McArthur River Underground Exploration Program

Report of the Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan

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on Uranium Mining Developments
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McArthur River Underground Exploration Program Panel Report

In accordance with the mandate provided on November 3, 1992, the Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan has completed its review of the McArthur River Underground Exploration Program. We are pleased to submit to you our report on the acceptability of the underground exploration proposal.

The proposal to construct the surface and underground facilities required for the exploration and delineation of the McArthur River ore body, and any necessary additional infrastructure has been examined and public hearings have been held in Regina, Saskatoon, Fond du Lac, Black Lake, Wollaston Lake, Pinehouse, and La Ronge.

The panel recommends that the underground exploration program as described by Cameco in its Environmental Impact Statement, and as clarified in its written and oral responses to the panel, be allowed to proceed under the conditions described within the report.

The panel further recommends that the findings and conclusions described throughout the report be given careful consideration by governments, Cameco Corporation and other interested parties.

Respectfully,

Donald Lee
(Chairperson)

Saskatchewan

Canada

McArthur River Underground Exploration Program

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

1.1 Project Description 1

1.2 Review Process 1

1.3 Panel 2

1.3.1 Membership 2

1.3.2 Mandate 2

2.0 **SOCIAL ISSUES** 3

2.1 Northern and First Nation Issues 3

2.1.1 Employment and Training 3

2.1.2 Business Opportunities 3

2.1.3 Revenue Sharing 4

2.1.4 Local Land Use 5

2.15 Heritage Resource Sites 5

2.1.6 Other Northern and First Nations Issues 5

2.2 Other Social Issues 5

2.2.1 Project Justification 5

2.2.2 Other Issues 5

3.0 **ENVIRONMENTAL ISSUES** 7

3.1 Air Quality 7

3.2 Hydrogeology 7

3.3 Surface Waters and Fisheries 8

3.4 Wildlife and Terrestrial Habitat 8

3.5 Bioaccumulation of Radionuclides and Metals 9

3.6 Decommissioning and Site Reclamation 9

4.0 **HEALTH AND SAFETY ISSUES** 11

4.1 Worker Health and Safety 11

4.1.1 General Concerns 11

4.1.2 Radiation Risks 11

4.1.3 Other Risks 12

4.2 Community Health 12

4.2.1 General Concerns 12

4.2.2 Radiation Risks 13

4.2.3 Other Risks 13

5.0 **CONCLUSIONS AND RECOMMENDATIONS** 15

APPENDICES

A Site Map 17

B Panel Biographies 18

C Terms of Reference 19

D Schedule of Public Hearings 20

E Submissions to the Panel 20

F Bibliography of Review Documents 21

1 .O INTRODUCTION

1 .1 Project Description

In 1992, Cameco Corporation, on behalf of the McArthur River Joint Venture, proposed an underground exploration program at the McArthur River uranium deposit in northern Saskatchewan. Five companies make up the McArthur River Joint Venture: Cameco (operator; owner of 43.991 per cent); Uranerz Exploration and Mining Limited (29.775 per cent); AGIP Resources Limited (10 per cent); Interuranium Canada Ltd. (9.063 per cent); and Cogema Canada Ltd. (7.17 per cent).

The McArthur River project is located within the Athabasca Basin region of northern Saskatchewan, approximately halfway between the Key Lake and Rabbit Lake mines, in the Close and Yalowega Lakes area. A map showing the location of the McArthur River project can be found in Appendix A of this report.

The purpose of the proposed underground exploration program is to provide additional information concerning the physical nature of the ore body prior to the commencement of any actual mining of the ore. The program, as proposed by Cameco, will involve several operations to be conducted over a two-year period. A process of baseline data acquisition and development approval will precede any underground exploration. The underground exploration program will involve development of both surface and underground facilities, as well as construction of an access road and an air strip. No mining of the ore body is to occur during the exploration program.

Initially, site access for delivery of exploration camp materials and supplies will be accomplished by use of the existing Fox Lake winter road and by construction of a temporary winter access road. Surface facility development in support of the underground program will follow with construction of a temporary camp; a headframe; mine water and sewage treatment facilities; waste rock storage sites; an air strip; a 1 O-km electrical transmission line connecting to a main transmission line; and other auxiliary facilities.

Underground exploration will require the sinking of a shaft to a depth of 500 metres and the driving of a drift (tunnel) in barren waste rock to facilitate diamond drilling through a representative portion of the anticipated ore body. Core samples obtained from the diamond drilling program will be used to more precisely delineate the size of the ore body, determine its exact location and confirm the grade of its ore. The detailed information gained from this activity will permit design of suitable mine facilities and selection of appropriate mining techniques to be utilized in the proposed future full-scale mining program.

Should exploration drilling from a single horizon be inadequate for ore body characterization, the shaft will be extended to a depth of 600 metres and a second exploration drift will be developed.

The anticipated schedule for the exploration program would see the development of temporary surface facilities, underground access, and tunnels in 1993 and early 1994, with detailed underground diamond drilling to take place in 1994.

1.2 Review Process

The Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan (the panel) was established in August, 1991, to review a proposed production mine at McArthur River. That review is being conducted under the federal *Environmental Assessment and Review Process (EARP) Guidelines Order* and under the Saskatchewan *Environmental Assessment Act,* in conjunction with the review of four other proposed uranium mine developments in northern Saskatchewan: Amok Ltd's Cluff Lake Extension; Minatco Ltd's McClean Lake Project; Midwest Joint Venture, South McMahon Lake; and Cigar Lake Mining Corporation's Cigar Lake Project.

The underground exploration phase of the McArthur River project was initially reviewed and evaluated by the Atomic Energy Control Board (AECB) under the *EARP Guidelines Order,* and by Saskatchewan Environment and Public Safety (SEPS) under the Saskatchewan *Environmental Assessment Act.* In July, 1992, Cameco submitted environment review documents that described the program and potential impacts to SEPS and AECB for a technical review.

In conducting technical reviews under the requirements of their respective environmental assessment processes, each agency sought public input. The issues and concerns raised during both reviews were provided to Cameco for comment. In October, 1992, Cameco responded to those concerns in an addendum, which, together with the environmental review documents submitted in July, comprise the Environmental Impact Statement (EIS). A complete list of review documents can be found in Appendix F.

In October, 1992, the McArthur River Underground Exploration Program was referred to the existing joint federal-provincial panel for public review, as a discrete project, to be considered separately from the production mining proposals. Citing significant public concern, the referral was made by AECB to the federal Minister of the Environment, under Section 13 of the *EARP Guidelines Order.* A similar requirement for public review had also been identified by SEPS as a result of earlier consultation by that department under the Saskatchewan *Environmental Assessment Act.*

The panel was asked to review and assess the potential environmental impacts of the exploration program, and the social effects, directly related to those environmental impacts, including occupational health and safety effects.

In their initial reviews of the Cameco program, AECB and SEPS had facilitated opportunities for public comment. The joint federal-provincial panel reviewed the EIS provided by

Cameco and comments by government agencies and public presenters. On the basis of its review, the panel submitted to Cameco a statement of 33 concerns related to the documentation for consideration at the subsequent public hearings.

As required by its terms of reference, the panel then conducted public hearings in December, 1992, **in Regina, Saskatoon, Fond du Lac, Black Lake, Wollaston Lake, Pinehouse and La Ronge. All public hearings permitted general** questions and comments on the program. Technical issues were addressed specifically at one session of the hearings in Saskatoon.

Following the public hearings, the panel prepared the following report, which draws conclusions about the acceptability of the McArthur River Underground Exploration Program. Recommendations are made in the report concerning the conditions under which the program could be allowed to proceed. This report is submitted to the federal Ministers of Environment, and of Energy, Mines and Resources; the Saskatchewan Minister of Environment and Public Safety; and to the Atomic Energy Control Board.

