Kiggavik Project
Final Environmental Impact Statement

Tier 2 Volume 2
Project Description and Assessment Basis

September 2014

History of Revisions

Revision Number	Date	Details of Revisions
01	December 2011	Initial release Draft Environmental Impact Statement (DEIS)
02	September 2014	FINAL Environmental Impact Statement

Foreword

The enclosed document forms part of the Kiggavik Project Final Environmental Impact Statement (FEIS) submission, presenting potential environmental and social impacts to determine if the Project should proceed and if so, under what terms and conditions. The submission has been prepared for the Nunavut Impact Review Board by AREVA Resources Canada Inc. to fulfill the requirements of the “Guidelines for the Preparation of an Environmental Impact Statement for AREVA Resources Canada Inc.’s Kiggavik Project (NIRB File No. 09MN003)”, to include new material or clarity provided during the review of the Draft Environmental Impact Statement, and to address company commitments and direction from the Nunavut Impact Review Board as outlined in the “Preliminary Hearing Conference Decision Concerning the Kiggavik Project (NIRB File No. 09MN003)”.

The FEIS submission consists of a number of documents, as shown in the attached road map. These documents have been categorized into tiers, as follows:

- **Tier 1** document (Volume 1) provides a plain language summary of the Final Environmental Impact Statement.

- **Tier 2** documents (Volumes 2 to 10) contain technical information and provide the details of the assessments of potential Project environmental effects for each environmental compartment. Tier 2 Volume 11 contains executive, popular, and volume summaries in Inuktitut.

- The Tier 2 documents each have a number of technical appendices, which comprise the **Tier 3** supporting documents. These include the environmental baseline reports, design reports, modelling reports and details of other studies undertaken to support the assessments of environmental effects. Management plans are provided as Tier 3 documents.

Volume 1
Main Document

Volume 2 Project Description and Assessment Basis

- Governance and Regulatory Oversight
- Project Description
- Assessment Basis

2A Alternatives Assessment
2B Drilling and Blasting Design
2C Explosives Management Plan
2D Design of Ore and Mine Rock Pads and Ponds
2E Water Diversion and Collection Design
2F Design of Andrew Lake Dewatering Structure
2G Kiggavik-Sissons Road Report
2H Ore Storage Management Plan
2I Water Management Plan
2J Marine Transportation
2K Winter Road Report
2L All-Season Road Report
2M Roads Management Plan
2N Borrow Pits and Quarry Management Plan
2O Mine Site Airstrip Report
2P Occupational Health and Safety Plan
2Q Radiation Protection Plan
2R Preliminary Decommissioning Plan
2S Waste Management Plan
2T Environmental Management Plan
2U Hazardous Materials Management Plan
2V Mine Geotechnical Reports

Volume 3 Public Engagement and Inuit Qaujimajatuqangit

Part 1
- Public Engagement

Part 2
- Inuit Qaujimajatuqangit

3A Public Engagement Documentation
3B Inuit Qaujimajatuqngit Documentation
3C Community Involvement Plan

Volume 4 Atmospheric Environment

Part 1
- Air Quality and Climate Change

Part 2
- Noise and Vibration

4A Climate Baseline
4B Air Dispersion Assessment
4C Air Quality Monitoring Plan
4D Baker Lake Long-Term Climate Scenario
4E Noise and Vibration Assessment
4F Noise Abatement Plan

Volume 5 Aquatic Environment

- Surface Hydrology
- Hydrogeology
- Water and Sediment Quality
- Aquatic Organisms
- Fish and Fish Habitat

5A Hydrology Baseline
5B Geology and Hydrogeology Baseline
5C Aquatics Baseline
5D Groundwater Flow Model
5E Prediction of Water Inflows to Kiggavik Project Mines
5F Mine Rock Characterization and Management
5G Thermal and Water Transport Modelling for the Waste Rock Piles and Tailings Management Facilities
5H Waste Rock Water Balance
5I Hydrology of Waste Rock Piles in Cold Climates
5J Tailings Characterization and Management
5K Historical and Climate Change Water Balance
5L Kiggavik Conceptual Fisheries Offsetting Plan
5M Aquatics Effects Monitoring Plan
5N Hydrology Assessments
5O Sediment and Erosion Control Plan
5P Technical Assessments of Water Withdrawal Locations and Baker Lake Dock Site

Volume 6 Terrestrial Environment

- Terrain
- Soils
- Vegetation
- Terrestrial Wildlife

6A Surficial Geology and Terrain Baseline
6B Vegetation and Soils Baseline
6C Wildlife Baseline
6D Wildlife Mitigation and Monitoring Plan

Volume 7 Marine Environment

- Marine Water and Sediment Quality
- Marine Mammals
- Marine Fish

7A Marine Environment Baseline
7B Underwater Acoustic Modelling

Volume 8 Human Health

- Occupational Dose Assessments
- Human Health Risk Assessment

8A Ecological and Human Health Risk Assessment
8B Radiation Protection Supporting Document

Volume 9 Socio-Economic Environment and Community

Part 1
- Socio-Economic Environment

Part 2
- Heritage Resources

9A Socio-Economic Baseline
9B Archaeology Baseline
9C Human Resources Development Plan
9D Archaeological Resource Management Plan

Volume 10 Accidents, Malfunctions and Effects of the Environment on the Project

- Risk Assessments
- Effects of the Environment on the Project

10A Transportation Risk Assessment
10B Spill Contingency and Landfarm Management Plan
10C Emergency Response Plan

Volume 11 Executive, Popular and Volume Summaries Translated into Inuktitut

KEY:

Tier 1 Document
Main Documents

Tier 2 Document
Environmental Effects Assessment Report

Tier 3 Document
Technical Appendices, Baseline Reports, Technical Development and Management Plans

Executive Summary – Project Description

As per the guidelines issued by the Nunavut Impact Review Board (NIRB 2011), AREVA Resources Canada Inc. (AREVA) has prepared this document as part of the Environmental Impact Statement (EIS) to assess the potential environmental effects associated with the Kiggavik Project (the Project). This volume of the EIS describes the construction, operation, and decommissioning activities and infrastructure, and associated management systems, required to implement the Project. The Project legal and regulatory framework is also described.

The Kiggavik Project is a proposed uranium ore mining and milling operation located in the Kivalliq region of Nunavut approximately 80 km west of the community of Baker Lake. Uranium in the Kiggavik area was identified during the 1970s and 1980s. In 1993, AREVA Resources Canada Inc. became the operator of the Kiggavik Project. As the uranium market improved during the first half of 2005, AREVA re-established community and territory contacts in Baker Lake and Nunavut. Field activities, engineering studies and environmental assessment studies resumed in 2007. These studies have been used to develop the Project plans presented in this document.

There are three main geographical areas incorporated in the Kiggavik Project; these are the Kiggavik site, the Sissons site and the Baker Lake dock site. The main base of operations will be the Kiggavik site, which will include open pit mining, power generation, ore processing, warehousing, administration and personnel accommodation. The proposed activities at the Sissons site, which is approximately 17 km to the south-south-west of Kiggavik, include open pit mining, underground mining, water treatment facilities, power generation and the ancillary activities required to support these mining operations. The dock site on the north shore of Baker Lake, to the east of the community, will serve as a transfer and storage facility for materials and supplies. Access to the Kiggavik site will be provided by a winter road between Baker Lake and the Kiggavik site. However, uncertainty surrounding the potential effects of climate change over the life of the mine suggests that it is prudent to also include in the EIS an all-season road option in case the winter road cannot adequately support the Project through to decommissioning and closure.

Legal and Regulatory Framework

Nunavut Tunngavik Incorporated (NTI) and the Government of Canada signed the Nunavut Comprehensive Land Claim Agreement (NLCA) in 1993. The agreement is the primary legislation directing the regulatory process in Nunavut. Federally, the Canadian Nuclear Safety Commission (CNSC), the federal nuclear regulatory agency, has jurisdiction over all nuclear energy projects in Canada, including the Kiggavik Project, through the federal *Nuclear Safety Control Act* (NSCA) Additional federal and territorial legislation and federal, territorial and Inuit guidelines are applicable to the proposed Kiggavik Project.

Since the Nunavut Lands Claim Agreement, a number of policy developments have provided clarity and direction for the development of uranium in Nunavut. The Nunavut Territory has given special consideration and planning to uranium development as evidenced in the consideration of uranium development in the broad principles, objectives and conditions for uranium exploration and mining outlined in the NTI Uranium Policy and the six guiding principles for uranium developed by the Government of Nunavut.

The Sissons site is located on Inuit-Owned Surface/Subsurface Land and the Kiggavik site is located on Inuit-Owned Surface and Crown Subsurface Land. Administration of surface and subsurface rights on Crown Land is the responsibility of Aboriginal Affairs and Northern Development Canada (AANDC). Surface rights on Inuit-Owned Land are administered by the Kivalliq Inuit Association. The Kiggavik leases predate the NLCA, and therefore the subsurface rights for these parcels are “grandfathered” and are administered by AANDC.

The Kiggavik Project is subject to a NLCA Article 12 Part 5 review which is coordinated by the NIRB. Numerous federal and territorial departments and Inuit Organizations participate in the NIRB review providing technical expertise. Non-Governmental Organizations and any interested person can also participate in the NIRB review. Upon completion of the environmental impact assessment, which is concluded with the issuance of a Project Certificate by NIRB, AREVA will require a number of major licences, approvals and agreements prior to development of the Project.

Approach to Design

In accordance with AREVA’s approach to sustainable development, Project design is recognized as one of the first opportunities to mitigate potential environmental effects and enhance benefits to the community.

To ensure that appropriate information is available to the project design team, AREVA’s approach incorporates integrated design, environmental assessment, and public engagement activities. Preliminary assessment and engagement results are used by the design team to improve predicted environmental performance and address community concerns wherever possible. The approach enhances mitigation by design, optimizes costs, maximizes operability and ensures that broad considerations are used in the selection of preferred options.

A precautionary design approach, using conservative assumptions for design criteria and performance forecasting provides for a robust design and conservative predictions of environmental interactions. A continuous improvement process will be used throughout the life of the Project to optimize environmental performance and operability on an on-going basis. Monitoring results will be compared to predicted performance, and an adaptive management approach implemented, if needed, to ensure that no less than predicted performance is achieved.

Construction Activities

Construction activities will begin at the Baker Lake dock site, where a temporary spud barge dock will be installed for offloading barges. A fuel tank farm and offloading lines will be installed. A laydown area and secured storage area for explosives will be cleared.

During the first winter of the construction phase, a winter road will be constructed between the Baker Lake dock site and the Kiggavik site. The road will likely cross Baker Lake and travel to the west using large ice-covered lakes. Some flooding will be required to prepare the road. Some over-land sections will require flooding or placement of a granular base.

Construction activities will include quarrying and crushing to generate fill for construction of roads and site pads. Potential borrow sources have been located along the Baker Lake – Kiggavik access route and near the Kiggavik site. Mine rock may also be used as a source of aggregate.

The airstrip will be constructed south of the Kiggavik site. A temporary ice airstrip on Pointer Lake may also be used for materials and personnel transport during the construction phase.

Project construction will also include preparing foundations and construction of the mill, accommodation complex, warehouse and maintenance facilities, fuel tanks, explosives storage, water treatment plants, administration buildings, and site roads. The combined footprint of the Kiggavik site, the Sissons site, the Kiggavik-Sissons access road, and the airstrip is expected to be approximately 1,000 hectares.

Freshwater diversion channels will be constructed early in the construction phase to reduce the amount of water entering the construction area. Surface drainage from within the site areas will be collected and treated using a temporary water treatment plant if required.

To gain access to the Andrew Lake deposit at the Sissons site, a portion of Andrew Lake will be dewatered by constructing a dewatering structure across the northern section of the lake.

A temporary construction camp erected at the Kiggavik site will be used to house the construction workforce until the permanent accommodations complex is erected. It is anticipated that construction will require approximately 4 years to complete.

Operating Activities

The Project includes the development of three open pit mines (East Zone, Center Zone, and Main Zone) at the Kiggavik site and both an open pit mine (Andrew Lake) and an underground mine (End

Grid) at the Sissons site. The ore will be mined using excavating equipment and then hauled, using trucks, to a designated ore stockpile.

Mine rock from the mines containing background to low levels of uranium will be segregated into 3 types: Type 1 mine rock, which is considered suitable for use as construction material; Type 2 mine rock, which is considered suitable for permanent storage on surface; and, Type 3 mine rock, which is considered to require specific management. Type 3 mine rock will be temporarily stored on surface and back-filled into the mined-out open pits during decommissioning.

Ore stored on stockpiles will be directed to the mill at the Kiggavik site to produce up to 4,000 tonnes of uranium (U) as an ore concentrate, commonly referred to as yellowcake, per year.

Tailings resulting from the extraction of uranium from the ore will be treated in the mill and deposited sequentially in the three Kiggavik mined-out open pits (East Zone, Centre Zone, Main Zone) converted for use as tailings management facilities (TMFs). The tailings will be stored underneath a layer of water during the operational period to prevent freezing.

Freshwater will be drawn from nearby lakes for potable and industrial uses. A small purpose-built-pit will also be excavated on the Kiggavik site for use as a water management facility to maximize site drainage containment, storage and recycling. Water treatment plants will be operated at both the Kiggavik and Sissons sites to meet treated effluent discharge requirements for protection of the environment. The treated effluent will be discharged to Judge Sissons Lake.

Power will be generated using on-site diesel powerhouses at the Kiggavik and Sissons sites.

During the open water season, reagents, fuel and operating supplies will be transported to Hudson Bay using either tankers and containerships or possibly rail to Churchill. The materials will then be transferred to barges and transported to the Baker Lake dock facility for off-loading and storage. These materials will then be transported to the Kiggavik site by truck on the Baker Lake – Kiggavik access road. If the winter road proves unable to adequately support the Project, an all-season access road, crossing the Thelon River with a cable ferry, may be constructed during the operations phase.

A 2,000 metre airstrip will be constructed on site for the transport of both employees and materials. The airstrip will also be used to transport containerized drums of uranium concentrate by air to southern Canada.

