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Speaker: The Honourable Donald M. Stewart, M.L.A.

LEGISLATIVE ASSEMBLY OF THE NORTHWEST TERRITORIES

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HAY RIVER, NORTHWEST TERRITORIES

THURSDAY, MAY 21, 1981

MEMBERS PRESENT

Mr. Appaqaq, Mr. Arlooktoo, Hon. George Braden, Mr. Curley, Ms Cournoyea, Mr. Evaluarjuk, Mr. Fraser, Mr. Kilabuk, Hon. Arnold McCallum, Mr. McLaughlin, Mr. MacQuarrie, Hon. Richard Nerysoo, Mr. Noah, Hon. Dennis Patterson, Mr. Pudluk, Mr. Sayine, Mr. Sibbeston, Mrs. Sorensen, Hon. Don Stewart, Hon. Kane Tologanak, Hon. James Wah-Shee

ITEM NO. 1: PRAYER

---Prayer

SPEAKER (Hon. Don Stewart): Orders of the day for May 21st.

Item 2, replies to the Commissioner's Address.

Item 3 on your order paper, oral questions.

ITEM NO. 3: ORAL QUESTIONS

Mr. Curley.

Question 45-81(2): Personal And Professional Information On Witnesses,
Uranium Debate

MR. CURLEY: Yes, Mr. Speaker. I have a question for the Minister of Justice. I asked the written question last session, Question 143-81(1), on personal and professional information circulated on witnesses from the uranium debate, two pages of information of personal and professional information regarding E.R. Young and Dr. R.F. Woollard. My question was, why was this information gathered? Was other personal and professional information gathered on other witnesses to the debate? The first question was, which department prepared this personal and professional information? What was the purpose of it? I wonder if the Minister would now have an answer to my question.

MR. SPEAKER: Mr. Braden.

HON. GEORGE BRADEN: No, Mr. Speaker. Because I do not have an answer, I will take that question as notice and will provide a written return.

MR. SPEAKER: Thank you, Mr. Minister. Oral questions. Item 4, written questions and returns. Are there any returns?

ITEM NO. 4: QUESTIONS AND RETURNS

Mr. McCallum.

Return To Question 5-81(2): Request For Additional Nurse In Pond Inlet

HON. ARNOLD McCALLUM: Mr. Speaker, I have returns. The first return is to Question 5-81(2), asked by Mr. Evaluarjuk on May the 14th, concerning the request for assistance in getting a second nurse at Pond Inlet. As there is a shortage of nurses throughout the Northwest Territories and the provinces, the medical services branch of Health and Welfare Canada has made extensive efforts to recruit nurses in Canada, and just recently has been granted permission to recruit overseas in Australia, New Zealand, and Great Britain. Health and Welfare Canada is endeavouring to get an additional nurse for Pond Inlet. They realize there is a great strain on the one nurse presently in that community. Health and Welfare Canada has confirmed that a husband and wife nursing team will be arriving to commence work in mid-August in Pond Inlet.

Return To Question 9-81(2): Care Of Accident Victim At Frobisher Bay Hospital

Mr. Speaker, Mr. Arlooktoo asked Question 9-81(2), concerning a medical problem at the Frobisher Bay General Hospital. I have the following return. The director of nursing at the Frobisher Bay General Hospital has advised me that a search of hospital records, both inpatient and outpatient, and medivacs from the communities and from the hospital, for the period April 20th to 30th, have been reviewed. No patient was treated for a broken leg. I would appreciate if the Member would give me, in confidence, the name of the person that he was referring to, so that I can then have Health and Welfare Canada investigate this situation and take disciplinary action, if necessary.

Further Return To Question 12-81(2): Increase Of Rents By NWT Housing Corporation

Mr. Noah asked a question on May 15th, Mr. Speaker, concerning rental increases in the Housing Corporation. The board of directors of the Northwest Territories Housing Corporation passed a motion in 1978 to increase the minimum rental from \$28 to \$30. The administration did not implement the increase at that time. Effective July 1, 1981, the minimum rental will be \$30 per month. The rental scale is based on income. For people who are unemployed, or senior citizens, or any person who does not have the income required to pay the minimum rental, they should apply for social assistance. The Department of Social Services of the Government of the Northwest Territories is aware of the increase in minimum rents and will be in a position to pay the additional two dollars per month for tenants who are presently receiving assistance. The rental scale in the Northwest Territories is the lowest in Canada.

MR. SPEAKER: Thank you, Mr. Minister. Are there any further returns?

Item 5, petitions.

Item 6, tabling of documents.

ITEM NO. 6: TABLING OF DOCUMENTS

Mr. Braden.

HON. GEORGE BRADEN: Thank you, Mr. Speaker. I wish to table the following Tabled Document 7-81(2), Statistics Quarterly, Volume three, Number one, dated March, 1981, prepared by the Bureau of statistics, Government of the Northwest Territories. Thank you.

MR. SPEAKER: Thank you, Mr. Minister. Tabling of documents.

Item 7, reports of standing and special committees.

Item 8, notices of motion.

Item 9, notices of motion for first reading of bills.

Item 10, motions.

ITEM NO. 10: MOTIONS

We have one motion on our books today, Motion 6-81(2). Mr. McLaughlin.

Motion 6-81(2): Amendment To NWT Teachers' Association Ordinance

MR. McLAUGHLIN: Thank you, Mr. Speaker.

WHEREAS it is desirable that the Northwest Territories Teachers' Association should have the means to guide the professional conduct of their members;

NOW THEREFORE, I move, seconded by Mr. Curley, that this Assembly recommend to the Executive Committee that section 12 of An Ordinance Respecting the Northwest Territories Teachers' Association be amended to provide for compulsory membership as a condition of employment.

MR. SPEAKER: Your motion is in order. Proceed, Mr. McLaughlin.

MR. McLAUGHLIN: Thank you, Mr. Speaker. The intent of this motion, Mr. Speaker, is fairly clear. The members of the Northwest Territories Teachers' Association desire that their association should have a similar control over their members' conduct, the same as lawyers and the medical practitioners, nurses, in the Northwest Territories. What they want to be able to do is revoke a person's membership if he does not conduct himself in the proper professional conduct that a teacher should. In order to make this effective control of the conduct of teachers, if the membership was compulsory as a condition of employment, and if they lost their membership, this would mean that these people would then lose their employment as teachers in the Northwest Territories.

There are instances, for example, where a teacher might be involved in a situation with students, for example the use of drugs or alcohol with juveniles, where the situation would involve juvenile children, parents would be unwilling to go before courts or any sort of a public situation in order to get a situation like this resolved. There are, in the existing ordinance, methods whereby the teachers can hold sort of in-house hearings in order to discipline their members. This way, according to the ordinance and it is set up in the ordinance right now in order to do this, these teachers can be administered some sort of punishment handed out by the association. The ordinance also allows for a very well thought-out and reasonable appeal process for individuals who might want to appeal the decision of the association.

Teachers Want To Be Treated The Same As Other Professions

The problem they have right now, which could actually happen, is if a member of the Teachers' Association was going to be reprimanded by the association, all he has to do is send them a letter resigning his membership from that association, which therefore makes the association unable to deal with that person. I think what this will do is complement the system. Right now we have a contract in place with the association, between the government and the association, which makes it very difficult to remove an undesirable teacher from the profession, when he is not conducting himself in a professional manner. What the Teachers' Association is basically asking for is to be treated the same as some of the other professions in the Northwest Territories, so they can do some in-house governing of their own members. This amendment will put some teeth into the system. Thank you, Mr. Speaker.

MR. SPEAKER: Thank you, Mr. McLaughlin. Mr. Curley is seconder. You have the floor if you wish it. To the motion. Mr. Nerysoo.

HON. RICHARD NERYSOO: Yes, just a question I would like to ask with regard to the motion. Did the mover and the seconder try to find out any information with regard to the effect of that motion, and the recommendation to societies and their ability to negotiate with teachers now or in future?

MR. SPEAKER: The normal procedure, Mr. McLaughlin, is if you speak again, you will close the debate. However, it is a matter of a question, and the Chair will allow you to answer the question.

MR. McLAUGHLIN: Thank you, Mr. Speaker. What I think the Member is referring to is the hiring and the control of teachers by the separate education committees or societies in the community. This is sort of a separate issue and not connected with this, because it deals with the hiring and firing of teachers, as jobs become available or necessary. What we are trying to accomplish through this amendment is strictly put some teeth into the ordinance so that the Teachers' Association can discipline their own members.

MR. SPEAKER: Mr. MacQuarrie.

MR. MacQUARRIE: Thank you, Mr. Speaker. Perhaps I can shed a little light on that question. The Yellowknife School Districts No. 1 and 2, both already have written into their contracts compulsory membership of teachers in the NWTTA, and yet their ability to hire and fire teachers and control the conditions of employment is not diminished because of that. So I think there would be no danger to that kind of control as a result of this motion.

MR. SPEAKER: Thank you, Mr. MacQuarrie. Mr. Patterson.

Smaller Communities Could Be Handicapped In Hiring Ability

HON. DENNIS PATTERSON: Thank you, Mr. Speaker. As always, of course, the advice of the House on this question will be very valuable to me and the other Members of the Executive Committee in determining what to do on this question.

I would like to sound a note of caution to Members on this issue, and I would respectfully suggest to Mr. MacQuarrie that, while this issue might not cause a problem in a place like Yellowknife, there is a very large question in the Northwest Territories in areas where local education authorities wish to hire persons who do not have formal qualifications, to contribute their knowledge in cultural areas, for example, that this amendment, if it were made, could see the professional body, the Teachers' Association, having control over membership and having control over who can be hired.

The corollary that you have to be a member of the association to be a teacher is that you have to be a member to be hired, and the association would be left controlling the membership criteria. It could lead to a situation where the Department of Education and local education authorities could be handicapped in their ability to hire people who might not meet the standards of the association. I just sound that note of caution because, while the discipline issue does provide a good reason to move in this direction, I think we must also ensure that any changes of this sort are not an obstacle to the desires of local authorities, and particularly societies, to hire whoever they feel is competent to teach school.

Now, as far as discipline is concerned, of course, as employer, the department does have the responsibility ultimately, to discipline and remove and suspend and otherwise deal with teachers who might cause concern through their behavior. While I do applaud the interest of the association in the professional development

area, and encouraging the highest standards of ethics and behavior amongst their members, I just want to go on record now as having expressed this concern about the implications of this particular motion. It may be why the Assembly refused to act on a similar motion in earlier years.

I am aware that the Teachers' Association president is very concerned about this issue and very anxious that it be resolved in the near future. I have told the association that the advice of this House would be very helpful to myself and the Executive Committee, but I do think that if we are to move in this direction, we must take precautions to ensure that the rights of people who may not be eligible for membership in the association are protected. Thank you, Mr. Speaker.

MR. SPEAKER: Thank you, Mr. Minister. To the motion. Mr. McLaughlin, you have the right to -- Mr. Curley, did you wish to speak?

Legal Opinion Regarding Compulsory Membership

MR. CURLEY: Mr. Speaker, I want to ask the Law Clerk whether or not in fact that would be a problem, and I think it would be wise to see the section regarding the compulsory membership as to exactly what is the wording of that particular concern.

MR. SPEAKER: Mr. Law Clerk, can you give us some information, or are you going to require some time to check this out?

LAW CLERK (Mr. Johnson): Yes, if I could just have a few seconds here to get the section of the ordinance.