1.3 Panel

1.3.1 Membership

In October, 1992, the Saskatchewan Minister of Environment and Public Safety and the federal Minister of the Environment referred the McArthur River Underground Exploration Program to the existing Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan. **Dr. Donald Lee, Head of the Department of Chemistry at the** University of Regina, is chairperson of the panel. Other panel members are:

- **Dr. James Archibald, Associate Professor of Mining En**gineering, Queen's University;
- **Mr. John Dantouze, Vice-chief, Prince Albert Grand Council;**
- **Dr. Richard Neal,** Professor of Biology, University of Saskatchewan; and
- **Dr. Annalee Yassi,** Associate Professor and Director of Occupational and Environmental Medicine, University of Manitoba.

Biographies of the panel members may be found in Appendix B.

1.3.2 Mandate

The panel was asked to review the McArthur River Underground Exploration Program as a distinct project, in advance of the production mine proposal already under panel review.

In conducting its review, the panel was asked to consider the environmental and directly related social effects, and the occupational health and safety effects, of Cameco's proposal. Also to be assessed were the measures described by the proponent to mitigate these effects.

Complete terms of reference for the panel may be found in Appendix C.

2.0 SOCIAL ISSUES

2.1 Northern and First Nation Issues

2.1.1 Employment and Training

During those public hearings held in northern Saskatchewan, it was evident that employment possibilities for northern residents is an issue of great and almost universal concern. Public hearing participants most frequently asked how many jobs would be created by the underground exploration phase, and by a subsequent production phase, if one were approved. The number of available jobs; the qualifications required to fill those jobs; the training available on site; and the percentage of northerners and Native peoples expected to be included in the McArthur River staff complement were questions asked at almost every session of the public hearings.

Cameco clearly indicated that the underground exploration phase would create few new jobs accessible to northerners; most of the 1 200 person-months of employment expected for completion of the project would be supplied by highly skilled technical professionals. Cameco estimated that approximately one-third of this employment would be available to northern employees. However, for every employment opening, Cameco made a commitment to hire a qualified northerner whenever possible.

Cameco faces certain problems in meeting its overall target of 50 per cent northerners in its workforce for this project. The level of education and technical training among northerners and Native peoples often does not meet the requirements of the positions being staffed. Cameco stated that it is willing to provide on-site training to facilitate the hiring of northerners and Native peoples. However, this solution is only suitable for positions with minimal requirements.

Cameco has also expressed a willingness to cooperate in other ways with educational authorities; for example, it is assisting with technical trades training in Wollaston Lake. Cameco has, however, indicated that it would not be comfortable with expectations that the company assume sole responsibility for providing the education and training necessary to equip northerners and Native peoples for positions in the uranium mining industry.

In conjunction with the issue of employment for northerners and Native peoples, concern about the definition of "northerner" was expressed. Some public hearing presenters felt that the current definition used by Cameco (those persons having lived half their life, or for a minimum lo-year period in the North) was too biased towards the hiring of ex-residents of the North now living in southern centres.

The panel notes that there has been significant progress regarding employment of northern and Native peoples in uranium mining. Not only is Cameco able to show an increase in the percentage of northern and Native peoples it employs, several contractors supplying goods and services to Cameco made presentations to the panel confirming that Cameco's 50 per cent target for northerners and Native peoples also applies to its contractors. However, Cameco presented documentation showing that staffing goals for northern and Native peoples have not yet been met:

> *As of September 1992, Cameco's northern operations workforce was 42 per cent northerner and 38 per cent aboriginal. The Contractor workforce was 45 per cent northerner and 44 per cent aboriginal.* [1]

The panel concludes that Cameco and its contractors must continue their efforts to hire more northerners and Native peoples, and that hiring and training targets should be included as part of the human resource agreement for this project.

2.1.2 Business Opportunities

Several persons made representations describing the business opportunities which they have derived from the uranium mining industry, and which they hoped to enjoy with the McArthur River proposal. Of particular note was the presentation by the Kitsaki Development Company, established by the Lac La Ronge Indian Band. This company has developed many successful businesses, most of which supply goods and services to the uranium mining industry. The profits and jobs from this company directly benefit Native peoples and northerners.

Other presenters were less enthusiastic about the beneficial role uranium mining plays in the economy, particularly in the northern economy, and suggested that time, money and efforts could more productively be channelled into alternative forms of economic development in northern Saskatchewan. Some alternatives suggested were eco-tourism, commercial fisheries, forestry, and the development of other, renewable sources of energy.

One public hearing participant felt that the uranium mining industry had had a negative impact on some business opportunities in the North. The visibility of mine surface facilities and of infrastructure supporting the mines has reduced the aesthetic appeal of northern Saskatchewan. This has had a negative impact on fly-in wilderness camps, disappointing tourists seeking a pristine wilderness experience.

It is estimated that the uranium mining industry directly employs 1 100 people, and is indirectly responsible for the employment of an additional 2 200. Approximately 2 per cent of the provincial economy is directly or indirectly tied to the uranium mining industry.

[1] Response To Panel Concerns, McArthur River Project, Underground Exploration Program, p.1. Compiled by Mark Wittrup, Cameco Corporation, December, 1992.

On balance, the panel concludes that the McArthur River Underground Exploration Program will have a positive effect on business opportunities for northerners and Native peoples. The panel encourages Cameco to pursue policies that will maximlze the opportunities for northern and native businesses to provide any required goods and services.

Although the panel recognizes the potential economic Importance of uranium development, it is also aware that uranium Is a non-renewable resource. Moreover, It cannot be expected to be the sole basis for the economy of the North. The panel concludes that efforts to develop alternate economic activities In the North should be vigorously encouraged.

2.1.3 Revenue Sharing

The McArthur River site lies in an area of the province that was inhabited only by Aboriginal peoples until fairly recent times and, the panel was told, was used by them for food and resource gathering on a sporadic basis. Although formally on Crown Land, several of the Aboriginal peoples who appeared before the panel referred to it as "our land" and indicated they had assumed a traditional right to use it for gathering purposes. As a consequence, it seems to be a matter of natural justice that the Aboriginal peoples should share in any revenue provided by development of the area and that they should logically benefit from mining operations in larger proportion than do the people living in the southern part of the province. Unfortunately, it seems that the converse is true and that predictions made in the final report of the Cluff Lake Board of Inquiry have come to pass:

1. *If the distribution of economic benefits (taxes and royalties, spin-off and job benefits) and social benefits is left to the natural market forces and normal governmental processes, the chances are high that the people of the province genera//y will benefit most from that distribution and the Northerners very little.*

2. *The social costs generally associated with a uranium mine and mill and with the expansion of the industry in the North will be borne almost exclusively by the local residents and the Northerners generally.**

Previous reviews of uranium mining in northern Saskatchewan have unequivocally recommended that a form of revenue sharing be implemented. For example, the Cluff Lake Board of Inquiry made several recommendations in this regard, foremost among them being:

> *The provincial government should institute a uranium royalty sharing scheme under which the government would pay a share of the uranium royalty to certain northern governing bodies and in return those northern governing bodies would undertake to perform certain governmental functions.*[3]

Subsequently, the Key Lake Board of Inquiry stated that:

> *Royalty sharing was rejected on the basis that the resources of the province belong to all of the people of the province rather than to the people in a particular geographic area. Further, uranium is a finite resource and it is not feasible in the long term* to *base the revenues of local government in the north upon such a limited base.*[4]

However, the panel notes that it is northern people who must tolerate the intrusion of mines, and it is they who bear the greatest risk of environmental damage or social disruption by these developments. They should, therefore, receive a disproportionately larger share of the revenue generated by northern mining.

Representatives of Cameco present at the public hearings indicated their agreement with this conclusion, but contended that they had no control over the use by government of the taxes, fees, and royalties paid by the corporation.