The operation would be fly-in/fly-out on a 7 to 14 day schedule with on-site employees housed in a permanent accommodations complex.

Based on the known resources and production schedule, operating activities will be complete after approximately 14 years. However, it is expected that additional resources will be found; the Project could operate for up to 25 years.

Decommissioning and Closure Activities

On completion of mining and milling activities, all Project sites will be returned as close as practical to their natural states. The decommissioning plan includes demolition and removal of all facilities and remediation of all Project areas.

Closure of the three tailings management facilities at the Kiggavik site will include pumping and treatment of the water layer, followed by the placement of a cover layer and an erosion barrier of mine rock over the tailings. Type 3 mine rock at the Kiggavik site will be placed into the Main Zone tailings management facility prior to covering. The surface of the final cover will be graded to blend into the existing topography.

Type 3 mine rock at the Sissons site will be placed into the mined-out Andrew Lake open pit and covered. The Andrew Lake pit will then be refilled to create a pit lake. The Type 1/Type 2 mine rock piles at both the Kiggavik and Sissons sites will be re-sloped and covered with clean overburden material to encourage revegetation.

Site access facilities, including the Baker Lake dock facility and Kiggavik – Baker Lake access road(s) will be decommissioned unless community or government agencies choose to take over ownership of this infrastructure.

It is anticipated that decommissioning activities and post-decommissioning monitoring will require up to 15 years to complete.

Benefits

Benefits of the Project to the Territory of Nunavut and the Kivalliq region include employment of local residents and Inuit. The Project is expected to employ an average of 750 people during construction and 400 to 600 people during operations. In addition, there may be as many indirect and induced jobs created for Kivalliq residents as direct jobs. Business development programs will be implemented to ensure Inuit and local residents benefit from inducted employment and business opportunities.

Training of local residents is anticipated prior to production at Nunavut educational institutions and at AREVA's McClean Lake Operation in northern Saskatchewan. AREVA is committed to the development and training of employees throughout the life of the Project.

Total taxes and royalties to be paid are estimated at $1 billion. Of this, it is estimated that approximately 25% will be paid to NTI, approximately 25% will be paid to the Government of Nunavut, and the remaining approximately 50% will be paid to the Government of Canada.

Other benefits will be detailed as part of the Inuit Impact Benefit Agreement (IIBA).

Management Plans and Programs

The Project will be managed through an Integrated Management System. This system will administer a number of management plans and programs to address environmental protection, tailings management, mine rock management, water management, wastes and hazardous materials, radiation protection, occupational health and safety, human resources, and community involvement. These plans and programs will be in place, and will be continuously improved, over the life of the Project.

Preliminary versions of these plans have been developed for the purpose of this EIS and to ensure that appropriate measures are fully considered in the current Project design. Further program definition will be conducted during the licensing phase of the Project.

In addition to the above plans and programs, AREVA has committed to the further development of a Mine Rock Optimization and Validation Program, and a Tailings Optimization and Validation Program.

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ᒪᓕᒃᑕᐅᓯᕆᐊᓕᒃᑎᒍᑦ ᓴᖅᑭᑕᐅᔪᑦ ᓄᓇᕗᒻᒥ ᐊᒃᑐᖅᓯᓂᕐᒧᑦ ᕿᒥᕈᐃᔩᓄᑦ (NIRB 2011), ᐊᕌᗋᒃᑯᑦ ᐋᕿᒃᓯᐃᓚᐅᖅᑐᑦ ᐊᕙᑎᒥᒃ ᐊᒃᑐᖅᓯᓂᕐᒧᑦ ᑎᑎᖅᑲᒥᑦ (EIS), ᐃᓚᐅᑉᐳᓂ ᖃᐅᔨᓴᐃᓂᖅ ᐊᒃᑐᖅᓯᓂᐅᔪᓐᓇᖅᑐᖅ ᐃᓄᐃᑦ ᐋᓐᓂᐊᕐᑲᖅᑕᐃᓕᒪᓂᕐᒋᓐᓄᑦ ᖃᓄᐃᖓᓕᖅᑎᑦᑎᓂᐅᔪᓐᓇᖅᑐᑦ ᐱᔾᔪᑎᓕᓐᓄᑦ ᓂᐱᖃᕐᓂᕐᒧᑦ ᐊᒪᓗ ᓴᖁᕿᓖᖅᑐᓄᑦ ᐊᒃᑐᐊᓂᖃᖅᑐᑦ ᑭᒡᒐᕝᕕᒃ ᐱᓕᕆᐊᒧᑦ (ᐱᓕᕆᐊᖅ). ᐅᖃᓕᒫᒐᖅ EIS-ᒥᑦ ᐅᖃᐅᓯᖃᖅᑐᖅ ᓴᓇᔭᐅᓂᖓ, ᐊᐅᓷᕐᓂᖓ, ᐊᒪᓗ ᐅᒃᑯᐊᕐᓂᖓᓅᖓᔪᑦ ᐱᑦᑯᑎᖏᓪᓗ, ᐊᒪᓗ ᐊᐅᓚᑦᑎᓂᕐᒨᖓᔪᑦ ᐋᕿᐅᒪᔪᑦ, ᐱᔭᕆᐊᖃᕐᓂᖅ ᐊᑐᓕᖅᑎᓐᓂᕐᒥᒃ ᐱᓕᕆᐊᖅ. ᐱᓕᕆᐊᑉ ᒪᓕᒐᑎᒍᑦ ᐊᒪᓗ ᒪᓕᒐᓕᕆᓂᕐᒧᑦ ᐋᕿᐅᒪᓂᕆᓴᖓ ᐅᖃᐅᓯᐅᖅᒥᔪᖅ.

ᑭᒡᒐᕝᕕᒃ ᐱᓕᕆᐊᖅ ᓄᖑᓯᐃᑐᒧᑦ ᐅᔭᕋᕐᓂᐊᖅᑐᓕᕆᓂᐅᔪᒪᔪᖅ ᐊᒪᓗ ᓯᖃᓪᓕᑎᕆᕝᕕᖃᕐᓂᐊᕐᓗᓂ ᑭᕙᓪᓕᕐᒥᑑᖅ ᓄᓇᕗᒻᒥᑦ 80 ᑭᓛᒥᑕ ᐱᖓᓐᓇᖓᓂᑦ ᖃᒪᓂᑦᑐᐊᑉ. ᐅᔭᕋᕐᓂᐊᖅᑐᓕᕆᓂᖅ ᑭᒡᒐᕝᕕᒻᒥᑦ ᐃᓕᑕᕆᔭᐅᓚᐅᖅᑐᖅ 1970 ᐊᒪᓗ 1980-ᖏᓐᓂᑦ. 1993-ᒥᑦ, ᐊᕌᗋᒃᑯᑦ ᐊᐅᓚᖅᑎᑦᑎᔨᐅᓕᓚᐅᖅᑐᑦ ᑭᒡᒐᕝᕕᒃ ᐱᓕᕆᐊᒥᑦ. ᓄᖑᓯᐃᑑᑉ ᐱᔭᐅᔪᒪᓂᖓ ᐱᐅᓯᕚᓪᓕᕐᒪᑦ 2005-ᒥᑦ ᓯᕗᓪᓖᑦ ᓇᑉᐸᖓᓂᑦ, ᐊᕌᗋᒃᑯᑦ ᓴᖅᑭᑦᑎᒃᑲᓐᓂᓕᓚᐅᖅᑐᑦ ᖃᐅᔨᒋᐊᕐᕕᒋᖃᑦᑕᕐᓂᐊᖅᑕᖏᓐᓂᒃ ᖃᒪᓂᑦᑐᐊᕐᒥᑦ ᐊᒪᓗ ᓄᓇᕗᒻᒥᑦ. ᓄᓇᒥᒃ ᖃᓄᐃᓕᐅᕐᓃᑦ, ᐃᑯᒪᓕᕆᓂᕐᒧᑦ ᖃᐅᔨᓴᐃᓃᑦ ᐊᒪᓗ ᐊᕙᑎᒥᒃ ᐱᒋᐊᓚᐅᖅᑐᑦ 2007-ᒥᑦ. ᑕᒪᒃᑯᐊ ᖃᐅᔨᓴᐃᓃᑦ ᐊᑐᖅᑕᐅᖃᑦᑕᖅᓯᒪᔪᑦ ᐱᕙᓪᓕᐊᓂᕐᒥᒃ ᐱᓕᕆᐊᒧᑦ ᐸᕐᓇᐅᑎᓂᒃ ᑖᕙᓃᑐᑦ ᑎᑎᖅᑲᒥᑦ.

ᐃᒃᓯᕙᐅᑉ ᐃᓂᖓ ᐅᐊᖅᓇᖓᓃᑐᖅ ᖃᒪᓂᑦᑐᐊᑉ ᓯᒡᔭᖓᓂᑦ, ᑲᓇᖕᓇᖓᓂ ᓄᓇᓕᐅᑉ, ᓈᑎᕆᓂᕐᒧᑦ ᑐᖅᑯᖅᑐᐃᓂᕐᒧᓪᓗ ᐊᑐᖅᑕᐅᖃᑦᑕᕐᓂᐊᖅᑐᖅ ᐊᑐᖅᑕᐅᔪᓄᑦ ᐱᕐᑯᑎᓄᓪᓗ. ᑎᑭᑕᐅᔪᓐᓇᕐᓂᖅ ᑭᒡᒐᕝᕕᐅᑉ ᐃᓂᖓ ᐅᑭᐅᑯᑦ ᐊᑉᕐᑯᑎᒃᑰᓂᐊᖅᑐᖅ ᐊᑯᓂᖏᓐᓂᑦ ᖃᒪᓂᑦᑐᐊᑉ ᐊᒪᓗ ᑭᒡᒐᕝᕕᐅᑉ ᐃᓂᖓ. ᑭᓯᐊᓂ, ᓇᓗᓇᖅᑐᑦ ᖃᓄᐃᖓᓕᖅᑎᑦᑎᓂᐅᔪᓐᓇᖅᑐᑦ ᓯᓚᐅᑉ ᐊᓯᐊᙳᕐᓂᖓᓄᑦ ᐊᐅᓷᕐᓂᓗᒃᑖᕆᓴᖓᓂᑦ ᐅᔭᕋᕐᓂᐊᕝᕕᐅᑉ ᓇᓗᓇᐃᖅᓯᔪᖅ ᐅᑭᐅᓗᒃᑖᖅ ᐊᑉᕐᑯᑎ ᐃᓚᓕᐅᑎᖃᑕᐅᓯᕆᐊᖃᕐᓂᖓ EIS–ᒧᑦ ᐅᑭᐅᑯᑦ ᐊᑉᕐᑯᑎ ᐊᑐᖅᑕᐅᓂᖅ ᐊᔪᓕᐊᓪᓚᒐᔭᖅᐸᑦ ᐃᑲᔪᐃᓂᕐᒧᑦ ᐱᓕᕆᐊᒥᑦ ᐅᒃᑯᐊᖅᐸᓪᓕᐊᓂᕐᒧᑦ ᑎᑭᓪᓗᓂ. ᐃᒃᓯᕙᐅᑉ ᐃᓂᖓ ᐅᐊᖅᓇᖓᓃᑐᖅ ᖃᒪᓂᑦᑐᐊᑉ ᓯᒡᔭᖓᓂᑦ, ᑲᓇᖕᓇᖓᓂ ᓄᓇᓕᐅᑉ, ᓈᑎᕆᓂᕐᒧᑦ ᑐᖅᑯᖅᑐᐃᓂᕐᒧᓪᓗ ᐊᑐᖅᑕᐅᖃᑦᑕᕐᓂᐊᖅᑐᖅ ᐊᑐᖅᑕᐅᔪᓄᑦ ᐱᕐᑯᑎᓄᓪᓗ. ᑎᑭᑕᐅᔪᓐᓇᕐᓂᖅ ᑭᒡᒐᕝᕕᐅᑉ ᐃᓂᖓ ᐅᑭᐅᑯᑦ ᐊᑉᕐᑯᑎᒃᑰᓂᐊᖅᑐᖅ ᐊᑯᓂᖏᓐᓂᑦ ᖃᒪᓂᑦᑐᐊᑉ ᐊᒪᓗ ᑭᒡᒐᕝᕕᐅᑉ ᐃᓂᖓ. ᑭᓯᐊᓂ, ᓇᓗᓇᖅᑐᑦ ᖃᓄᐃᖓᓕᖅᑎᑦᑎᓂᐅᔪᓐᓇᖅᑐᑦ ᓯᓚᐅᑉ ᐊᓯᐊᙳᕐᓂᖓᓄᑦ ᐊᐅᓷᕐᓂᓗᒃᑖᕆᓴᖓᓂᑦ ᐅᔭᕋᕐᓂᐊᕝᕕᐅᑉ ᓇᓗᓇᐃᖅᓯᔪᖅ ᐅᑭᐅᓗᒃᑖᖅ ᐊᑉᕐᑯᑎ ᐃᓚᓕᐅᑎᖃᑕᐅᓯᕆᐊᖃᕐᓂᖓ EIS–ᒧᑦ ᐅᑭᐅᑯᑦ ᐊᑉᕐᑯᑎ ᐊᑐᖅᑕᐅᓂᖅ ᐊᔪᓕᐊᓪᓚᒐᔭᖅᐸᑦ ᐃᑲᔪᐃᓂᕐᒧᑦ ᐱᓕᕆᐊᒥᑦ ᐅᒃᑯᐊᖅᐸᓪᓕᐊᓂᕐᒧᑦ ᑎᑭᓪᓗᓂ.

