent storage. We came to the same conclusion but vigilance is necessary and continual vigilance is always necessary to prevent spills in this regard.

And with regard to garbage disposal, the site must be out of the flood plain as the proponent has indicated it will be. And preferably out of sites for future tailings ponds, etc., but the disposal methods appear to be adequate again.

So in brief summary, our Division is of the opinion that subject, of course, to further intensive assessment by the Technical Committee to the Water Board, a licence may be issued to Cadillac Mines with requirements which will ensure the protection of Nahanni National Park and Prairie Creek itself.

Thank you.

MR. G. WARNER: Thank you Lorne. Go ahead, Lou.

FR. L. MENEZ: You work for the Department of Water Resource?

MR. L. COOPER: That's right.

FR. L. MENEZ: Yes. Have you been doing some kind of surveillance on the mine?

MR. L. COOPER: Yes, we have.

FR. L. MENEZ: How long have you been working on that surveillance?

MR. L. COOPER: Well the surveillance, I suppose, started back in about 1974. That was more of a baseline data collection and we've resurrected it last year and have infrequently gone to the mine site.

FR. L. MENEZ: Is your Department satisfied with the way the situation, as it does exist actually at the mine, with perhaps run-off that doesn't go to the containing tailing pond because there is none?

MR. L. COOPER: No, I don't think the present situation is adequate in consideration of a mine being installed there. No, I would not say so. There is no settling pond installed for instance.

FR. L. MENEZ: Yes. I was at the mine this afternoon and I noticed a fair amount of water, and I believe water highly contaminated, coming from the mine itself, from underground, and running, well, God knows where. And what have you been doing to correct that?

MR. L. COOPER: The minewater that leaves the adit, to my knowledge, seeps into the ground in the area of the campsite and the minesite there, at this time.

FR. L. MENEZ: And you are satisfied with that?

MR. L. COOPER: I wouldn't be satisfied with that in a long-term situation either, and I think the only sufficient way of dealing with that, when you're dealing with higher qualities and lower qualities, higher quantities and lower quality water is systems such as are being proposed.

FR. L. MENEZ: How long is that situation going to last?

MR. L. COOPER: I suppose it would depend somewhat on the Water Board. It depends when a licence is issued I would suppose.

FR. L. MENEZ: You mean if the Public Hearing would have been taking place let's say three months from now the situation would have lasted three months because the Water Board would have known nothing about it?

MR. L. COOPER: No, I mean when the licence is issued the requirements for the treatment systems to be installed will accompany the licence, I would assume.

FR. L. MENEZ: So we'll wait, and we'll leave the highly contaminated water to go into the ground and from the ground it goes somewhere I suppose. It doesn't mix with some other water that goes perhaps to Prairie Creek?

MR. L. COOPER: The water from samples taken previously is not, like it's not comparable to say mill tailings. It's simply mine drainage and what it has, we have samples that show levels of lead and zinc to be above the background levels, definitely, of Prairie Creek.

FR. L. MENEZ: So that water has been analyzed?

MR. L. COOPER: Yes, we have some analysis. In fact, we've got one that was just analyzed today, in fact.

FR. L. MENEZ: And what was the result please?

MR. L. COOPER: It was elevated over, well over, Prairie Creek.

FR. L. MENEZ: How much?

MR. L. COOPER: You'll have to excuse me if I don't have the numbers exactly right. I believe the zinc level at the discharge in the mine was about 4 milligrams per litre and the lead was something less. I don't know what it was.

FR. L. MENEZ: I have a second question. The second question is about the site of the secondary tailing pond, I believe they called it, the T4 or T3?

- MR. L. COOPER: You mean
- FR. L. MENEZ: This on the south side of the actual site.
- MR. G. WARNER: Can you help us out?
- MR. N. GUILD: It's T3 you're referring to.
- FR. L. MENEZ: T3, yes.
- MR. G. WARNER: Thank you.
- FR. L. MENEZ: Additionally, noticed something on that site? Okay, I'm going to help you. Some of the machinery or caterpillar has been there and pushed the topsoil out of it so that the next flood, that means this spring, there will be very serious erosion and certainly will add to Prairie Creek lots of sediment and solid matters.
- MR. L. COOPER: Are you saying there's been work done in the flood plain?
- FR. L. MENEZ: Well, Mr. Guild, is that correct there has been some work done on the flood plain?
- MR. N. GUILD: There has, my understanding is there has not been any work done. There was an area that was cleared. Now perhaps you could, if you'll elaborate on that.
- MR. C. KUNKEL: I think the area that you refer to, that we were down looking at earlier, or later this afternoon, I think we were looking at an area that had been cleared of snow and we probably could have answered at that time. It had to have been a proposed area that we had cleared to look at to see what possibilities were for an area for aggregates. But there has been no aggregates taken out of that area. We were onto a higher bench area which we had tested, pit tested, in search of aggregates, which had been cleared through Mr. Cooper several weeks back.

MR. L. COOPER: Perhaps to clarify that. Your clearance would have been obtained through the Land Use, Land Resources of the Department, rather than through Water Resources.

FR. L. MENEZ: Oh, I see.

MR. G. WARNER: Wayne.

MR. W. BRYANT: Has there been any gravel taken from the flood plain or from the Prairie Creek bed?

MR. L. COOPER: Not to my knowledge.

MR. W. BRYANT: I think the concern here of my colleague Lou Menez is that disturbance of the flood plain could result in a heavy silt load into the creek and, therefore, into Nahanni Creek.

MR. C. KUNKEL: There has been no aggregate taken from that area.

FR. L. MENEZ: I'm talking about the area where not only snow had been removed but topsoil had been pushed on the side. And that was on that area we're looking at, T3.

MR. C. KUNKEL: I think, basically, there was snow cleared from the area to have a look at the site but there was no material taken off that site that we're aware of or that we've taken off.