At present, revenue sharing with the communities of northern Saskatchewan occurs primarily through the Northern Revenue Sharing Trust Account. The income for this account comes from permits, lease fees, taxes, Crown Land sales and interest. The revenues, which flow into a revolving fund administered by the Northern Municipal Services Branch of Community Services, are used to provide capital grants and a portion of the operating grants to northern municipalities.[5]

The fact that grants from the Northern Revenue Sharing Trust Account are available only to municipalities and not to reserves has created certain inequities and an undesirable situation. For example, the Hamlet of Wollaston qualifies for grants from the account, but the contiguous Hatchet Lake Band is ineligible. Since the people who live in both the hamlet and on the reserve have a common history with equivalent rights to share in the wealth produced by "their land", it does not seem that natural justice is being achieved. There is, therefore, a need to develop a mechanism for increasing the funds available and for coordinating the federal and provincial support programs to ensure that all impacted peoples share equitably in the revenue derived from these developments.

Another form of revenue sharing, described by R.M. Bone,[6] attempts to ensure that hunting, fishing and trapping will remain viable options for Aboriginal peoples. Implemented in conjunction with the James Bay Hydro Electric Project, the program provides minimum income guarantees that are similar in purpose to some of the support systems now available

[2] Final Report. Cluff Lake Board of Inquiry, E.D. Bayda, Chairman, 1978, p. 206.

[3] Final Report. Cluff Lake Board of Inquiry, E.D. Bayda, Chairman, 1978, p. 206.

[4] Key Lake Board of Inquiry Report, R.W. Mitchell, Chairman, 1981, p. 50.

[5] Reported by Ron Zukowski, Saskatchewan Environment and Public Safety, at a public hearing on December 10, 1992, in La Ronge, Saskatchewan.

[6] R.M. Bone, "The Geography of the Canadian North", Oxford University Press, Toronto, 1992, p. 223-224.

to farmers in southern Saskatchewan. We believe this approach may eventually prove to be more effective in promoting long-term security and increased self-esteem among northern people than does the current system of welfare payments.

The panel recognizes that the McArthur River project, being part of an exploration program, will generate revenue for the province only in the form of taxes and lease fees, and that the funds derived will be much less than those from operating mines that pay, in addition, royalties and corporate income tax. Despite this, it seems appropriate to the panel that a surface lease, specific to the underground exploration program, should be negotiated with the full participation of the Aboriginal peoples and that it describe, in clear language, agreed-upon provisions for revenue sharing, utilization of human resources, and environmental safeguards.

2.1.4 Local Land Use

Concern was expressed to the panel during the hearings that uranium mining could have a negative impact on traditional land uses in the Athabasca Basin. The panel was also informed that the hearings provided an appreciated opportunity for early involvement by the public in the decision-making process.

There is a growing indication that greater control by Native peoples over resources and over economic and community development is highly desirable. There is also increasing acceptance of the fact that the lands of northern Saskatchewan constitute the traditional lands of Native peoples, and that there still exists considerable interest among Aboriginal peoples in pursuing traditional land uses, in conjunction with other opportunities.

The panel, therefore, concludes that full involvement of northern and Native peoples in decisions regarding land use and the benefits thereof is essential.

2.1.5 Heritage Resource Sites

Questions regarding heritage resource sites were raised by one speaker during the public hearings. This presenter was concerned that a native burial site would be disturbed by activities at the McArthur River site. The panel and the speaker were assured that the burial site was over 50 km away and that it would not be disturbed by underground exploration and associated activities at McArthur River.

2.1.6 Other Northern and First Nations Issues

Public hearing participants raised concerns that the uranium mining industry has disrupted traditional lifestyles. Part of the disruption was due to the incursion of mining activities onto hunting, fishing and trapping territories. The employment of northerners and Native peoples also has caused a disruption, since there has been a tendency for approximately one-third of mine wage workers to move south. Some persons employed at a mine site have found it difficult to continue their traditional lifestyle activities.

Cameco has attempted to address the preference of northern and Native employees to live in their home communities by designing a work policy that schedules seven days of work followed by seven days off, and by providing an air service pick-up at several key communities in the **North.** This schedule and transportation service was designed to allow Native employees greater flexibility to pursue traditional lifestyle activities in conjunction with work at the mine site, but has **also** had a negative impact on family life in some cases.

Another issue raised during the hearings was the possibility of establishing a Cameco pay office on reserves. This would allow Status Indian employees to maintain their tax-exempt position. Cameco responded that it had investigated this pay option, but had determined that there were legal barriers preventing such a compensation package. Additionally, Cameco had concluded that differential treatment of employee sub-groups could foster disharmony and resentment.

2.2 Other Social Issues

2.2.1 Project Justification

Two issues related to the justification of this project were also raised. These are the need for underground exploration and the wisdom of depleting Saskatchewan's world-class uranium deposits in a soft market.

Cameco stated that the project was justified because underground exploration would give detailed information (necessary for the safe design of mine facilities and the development of appropriate technologies to be used in the proposed full-scale mine) that cannot be accurately obtained by a more intensive surface drilling program. This issue is further considered in Section 3.2.

Cameco further stated that the ore resulting from the proposed McArthur River mine would be used to maintain operations at the Key Lake mill, which would otherwise run out of ore in 1997. This continued supply would allow Cameco to honour its present commitments, and fill new contracts as demand for uranium grows. An oversupply of uranium between 1970 and 1985 is, in part, responsible for the depressed price of uranium in recent years. Since 1985, however, consumption has exceeded production resulting in a draw-down of current inventory and creating a climate in which the price of uranium is expected to rise.

The panel wishes to draw governments' attention to the importance of these issues.

2.2.2 Other Issues

Numerous concerns were raised regarding the end uses of uranium. While this issue is beyond the mandate of a review of an exploration project, it is, nevertheless, significant enough to warrant noting.

Some presenters expressed opposition to the uranium industry largely due to its link to nuclear armaments; some individuals stated that uranium mining is immoral; some were concerned with the disposal of high-level radioactive waste;

others maintained that the lack of control over pollution from end uses of uranium was sufficient reason to oppose uranium mining **in Saskatchewan.**

While, as one northern resident stated, northern Saskatchewan should not be forced to be the social conscience of the world, both northern and southern Saskatchewan residents expressed interest in the issue of end uses.

The panel wishes to bring to the attention of governments the importance attached by many public hearing presenters to the issue of end uses and high-level radioactive waste disposal, the desire of these citizens to be informed about the end uses of Saskatchewan uranium, and their need to be reassured about safeguards that would prevent Saskatchewan uranium from being used in nuclear weaponry.

The panel notes that a federal environmental assessment review panel is reviewing the issue of safe disposal of nuclear fuel waste, and supports full public information and discussion regarding disposal options in this context.

3.0 ENVIRONMENTAL ISSUES

3.1 Air Quality

Most air quality concerns were related to radon emissions and focused both on the safety of employees at the exploration site and on the impact of emissions on air quality in the vicinity of the McArthur River project.

The proponent has gathered a considerable quantity of baseline data concerning surface air quality conditions since 1989. Background radon levels, for example, lie well within the ranges of radon concentration measurements made over open soil in other locations within Saskatchewan and have been estimated to occur at levels below average concentrations measured for the continental United States. Baseline radon and gamma concentrations were also found to be very similar to levels measured at the adjacent Cigar Lake, Midwest Joint Venture and McClean Lake project surface sites. Similarly, airborne dust measurements made at the proposed McArthur River site have indicated that baseline dust concentrations exist at levels below Saskatchewan clean air limits.

Because of the barren nature of the rock through which development will occur, very little radioactive dust or radon exposure is anticipated during underground operations. For the proposed underground exploration program, control of liberated dusts and radon gas will be maintained through use of wet drilling procedures and single-pass exhaust ventilation flows. Based upon experience at nearby underground uranium test mines, where similar control measures have been established, low levels of radioactive dust and radon gas exposure can be anticipated to occur during exploration operations. Where development activities and appropriate engineering control measures can be maintained at the McArthur River exploration project (in similar fashion to those existing at other underground sites such as the Eagle Point Test Mine) dust and radon exposures are anticipated to be considerably below legislated occupational limits. The issue of employee safety is further addressed in Section 4.1.2.

