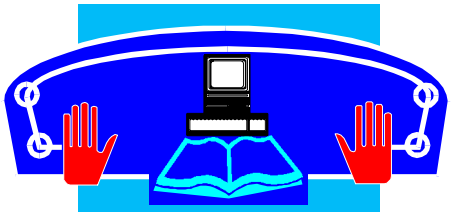

Kiggavik Uranium Mine Environmental Assessment Panel - Environmental Impact Assessment Guidelines And Government Information Requirements

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KIGGAVIK URANIUM MINE ENVIRONMENTAL ASSESSMENT PANEL

Environmental Impact Statement Guidelines and Government Information Requirements

June, 1989

Canada

Federal Environmental Assessment Review Office
510 - 750 Cambie Street, Vancouver, B. C. V6B 2P2 Telephone (604) 666-2431

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KIGGAVIK URANIUM MINE ENVIRONMENT ASSESSMENT PANEL

Draft Environmental Impact Statement Guidelines and Government Information Requests

1.0 INTRODUCTION

Urangesellschaft Canada Ltd. is proposing to develop an open pit uranium mine located about 75 km west of Baker Lake in the Northwest Territories. In order to ensure that a comprehensive environmental impact assessment is carried out with full opportunities for public involvement, an Environmental Assessment Panel has been appointed by the federal Minister of the Environment. The appointment of the panel has the support and concurrence of the Government of the Northwest Territories. The role of the Panel is to publicly review and assess the environmental and socio-economic effects of the project (including consideration of issues relating to community health, worker safety and regulatory procedures) .

As one of the first steps in the Panel review process, the Panel has developed guidelines for the preparation by Urangesellschaft Canada Ltd. of an Environmental Impact Statement (EIS) . In recognition that some of its information requirements can best be met through means outside of the proponent-prepared EIS, the Panel has also developed information requirements to be responded to by federal and territorial government agencies.

The EIS Guidelines and Government Information Requirements have been prepared through consultation with the public; local, regional, territorial and federal agencies; interest groups; and the proponent, through an issues scoping process which included workshops in Baker Lake, Rankin Inlet, and Yellowknife. The length of this document increased significantly as a result of consultation with review participants. In most instances, the

increased size of this final version of the guidelines serves to provide the necessary focus and detail to more general questions already posed in earlier versions.

The responses provided to this document will collectively provide the Panel and review participants with the main information base to be discussed and examined during the public hearings. In addition to examining these responses, the public hearings will also provide an opportunity to discuss other submissions to the Panel from public groups, native organizations and government agencies.

1.1 Format of Guidelines

These guidelines are organized by groups of issues that are of concern to local communities and interested government and non-government organizations. The sections on potential impacts are broken down into baseline data, potential agents of change and potential consequences. The EIS should make clear distinctions between these types of information. Each section begins with a statement on the focus of concern and the spatial and temporal boundaries. Mitigation and monitoring, and the regulatory framework form separate sections but clearly apply to all potential impacts. Rather than repeating requests for mitigation plans and regulatory requirements, the request is made once in each of the appropriate sections.

The issues addressed in this document are organized into the following categories: ecosystem impacts, including plant life, wildlife, physical environment, surface and groundwater, and atmospheric environment; socio-economic impacts; human health and safety, including worker and public health; risk management; tailings management and decommissioning; and mitigation and monitoring.

1.2 Organization and Content of Responses

The Panel expects the responses to the finalized version of these EIS Guidelines and Government Information Requests to be prepared and submitted in the following manner:

1. Project Description prepared by Urangesellschaft Canada Ltd
   Due August 1, 1989

2. Government regulatory requirements prepared by relevant government departments.
   Due September 1, 1989

3. Environmental Impact Statement (EIS) prepared by Urangesellschaft Canada Ltd.
   Due November 1, 1989

4. Document containing all other federal government responses.
   Due November 1, 1989

5. Document containing all other Government of the Northwest Territories (GNWT) responses.
   Due November 1, 1989

The following information requirements, are structured around the main issues to be addressed during the review. The EIS, in particular, should focus on a thorough examination of the identified issues, their significance and what can be done to minimize or mitigate them. As the Panel plans to structure its hearings around these issues, it is important that the EIS contain sufficient information on the issues and their significance to allow for an informed and productive discussion at the hearings.

In order to facilitate public involvement in the EIS review and public hearings, a non-technical summary of the full EIS should be produced in both English and Inuktitut. This summary should be written in plain, non-scientific language and contain a glossary

of terms. It should briefly describe the existing environmental and socio-economic setting, the major positive and negative effects associated with the project, the proposed mitigation, enhancement and compensatory measures, and the proposed monitoring programs. Those aspects of project effects which are of greatest interest and concern to communities should be highlighted. The project description, EIS summary and the full EIS will help to ensure that all review participants from government scientists to community residents will have available to them appropriate information to enable them to effectively take part in the hearings.

1.3 Methodological Considerations

The following methodological considerations should be taken under advisement by the proponent in preparation of the EIS. They are based on Section 12 of ~~An Ecological Framework For Environmental~~ Impact Assessment in Canada, Beanlands and Duinker, 1983. Reference should also be made to the "Ethical Principles for the Conduct of Research in the North", Association of Canadian Universities for Northern Studies, 1977. Copies of these documents are available from the Panel Secretariat.

1. ~~Identify Valued Ecosystem Components to Provide a Focus For Subsequent Research Activities.~~

   In these guidelines the Panel has begun to identify valued ecosystem components as brought forward in the scoping workshops. Further focussing may be necessary on the part of the proponent. The EIS must also identify ecosystem components that are expected to be impacted but are not sufficiently valued to be studied in detail.

2. ~~Set Explicit Spatial and Temporal Boundaries For Study and Analysis of Changes in the Valued Ecosystem~~ Components.

   When assessing impacts, the proponent is asked to define the maximum spatial and temporal extent of potential impacts, provide rationale for this delineation, and then carry out impact assessment within these boundaries. Where impacts may be felt outside the Northwest

Territories, such as in transportation of dangerous goods by air and water, information must be included. Due to the long-term persistence of radioactive materials, there is clearly a need for temporal boundaries to be extended into the long-term.

3. Define the Criteria For Determining Impact Significance

When defining the significance of potential impacts the proponent must take into consideration the following three factors:

statistical significance (related to the problems of isolating project-induced changes from natural variation) ;

ecological considerations (related to the importance of project-induced changes from a purely ecological perspective, independent of social values) ; and

social importance (related to the acceptability of project-induced changes in valued ecosystem components) .

Terminology used to represent the level of significance (eg. negligible, minor, major, etc.) must be clearly defined.

4. State Impact Predictions Explicitly and Provide Rationale For Predictions

To be most useful, impact predictions must:

fulfill the environmental assessment objective of contributing to informed decision-making,
contain an estimate of the uncertainty expected, and
be testable through a monitoring program

The predictive analysis should strive to ascertain the nature, magnitude, duration (timing), extent (geographic distribution) , level of confidence, and range of uncertainty of the predicted changes. Reasons should be given if any of the above cannot be ascertained. All strategies and methodologies used for predicting the potential effects of the project on each valued ecosystem component must be shown explicitly, providing details of all models, assumptions, simplifications and generalizations used.

5. Design and Undertake a Monitoring Program

A monitoring program must be designed to monitor change during the construction, operation and abandonment phases of the proposed mine. This program must test impact predictions and hypotheses, thus contributing to the body of knowledge for future assessments, and test mitigative measures, thus ensuring protection of valued ecosystem components.