MR. G. WARNER: Wayne.

MR. W. BRYANT: Question for Lorne. This minewater, Lorne, which I estimate something like 40, 50 gallons per minute. How do you know it's just going into the ground? How do you know it's not going into Prairie Creek?

MR. L. COOPER: I know it's initially entering the ground. I cannot tell you where it's going from there. I can only tell you that it's entering the ground. Beyond that I really don't know.

MR. W. BRYANT: Is it not feasible for the mine to put a temporary settling basin, lined with clay, where that minewater can drain into until they have their treatment facility?

MR. L. COOPER: I think you'll find they're installing a sump within the mine at the present time, but they should be responding to that.

MR. W. BRYANT: Thanks.

MR. N. GUILD: Lorne, there's a point I'd like to advise you. I learned too today that, in fact, they have started work on the sump in the mine and that's part even in conversation I had with Mr. Bryant. But we also discussed on the site that if this sump, I wasn't aware the sump work had started yet, but prior to that, consideration could be given to collecting that drainage and running it to a settlement area at the foot of the slope where the waste rockpile is as an interim measure. So those matters are under consideration.

MR. G. WARNER: Anything further for Mr. Cooper? Thank you Lorne. Is William Berthele here for the presentation? William is the Chief of the Fort Liard Dene Band.

CHIEF W. BERTHELE: William Berthele, Chief from Fort Liard. I guess most of the questions I would like to ask have all been answered and just one thing I ask is about transport of cyanide. Do you have any experience in transporting of cyanide like through the winter road to Cadillac Mine before?

MR. R. NENDICK: Experience in other projects? CamLaren Mines, which is about 50 miles out of Yellowknife, is moving in cyanide over a winter road for a gold treatment plant. Cyprus Anvil Mines in the Yukon Territory moves in cyanide over quite a long distance from Skagway to Whitehorse

and then from Whitehorse to Faro. It's not strictly a winter road but it's not a main highway that they move it along. Would that answer your question?

CHIEF W. BERTHELE: Yes. And there's another question I'd like to ask about wildlife. How long have the studies been going on about wildlife around the mine?

MR. N. GUILD: The studies were started in April of last year and were conducted April and July and then they were also being conducted in March and January of this year.

CHIEF W. BERTHELE: Well, it says here on page 14, says "literature and consultation with persons familiar with the area". Can you mention who that person is?

MR. N. GUILD: I'd have to refer that to Beak to discuss the work. Ian Robertson.

MR. I. ROBERTSON: Excuse me, could you just ask what specific point you want to make about the report?

CHIEF W. BERTHELE: On the page 14 it say, "literature and consultation with persons familiar with the area". You know, that's at the bottom line there. I just want to know who that person was?

MR. I. ROBERTSON: Yes. We discussed it with several people in the Territorial Wildlife Service. I think the people we spoke to included Sam Miller, Paul Gray recently, I don't know if we spoke to him at that time, I was not involved in those meetings. But there were a series of meetings in Yellowknife in April or May of 1980 in which people involved in wildlife studies in the Territories were consulted. And John Donihu, he was perhaps our principal contact during that period.

CHIEF W. BERTHELE: It seems that it's a pretty short time to do a complete study on wildlife. Like fish, for example, there is not too much information in that and if something happened to the fish there would be no guarantee that there's no fish in there. Seems like there's fish in there, there might be one or a thousand. It never mentioned anything here.

MR. I. ROBERTSON: We've certainly not tried to infer that our studies are in any way complete, and they're meant to provide some type of overview of the area. Now we have conducted detailed studies in summer and during the winter for wildlife and aquatic resources, and these are ongoing as part of our 1980 and 1981 program. Maybe there's something specific you might focus on. For example, we have sampled in Prairie Creek last summer for fish and we confirmed the presence of fish and it's referred to in here. Now there's a larger report that gives a far more complete documentation of what we found in Prairie Creek and in the Tetcela River and the Grainger River at that time.

CHIEF W. BERTHELE: I just want to get one more question here. Is there any way that mercury content in the mine is measured in the mine?

MR. I. ROBERTSON: Excuse me, what type of content?

CHIEF W. BERTHELE: Is there any mercury involved in this mine?

MR. R. NENDICK: Yes, there is some mercury in the ore. A small amount. Most of it will be shipped out with the concentrates. Most of the remainder will be in the solid form in the tailings. The small amount that goes into the water in the process will be precipitated in the water treatment plant. In other words, it will be put back into a solid form in the water treatment plant and impounded in the tailings area.

CHIEF W. BERTHELE: Could you tell me how much is a small amount?

MR. R. NENDICK: The discharge into, the water that enters Prairie Creek will contain less than .002 parts per million. I'm not sure how to put it into perspective, but it's a very small amount. I think it will be about the same, I don't know what the background is for Prairie Creek, but it will probably be about the same as the background level, I think. In other words, what's there now, it will not increase the level of mercury in the Prairie Creek.

CHIEF W. BERTHELE: I just want to add that I think, Mr. Warner, that you mentioned something about tailing ponds overflowing or something like that, saying that the water will be guaranteed. Is that what you had mentioned awhile ago?

MR. G. WARNER: I don't think it was me but if you express your concern we'll find someone to answer it.

CHIEF W. BERTHELE: Yes. Well I think somebody mentioned that the waters going to the Prairie Creek will be safe to drink. Is that my understanding?

MR. R. NENDICK: I think that they were referring to the water from the sewage plant would be drinkable. We're not recommending that anybody drink it, but it would be drinkable.

CHIEF W. BERTHELE: But I just want to mention, can you guarantee that it can be drinkable, that water?

MR. R. NENDICK: I think the term was used to express the fact the water is non-toxic, in other words, it's not poisonous.

CHIEF W. BERTHELE: Okay, thank you, gentlemen.

MR. G. WARNER: Thank you William. Gabe Gargon. Gabe, have you got something to say?