It is the opinion **of the panel that, with underground exploration activities planned to take place at some distance from zones of ore mineraliration, and with provision of adequate engineering control measures, worker exposure to airborne dust and gas contaminants can be effectively maintained at levels below legislated occupational limits. Nonetheless, systematic workplace and personal monitoring programs for radioactive and non-radioactive dusts, radon and radon progeny should be regularly conducted. Data obtained from such systematic monitoring efforts may then be used to provide records of worker exposure and a measure of the long-term effectiveness of engineering controls for sustaining adequate air quality conditions.**

3.2 Hydrogeology

A substantive quantity of baseline information concerning regional and local hydrogeologic parameters has been compiled by the proponent. It is expected that this data base will be enhanced by additional test work which Cameco proposes to conduct during the development and drilling phases of the underground exploration program.

A concern which was expressed by at least one member of the public suggested that the process of exploration drilling would significantly alter the rock mass hydrogeologic conditions, making the rock mass generally more permeable to ground water flow and more likely to produce contaminant release.

The proponent's presentation made it evident that the accuracy of drilling, and, therefore, the adequacy of ore body physical delineation, suffers due to the distance between the drill and target site. In the case of the McArthur ore body, the minimum distance is approximately 500 metres for the surface drilling scenario and approximately 40 metres for the underground drilling scenario. In order to delineate the ore body with an accuracy similar to that achievable by an underground program, surface drilling would require a significant number of large diameter holes, at close spacing intervals. It is anticipated that such a surface drilling program would not provide any cost/benefit to the proponent, although it would clearly result in significant alteration of the hydrogeologic character of the waste rock zone overlying the ore body. The existence of drill holes connecting the surface to the ore body provides direct routes of access for natural groundwater flows and, therefore, of possible contaminant sources to the surface environment. Where, however, an underground drilling program can be established, the anticipated flow paths of water and contaminants would be restricted to local areas between the ore body and developed excavations, at depth. Exposure and release of contaminated water could, therefore, be more systematically controlled. In addition, the zone of hydrogeologic alteration about the ore body, caused by underground drilling activity, could be more locally restricted than for the surface drilling scenario. Plans for delineation drilling from underground, rather than from surface, therefore, pose the least effect on the hydrogeologic character of the rock which overlies the existing ore body.

It is the opinion of the panel that the local influence of drill holes from a single exploration drift at depth, rather than the intersection of many, widespread and longer drill holes from surface, represents a least impact scenario. The drilling option proposed in the McArthur River Underground Exploration Program is to be preferred because it results in least alteration of the regional rock mass hydrogeologic character. It is, however, the suggestion of this panel that all drill holes developed in close proximity to or through the ore body, from whatever source, be fully grouted and sealed following exploration drilling. Sealing of drill holes would reduce possible sources of contaminated water inflow during this and any future stages of ore body development, should they be permitted to occur. Additionally, grouting of drill holes would serve to enhance the hydrogeologic character of the rock, rendering it less permeable to natural water flow.

3.3 Surface Waters and Fisheries

The surface waters of the project area are typical of unpolluted waters in the Athabasca Basin, i.e., they have low amounts of dissolved and suspended solids. In particular, the concentrations of heavy metals and radionuclides are close to or below the limits of detection. The sediments also usually have low concentrations of metals and radionuclides. There is, however, an anomalously high concentration of naturally occurring uranium in Lower Read Lake and in the sediments immediately downstream of Boomerang Lake and Read Creek. However, further down the watershed, at Little Yalowega Lake, the levels of uranium in the sediments are at the typically low values of lakes in the region (approximately 1 microgram per gram [µg/g]). Fish collected from Boomerang Lake and Little Yalowega Lake have concentrations of metals and radionuclides close to or below detection levels in their flesh and bone. It is not known at this time if there are elevated uranium concentrations in the flesh and bone of fish from Lower Read Lake, but samples have been collected and are being analyted by Cameco; the results will be reported in the EIS for the production mine proposal.

There is a good diversity of fish in the project area and fish population levels and biomass are generally high compared to other lakes in the region. There is commercial fishing on Yalowega Lake, located approximately 8 km from the proposed point of discharge of liquid effluent from the proposed exploration program.

The primary concern of the public is that effluent from exploration would pollute the surface waters and that fish and other aquatic organisms would become contaminated. There is also concern that this would add to similar pollution from other mines in the region to produce a regional deterioration in water quality.

The panel considered these public concerns by noting the following information:

- The exploration shaft and drifts will be constructed in sandstone and basement rocks which contain extremely low levels of radionuclides and metals. Thus, most of the rock removed will not be contaminated with radionuclides or metals.

- The ore body will not be mined, although drilling into the ore body will release some contaminants into the excavation water. However, the excavation water will be treated before release to remove most of the dissolved radionuclides and metals.

- Effluent will be discharged into a bog draining into Boomerang Lake. The amount of effluent released will be small, relative to most underground excavations. It is estimated that approximately 125 000m^3 of effluent will be released each year (even assuming no recycling of water), which provides a 1:200 dilution factor in Read Creek at a point immediately downstream of Boomerang Lake. Any remaining metals and radionuclides will tend to adsorb to the sediments.

- The main change in water quality will be elevated levels of sulphates and chlorides (produced as a result of water treatment) in the immediate vicinity of the discharged effluent. However, it is anticipated that these major ions will be sufficiently diluted downstream and that changes in water chemistry at Little Yalowega Lake will be virtually undetectable. Thus, any impacts of liquid effluent will be extremely local, i.e. close to the point of discharge into Boomerang Lake. The situation will be monitored by Cameco and regulatory agencies by sampling the water, sediments, macrophytes and fish at locations downstream from the point of discharge.

Consequently, the panel concludes that these issues have been addressed adequately during the public hearings.

A second concern is that the characteristics of the water are such that they have low acid-buffering capacity. There are acid-generating sulphide minerals in the basement rock in the location of the proposed exploration excavation, and leachate from such waste rock could impact the surface waters.

The panel concludes **that Cameco has adequately addressed this concern. Sulphide-containing rocks can be readily identified, and such rock will be placed on a special waste storage pad and eventually returned underground. Any water draining from the special waste rock while on the storage pad will be treated at the water treatment facility before release.**

A third concern of the public is that baseline studies of the water, sediments, and biota are incomplete. **The panel recognizes this concern and notes that Cameco has undertaken to complete the gathering of baseline data before any construction of an underground exploration facility takes place.**

3.4 Wildlife and Terrestrial Habitat

The area is not highly productive and wildlife populations are low. Several habitats can be found in the project area but all, except for an exposed sand dune area, are seen widely throughout the north. Rare and endangered plants have the potential to occur in several habitats, particularly bogs and fens and, indeed, a few rare species have been identified.

Several matters of concern were raised at public hearings.

The first was that the baseline information is viewed as being incomplete. **The panel notes that this concern will be addressed since Cameco has agreed to complete the collection of any remaining baseline data before beginning underground exploration.**

Second, there was concern of widespread contamination of the area, including the vegetation and wildlife, by radon progeny. **The panel concludes (see Section 3.1) that this is extremely unlikely to occur, and notes that a commitment was given by Cameco and the regulatory agencies to monitor the situation.**

A third concern was related to the possible disruption of wildlife, in particular, woodland caribou. The major impact on habitat and wildlife will likely arise from the excavation of borrow materials from eskers, and from the roads constructed to haul this material. Similarly, the construction of a 10-km power line will also disrupt some habitat. Both of these activities will likely increase the accessibility of the general area to hunters. Such access will need to be controlled by Cameco during its tenure on the site. **The panel concludes that some disruption to wildlife will occur, but within acceptable parameters because of the small area of the exploration program (approximately 25 hectares) and low wildlife population in the area. Cameco should, however, be required by the regulatory agencies to justify that the preferred locations of any borrow pits have been selected to minimize the environmental impacts of the pits and the haul roads. For similar reasons, the route of the power line should be carefully selected in consultation with SEPS. In particular, woodland caribou habitat should be protected.**

A fourth concern was that the release of effluent into the bog draining into Boomerang Lake could impact rare plants that might be present in that habitat. **The panel concludes that this risk is within acceptable limits given that this type of habitat is commonly found throughout the region.**

3.5 Bioaccumulation of Radionuclides and Metals

There is a common perception and concern that radionuclides and metals can be magnified in food chains to pose a risk to humans, particularly those in the North who lead traditional ways of life on the land.