6. Undertake Rigorous Data Collection

The EIS should use the most recent information available, drawing on international experience where relevant. The proponent should undertake fieldwork or original research whenever possible to verify or collect data that are not already available. Any information gaps should be identified and where information is not available, the proponent should demonstrate what efforts were made to acquire such information and what additional efforts would be required to obtain the information.

7. Make use of Graphic Material

Wherever possible, maps, illustrations and graphs should be used to assist in the display of information. Where possible, maps should be of the same scale to allow for comparison of the distribution of mapped features.

8. Make Use of Local Knowledge

In order to contribute information that is otherwise unavailable and to enhance existing information, local knowledge and expertise should be incorporated in all possible aspects of the EIS. All local knowledge incorporated into the EIS should be identified as such.

9. Collection of Relevant Baseline Information

In preparing the EIS, the Panel expects that the proponent will collect all baseline data necessary for estimating the potential impacts of the proposal. More detailed baseline data necessary for a comprehensive monitoring program need not be collected at this time. However, the proponent must indicate what, how and by what schedule monitoring baseline data would be collected if approval for the project were granted.

1.4 Information Requirements

In developing the following information requirements, the Panel has designated whom it expects to respond to each of the requirements. The majority of the information requests are directed to **Urangesellschaft.** Where noted in brackets, information requests are also directed at federal and/or territorial government agencies. Also, some information requests are directed at more than one respondent. In some instances the proponent will likely draw upon government documents, data or expertise. All federal and territorial government agencies involved with uranium mining are asked, in addition to the other information requests, to **forward** a listing of research **carried** out for or by the agencies regarding the potential **socio-economic** and environment**tal** impacts of uranium mining. The Panel would like to receive this information by September 1, 1989.

The government agencies that are expected to have a role to play in uranium mining in the Northwest Territories are:

Government of the Northwest Territories **(GNWT)**
NWT Water Board
Atomic Energy Control Board **(AECB)**
Department of Energy, Mines and Resources **(EM&R)**
Department of Indian Affairs and Northern Development **(DIAND)**
Department of Fisheries and Oceans **(DFO)**
Health and Welfare Canada **(HWC)**
Environment Canada (DOE)
Transport Canada (DOT)
Labour Canada **(LC)**

2.0 BACKGROUND INFORMATION

Responses to the following requests for background information will help set the scene for the detailed assessment and analysis of project impacts. Responses to the following requests should

provide a complete description of the project, information on its economic rationale, background on the proponent and details on the government regulatory framework under which the project would operate.

2.1 Project Description

The proponent **must** provide a complete and detailed description of all aspects of the proposed development, including the **setting,** design, construction, operation and transportation. As outlined above, the Panel has requested that the project description be submitted by August 1, 1989. Submission of the project description in advance of the EIS will allow the Panel and other review participants to fully familiarize themselves with the proposal prior to examination and review of the potential environmental, socio-economic and health impacts.

2.1.1 Setting

Provide information on existing, planned or probable developments in the region in sufficient detail to provide insight into cumulative impacts or interactions that may arise. Include information on current or proposed uranium exploration programs. (UG in consultation with **GNWT, DIAND** and **EMR)**

Outline any future plans that the proponent may have to expand the proposed facility or to develop other mineral deposits in the **Keewatin.**

Using comparative historical data from similar projects elsewhere, indicate whether proceeding with the project would be likely lead to its further expansion or might attract other developments, whether of a similar nature or not. (UG in consultation with **DIAND** and **GNWT)**

How have arctic conditions been taken into consideration in the design and selection of equipment for construction, operation and decommissioning plans for the proposed mine?

2.1.2 Des ign

Provide rationale and criteria **used** to justify the selection of approaches, designs and strategies used in the construction, operation and decommissioning phases of the project. Where alternatives were examined, provide rationale used to selects particular alternative and reject others. Engineering, economic or operational constraints which preclude certain options should be described. Significant differences in impacts among the alternatives considered should be described. Emphasis should be placed particularly on alternative methods of long-term tailings management. Where project options are still being considered, identify all alternatives and clearly set out the factors being considered and any information must be obtained before a decision can be made.

What is the total land area required by the proposed project?

What is the total land area that the public and wildlife would be prevented from making use of? Would this change over time?

What measures would be taken, such as constructing a fence, for the purpose of limiting access of people and wildlife to the proposed mine facilities?

2.1.3 Construction

Describe the following:

location, method and timing of construction;

types, approximate quantities, sources, timing and means of acquiring construction materials, equipment and **services;** and

expected quantities and characteristics of toxic wastes, debris, effluent and emission, including noise caused by or attributable to construction.

2.1.4 Operation

Provide details of the design and operation of the following aspects of the proposal:

- open pits
- ore storage pads
- waste rock disposal
- uranium tailings treatment and disposal
- mill
- sulphuric acid plant
- lime plant
- power plant
- fuel storage
- solid waste management
- liquid waste management
- facility decommissioning
- site reclamation

Provide a breakdown of the composition, disposition and tonnage of the material to be mined, including waste rock, mill tailings and uranium.

What is the depth and size of the ore body?

What is the proposed rate and method of mining?

Outline the proposed use of explosives.

Outline in detail the proposed waste rock disposal process, including the potential for trace metals and low levels of radionuclides leaching from the waste rock.

Outline plans for the removal and treatment of snow which may accumulate in the open pits during the winter months.

Outline plans for the removal and treatment of excessive volumes of water which may accumulate in the spring melt season.

Identify all input resources required, including process chemicals, water and energy

Identify all liquid outputs including sanitary wastewater, process waste water, surface runoff. Outline all radioactive and non-radioactive contaminants of these outputs.

Identify all gaseous emissions and the chemical composition of these emissions.

Describe the mill process, including ore preparation, grinding, thickening, leaching and washing, solvent extraction, uranium recovery and process control.

Describe the tailings disposal and effluent treatment, including the lime plant, sulphuric acid plant, fuel storage, service buildings, water supply and balance.

Provide details of construction and permanent camps, including: potable water systems, waste treatment and disposal, accommodation, wash facilities, and medical and surgical care facilities.

Provide details of the nature and timing of operations and supporting transportation systems associated with the limestone quarry.

Provide details of the proposed decommissioning plans, giving rationale for the chosen approach.

Describe any plans for reclamation and outline the expected state of the environment after mine abandonment.

2.1.5 Transportation

Outline the entire transportation infrastructure, including surface, air and marine transport facilities.

Identify any changes that may be required in the existing infrastructure of nearby communities.

Outline the pattern, frequency and seasonal trends of surface transport, aircraft flights and marine shipments in sufficient detail so as to identify possible interactions with wildlife.

Specify the transportation equipment to be used and the training of the transportation personnel.

Outline the frequency and volume of dangerous goods to be stored; and transported into, out of and within the project site.

- Provide details of spill containment designs for all areas where hazardous materials are stored, handled or utilized, including along transportation routes.

- Describe any power or other service corridors required.

2.2 Project Justification

2.2.1 Economic Rationale

Based on factors such as market supply and demand, pricing and future projections, display economic rationale for the project. Outline the historic, existing and projected market characteristics, including the geographic context. Methodology used in deriving estimates of supply and demand and the qualifications and assumptions attached to them should be clearly stated.

What changes in the market for uranium might affect the viability of the proposed mine?