ᒪᓕᒐᑎᒍᑦ ᐊᒪᓗ ᒪᓕᒐᓕᕆᓂᕐᒧᑦ ᐋᕿᐅᒪᔪᖅ

ᓄᓇᕗᑦ ᑐᙵᕕᒃᑯᑦ (NTI) ᐊᒪᓗ ᑲᓇᑕᐅᑉ ᒐᕙᒪᒃᑯᖏᑦ ᐊᑎᓕᐅᓚᐅᖅᑐᑦ ᐊᖏᕈᒥᒃ ᐃᓗᓕᓕᖕᒥᒃ ᓄᓇᑖᕐᓂᕐᒧᑦ ᐊᖏᖅᑎᒋᔫᑎᒥᒃ (NLCA) 1993–ᒥᑦ. ᐊᖏᖅᑎᒋᔫᑎ ᒪᓕᒐᐅᐊᑐᐊᕐᔪᖅ ᖃᓄᐃᓕᐅᕆᐊᕐᓂᕐᒧᑦ ᒪᓕᒐᓕᕆᓂᕐᒨᖓᔪᓂᒃ ᓄᓇᕗᒻᒥᑦ. ᒐᕙᒪᑐᖃᒃᑯᓐᓂᑦ, ᑲᓇᑕᒥᑦ ᐅᕈᕆᐊᓇᖅᑐᒧᑦ (Nuclear)–ᒧᑦ ᐊᑦᑕᓇᖅᑐᕐᑖᐃᓕᒪᓂᕐᒧᑦ ᑲᑎᒪᔩᑦ (CNSC), ᒐᕙᒪᑐᖃᒃᑯᑦ nuclear–ᒧᑦ ᒪᓕᒐᓕᕆᓂᕐᒧᑦ ᑲᒪᔩᖏᑦ, ᑎᑭᖅᑲᐅᒪᓂᖃᖅᑐᑦ ᑕᒪᐃᓄᑦ nuclear–ᒧᑦ ᐆᒪᖅᑯᑎᓕᕆᓂᕐᒧᑦ ᐱᓕᕆᐊᓄᑦ ᑲᓇᑕᒥᑦ, ᐃᓚᐅᑉᐳᓂ ᑭᒡᒐᕝᕕᒃ ᐱᓕᕆᐊᖅ, ᒐᕙᒪᑐᖃᒃᑯᑎᒍᑦ *Nuclear-ᓄᑦ ᐊᑦᑕᓇᖅᑐᕐᑖᐃᓕᓂᕐᒧᑦ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐱᖁᔭᖏᑦ* (NSCA) ᒐᕙᒪᑐᖃᒃᑯᓐᓄᑦ ᓄᓇᕗᒻᒧᓪᓗ ᒪᓕᒃᑲᓐᓂᑦ ᐊᒪᓗ ᐃᓄᐃᑦ ᒪᓕᒃᑕᐅᔪᒃᓴᖁᑎᖏᑦ ᐊᑐᖅᑐᑦ ᑭᒡᒐᕝᕕᒃ ᐱᓕᕆᐊᖑᔪᒪᔪᒧᑦ.

ᑕᐃᒪᙵᑦ ᓄᓇᕗᒻᒧᑦ ᓄᓇᑖᕐᓂᕐᒧᑦ ᐊᖏᖅᑲᑎᒌᒍᑎᖅᑲᓕᕐᒪᑦ, ᖃᐸᓯᐊᕐᔪᖕᓂᒃ ᐊᑐᐊᒐᓂᒃ ᐱᕙᓪᓕᐊᓃᑦ ᑐᓂᓯᓯᒪᔪᑦ ᑐᑭᓯᓇᖅᑐᒥᑦ ᐊᒻᒪ ᖃᓄᐃᓕᐅᕆᐊᖅᑲᕐᓂᕐᒥᒃ ᐱᕙᓪᓕᐊᓂᖓᓄᑦ ᓄᖑᓱᐃᑐᖅ ᓄᓇᕗᒻᒥᑦ. ᓄᓇᕗᑦ ᑐᓂᓯᓯᒪᔪᖅ ᐊᔾᔨᐅᖏᑦᑐᒥᒃ ᐃᓱᒪᒃᓴᖅᓯᐅᕈᑎᒥᒃ ᐊᒻᒪ ᐸᕐᓇᐃᓂᕐᒥᒃ ᓄᖑᓱᐃᑐᖅ ᐱᕙᓪᓕᐊᓂᖓᓄᑦ ᑕᑯᒃᓴᐅᓂᖓᑐᑦ ᐃᓱᒪᒃᓴᖅᓯᐅᕈᑎᒋᔭᐅᔫᑉ ᓄᖑᓱᐃᑐᖅ ᐱᕙᓪᓕᐊᓂᖓᓄᑦ ᐊᖏᔪᓂᒃ ᒪᓕᒃᑕᐅᔭᕆᐊᓕᖓᓂᑦ, ᑐᕌᖓᓂᑦ ᐊᒻᒪ ᖃᓄᐃᖓᔭᕆᐊᖅᑲᖅᓂᐅᔪᓂᑦ ᓄᖑᓱᐃᑐᒥᒃ ᕿᓂᖅᓴᐃᓂᕐᒧᑦ ᐊᒻᒪ ᐅᔭᕋᖕᓂᐊᖅᑐᓕᕆᓂᖅ ᑎᑎᕋᖅᑕᐅᓯᒪᓂᖓᑐᑦ ᑐᙵᕕᒃᑯᑦ ᓄᖑᓱᐃᑐᒧᑦ ᐊᑐᐊᒐᖓᓐᓂᑦ ᐊᒻᒪ ᐊᕝᕙᓂᓖᑦ ᖃᓄᐃᓕᐅᕐᓂᕐᒧᑦ ᒪᓕᒐᑦ ᓄᖑᓱᐃᑐᒧᑦ ᓴᖅᑭᑕᐅᔪᖅ ᓄᓇᕗᑦ ᒐᕙᒪᒃᑯᖏᓐᓄᑦ.

Sissons ᐃᓂᖓ ᓄᓇᐅᑉ ᖀᖓᓄᑦ ᓄᓇᐅᑉᑐ ᐃᑐᐊᓃᑐᓄᑦ ᐃᓄᐃᑦ ᓇᖏᓂᕆᔭᖓᓐᓂᑦ ᐃᓂᐅᔪᒦᑐᖅ ᐊᒻᒪ ᑭᒡᒐᕝᕙᐅᑉ ᐃᓂᖓ ᓄᓇᐅᑉ ᖀᖓᓄᑦ ᓄᓇᐅᑉᑐ ᐃᑐᐊᓃᑐᓄᑦ ᐃᓄᐃᑦᑐ ᒐᕙᒪᒃᑯᑦᑐ ᓇᖏᓂᕆᔭᖓᓂᓗᓂ. ᐊᐅᓚᑦᑎᓂᖅ ᓄᓇᐅᑉ ᖀᖓᓄᑦ ᓄᓇᐅᑉᑐ ᐃᑐᐊᓃᑐᓄᑦ ᐱᔪᖓᐅᑎᓄᑦ ᒐᕙᒪᒃᑯᑦ ᓇᖏᓂᕆᔭᖏᑦᑐᑦ ᐱᔭᒃᓴᐅᑎᕆᖓᑦ ᒐᕙᒪᑐᖅᑲᒃᑯᑦ ᐃᓄᓕᕆᔨᖏᑦᑕ (AANDC)–ᑯᑦ. ᓄᓇᐅᑉ ᖀᖓᓄᑦ ᐱᔪᖓᐅᑏᑦ ᐃᓄᐃᑦ–ᓇᖏᓂᕆᔭᖏᓐᓄᑦ ᐊᐅᓚᑕᐅᔪᑦ ᑭᕙᓪᓕᖅ ᐃᓄᐃᑦ ᑲᑐᔾᔨᖅᑲᑎᒌᖏᓐᓄᑦ. ᑭᒡᒐᕝᕙᐅᑉ ᐊᑐᖅᑐᐊᕐᓂᕆᔭᖏᑦ ᐱᑎᐊᓚᐅᖅᑐᑦ ᓯᕗᓂᐊᒍᑦ NLCA ᓴᖅᑭᑕᐅᖕᒪᑦ, ᐊᒻᒪ ᑕᐃᒪᓐᓇᒧᑦ ᓄᓇᐅᑉ ᐃᑐᐊᓂᑦ ᐱᔪᖓᐅᑏᑦ ᑖᑉᑯᓄᙵ ᓄᓇᐅᔪᓄᑦ ‘ᑭᖑᕚᕆᔭᐅᔪᑦ’ ᐊᒻᒪ ᐊᐅᓚᑕᐅᑉᓗᑎᒃ AANDC-ᑯᓐᓄᑦ.

ᑭᒡᒐᖁᕝᕙᒃ ᐱᓕᕆᐊᖅ ᐊᒃᑐᐊᓂᖅᑲᖅᑐᖅ NLCA-ᖑᓕᐊᖑᔪᒧᑦ ᑎᑎᖅᑲᖅ 12 ᐃᓚᖓ 5 ᕿᒥᕐᕈᔭᐅᓂᕐᒧᑦ ᐊᐅᓚᑕᐅᔪᖅ NIRB–ᑯᓐᓄᑦ. ᖃᐸᓯᐊᕐᔪᐃᑦ ᒐᕙᒪᑐᖅᑲᒃᑯᑦ ᐊᒻᒪ ᓄᓇᕗᑦ ᐊᕝᕙᒃᑐᖅᓯᒪᔪᕐᑯᑎᖏᑦ ᐃᓄᐃᑦᑐ ᑲᑐᔾᔨᖅᑲᑎᒌᖏᑦ ᐃᓚᐅᖅᑲᑕᐅᓯᒪᔪᑦ NIRB–ᑯᑦ ᕿᒥᕐᕈᓂᖓᓐᓂᑦ ᖃᐅᔨᒪᓂᕐᒥᒃ ᑐᓯᓂᐅᑉᓗᑎᒃ. ᒐᕙᒪᒃᑯᓐᓅᖏᑦᑐᖅ ᑲᑐᔾᔨᖅᑲᑎᒌᖑᔪᑦ ᐊᒻᒪ ᑭᑐᑐᐃᓐᓇᐃᑦ ᐃᓚᐅᓂᖅᑭᒪᔪᑦ ᐃᓚᐅᖅᑲᑕᐅᔪᖓᖅᑐᑦ NIRB–ᑯᑦ ᕿᒥᕐᕈᓂᖏᑦ. ᐱᐊᓂᒃᑕᐅᑎᑦᑐᒍ ᐊᕙᑎᒥᒃ ᐅᒃᑐᖅᓯᓂᕐᒧᑦ ᖃᐅᔨᓴᐃᓂᖅ, ᐱᐊᓂᒍᑕᐅᑉᑐᓂ ᑐᓂᔭᐅᖕᒪᑕ ᐱᓕᕆᐊᒧᑦ ᓇᑐᓇᐃᑯᑕᒥᒃ NIRB–ᑯᓐᓄᑦ, ᐊᓅᕙᒃᑯᑦ ᖃᐸᓯᐊᕐᔪᖕᓂᒃ ᐊᖏᔪᓂᒃ ᓚᐃᓴᓂᒃ ᐱᔭᓇᐊᖅᑲᕐᓂᐊᖅᑐᑦ, ᓈᒻᒪᒋᔭᐅᔪᓂᒃ ᐊᒻᒪ ᐊᖏᖅᑲᑎᒌᒍᑎᓂᒃ ᐱᕙᓪᓕᐊᓂᐊᕌᖅᑎᑦᑐᒍ ᐱᓕᕆᐊᖅ.

ᖃᓄᐃᓕᐅᕈᑕᐅᓂᖓ ᖃᓄᐃᑑᓂᐊᕐᓂᖓ

ᒪᓕᒃᓱᒋᑦ ᐊᓅᕙᒃᑯᑦ ᖃᓄᐃᓕᐅᕈᑎᖓ ᓱᖁᓯᐊᖏᑦᑐᒥᒃ ᐱᕙᓪᓕᐊᑎᑦᑎᓂᕐᒧᑦ, ᐱᓕᕆᐊᑉ ᖃᓄᐃᑑᓂᐊᕐᓂᖓ ᐃᓕᑕᕆᔭᐅᔪᖅ ᓯᕗᓪᓕᖅᐹᖑᔪᑐᑦ ᐱᕕᖅᑲᕐᓂᕐᒧᑦ ᐊᖏᓗᐊᖏᕆᐊᖅᑎᑦᑎᓂᕐᒧᑦ ᐊᕙᑎᒥᒃ ᖃᓄᐃᖓᓕᖅᑎᑦᑎᓂᐅᑐᐃᓐᓇᕆᐊᓕᖕᓄᑦ ᐊᒻᒪ ᐱᐅᓯᕆᐊᖅᑎᓐᓂᕐᒧᑦ ᐃᑲᔫᑕᐅᔪᑦ ᓄᓇᓕᖕᒧᑦ.