MR. G. GARGON: Ladies and gentlemen. What are you going to do with this point here? Where is this water going to? I'm from Providence. Where is the sewage going to go? Back up? You never see a little creek running up the hill, do you? You should have said that in the first place. The thing has already started and now you're bullshitting with it. I don't see why you guys are sitting here. That's my question. Where does that water go? You can't sit on it all night or all day. Respect these people down here and answer our questions. We've got enough bullshit this area here. Yellowknife, Pine Point, Hay River, all of us are concerned.

MR. L. MORRISROE: This is Mr. Morrisroe. I'll tell you, boss, if you don't run uphill it's going to come all the way down the Liard River right down to the Arctic Ocean. It won't get up to Fort Providence, it won't get up to Hay River.

MR. G. GARGON: You've been sitting on your ass all day and all night, I don't see why you're getting paid for it.

MR. G. WARNER: I think we'll take a five minute break and stretch. Fill up your coffee cups. We'll come back in five minutes.

MR. G. WARNER: We have one more verbal presentation. Jim, do you want to go ahead with yours? Chief Jim Antoine, are you ready with your verbal presentation please?

CHIEF J. ANTOINE: This is Jim Antoine here, Fort Simpson Dene Band Chief.

I've just got to make a few comments here. As I said earlier, I think the Water Board has a very important job and that it, especially with Cadillac Mine, and besides that for water in general along the Mackenzie Valley drainage basin. And as for Cadillac Mine, it's just like a precedent setting type of a mine, especially in the mountains, that directly affects us down the valley here. Listening to the different technical people that Cadillac has, they seem to have the B.C. experts there, and in listening to the news and especially on C.B.C., the Fifth Estate recently, in regards to the mining practices in B.C., I think they're pretty lenient. Talking to all the different Indian people along the West Coast at different times, I go to different Chief's meetings in different places, they're very uptight about the whole mining operation on the West Coast because of their leniency. Recently, in the Nishka area, there's a company there that had the go ahead to dump their tailings right into the ocean where the Nishka people get their food and different fishermen make their living off it, and they have a licence there to dump tailings right into the ocean.

What I'm getting at is that the Water Board here doesn't have any type of conditions or restrictions, I don't think, that they go by right now. I think if they're going to, the experts tend to want to say they do this in B.C. so it should be okay here. I don't think so, because I think that since Cadillac is a precedent setting type of a mine, the first one in our area, that there should be very strict conditions attached to them and that it would set a precedence for possibly other mines in this whole area. The Water Board, from my understanding,

has never refused any licence in the history of it being a Board. So I'd like to suggest very clearly here that the Water Board make very, very strict conditions on Cadillac Mine since it's going to be setting a precedent. I don't think they should follow B.C. regulations in their mining industry. The reason for that is that the life of the mine is going to be six years, and our people here might be lucky to get a few jobs, and then it would be left with an unattended radio-active tailing pond after they're all gone, so I don't know that there is very much benefit in that.

Another comment in looking at the study is that last summer, as we all know, was one of the driest seasons in this whole area and that to do a study in the mountains for two months in one of our driest seasons is not enough. I think that to study two fish is not enough and that there has been a very wet season and there has been a very dry season, and last summer was the driest season that I've seen in my lifetime in this area. I think there are going to be wetter seasons to come yet, so last summer's study is not relevant at all, as far as I'm concerned.

Another point I'd like to make is that the whole question on the Dene land settlement that we're going to be negotiating with the Government, and as a Dene leader for some time now, and talking to all the people that I represent and other leaders, we have a mandate from our people to negotiate all aspects of everything that affects our lives, and that includes all the resources. Now the Federal Government has Bill C-48, or whatever they call it, C-48 or something, and that's going to take oil and gas and stuff away from it, and I think there's not very

far behind they're going to have a Bill for non-renewable resources also. But, as far as I'm concerned, when you're dealing with Bills such as that, already negotiations have ~~begun on~~ the different points that have been given to us in our mandate, and indirectly, but it's still negotiations as far as I'm concerned. But the point I'm trying to make is that in our rights position, one of our mandates is to negotiate for non-renewable resources such as lead, zinc, copper and silver. I told this to Mr. Morrisroe the first ~~time that we met~~ over a supper meeting at Sub-Arctic, I made clear our position that we have an outstanding land settlement and, as I stated earlier, the Federal Government finally got a negotiator, today we found out, and that is the first step towards negotiations. But as far as the people that I represent are concerned, this land belongs to the Dene and all the resources on it, and if you come in here to take it out in six years ~~you look~~, what are we going to benefit besides jobs. I've also indicated to Morrisroe in our past meetings that there's a question of royalties which is part of our position in our negotiations and that is not final yet, so our position has always been based on no major development until a land settlement. And that is still the position that we maintain at this time.

So, it's getting late and I'm tired; I had a full day. I think a lot of people feel the same way, so I'll just cut it short at that. So I'd just like to say thank you.

MR. G. WARNER: Thank you Jim. Are there further verbal submissions?
Nick.

MR. N. SIBBESTON: I won't be very long. I just want to say a number of things dealing with the type of meeting that you're having here tonight.

I do think that it's ridiculous to have a Hearing on a matter that's so important to the people in this area in the course of one evening. I think it's really unfair for you to think that people can made their presentations at midnight. Like I'm tired, and I know other people are tired, and I really think it's unfair. I think that you ought to be able, you ought to be open to extend this meeting until tomorrow or else come back some other time.

The other thing I want to say is as respect to the presentation. I appreciate their presentation made by the officials of Cadillac Mines and I understand, in comparison to other presentations by other companies, I think it was a reasonably good one, but I do think that it is still much too complex and complicated for the people who, particularly people who are in the backend of the hall, and a lot of the information, diagrams and so forth provided, I think, were seen for the first time. A lot of the information was not available beforehand, so certainly I think it's unfair to think that people who've heard it once can then ask intelligent and proper questions on the presentation made.