2.2.2 costs

What is the expected departmental cost for each government office that would have a regulatory or monitoring responsibility should the project proceed? Include costs from exploration to long term post-project monitoring. Is the expertise, manpower, infrastructure and equipment available within these offices at the present time? If not, from where would these resources be drawn and at what cost? (GNWT, AECB, EM&R, DIAND, NWT Water Board, DFO, HWC, DOE, DOT, LC)

Would there be any government assistance to fund the project?

What is the estimated cost to the proponent of producing uranium from the proposed Kiggavik project? include the cost of:

- design
- construction
- site infrastructure
- mine/mill operations
- decommissioning
- reclamation
- mitigation
- monitoring

2.2.3 Benefits

What are the potential economic benefits of the project to the Keewatin, Northwest Territories, and Canada? Of particular interest is potential tax revenue (not including personal income tax). What is the expected income, through taxes and royalties, to each level of government? Provide a breakdown for each type of income for each year of production. How would the revenue generated be utilized and distributed? (Urangesellschaft, **GNWT, AECB, EM&R, DIAND)**

Is there any possibility of establishing a fund, based on royalties from the proposed mine, for the **Inuit** similar to the "Heritage **Fund"** in Alberta? **(DIAND, GNWT)**

What would the proposed mine contribute permanently **to** the infrastructure of the region as opposed to any temporary contributions (ie. what services and opportunities, if any, would remain after mine closure)?

After mine closure, would the region lose a variety of **services** on which it had come to depend?

2.3 Background on **Proponent**

What financial security does **Urangesellschaft** have to ensure that the project is carried through in compliance with all regulations?

- What experience does **Urangesellschaft** have in **uranium** mine construction, operation and decommissioning?
- What experience does Urangesellschaft have in introducing industrial development to isolated northern and native communities?
- What experience does **Urangesellschaft** have with development in arctic regions, particularly in continuous permafrost regions?

What experience has **Urangesellschaft** had in incorporating environmental and health considerations into project construction, operation and abandonment (include uranium mining and other experiences) . How successfully have impacts been avoided or mitigated?

Where the proponent does not have expertise required to successfully carry out the proposed project, outline how this expertise would be acquired.

Does the proponent have the financial resources to post bond to ensure adequate clean up in the event of a major spill as well as for decommissioning?

2.4 Reuulatory Framework

2.4.1 Structure

Identify all siting, design, construction, operating and monitoring and decommissioning standards, regulations and requirements set out by various government departments that apply to the proposed uranium mine and potential impacts on humans and the environment. Include identification of responsible government agencies and the reporting requirements for each of the regulations or standards. Identify any overlaps or gaps in the regulatory framework. (GNWT, AECB, EM&R, DIAND, NWT Water Board, DFO, HWC, DOE, DOT, and LC)

Include standards and regulatory requirements relating to:

construction phase, open-pit mine, mill, ore storage bins, waste ore piles, chemical and power plants, tailings piles and tailings ponds, transportation infrastructure, ongoing operation of the proposed mine, decommissioning of the mine and all other aspects of the proposal;

potential impacts to plant life, fish and wildlife, surficial geology, surface and ground water, the atmosphere, and all other potential environmental impacts; and

health and safety of workers and the general public, socioeconomic impacts on the local communities, and all other potential human impacts.

What processes and/or bodies are likelyto be established as a result of the final settlement of the Tungavik Federation of Nunavut land claim? (GNWT)

What authority would these processes and/or bodies have in authorizing aspects of or enforcing compliance and effects monitoring aspects of the proposed project? (GNWT , AECB, EM&R, DIAND)

How might authority over mining be devolved to a greater extent to the GNWT over the course of the review, construction, operation or decommissioning of the proposed mine? (GNWT , AECB, EM&R, DIAND)

How would regulation of the proposed project be coordinated between and within government agencies at all levels of government? **(GNWT, AECB,** EM&R, **DIAND, NWT** Water Board, DFO, HWC, DOE, DOT, and **LC)**

How does **Urangesellschaft** propose to comply with each of the regulations and standards?

How would compliance with regulations be enforced by responsible government agencies? **(GNWT, AECB,** EM&R, **DIAND, NWT** Water Board, DFO, **HWC,** DOE, DOT, and **LC)**

How would information required by regulation be recorded? Would it be publicly available? **(GNWT, AECB,** EM&R, **DIAND,** NWT Water Board, DFO, HWC, DOE, DOT, and **LC)**

2.4.2 Legislation

1s there a need for the creation of new legislation to effectively regulate the proposed project? If so, **what** legislation is required and by what process would it be put in place? What time frame is required to develop and enact such legislation? **(GNWT)**

What leases, licenses, or permits would be required if approval were granted for the proposed mine? Through what processes would applications be considered? **(GNWT, AECB,** EM&R, **DIAND,** NWT Water Board, DFO, HWC, DOE, DOT, and **LC)**

2.4.3 Compensation

Do legal provisions exist to require the proponent to post a bond to cover the costs of decommissioning as well as containment and clean up of spills or other accidental releases of contaminants. **(GNWT, AECB,** EM&R, **DIAND,** NWT Water Board, DFO, HWC, DOE, DOT, and **LC)**

What amount of bond, if any, should be posted to protect against the possibility of damage to the environment, wildlife or humans? **(GNWT, AECB,** EM&R, **DIAND, NWT** Water Board, DFO, HWC, DOE, DOT, and **LC)**

Which government agency or non-government organization should be responsible for the administration of such a bond? **(GNWT,** AECB, EM&R, **DIAND,** NWT Water Board, DFO, HWC, DOE, DOT, and LC)

What requirements are there for the provision of compensation? What criteria would be used for awarding compensation? Who would administer a compensation program? Who would fund the program? How would the criteria incorporate the provisions of the Wildlife Compensation Agreement-in-Principal initialed 19 June, 1988 by the Government of Canada and the Tungavik Federat-ion of Nunavut? (GNWT, AECB, EM&R, DIAND, NWT Water Board, DFO, HWC, DOE, DOT, and LC)

2.4.4 Expertise

What experience has each government agency involved have in regulating projects of a similar nature? (Gin, AECB, EM&R, DIAND, NWT Water Board, DFO, HWC, DOE, DOT, and LC)

Are there any conflicts of interest or apparent conflicts of interest within government agencies which play a role both in the regulation and promotion of uranium mining? (GNWT, AECB, EM&R, DIAND, NWT Water Board, DFO, HWC, DOE, DOT, and LC)

What long term commitments are the government monitoring agencies prepared to make in terms of frequency and adequacy of inspection to ensure the level of monitoring would not be affected by budgetary constraints? (GNWT, AECB, EM&R, DIAND, NWT Water Board, DFO, HWC, DOE, DOT, and LC)

3.0 ECOSYSTEM IMPACTS

This section includes requests for information that relates to the effects of the project as a whole, on the entire ecosystem. The objective of this ecological approach to environmental impact assessment is to ensure that all potential impacts resulting from the project are examined as part of an interrelated system rather than as isolated units.

3.1 Biological Impacts

3.1.1 Plant Life

3.1.1.1 Focus of Concern

Concerns expressed over potential impacts to the plant life in the Keewatin region focussed on plant life (particularly lichen) as a food supply for wildlife (particularly caribou) . Plant life is seen as an important element of the food chain which eventually includes humans as the consumer of wildlife and plants (particularly berries).

3.1.1.2 Spatial and Temporal Boundaries

In establishing a study area for data collection and analysis, the proponent must first define the maximum spatial and temporal extent of potential impact. This boundary must take into consideration air and water pathways by which contaminants may be dispersed over time.