ᑕᒪᒃᑯᓄᙵ ᑐᑭᓯᐅᒪᔾᔪᑏᑦ ᑕᐃᒪᐅᒐᓗᐊᕐᓂᖏᓐᓄᑦ ᒪᓂᒪᔪᑦ ᐱᓕᕆᐊᑉ ᖃᓄᐃᖓᓂᐊᕐᓂᖓᓄᑦ ᐱᓕᕆᐊᖅᑲᖅᑐᓄᑦ, ᐊᓅᕙᒃᑯᑦ ᖃᓄᐃᓕᐅᕐᓂᕆᔭᖓ ᐃᓚᐅᑎᑦᑎᔪᖅ ᑲᑎᑕᐅᓯᒪᔪᓂᒃ ᖃᓄᐃᖓᓂᐊᕐᓂᕐᒧᑦ, ᐊᕙᑎᒥᒃ ᖃᐅᔨᓴᐃᓂᕐᓄᑦ, ᐊᒻᒪ ᐃᓄᐃᑦ ᐃᓚᐅᖃᑕᐅᓂᖏᓐᓄᑦ ᖃᓄᐃᓕᐅᕐᓂᐅᔪᓄᑦ. ᓯᕗᓪᓕᖅᐹᖅ ᖃᐅᔨᓴᕐᓂᖅ ᐃᒻᒪ ᐃᓚᐅᑎᑦᑎᓂᕐᒧᑦ ᖃᓄᐃᖓᓂᐅᔪᑦ ᐊᑐᖅᑕᐅᔪᑦ ᖃᓄᐃᖓᓂᐊᕐᓂᖓᓄᑦ ᐱᓕᕆᔾᔪᑎᓄᑦ ᐱᐅᓯᕚᓪᓕᖅᑎᑦᑎᓂᕐᒧᑦ ᐊᒻᒪ ᐱᓕᕆᐊᕐᕕᖕᒧᑦ ᓄᓇᓕᖕᒥᐅᓄᑦ ᐃᓱᒫᓗᑕᐅᔪᓂᒃ ᐱᔪᖕᓇᑐᐊᕐᖓᑕ. ᖃᓄᐃᓕᐅᕐᓂᖅ ᐱᐅᓯᕆᐊᖅᑎᑦᑎᔪᖅ ᐊᖏᕈᐊᖏᕆᐊᖅᑎᑦᑎᓂᕐᒥᒃ ᖃᓄᐃᑑᓂᐊᕐᓂᖓ ᐊᑐᖅᑐᒍ, ᐊᑭᑐᕈᐊᖏᑎᑦᑎᑉᓗᓂ, ᐊᖏᑖᒃᑯᖓᑎᑦᑎᑉᓗᓂ ᐊᐅᑖᖅᑎᑦᑎᓂᐅᔪᖕᓇᖅᑐᒥᒃ ᐊᒻᒪ ᐊᖏᔪᑦ ᐃᓱᒪᒃᓴᖅᓯᐅᕈᑏᑦ ᐊᑐᖅᑕᐅᑉᓗᑎᒃ ᓂᕈᐊᕐᓂᕐᒥᒃ ᐊᑐᖅᑕᐅᖖᒋᕈᒪᔪᓂᒃ.

ᐅᔾᔨᖅᑐᕐᓂᕐᒧᑦ ᖃᓄᐃᖓᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᔪᖅ, ᐊᑐᖅᓱᑎᒃ ᐱᖅᑯᓯᑐᓂᐅᔭᒃᑯᑦ ᐃᓱᒪᒋᔭᐅᔪᑦ ᖃᓄᐃᑑᓂᕐᒧᑦ ᐊᒻᒪ ᐊᔪᙱᓐᓂᕐᒧᑦ ᓇᓚᐅᑖᖅᑕᐅᓂᒃᑯᑦ ᑐᓂᓯᔪᖅ ᐅᒻᒪᑎᒃᑐᒥᒃ ᖃᓄᐃᑑᓂᐊᕐᓂᕐᒥᒃ ᐊᒻᒪ ᐱᖅᑯᓯᑐᐃᓐᓇᕆᔭᐅᔪᑦ

ᓇᓚᐅᑖᖅᑕᐅᔪᑦ ᐊᕙᑎᒥᒃ ᖃᐅᔨᓴᐃᓂᕐᒧᑦ ᐱᓕᕆᖃᑎᒋᓐᓂᐅᔪᓄᑦ. ᑲᔪᓯᔪᒥᒃ ᐱᕚᓪᓕᖅᑎᑦᑎᓂᕐᒧᑦ ᐱᓕᕆᐊᖃᕐᓂᖅ ᐊᑐᖅᑕᐅᓂᐊᖅᑐᖅ ᐱᓕᕆᐊᑉ ᐊᐅᓚᕐᓂᓗᒃᑖᕐᒪᓂᑦ ᐱᐅᓯᒋᐊᖅᑎᓐᓂᕐᒧᑦ ᐊᕙᑎᐅᑉ ᖃᓄᐃᓕᐅᕐᓂᖕᒪ ᐊᒪᓗ ᐊᐅᓛᕈᖕᓇᕐᓂᐅᑉ. ᖃᐅᔾᔨᐊᖃᑦᑕᕐᓂᕐᒧᑦ ᖃᓄᐃᖕᒪᓂᐅᔪᑦ ᖃᓄᐃᓐᓂᖅᓴᐅᓂᖏᓐᓄᑦ ᓇᓚᐅᑖᖅᑕᐅᔪᓂᒃ ᖃᓄᐃᓕᐅᕐᓂᐅᔪᓄᑦ, ᐊᒪᓗ ᐊᑐᓕᖅᑎᑕᐅᔪᖕᓇᖅᑐᑦ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᔪᖅ ᐊᑐᓕᖅᑎᓪᓗᒋᑦ, ᐱᔭᕇᕐᑲᖅᐸᑦ, ᒥᑭᓂᖅᓴᒥᒃ ᖃᓄᐃᓕᐅᕐᓂᐅᔪᓂᒃ ᐱᓂᖖᒋᑦᑐᒪᒧᑦ.

ᓴᓇᔾᐅᓂᕐᒧᑦ ᖃᓄᐃᓕᐅᕐᓃᑦ

ᓴᓇᕙᓪᓕᐊᓂᖅ ᐱᒋᐊᕐᓂᐊᖅᑐᖅ ᖃᒪᓂᑦᑐᐊᑉ ᐃᒃᓴᕿᕐᒪᓄᑦ, ᓯᑲᐅᒧᑦ ᐃᒃᓴᕿᖅᒥᑦ ᐃᓕᓯᓗᑎᒃ ᑕᐃᑳᓂᓚᐅᐱᓪᓚᕐᓂᐊᖅᑐᒥᒃ ᐅᓯᖅᑎᔭᐃᓂᕐᒧᑦ. ᐅᖅᓯᐊᑑᓯᕙᒃ ᐊᒪᓗ ᐅᓯᖅᑎᔭᐃᓂᕐᒧᑦ ᐅᖅᓯᐊᓗᖅᓂᑦ ᓱᐸᓘᑦ ᐃᓕᔭᐅᓗᑎᒃ. ᓄᖅᑲᖓᕙᖕᒧᑦ ᐊᒪᓗ ᑐᖅᑯᖅᓯᒪᕙᒃ ᖃᖅᑕᖅᑐᓄᑦ ᐃᓂᓕᐅᕐᓗᑎᒃ.

ᓯᕗᓪᓕᕐᒥᑦ ᐅᑭᐅᒃᑯᑦ ᓴᓇᔾᐅᑎᓪᓗᒍ, ᐅᑭᐅᑯᑦ ᐊᑉᑯᑎᒥᒃ ᓴᓇᓂᐊᖅᑐᑦ ᐊᑯᓐᓂᖅᑭᓐᓂᑦ ᖃᒪᓂᑦᑐᐊᕐᒥᑦ ᐃᒃᓴᕿᐅᑉᓗ ᑭᒻᒪᕿᐅᑉ ᐃᓂᖓᑕᓗ. ᐊᑉᑯᑎ ᖃᒪᓂᑦᑐᐊᑰᕐᓂᐊᖅᑐᒃᓴᐅᔪᖅ ᐊᒪᓗ ᐱᖓᖕᓇᖑᓄᑦ ᐊᑐᕐᓗᑎᒃ ᐊᖏᔪᓂᒃ ᓯᑯᓯᒪᔪᓂᒃ ᑕᓯᕐᓂᑦ. ᐃᒻᒥᖅᑐᐃᓂᖅᑕᕐᑲᓇᐊᖅᑲᕐᓂᐊᖅᑐᖅ ᐊᑉᑯᓯᐅᕐᓂᐊᕐᓂᕐᒧᑦ. ᐃᓚᖏᑦ ᓄᓇᒃᑰᖅᑐᑦ ᐃᒥᖅᑐᖅᑕᐅᔭᓇᐊᖅᑲᕐᓂᐊᖅᑐᑦ ᐅᕙᓘᓃᑦ ᓯᐅᕿᖅᑐᖅᑕᐅᓗᑎᒃ.

ᓴᓇᔾᐅᑎᓪᓗᒍ ᐃᓚᐅᓂᐊᖅᑐᑦ ᐃᓗᑦᑐᖅᑎᓇᓂᖅ ᐊᒪᓗ ᓯᖃᓪᓕᑎᓇᓂᖅ ᓯᐅᕿᖅᑐᐃᓂᕐᒧᑦ ᐊᑉᑯᑎᓄᑦ ᐊᒪᓗ ᐃᓂᒋᔭᐅᓂᐊᖅᑐᓄᑦ ᑐᙵᕕᖕᓄᑦ. ᐊᑐᖅᑐᐊᕿᐅᔭᕆᐊᖃᕐᓂᐊᖅᑐᒃᓴᐅᔪᓂᑦ ᓇᓂᓯᓚᐅᖅᑐᑦ ᖃᒪᓂᑦᑐᐊᕐᒥᑦ – ᑭᒡᒐᕖᖑᒧᑦ ᐊᑉᑯᑕᐅᔪᒥᑦ ᑭᒡᒐᕙᐅᑉ ᖃᓂᑕᖕᒪᓂᑦ. ᐅᔭᕋᖕᓂᐊᕐᕕᖕᒥᑦ ᐅᔭᖅᑲᐃᑦ ᐊᑐᖅᑕᐅᓂᐊᖅᑐᒃᓴᐅᔪᑦ ᐃᓚᓕᐅᑎᔭᐅᓂᕐᒧᑦ.

ᒥᑦᑕᕐᕕᒃ ᓴᓇᔭᐅᓂᐊᖅᑐᖅ ᓂᑭᐊᓂᑦ ᑭᒡᒐᕖᑉ ᐃᓂᖓᓂᑦ. ᓯᑯᒥᑦ ᒥᑦᑕᕝᕕᓕᐅᕐᓂᐊᖅᑐᑦ Pointer ᑕᓯᕐᒥᑦ ᐊᑐᖅᑕᐅᓂᐊᖅᑐᒃᓴᐅᖕᒥᔪᖅ ᐊᑐᖅᑕᐅᓂᐊᖅᑐᓄᑦ ᐊᒪᓗ ᐱᓕᕆᔨᓂᒃ ᐊᒃᔭᖅᑐᐃᓂᕐᒧᑦ ᓴᓇᔾᐅᑎᓪᓗᒍᒥᑦ.

ᐱᓕᕆᐊᖅ ᓴᓇᔾᐅᓂᖕᒪᓂᒃ ᐃᓚᐅᓂᐊᖅᑐᖅ ᑐᙵᕕᒃᓴᓕᐅᕆᓂᖅ ᐊᒪᓗ ᓴᓇᔾᐅᓂᖕᒪ ᓯᖃᓪᓕᑎᕆᕙᒃ, ᓯᓂᒃᑕᕐᕕᒃ, ᐱᖁᑕᐅᓯᕙᒃ ᐊᒪᓗ ᐋᕿᒃᓯᐃᕙᕝᕕᑦ, ᐅᖅᓯᐊᓗᓯᕙᕝᕕᑦ, ᖄᖅᑕᖅᑐᓂᒃ ᑐᖅᑯᖅᓯᒪᕙᕝᕕᑦ, ᐃᒪᓕᕆᕙᕝᕕᑦ, ᐊᐅᓛᖅᑎᑦᑎᓂᕐᒧᑦ ᐃᒡᓗᖁᔪᐊᑦ, ᐊᒪᓗ ᐃᓂᐅᔪᒥᑦ ᐊᑉᑯᑏᑦ. ᑲᑎᙵᓕᑦ ᐃᓂᐅᔪᖅ ᑭᒡᒐᕖᑉ ᐃᓂᖕᒪᓄᑦ, Sissons ᐃᓂᖕᒪᓄᑦ, ᑭᒡᒐᕝ-Sissons ᐊᑉᑯᑎ, ᐊᒪᓗ ᒥᑦᑕᕝ 1000 hectares–ᓗᐊᖑᓂᐊᖅᑐᖅ.

ᐃᒪᑦᑎᐊᕙᖅᒥᑦ ᓴᖑᑎᑦᑎᓂᕐᒧᑦ ᓱᐸᓗᐃᑦ ᓴᓇᔾᐅᓂᐊᖅᑐᑦ ᓴᓇᔾᐅᕙᓪᓕᐊᓕᕝᖅᑎᓪᓗᒍ ᒥᒃᓵᕆᐊᖅᑎᓐᓂᕐᒧᑦ ᐊᖏᓂᖕᒪ ᐃᒪᖅ ᓴᓇᔾᐅᕙᓪᓕᐊᔪᒨᖕᒪᐅᔪᖅ. ᐃᒪᕐᒥᑦ ᑯᕕᑎᑦᑎᓂᖅ ᐃᓂᐅᔪᒥᑦ ᑲᑎᑕᐅᓂᐊᖅᑐᑦ ᐊᒪᓗ ᐱᓕᕆᐊᖑᓗᑎᒃ ᐊᑐᕐᓗᑎᒃ ᐃᒪᓕᕆᕝᕕᖕᒥᑦ ᐊᑐᖅᑕᐅᓚᐅᐱᓪᓚᕐᓂᐊᖅᑐᒥᑦ ᐱᔭᕇᕐᑲᖅᐸᑦ.

ᑎᑭᐅᑎᔪᕐᓇᕐᓂᖅ Andrew ᑕᓯᕐᒦᑐᓄᑦ Sissons ᐃᓂᐊᓂᑦ, ᐃᓚᖓ Andrew ᑕᓯᖅ ᐃᒪᐃᔭᖅᑕᐅᓂᐊᖅᑐᖅ ᓴᓇᓗᑎᒃ ᐃᒪᐃᔭᐃᔾᔪᑎᒥᒃ ᐅᐊᖕᓇᖅᐸᓯᐊᓂᑦ ᑐᓯᐅᑉ.

ᐊᑐᓚᐅᐱᓪᓚᕐᓂᐊᖅᑐᒥᒃ ᓄᓇᓕᐊᑯᒥᒃ ᐋᕿᒃᓯᓚᐅᖅᑐᑦ ᑭᒡᒐᕝᐅᑉ ᐃᓂᖓᓂᑦ ᐊᑐᖅᑕᐅᓂᐊᕐᓗᓂ ᓴᓇᔨᓄᑦ ᐊᑐᐅᓐᓇᕐᓂᐊᖅᑐᖅ ᓯᓂᒃᑕᕝᕕᒃ ᐱᐊᓂᒃᐸᒧᑦ ᑭᓯᐊᓂ. ᓂᕆᐅᒃᑐᑦ ᓴᓇᔾᐅᓂᖓ ᓯᑕᒪᓄᑦ ᐅᑭᐅᓄᑦ ᓴᓇᔾᐅᕋᓂᖅᓂᐊᕐᓂᖓᓄᑦ.