The radionuclides and metals released by uranium mining generally do not show biomagnification. Two radon progeny, Lead-210 and Polonium-210, can be magnified by some food chains. However, as indicated in Section 3.1, there will be little release of radon during the underground exploration phase and any contamination will be of a local nature. Other radionuclides which magnify in food chains, such as Cesium-137 and Iodine-131, are fission products which are not produced by uranium mines. Similarly, the metals which can magnify in food chains, such as cadmium and methyl mercury, are not contaminants of concern in the Athabasca region.

Thus, **the panel concludes that the small amounts of radionuclides and metals released by the McArthur River Underground Exploration Program will not be magnified in the food chains to pose a significant health risk to humans who obtain some of their food from the surrounding area.**

Bioconcentration is a more realistic concern. This is the process whereby some organisms, e.g. mosses and lichens, can concentrate certain metals and radionuclides; and some tissues, e.g. bone, may also accumulate certain metals and radionuclides. This would be a matter of concern, if there is widespread and heavy contamination of the environment.

The panel concludes that significant environmental contamination is unlikely for the reasons given in Sections 3.1 and 3.3. However, to reassure those concerned, the proponent should put in place a comprehensive monitoring program, including air, water, sediments, soil, lichens, macrophytes, and fish. The panel notes the commitment given by Cameco to establish and implement such a monitoring program.

3.6 Decommissioning and Site Reclamation

Concern was expressed about the restoration of disturbed habitat after site abandonment. **The panel notes that Cameco has made a commitment for site restoration and concludes that it has provided an appropriate level of detail of this process in the EIS at this time. The panel understands that a more detailed decommissioning and site restoration program will be required by AECB and SEPS at a later date.**

4.0 HEALTH AND SAFETY ISSUES

4.1 Worker Health and Safety

4.1 .1 General Concerns

During the hearings, several presenters commended Cameco on its safety record; speakers associated with the uranium mining industry contended that the industry as a whole has an excellent health and safety record, and that Cameco is at the forefront of the industry. Cameco stated that it is committed to meeting or exceeding the federal and provincial workplace standards.

The panel also heard from Cameco that there will be two health and safety officers employed at McArthur River: either two registered nurses, or one registered nurse and one trained emergency medical technician. These health and safety officers will receive the training necessary to carry out their duties in health surveillance, orientation, radiation monitoring, Workplace Hazardous Materials Information System (WHMIS) training, safety rules and mine rescue training. Information with respect to mine rescue training will be provided by the province. The health and safety officers will treat all worker records with the same level of confidentiality as is required under the applicable regulations, and as would be expected from any other medical officer.

Although the contingency plan being developed for McArthur River was not available during this review, such a contingency plan is required by AECB for review and approval 60 days before shaft sinking begins. The panel anticipates the submission to the AECB will contain much greater detail than Cameco has provided to this panel, as well as plans for all foreseeable contingencies, not simply those with a high probability of occurrence.

4.1.2 Radiation Risks

This issue generated a great deal of discussion during the panel hearings; it soon became obvious to the panel that there is a large measure of misperception about the level of radiation exposure, the associated risks, and the studies and literature available on health effects of radiation exposure. In Saskatoon and Regina, representatives of AECB and SEPS attended the hearings and were able to provide additional information and explanation in these areas. In many instances, they were able to shed light on areas of confusion regarding the setting of dose limits, the technology and programs to monitor radiation levels, the availability of long-term worker health studies, and the procedures followed to record and register worker exposure levels.

An expert in radiation protection from AECB explained how it arrives at the Canadian radiation exposure dose limits. AECB bases its dose limits on the recommendations of the International Commission on Radiological Protection (ICRP). ICRP derives its recommendations from ongoing study and review of data obtained from those exposed to radiation — bomb survivors, miners, and patients exposed to high levels of radiation. AECB has recently proposed a total dose limit of 20 milliSieverts per year (mSv/y) which takes all sources of exposure into account. This would be a reduction from the current limit of 50 mSv/y of external gamma radiation and 4 Working Level Months (WLM) of exposure to radon progeny.

The panel heard many expressions of concern regarding the potential health effects of uranium and associated exposures on the workforce; on the surrounding communities with respect to both current and future generations; and, indeed, on the planet as a whole. Some speakers suggested that more comprehensive health studies be carried out before any further uranium mines are permitted in northern Saskatchewan. While the panel recognizes that these matters have been studied extensively by numerous committees of internationally recognized experts, it was apparent that public familiarity with these studies and the relevant conclusions was lacking. This greatly hindered the quality of debate regarding the acceptability of radiation-related risks, the dose limits, and appropriate control measures.

The panel, therefore, concludes **that greater attention must be devoted to raising public awareness and scientific understanding of radiation and related issues, utilizing, as much as possible, organizations that are seen by the public to be neutral, (e.g. the Canadian institute for Radiation Safety).**

The radiation exposure level of workers at McArthur River is expected to be similar to that of workers at the Cigar Lake Test Mine. Figures provided by Cameco indicate that the level of exposure for geologists and technicians at Cigar Lake is far below the 20 mSv/y level proposed by AECB. The estimated doses for McArthur River workers are approximately 2.4 mSv/y, or 12 per cent of the 20 mSv/y limit.

There was also some concern that exploration geologists are exposed to higher levels of radiation than mine workers. Cameco has policies and guidelines in place that cover geologists working on exploration projects. These guidelines set out precautions to limit geologists' exposure to radioactive core samples. Information provided by Cameco demonstrated that the total exposure levels of geologists and diamond drillers at McArthur River in 1991 were between O-l mSv/y, far below the proposed 20 mSv/y limit.

The code of practice to be developed for McArthur River was not available to the panel for review. However, the panel expects it to be similar to the code of practice in place at the Eagle Point Test Mine. This code identifies the steps to be taken in response to the detection of various concentrations of radon progeny. The code also describes protective action for gamma dose equivalent rates and ore dust concentrations, and establishes performance criteria for the ventilation system.

4.1.3 Other Risks

There are other risks associated with the McArthur River program that are not related to radiation risks. Dust, noise levels, and the danger of falling rock are risks common to all types of mining.

Dust is not anticipated to pose a significant problem at McArthur River because a wet drilling procedure, designed to reduce airborne dust, will be used. The activities, equipment and procedures to be used at McArthur River are similar to those already in place at the Eagle Point Test Mine. Results of workplace and personal monitoring indicate that, in 1992, radioactive dust levels averaged approximately 10 per cent of the allowable limit, and silica dust levels averaged approximately 36 per cent. Dust monitoring results at McArthur River are expected to be similar.

Standard mining practices are to be used to prevent and deal with any falling rock or other similar occurrences; all noise control measures required under applicable regulations are to be applied.

4.2 Community Health

4.2.1 General Concerns

Comments from presenters, particularly in the northern communities, indicated that the expanded development of lands traditionally used by the residents for hunting, fishing and trapping has brought an increased level of stress. One speaker explained the belief of the Aboriginal peoples that the earth must be allowed to remain intact, that earth as the source of life and sustenance must be left undisturbed. Another mentioned the important role played by the integrity of the environment in the wellness of people.

The **panel recognizes that land is fundamental to aboriginal culture, and that disruption of the land must be minimized to mitigate negative social health impacts.**

Increased activity connected to the uranium mining industry has brought stress in other ways. A study commissioned by the panel, Health *in the Context Of Uranium Mining in Northern Saskatchewan,* reported:

> *... interviews with regional residents revealed that the mines have made a substantial contribution to the social stresses experienced by families and communities: expectations have been raised and not fulfilled; mine wages have contributed to alcohol related problems; and seven day in-seven day out rotational shifts have made it difficult to maintain any semblance of balanced family life.*[7]

The panel also noted that few (if any) women in the northern communities spoke in favour of uranium mining. Concerns about the well-being of Mother Earth and future generations were particularly passionate.