MR. SPEAKER: Thank you. Well, we will allow the Law Clerk time for his investigation. We will recess for five minutes for coffee.

---SHORT RECESS

MR. SPEAKER: The Chair recognizes a quorum and calls the Assembly to order please. Mr. McLaughlin.

Motion 6-81(2), Withdrawn

MR. McLAUGHLIN: Thank you, Mr. Speaker. I have consulted with Mr. Curley on this matter and we decided to withdraw our motion and in the interim we are going to consult with the Teachers' Association and with the Minister of Education as how this amendment would affect teachers' societies and some of the employees who are not certified teachers. Thank you.

MR. SPEAKER: Thank you, Mr. McLaughlin. Mr. Curley, as seconder, are you in agreement with withdrawing the motion?

MR. CURLEY: Mr. Speaker, yes, I am in agreement and withdraw my seconding the motion.

MR. SPEAKER: Thank you. Then the motion is withdrawn. Mr. Curley, in reply to your request from the Law Clerk, you can get that information from him. He has an answer for you. We will not take the time of the House at this time to go through it.

Item 11, introduction of bills for first reading.

Item 12, second reading of bills.

ITEM NO. 12: SECOND READING OF BILLS

Mr. Braden.

Second Reading Of Bill 7-81(2): Supplementary Appropriation Ordinance, No. 4, 1980-1981

HON. GEORGE BRADEN: Mr. Speaker, I move that Bill 7-81(2), An Ordinance Respecting Additional Expenditures for the Public Service for the 1980-1981 Financial Year, be read for the second time. The purpose of this bill, Mr. Speaker, is to provide for additional expenditures for the public service for the 1980-1981 financial year.

MR. SPEAKER: Thank you, Mr. Minister. Is there a seconder? Mr. Nerysoo. The bill at this time can be debated as a matter of principle. Does a person wish to speak to the principle of the bill? Are you waiting for the question? All those in favour? Opposed, if any? The motion is carried.

---Carried

Second reading of bills. Mr. Minister.

Second Reading Of Bill 8-81(2): Liquor Ordinance

HON. GEORGE BRADEN: Mr. Speaker, I move that Bill 8-81(2), An Ordinance to Amend the Liquor Ordinance, be read for the second time. The purpose of this bill, Mr. Speaker, is to amend the Liquor Ordinance to exempt the operation of the plebiscite provisions of the ordinance when dealing with private recreational facilities.

MR. SPEAKER: Is there a seconder? Mr. Nerysoo. Any debate on principle?

AN HON. MEMBER: Question.

MR. SPEAKER: Are you ready for the question? All those in favour? Opposed, if any? The motion is carried.

---Carried

Second reading of bills. Item 13, consideration in committee of the whole of bills, recommendations to the Legislature and other matters.

ITEM NO. 13: CONSIDERATION IN COMMITTEE OF THE WHOLE OF BILLS, RECOMMENDATIONS TO THE LEGISLATURE AND OTHER MATTERS

Uranium exploration and mining and Sessional Paper 1-81(2). The Assembly will resolve into the committee of the whole, with Mr. Pudluk in the chair.

---Legislative Assembly resolved into committee of the whole for consideration of Uranium Mining and Exploration, with Mr. Pudluk in the chair.

PROCEEDINGS IN COMMITTEE OF THE WHOLE TO CONSIDER URANIUM MINING AND EXPLORATION

CHAIRMAN (Mr. Pudluk): This committee will come to order. I believe we were still talking with Dr. Woollard. The House would like to invite him to the witness table. Sergeant-at-Arms, would you escort Dr. Woollard to the witness table, please? Dr. Woollard, we still have 40 minutes on the question period. On my list, Dennis Patterson was next for the first question.

Uranium Mining And Exploration

HON. DENNIS PATTERSON: Thank you, Mr. Chairman. Dr. Woollard, I would like to thank you for a very pragmatic presentation yesterday. I think this is just the kind of advice we need as we get closer to the conclusion of this debate.

We are told about the jobs which will be available in connection with uranium mining. I am concerned about health risks to mine workers, and I know that your study had findings about the adequacy of the safe radiation working levels recommended by the Atomic Energy Control Board. Could you summarize what you found the health implications for workers are, and comment on your view of the adequacy of the existing Canadian regulations, perhaps in comparison with other jurisdictions? Thank you.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Patterson. Dr. Woollard.

DR. WOOLLARD: Thank you, Mr. Chairman. The study that we attempted to undertake was a review of the literature that was available and to aid us in our deliberations we were fortunate enough to be able to call upon some of the most prominent expertise in the world, and I refer specifically to Dr. Radford who is the chairman of the National Academy of Sciences, the American National Academy of Sciences committee on the biological effects of ionizing radiation. This body has been responsible for some of the most detailed investigation of the adequacy of regulatory control. Dr. Radford indicated in his presentation on our behalf to the Bates Commission, a copy of which will be available to the House, his reservations about the current regulatory limits.

Levels Of Exposure To Workers

I would suppose that the best summary that I could give is contained in our summary argument which I will read to the House on page k of the resumé, and I if I may quote that into the record and then perhaps discuss around it. "The British Columbia Medical Association calls for an emergency task force into lowering the present radiation standards. Review by the AECB or its committees is unacceptable. The task force should be under advisory council of occupational health and safety for the Science Council of Canada. The four working level months annual maximum permissible exposure to radon and thoron daughters should be lowered to less than one working level month per year immediately, and serious consideration should be given to lowering it to 0.4 working level months per year. This would still exceed the risks for a safe industry using AECB guidelines."

That is followed by a direct quote from Dr. Radford's paper. "The current exposure limits to radon daughters are definitely not preventing a serious risk of lung cancer in underground mines, even where radon concentrations are maintained at the 'acceptable' limits. This situation applies also to some non-uranium mines."

I read that quotation to the record. Again I am not an expert myself, but our committee was, as I say, able to obtain the services of some of the most prominent experts and this was the advice they got. To translate that we measure the exposure that workers have by a measure which is called the working level month which is an attempt to express both the amount of radiation they receive in a given time and the total amount of time that they are exposed to that, because these two factors are essential. The more exposure to radiation you have, the greater the likelihood of cancer.

Now, as this House appreciates, this is a very difficult area because the cancer that is caused by the exposure of the workers to radon gas is exactly the same kind of cancer, if you look at it under the microscope, that you might expect to see in a smoker or someone who would receive their cancer from some other cause. That is the source for the debate as to what the effects of radon gas are. The industry -- and unfortunately in testimony before the Bates Commission -- the Atomic Energy Control Board tend to minimize these risks and so allow approximately 120 working level months of exposure over the working lifetime of a uranium miner.

Our concern is that that will allow an unconscionable and an unacceptable number of cancers in these miners and we have called for, and Dr. Bates has also called for, an ongoing study to try and better appreciate what happens to workers at these kinds of levels. We know that at higher levels the incidence of cancer is very, very high. What we are not certain of what it is at this level and all I can do is reiterate Dr. Radford's statement that it is his feeling, as one of the most prominent experts in the world in this field, that current levels are too high; that they are causing an unacceptable number of cancer deaths. Does that answer the question? The other aspect, of course, is that even apart from whatever standards one has one also has to look at whether even those standards are being met in the mining process and that is directly related to the vigour of regulation.

CHAIRMAN (Mr. Pudluk): Thank you, Dr. Woollard. Mr. Patterson.

Atomic Energy Control Board Unfit To Regulate Uranium Mining

HON. DENNIS PATTERSON: Thank you, Mr. Chairman. Just one supplementary on this question of regulation. You determined and I think your report says that the AECB is unfit to regulate uranium mining -- I am quoting the summary on page 1. Now, is the reason for that the inadequacy of the regulations or the inability to enforce the regulations or both or what? Could you just give us some reasons why you came to this conclusion? Thank you.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Patterson. Dr. Woollard.

DR. WOOLLARD: Thank you, Mr. Chairman. I think you have correctly outlined that it is in fact both the adequacy of the regulations and the ability to enforce those regulations that we question. The regulations that the AECB attempts to impose are based directly on the suggestions of the International Commission on Radiological Protection or the ICRP and the AECB has, by admission before the Bates Commission, carried out very little independent research to determine whether those standards are adequate to apply to the conditions that exist in the industry in Canada. In fact, again, one of the recommendations of Dr. Bates and one of the strong recommendations that I have just read to you of the British Columbia Medical Association is that an independent reassessment of the standard setting and the standards should be

undertaken. This needs to be reviewed in a Canadian context and in an open context. That is, where the public and the workers have a very meaningful say in setting those regulations and determining whether or not those are reasonable regulations and levels toward which to work.

That is one half of the problem and one of the reasons why we feel the AECB is at the present time, unfit to regulate uranium mining in British Columbia. There are, as a supplement to that point, statutory problems as far as federal-provincial relations, etc., that also would compromise their effectiveness.

As far as the application of those regulations, that is the AECB's ability to ensure that the standards are met, there I think that the main limitation appears to be lack of staffing and lack of adequate funding. As I believe I mentioned yesterday, the meaningful regulation of uranium mining by the AECB is a very recent phenomenon and I think they are just now starting to get their house in order. They certainly do not have adequate staff to ensure regulation and in fact, as I mentioned yesterday, they are seriously talking about encouraging industry self-regulation, something which I think this House should condemn and a concept which I believe, after reviewing the history of uranium mining in other jurisdictions, is something that makes them unfit to regulate. That is not a philosophy which I believe is acceptable in a regulatory agency.

CHAIRMAN (Mr. Pudluk): Thank you, Dr. Woollard. Mr. Braden.

Uranium Mining Needs Stringent Regulations

HON. GEORGE BRADEN: Thank you, Mr. Chairman. I have a comment to make and then I will have a question. With respect to my comment, I believe I am reiterating what Mr. MacQuarrie said yesterday, that it would appear that with very stringent regulation of the industry it would be possible to conduct uranium mining in the Northwest Territories. When I say stringent regulation, we are talking at present about health standards and safety standards and it would seem from what this witness has to say, that with very tight regulation of the industry it would be possible to conduct mining.

One area that I am still concerned about, where it does not seem that regulation or practice is able to overcome a major problem, is with respect to disposing of tailings. Now, yesterday the witness indicated that in one particular mine, I do not recall which one, the tailings were being put in cement containers, but that these cement containers were going to deteriorate in 100 years, I believe. Well, I have been reading a report here that says that some of these wastes last up to 10,000 years, so that is still a major problem, but it would seem that as far as the health and safety of miners working in a mine, that with tight regulations this could be done. Now, that is just my comment, Mr. Chairman, and the witness can tell me if I am right or wrong.

Now, with respect to my question, I have got a document here called "The Ranger Uranium Environmental Inquiry". It is the first report and it is an inquiry, Mr. Chairman, that was conducted in Australia concerning the development of deposits of uranium ore in the Northern Territory of Australia. In this document they refer to a study done of uranium miners in Colorado. I am not going to go into the technical details of the doses of uranium and exposure, but they conclude that with a certain standard of exposure or level of exposure miners should be able to work in a mine without adverse effects, but they do raise an interesting point which I would like the doctor to comment on and that is the relationship of cancer to miners who smoke.

Now, in this study done in Colorado it indicates that the risk of contracting lung cancer is about eight times greater for miners who smoke cigarettes than for non-smoking miners. Calculations based on linear extrapolation -- I do not know how you are going to translate that -- put the risk of lung cancer to the average smoking miner exposed to four working level months per year at about four in 10,000 per year above that to equivalent smokers not exposed to radon-decay products.