The other thing I think is that I think something should be done, I think the Water Board has a responsibility to make sure that these Hearings are fair, that people understand the issue, they understand what is being discussed, and I think that the Water Board has a responsibility to make sure that the Dene people, people who don't understand English very well, really understand a lot of the stuff that is being presented. I think it's not asking too much of company officials to produce audio-visual, maybe even a film in Slavey, on the subject because

they talk of doing all sorts of wonderful things for the people in this area, for the Native people, and all that, and it seems that a sign of their sincerity would be proper means so that people can understand.

So it is late but I do have a number of points, and if you insist on continuing on tonight I will make a presentation. But I'm tired and maybe I won't do as good a job as I would normally, and maybe you people on the other hand, might be a little tired and may not like some of the things I'm going to say. It's not the best situation, let's say, but I'll do my best anyway.

Let me just say that I don't approach appearing before the Water Board very enthusiastically because I think that it's a bit of a farce. I mean, for you to expect people to come here, make a presentation and say what people feel, I think particularly in a situation like this, is ~~very serious~~ I mean, the fact that you are doing it, the fact that you think you can go on til two or three o'clock in the morning, when people are tired and so forth, people haven't had, haven't been properly educated, I think indicates, in a sense, the role or the way that the Water Board in the past has been practicing doing things. I, like I say, I don't feel very enthusiastic about appearing before you because I think it's a foregone conclusion. The Water Board intends to give a licence to the Cadillac Mines despite what is being said here tonight. So in that respect I think it's a farce. But I'll say what I have to.

I think the role, or the mandate, of the Water Board to date has been a federal system of approving development in the North. Of course, you know, you show some concern for the water, the environment.

But once a company has embarked on a project such as Cadillac Mines, once they've embarked on a project and have advanced to this state, I would say that it's very unlikely that you will recommend to the Minister that he not grant a licence to the company.

And as far as the composition of the Water Board, some of you have been chosen by the Federal Government, some of you have been chosen specifically because you are pro-development. Some of you are civil servants and you're placed on the Water Board because the Federal Government wants people like you on it so that projects in the North are not threatened. I must say that the Territorial Council has an opportunity to place some people on it, and we've been very pleased with Father Menez, Lou Menez, and Mr. Gamble. I understand that they've been valuable members of the Board and I understand, down in Good Hope, and the Board generally is improving as a result of their membership.

Now I feel up to now the Water Board has been a vehicle of the Federal Government and I feel that it's time in the history of the North that the Water Board becomes a tool of the people of the North. Some of you are real Northerners, some of you are born in the North, some of you've been in the North a long time, and some of you really think you're Northerners. I guess all of you have some affinity or concern for the people of the North but, whether you like it or not, I do think that you are involved in the political process. Or you might think, well people should really restrict their comments and presentations to a specific topic of water only but, really, I think it would be naive of you to make your decisions just on the technical question of water, whether a company has done a good job as far as making sure that the water that they use

and return to the streams and so forth are in good condition. And I would say that as a Board, I would say a sign of maturity or a sign of responsibility that you not be used by the Federal Government, you know, making the things that they want to happen. I think it's a sign of maturity and responsibility to the people of the North if you began challenging the Federal Government and began to stick up or stand up for the people of the North.

And when you deal with a project as proposed by Cadillac Mines, you cannot divorce that project from other things that are happening in the North. The other big thing that's happening in the North is land claims, whether you want to deal with that topic or not, I think you have to. You can't just isolate yourself and say, well we have a mandate just to look at this project, just to look at the water and so forth. You have to look at the fact that when a company such as Cadillac comes forward, wants a project to go ahead, you have to look at other things. You have to recognize the fact that land claims negotiations is about to begin in the North. And let me just say that the majority of my constituents are Native people, they're Dene and Metis people. And Native people are very concerned about the land and the water. Native people feel that the land, the water resources are theirs and an agreement has not been made as yet with the Federal Government to give up these things. That's what land claims negotiations is about and we're beginning this process very soon. As other people have said tonight, the Federal Government has just appointed a negotiator and, I believe, about by the middle of May, negotiations are going to begin between the Dene Nation, Metis Association and the Federal Government.

So I feel that it is folly or unfair of you people to be used by the Federal Government to grant a licence to Cadillac at this stage when land claims are not finished. I feel that in many ways it's a critical time in the North, that perhaps one of the most important things for Native people has begun, that's the land claims process. And you can't have the Federal Government, on the one hand, beginning to negotiate about all these things and have like a vehicle, or an appendage, of the Federal Government, in the meantime, just granting permission in a sense for a company to take lands and resources and so forth from the Native people in the North. I think that would be unfair and it makes a folly of the whole land claims process.

So my point, my major point tonight, would be that you take a firm stand and support the Native people of the North and state or recommend that a water licence not be given to Cadillac Mines until an agreement in principle is made with the Native people, the Dene and Metis people of the Mackenzie Valley. I guess that would be my major point.

And I just want to say a number of other things that are of a more local nature. As you heard tonight, particularly amongst the Native people and a certain amount of other people, that people are really concerned about the possibility of pollution from the mine. And it's a very legitimate concern. And the company intends to use cyanide, one of the chemicals that is very lethal, and when placed in water can spread and carry on to all parts of the North, and the company of course, on the other hand, says that they're going to be very careful, they're going to make sure that, but I do feel, despite their feelings on the subject, there

is always the possibility of chemicals getting into the water system and the water system being polluted. It's a very legitimate concern and it shouldn't just be brushed off as, well you know, a bunch of Native people, they always seem to be concerned about pollution, whatever you say they always talk about it, that seems to be all they talk about. But I don't think you should view it that way. It's a very legitimate concern. The little creek in question goes into the Nahanni, and Nahanni Butte people drink the water, and then onwards down this way, so you know it's a very legitimate concern.