The panel recognizes the important role women play in traditional northern Native society and encourages the involvement of women in decisions regarding uranium mining development.

Public hearing participants expressed concern about a perceived increase in the number of serious illnesses, such as cancer and diabetes, and a possibility that this increase might be linked with an expansion of uranium mining activity. One presenter urged that a detailed health study be conducted on uranium mine workers and communities within the impact area. The panel referred presenters to a study which it had commissioned, *Health in the Context Of Uranium Mining in Northern Saskatchewan,* and to other previously published studies.

The uranium mining industry is faced with a paradox. Whereas mine jobs are sought after by northerners and Native peoples and viewed as beneficial in economic terms, they are also blamed for many of the social health ills of the North. The panel feels that the commitment of the proponent must go beyond the provision of employment. Consideration must be given to involvement in community health in a broader sense. Flexibility of worker schedules and employment conditions; support in the provision of adequate community nursing and medical staff; acknowledgement and support for traditional healing systems; information programs in accessible languages are all means of mitigating some of the negative community health impacts associated with the uranium mining industry.

The McArthur River Underground Exploration Program will be of short duration and will, as a result, have relatively minimal impact on community health. However, the panel feels that Cameco should develop strategies for mitigating undesirable impacts of mining on the health of northern and Aboriginal peoples.

The subject of decommissioning was often raised at the hearings, with concern about tailings being the source of health-related anxiety. Because the program under review does not involve mining or milling, no tailings will be produced and any mineralized rock generated will be returned underground. Cameco is required to submit a detailed plan for decommissioning to the regulatory agencies. **The panel is satisfied that the decommissioning measures proposed by Cameco are adequate as far as community health is concerned.**

The panel recognizes that health is not only the absence of illness but a state of physical, mental, emotional and spiritual well-being. It is known that anxiety related to uncertainty regarding risk, as well as mistrust of those charged with responsibility for mitigating these risks, can have a powerful negative impact on well-being. The panel has noted that the general population is often not provided with sufficient information and

[7] Health in the Context Of Uranium Mining in Northern Saskatchewan, p. iii. Report prepared by Environmental-Social Advisory Services (ESAS) Inc., September 15, 1992.

understanding to allay their anxieties and there is considerable mistrust of available information. **The panel recognizes that establishing trust is not a simple endeavour, but concludes that greater effort in risk communication is desirable.**

4.2.2 Radiation Risks

Because uranium will be neither mined nor milled in the context of the proposal under review, the consideration of radiation risks to communities is not a major issue. The panel noted, however, that concerns related to radiation risks were expressed in various communities. It also noted that the general public does not have a clear understanding of radiation and its effects, and that the public mistrusts government and the industry as information sources.

4.2.3 Other Risks

The primary non-radiation concern stated by presenters related to surface water quality. Because the McArthur River program involves only underground exploration, the amount of contaminants brought to the surface would be minimal. Preliminary tests, including chemical analysis, indicate that few leachable materials are likely to be encountered when drilling core samples. AECB and the Saskatchewan Mines Pollution Control Branch will monitor and regulate the placement of all waste rock. Environment Canada has recommended that,

> *...in order to minimize the volume of any contaminated leachate, the waste rock from the basement fault zone and basement wedge areas should initially be separated from non-acid generating waste rock and eventually sealed in abandoned underground workings.*[8]

The panel concludes that potential for contamination of community water supplies is slight, that the mitigative measures proposed by Cameco are adequate, and that the Mines Pollution Control Branch and AECB can be relied upon to monitor and regulate the project.

[8] Technical Position on McArthur River Project Underground Exploration Program, p.5. Submitted by Environment Canada, Western and Northern Region, December, 1992.

5.0 CONCLUSIONS AND RECOMMENDATIONS

On the basis of the proposed project description, the proponent has demonstrated a sound and technically feasible underground exploration plan. The development and operating procedures which have been proposed meet current and many anticipated design criteria for an underground exploration site. The documentation received provides sufficient procedural detail and assessment of contingency planning necessary to safely achieve completion of the proposed underground exploration process. Data received in the EIS, along with those provided in subsequent panel public hearings, are adequate to permit a thorough evaluation of technical concerns related to underground exploration activities.

The exploration program represents a timely and appropriate process whereby the proponent can obtain additional information necessary for implementation of an EIS for the proposed McArthur River mine. Benefits to the planning and design processes for either a test or a full-scale mine that may develop from this exploration phase, and which may not be achievable without underground excavation and exploration include more detailed assessment of *in-situ* hydrogeologic parameters; ore zone boundary and grade characteristics; and geotechnical characteristics of the ore and waste zone materials.

The panel recognizes that Cameco has made major progress in employment of northern Natives and promotion of northern Native opportunities. However, the panel also notes that socio-economic aspirations of northern Native peoples have not been realized. Moreover, the Northern Revenue Sharing Trust Account provides no funds to Treaty Indians, and for them, therefore, no prospect of future benefits from this source. There is a growing perception that it is highly desirable for Native peoples to have greater control over their resources, and their economic and community development. There is also increasing recognition that the lands of northern Saskatchewan constitute the traditional lands of Native peoples.

RECOMMENDATION **1:**

The panel recommends that the McArthur River Underground Exploration Program, as described by Cameco Corporation in its EIS, and as clarified in its written and oral responses to the panel, be allowed to proceed, subject to the following conditions:

1.1 A surface lease agreement, specific to the Underground Exploration Program, shall be prepared in consultation with the First Nations peoples, as represented by the Prince Albert Grand Council, the Meadow Lake Tribal Council, the Saskatchewan Métis Association, and the Aboriginal Womens' Council for Saskatchewan, and with the impacted communities (including but not limited to Beauval, Hamlet of Wollaston, La Ronge, Patuanak, Pinehouse, Southend and Stony Rapids) as represented by the mayors of those communities.

The surface lease should include clauses acceptable to the Government of Saskatchewan; Cameco Corporation; and to the majority of those representing the First Nations peoples and the impacted communities, before excavation begins,[9] on:

- **a human resource agreement (including employment and training);**
- **revenue-sharing (including income protection for traditional land-users);**
- **worker health and safety (including a code of practice); and**
- **environmental protection (including monitoring and mitigation).**

1.2 Cameco shall complete the site-specific, biophysical baseline data-gathering program, as specified in Section 5.1(2)a — c (p.38-39) of the EIS guidelines, issued by this panel in September, 1992 (entitled *Guidelines for the Preparation Of Environmental Impact Statements and Government Information Requests for the Cigar Lake And McArthur River Projects),* before underground excavation begins.

1.3 Compliance with these recommendations does not prejudice in any way the panel's right to review any subsequent proposals for test or full-scale production mining.

RECOMMENDATION 2:

The conclusions expressed in this report should be given careful consideration by governments, Cameco Corporation, and other interested parties.

[9] The panel recognizes that, despite conscientious efforts, the parties may require extensive consultation prior to elaborating details on all clauses. In such cases, the parties may choose to agree on a timetable, as part of the surface lease, for reaching agreement on such clauses.