Now, Mr. Chairman, I would like specifically the witness to comment on the potential hazards which smokers have when they are working in uranium mines. I think that this does not just relate to uranium mining. I recall a study I believe that was done in Yellowknife of people who work in the gold mines and I stand to be corrected, but I think that there was a strong relationship between the miners who were heavy smokers and who had respiratory diseases related to some of the material that they breathed in and the correlation between miners who did not smoke and respiratory disease was much lower. So, that is the question that I have, Mr. Chairman. I would like some comment on that.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Braden. Dr. Woollard.

Relationship Between Smoking And Non-Smoking Miners

DR. WOOLLARD: Thank you, Mr. Chairman. The relationship between smoking and non-smoking and miners would appear to be characterized as we outline in our book. In reviewing the literature, there is a certain amount of controversy related to it, but it would seem that -- and I believe that this is the position that Dr. Bates, who is a lung physiologist and an expert in this area -- but this is the BCMA conclusion, that the risk of lung cancer may be as great for smokers and non-smokers. The smokers develop the lung cancer earlier. It would seem that the two phenomena work together in some way to potentiate one another so that depending on how you create your epidemiologic study -- if you take miners at age 45, for example, who have been working in the uranium mine since they were 20, at that stage you may find a significant difference. That is that the smoking miners have a higher rate of cancer. If, on the other hand, you go on to age 65 that difference may disappear, so that it would seem that these are two events which definitely cause cancer and they can be interrelated in one way or another. They can be to some extent confused and unfortunately industry advocates have often taken this as an excuse for allowing higher exposures to radon, saying that if the miner accepts a cigarette in his lips, then he should accept a higher concentration of radon that he is breathing in. I hope that is useful.

I would like, if I may, to make a couple of comments on your comment. The danger of the tailings in fact in terms of radiation diminishes only marginally over a period of 80 to 100,000 years, rather than the 10,000 years, but as you quite accurately point out, after a century when the canisters break up it is academic anyway.

The other is a comment which comes to mind to some extent out of the Ranger inquiry in Australia, which you quoted and your earlier comment about stringent regulation. I think that the definition of stringent regulation is that degree of regulation which will effectively minimize adverse health effects on the workers and on the public in relation to the mine to what can be determined as acceptable levels. Now, it seems then that little time should be spent on the debate as to whether or not this can be done. The accent should be to determine whether those regulations can be created and can be put in place.

Legislators Do Not Follow Through On Regulations

The Ranger inquiry was represented at the Bates inquiry by Dr. Kerr, who was the commissioner on the Ranger inquiry and his comment to the Bates inquiry, if I may summarize them, and they are mentioned in our book, was that the commission was naive enough to believe that the findings that they brought forth would be adequately debated in the legislature and would be reflected in adequate regulation, and my reading of his comments is that he was cautioning the commission that there is an historic tendency for legislators to not follow through, to not adequately enforce the regulatory procedures and to some extent to not adequately debate them. I think that is a point that needs to be kept in mind, because the chickens have not come home to roost in Saskatchewan. The

Saskatchewan government may, for whatever reasons, have decided on a particular course of action. The health consequences of that will not be felt for some considerable time yet and with due respect, I would like to caution the Legislature against assuming that what has been found acceptable legislatively in other jurisdictions is something that might be followed here.

CHAIRMAN (Mr. Pudluk): Thank you, Dr. Woollard. When you are responding to the questions, I wonder if you can make it a little shorter, because of the time. Mr. Noah.

MR. NOAH: (Translation) Dr. Woollard, I would like to ask you what is known about the effects of radiation on the environment, and whether or not it can actually be measured in any way. It is known that there is a problem with disposing of material which is radio-active, and it is of great concern, and it should be determined just what the effects of this radiation will be, and how widespread it will be.

My second question relates to events in Elliot Lake, Ontario, where it has been learned that people working in the mines and therefore being exposed to uranium radiation were found to contract cancer. I would like to know more about the relationship between uranium mining and cancer, and I would also like to know what information you can give us on the effect on the families of the miners working with uranium. What is the effect of this in their homes? Those are my two questions. I have other questions that I want to ask, but I will ask them when you have given the answers to these first questions.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Noah. Dr. Woollard.

DR. WOOLLARD: Mr. Chairman, I did not catch the second question, the exact nature of the second question. Was it, were the miners exposed to radiation in their own homes? Is that the gist of the question?

CHAIRMAN (Mr. Pudluk): Mr. Noah.

MR. NOAH: (Translation) Yes, with regard to experiences in Elliot Lake, it has been brought out that people were contracting diseases in their homes, and I want to know whether this directly relates to mining of radio-active materials as well as to the disposal of those materials in the area.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Noah. Did you get the question now, Dr. Woollard?

Radiation Exposure Cannot Accurately Be Measured

DR. WOOLLARD: Yes, thank you, Mr. Chairman. As regards to the first question, if the tailings are not adequately stored, the radiation will leave it both in the water and in the air, and the people around the tailings will be exposed to that, depending on a large number of things, such as how the air moves, how the water moves, what kind of plants pick up the radiation, what kind of animals eat those plants, and what the people eat in terms of those animals. All of these factors have to be taken into account. As far as being able to measure when exposure takes place, this will depend on what kind of a monitoring system is set up. This can measure the radiation. The question, then, is how do you set up this system, and what do you do about it if the radiation is leaking, and can you correct it? Those questions, I think, cannot be adequately answered, but in our experience, from the designs in British Columbia, the people near the mines would have been exposed to unacceptable amounts of radiation.

The second question: The Elliot Lake miners certainly suffered significant health effects. The incidence of cancer among the miners themselves was higher, much higher, than would have been expected because of their exposure to the radiation. We do not know the effects that that radiation may have had on the families associated with the mining. We know that some people in Elliot Lake

had high concentrations of radiation in their houses, but as I mentioned earlier, it is difficult to design a study that will say, "This disease was caused by this radiation that was in the house", and in fact there is not sufficient data to make such a judgment about Elliot Lake.

CHAIRMAN (Mr. Pudluk): Thank you, Dr. Woollard. Mr. Noah.

MR. NOAH: (Translation) Can you give us any information about what was done to make the houses safer? Did the government have any solution for the problem of radiation in these houses in Elliot Lake?

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Noah. Dr. Woollard.

DR. WOOLLARD: Thank you, Mr. Chairman. I do not know all of the specifics of what the government did about the houses. I know that some of the houses were fitted with special fans that would blow the gases out of the basements of the houses, and this was in an attempt to bring the radiation in the basements down to what was thought to be acceptable levels, but I think that some of the miners were moved but it is my understanding that even some of the newer housing has high levels of radiation in the basements. I am just not sure about what the government has done about that.

CHAIRMAN (Mr. Pudluk): Thank you, Dr. Woollard. We have still got only six minutes, and somebody else wanted to talk. I wonder if you could make it very short, Mr. Noah?

Effect Of Radiation On Pregnant Humans And Animals

MR. NOAH: (Translation) Yes, Mr. Speaker. I have some more questions. My first question is about whether there is radiation in the land because of uranium mining, and what effect uranium radiation has on pregnant humans and animals and on smaller animals such as lemmings and mice. My second question is about the waste products that are left behind after the uranium is mined, and who will clean it up and make sure that there is nothing left that will be of harm.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Noah. Dr. Woollard.

DR. WOOLLARD: Thank you, Mr. Chairman. The first question related to the problem of expectant mothers; there is radiation in the land during the process of extraction of the ore. However, if the tailings are not adequately handled, the radiation that expectant mothers or anyone else may be exposed to will increase, and it may increase significantly. If it increases significantly for expectant mothers, then this is a very serious problem, because of the special hazards that developing fetuses have when exposed to radiation. It is a controversial area, but I think there is little doubt that much lower doses of radiation than we previously thought will have a decidedly bad effect on the mothers and their babies in this situation.

Companies Will Not Be Around To Clean Up

The second question, as regards tailings and who will clean it up, that question has, to my mind, not been answered in any other jurisdiction. There are vague talks that the companies would have to do it, but I respectfully suggest that the companies will probably not be around for very long after the extraction of the ore, and it is unlikely that they would be there to clean it up, and it is one of the provisions that I think this House would have to make. The best thing, of course, would be to develop a process that would not require dirty radiation in the body if you get more than you should have, and you get sick related to that. The commonest form of this, related to uranium mining, is lung cancer, and lung cancer is essentially untreatable, so that I do not think there is anyone that one could go to for a cure after it had been caused. As far as studying that is concerned, that should be an ongoing process under the direction of some government agency, as we described in our submission.

CHAIRMAN (Mr. Pudluk): Thank you, Dr. Woollard. Mrs. Sorensen, we only have a few minutes left in our question period. That will be it.

MRS. SORENSEN: On behalf of the MLA's, I would like to thank you for your very interesting presentation. You mentioned earlier when Mr. Braden asked you a question, that the difficulty with stringent regulations was not necessarily in designing those regulations, but rather whether those regulations could be put in place and could be enforced. You also mentioned that legislators were in difficulty and were in danger of not following through with those regulations, not adequately enforcing those regulations, not adequately debating them. I am interested, then, in your interpretation of what kinds of stumbling blocks are placed in front of legislatures that would make you say that. What kinds of pressures might be brought to bear upon a legislature, particularly with respect to the enforcing of so-called stringent regulations in the uranium industry itself?

CHAIRMAN (Mr. Pudluk): Thank you, Mrs. Sorensen. Dr. Woollard.

Gradual Erosion Of Interest In Adequate Regulation

DR. WOOLLARD: I think that the major stumbling block would relate to inadequate time on your part, something with which I am sure you are familiar. Given the vast areas of responsibility that elected members have, it is not unlikely that, as time goes on, particularly once an industry becomes established, that there is a gradual erosion of interest in adequate regulation. This, I believe, in this area is compounded by the federal-provincial jurisdictional problems, because, if there is an "out", so to speak -- that it is somebody else's ball game -- it is a natural human tendency to say, "Let them do it", and if you have two levels of government where that confusion exists, it is very easy for the problems to be shoved in between and forgotten about, and that has certainly happened historically in uranium mining.

The third major factor is the lack of openness of the whole regulatory procedure. There is a tendency among scientists to use esoteric words, if not concepts, to minimize the legislators' confidence in their ability to deal with it, and I think that I cannot think of another industry where this is so rampant as it is in the whole nuclear industry, where there is sort of a closed-club attitude to be patronizing toward the legislators, or even openly hostile toward those who may want to learn more about the details of the regulation. Briefly, those are the comments that would come off the top of my head, Mr. Chairman.

CHAIRMAN (Mr. Pudluk): Thank you, Dr. Woollard. I think you have to make your conclusion now.

Legislative Foresight Has Been Lacking

DR. WOOLLARD: Thank you, Mr. Chairman. I think that most of the points that I would like to make in conclusion have been made in response to the questions. I would, I think, simply close with a plea of realizing that the consequences of allowing the industry to proceed can be, to a great extent, mitigated for the present, but I would plead with you to think of the future, and think of the problems that this industry can present to future generations, because that is the kind of legislative foresight that has been sadly lacking in other jurisdictions. I thank you very much for the privilege of, and the experience, of having been here to speak to you. I would like to leave the materials that I have referred to here for the consideration of the Assembly. Again, thank you very much.