3.1.1.3 Baseline Data

Identify and illustrate the extent and distribution of all significant plant species in the study area as defined above. Significant plant species include those which, in isolation or as part of a plant community:

- are rare or unique to the Xeewatin region;
- are important food sources to humans and/or wildlife;
- tend to bioaccumulate contaminants;
- are particularly sensitive to contaminants;
- are 'Syndicators'c of various potential impacts;
- play an important role in the ecosystem structure and function; or
- play an important role in permafrost integrity and slope stability.

- Identify those "keystone species's which play a particularly important role in maintaining the balance of the ecosystem. What role do these important species play in maintaining the structure and function of the ecosystems?

  - include such factors as consumption by wildlife and humans, slope stability and permafrost degradation

What is the potential for **bioaccumulation** of radiological and non-radiological contaminants in the significant species as defined above? What is the long-term persistence of these contaminants?

Identify any pathways through which radiological and **non-**radiological contaminants could pass from plant species to wildlife and humans.

Are any of the significant (see above) plant species currently contaminated with radiological or **non-**radiological contaminants? Identify the source, degree, distribution and means of contamination. Include all contaminants which could potentially increase with impacts from the proposed mine, and any chemical, physical or biological characteristics of the existing **plant** life which may affect the rate of **uptake, persistence** or **susceptibility of plants to** future contaminants.

3.1.1.4 Potential Agents of Change

What radiological and non-radiological contaminants associated **with** the proposed mine project could potentially contaminate plant species? What are the sources of these contaminants? Are there any seasonal variations to the distribution of these contaminants?

include contaminants arising from **construction,** open-pit, mill, ore storage bins, tailings, sewage disposal, **sulphuric** acid and lime plants, power plant, camp, transportation infrastructure, decommissioned facility and all other potential sources of contaminants

By what means could contamination occur?

include air deposition (fallout), rainfall, uptake from groundwater, soil contamination and all other potential means of contamination

What is the potential distribution and degree of contamination?

By what means could plant life undergo physical disturbance?

include road construction, quarrying, backfilling and all other potential means of disturbance

3. 1.1.5 Potential Consequences of Change

Given the agents of change identified above, what are the potential impacts of contamination and disturbance on the plant species themselves and on maintenance of the ecosystem balance? Include various degrees of impact from least to greatest significance.

3.1.2 Wildlife

3.1.2.1 Focus of Concern

Concern expressed for the wildlife focussed primarily on the fish and caribou which make up a significant portion of the local diet. Contamination of these human food sources and habitat disturbance (particularly the limestone quarrying activities in caribou calving grounds) are seen in the context of the entire food chain.

3.1.2.2 Spatial and Temporal Boundaries

In establishing a study area for data collection and analysis, the proponent must first define the maximum spatial and temporal extent of potential contamination or disturbance. This boundary must take into consideration air, water and food supply pathways by which contaminants may be spread, and migratory routes by which **wildlife** may travel over time.

3.1.2.3 Baseline Data

Identify and show the extent and distribution of all significant species of fish, birds, insects, and small and **large** mammals that permanently or temporarily make use of the habitat in the study area as defined above. Identify important habitat areas, migratory routes and patterns, breeding patterns and calving grounds (specify intensity and timing of land use). Significant species include those which:

- are rare or unique to the Keewatin region;
- are important food sources to humans and/or other wildlife;
- are important to the local culture;
- are important to the local economy;
- tend to **bioaccumulate** contaminants;
- are particularly sensitive to contaminants;

are **"indicators"** of various potential impacts; or play an important role in the ecosystem; structure and function.

Identify those "keystone species's which play a particularly important role in maintaining the balance of the ecosystem. What role do these important species play in maintaining the structure and function of the ecosystems?

include such factors as food supply, competition, predation, habitat and consumption by humans

What is the potential for **bioaccumulation** of radiological and non-radiological contaminants in the significant species as defined above? What is the long-term persistence of these contaminants?

Identify any pathways through which radiological and **non-**radiological contaminants could pass from one wildlife species to another or to humans.

Are any of the significant (see above) wildlife species currently contaminated with radiological or **non-**radiological contaminants? Identify the source, degree, distribution and means of contamination. Include all contaminants which could potentially increase with impacts from the proposed mine, and any biological or chemical attributes of the existing wildlife which may affect the rate of uptake, persistence or **susceptibility** of wildlife to future contaminants.

3.1.2.4 Potential Agents of Change

What radiological and non-radiological contaminants associated with the proposed mine project could potentially contaminate wildlife species? What are the sources of these contaminants?

By what means would contamination occur?

include air deposition (fallout) , water, food supply and all other potential means of contamination

What is the potential distribution and degree of contamination in wildlife species?

What is the potential for **bioaccumulation** of radiological and non-radiological contaminants in all indigenous wildlife species?

What is the potential for contamination of **"country food"** stored in caches on the land?

By what means could wildlife habitat undergo physical disturbance? (Of particular importance is disruption of caribou calving grounds and wolf dens)

include road construction, winter roads, quarrying, backfilling and all **other** potential means of disturbance

How might wildlife be **disturbed** by the noise and ongoing activity of construction and **mine** operation?

How might fish and wildlife be affected by increased **fishing** and hunting with in-migration of population and increased access to **fishing** and hunting areas?

3.1.2.5 Potential Consequences of Change

What are the potential impacts of animal contamination, habitat disturbance and other disturbances on the **animal** species themselves and on maintenance of the ecosystem balance? Include information on long-term, cumulative impacts given the **current** levels of contaminants **in** the wildlife, and degrees of impact at various age groups.

3.2 Physical Environment Impacts

3.2.1 **Focus** of Concern

The element of the physical environment which is of greatest concern is the permafrost. Uncertainty of how the integrity of the permafrost would be altered through the course of the proposed development and into the long term is of concern particularly in the face of global climate change.

3.2.2 Spatial and Temporal Boundaries

In establishing a study area for data collection and analysis, the proponent must first define the maximum spatial and temporal extent of potential contamination or disturbance. This boundary must take into consideration air, and water pathways by which contaminants and physical disturbances may be distributed.

3.2.3 Baseline Data

Provide an inventory of the physical environment outlining all significant **geomorphological** features.

include all **surficial,** geological, glacial and permafrost features

What processes are active in the dynamics of these features? Of particular importance are permafrost dynamics.

include role of climate, vegetation, wildlife, water, and all other factors which influence the state of the physical environment

What are the current permafrost distributions, depths and variations in the proposed project site area?

What is the pattern and depth of the active layer? What are the seasonal variations? What variations in active layer depth have taken place over time?

Provide a comprehend ive geotechnical study of the proposed tailings containment facility.

What role does the surficial geology play in maintaining ecosystem balance? .

include soil-plant interactions and groundwater movement

Is any of the **surficial** material currently contaminated with radiological or non-radiological contaminants?

3.2.4 Potential Agents of Change

What radiological and **non-radiological** contaminants associated with the proposed mine project could potentially contaminate **surficial** material?

What are the sources of these potential contaminants?

include the open pit, **mill,** lime plant, **sulphuric** acid plant, ammonium nitrate fuel oil blasting, and any other potential sources

By what means could contamination occur?

include all air and water pathways (including acid precipitation)

What is the potential for accumulation and concentration of radiological and non-radiological contaminants in surficial materials?

By what means could the physical features undergo physical disturbance?

include permafrost degradation resulting from vegetation disturbance, and potential impacts of the tailings management plan on permafrost integrity

3.2.5 Potential Consequences of Change

What are the potential impacts of contamination and physical disturbance of the physical features themselves and on maintenance of ecosystem balance?