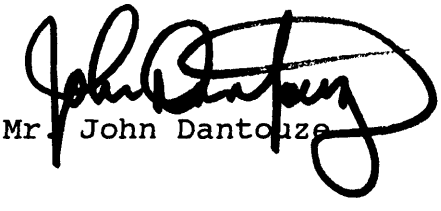
JOINT FEDERAL-PROVINCIAL PANEL

ON

URANIUM MINING DEVELOPMENTS IN NORTHERN SASKATCHEWAN

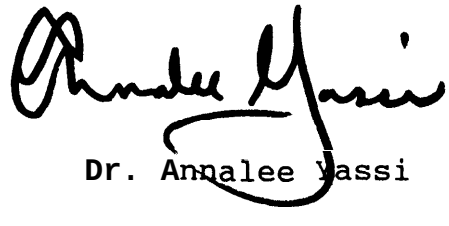
Dr. Donald Lee
(Chairperson)

Dr. James F. Archibald



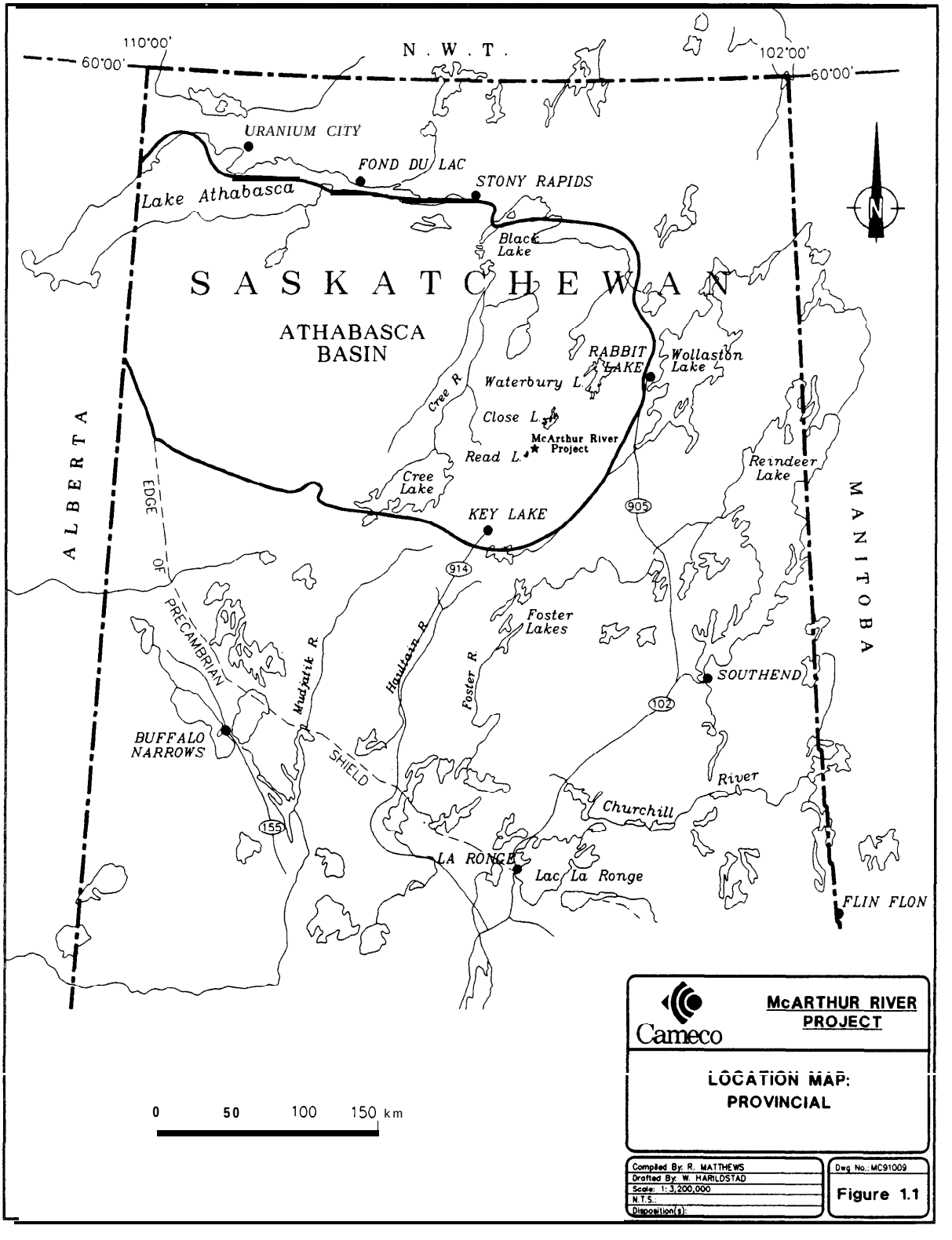
Mr. John Dantouze

Dr. Richard Neal



Dr. Annalee Yassi

APPENDIX A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Waterbury L.
Cree R.
Close L.
McArthur River Project
Read L.
Cree Lake
Reindeer Lake
KEY LAKE
905
914
ALBERTA
EDGE OF PRECAMBRIAN SHIELD
MANITOBA
Foster Lakes
Foster R.
Mudjatik R.
Haultain R.
SOUTHEND
102
BUFFALO NARROWS
155
Churchill River
LA RONGE
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Cameco
McARTHUR RIVER PROJECT
LOCATION MAP: PROVINCIAL
Compiled By: R. MATTHEWS
Drafted By: W. HARILDSTAD
Scale: 1:3,200,000
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Figure 1.1

APPENDIX B

PANEL MEMBER BIOGRAPHIES

DONALD LEE (Chairperson)

Dr. Lee is Head of the Chemistry Department at the University of Regina and Past President of Luther College. A native of Saskatchewan, he has an M.A. from the University of Saskatchewan, a Ph.D. in Chemistry from the University of British Columbia and has completed post doctoral studies at Harvard University. Dr. Lee has been a member of the faculty at the University of Regina since 1967 and has served as a visiting professor at Stanford University and as a visiting scientist at the University of Oslo. He has published over ninety scientific papers and numerous non-scientific articles.

Active in community affairs for many years, Dr. Lee has been Chairman of the Saskatchewan section of the Chemical Institute of Canada, Executive Member of the Saskatchewan Association of Independent Schools, a national official of the Canadian Amateur Swimming Association, and President of the Regina Optimist Dolphin Swim Club.

JAMES F. ARCHIBALD

Dr. Archibald received his Ph.D. in Mining Engineering at Queen's University and is now an Associate Professor in the Department of Mining Engineering at Queen's. His work experience is primarily in the academic field with some associated private consultation. Dr. Archibald is a member of the Canadian Institute of Mining and Metallurgy (CIM), the CIM Backfill Sub-Committee (Rock Mechanics Group) and the American Institute of Mining Engineers.

Dr. Archibald's research interests include measurement and control of radiation hazards in underground mines, mine ventilation systems, *in-situ* stress analysis, rock burst prediction and structural mine design evaluation. Dr. Archibald is a member of the Scientific Review Group examining the concept of deep geologic disposal of nuclear fuel waste.

JOHN DANTOUZE

Mr. Dantouze is a Vice-chief of the Prince Albert Grand Council, with responsibilities encompassing treaty issues, First Nations self-government, and a variety of program, service, and policy areas. Previously, Mr. Dantouze was Prince Albert Tribal Council Community Planning Advisor for the Athabasca Indian Bands of Fond du Lac, Black Lake and Hatchet Lake in northern Saskatchewan.

Mr. Dantouze also sits as an advisor on the Caribou Management Board and the Athabasca Task Force Committee on Northern Health Services. He recently participated in the Saskatchewan Environmental Assessment Review Commission formed to review the province's environmental assessment **review** process, and acted as a Dene interpreter when the commission visited the Athabasca region of northern Saskatchewan.

RICHARD NEAL

Dr. Neal is Associate Dean (Academic) and Professor of Biology in the College of Arts and Science, University of Saskatchewan. He received both his B.Sc. and Ph.D. in Zoology from the University of Southampton, U.K. Dr. Neal has been a member of the faculty of the Department of Biology at the University of Saskatchewan since 1968, and has taught extensively in the field of biology.

Dr. Neal's research interests include population ecology and a broad range of environmental issues, including impacts of uranium mine and mill effluents on the aquatic environment in northern Saskatchewan, effects of pesticides on prairie ponds and duck populations, and revegetation of lands salinized by potash mine tailings. Dr. Neal is actively involved in a number of professional organizations and has been the Chairman of the Environmental Advisory Committee for the City of Saskatoon.