---Applause

CHAIRMAN (Mr. Pudluk): Yes, I would like to thank Dr. Woollard very much. I have an announcement. The standing committee on legislation meeting, 11:45 in the caucus room. Now, this committee will recess until 1:00 this afternoon.

---LUNCHEON RECESS

CHAIRMAN (Mr. Pudluk): I recognize a quorum. Now, we will continue our discussion on uranium mining. Mr. Doug Chambers is going to appear before us today. The House is going to be on the same rules, one hour of opening remarks, one hour of question period. I wonder if the Sergeant-at-Arms could escort Mr. Doug Chambers into the House. No Clerks, and no Sergeant-at-Arms. Just come into the House, please. Thanks very much, Mr. Doug Chambers. We are going to have the same rules this afternoon. Doug Chambers is going to be here as the witness this afternoon. I wonder if you would make your opening remarks, and you can have one hour.

Presentation By Mr. Doug Chambers

MR. CHAMBERS: Thank you very much. I believe you all have a copy of my brief, which I am presenting on behalf of the Northwest Territories Chamber of Mines. For the presentation, I have attempted to simplify the brief somewhat, and eliminate some of the technical terms. Also, through yesterday's discussion and this morning's discussion, there are a number of questions that I may, perhaps, be able to clarify, and so I will make comments from time to time that are not found in my written brief.

My name is Doug Chambers. I am a physicist -- I am not sure how you translate that. For about the past 10 years I have worked in environmental radio-activity. My work has largely been associated with making measurements of radio-activity in the air, in the water, in the soil, in various plants and animals, and looking at this data, and making judgments or evaluations as to the significance of radio-activity on various people.

I have worked for many of the mining companies. I was responsible for assessing the radiation impacts of the expansion of the Elliot Lake uranium mines. I am quite familiar with that situation, in case there are questions that arise later on. I have worked for uranium mines and exploration companies in various provinces across Canada and in the United States. In addition, I am doing considerable work for various regulatory agencies, including Environment Canada, the Atomic Energy Control Board, particularly with regard to the clean-up actions in Port Hope, and the various provincial regulatory agencies. I would like to say, before I start, that I very much appreciate the opportunity extended to me, and I hope I can shed some light on certain subjects.

Exposure To Radiation

All people are exposed to ionizing radiation throughout their entire life. We are exposed to radiation originating from the sun and from the stars. All rocks, soils, water, plants and animals and people are radio-active. There are radio-active gases in the air we breathe, and our bodies are radio-active. Radiation exposure also results from many of man's activities, including medical X rays, nuclear medicine, industrial isotopes, fall-out from nuclear explosions, and nuclear generating stations.

The amount of radiation to which people are exposed is a function -- depends on many things, such as where they live, what they drink, and what they eat, what their house is made of, and local environmental conditions. For example, the radiation a person receives depends on the elevation of where they live, because as we move higher, we have less shielding effect from radiation from outer space. For example, a person living in Yellowknife receives about one and a half times the radiation that someone does who lives in Inuvik.

Radiation exposures vary very widely, from place to place and even from person to person. In Canada and the United States, the annual exposure to ionizing radiation has been estimated to range from approximately 60 to 245 units, with an average of about 180 units per year. Some populations, notably groups that live in areas with high natural radio-activity, in parts of Brazil and India, France, the United States have been found to receive natural radiation exposures that are 10 times higher than those received by the average Canadian. These persons have no apparent health effects.

I would like to expand on that for a second. When Dr. Meyers was here, he referred to a study that had been done by Argon National Laboratories in the United States. This study looked at cancer occurrence in the United States, in three groups of people; in 14 states where the radiation levels were four times higher than the average level, in 14 states where the radiation levels were lower than the average, and then the average exposure throughout the United States. In no instance was there any indication that excess cancer risk was associated with the change in background exposure rates. In fact, there was a suggestion that the radiation risk might even be lower for a person living in Colorado than someone living in a seaboard situation.

A recent study of persons in China living in radiation fields that are four times higher than adjoining areas has been carried out by the Chinese government. This study considered some 66,000 persons who lived in an area where they had high levels of external radiation, and where levels of internal radiation were four times higher than adjoining states. The same study considered, as a reference population, 77,000 people from low exposure areas. This study found no indication of excess cancer incidence or excess inheritable diseases passed on to children and offspring.

Wide Variations In Background Radiation Levels

In Canada, background radiation levels vary very widely. There was a study done recently by Health and Welfare Canada which measured radon daughter levels in cities across the country, including some 10,000 measurements. Levels ranged very widely. Some cities differed through natural causes -- no contamination, just natural environmental causes -- by factors of 10. Subsequently, Health and Welfare Canada, with the assistance of Statistics Canada, did a preliminary study looking at possible cancer differences between people living in the various cities. This study concluded that there was no difference in the cancer risk for people living in the various areas in Canada.

What are the effects of exposure to radiation? Ionizing radiation can damage living cells. The degree of hazard is generally considered to be proportional to the amount of radiation. At radiation exposures of more than 50,000 units, received in short times, the effects are very observable, but as the exposure decreases, the effects become less apparent. At low doses, less than 5000 units -- remembering that our background levels are perhaps 100 to 200 units -- cells are less likely to be killed, and damage may be removed by natural repair mechanisms.

In recent years, considerable attention has been focussed on low levels of radiation, which include the kind of radiation exposures one expects in uranium exploration, and even mining and milling. Disagreement among scientists has resulted in confusion, not only in the scientific community, but also in the public. Various models have been forwarded to predict the effects of low levels of radiation exposure. The effects at these low exposures, however, are so small that it is difficult to verify any one theory conclusively. The point I want to make here is that not necessarily are there no effects, but the effects are very, very small, and are very difficult to identify because they are so small.

For the purpose of radiation protection, such as is carried out in Canada, it is assumed that the chance of a potential effect varies directly with the amount of radiation received, right down to no radiation. For some types of radiation exposure, such as external exposure, and for the ingestion of radium-226 -- I am not sure how you translate that. Radium is a daughter of uranium, and is present wherever uranium is present, in most cases -- this model is known to overestimate risk.

There is probably no other agent, chemical, drug or environmental pollutant, to which man is exposed that has been studied as thoroughly as ionizing radiation. The body of scientific literature has been examined by several national and international commissions, which have published their reports and recommendations. These publications represent the general scientific consensus on the conclusions drawn from the enormous amount of research into radiobiological effects of ionizing radiation.

Radiation standards in many countries, including Canada, have been adopted from, or directly influenced, by the International Commission on Radiological Protection. This commission is an independent, non-governmental body which has existed since 1928. Its elected members are recognized scientists with specialties in medicine, physics, radiobiology and many other subjects, who come from many countries, including Canada. The Atomic Energy Control Board regulations are based, as I said before, on the recommendations of the ICRP and hence are in fact based on considerable scientific knowledge.

How Uranium Exploration Can Change Environmental Radiation Levels

How can uranium exploration change environmental radiation levels? Exploration encompasses a wide range of activities that include office workers, various types of field visits, geophysical techniques, drilling of holes and digging small excavations. Eventually, if uranium is found in considerable quantities, this may lead to the development of a mine. It is during the physical aspects of uranium exploration such as drilling or digging test pits that a potential exists to change the levels of radio-activity in the environment.

I emphasize here that all the types of radio-activity that are associated with uranium mining currently exist in the environment at the present time. Uranium exploration and the mining and milling adds nothing new to the environment. What has to be considered are the levels of radio-activity at a particular spot and the effects of changes in the levels.

Wherever uranium and its daughter, radium, are present a radio-active gas is produced. This radio-active gas, radon, escapes from cracks in rocks or soils into water or into air. Radon gas is released from every square metre of land surface in the world all the time. Average concentrations of airborne radon in North America range from 0.01 to one units. The drilling of exploratory holes into rock increases the amount of surface area exposed to air and can increase the amount of radon gas leaving the immediate area of the drill site. Thus, there is a potential for increased exposure to radon. In most of the Northwest Territories, drill holes cease to be potential radon sources soon after drilling is completed as experience has shown that within hours the drill holes fill with water and freeze throughout their length, thus effectively sealing that drill hole as a potential source of radon. We also know with measurement that snow cover and freezing conditions also greatly reduce the rate at which radon can be released from soil.

Radon Measurements

Radon measurements have been made at exploration sites in British Columbia, Saskatchewan and Wisconsin and in Nova Scotia. These data indicate that radon levels leaving drill holes do not measurably change the outdoor radon concentrations in the vicinity of an exploration site. That is not to say there is no radon being released. It is simply to say that the amount of radon is so low that it cannot be measured by comparison to what is there already.

However, one must also be cautious. Concentrations of radon can increase indoors as well as to outdoor levels. Buildings at exploration sites can include core shacks or sample storage buildings in which rock cores are studied by geologists. These buildings may be tents or simple shelters, in which case

normal ventilation will keep the radon levels low. In better constructed structures, and particularly if you found uranium, which is the purpose of the exploration, levels can increase and need to be adequately monitored by the exploration crews. Experience has shown that levels indoors can easily be controlled with simple ventilation.

Second, let us consider radiation from outside the body. Exploration activities can bring radio-active materials up to the surface of an exploration site, for example, rock cores recovered by diamond drilling. Data, including the results of measurements of special devices worn by exploration crews to measure this kind of radiation, have demonstrated that exposures to radiation outside the body of workers at exploration camps are very low; far below regulatory levels. Although the potential exposures are well below government levels, you recognize that increases to exposure should always be kept as low as possible. This can readily be encouraged by having exploration crews utilize caution when handling mineralized material.

Radio-Activity Released By Drilling Activities

Another possible route by which radio-activity can be dispersed to the environment during exploration is through dust released by drilling activities. In the Territories only diamond drilling, which is a wet technique, has been used and it generates little or no dust. The abundance of water at and near the surface in the Territories during the summer will also restrict the possibility of dust generated by exploration activities.

With regard to surface water, uranium exploration in the Territories, as I mentioned before, has employed diamond drilling. This is the technique used to produce rock cores and requires the use of water or slurries of water and salt to lubricate the drill as it proceeds through the rock. There is a possibility that this water or slurry can carry away small rock particles and thus may become radio-active when exploration is being carried out in the mineralized zones.

Recently in the Territories a government agency sampled a small stream into which drill water was being released at an exploration site. The radionuclide levels in the discharge, where the water was being discharged, were 10 times lower than the federal drinking water standards and from the radio-activity point of view, were acceptable as a source of drinking water, although obviously undesirable.

There is also data available on the levels of radio-activity in drilling slurries and muds. In British Columbia 42 drill mud samples were analysed during exploration at a mineralized area. Mud samples were found to contain from one to 85 units of uranium, with an average of 12 units of uranium. Soils in British Columbia typically ranged from one to 20 units of radio-activity. Thus, the drill muds contained average concentrations of uranium that were no different than the average concentrations of uranium found in soils throughout the province. The use and disposal of drilling slurries when properly disposed would therefore not be expected to have a significant affect on the existing environment.

The possibility of ground water contamination exists, but is not a matter that can be easily solved by simple monitoring. While field data are lacking, it should be remembered that drill holes in the Territories cannot act for links for aquifers as they fill quickly with water and freeze. Given the fragmented nature of the ground water regime in the Territories, the levels of radionuclides that have been measured in drill water, and the brief duration of time when drill water is used the possibility of this contamination mechanism is very low.