3.3 Surface and Groundwater Impacts

3.3.1 Focus of Concern

The potential for contamination of the water and subsequently the wildlife, plants and humans supported by water was expressed as a broad concern. Recognizing that-water is also a means of spreading contaminants, the position of communities downstream from the proposed mine site and the spring run off conditions were referred to frequently.

3.3.2 Spatial and Temporal Boundaries

In establishing a study area for hydrologic data collecting and analysis, the proponent must first define the maximum spatial and temporal extent of potential contamination. In the case of hydrologic boundaries; the spatial extent of impact must be defined for both surface and ground water (ie. surface area covered and depth of subsurface water). At a minimum, hydrological information must be collected for all receiving waters throughout the system to the marine confluence.

3.3*3 Baseline Data

Identify all surface and groundwater features in the area defined by the boundary established above.

include details of drainage patterns, location and size of watersheds, precipitation, runoff and evapotranspiration, storage capacity, water quality, thermal patterns, discharge rates, velocity, **sedimentology,** lake morphometry, and channel morphology.

What role does each component of the hydrologic environment play in maintaining ecosystem balance?

include support of plants, wildlife and humans, and role in the dynamics of **surficial** features

Are any elements of the hydrologic environment currently contaminated with radiological or non-radiological contaminants? Identify the source, degree, distribution and means of contamination.

3.3.4 Potential Agents of Change

What radiological and non-radiological contaminants associated with the proposed mine project could potentially contaminate elements of the **hydrologic** environment?

What are the potential sources of these contaminants?

include construction, the open-pit, mill, ore storage bins and piles, waste rock piles, tailings, transportation system, marine terminals, fuel storage areas, chemical storage areas, decommissioned facility and all other potential sources

By what means could contamination potentially occur?

include water and air pathways

What is the potential distribution and degree of contamination of surface and groundwater? How might spring runoff and other seasonal variations in water volume and velocity affect the rate of potential contaminant dispersion?

What is the potential for radiological and **non-**radiological contamination of downstream waters in the area of the communities of Baker Lake and Chesterfield Inlet?

What is the potential for accumulation and concentration of radiological and non-radiological contaminants in the hydrologic environment?

include stream and lake sediment, groundwater channels and aquifers

What is the potential for alteration of the sedimentation patterns in rivers and lakes?

What plans, if any, are there for channel training, dredging or other engineering alterations to the Chesterfield Inlet waterway?

What elements of the hydrologic environment might undergo physical disturbance?

include use of lakes for tailings, damming of streams and all other potential disturbances

What is the potential for changes to water levels, and water movement patterns?

What is the potential for alteration of surface drainage patterns?

include spring run-off, subgrade degradation, and ice-filling of culverts

3.3.5 Potential Consequences of Change

What are the potential impacts of sediment and water contamination, sedimentation changes, water level changes and physical disturbance of surface and groundwater systems and on the maintenance of ecosystem balance?

include potential on-site and downstream impacts

3.4 Atmospheric Environment Impacts

3.4.1 Focus of Concern

Given the distinctively strong winds in the Keewatin region, concern over air quality impacts focussed on the potential for widespread dispersal of radioactive gas and dust.

3.4.2 Spatial and Temporal Boundaries

In establishing the boundaries for the study area, the proponent must define the maximum spatial and temporal extent of potential air quality impact.

3.4.3 Baseline Data

Provide a profile of the meteorological conditions for the area as defined above, including all parameters that would affect air quality and the airborne dispersal of radiological and non radiological contaminants. If the Baker Lake station is used as a standard for the **Kiggavik** site, provide quantitative rationale to support this extrapolation.

What radiological and non-radiological contaminants are presently in the atmosphere in the **Kiggavik** area? What are the sources of these contaminants?

3.4.4 Potential Agents of Change

What radiological and non-radiological contaminants associated with the proposed mine project could potentially enter the atmosphere?

include particulate matter, gaseous emissions and chemical emissions

What are the sources of these potential contaminants?

include construction, open-pit, mill, ore storage bins, lime and **sulphuric** acid plants, power plant, limestone quarry, tailings, transportation, decommissioned facilities, and all other potential sources

How would contaminants be dispersed and deposited?

How do site-specific and seasonal factors such as wind speed and direction, precipitation, atmospheric stability, temperature inversions, heavy fog and topography affect dispersal of particulate and gases?

What are the potential patterns of contaminant dispersal and deposition for all potential contaminants?

3.4.5 Potential Consequences of Change

What impacts would these contaminants have on ecosystem balance?

include potential contamination of water, soil, plants, wildlife and humans?

What potential impacts would contaminants have on local, regional and global air quality?

3.5 Archaeological Impacts

PWNHC

Identify all areas or features of archaeological or cultural importance in the area. Identify ancestral burial sites near the proposed mine site and transportation infrastructure. What arrangements are proposed to deal with situations where the proposed project may interfere with existing valued cultural and archaeological sites and features? (UG and GNWT)

Identify any plans to protect sites by avoidance, excavation or company policies to discourage vandalism.

What are the potential impacts of the proposed development on cultural and archaeological features?

4.0 SOCIO-ECONOMIC IMPACTS

Like the previous section, this section takes a broad-based approach to examining impacts as part of an interrelated system. In this case, the interrelated system is the socio-economic system that could be affected by the project. This system includes elements relating to community lifestyles, community character culture, employment, and community-based enterprises. The responses to the following information requests are intended to provide a comprehensive picture of the socio-economic system in the project area and potential project impacts on this system. The Panel views socio-economic impacts to be of great importance and the responses to the following requests should not be treated as of secondary importance when compared to the ecosystem impacts.

4.1 Focus of Concern

The socio-economic concerns of the Keewatin communities focussed on the potential negative impacts associated with in-migration of southern workers. Many questions also arose about the potential for native and northerner employment opportunities.

4.2 Spatial and Temporal Boundaries

Studies into the potential socio-economic impacts are expected to include all of the Keewatin communities. The temporal boundary should be extended into the long term, to the maximum future extent of potential impact.

4.3 Socio-Economic Structure

Carry out a baseline study of the local communities to identify population distribution, levels of education, demographics, language, religiousaffiliation,ethnic background, household income, dependence on government assistance and employment patterns.

Identify those aspects of the communities that are most important in defining the character and culture of the community and in maintaining the social structure and function of the community.

What are the dominant institutional and economic activities in the Keewatin?

What social problems are evident in the local communities?

How might the proposed mine directly or indirectly alter the existing social structure?

include such factors as changes in household income, increased economic activity, separation of workers from family members, in-migration of non-northerners, change in subsistence economy patterns, etc.

Given the current socio-economic structure of the Keewatin, what projections can be made about the future structure in the absence of the proposed mine development?

How has industrial development affected the social and economic structure of similar northern communities?

What is the potential for in-migration of people into the Keewatin Communities in both the construction and operation phases of the proposal? Provide a breakdown of anticipated in-migrants (ie. native/non-native, northern/southern.

consider the potential for in-migration associated with the potential for increased economic activity through the provision of supplies and services to the proposed mine by local communities

What are the potential impacts of population in-migration and other potential changes on the communities?

include changes in the cost of living, boom/bust syndrome, cultural differences, increased pressure on service facilities such as schools and hospitals, demand and cost of housing, increased hunting, creation or exacerbation of social problems, alcoholism, drug abuse, prostitution, unwanted pregnancies, loss of language and culture, marriage and family breakdown and all other potential impacts that may occur throughout all phases of the proposed project

How might in-migration of construction and mine/mill workers affect the rates of sexually-transmittable diseases such as venereal disease, herpes and AIDS?