ANNALEE YASSI

Dr. Yassi is an Associate Professor and Director of the Occupational and Environmental Health Unit, in the Department of Community Health Science, University of Manitoba. She is also the Director of the Department of Occupational and Environmental Medicine at the Health Sciences Centre in Winnipeg. Dr. Yassi received her B.Sc. in 1974 from McGill University and her M.D. in 1977 from McMaster University. She obtained a M.Sc. in Community Health, (Epidemiology/Occupational and Environmental Health) in 1985 from the University of Toronto, and is a Royal College Fellow in both Community Medicine and Occupational Medicine.

Dr. Yassi has served as an occupational physician for the Manitoba Federation of Labour Occupational Health Centre; she has also served as the principal medical consultant for the Manitoba Hazardous Waste Management Corporation. She has conducted numerous health hazard evaluations and has been involved in several environmental impact assessments affecting Native communities. She was also a member of the Canadian Public Health Association's Task Force on Human and Ecosystem Health.

APPENDIX C

TERMS OF REFERENCE FOR THE REVIEW OF THE PROPOSED UNDERGROUND EXPLORATION PROGRAM AT McARTHUR RIVER

INTRODUCTION

The Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan shall undertake a public review of the proposed McArthur River Underground Exploration Program. The Program has been proposed by Cameco Corporation on behalf of McArthur River Joint Venture.

As a result of this review, the Panel will make recommendations to assist both governments in reaching decisions on the acceptability of the proposal.

THE PROPOSAL

The McArthur River Underground Exploration Program consists of the construction of surface and underground facilities required to support the exploration and delineation of the McArthur River ore body, any additional infrastructure required to provide power and access to the site and proposals to maintain or reclaim the site, depending on the outcome of the review process for the production mine proposal.

Information obtained from the exploration program will be included in the Environmental Impact Statement for the proposed production mine.

Documentation describing the proposal has already been made available to the public by the proponent and by the provincial and federal regulatory agencies.

SCOPE OF THE REVIEW

The Underground Exploration Program shall be reviewed as a distinct project in advance of the production mine proposal already under Panel review.

The Panel shall review the potential environmental effects of the Program and social effects directly related to those environmental effects, including occupational health and safety effects.

The Panel shall ensure that, in conducting its review, it considers the measures proposed by Cameco Corporation to deal with the effects noted above.

REVIEW PROCESS

The Atomic Energy Control Board and Saskatchewan Environment and Public Safety have already completed initial reviews of the Program, including opportunities for public comment.

The Panel shall conduct its review in accordance with the requirements of the Environmental Assessment Act of Saskatchewan and the federal Environmental Assessment and Review Process.

In order for the governments of Canada and of Saskatchewan to be able to make a timely decision on whether this proposal is acceptable, the Panel shall structure its public review in the following manner:

1) review the documents listed in Appendix I;
2) notify the proponent regarding any needed clarifications to be addressed at hearings;
3) hold public hearings no later than 45 days after it has received the information mentioned in Appendix I, to hear participants' views and opinions on the acceptability of the exploration program;
4) prepare recommendations on the conditions, if any, under which the McArthur River Underground Exploration Program should proceed. If the Panel is unable to find the proposal, or any aspect of it, acceptable, it shall provide its reasons for this conclusion; and
5) submit any recommendations by January 15, 1993, to the federal Ministers of the Environment and Energy, Mines and Resources, the Saskatchewan Minister of Environment and Public Safety and the Atomic Energy Control Board.

The Ministers will make the recommendations public.

APPENDIX D

SCHEDULE OF PUBLIC HEARINGS

Public Hearings were held on the proposed McArthur River Underground Exploration Program as follows:

December 3, 1992	Hotel Saskatchewan, Regina
December 4-5, 1992	Holiday Inn, Saskatoon
December 7, 1992	Band Hall, Fond du Lac
	Band Hall, Black Lake
December 8, 1992	Band Hall, Wollaston Lake
December 9, 1992	Community Hall, Pinehouse
December 10, 1992	Friendship Centre, La Ronge

APPENDIX E

SUBMISSIONS TO THE PANEL

Elder Eli Adam
Maureen Ahenakew
Association of Consulting Engineers of Saskatchewan (E.J. Hinz)*
Association for Energizing Saskatchewan (Bill Ryan)*
Atomic Energy Control Board (George Jack; Dr. Mary Measures)*
Linda Batty
Ed Benoanie
Brent Construction (Russell Clunie)*
Alison Besskkaystare
Sybil Breti*
Robert Bone*
Cameco Corporation*
Canadian Nuclear Society, Saskatchewan Branch (David Malcolm)*
Gordie Carle*
Cecile Caisse
Clifton Associates Ltd. (Wayne Clifton)
Clunie Consulting Ltd. (Jason Clunie)*
Community Health Services (Saskatoon) Association Ltd. (Sue Archer, Michael Murphy)*
D and D Camps (Doug Cossette)
Thorild Dahlgren*
Charlie Denechezhe
Simon Denechezhe
Dirk Jan Dullemond*
Energy, Mines and Resources Canada (G. McGuire)*
Environment Canada, Conservation and Protection (Dennis Lawson, Bill Howard)*
Chief George Fern
Fisheries and Oceans (P.H. Sutherland)*
Dr. Louise Gagné*
Isabelle George*
Kurtis Gibson
Health and Welfare Canada (Jerry Shaw)*
Councillor Eric Henderson
Inter-Church Uranium Committee Educational Co-Operative (Phillip Penna)*
Inuit Tapirisat of Canada*
Kitsaki Development Corporation (J.P. Roberts)*
Mary Ann Kkalther
Kramer Ltd. (Tim Kramer)*
La Ronge and District Chamber of Commerce (Doug Currie)*
La Ronge Exploration Group*
La Ronge Mining Contractors (Rod Spooner)*
Steve Lawrence*
Lowell McIntyre
John MacKinnon
Helen Madonik
Alfred Naldzil
Joachim Neumann*
Norplan Consulting (J.J. Bell)*
North Saskatoon Business Association (Ed Stevens)*
Northern Explosives Ltd. (Larry Wolkowsky)
Northlands College (Dr. Neil Clarke)*

Nuclear Free and Independent Pacific (Rosie Wagstaff)*
Dan Parrott
Porcupine Plains Opportunities Program, Inc. (Carl Kwiatkowski)*
Allan Quandt
Tim Quigley*
René Rediron
Archie Robillard*
Greg Ross
Lil Sanderson
Nap Sanderson
Rick Sanderson
Saskatchewan Community Services
Saskatchewan Construction Association (Jim Chase)*
Saskatchewan Environment and Public Safety (Ron Zukowsky, Greg Vogelsang, Malcolm Ross, Brian Goffin)*
Saskatchewan Environmental Association (Peter Prebbles)*
Saskatchewan Mining Association Inc. (Bob Cunningham)*
Saskatchewan Natural History Society*
Saskatoon Chamber of Commerce (Al Johnson)*
Maisie Shiell*
Graham Simpson*
Neil Sinclair*
Six Seasons Catering Ltd. (William Smith)*
George Smith
Jim Smith
His Worship Peter Smith
Tim J. Smith*
Carol Stang
Dr. J. G. Strnad'
Synergy Today (William Childerhose)*
Allan S. Taylor*
Mike Thomas
Thyssen Mining Construction of Canada Ltd. (Don Stankov)*
Tron Power Ltd. (Ron Hemeon)*
Chief Joe Tsannie
Rosalie Tsannie
Stephanie J. Weigel'
Acting Chief Louis Wolverine

- A written submission was supplied, and is available for public review.

APPENDIX F

BIBLIOGRAPHY OF REVIEW DOCUMENTS

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- Transcript of Public Hearings held in Regina, December 3, 1992; Saskatoon, December 4-5, 1992; Fond du Lac, December 7, 1992; Black Lake, December 7, 1992; Wollaston Lake, December 8, 1992; Pinehouse, December 9, 1992; and La Ronge, December 10, 1992.
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