ᐊᐅᓛᖅᑎᕐᑎᓂᕐᒧᑦ ᖃᓄᐃᓕᐅᕐᓃᑦ

ᐱᓕᕆᐊᒥᑦ ᐃᓚᐅᔪᑦ ᐱᕙᓪᓕᐊᓂᖅᒋᑦ ᐱᖓᓱᐃᑦ ᐅᑯᐃᖓᔪᑦ ᓄᓇᒥᑦ ᐅᔭᕋᖕᓂᐊᖅᑐᓕᕆᓃᑦ (ᑲᓇᖕᓇᖓᓂᑦ, ᕿᑎᐊᓂᑦ, ᐊᒻᒪ ᐊᑐᖅᑕᐅᔪᐊᖅᑐᒥᑦ) ᑭᒡᒐᕚᐅᑉ ᐃᓂᖓᓂᑦ ᐊᒻᒪ ᑕᒪᕐᒥᒃ ᐅᑯᐃᖓᔪᑦ ᓄᓇᒥᑦ ᐅᔭᕋᖕᓂᐊᕐᕖᒃ (Andrew ᑕᓯᖅ) ᐊᒻᒪ ᓄᓇᐅᑉ ᐃᓗᐊᓂᑦ ᐅᔭᕋᖕᓂᐊᕐᕕᒃ (End Grid) Sissons ᐃᓂᐊᓂᑦ. ᐅᔭᖅᑲᐃᑦ ᐅᔭᕋᖕᓂᐊᖅᑕᐅᔪᑦ ᐊᑐᖅᑐᑎᒃ ᓄᓇᒥᒃ ᐲᔭᐃᔾᔪᑎᓂᒃ ᐊᒻᒪ ᐅᓯᔭᐅᑉᐳᑎᒃ, ᓄᓇᒃᑰᕈᑎᒃᑯᑦ, ᐃᓂᒋᔭᖕᒋᓐᓄᑦ ᐅᔭᖅᑲᓂᒃ ᑲᑎᓯᒪᔪᓄᑦ.

ᐅᔭᖅᑲᐃᑦ ᐅᔭᕋᖕᓂᐊᕐᕕᖕᓂᑦ ᐃᒍᓕᖅᑲᖅᑐᑦ ᐊᑦᑎᒃᑐᒥᒃ ᓄᖑᓯᐃᑐᒥᒃ ᐊᕕᒃᑐᖅᑕᐅᓂᐊᖅᑐᑦ ᐱᖓᓱᐃᓕᖓᓗᑎᒃ: Type 1, ᐊᑐᖅᑕᐅᔾᔮᖅᑐᖅ ᓴᓇᕙᓪᓕᐊᓂᕐᒧᑦ; Type 2, ᐊᑐᖅᑕᐅᔾᔮᖅᑐᖅ ᑐᖅᑯᖅᓯᒪᕗᕕᖕᒧᑦ ᐃᓂᒋᔭᐅᔫᑉ ᖃᖓᓂᑦ; ᐊᒻᒪ Type 3, ᑐᕌᖓᔪᒥᒃ ᐊᐅᓚᑦᑎᓂᖅᑕᕐᑲᓇᕐᑲᖅᑐᖅ. Type 3 ᐅᔭᖅᑲᐃᑦ ᖄᒥᒫᓗᑎᒃ ᑐᖅᑯᖅᑕᐅᓯᒪᓚᐅᐱᓪᓚᖅᑦᑕᕐᓂᐊᖅᑐᑦ ᐅᑎᖅᑎᑎᖅᑕᐅᓗᑎᒡᓗ ᐅᔭᕋᖕᓂᐊᕐᕕᐅᕍᓂᒃᑐᒧᑦ ᐅᒃᑯᐊᖅᐸᓪᓕᐊᑎᓪᓗᒋᑦ.

ᐅᔭᖅᑲᐃᑦ ᑐᖅᑯᖅᑕᐅᓯᒪᔪᑦ ᑲᑎᓯᒪᔪᓂᑦ ᓯᕐᑲᓪᓕᑎᓇᖕᕕᖕᒍᐊᖅᑕᐅᕐᑲᑦᑕᕐᓂᐊᖅᑐᑦ ᑭᒡᒐᕚᐅᑉ ᐃᓂᖓᓂᒃ 4,000 ᑖᓂᒃ ᓄᖑᓯᐃᑐᓕᐅᕐᓗᑎᒃ (U)−ᒥᒃ ᐅᔭᖅᑲᐃᑦ ᑲᑎᓯᒪᔪᑎᑐᑦ, yellowcake−ᖑᓂᕋᖅᑕᐅᓰᖅ, ᐅᑭᐅᑕᒫᑦ.

ᕿᒪᒃᑎᑦᑐᓂᒃ ᖃᓄᐃᖓᓂᐅᔪᑦ ᐋᖅᑕᐅᔪᓂᑦ ᓄᖑᓯᐃᑐᓂᑦ ᐅᔭᖅᑲᓂᑦ ᐱᓕᕆᐊᖑᕐᑲᑦᑕᕐᓗᑎᒃ ᓯᕐᑲᓪᓕᑎᓇᖕᕕᖕᒥᑦ ᐊᒻᒪ ᐃᓕᐅᕐᑲᖅᑕᐅᓗᑎᒃ ᐱᖓᓱᓄᑦ (ᑲᓇᖕᓇᖓᓂᑦ, ᕿᑎᐊᓂᑦ, ᐊᒻᒪ ᐊᑐᖅᑕᐅᔪᐊᖅᑐᒥᑦ) ᐊᑐᖅᑕᐅᔾᔮᖅᓯᑎᑕᐅᑉᐳᑎᒃ ᕿᒪᒃᑎᑦᑐᓂᒃ ᐊᐅᓚᑦᑎᕗᕕᖕᒥᑦ (TMF). ᕿᒪᒃᑎᑦᑐᑦ ᑐᖅᑯᖅᑕᐅᓯᒪᓗᑎᒃ ᐃᒪᐅᑉ ᐊᑖᓂᑦ ᐊᐅᓛᖅᑎᓪᓗᒍ ᖁᐅᖁᙱᕈᑎᑦ.

ᐃᒪᑦᑎᐊᕙᖕᒥᑦ ᐲᔭᐃᓂᖅᑕᕐᑲᕐᓂᐊᖅᑐᖅ ᖃᓂᑦᑐᓂᒃ ᑕᓯᕐᓂᑦ ᐱᓕᕆᕕᐅᔪᒥᑦ ᐊᑐᖅᑕᐅᓂᐊᖅᑐᒥᑦ. ᒥᑭᑦᑐᒥᒃ ᐃᒍᑦᑐᖅᓯᓂᐊᕐᒥᔪᑦ ᐃᒪᖅᑲᐅᓯᕗᕕᐅᒍᒃ ᑭᒡᒐᕚᐅᑉ ᐃᓂᖓᓂᑦ ᐊᑐᖅᑕᐅᒍᓂ ᐊᐅᓚᑦᑎᕗᕕᖕᒥᑦ ᐊᖕᒋᓛᖁᖅᑎᓐᓂᕐᒧᑦ ᐃᓂᒥᑦ ᑯᕕᕗᕕᐅᔪᖅ, ᑐᖅᑯᖅᓯᓯᒪᕗᕕᒃ ᐊᒻᒪ ᐊᑐᒃᑲᓐᓂᕐᓂᐊᖅᑐᓕᐅᕆᓂᕐᒧᑦ. ᐃᒪᓕᕆᕗᕖᑦ ᐊᐅᓚᑕᐅᓂᐊᖅᑐᑦ ᑕᒪᕐᒥᒃ ᑭᒡᒐᕙᖕᒥᑦ ᐊᒻᒪ Sissons ᐃᓂᖕᒋᓐᓂᑦ ᑎᑭᐅᑎᓂᕐᒧᑦ ᐱᓕᕆᐊᖑᔭᕆᐊᓖᑦ ᐱᐅᖕᒋᑦᑐᓂᒃ ᑯᕕᑎᑕᐅᔪᓄᑦ ᐱᔭᕆᐊᖃᖅᓂᐅᔪᑦ ᒥᐊᓂᖅᓯᓂᕐᒧᑦ ᐊᕙᑎᒥᒃ. ᐱᓕᕆᐊᖑᓯᒪᔪᑦ ᑯᕕᑎᑕᐅᓗᑎᒃ Judge Sissons ᑕᓯᕐᒧᑦ.

ᐆᒪᖁᑎᑕᖃᖅᓂᐊᖅᑐᖅ ᐊᑐᕐᓗᑎᒃ ᐃᓂᒋᔭᐅᔪᒥᑦ ᐅᖅᓯᐊᓗᖕᒧᑦ ᐊᐅᓚᑕᐅᔪᑦ ᐆᒪᖁᑕᐅᓯᕗᕕᖕᓂᑦ ᑭᒡᒐᕚᒃ ᐊᒻᒪ Sissons ᐃᓂᖕᒋᓐᓂᑦ.

ᐊᐅᔭᐅᑎᓪᓗᒍ, ᐃᓚᔭᐅᖃᑦᑕᖅᑐᑦ ᐅᖅᓯᐊᓗᖕᓄᑦ, ᐅᖅᓯᐊᓗᐃᑦ ᐊᒻᒪ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐱᖁᑏᑦ ᐊᙳᖅᑕᐅᖃᑦᑕᕐᓂᐊᖅᑐᑦ ᑕᓯᐅᔭᕐᔪᐊᕐᒧᑦ ᐊᑐᕐᓗᑎᒃ ᐅᖅᓯᐊᓗᖕᓂᒃ ᐅᓯᖃᑦᑕᖅᑐᑦ ᐊᒻᒪ ᐅᒥᐊᕐᔪᐊᓂᒃ ᐅᓯᖃᑦᑕᖅᑐᓂᒃ ᐅᕙᓃᓐᓂᑦ ᓄᓇᒃᑰᕈᑎᕐᔪᐊᒃᑯᑦ (train) ᑰᖕᔪᐊᕐᒧᑦ. ᐊᑐᖅᑕᐅᖃᑦᑕᖅᑐᑦ ᓅᑕᐅᓕᕐᓗᑎᒃ ᓯᑲᐅᓄᑦ ᐊᙳᖅᑕᐅᓗᑎᒡᓗ ᖃᒪᓂᑦᑐᐊᕐᒥᑦ ᐃᒃᓴᕝᕕᖕᒧᑦ ᐅᓰᔭᖅᑕᐅᓗᑎᒃ ᑐᖅᑯᖅᑕᐅᓗᑎᒡᓗ. ᐊᑐᖅᑕᐅᖃᑦᑕᖅᑐᑦ ᐊᙳᖅᑕᐅᓕᕐᓗᑎᒃ ᑭᒡᒐᕚᐅᑉ ᐃᓂᖓᓄᑦ ᓄᓇᒃᑰᕈᑎᒃᑯᑦ ᖃᒪᓂᑦᑐᐊᑉ−ᑭᒡᒐᕚᐅᑉ ᐊᖅᑯᑖᒍᑦ. ᐅᑭᐅᑯᑦ ᐊᑐᖅᑕᐅᖃᑦᑕᖅᑐᖅ ᐊᖅᑯᑎ ᐊᑐᖅᑕᐅᓂᖅ ᐊᔪᕋᔭᖅᐸᑦ, ᐅᑭᐅᓗᒃᑖᖅ ᐊᖅᑯᑎ, Thelon ᑰᒃᑰᖅᑐᖅ ᓴᕕᒐᐅᔭᖅᑲᖅᑐᒃᑯᑦ ᐅᒥᐊᑯᑦ, ᓴᓇᔭᐅᑐᐃᓐᓇᕆᐊᖅᑲᖅᑐᖅ ᐊᐅᓛᖅᑎᓪᓗᒍᒥᑦ.

2,000 ᒦᑕᒥᒃ ᑕᑭᑎᒍᐊᖅ ᒥᑦᑕᕐᕕᓕᐅᕐᓂᐊᖅᑐᑦ ᐃᓂᐅᔪᒥᑦ ᐊᒡᔭᖅᑐᐃᓂᕐᒧᑦ ᑕᒪᐃᓂᒃ ᐱᓕᕆᔾᑦ ᐊᒻᒪ ᐊᑐᖅᑕᐅᕐᑲᑦᑕᖅᑐᑦ. ᒥᑦᑕᕐᕕᒃ ᐊᑐᖅᑕᐅᕐᑲᑦᑕᕐᓂᐊᕐᒥᐊᖅ ᐊᒡᔭᖅᑐᐃᓂᕐᒧᑦ ᑐᖅᑯᖅᑕᐅᓯᒪᔪᑦ ᐅᖅᓱᐊᓘᓯᕝᕖᑦ ᐃᓗᓕᕐᑲᖅᑐᑦ ᓄᖑᓯᐃᑐᒥᒃ ᑲᑎᓯᒪᔪᓂᒃ ᑎᖏᓲᑯᑦ ᕿᑉᐳᓈᑦ ᓄᓇᖓᓐᓄᑦ ᑲᓇᑕᒥᑦ.

ᐊᐅᓃᕐᓂᖅ ᑎᖏᓲᑯᑦ ᑎᑭᕐᑲᑦᑕᕐᓗᑎᒃ/ᐊᐅᓚᕐᑲᑦᑕᕐᓗᑎᒃ 7-ᓂᒃ 14-ᓄᑦ ᐅᑉᓗᐃᑦ ᑎᑭᐅᑎᓂᑖᑦ ᐱᓕᕆᔾᐅᔪᑦ ᓯᓂᒃᑕᕝᕕᖕᒥᐅᑕᐅᕐᑲᑦᑕᖅᑐᓂᒃ.