There is an obvious concern been expressed about the possible effect in changes in radio-activity levels on animals and people. The point that has to be remembered, as I have said before, is that all these radio-active materials exist in the environment and what has to be considered is how much of a change will occur in the environment as a result of a properly controlled exploration activity, mining activity or milling activity.

The data that I have seen, including measurements I have made myself, indicate that the added levels of radio-activity to the environment are very small. Exploration should not result in any measurable change in levels of radio-activity in plants growing at the site, or in animals such as caribou whose range includes the site and, therefore, should not have an effect on persons who might eat those caribou. I will come back to that point in a minute.

Next Stage After Exploration

This brief focusses on exploration. What happens, however, if a uranium deposit is taken to the next stage? Typically, the company proposing such a project would be required to gather information about the local environment and how the project would affect existing conditions. All of this information would be presented and assessed. One would expect an open review by government agencies and the public would be heard. Based on the evidence and opinions presented, recommendations could be made as to the desirability of the project. If the project was found to be cost effective while not resulting in unacceptable levels of environmental stress, then the project could possibly proceed.

Sometimes people ask whether or not projects have been cancelled because of environmental assessments. The answer is clearly yes. Eldorado's project in Warman was cancelled. Eldorado's project at Port Granby was cancelled because of public concerns and in particular, concerns of people living immediately adjacent to the project. That was the prime reason for turning down that project. Thus it is reasonable to expect that if the project is not properly designed and not properly presented there is certainly precedent to terminate such a project. It is the obligation of the proponent to ensure that his project is carried out in the proper fashion. There is also obviously an obligation on behalf of the regulatory agencies to evaluate such projects and proposals. I would like to emphasize that each potential mine site has its own specific conditions that must be recognized individually and taken into account in the design of the facility.

Studies Re Health Effects On Miners

I think I would like to deviate here for a minute and comment on some studies that are currently taking place. A question was asked this morning relating to what studies are going on about health effects on miners. There are two very major studies being carried on at the present time. One study is being funded and carried out by Eldorado Nuclear. This study is looking at the health of persons who have worked for Eldorado, either at Port Radium or at the Beaverlodge operation or at their refinery. There are approximately 16,000 persons being included in this study.

Eldorado, at the present time, is compiling the histories of these persons and making estimates of the exposures which these people received. The actual evaluation of the data will be carried out by an independent agency, a national cancer agency institute. Eldorado may do their own analyses, but the actual interpretation of data will be carried out independently.

Another major study is being carried out in Ontario at the present time, and I do not recall it being mentioned. This is a study of all persons who have worked in Ontario uranium mines. This study is being carried out by the provincial government of Ontario and some time next year preliminary results should be available from that study. There are some 16,000 people involved in that project as well.

It is generally felt by the regulatory agencies and the largest portion of the scientific community that current radiation protection standards are safe. I may be happy to answer questions on that if they arise.

Study Re Long-Term Waste Management Of Uranium Tailings

There is another program that the Assembly may be interested in and a report is due very shortly. It is a national waste management program under the auspices of the federal Department of Energy, Mines and Resources. There was a task force set up approximately a year ago to study the question of long-term waste management of uranium tailings. I emphasize that uranium tailings are no different from tailings from other base metal operations other than, from time to time, they have slightly extra quantities of radio-activity. In essence the management is similar. This group is about to make a report in the next few months and I suggest that it might be of interest to the Assembly to obtain a copy, and I can comment on that further as well.

With regard to uranium exploration, I feel exploration can be carried out quite satisfactorily without any measurable effect on the environment. With regard to uranium mining and milling, with proper design and management, I again feel that we have technology at the present time to carry out such developments without any significant effect on the environment.

Data are available from existing operations in Elliot Lake, Saskatchewan and elsewhere, that tell us what levels of radio-activity escape into the water and into the air, and using these we can assess the effect that these facilities have. All the data I am aware of at the present time demonstrate that the existing uranium operations result in increased exposures to most exposed persons that are smaller than naturally occurring fluctuations in background levels that occur in the same areas. In essence then, these exposures cannot be measured, they have to be calculated.

Economics And Development Of Non-Renewable Resources

Finally, I would like to briefly comment on economics. Historically, the mining industry has been a major source of wealth in the Territories, and the economic future of the Territories seems to be closely aligned to the development of non-renewable resources.

The Northwest Territories Chamber of Mines estimates that between 1975 and 1979 expenditures for exploration in the Territories amounted to about \$139 million. In 1980 total expenditures were estimated at \$40 million for all exploration activities, approximately 85 per cent of that total being spent in the search for uranium.

Major expenditure items during exploration include equipment use rental, wages, accommodation, transportation, permanent acquisitions. Direct expenditures incurred in the Territories during exploration include the wages paid to the employed residents, the use of local services including accommodation and transportation, equipment rental, and the purchase of supplies. From information supplied by people in Baker Lake, Chamber of Mines has estimated that approximately \$1.5 million has accrued to interest in that settlement for goods and services, while creating 10 permanent and 40 seasonal jobs.

The mining industry has played an important role in the economic growth of the Northwest Territories. In 1979 operating mines paid approximately two million dollars to the Government of the Northwest Territories and another \$750,000 to local municipalities. Some \$54 million were paid to the federal government, of which, I understand, approximately \$13.5 million were returned to the Territories. The development of the uranium mining industry would provide increased revenues to the Territories and employment opportunities for its people. The Department of Economic Development and Tourism has estimated that 500 new jobs must be created annually to maintain the current levels of employment in the Territories.

Finally in conclusion, I would like to emphasize that with proper design and monitoring, I believe it is possible to carry out uranium exploration and development activities without having a significant effect on the environment of the Northwest Territories. Thank you very much.

---Applause

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Doug Chambers. Now we are going to go into the question period for one hour. Mr. Braden.

HON. GEORGE BRADEN: Thank you, Mr. Chairman. I would like to thank our guest for providing a brief and concise explanation of uranium mining from the point of view of the Chamber of Mines and without any moral lecture.

Just to comment initially, I refer to the many statements that the witness has made about uranium exploration and I must say that I think in the exploratory stage, there really is not a lot of danger. I remember when I was younger, exploring for uranium, wandering around the Arctic with a Geiger counter, chipping on rocks -- and I do not know if you are aware, Mr. Chairman, there is a technique which you use when you get a rock sample, you wet it or lick it or spit on it so that the mineralization shows up and then you get your little magnifying glass and look at the mineralization. Now, from all the years that I spent looking for uranium, I think I am still pretty healthy and any deterioration in my health...

CHAIRMAN (Mr. Pudluk): A point of order, Mr. Patterson.

HON. DENNIS PATTERSON: Mr. Chairman, are we now making speeches or is this question period? I thought it was agreed that Members would make...

HON. GEORGE BRADEN: It is a comment.

HON. DENNIS PATTERSON: Questions and not speeches. I would like to make a speech too.

HON. GEORGE BRADEN: It is a comment.

CHAIRMAN (Mr. Pudluk): Other...

Disposal Of Uranium Tailings

HON. GEORGE BRADEN: I was going to talk about a lot of other vices, Mr. Chairman, but I will get right to the point. The witness indicated that uranium tailings are no different than tailings of other base metal operations. Again, I refer to the Ranger Uranium Environmental Inquiry where they do indicate that there are a lot of dangerous substances that really have a long life. So I would like the witness to comment on that general statement he made, and I would also like him to comment on a point in the report where the authors talk about disposal of tailings and suggest that one of the ways in which to contain radon is to build what they call an engineered dam. They keep this dam covered with water, as they seem to feel that that is one technique to reduce the amount of radon that is given off in the environment, and I would assume that this is just an extension of the argument that the witness gave earlier on about drill holes, when they fill in with water and freeze that, as well reduces the amount of radon.

So I would like him to comment, Mr. Chairman, on his general statement about uranium tailings, and then have him comment on this one particular technique to deal with the disposal of tailings. Thank you.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Braden. Mr. Chambers.

MR. CHAMBERS: Thank you. The statement I made earlier, referring to tailings, I believe is essentially correct. I did indicate that the only difference between base metal tailings and uranium tailings is the presence of slightly elevated quantities of radio-activity. The one that is usually mentioned is radium-226. The method of containing the tailings so that they are not dispersed in the environment, there is no reason for that to be different, provided, of course, you are assured that the radiation exposure to persons living in the area are kept within whatever limits are determined to be appropriate for that particular area, but the design of the tailings dam, or the method of disposal in a lake, really is no different in engineering approach.

With regard to the second question, the construction of a dam and keeping the tailings flooded would, for all practical purposes, eliminate the radon release from the tailings entering the environment. I can get into the physics of it; I do not think it is necessary. I would like to comment, however, that in looking at designs for tailings areas, be it a base metal or be it uranium tailings, one has to balance, or one has to decide what level of security is appropriate to that particular instance.

Now, in the case of radon, we know from many measurements in the United States and Canada that even if all the tailings were sitting on top of the ground, totally dry, which is the worst condition for releasing radon, that if one measured radon levels at different distances from the tailings area, the increased amount of radon in the air would not be measurable beyond approximately 1000 metres; depending on the weather, it might be 500 metres or 2000 metres, but approximately 1000 metres. It would not be measurable. So then one has to ask what added degree of protection is required and that, of course, depends on each specific facility. Thank you.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers. Any more questions? Mr. MacQuarrie.

Exploration Around Baker Lake

MR. MACQUARRIE: Thank you, Mr. Chairman. Mr. Chambers, you stated that in Baker Lake the exploration industry had brought \$1.5 million to that community, 10 permanent jobs, 40 seasonal jobs. You were outlining the benefits to the people in that area from the exploration that has taken place. At what cost? In other words, what additional radiation exposure have the residents of Baker Lake received as a result of any exploration activity that is taking place in that area?

CHAIRMAN (Mr. Pudluk): Thank you, Mr. MacQuarrie. Mr. Chambers.

MR. CHAMBERS: With regard to exploration, it would be my estimate the residents of Baker Lake would not have received any measurable increase whatsoever as a result of the exploration activities. Perhaps I will extend that answer -- may I extend that answer just slightly? I am not aware if calculations have been done. I doubt that they have for Baker Lake, so I will refer to another situation.

I have done calculations and have seen other people's estimates and have also made measurements of radio-activity in the vicinity of uranium mining operations. I will talk specifically here, for example, about Elliot Lake. In making these estimates, we look at persons who are most likely to receive high radiation exposures, and we compound assumptions of conservatism. In these calculations, for example, we assume that people eat only fish from the Serpent River, and that they live essentially immediately adjacent to a tailings area; this kind of assumption.

The most exposed group of persons in Elliot Lake are estimated to receive less than 20 million rem per year, equivalent radiation exposure. That is far smaller than the change in background radiation exposure that they would receive if they moved from Elliot Lake to house A in Blind River, or house B in Blind River, which is a town a little bit away. It is smaller than the natural range of variation in that area, and as I mentioned before, all the work that has been done to date on populations who have been exposed to three, four, 10 times background levels, none of these studies have indicated any excess risk, either to current generations or to future generations from these exposures.

I would also like to clarify one thing from this mornings speaker. There was perhaps an impression left that the elevated radiation levels in the houses in Elliot Lake resulted from, if you will, material being brought from the mines and placed around the houses, or forming part of the construction in the houses. That is not the case. The elevated levels of radio-activity in the houses in Elliot Lake are simply a result of where the houses were built; they were built on rock outcrops, and the rock outcrops happen to be radio-active. So it was perhaps a poor choice of a building site, but it has nothing whatsoever to do with the actual mining operations directly, and I think that should be clarified.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers. Mr. MacQuarrie.