What long-term benefits would remain in the Keewatin after mine closure?

Is there any possibility of there being an increase in home, life and health insurance in nearby communities due to the presence of the proposed mine?

4.4 Native and Northern Employment

What is the current level of skill and training in the local communities that could be utilized for employment in the proposed mine?

What needs of the proposed mine could be met by skills and capabilities currently existing in the local communities?

What types of jobs would be available for northern and native people? How many? What criteria would be used to define northern and native people?

How would native and northern employment be incorporated into the proposed mine hiring policies?

Would these policies apply uniformly throughout all phases of the project?

What total percent of northerners would the proposed mine employ?

Would the management of the proposed mine ensure that contractors and sub-contractors were subject to the same" policies?

What type of commitment or guarantee would the proponent be willing to make regarding employment of native and northern people?

Would natives and northerners acquire appropriate mining certification that could be used in other locations in the future?

Would there be any cross-cultural programs between northerners and southerners and natives and non-natives?

What policies would be in place regarding native and northern workers receiving equivalent pay to southern workers with the same experience and qualifications?

How would the communities be consulted regarding work schedules?

What programs are proposed to assist native employees with the transition to wage employment and matters of financial management?

What is the willingness and interest amongst local people to work in an industrialized environment generally, and at the proposed mine specifically?

Would the proposed mine employ union or non-union workers? How would this affect the ongoing prospects for native employment?

Would native trainees and employees have native supervisors and native support personnel whom they can consult about personal and other problems related to their training or employment?

- How would local communities be informed about job and training opportunities?

4.5 Provision of Goods and Services

Provide information on the type, volume and value of goods and services to be acquired locally and opportunities to diversify and increase local supply.

How would the proponent assist local small businesses in order that they may successfully bid on business opportunities? (consider such options as dividing jobs up into small tasks, holding pre-bid workshops to explain the bidding process, post-bid workshops to explain deficiencies in unsuccessful bids, joint-venture programs, providing transport of materials into the site, etc.)

Are any of the employment and business opportunities likely to remain after mine closure?

4.6 Non-northern Employment

Would residents of regions other than the Northwest Territories be contacted with regard to employment opportunities? How and where would this be carried out?

How would southerners apply to the proposed mine?- (ie would they arrive in Baker Lake to seek employment?)

Is there any legal mechanism by which non-local job-seekers can be limited in their access to Baker Lake?

What contact would southern-hired mine employees have with Baker Lake while off duty? Would this contact be limited or controlled in any way?

4.7 Training

How and where would pre-training and in-service training be carried out?

- Would there be management training and management positions for native and northern people?

- Would the proposed mine promote mining career training through such programs as scholarships for high schools, technical schools and universities?

What pre-service and in-service training programs are proposed for native and northern employees?

What would happen to employees after mine closure? What programs would be developed to assist employees?

When would job training begin? Would this be for skilled labour and management as well as for laborers?

What training would be required to prepare local residents for managerial and other positions of responsibility on the proposed mine site? Who would pay for this training?

What rotational work schedule is proposed? What is the rationale for selection of this schedule?

4.8 Workers' Camp

Questions regarding the workers' camp apply to all camps, including temporary camps for construction and more permanent camps for mine/mill operation.

What accommodation arrangements would be provided to mine workers? Would arrangements be made to accommodate female workers?

Would couples with or without children be accommodated?

What arrangements would be made to control drugs and alcohol at the camp?

Would any child care facilities be provided for children while parents are working? Where would such facilities be located? Who would staff such facilities?

What access would workers have to fishing and hunting in the area? How would this be controlled and monitored?

Would the proposed mine schedule be sufficiently flexible to allow for traditional hunting seasons?

Who would pay for the air transport of workers from their homes to the proposed mine site?

From what areas would the company fly workers in?

What would happen if weather conditions were such that the airplanes could not bring workers in or take workers

out? Would workers unable to leave the mine site continue to be paid while waiting for the weather to change? How often is the Baker Lake airport closed? How often would there likely be air strip closure at the proposed mine site?

What social and recreational programs would be provided at the camp?

How would the camp be adapted to meet the particular needs of native employees? Would country foods be provided in the cookhouse?

Provide rationale for use of the fly-in/fly out system of employment?

What access would local people have to the mine and what access would mine workers have to the local communities? How would this be controlled?

4.9 **Renewable** Resource Use

What are the current traditional uses of the area?

include hunting, fishing, trapping and all other traditional uses

What is the economic value of **"country food"** consumption (ie. what is the replacement cost if another source of protein were required)?

- What are the commercial uses of the natural resources?
- What is the potential for commercial use of natural resources?
- What is the economic value of commercial resource use?
- What impacts could real or perceived contamination of these resources have on the commercial use of these resources?
- How would transportation systems associated with the proposed mine affect access to renewable resources?

4.10 **Tourism**

What is the present recreation and tourism use of the Keewatin region?

What role does tourism play in the local economy?

What features of the **Keewatin** attract tourists?

Identify all significant recreation, sport, hunting, fishing and other tourism opportunities.

What is the recreation and tourism potential for the **Keewatin** region?

Are there any plans to expand traditional or recreational uses of the region?

What impacts could the proposed mine have on existing or potential tourist industries, particularly those based on renewable resources?

What are the potential impacts of the project on current and planned traditional and recreational uses of the area?

How might transportation systems associated with the proposed mine affect access of the area to tourism and recreation?

5.0 HUMAN HEALTH IMPACTS

Responses to information requests in this section are intended to examine potential effects on worker and community health and safety.

5.1 Worker Health and Safety

5.1.1 Focus of Concern

The primary concern with regard to worker health and safety centered on potential for negative health affects associated with uranium mining, particularly on the incidence of cancer.

5.1.2 Spatial and Temporal Boundaries

In establishing the study area, the proponent must identify all potential groups of workers and define the maximum temporal extent of potential health impacts.

5.1.3 Information Requirements

All sources of hazards, radiological and non-radiological, must be identified and the means of controlling these hazards and of protecting the workers must be described. Without restricting the generality of this requirement, the following points must be addressed.

Outline the potential long and short term effects of exposure to ionizing radiation. (UG, AECB and HWC)

include potential effects to smokers and non-smokers

What radiological and non-radiological contaminants associated with the proposed mine project could adversely affect the health of workers?

What are the potential sources of radiation dose?

include construction, open pit, ore storage bins, mill, tailings area, surrounding area, transportation, decommissioned facilities, and all other potential sources

What measures would be taken to limit **workers'** dose?

Describe the planned distribution and use of respirators, protective clothing, etc. Has this equipment been tested and used in arctic conditions?

What precautions will be exercised against the intake of uranium dust?

Describe the provisions being made **for workers'** clothing, storage of laundry waste water, contaminated vehicles, equipment and containers, etc.

What training is proposed to educate workers on matters of radiation protection, health instruction, and safety and emergency response?

What health facilities are proposed to provide medical **services** to the mine workers?

What consultative processes would take place between health professionals, the workers, and their families regarding screening and monitoring of body radiation levels and general health.

Provide details of health surveillance programs which would be offered to employees before, during, upon termination, and after employment? Would this include a biological sampling program?

What special surveillance programs would be carried out for workers considered to be at special health risks?

Where would health records be deposited and **preserved?**

What provisions would be made to ensure confidentiality of individual **worker's** health records?

- Would regular independent audits of the worker health and safety program be carried out?