ᐱᕝᕙᐅᕙᒃᑐᑦ ᐊᑐᕐᓗᒋᑦ ᐊᒻᒪ ᐱᑖᖑᕙᓪᓕᐊᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᔪᖅ, ᐊᐅᓃᖅᑎᑦᑎᓂᕐᔫᖓᔪᑦ ᐱᐊᓂᒐᔭᖅᑐᑦ ᐅᑭᐅᑦ 14-ᓗᐊᓂᑦ. ᑭᓯᐊᓂ, ᓂᕆᐅᒋᔭᐅᔪᖅ ᐱᕝᕙᐅᕐᑲᑦᑕᖅᑐᒃᑲᓐᓂᐅᔪᓂᒃ ᓇᓂᓯᓂᐊᕐᓂᖏᓐᓄᑦ; ᐱᓕᕆᐊᖅ ᐊᐅᓃᕐᓂᕐᑲᕈᖕᓇᖅᑐᖅ ᐅᑭᐅᓄᑦ 25-ᓄᑦ ᑎᒃᑭᒃᓴᓗᒍ.

ᓄᖅᑲᖅᐸᓪᓕᐊᓂᖅ ᐊᒻᒪ ᐅᒃᑯᐊᖅᐸᓪᓕᐊᓂᕐᔫᖓᔪᑦ

ᐱᐊᓂᒃᑎᓪᓗᒍ ᐅᔭᕆᖕᓂᐊᕐᓂᖅ ᐊᒻᒪ ᓯᕐᑲᓪᓕᑎᑎᓂᕐᔫᖓᔪᑦ, ᑕᒪᐃᓂᒃ ᐱᓕᕆᐊᑉ ᐃᓂᖏᑦ ᐅᑎᖅᑎᑕᐅᓂᐊᖅᑐᑦ ᖃᓄᐃᖓᓂᕆᓚᐅᖅᑕᖓᓄᕆᐊᖅ. ᓄᖅᑲᖅᐸᓪᓕᐊᓂᕐᒧᑦ ᐸᕐᓇᐅᑎᒥᑦ ᐃᓚᐅᔪᑦ ᓯᕐᑯᑉᑎᕆᓂᖅ ᐊᒻᒪ ᐋᔭᐃᓂᖅ ᐃᒡᓗᕐᔪᐊᕆᔭᐅᓚᐅᖅᑐᓂᓗᒃᑖᖅ ᐊᒻᒪ ᐋᕐᑭᒋᐊᖅᓯᓂᖅ ᑕᒪᐃᓂᒃ ᐱᓕᕆᐊᑉ ᐃᓂᒐᓚᐅᖅᑕᓗᒃᑖᖕᒋᑦ.

ᐅᒃᑯᐊᖅᓯᓂᖅ ᐱᖓᓲᔪᓂᒃ ᕿᒪᒃᑎᑦᑐᓄᑦ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᔪᑦ ᑭᒡᒐᕙᐅᑉ ᐃᓂᖓᓂᑦ ᐃᓚᐅᓂᐊᖅᑐᑦ ᑯᕙᖅᓴᐃᓂᖅ ᐊᒻᒪ ᐃᒪᓕᕆᕝᕕᒃ, ᐃᓪᓕᕆᔭᐅᓗᓂ ᖄᓕᖅᑕᐅᓗᓂ ᕿᒪᒃᑎᑦᑐᓂᒃ ᓱᑭᖅᑕᐃᓕᒫᔪᑎᒥᒃ ᐅᔭᕆᖕᓂᐊᖅᑕᐅᔪᓂᒃ ᐅᔭᖅᑲᓂᒃ. Type 3 ᐅᔭᖅᑲᐃᑦ ᑭᒡᒐᕙᐅᑉ ᐃᓂᖓᓂᑦ ᐃᓕᔭᐅᓂᐊᖅᑐᑦ ᐊᑐᖅᑕᐅᓗᐊᖅᑐᒧᑦ ᕿᒪᒃᑎᑦᑐᓄᑦ ᐊᐅᓚᑦᑎᕝᕙᖑᒧᑦ ᖄᓕᖅᑕᐅᓂᐊᕌᕐᓗᓂ. ᖄᖓ ᑭᖑᓪᓕᖅᐹᒥᒃ ᖃᓪᓕᖅᑕᐅᓗᓂ ᐊᑯᑉᓕᖅᑎᑕᐅᓗᓂ ᒦᓐᓇᐅᔪᖅ ᓄᓇᐅᔪᒧᑦ.

Type 3 ᐅᔭᖅᑲᐃᑦ Sissons ᐃᓂᖓᓂᑦ ᐃᓕᔭᐅᓂᐊᖅᑐᑦ ᐅᔭᕆᖕᓂᐊᕐᕕᐅᓚᐅᖅᑐᒥᑦ Andrew ᑕᓯᕐᒥᑦ ᐅᒃᑯᐃᖓᔪᖅ ᒪᓂᕆᖅ ᖃᓪᓕᖅᑕᐅᓗᓂ. Andrew ᑕᓯᖅ ᐃᓗᑦᑐᖅᓯᒪᔪᖅ ᐃᓗᓪᓕᖅᑕᐅᑲᓐᓂᕐᓗᓂ ᑕᓯᓕᐅᕐᓂᕐᒧᑦ. Type 1 ᐊᒻᒪ Type 2 ᐅᔭᖅᑲᐃᑦ ᑲᑎᓯᒪᔪᑦ ᑕᒪᐃᓂᒃ ᑭᒡᒐᕝ Sissons-ᒧ ᐃᓂᖏᓐᓂᑦ ᐋᕐᑭᒃᑕᐅᑲᓐᓂᕐᓂᐊᖅᑐᑦ ᖃᓪᓕᖅᑕᐅᓗᑎᒡᓗ ᓴᓗᒪᔪᒥᒃ ᐊᑐᖅᑕᐅᓂᑯᒥᑦ ᐱᕈᖅᑐᕐᑲᒃᑲᓐᓂᕐᑯᑉᓗᒍ.

ᐃᓂᐅᔪᒥᑦ ᐱᕐᑯᑎᕆᔭᐅᔪᑦ, ᐃᓚᐅᑉᓗᑎᒃ ᖃᒪᓂᑦᑐᐊᕐᒥᑦ ᐃᒃᓴᕝᕕᒃ ᐊᒻᒪ ᑭᒡᒐᕝᕕᒃ - ᖃᒪᓂᑦᑐᐊᖅ ᐊᑉᕐᑯᑎ(ᑏᑦ) ᐊᑐᕈᖕᓃᖅᑎᑕᐅᓂᐊᖅᑐᑦ ᑭᓯᐊᓂ ᓄᓇᓕᐅᑉ ᐅᕙᓃᑦ ᓴᕙᒪᒃᑯᓐᓄᑦ ᑲᒪᔾᐅᔪᑦ ᑎᒍᔪᒪᒃᐸᑦᔪᒃ ᑕᒪᒃᑯᐊ.

ᓂᕈᐅᒃᑐᑦ ᐊᑐᕈᖕᓃᖅᑎᑦᑎᓂᕐᔫᖓᔪᑦ ᐊᒻᒪ ᐊᑐᕈᖕᓃᖅᑎᑦᑎᓂᖅ ᐊᓂᒍᖅᑎᓪᓗᒍ ᖃᐅᔾᔨᐊᕐᑲᑦᑕᕐᓂᖅᑕᕐᑲᓇᐊᕐᑲᕐᓂᐊᕐᓂᖓᓂᒃ 15 ᐅᑯᐅᓄᑦ ᑎᑭᐅᑎᓗᒍ ᑕᒪᓐᓇ ᐱᐊᓂᖕᓂᐊᕐᓗᒍ.

ᐃᑲᔫᑏᑦ

ᐃᑲᔫᑏᑦ ᐱᓕᕆᐊᒥᑦ ᓄᓇᕗᒻᒧᑦ ᑭᕙᓪᓕᕐᒧᓪᓗ ᐃᓚᐅᔪᑦ ᐱᓕᕆᐊᒃᓴᐃᑦ ᓄᓇᓕᖕᒥᐅᓄᑦ ᐃᓄᖕᓄᓪᓗ. ᐱᓕᕆᐊᖅ ᓂᕆᐅᒋᔭᐅᔪᖅ ᐱᓕᕆᑎᑦᑎᓂᐊᕐᓂᖓᓄᑦ 750-ᓂᒃ ᐃᓄᖕᓂᒃ ᓴᓇᔭᐅᑎᓪᓗᒍ ᐊᒻᒪ 400-ᓂᒃ 600-ᓄᑦ

ᐃᓄᖕᓂᒃ ᐊᐅᓛᖅᑎᓪᓗᒍ. ᐊᒻᒪ, ᑕᐃᒪᓐᓇᑎᑦᑐᑦ ᑕᐃᑲᓪᓚᒻᒪᕆᐅᖕᒋᑦᑐᖅ ᐊᒻᒪ ᐱᓕᕆᐊᒃᓴᐃᑦ ᓴᖅᑭᑎᑕᐅᔪᑦ ᑭᓯᓪᓕᕐᒥᐅᓄᑦ ᑕᐃᑲᓪᓚᑦ ᐱᓕᕆᐊᒃᓴᐅᑉᓗᑎᒃ. ᐱᔾᓂᓯᕐᑲᕐᓂᕐᒧᑦ ᐱᓯᓪᓕᐊᓂᕐᒧᑦ ᑐᕌᓚᔪᑦ ᐊᑐᓕᖅᑎᑕᐅᓂᐊᖅᑐᑦ ᐃᓄᐃᑦ ᐊᒻᒪ ᓄᓇᓕᖕᒥᐅᑦ ᐃᑲᖅᑕᐅᑎᓐᓂᕐᒧᑦ ᐱᓕᕆᐊᓄᑦ ᐊᒻᒪ ᐱᔾᓂᕐᑲᕐᓂᕐᒧᑦ ᐱᕙᐅᔪᓄᑦ.

ᐱᓯᓪᓕᐊᓂᕐᑲᕐᓂᐊᓵᖅᑎᓪᓗᒍ ᐊᔪᕈᖕᓃᖅᓴᐃᓂᖅ ᓄᓇᓕᖕᒥᐅᓂᒃ ᓂᕆᐅᒋᔭᐅᔪᖅ ᓄᓇᕗᒻᒥ ᐃᓕᓐᓂᐊᕐᕖᐅᔪᓂᑦ ᐊᒻᒪ ᐊᓅᓯᒃᑯᑦ McClean ᑕᓯᕐᒥᑦ ᐊᐅᓚᓐᓂᖕᒐᓂᑦ ᐅᐊᖕᓇᖅᐸᓯᐊᓂᑦ ᓴᒃᑳᑐᐊᓐᒦᑐᒥᑦ. ᐊᓅᓯᒃᑯᑦ ᐱᓂᐊᕐᓂᕐᑲᖅᑐᑦ ᐱᓯᓪᓕᐊᑎᑦᑎᓂᕐᒥᒃ ᐊᒻᒪ ᐊᔪᕈᖕᓃᖅᓴᐃᓂᕐᒥᒃ ᐱᓕᕆᐊᖅᑖᕐᓂᕐᒧᑦ ᐱᓕᕆᐊᕐ ᐊᐅᓛᕐᓂᓗᒃᑖᖕᒐᓂᑦ.

ᑲᑐᑦᔨᑦ ᑖᒃᓲᔭᐃᔭᕐᓃᑦ ᐊᒻᒪ ᐊᑭᓕᐅᑏᑦ ᓇᓚᐅᑖᖅᑕᐅᔪᑦ $1 ᐱᓕᔭᓐᖏᓐᓅᓐᓂᐊᕐᓂᖏᓐᓄᑦ. ᑕᒪᑐᒥᙵᑦ, ᓇᓚᐅᑖᖅᑕᐅᔪᖅ 25%−ᓗᐊᑦ ᐊᑭᓕᐅᑕᐅᓂᐊᖅᑐᑦ ᑐᙵᕙᒃᑯᓐᓄᑦ, 25%−ᓗᐊᑦ ᐊᑭᓕᐅᑕᐅᓗᑎᒃ ᓄᓇᕗᑦ ᒐᕙᒪᒃᑯᖏᓐᓄᑦ, ᐊᒻᒪ ᐊᒥᐊᑯᖓ 50%−ᓗᐊᖅ ᐊᑭᓕᐅᑕᐅᓗᓂ ᑲᓇᑕᐅᑉ ᒐᕙᒪᒃᑯᖏᓐᓄᑦ.

ᐊᓯᖏᑦ ᐃᑲᔫᑏᑦ ᓇᓗᓇᐃᔭᖅᓯᒪᔪᑦ ᐃᓚᒋᔭᐅᑉᓗᑎᒃ ᐃᓄᐃᑦ ᐋᒃᑐᖅᓯᓂᕐᒧᑦ ᐃᑲᔫᑎᒥᑦ (IIBA)−ᒥᑦ.

ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐸᕐᓇᐅᑏᑦ ᐊᒻᒪ ᑐᕌᖓᔪᑦ

ᐱᓕᕆᐊᖅ ᐊᐅᓚᑕᐅᓂᐊᖅᑐᖅ ᑲᑎᓯᒪᔫᒃᑯᑦ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐋᕿᐅᒪᔪᑎᒍᑦ. ᐋᕿᐅᒪᔪᖅ ᐊᐅᓚᑦᑎᓂᐊᖅᑐᖅ ᖃᐸᓯᐊᕐᔪᖕᓂᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐸᕐᓇᐅᑎᓂᒃ ᐊᒻᒪ ᑐᕌᖓᔪᓂᒃ ᐱᓕᕆᐊᕆᓂᐊᕐᓗᒋᑦ ᐊᕙᑎᒥᒃ ᒥᐊᓂᖅᓯᓂᕐᒨᖓᔪᑦ, ᕿᒪᒃᑎᑦᑐᓂᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ, ᐅᔭᕋᖕᓂᐊᖅᑐᓕᕆᓂᕐᒥᑦ ᐅᔭᖅᑲᓂᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ, ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ, ᐊᒃᑕᑯᓂᒃ ᐊᒻᒪ ᐅᓗᕆᐊᓇᖅᑐᓂᒃ ᐊᑐᖅᑕᐅᔪᓂᑦ, ᐆᓐᓇᖅᑐᒥᒃ ᒥᐊᓂᖅᓯᓂᕐᒧᑦ, ᐱᓕᕆᓂᕐᒧᑦ ᐋᓐᓂᐊᖅᑕᐃᓕᒪᓂᖕᒋᓐᓂᒃ ᐊᒻᒪ ᐊᑦᑕᓇᖅᑐᒦᑎᑦᑕᐃᓕᒪᓂᖕᒋᓐᓂᒃ ᐃᓚᐅᓂᕐᒧᑦ. ᑕᒪᒃᑯᐊ ᐸᕐᓇᐅᑏᑦ ᐊᒻᒪ ᑐᕌᖓᔪᑦ ᐊᑐᓕᕐᓂᐊᖅᑐᑦ, ᐊᒻᒪ ᑲᔪᓯᓂᑎᓪᓗᒍ ᐱᐅᓯᕆᐊᕐᑲᑦᑕᕐᓂᖅ, ᐊᐅᓛᕐᓂᓗᒃᑖᖕᒐᓂᑦ ᐱᓕᕆᐊᕐ.

ᓯᕗᓕᖅᐹᓕᐊᖑᔪᑦ ᑖᑯᓄᙵ ᐸᕐᓇᐅᑎᓄᑦ ᓴᓇᔭᐅᓚᐅᖅᑐᑦ ᐱᔾᔪᑎᒋᐸᓗᒍ EIS ᐊᒻᒪ ᖃᓄᐃᓕᐅᕆᐊᕐᑲᕐᓃᑦ ᐃᓱᒪᒃᓴᖅᓯᐅᕈᑎᒋᔭᐅᑎᐊᕐᓂᖕᒋᓐᓄᑦ ᒫᓐᓇᐅᔪᖅ ᐱᓕᕆᐊᕐ ᖃᓄᐃᖕᒐᓂᐊᕐᓂᕆᔭᖕᒐᓄᑦ. ᑐᕌᖓᔪᒧᑦ ᑐᑭᓕᐅᕆᒃᑲᓐᓂᕐᓂᖅ ᐱᓕᕆᐊᕐᒍᓂᐊᖅᑐᖅ ᓚᐅᓴᓕᕆᓂᐅᑎᓪᓗᒍ ᐱᓕᕆᐊᒥᑦ.

ᐃᓚᓯᓂᖅ ᖁᓛᓂ ᐸᕐᓇᐅᑎᓄᑦ ᑐᕌᖓᔪᓄᓪᓗ, ᐊᓅᓯᒃᑯᑦ ᐱᓂᐊᕐᓂᕐᑲᖅᑐᑦ ᐱᓯᓪᓕᐊᑲᓐᓂᕐᓂᒥᒃ ᐅᔭᕋᖕᓂᐊᖅᑐᓕᕆᓂᕐᒥᑦ ᐅᔭᖅᑲᓂᒃ ᐱᐅᓯᑎᑦᑎᓂᕐᒧᑦ ᐊᒻᒪ ᓇᓗᓇᐃᖅᓯᓂᕐᒥᒃ ᑐᕌᖓᔪᖅ, ᐊᒻᒪ ᕿᒪᒃᑎᑦᑐᓄᑦ ᐱᐅᓯᕆᐊᖅᑎᑦᑎᓂᕐᒥᒃ ᐊᒻᒪ ᓇᓗᓇᐃᖅᓯᓂᕐᒧᑦ ᑐᕌᖓᔪᒥᑦ.

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Abbreviations

ALARA .... As Low As Reasonably Achievable
cm .... centimetre
CNSC .... Canadian Nuclear Safety Commission
COP .... Code of Practice
DMS .... Dosimetry Monitoring Strategy
e.g. .... example
HEPA .... high-efficiency particulate air
HVAC .... Heating Ventilation Air Conditioning
i.e. .... id est (that is)
IRS .... Internal Responsibility System
LHD .... load-haul-dump
LLRD .... long lived radioactive dust
OHC .... Occupational Health Committee
OHSAS .... Occupational Health and Safety Assessment Series
mSv .... milliSievert
mSv/y .... milliSievert per year
NEW .... Nuclear Energy Worker
PTNSR .... Packaging and Transport of Nuclear Substances Regulations
RIP .... resin in pulp
RnP .... radon progeny
RP .... Radiation Protection
RPP .... Radiation Protection Plan
SAG .... semi-autogenous
SHEQ .... Safety Health Environment and Quality
TMFs .... tailings management facilities
U .... uranium
% .... percent

Conversion Factors

X % U = X t U per 100 t ore

1 tonne = 1000 kg

1 kg = 2.20462 lb

U_3O_8 = U / 0.84798

1 tonne U = 2559.85 lb U_3O_8

Yellowcake (uranium concentrate) = ~72% U (84.9% U_3O_8)

Yellowcake will be shipped in 55 gallon (210L) drums each containing ~430 kg of yellowcake

1 Introduction

1.1 Background

The Kiggavik Project (Project) is a proposed uranium ore mining and milling operation located in the Kivalliq region of Nunavut approximately 80 kilometres (km) west of the community of Baker Lake (Figure 1.1-1). The Project is operated by AREVA Resources Canada Inc. (AREVA), in joint venture partnership with Japan-Canada Uranium Company Limited (JCU) and Daewoo International Corporation

Within the Kiggavik Project there are two general site areas referred to herein as the Kiggavik site and the Sissons site. The two sites are located approximately 17 km apart. Three uranium ore deposits will be mined at the Kiggavik site: East Zone, Centre Zone and Main Zone. A uranium mill, related facilities, main accommodations, and landing strip will also be located at the Kiggavik site. The Sissons site has two uranium ore deposits to be mined: Andrew Lake and End Grid. Open pit mining will be used to extract the ore from the three Kiggavik deposits as well as the Andrew Lake deposit. Mining of End Grid ore will require underground methods.

All ore extracted from the mine sites will be processed through the Kiggavik mill. Mined out pits at the Kiggavik site will sequentially be used as tailings management facilities (TMFs) with East Zone being the initial TMF. The uranium product will be packaged and transported via aircraft to southern transportation networks. Initially, mill reagents, fuel and other supplies will be transported by barge to Baker Lake and then by truck to the mine site over a winter access road. An all-season road between Baker Lake and the Kiggavik Site is carried through the assessment as an option proposed as a contingency in case the winter road cannot adequately support the Project over its life-span.

Decommissioning of the Project will include demolition of site facilities, clean up and reclamation of any disturbed areas, closure of the TMFs and reclamation of mine rock piles to promote vegetative growth and to provide wildlife access.

Projection: NAD 1983 UTM Zone 14N
Creator: CDC Revised: TL
Date: 9/03/2014 Scale: 1:16,000,000
File:
Data Sources: *Natural Resources Canada, Geobase®, Nation Topographic Database, Geological Survey of Canada, AREVA Resources Canada Inc.*

FIGURE 1.1-1
GENERAL LOCATION OF PROPOSED KIGGAVIK PROJECT IN CANADA

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The Kiggavik Project is subject to the environmental review and related licensing and permitting processes established by the Nunavut Land Claims Agreement (NLCA) (NIRB [Nunavut Impact Review Board] 2011), and to the licensing requirements of the Canadian Nuclear Safety Commission (CNSC). The Minister of Indian and Northern Affairs Canada (now Aboriginal Affairs and Northern Development Canada; AANDC) referred the Kiggavik Project to the NIRB for a Review under Part 5 of Article 12 of the NLCA in March of 2010.

The final NIRB "Guidelines for the Preparation of an Environmental Impact Statement for AREVA Resources Canada Inc.'s Kiggavik Project (NIRB File No. 09MN003)" (NIRB 2011) were issued in May of 2011. AREVA submitted the Draft Environmental Impact Statement in December 2011 and again in April 2012 with the NIRB determining that the submission successfully conformed to the EIS guidelines in May 2012. Two review periods followed with the Information Request stage completed in January 2013 and the Technical Review stage completed in May 2013. An in-person technical meeting was hosted in Rankin Inlet, Nunavut by the NIRB in May 2013 with a Community Roundtable and a Pre-Hearing Conference (PHC) hosted in Baker Lake, Nunavut shortly after in June 2013. Following the Pre-Hearing Conference the NIRB issued the "Preliminary Hearing Conference Decision Concerning the Kiggavik Project (NIRB File No. 09MN003)" in July 2013.

1.2 Nunavut Impact Review Board Guidelines for the Environmental Impact Statement and Preliminary Conference Decision

The DEIS, including this volume, was determined by the NIRB on May 4, 2012 to have adequately addressed relevant sections of the NIRB "Guidelines for the Preparation of an Environmental Impact Statement for AREVA Resources Canada Inc.'s Kiggavik Project (NIRB File No. 09MN003)" (NIRB 2011).

Greater clarity, consistency and, in some cases, additional design or assessment were provided within AREVA's responses to information requests in January 2013 and technical comments in May 2013. AREVA commitments for the preparation of the FEIS and regulatory review requirements are listed in the NIRB PHC Decision dated July 2013. Changes from the draft to final EIS including the location of information related to information requests, technical comments, and PHC requirements is noted in the Final Environmental Impact Statement (FEIS) conformity table (Tier 1, Volume 1, Technical Appendix 1A).

1.3 Purpose and Scope

The purpose of this document is to describe the Project components and activities, with a focus on detailing those components and activities that have the potential to interact with the environment. The overall objective of the Project Description is to provide sufficient detail on the Project to facilitate robust assessments of the potential effects of the Project on the biophysical and socio-economic environments.

For some Project components, a number of options or a range of potential operating conditions are presented. To ensure that the assessments of effects account for potential adjustment in final design parameters, AREVA has endeavoured to use conservative assumptions and bounding scenarios for the assessments. To clarify the assumptions and parameters used throughout the effects assessments, the final Section of this volume presents the Assessment Basis, which summarizes the bounding cases used by the assessment team.

1.4 Report Content and Related Documents

This volume of the FEIS is organized to focus the Project Description on the key activities that have potential for Project-environment interactions and/or that are recognized as a particular interest for regulatory agencies or the public. The initial sections are focused primarily on operational activities, as these provide context to the activities to be completed during the construction and decommissioning phases. The latter sections describe construction and decommissioning activities and AREVA's management programs which will be in place for all Project phases. This volume describes activities conducted under routine construction, operating, and decommissioning scenarios. Potential accidents and malfunctions and related Emergency Response and Spill Contingency Plans are described and assessed in Volume 10 and associated appendices.

In addition to this introduction (Section 1), this volume contains the following sections:

- Section 2: presents AREVA's understanding of the regulatory and legal framework within which the Project will operate.
- Section 3: describes current and historical activities on the Project site. Future exploration activities are also discussed.
- Section 4: outlines AREVA's approach to design of the Kiggavik Project, including influences of IQ and stakeholder engagement on project design, considerations and results of the alternatives assessment, site-specific design challenges, and environmental design features.
- Section 5: provides a description of mining activities during the operational phase of the Project.
- Section 6: describes mine rock characterization and management practices.
- Section 7: describes the milling activities and related infrastructure required during the operational phase.
- Section 8: describes the tailings characteristics that the mill is forecast to produce and outlines tailings management activities and facilities.

- Section 9: outlines the water management facilities and practices proposed to minimize water usage and ensure containment. The predicted treated effluent discharge characteristics are also outlined.
- Section 10: describes logistics and related transportation infrastructure required to support the Project, including marine transportation and the Baker Lake dock and storage facility, Baker Lake-Kiggavik access roads, and the Pointer Lake airstrip.
- Section 11: describes additional support infrastructure and activities, including power generation and on-site personnel accommodations.
- Section 12: presents the site preparation and construction activities planned to implement the Project. Supporting activities, including development of borrow pits and quarries, waste management, and temporary transportation modes, are also described.
- Section 13: describes decommissioning and reclamation activities proposed to safely close the Project at the end of mine life.
- Section 14: describes hazardous materials and general waste management for the Project.
- Section 15: presents a summary of the Radiation Protection Program and radiation protection measures for the mines and mill.
- Section 16: outlines the proposed Occupational Health and Safety Program and specific measures and design features.
- Section 17: presents the Environmental Protection Program.
- Section 18: describes anticipated workforce requirements and presents AREVA's approach to human resources management and community involvement.
- Section 19: presents a potential future development scenario for the Kiggavik area.
- Section 20: summarizes the Project activities and parameters used as the assessment basis in other Tier 2 volumes for evaluation of the potential effects of the Project on the environment.

This volume is intended to provide a comprehensive summary of the Kiggavik Project. Tier 3 documents are appended to this Volume to provide further details and supporting information. The Technical Appendices pertaining to this volume are as follows:

- 2A – Alternatives Assessment
- 2B – Drilling and Blasting Design
- 2C – Explosives Management Plan
- 2D –Design for Ore and Mine Rock Pads and Ponds
- 2E – Water Diversion and Collection Design
- 2F –Design for Andrew Lake Dewatering Structure
- 2G – Kiggavik to Sissons Road Report
- 2H – Ore Storage Management Plan
- 2I – Water Management Plan
- 2J – Marine Transportation
- 2K – Winter Road Report

- 2L – All-Season Road Report
- 2M – Roads Management Plan
- 2N – Borrow Pits and Quarry Management Plan
- 2O – Mine Site Airstrip Report
- 2P – Occupational Health and Safety Plan
- 2Q – Radiation Protection Plan
- 2R – Preliminary Decommissioning Plan
- 2S – Waste Management Plan
- 2T – Environmental Management Plan
- 2U – Hazardous Materials Management Plan
- 2V – Mine Geotechnical Reports

Tier 3 technical appendices associated with other volumes in this EIS that provide detailed information relevant to the Project Description include:

- 5J – Tailings Characterization and Management
- 5F – Mine Rock Characterization and Management

2 Project Legal and Regulatory Framework

2.1 Land and Mineral Tenure

There are four classifications of land in Nunavut:

- Crown Land;
- Inuit-Owned Land – surface land;
- Inuit-Owned land – surface/subsurface (mineral) land; and
- Commissioners Land.