The other aspect I think you have to take into consideration is that if the mine is to go ahead, are people in this area going to benefit? I think that, you can't deal with the question of granting a water licence without also dealing with that. And I must say that, in my view and from my experience here in Simpson, is that since Cadillac has gotten into operation, since they've begun being interested in developing a mine, since they've become interested and done some very initial work last summer, Simpson people and businesses have really not benefited very much. As far as people employed from this town, I believe last summer there were two persons, and I heard more recently there was one person. And let's just say that the mine is beginning at a very initial stage where, I suppose, they can use a lot of labour and trades. So if they aren't able to hire people at this stage, when they could use a lot of labour and, you know, trades people, I would say that there's less likelihood of them hiring people from this area eventually when it becomes more sophisticated, more complex, where they require experienced miners, when they will be requiring experienced mill operators and so

forth. So I feel that Simpson, in particular, has not benefited very much from Cadillac and people, I think, are basically suspicious that they, despite the promises, will not benefit very much. Fort Nelson has been the community, the center that's benefited most from the Cadillac development. That's where the company hires its men and that's where it gets its supplies from. So I would say that as far as Simpson goes, that Simpson has not really benefited very much from Cadillac Mines and I suspect, despite their promises, that Simpson will not benefit very much. So I would say that Simpson doesn't have a great deal to benefit from the mines in terms of jobs, and in terms of providing services to the company.

So those are all my comments and I strongly urge the Water Board to be realistic, not to look at the matter of granting water licence in a very isolated or narrow way, that they do take into consideration the land claims negotiations is just beginning and also that they ought to be able to stand up to the Federal Government, not be afraid of the Federal Government, and instead of being a tool of the Federal Government become a tool of the people of the North and take a firm position, say that until the Native people have reached an agreement in principle, that you will not grant a water licence to Cadillac Mines. And this is not to say that Native people, or I, are against seeing Cadillac eventually go. You know, I think there's merit, probably there is merit in the mine being developed eventually, but not at this stage. So, thank you.

MR. G. WARNER: Thank you Mr. Sibbeston. Any further verbal presentations?
Lorayne.

MS. L. MENICOICHE: My name's Lorayne Menicoiche and I'd just like to ask Mr. Morrisroe some questions. You know this summary of project standards to the Water Board? I was just wondering how come it wasn't released sooner, like for us people to be able to review it?

MR. L. MORRISROE: I think that we met all the schedules and everything that was required by the Water Board, timing and so forth.

MS. L. MENICOICHE: I was just wondering, like, why wasn't it made available to the public, like for ~~us~~ to look at it, to study it further, before we come to this Water Board Hearing. That's all. I was just wondering.

MR. L. MORRISROE: Of course there's a number of copies have been around, but when you get to the public, where do you end with copies?

MS. L. MENICOICHE: I'm just wondering how many people are working at the mine site right now?

MR. L. MORRISROE: Well there's not very many there yet. There's probably 30, 35 people.

MS. L. MENICOICHE: And how many of them people are Northern people?

MR. L. MORRISROE: I really couldn't tell you off hand.

MS. L. MENICOICHE: And I was just wondering how many Northern people will be hired in the future?

MR. L. MORRISROE: As I told you tonight, we'd like to hire as many people as we can from the North because it's to our advantage, you're close here. As you know on our program, we plan on working two weeks in and a week out so we've got to pick you up and deliver you people home. So the closer we can get them to home the better it is for the company.

MS. L. MENICOICHE: These lengths of the studies for the fish and wildlife and things like that, were they done for a four month period or was just it done for a little while?

MR. L. MORRISROE: Well apparently, I think you've mentioned tonight, the studies have been going on for over a year. They did them over a period of every four months, there's been another study and they're still continuing.

MS. L. MENICOICHE: And how long do these studies last?

MR. L. MORRISROE: Well I hope they'll end pretty soon. Apparently we've got a program til the end of 1981.

MS. L. MENICOICHE: You made a statement, a comment, tonight just saying something about the tailing ponds, if there was an overflow it wouldn't really affect the rivers or anything like this. And so I was just wondering, like somebody else mentioned, that what is the purpose of the tailings pond and why put it in?

MR. L. MORRISROE: Well I think it was mentioned here carefully that after these tailings go into a pond then they reach a point where, they're non-acid to start with, but then when they go back into the ground, then they're stable. I said if they did break out it would never be seriously enough to think that you're going to kill anybody or anything like that.

MS. L. MENICOICHE: What kind of chemicals would that tailing pond hold? I heard there was some mercury in solid form. What different sort of things? I'm just kind of wondering. I'm not too sure, I don't even know what a tailings pond looks like, you know.

MR. L. MORRISROE: I see.

MS. L. MENICOICHE: I don't know what's going on. I'm just trying to figure out in my mind what this tailing pond is all about. What it holds? And what's the purpose of it?

MR. L. MORRISROE: Well maybe we'll let Roger here tell you a little bit more about that so you understand it better.

MR. R. NENDICK: There's a sample of tailings in a jar over on the table there. It will show you what it looks like. It won't be as dry as that in the dam, it will be almost like a beach, sand beach, when it's left. It will contain a whole variety of things. Most of it will be dolomite, which is magnesium carbonate, you take it in indigestion tablets even. It's non-poisonous. Silica, which is sand, and whatever lead we haven't recovered will be there, whatever zinc we haven't recovered, and all the trace metals will be there. But they'll be in a solid form, and what we're concerned about is what's going to find their way into the waterway and, as such, for treating the water we have the water treatment plant. As long as it's in a solid form we can contain it within the tailings dam. Does that answer your question?

MS. L. MENICOICHE: Are there any toxic chemicals?