To what additional non-radiologic hazards would workers be exposed? How do these hazards compare to other types of mining?

What preventative/treatment programs are proposed for drug and alcohol abuse, sexually transmitted disease and other related illnesses that may be associated with mining camps of the nature proposed?

In the case of accidents where workers are seriously injured, how would they be transported and to what medical facility would they be taken?

Would workers be provided with liability or life insurance? What terms and conditions would apply?

Would a **workers'** safety committee be formed? What role would it have?

Describe the means for monitoring and/or determining radiation dose, from all sources, external or internal, including **bioassays.**

- Who would decide on the appropriate parameters to monitor? How would *these* parameters be monitored? Who would monitor them? Who would pay for the compliance and effects monitoring? For how long? (UG and **GNWT)**

- What financial arrangement would be made to provide sufficient resources for the compensation of former

workers for any damage to health, both pre- and post abandonment?

5.2 Public Health and Safety

5.2.1 Focus of Concern

Public health concerns focussed on the potential for negative health affects associated with radioactive contamination through ingestion of contaminated water and "country food" and through inhalation of contaminated air.

5.2.2. Spatial and Temporal Boundaries

As for socio-economic impacts, the study area for public health impacts should include all Keewatin communities, and extend into the long term, to the maximum future extent of potential impact.

5.2.3 Baseline Data

Provide baseline data necessary for predicting potential impacts to public health. This may include the following information:

population size
fertility rates
live birth weights and rates
fetal and infant mortality rates
breastfeeding rates
expected life spans
cancer rates
major infectious disease rates
autoimmune disease
congenital disease or malformation rates
normal blood and urine parameters
nutrition patterns
existing levels of uranium decay products and heavy metals

What baseline information would be required for an adequate public health monitoring program?

What baseline information would be required as a legal basis for compensation litigation?

Would split samples of baseline and monitoring tests be provided for independent verification?

What is the current level of background radiation in the local human population? What are the sources and pathways of this radioactivity?

5.2.4 Potential Agents of Change

What radiological and non-radiological contaminants could potentially affect the health of Keewatin residents?

What are the sources of these potential affects?

What are the potential means of contamination?

include air, water, soil, plant and wildlife pathways

5.2.5 Potential Consequences of Change

What are the potential long and short term health impacts of exposure to radiation?

include expected levels of exposure to permanent residents of nearby communities and to others such as hunters and trappers who may reside temporarily in the area surrounding the proposed mine

How might presence of the proposed uranium mine alter the relative risks of these groups to health impacts such as cancers, birth defects and other illnesses? How does this vary by age and by sex?

- How does the rate of tobacco consumption affect the risk of potential negative health impacts associated with uranium mining? (UG, AECB, HWC, GNWT)

How would the rate of tobacco consumption be incorporated into the estimation of potential health impacts?

- Have local characteristics such as body size and weight been taken into consideration in determining acceptable levels of exposure? How might these factors alter the acceptable levels? (UG, AECB, HWC, GNWT)

- What variation in inhalation of contaminants may exist between nose-breathing and mouth-breathing (which is more

common in cold climates) people? Have these factors been taken into consideration? (UG, **AECB,** HWC, **GNWT)**

What particular potential health risks are associated with radioactive exposure of pregnant women? Are the expected levels of exposure resulting from the proposed mine high enough to give rise to these risks? (UG, **AECB, HWC, GNWT)**

How might presence of the proposed uranium mine affect the psychological health of Keewatin residents? (UG, **AECB,** HWC, **GNWT)**

include effects of stress and anxiety associated with fear of potential radioactive and non-radioactive contamination of the environment and humans and potential negative **socio-economic** impacts, including separation of family members, shift from traditional to wage economy etc.

What health care facilities and programs wouldbe offered to Keewatin residents? (UG, **AECB,** HWC, **GNWT)**

What control measures would be undertaken to ensure that people are not exposed to contaminated waste through scavenging of contaminated building materials, equipment, etc. ?

What problems may arise from **the Inuit's** immunity to viruses and diseases from outside **their** communities **that** they may come into contact with<.. **(UG and HWC)**

How would it be determined that a **death,** illness or condition is attributable to the mining operation? Who would determine this?

5.2.6 Consumption of 'Country **Foods"**

To what extent do the local residents depend on **"country foods",** particularly fish and caribou? Does this vary seasonally? Does this vary within and between the Keewatin communities?

What are the potential health impacts of exposure to radioactive and non-radioactive contaminants through the consumption of caribou and other **"country food"** that may be contaminated? Illustrate how this may vary according to age of humans, rates of consumption, and levels of contamination in food. (UG, **AECB** and **HWC)**

If the supply of 'country food" were to decline, what would the potential health impacts be of switching from "country food" to store-bought food? (UG, AECB and HWC)

6.0 RISK MANAGEMENT

An important component of managing a project with potential negative effects on the natural and human environments is the identification and assessment of risks associated with the project and the identification of procedures to deal with these risks. Responses to the following information requests are intended to address these issues and become the focus for a comprehensive environmental and health protection management plan.

6.1 Focus of Concern

Concern focussed on the preparedness of the proponent and region to respond to various accident scenarios, including a fuel spill in Chesterfield Inlet and a plane crash involving yellowcake. It was felt that accidents are inevitable, particularly given the harsh arctic conditions.

6.2 Spatial and Temporal Boundaries

In defining an area within with to consider risk management, the proponent must identify the maximum spatial and temporal extent of potential impact. In instances such as transport of dangerous goods, risk must be considered along the full route of transport.

6.3 Information Reauirements

Outline details of emergency response procedures for the mine and mill operation and the transportation system.

Identify all areas that have a relatively high risk of an accident occurring. For these areas, outline emergency response plans for the most probable accident and the worst-case accident.

What spill and fire contingency plans are proposed?

include reference to diesel, kerosene, uranium, thorium, ammonium nitrate and all other regulated dangerous goods to be used, stored or transported on site

- What particular plans are proposed for the safe transport, handling and transferring of dangerous goods?

- What physical barriers would be constructed at the mine, mill, storage, and transportation systems to allow for containment of spills?

- What measures would be undertaken to prevent accidents from occurring?

include worker safety training programs, monitoring and inspection

What emergency response equipment is proposed?

What experience and academic qualifications would be required of the person responsible for radiation protection and safety at the proposed mine?

- What communications network is proposed?

- Have the emergency response plans and equipment been specifically adapted to the arctic environment?

- What special adaptations have been made to plans and equipment for response to emergencies that may occur during severe arctic storms?

- Outline programs for training employees in emergency response procedures and accident prevention. How much "hands on" training would be carried out?

- What dangerous goods would be transported near communities? What contingency plans are proposed for these areas?

- What accident scenarios, if any, could potentially result in the evacuation of Baker Lake or other Keewatin Communities?

- Outline programs for training members of the surrounding communities in emergency response and evacuation procedures.

In the event of a hazardous materials release, how would clean up be carried out, by whom and who is responsible for the cost of clean up?

Would manuals be prepared for use by workers in the event of an accident?

For each regulated dangerous good used, handled, stored or transported on-site, provide the worst-case and most probable accident scenario. Outline the proposed emergency response plan for each of these scenarios.

Specifically, provide details of a proposed response plan to the following situations (assuming worst-case weather conditions) :

an accident involving the release fuel from a barge in Chesterfield Inlet;

a breach (or burst) of the tailings dam; and

a plane accident involving the release of **yellowcake** near a settlement or important water course.

In the event of a large-scale accident, who would be responsible for protection of wildlife?