Risks Involved Beyond The Stage Of Exploration

MR. MacQUARRIE: So I take it that, if there had been no mine at Elliot Lake at all, but if somebody had built a house there, they would have had precisely the same problem. I guess that is what you are saying. If we can take it a step further, supposing we went beyond the stage of exploration, and mining and milling were begun at a site somewhere west of Baker Lake, 50 miles or something like that, again, someone could cite the benefits that might come to the community as a result of that. But, again the question has to be asked, at what cost to the people who live there in terms of additional exposure?

Do I understand you are saying that the additional exposure likely in a case like that, would be significantly less than what they might get if they move to some other part of the country or the world where natural backgrounds were higher, and could you maybe just put the degree of risk into a little more concrete perspective? Those of us who are Assembly Members are often involved in travel in jet aircraft, and when we get to places we sit in hotel rooms and watch television and perhaps some do other things, but that is the great excitement in my life. There is, I understand, radiation risk involved in flying in jet aircraft, and in watching television. How is it proportional to the additional risk that people might be exposed to, living 50 or so miles from a mine and tailing site?

CHAIRMAN (Mr. Pudluk): Thank you, Mr. MacQuarrie. Mr. Chambers.

MR. CHAMBERS: Thank you. I will try and answer that, perhaps not exactly in the same order. There is a certain risk associated with flying, of course. In addition to that there is -- as you pointed out, properly -- a radiation risk. Dr. Edwards or Dr. Myers may correct me, but my recollection is that a round trip from, say, Montreal or Halifax to Vancouver and back would result in approximately a four or five millirem exposure, depending on altitude, depending upon solar activity and a host of other variables.

To put that in perspective, then, the risk to a stewardess, for example -- many of them are mothers-to-be, I have seen quite a few, recently -- a stewardess who would fly four return trips would be equivalent to the exposure received by the most exposed person in Elliot Lake, and, as I say, I have not done the calculation for Baker Lake, but the Elliot Lake operations include many, many tailings areas and many mines. So I think it is reasonable to assume that they would be higher than the increment in the Baker Lake area. So it is approximately what a stewardess would receive in four return trips.

The International Commission on Radiological Protection estimates a risk of one in 10,000 to an exposure of one rem, and so an exposure to 20 millirem per year, 20 units per year for the translator, I guess would be about one in a million of developing a fatal cancer. Roughly speaking, that is equivalent to smoking three cigarettes -- on a crude basis of comparison. Which reminds me of something else. If it is appropriate, there was some question this morning about the effect of smoking on lung cancers incurred by uranium miners. There is little doubt in the early days the very high exposure levels, that there is an excess risk associated with radon gas exposure. To the end of 1980, in Colorado, there were 292 miners who had died of lung cancer. Out of those 292, there were only 13 non-smokers, 13 out of 292. Out of that 13, roughly half of those were former smokers. There were actually only three or four persons who had never smoked. I can expand, if that does not clarify your question.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers. Mr. Patterson.

Necessity Of Studies Re Disposal Of Uranium Tailings

HON. DENNIS PATTERSON: Thank you, Mr. Chairman. I gathered that you are saying that uranium tailings are only slightly different from the kind of tailings we have down the road here in Pine Point, so, really, we need not be worried about special measures to dispose of these tailings, we need not be worried about long-term solutions? The months of testimony and study in Saskatchewan and other jurisdictions that have been concerned about this problem are really unnecessary? Are you telling us we should not bother about this disposal question at all?

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Patterson. Mr. Chambers.

MR. CHAMBERS: I am sorry. If that was what I implied, I left the wrong impression. I feel it is important to spend a lot of attention on the disposal of uranium tailings, but I was trying to indicate that, with regard to most of the characteristics and in many cases the characteristics that most affect the environment, they are not very different from other tailings that exist. There is a lot of work going on at the present time, some of which I am involved in, with regard to how is it possible, for the long term, to dispose of the tailings such that there is a reasonable minimum release of radon or radium-226. It is important that every reasonable effort be made to dispose of these tailings in a safe fashion. I think that is a very important issue.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers. Mr. Patterson.

HON. DENNIS PATTERSON: Thank you, Mr. Chairman. What is the long-term solution? Is it burial in concrete? What is it?

Containment Of Uranium Tailings

MR. CHAMBERS: I think that the solution depends on the site. Each site has a different geology, a different setting, different weather conditions, and I think that the solution depends on the particular location. I am not that familiar with the engineering conditions in Baker Lake. I am confident enough, quite frankly, in our current engineering abilities, to have confidence that suitable geotechnical engineering can be carried out to safely contain the tailings. If you want, I can elaborate on some of the work that is going on.

There is often confusion between the southwest United States and Canadian climates, and they are quite different, obviously, as you recognize. In Elliot Lake, the approach that has been taken to the disposal of the tailings at the current time -- as you will recall, they were sitting in a rock basin -- is to minimize two concerns, the radon-222, and radium-226. The radium-226 relates

to the ability of, in essence, rain water to fall on the tailings, flow through the tailings, and extract, from the tailings, dissolve the radium. At the present time there are something in excess of 800 ground water monitoring locations in Elliot Lake. One particular site I am thinking of has ground water measurements within 10 feet of the tailings. In the last few years these tailings have been revegetated which has no effect on the water which is in the lower portion of the tailings, and to the present time there has been no indication of any excess radio-activity. So at least in the space of 30 years, this material has not travelled even a few feet.

Elliot Lake is looking at two areas, revegetation and disposal at the bottom of a deep lake. At the present time there are very extensive chemical and physical studies being carried out to look at the possible long-term leaching of radium from tailings disposed of on the bottom of a lake.

In the North you have an advantage. You have, most of the year, frozen conditions, and that probably would be taken advantage of in the disposal practices, but I cannot say, because the studies probably have not been carried out at this time. In other places, there was some discussion -- in British Columbia, there is a layered tailing system which is being proposed, the idea being here the tailings are deposited in thin layers with carefully controlled addition of lime, and in essence, the observations on non-uranium tailings of this approach indicate this material becomes essentially like concrete, the whole tailings, not just encapsulated in concrete, but essentially become a solid mass of concrete themselves, and therefore, as this material weathered, it would weather as rock weathers, and that is how radio-activity gets into the environment now, from the weathering of rock. So if that option were chosen, then the tailings disposed of in that fashion would, as the rain washes over it and the wind and the snow crack the top of it, erode as does concrete, that is very slowly, and therefore the rate at which radio-activity was released to the environment would also be very slow.

There are some considerations in Saskatchewan and these are open pit mines, of placing the tailings back at the bottom of the open pit mine, and then covering it over. So, in essence, you are putting the radio-activity back where it was at the start, in the ground. As I say, it depends on the particular location that you are considering. I think it is very important. These are very site-specific phenomena. If that is any help. I can clarify it further if you give specific direction.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers. Mr. Patterson.

Expenses Of Mr. Doug Chambers

HON. DENNIS PATTERSON: Yes. Just one more, Mr. Chairman, if I may, a short question. Are you being paid for this presentation, other than expenses, and, if so, by whom, and if I may, how much? Thank you.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Patterson. Mr. Chambers, when you reply, could you slow down a little bit again, please?

MR. CHAMBERS: All right. Thank you. I will be submitting an invoice to the Northwest Territories Chamber of Mines, the same as I would if I was working for the Control Board, and I submitted an invoice to the Atomic Energy Control Board, or Environment Canada, or a mining company. What the Northwest Territories Chamber of Mines does with that, I am not absolutely sure. It sounds strange, but I am not absolutely sure of my daily rate. We have the standard form with my daily rate, and I can provide that to you at a later time. It is not a major concern.

HON. DENNIS PATTERSON: Yes, I will take you up on that.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers.

MR. CHAMBERS: I will send one to the Clerk.

CHAIRMAN (Mr. Pudluk): Mr. Curley.

Economics Of Uranium Mining Outweigh Social Fears

MR. CURLEY: Thank you, Mr. Chairman. My impression of your presentation Mr. Chambers, is that the economics of the uranium exploration and mining outweigh all those other social fears of uranium exploration and mining. That seemed to be the thrust of your presentation, and my reading of it also seems to be at least giving me the impression that uranium exploration and mining is no more different than maybe the safest possible mine anywhere in Canada. Is that what you are trying to convince me of, that it is not necessary for the public and myself to question any of the possible hazards or dangers for this exploration and mining? First question.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Curley. Mr. Chambers.

MR. CHAMBERS: I think, really, my answer is in two parts to that. First of all, I think it is fair and appropriate for people living in the area of a development to question what is going to happen to me or what is going to happen to my environment. I think that is a very fair question. What I was trying to say is, in my evaluation, that there would be no measurable impact on your environment, or on the environment of persons living in the Baker Lake area, from exploration activities that are or will be taking place. I think it is fair, however, for people to ask questions. I think that is important, that they ask questions.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers. Mr. Curley.

Uranium Exploration Effects On Caribou Migration

MR. CURLEY: Thank you. Yes, I have another question. You also indicated to the Assembly that there was absolutely no effects on the environment, the caribou and the people during the exploration. I would say as far as the radiation is concerned -- we have no scientific evidence that the effects of radiation, or what amount it is causing to the people and the caribou, but I want to ask you a question. What evidence do you have as far as the exploration activities' effect on migration of caribou and the use of that particular area by the caribou, whether or not that has any effect on the present area that caribou have been feeding on for many years? Has there been any effects and if so, what evidence do you have to convince me that it has not affected the migration patterns of the caribou in the Baker Lake area?

MR. CHAMBERS: Okay. There are two questions here.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Curley. Mr. Chambers, I have to wait for the interpreters to finish what they are saying.

MR. CHAMBERS: Thank you. I saw the button on, so I thought it was all right to speak. First of all, there have been measurements made of levels of radio-activity in caribou in northern communities, including northern Canada and Lapland. So, some of this data is available and I would be happy to send you a paper or two if you have any interest in that subject. There are also measurements of radio-activity in some of the foods that caribou eat, such as arboreal lichens.

My thesis -- what I am trying to indicate is that what is really important is how much additional radio-activity are you adding to the environment from the exploration operations and how much are you adding to the air and adding to

the water compared to what is already there. What I am saying is that the data that I have available and my experience elsewhere indicates that you are making a very tiny change to what is already there. In fact, the change is so small that day-to-day variations in radon concentrations or variations in uranium, for example, in the soil that you find from place A to place B are much larger than the extra amount of uranium which you would add or bring to the surface from your exploration activities. Now therefore, if what you are adding is very small compared to the natural variation that is there, I do not see any reason to expect any larger change in different components of the food chain, whether it is in arboreal lichens or whether it is in caribou flesh or whether it is in moose flesh or whatever it happens to be. I think the basic change is what is in the air and what is in the water.

With regard to your second question, I have to back off because migration of caribou is not something I am very familiar with. I do know that caribou do wander through towns and they seem to become adjusted to human activities. So, one would probably expect -- and I say I qualify this, because this is certainly not my area, to a layman in this area, there is probably no reason to expect that -- certainly once the drill rigs have gone and they are a very local phenomenon that the caribou would not return the following season. You may have other data. I have not. I am not familiar with the data on that subject, but I see no reason to conclude otherwise because caribou do go through towns and they get used to human activities.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers. Mr. Curley.