MR. R. NENDICK: Certainly there are toxic chemicals there in the tailings dam, but they're as solids so there's no way for them to get into a system where they could come into contact with you, or with wildlife, or so on. It's a difficult point for me to explain but if you were to walk across the top of it when it was dried out, you wouldn't be in any danger. They are there in a perfectly stable form and you're not going to contact anything that will do you any harm even if you walk across the tailings dam.

MS. L. MENICOICHE: Oh.

MR. R. NENDICK: I've walked across the top of a lot of tailings dams and I'm still here.

MS. L. MENICOICHE: Are you sure?

MR. G. WARNER: This lady has the floor, please.

MS. L. MENICOCHÉ: This mention about an artesian pressure, right, and something about putting one and a half foot of earth to neutralize. And I'm just wondering, is there any guarantee that the earth will stay there?

MR. B. FLETCHER: Maybe if I could try to explain to you what an artesian pressure is. Okay, I assume that you're not quite clear on what that is. Is that correct?

MS. L. MENICOCHÉ: Yes. Correct.

MR. B. FLETCHER: Okay. If you had a straw and if you bent it in a U-shape and had it full of water, or partly full of water, and if you just put a little bit of breath in one end then the water would move around it, right. So it would be higher over on this side than on the other. Okay. So you've got an excess pressure there, the difference in height between the water on this side and the water on the other side is artesian. Okay. That's a very simplistic view of it.

Now underneath the clay in Prairie Creek we have that condition, and it's because the water upstream in Prairie Creek is higher than the water at the Cadillac minesite, and so it exerts a pressure up there which causes the water down around the minesite to want to move upwards. But it's only very small. In other words, there's about a three foot excess head at the Cadillac minesite. In other words, if you drilled a hole in the ground and put a pipe in there, the water would come up the pipe to about three feet above the ground. Okay. So that's an excess pressure of three feet, and water weighs about 62 pounds a cubic foot, so that's about 186 odd pounds of force or pressure that's there. Okay. So to push that back down, you'd need 186 pounds, which would be about, well it would be about a foot and a half of ground on top of that would push it down.

MS. L. MENICOICHE: And then you would put clay on top of that?

MR. B. FLETCHER: Well, don't confuse me now. In other words, all I'm saying is that that's all the ground that is required to keep that water behaving itself. Okay. Now we've got, in fact, 30, 40, 50 odd feet of earth on top and we're not removing very much of that, only about 10 feet. So it's a perfectly safe condition. Does that fix that one up?

MS. L. MENICOICHE: Yes it does. And you said that, I think it was you, I think you said something like some part of the ground where that clay is all sitting there, right, and then some part may not be as maybe wide.

MR. B. FLETCHER: As thick, yes.

MS. L. MENICOICHE: As wide as another part. And if you have another part you said that's very thin you would cover it, you would put a clay seal on top of that, right? To make it even with the other parts. So how long would this clay last, the one that you put on? Like the other clay's been put there naturally right, but the ones you put there is man-made and would it last as long as the other parts of the clay?

MR. B. FLETCHER: It'll last forever.

MS. L. MENICOICHE: It would?

MR. B. FLETCHER: Unless somebody comes and digs it out, you know, but once it's there and there are tailings on top of it, then there isn't anything to make it move.

MS. L. MENICOICHE: It was estimated that the mine life was going to be about six years. What if there's more? Like you find out there's more, because some place I read, I think it was in your IEE Report, I read that it was

extended to about 25 years and so would that mean that you have to do, have other tailing ponds besides T3?

MR. B. FLETCHER: Is that question directed to me?

MS. L. MENICOCHÉ: Any one of you.

MR. B. FLETCHER: There's the tailing pond that is designed and anticipated right now, is T2, and that is reckoned to last seven, six, seven, eight years, in that vicinity. The area that's been identified as T3 is very large and, relative to T2, and would last, I don't know how many years. You know, I haven't done a careful analysis on that, but it could go for a long, long time.

MS. L. MENICOCHÉ: Okay. I think Chief William Berthele had mentioned about page 4, bottom part, it says "consultation with persons familiar with the area". Page 14, I'm sorry. And I'm just wondering, were any of the Native people contacted in the studies on wildlife and fishes, the two fishes?

MR. I. ROBERTSON: They weren't contacted by me but we prepared a section on trapping, it was done last autumn and, I believe, Native people were consulted. Also, I assume there was some contact made with people who might have registered trap lines, at least those where there are records kept every year, fairly close to the mine site. And I don't have that information with me, but I know a table was made up of the recent trapping records, so I would imagine some contact was made. But I can't guarantee that.

MS. L. MENICOCHÉ: I was just wondering if any of the Native people were contacted about wildlife and things like that because that's their country, they know it, you know, they've been there all their lives.

They know what's happening. You know, instead of having these guys or whoever do these studies just come in for little short spurts and say, oh wow, here we're experts with all our studies and things like that. You know, the people should have been contacted. That's the point I wanted to make.

And there's this, on page 9, on effluent treatment. It's very hard for me to understand what's going on here. I was trying to read it and trying to put it in my mind and, like somebody said, more community consultation should have taken place, especially with audio-visual equipment and things like that, and some of these words broken down into layman language. I'm sure it could be done to explain to the people exactly the process of the mining and what the treatment of the water and things like that. Like the statement says, "mine effluent will be collected in an underground sump", and there's nothing been mentioned about this underground sump. Where is it going to be located? Unless I wasn't listening good enough. And there's things like "treated effluent will overflow the thickener to the run-off settling pond or directly to Prairie Creek during the wintertime". Now what does that mean?

MR. N. GUILD: Basically, the effluent discharge, apart from the sewage treatment plant, which is a small plant that treats domestic sewage and has its own small discharge, about 20,000 gallons a day, the remaining discharge that we've asked a licence for is a discharge that comes from the mine itself. And that's a combination of water that seeps into the mine, some water that Cadillac will use to suppress dust within the mine, and some water that will drain out from what I tried to explain, the

backfill that's going into the mine. In the mining process the backfill, the areas that I'm mining from on a continuing basis, and water will drain from that.