What packaging would be used in the air transport of **yellowcake** to prevent spillage in the event of an air crash?

What compensation would be available in the event that a public water system or food source is contaminated to a degree where it is no longer fit for consumption?

What particular problems do the wind, spring runoff, snow, ice and permafrost present for clean up in the event of a dangerous goods release?

Have there been any barge or shipping accidents through the Chesterfield Inlet waterways? Provide location, conditions, consequence, cause, and any response measures taken.

Is there any equipment or expertise in the area to respond to a marine **spill** of fuel enroute from Montreal to Baker Lake? How would clean up be handled in different seasonal conditions? Where would clean up crews come from?

7.0 TAILINGS MANAGEMENT AND SITE DECOMMISSIONING

7.1 Focus of Concern

It is widely recognized that the tailings and waste rock would remain radioactive for a very long time. Concerns focussed on long-term management of the tailings and the decommissioned site.

7.2 Spatial and Temporal Boundaries

In defining the study area for consideration of the tailings management and site decommissioning, the proponent should define the maximum spatial and temporal extent of possible future impacts. Given the concern for long-term impacts of the site after mine closure, particular emphasis should be given to the long term.

7.3 Information Requirements

Outline the proposed management scheme for waste rock and tailings in the decommissioning and abandonment stage.

How long would the proposed mine site remain contaminated with radioactive and non-radioactive wastes? How might contamination vary seasonally and over time?

What radioactive material would be left above ground after decommissioning? Describe the physical, chemical and radiological characteristics of this material.

How have the extreme weather conditions been taken into consideration in establishing long-term tailings management plans?

What are the potential impacts of global warming on the integrity of permafrost and the tailings management plans?

Would the tailings pond be lined? If SO, would the material be resistant to scouring and annual-freeze-thaw pressures?

What mechanisms, including a possible physical barrier would be put in place to prevent wildlife from using the tailings pond area as a source of water and habitat?

What is the expected capacity of the tailings pond?

Would there be adequate physical barriers to prevent the contents of the tailings pond from spilling over the banks in the case of high winds or intense precipitation of extended duration?

Would there be any barriers to prevent contaminated snow on top of the tailings from dispersing beyond the site under high wind conditions?

What evidence is there to support the assumption that the permafrost would create an impermeable barrier to radioactive and non-radioactive contamination from the tailings and waste rock?

What possible impacts might the presence of radioactive material in the tailings have on the permafrost beneath them?

What levels of radioactive and non-radioactive contamination would remain in the liquid outputs, including sludge?

How would these liquid outputs be treated and stored?

What levels of radioactive and non-radioactive contamination would remain in the waste rock?

Would buildings and infrastructure be contaminated after closure of the proposed mine? What plans are in place for abandonment, decontamination, removal or use of the infrastructure after mine closure?

How long would the wastes remain hazardous to the environment and the health of humans and wildlife?

8.0 MITIGATION AND MONITORING

Responses to this section are intended to address proposed and alternative means of mitigating potential negative impacts of the project on the physical, biological, human and economic environments, and to outline the proposed means of monitoring the physical, ecological and human systems to ensure that changes to these systems are identified and reported to appropriate government agencies. The Panel is interested in potential on-site and related

off-site impacts. In order to enhance the understanding of environmental and social impacts from uranium mining and development in the arctic, and to assist in the evaluation of such mines in the future, the Panel expects that the proponent would place importance on developing a post-project analysis program.

8.1 Focus of Concern

Public involvement in long term monitoring of impacts and mitigation measures arose as a key issue. The possibility of public input to the development of mitigation measures was also brought forward. Long-term mitigation and monitoring of impacts associated with the tailings was of particular concern.

8.2 Spatial and Temporal Boundaries

Outline proposed mitigation and monitoring programs for the impacts identified in the EIS. The spatial and temporal boundaries for monitoring and mitigation should be the same as those delineated for potential impacts in the EIS.

8.3 Mitigation

For all potential impacts to the environment, wildlife and humans, outline proposed mitigation plans.

include potential impacts to the biosphere (plants and wildlife) , lithosphere, hydrosphere, atmosphere, and humans

Give rationale for selecting the proposed plans and outline alternative mitigation options.

In each instance, indicate who would pay for mitigation and how it would be carried out.

Provide rationale where mitigation plans are not proposed for potential impacts.

What approach would be taken to mitigate unanticipated impacts? Who would be responsible?

EMPR coordinate

8.4 Monitoring

The remaining questions and information requests on monitoring and post-project analysis are directed to:

Urangesellscha ft
Government of the Northwest Territories
Northwest Territories Water Board
Atomic Energy Control Board
Department of Energy, Mines and Resources
Department of Indian and Northern Affairs
Department of Fisheries and Oceans
Health and Welfare Canada
Environment Canada
Transport Canada
Labour Canada

What programs are proposed to provide for effects monitoring of radiological and non-radiological contamination levels over all phases (construction to post-operation) of the proposed mine project?

What potential environmental and human impacts would be monitored? During what phases would these impacts be monitored? How long would they be monitored for? How would they be monitored?

What baseline data would be collected?

who would be responsible for the design- and implementation of a monitoring program?

Would independent experts be appointed to help with the design of the monitoring program?

What would the roles of government agencies and the proponent be in the design and implementation of a monitoring program?

Who would pay for various monitoring programs?

Would ongoing independent audits of the environmental and health monitoring programs be carried out? How **would** they be carried out?

What role would communities and regional organizations have in compliance and effects monitoring? Would a public monitoring committee be established? **Who** would be involved? How would this operate?

Identify and refer to public monitoring programs which have been used in other areas.

What provisions would be made to train and provide local people with independent ability to carry out compliance and effects monitoring of mine and mill effluent, airborne gases and contaminants, health effects, and food contamination?

How would cumulative effects be monitored?

How would "negative impacts" or failure of environmental management systems be identified? What criteria would be used to determine significant changes in environmental quality?

When monitoring programs identify negative impacts, what would be done to mitigate them? Who would pay for mitigation?

If technology is ever available to dispose of the wastes from the proposed site, who would be responsible for removing the waste and ensuring it is safely disposed of?

What financial arrangements would be made by the proponent and government agencies to provide sufficient resources for the compensation of Keewatin residents for damage to human health, wildlife and the environment identified through monitoring?

8.5 Post Project Analysis

Outline details of the proposed post-project analysis program. What elements of the project would undergo post-project analysis?

Who would be represented in development of the post-project analysis program?

What roles and responsibilities would each organization have in the program?

How would the public be involved in post-project analysis?

Estimate the approximate costs of the program and the organizations that would bear these costs.

What is the estimated time frame for the post-project analysis?

Who would continuously review the project records and report to the proponent, government agencies, interested groups and the public?

How would elements of the projects be selected to undergo post-project analysis? Would the public be involved in identifying "key issues" to addressed in the post-project analysis program?

Would there be a clear, precise definition of hypothesis testing?

Who would ensure that adequate and sufficient data are collected to provide an effective data base for post-project analysis?

Would independent experts be engaged in the post-project analysis? At what stages? Who would pay for them?

Would the public have access to all information?

How would the information gained for the post-project analysis be made available to improve scientific knowledge and the procedural/administrative framework of future projects?

How would the information collected be documented and stored? Who would have access to this information?- What information would the public have access to?

Would post-project analysis information be made available in English and Inuktitut?

How would the post-project analysis review cumulative impacts?

How would the post-project analysis be coordinated with the monitoring program?

Would the post-project analysis be a condition of licensing or project approval?