MR. CURLEY: Yes. Thank you, Mr. Chairman. I am glad, you know, you have confirmed that you have no real knowledge about the movement of caribou and the effect that it has as far as the exploration activity is concerned, because I think the people are concerned that exploration has effects.

Dangers Of Uranium Mining To Baker Lake Residents

My last question to you, you are giving me again the impression that the chances of a hazardous accident or whatnot, the effects of radiation in that area are remote. You seem to be telling me that there is a very remote possibility of any of the hazardous problems that would result from the mining of uranium in that area, but I am not sure whether that would be the case because the Baker Lake area certainly has a lot of river systems that flow into the Baker Lake and it would have an effect on the fish and whatnot which the people of Baker Lake rely on. So, I want you to again explain to me as to what kind of measures -- can you assure me that there in fact would not be any kind of possible dangers or release of radio-active wastes that would flow into the Baker Lake, because if the mining were to occur in that part of the area, you know, the river systems in that part of the area would naturally flow into the Baker Lake, which has a direct connection to the lives of the people in the Baker Lake area. Thank you.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Curley. Mr. Chambers.

MR. CHAMBERS: Thank you. First of all, I have to say there is no such thing as an absolute guarantee. I have no guarantee that my plane will not crash on the way back to Edmonton, for example. I do know that current experience is such that if there is a liquid effluent for example, from a milling operation, that it can be treated successfully to remove radium. It is done all the time. For example, it is done in Elliot Lake. This is done by the addition of chemicals, I am not sure how to say it, that in essence, settle out the radium and remove the radium from the water streams.

In Elliot Lake, for example, and in northern Saskatchewan, the discharge directly from tailings areas usually is below 10 units of radium, which is below the drinking water standard. You would not want to drink that, obviously, but it is below the drinking water standard. The technology is there. The treatment systems are effective.

It is important and I think several people mentioned this, that the mine be properly designed, that the operations be properly monitored, both the environment and the people working at the facility and this is done at the present time. I think it is important that there be a good communication with people in the area. A new device that -- I am not sure whether it occurs in Saskatchewan, but it certainly is occurring in Ontario -- is something called a public monitoring committee and although it is not operating perfectly, it is an attempt. A facility I can think of has established a public monitoring committee with people living in the area. The monitoring committee works this way. The company and the government agencies make measurements every day, every month. At the end of the month they collect the measurements and submit them to the public monitoring committee and they have a meeting and talk about them and so that the people living in the area know what is happening. Obviously, it is a regulatory group's responsibility to make sure that things are corrected if something is going astray, but at least I think it is an improvement of communication, if you will, between the operator and the people living in the area and it gives them a method for asking questions, if you will, quickly to the operator if they have a particular concern. I think eventually that sort of thing may be quite helpful.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers. I believe we are going to adjourn around 4:00 o'clock and we are going to have only one coffee break this afternoon. Let us take 15 minutes for a coffee break. I still have two people who want to speak. Thank you.

---SHORT RECESS

CHAIRMAN (Mr. Pudluk): Would the Sergeant-at-Arms please ask the Members to come in? Will the committee come to order finally? We still have some questions here for Mr. Chambers. Mrs. Sorensen.

Moratorium On Mining In British Columbia

MRS. SORENSEN: Thank you, Mr. Chairman. On page 23 of your brief, you make reference to the fact, and I will quote, "Based upon experience at similar reviews recently held in British Columbia, Saskatchewan, and Ontario, such a procedure often takes up to several years to complete. From the results of those reviews, it has been demonstrated that most of the general concerns about uranium mining have been resolved."

Now, you said that, Mr. Chambers, yet it is my understanding that there is a moratorium on uranium exploration and mining in British Columbia where these reviews have taken place, and in addition to that, I understand that there is a somewhat similar situation in Newfoundland, where a mine slated to go ahead is not going to go ahead because of government intervention. I wonder if you can give me your opinion of why, if what you say about the general concerns with respect to uranium mining have been resolved, why governments in these two provinces have chosen a moratorium route?

CHAIRMAN (Mr. Pudluk): Thank you, Mrs. Sorensen. Mr. Chambers.

MR. CHAMBERS: Thank you. I cannot really answer the question, why British Columbia has a moratorium. It is my understanding of the Bates report that the report suggested that uranium exploration could go ahead safely and it was a government decision not to permit that at the present time, for reasons that are peculiar to British Columbia.

In the Labrador situation -- I believe that is the Brinex property -- it is my understanding that there is not a moratorium, but rather that that proposal for that particular project was considered to be deficient. As I mentioned before, there had been projects turned down. It is my understanding, that that is another example. I cannot recall precisely, but I believe that Mr. Butters commented on that the other day as well.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers. Mrs. Sorensen.

MRS. SORENSEN: I guess I am in somewhat of a dilemma. If the Bates report has concluded that uranium mining can safely go ahead in British Columbia, yet the legislators have decided that they would impose a moratorium, obviously there must be some fairly strong reasons why they would choose that route, but you have indicated you are not familiar with that situation.

Technology Available For Disposal Of Uranium Tailings

I have another question and it concerns your comments with respect to the existing technology being available to, I guess, resolve the problem with the disposal of tailings in the long-term, yet Dr. Woollard has indicated that we do not seem yet to have the technology to address the tailings problem, other than to put the tailings in enclosed casings and bury them. Are you aware of technology that perhaps Dr. Woollard is not, and if so, could you please expand on why you think we have the technology now to address the tailings problem?

CHAIRMAN (Mr. Pudluk): Thank you, Mrs. Sorensen. Mr. Chambers.

MR. CHAMBERS: Thank you, I am not sure whether Bob Woollard is familiar or not with some of the work that has gone on, and also as in all things, there well may be differences of opinion of adequacy or non-adequacy of certain proposals.

Before I comment on the tailings, I would like to comment briefly on British Columbia and other areas. I think there are two levels at least of setting regulations. I think there is, if you will, a scientific evaluation that sets forward, not recommended regulations, but sets forward what is known about the effects on humans of the effects on fish or animals of exposure to certain levels of radiations, or certain levels of chemicals, this kind of thing. I think then it is the regulators or perhaps the government's responsibility directly then to look at the scientific information and decide what they feel is appropriate for their particular constituency. I think there are two separate problems in that. I think science can only go so far, but it is the politicians or perhaps the regulatory agencies with delegation from the politicians' talk too, if you will, adopt science for their particular environment.

Now, over the last few years, there has been a lot of money spent on uranium tailings, and a lot of research and development work carried out. In Saskatchewan, there are two proposals at the present time for tailings management, one of which was discussed at some length during the British Columbia inquiry, and that is the layered tailings system I talked about earlier.

Tailings are normally discharged from the mill in a slurry and that probably cannot be translated but it is a mixture and solid particles. In the mill in the layered tailings system, the proposal would be to add extra lime which is a component of concrete. The tailings are then discharged on tailings beaches in very thin layers, and these are allowed to dry. When they dry, they have consistency of concrete. We are not talking about putting tailings inside thin concrete barrels, we are talking about making the tailings into a large block of material. That is essentially like a large block of concrete.

This tailings method has worked successfully in Rhodesia and other countries, and there is still some question as to whether or not it will work properly in cold Canadian climates. That is currently unresolved, but is very promising. If it does work, then you would have a tailings mass that is like a block of concrete and would in essence only degrade slowly as a block of concrete would into the environment, with the outer layers peeling away.

Another proposal in northern Saskatchewan and elsewhere, as I mentioned before, would be to place the tailings at the bottom of a deep open pit. Then you have a choice of either leaving them or covering the tailings over. If the tailings were covered over, perhaps by blasting the side walls, then in essence you have returned the radio-activity to where it came from, and the effect on the environment would be very little different than what the original ore body had on the environment when it was in the ground in the first place.

In areas where you have lakes, another option that is available and is being investigated is placing tailings on the bottom of the lake under water, and, as I say, there are literally dozens of permeations depending on the site that you have, the particular ore body that you have which affects the milling process, the extraction process and the climate.

From having worked on assessing the radio-active aspects of several of these methods, it is my personal conclusion -- and I cannot speak for Baker Lake because I am not that familiar -- but from experience at other sites where I believe we have reasonable methods of disposing of tailings, I have every reason to believe we have sufficient engineering capability to design a safe system for tailings in Baker Lake or any place else. I hope that answers your question. I can elaborate if necessary.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers. Mrs. Sorensen.

Solution To Long-Term Tailings Problem

MRS. SORENSEN: Well, the concern that I have heard expressed is this. I think it is understood that the tailings can be contained. It is those same tailings 100, 200, 10,000 years from now, as the containments break up, that however is or might be of great concern to legislators. I was under the impression that that was the kind of technology that you were referring to in your brief. Technology that now exists or that we now are on the edge, so to speak, of a breakthrough in that area. Am I wrong then in believing that that technology might exist and we have only just to wait a few more months or years and we will have a solution to the long-term tailings problem?

CHAIRMAN (Mr. Pudluk): Thank you, Mrs. Sorensen. Mr. Chambers.

MR. CHAMBERS: Yes, let me say it this way, I think you put it very well, that we are on the edge of technology. From my perspective, I believe we have methods available to us in different locations, and data have collected for several years and are continuing to be collected. There are still uncertainties. With regard to the very long-term -- let me just backtrack. I believe the reference to this concrete was to the tailings "from the Cluff Lake". Mr. Kupsch may correct me, but my understanding is that in essence the tailings that are going into those concrete vaults still have considerable uranium reserves and will be reprocessed at a later date when the Cluff Lake mine starts to mine the adjoining ore bodies. It is currently mining in the D zone which is a very very unusually high grade ore, and because the mill is tailored to the ore grade in the minerology of the ore, you are saving these materials to process them at a later date. I do not think that has been proposed as, if you will, a disposal alternative.

Now, if you consider, for example, placing the tailings on the bottom of a lake and look at the mechanisms, only those mechanisms that would affect that lake in a geological sense would affect the tailings on the bottom of that lake, and the concerns then focus on the possibility for dissolving radio-activity from the tailings that are on the bottom of that lake.

Now, the studies that we have done and others have done, indicate that we have every reason to be confident that is a viable long-term disposal option. It is out of reach of man, it is out of reach of animal. What we have to assure ourselves is the leaching rate is at a reasonable rate. Now, the leaching rate depends on the ore. If the ore contains a lot of acid-generating materials, sulphurs, then you have different kinds of analyses that you have to do. That is one option.

Similarly, if you look at the layered tailoring system, you do not just have the tailings contained by a thin wall of concrete. The whole tailings areas themselves are then in essence masses of concrete and if they erode from natural weather phenomenon, then they erode at the rate the concrete would erode, which is very slow. What you have to look at then, in evaluating the tailings management, is the rate or how quickly the radio-activity in the tailings area is added to the natural environment, recalling the natural environment is already radio-active.

So what is not so important is how much radio-activity is in the tailings basin, under water, the bottom of an open pit, under a lake, in the layered system, or whatever, it is how quickly in the long-term that radio-activity might be released to the environment, outside the tailings area.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers. Mr. Noah. We have 10 minutes.