Now those three streams come together and they come to a sump. And a sump is a large sort of hole at the entrance to the mine and at that point it gives a point where they can all collect, and from there then that water will be conveyed, by pipe, to the slide that you saw, and what's on the wall there, what we've called the treatment plant. And there's sort of several processes involved in that plant.

One, we want to settle out what we call suspended solids, which is fine particles that you can see and makes the water cloudy. There's provision in that plant to aid in the settlement of these before the water goes to Prairie Creek. There's also provision in the plant to add chlorine, which is an oxidizing agent which breaks down the cyanide, any cyanide that might be left in this water and then, by adding lime, we sort of get the water such that the other heavy metals that we've talked about, they sort of form what we call hydroxides, but it's just a method of settling them out again. And the time it takes to go through it permits this reaction to happen. Everything has a time and there's an allowance in there, as we say, for 75 minutes.

And this all happens and then it goes through to what we've called the Lamella Settler. But it's just a big settling tank whereby you put the water in with all the suspended solids and, by the time it comes out the other end, the suspended solids have settled out and they're returned to the pond, they don't go into Prairie Creek.

So in other words, we've sort of endeavored to purify the water so that when the water comes out it can be discharged to Prairie Creek. Now why we said if all there was, during the summer one can discharge to, pretty close to where that pond is, at the bottom, and water can flow. But in the winter, we have frozen conditions and we don't want to discharge the water directly or we'll have a sheet of ice. So the intention then would be to discharge below the frozen level in Prairie Creek so that it's below. So that was the reason for saying two methods. Does that help?

MS. L. MENICOCHÉ: Just out of curiosity, I was just wondering who authorized the building of the dykes? Was that part of your land use permit?

MR. L. MORRISROE: That dyke was built before environmentalists came into being.

MS. L. MENICOCHÉ: Oh, okay. Mr. Warner.

MR. G. WARNER: Yes.

MS. L. MENICOCHÉ: I was just wondering about a few things. When you do give the licence, it says under Section 10(1)(A) of the Inland, Northern Inland Waters Act, it says that the Board may, with the approval of the Minister, issue a licence to the applicant for a term of 25 years.

MR. G. WARNER: That's the maximum term the licence could be issued. Normally, with new licences, it has been the procedure of this Board to issue licences for three or four years for new mines, and longer terms after things prove to be working well. But it's completely inconceivable that the mine would be issued a licence for 25 years. More like three or four or five at the most.

MS. L. MENICOCHÉ: Have you ever done it on a minimum basis? Is it ever done?

MR. G. WARNER: Have you done one? Wayne could speak to that. He's been on the Water Board longer than I have.

MR. W. BRYANT: Nanisivik Mines was only issued a one year licence for the mine, and then there were more Hearings. Then they were given a further licence for two years. It depends on the project.

MS. L. MENICOCHÉ: I was just wondering, Mr. Warner, have you held, or are you going to be holding, Hearings in Liard and Nahanni Butte.

MR. G. WARNER: No Hearings are scheduled for Liard and Nahanni Butte. We invited the communities to send representatives to this one, which they did.

MS. L. MENICOCHÉ: And I was just wondering, since it's so late, and it's been mentioned before. Would you be extending the Hearings for more? Like I'll tell you what I think. I think there's a lot of stuff we saw tonight, and we just got this real summary of Cadillac Mines, and there's a lot of people in the communities I'm sure don't really understand what's going on there. Maybe if more time were given to the people to study this, and for the company to go to the communities and if they could purchase audio-visual equipment and show exactly the sort of slides and different things that's going to be happening so the people could have a better understanding and so we wouldn't be so freaked out about the whole thing, about pollution and things like that, because they have a better understanding. Because to them water, to us and them and everybody else and the animals and fish etc., water is very important. It's one of the basic necessities of life, you know.

MR. G. WARNER: That's a very good point, Lorayne, and perhaps one that we should consider now. I would like to discuss it with the Board and

get their input. You know, we could recess this Hearing and reopen it at a later date next month, or at a date that is decided. And if it is your request, I would call a short recess right now to discuss it with my Board and get their opinion on it.

MS. L. MENICOICHE: Sure.

MR. G. WARNER: You think that's a good idea?

MS. L. MENICOICHE: Sure.

MR. G. WARNER: Okay, we'll stand recessed for ten minutes. Yes, Agnes, go ahead.

MS. A LAFFERTY: It wouldn't be possible to carry on for tomorrow, would it?

MR. G. WARNER: Well that causes a lot of problems for a lot of people, including two airplanes that have to go back tonight, and the fact that we've checked out of the hotel. But to get back to Lorayne's point, it may be more important if we are going to recess to do it for a longer term and give people a chance to digest it.

MS. A LAFFERTY: I really feel that it is important because I know tonight when I got here I didn't know anything about what's going on, and a few remarks from some just bring out the worst in me, and I've got a few things I'd like to say and I'm sure there's other people in the community, we've got some Elders in this community, and they know about these flash floods that happen in the Nahanni, and I know they are terrible and they do happen because our river climbs here so many feet in a few hours and if that happens here, what's happening way out there? Maybe we could get some Elders to come and tell us a little bit about what goes on up there and they'll know a little bit more about what goes on.

MR. G. WARNER: I think your point is very well taken, Agnes, and we'll certainly give it consideration, and we'll do it right now, if it's agreeable. Recess for ten minutes.

MR. G. WARNER: We're not really setting a precedent here in this decision tonight, folks. We did a similar thing at Fort Good Hope in a very similar set of circumstances where they requested additional Hearings in order to consider the full ramification of a major project at Norman Wells. The Board has decided that this Public Hearing will be recessed until 2 p.m. on Wednesday, May the 20th, at Fort Simpson. We can't name the place, it will be here in the Community Hall if this is available, but I don't know that.