Number Of Uranium Mines

MR. NOAH: (Translation) Thank you, Mr. Chairman. I have a brief question. I do not have much for the witness. Does Mr. Chambers ever have any studies on uranium? I have two questions. I would like to know how many uranium mines there are all together in the world and how many do they plan to open within the next five or 10 years? Those are the two questions and I will later have two more questions to ask you.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Noah. Mr. Chambers.

MR. CHAMBERS: There was some problem with the translation so I missed the first question. I will try and answer the question about the number of uranium mines. Personally, I am not familiar with the world uranium situation in detail. There are a number of proposed mines in Australia that you are familiar with or have heard mentioned. In Canada, however, I can give you some indication.

At the present time in Ontario and I will list them for you, there are two operating mines in Elliot Lake, Rio Algom Mines Limited and Denison Mines. There is a subsidiary of Rio Algom in Elliot Lake and it is operating a mine at Canol and there are two additional mines in Elliot Lake that will come into operation in the next two or three years. There is a mine operating in Bancroft, Ontario, Madawaska Mines Limited. In Saskatchewan, Eldorado Nuclear Limited has a mine at Beaverlodge and Gulf Minerals Canada Limited has a mine on Wollaston Lake. Gulf are also proposing to open a new mine in the B zone very shortly. Cluff Lake has an operating mine. In Saskatchewan, Key Lake will be the next uranium mine to come into operation and there are proposals for a mine, a new mine Wollaston Lake area by Canadawide Mines and possibly at a later date by Canadian Occidental Petroleum in the same area. I think whether or not there are sufficient uranium reserves in the Territories, I am not really the proper person to ask that question to, but I think that still needs resolution. There had been a mine proposed in Labrador that was turned down for environmental grounds and it will be obvious that there shall not be a uranium mine in British Columbia for a period of time. In essence though, uranium exploration is taking place in every province of Canada and there is potential for uranium mines, therefore, if sufficient uranium is found in any of those provinces. If you would repeat your first question, I will try and answer that, please.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers. Mr. Noah.

MR. NOAH: (Translation) Thank you, Mr. Chairman. The first question I had was I wanted to know if Mr. Chambers himself had ever worked in a uranium mine. Have you ever worked in a uranium mine before or have you worked in gold mines only or with other mining companies? Have you ever worked as a miner yourself? That was my first question. Have you personally worked in a mine yourself, especially working in a uranium mine?

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Noah. Mr. Chambers.

MR. CHAMBERS: No, I have not had the opportunity of working in a uranium mine. I have, however, been in and made measurements in three underground uranium mines and at least one open pit uranium mine I can recall immediately. I have not worked as a miner or shiftee or whatever.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers. Mr. Noah.

Moratorium On Uranium Mining Necessary

MR. NOAH: (Translation) My last two questions are, some people who have had experience, who are experts in mining and who are quite knowledgeable about mining always seem to say that uranium is not dangerous. I have heard that from hearing about them. Do you know about the good ship Titanic? It was

meant to be unsinkable. It was to be going into a lot of areas and it was very expensive and a lot of millionaires owned it. They were all aboard the Titanic and they were very happy about going on the Titanic and they drank a lot. It was quite a cruise for them in the boat Titanic, but they believed in the Titanic so much that they were going to conquer the unconquerable, but it ran into a big ice pack and it sank. The millionaires who were aboard the ship also sank. I know that when you do talk about uranium mining you will be very careful. Perhaps, Mr. Chambers, you might have a family of your own, a wife and children, and you have your parents. Should we not think about our families first? When we talk about dangerous things and we are not prepared to get into dangerous things like that, should we not do our homework first? Should our families not come first? You probably have a wife and if you do you probably love her. Perhaps, before we have any more knowledge about uranium mining, I think we should put on a freeze or a moratorium until we have enough research material and we know enough about it to go ahead.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Noah. Mr. Chambers.

MR. CHAMBERS: First, with regard to uranium mining, mining of any kind is very hazardous. It is dangerous, the same as forestry is dangerous, the same as hunting and fishing are dangerous occupations. Unfortunately, even with the best designed mines and the most careful equipment people get killed in rock falls. They get run over by equipment. What I was really talking about are not the conventional hazards which miners have been exposed to, and improvements have been made, but the hazards associated particularly with the radio-active nature of uranium.

For example, we have standards for radon gas in uranium mines. The federal standard is four working units, and 50 per cent of the miners in Canadian mines are exposed to less than one working unit. The mines are able to keep the levels below one. There are 90 per cent exposed to less than two working units. The mines do spend a lot of time and a lot of money and there are a lot of efforts made by the regulatory agencies to keep the levels as low as possible. Very few people are exposed to levels approaching the full four units.

Mining Is Hazardous

I have to emphasize, however, mining is hazardous. Commissioner Ham, in the study of Ontario mines, indicated that in his view the risk of accidental loss of limb and loss of life was five to 10 times greater than the risk of losing life or losing time from work as a result of an industrial disease. This includes gold mines, uranium mines, all the mines that exist in Ontario. I did not want to indicate that mining is not hazardous. It is hazardous, the same as fishing and hunting.

I do indeed have a family and I do love my wife. I have a five year old girl that I love dearly and a three year old son. I understand your concerns and it is something I have thought about a lot. When I first became involved in uranium mining I asked myself the question of whether or not I would consider living in Elliot Lake, for example, and I concluded that I would. I would have no hesitation and I speak this with all sincerity. I would not feel that my wife and my daughter or my son were at risk if we lived in Elliot Lake. I cannot say anything more than that.

If I was fortunate enough to live in Baker Lake at some point in time and uranium mining was taking place, personally, I would not be concerned about the uranium mining operations. I would want to be assured, and this is very important, that every reasonable effort had been made by the mining companies to develop their operations in a safe fashion; that very careful monitoring of the workers was taking place; that very careful monitoring of

the environment was taking place and if I lived in Baker Lake I would want to know what the monitoring data was telling me and I would expect to be told, but I would have no hesitation living there. I would not be afraid of the uranium mining operations. That is only my view. Other people could easily have different views. I do not know whether that answers your question. If you have another one, I could try and expand on it.

CHAIRMAN (Mr. Pudluk): Thank you, Mr. Chambers. If you have a closing remark, we are going to give you a few minutes for the closing remarks, if you have any.

Hazards Are Related To Milling And Tailings

MR. CHAMBERS: Thank you. I will make a few short remarks. Most of my talk addressed exploration. Most of the possible hazard with uranium mining is related to uranium milling and the management of the radio-active tailings. These tailings are not the same kind of materials that are associated with spent fuels from reactors or high level wastes. They are not as radio-active and do not have the same hazards, or hazards to the same extent.

From the measurements that I have made and from measurements I have seen of other persons the levels of radio-activity added to the environment through uranium exploration, through the mining of uranium, through the milling of uranium, that is the extraction of the uranium from the ore, and through the management of tailings, need not, with proper design and supervision, add measurable quantities of radiation to the environment outside a very small area beyond the tailings basin or tailings storage area during operation.

Bearing in mind that studies have been done and in some cases very extensive studies on human populations living in different parts of the world who are exposed to different levels of radio-activity from outside the body at levels that are three, four, perhaps 10 times larger than the levels currently existing in Canada and none of these studies have shown any significant effect or measurable effect on either existing people or on any possibility of genetic effects, it seems reasonable to me that with the control of uranium mining such that the added radio-activity to the environment is very small, there is no reason to expect any increased health effects on the general population.

It is recognized that some major studies are under way that will help some of the uncertainties with regard to working conditions and the effect on workers. The current scientific consensus is, however, that if uranium miners are exposed below the current regulatory limits there should not be a significant effect on the workers. Most workers are also exposed far below regulatory levels, at a factor of two or three or four times smaller than the regulatory limits, thus proportionately reducing possible effects. Thus, although there is the potential for accidents and rock falls, the health hazards from uranium mining and milling to the workers should be very small, with proper engineering control, measurement and monitoring.

Controversies Regarding Effects Of Low Level Radiation

Finally, I would like to say there is a controversy with regard to the effects of low level radiation. I would also like to state what the controversy is about, is in some ways summarized by the models that are assumed to relate radiation exposure and human response. In all cases, however, these controversies occur in the area where the exposures are so small that they are not observable except on very, very large populations, if they are observable at all. This, in essence, the kind of conclusions that one draws from these large-scale studies on human populations in different areas of the world, exposed to different levels of radio-activity.

With those remarks I would like to conclude by saying that with proper engineering design, proper monitoring, suitable regulatory controls, I see no reason why uranium exploration development could not take place successfully in the Northwest Territories without contributing significant radiation burden, radiation detriment, to the population living in the Territories. Thank you very much.

---Applause

CHAIRMAN (Mr. Pudluk): Thank you very much Mr. Doug Chambers who has appeared before us in the House and has given us some information that we would like to know. I wonder if the Sergeant-at-Arms could escort him from the room. Now, we still have 40 minutes left. Would the committee like to invite Mr. John Moelaert to appear to this House? Mr. Braden.

HON. GEORGE BRADEN: Mr. Chairman, I wonder if we might inquire about the length of the next presentation.

CHAIRMAN (Mr. Pudluk): We will not know until we invite him and ask him how long it is going to take for his presentation. Could you hold on a second? I am going to find out. His original plan was one hour but he can reduce it down to 40 minutes. Mr. Braden.

HON. GEORGE BRADEN: Mr. Chairman, in view of the length of the presentation and the fact that a number of Members of the Executive and the standing committee on education have to be in Pine Point later on this afternoon, I move we report progress.

CHAIRMAN (Mr. Pudluk): The motion is not debatable. All in favour? Thank you. Opposed? The motion is carried.

---Carried

MR. SPEAKER: Mr. Pudluk.

REPORT OF THE COMMITTEE OF THE WHOLE OF URANIUM MINING AND EXPLORATION

MR. PUDLUK: Mr. Speaker, the committee has been considering uranium exploration, processing and mining and wish to report progress.

MR. SPEAKER: Thank you. Mr. Clerk, announcements and orders of the day, please.

CLERK OF THE HOUSE (Mr. Remnant): Yes, Mr. Speaker, there is a standing committee on finance meeting in the caucus room at 8:30 tomorrow morning. The sitting hours for tomorrow will be from 10:30 a.m. to 12:00 noon and 1:00 to 6:00 p.m. This is to provide time for the continuation of the uranium debate, recognizing that there are still five witnesses to be heard. Immediately before the opening of the session, there will be a brief caucus meeting in the caucus room at 10:15, which all Members are urged to attend.

ITEM NO. 14: ORDERS OF THE DAY

Orders of the day at 10:30 a.m., Friday, May 22nd.

1. Prayer
2. Replies to the Commissioner's Address
3. Oral Questions
4. Questions and Returns
5. Petitions

6. Tabling of Documents
7. Reports of Standing and Special Committees
8. Notices of Motion
9. Notices of Motion for First Reading of Bills
10. Motions
11. Introduction of Bills for First Reading
12. Second Reading of Bills
13. Consideration in Committee of the Whole of Bills, Recommendations to the Legislature and Other Matters: Uranium Exploration and Mining; Sessional Paper 1-81(2); Bills 1-81(2), 2-81(2), 3-81(2), 4-81(2), 5-81(2), 6-81(2), 7-81(2), 8-81(2)
14. Third Reading of Bills
15. Assent to Bills
16. Orders of the Day

MR. SPEAKER: Thank you, Mr. Clerk. This House then stands adjourned until 10:30 a.m., May 22nd, 1981.

---ADJOURNMENT

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