And at this time all I can do is thank the people who brought their formal interventions for their time, and we will ask them that they come back to Fort Simpson on that date, or send somebody back to present their formal interventions.

Meeting recessed. Good night.

Meeting recessed at 1 a.m.

ATTENDANCE

The following people registered with Mr. Jo MacQuarrie, Executive Secretary, N.W.T. Water Board.

G.B. Warner	Chairman, N.W.T. Water Board Yellowknife, N.W.T.
W. Bryant	Member, N.W.T. Water Board Yellowknife, N.W.T.
D. Gamble	Member, N.W.T. Water Board Ottawa, Ontario
L. Menez	Member, N.W.T. Water Board Fort Resolution, N.W.T.
M. Mersereau	Member, N.W.T. Water Board 100 Mile House, B.C.
A. Redshaw	Member, N.W.T. Water Board Yellowknife, N.W.T.
D. Arden	Member, N.W.T. Water Board Prelude Lake, N.W.T.
G. Carter	Legal Advisor, N.W.T. Water Board Yellowknife, N.W.T.
A. Cullen	Controller of Water Rights Yellowknife, N.W.T.
J. MacQuarrie	Executive Secretary, N.W.T. Water Board Yellowknife, N.W.T.
M.D. Bath	Kilborn Engineering/Cadillac Explorations Vancouver, B.C.
Dr. W. Dwernychuk	Beak Consultants/Cadillac Explorations Richmond, B.C.
J.W.A. Edwards	Alto Construction/Cadillac Explorations Esterhazy, Saskatchewan
E.B. Fletcher	Golder Associates/Cadillac Explorations Vancouver, B.C.
N.I. Guild	Ker, Priestman & Associates/Cadillac Explorations Victoria, B.C.
A. Horsman	ACPH & Associates/Cadillac Explorations Richmond, B.C.

C.F. Kunkel	Alto Construction/Cadillac Explorations Esterhazy, Saskatchewan
E.L. Morrisroe	Cadillac Explorations Ltd. Calgary, Alberta
L.C. Morrisroe	Cadillac Explorations Ltd. Calgary, Alberta
R.M. Nendick	Cadillac Exploration North Vancouver, B.C.
I. Robertson	Beak Consultants/Cadillac Explorations Richmond, B.C.
G. Antoine	Mackenzie Liard Region Fort Simpson, N.W.T.
Chief J. Antoine	Fort Simpson Dene Band Fort Simpson, N.W.T.
J. Bayly	Dene Nation Yellowknife, N.W.T.
Chief W. Berthele	Fort Liard, N.W.T.
Chief W. Conisanta	Sub-Chief Nahanni Butte, N.W.T.
L. Cooper	DIAND, Water Resources Yellowknife, N.W.T.
A. Fowlow	Public Health Department Fort Simpson, N.W.T.
G. Gargan	Providence, N.W.T.
A. Lafferty	Fort Simpson, N.W.T.
R. Lamothe	Fort Simpson, N.W.T.
L. Menicoche	Yellowknife, N.W.T.
N. Sibbeston	Fort Simpson, N.W.T.
B. Wilson	Environmental Protection Service Yellowknife, N.W.T.
D. Antoine	Dene Council Fort Simpson, N.W.T.
K. Browning	Fort Simpson, N.W.T.
Doris Bye	Fort Simpson, N.W.T.

R. Bye	Transport Canada Fort Simpson, N.W.T.
R. Cairns	DIAND, Public Affairs Yellowknife, N.W.T.
K. Davidge	Dept. of Renewable Resources/Wildlife Service Fort Simpson, N.W.T.
L.A. Dvorak	Wolverine Air Ltd. Fort Simpson, N.W.T.
M.R. Falk	Parks Canada Winnipeg, Manitoba
N. Fowlow	Fort Simpson, N.W.T.
E.S. (Ted) Grant	Simpson Air (1981) Ltd. Fort Simpson, N.W.T.
P. Gray	Wildlife Service Yellowknife, N.W.T.
R.D. Hamilton	Dept. of Fisheries & Oceans Winnipeg, Manitoba
A. Hardisty	Fort Simpson, N.W.T.
H. Hardisty	Fort Simpson, N.W.T.
R. Hardisty	Fort Simpson, N.W.T.
R. Hardisty	Band Council Fort Simpson, N.W.T.
A. Horesay	Dene Band Council Fort Simpson, N.W.T.
M.E. Johanson	Nahanni National Park Fort Simpson, N.W.T.
E.M. Lamothe	Fort Simpson, N.W.T.
L. de March	Dept. of Fisheries & Oceans Winnipeg, Manitoba
D. McPherson	Fort Simpson, N.W.T.
E.J. Menicoche	Dene Council Fort Simpson, N.W.T.
P. Michaelis	Fort Simpson, N.W.T.

F. Norwegian	Fort Simpson, N.W.T.
J.P. Parkinson	Dept. of Environment Edmonton, Alberta
R. Pelkman	Fort Simpson, N.W.T.
S. Pellissey	Fort Simpson, N.W.T.
C. Piche	Catholic Church Fort Simpson, N.W.T.
R. Rae	Secretary Manager Fort Simpson, N.W.T.
A. Rodh	Fort Simpson, N.W.T.
P.B. Shaw	Fort Simpson, N.W.T.
K. Sibbeston	Fort Simpson, N.W.T.
G. Schmitz	Council Fort Simpson, N.W.T.
D. Sutherland	Environment Canada Yellowknife, N.W.T.
D.K. Wallden	Canada Employment Centre Yellowknife, N.W.T.
O. Watsyk	Mayor Fort Simpson, N.W.T.
P. Wood	Water Survey of Canada Fort Simpson, N.W.T.