The administration of rights and associated legislation for all types of land in Nunavut are presented in Table 2.1-1. Administration of surface and subsurface rights on Crown Land is the responsibility of Aboriginal Affairs and Northern Development Canada (AANDC). Surface rights on Inuit-Owned Land are administered by the Kivalliq Inuit Association.

Table 2.1-1 Land Ownership and Administration of Rights in Nunavut

Land Ownership	Surface/Mineral Rights	Grandfathered Rights	Administered By:	Legislation
Crown	Surface		Aboriginal Affairs and Northern Development Canada	*Territorial Lands Act*
	Mineral		Aboriginal Affairs and Northern Development Canada	*Canada Mining Regulations*
Inuit-Owned Surface	Surface		Regional Inuit Association	*Nunavut Land Claim Agreement*
	Mineral		Aboriginal Affairs and Northern Development Canada	*Canada Mining Regulations*
Inuit-Owned Surface/Subsurface	Surface		Regional Inuit Associations	*Nunavut Land Claim Agreement*
	Mineral	No pre-existing rights at signing of Land Claim	Nunavut Tunngavik Incorporated	*Nunavut Land Claim Agreement*
		Pre-existing rights at signing of Land Claim	Aboriginal Affairs and Northern Development Canada	*Canada Mining Regulations*
Commissioner			Government of Nunavut – Department of Community and Government Services	*Commissioners Land Act*

2.2 Existing Land and Mineral Tenure

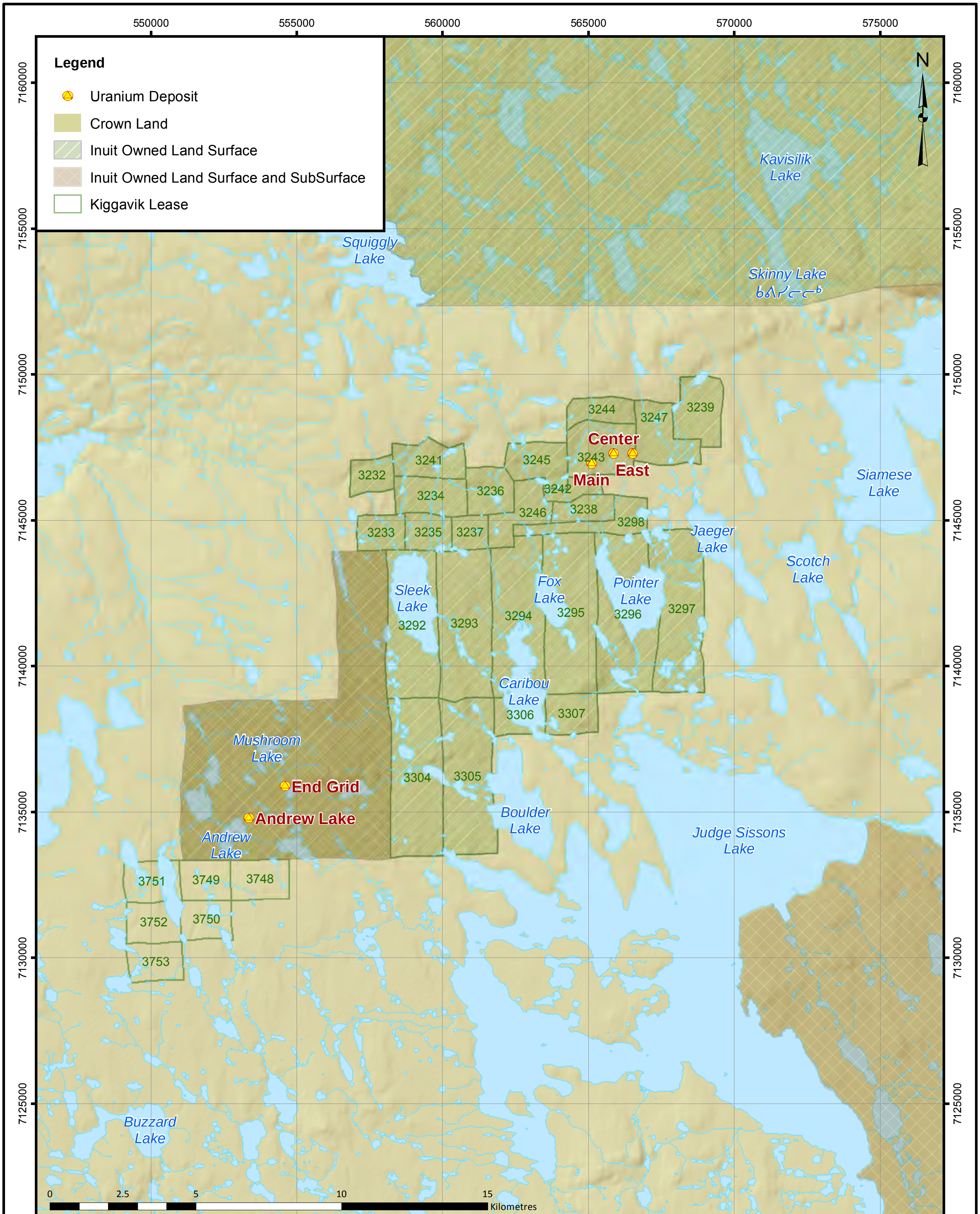
The Kiggavik Project consists of two main sites: Kiggavik and Sissons, which are collectively composed of 37 mineral leases covering 45,639 acres located within the Kivalliq Region of Nunavut.

Since submission of the Kiggavik DEIS, a surface land exchange between the Government of Canada and the Kivalliq Inuit Association pursuant to Article 8.2.5 of the *Nunavut Land Claim Agreement* was finalized. Land Parcel RE-32 was obtained by the Government of Canada to facilitate the creation of Ukkusiksalik National Park and Land Parcels RE-EX32 and RE-RE32 were obtained by the Kivalliq Inuit Association based on the potential development of non-renewable resources consistent with Article 17.1.2(b)(i) and (ii) of the *Nunavut Land Claim Agreement.* Land Parcel RE-EX32 coincides with the proposed Kiggavik Project and changes to ownership and administration of leases is summarized in Table 2.2-1 below. At the writing of the FEIS, thirty one of the 37 leases covering 41,845 acres have surface rights administered by the Kivalliq Inuit Association with the remaining six leases covering 3,794 acres held by the Crown with surface rights administered by AANDC.

Table 2.2-1 Ownership and Administration of Rights in Nunavut

	Inuit-Owned and Administrated Surface Leases and Area	Crown Owned and Administrated Surface	Total Kiggavik Lease Area
DEIS	5 leases; 11,702 acres	32 leases; 33,937 acres	37 leases; 45,639 acres
FEIS	31 leases; 41,845 acres	6 leases; 3,794 acres	37 leases; 45,639 acres

Subsurface rights and administration have not changed since submission of the DEIS. As shown in Figure 2.2-1, the Andrew Lake and End Grid deposits at the Sissons site are located on Inuit-Owned Surface/Subsurface Land and the Main, Center and East Zone deposits at the Kiggavik site are now located on Inuit-Owned surface land with subsurface rights and administration remaining Crown.



Projection: NAD 1983 UTM Zone 14N
Creator: CDC
Date: 03/26/2012 Scale: 1:175,000
File:
Data Sources: *Natural Resources Canada, Geobase®, Nation Topographic Database, AREVA Resources Canada Inc.*

FIGURE 2.2-1
KIGGAVIK PROJECT LEASES

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The Kiggavik leases predate the May 25, 1993 *Nunavut Land Claims Agreement*, and therefore the subsurface rights for these parcels are “grandfathered” and are administered by AANDC.

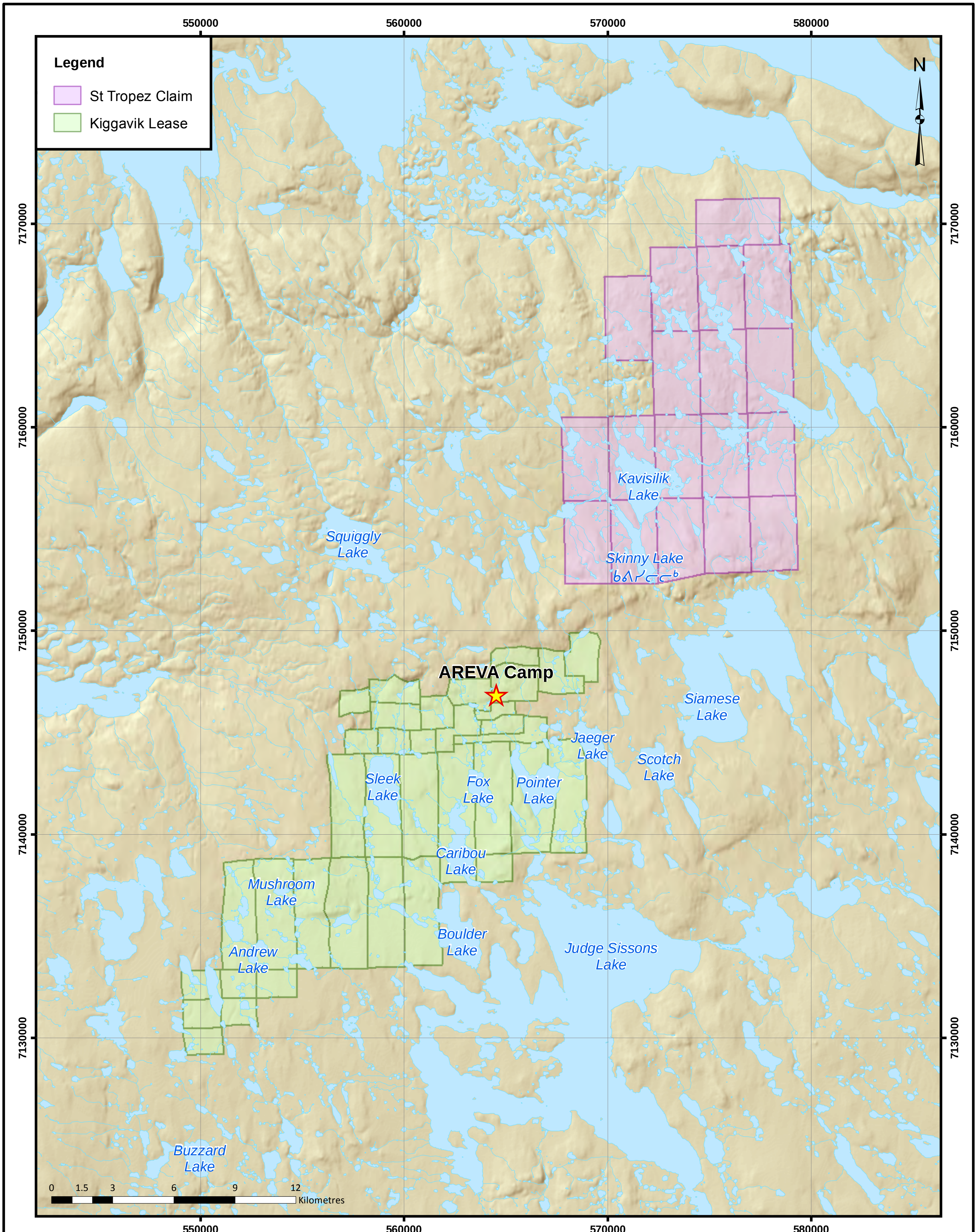
Leases have a 21 year term and are renewable. Thirty-one (31) of the Project leases were recorded in 1988 and renewed in 2011. The remaining six (6) leases were recorded in 1998 and will be due for renewal in 2019 (Table 2.2-2).

Table 2.2-2 Current Dispositions on the Kiggavik Project

Lease #	Acres	Ownership	Recorded	Renewal Due
ML3232	426	IOL - Surface	1988-Mar-31	2030
ML3233	492	IOL - Surface	1988-Mar-31	2030
ML3234	772	IOL - Surface	1988-Mar-31	2030
ML3235	498	IOL - Surface	1988-Mar-31	2030
ML3236	623	IOL - Surface	1988-Mar-31	2030
ML3237	360	IOL - Surface	1988-Mar-31	2030
ML3238	434	IOL - Surface	1988-Mar-31	2030
ML3239	867	IOL - Surface	1988-Mar-31	2030
ML3241	709	IOL - Surface	1988-Mar-31	2030
ML3242	294	IOL - Surface	1988-Mar-31	2030
ML3243	1027	IOL - Surface	1988-Mar-31	2030
ML3244	484	IOL - Surface	1988-Mar-31	2030
ML3245	713	IOL - Surface	1988-Mar-31	2030
ML3246	698	IOL - Surface	1988-Mar-31	2030
ML3247	870	IOL - Surface	1988-Mar-31	2030
ML3291	2132	Inuit – Surface/Mineral	1988-Apr-12	2030
ML3292	2205	IOL - Surface	1988-Apr-12	2030
ML3293	2326	IOL - Surface	1988-Apr-12	2030
ML3294	2349	IOL - Surface	1988-Apr-12	2030
ML3295	2459	IOL - Surface	1988-Apr-12	2030
ML3296	2641	IOL - Surface	1988-Apr-12	2030
ML3297	2311	IOL - Surface	1988-Apr-12	2030
ML3298	690	IOL - Surface	1988-Apr-12	2030

Table 2.2-2 Current Dispositions on the Kiggavik Project

Lease #	Acres	Ownership	Recorded	Renewal Due
ML3300	2149	Inuit – Surface/Mineral	1988-Apr-12	2030
ML3301	2615	Inuit – Surface/Mineral	1988-Apr-12	2030
ML3302	2180	Inuit – Surface/Mineral	1988-Apr-12	2030
ML3303	2626	Inuit – Surface/Mineral	1988-Apr-12	2030
ML3304	2382	IOL - Surface	1988-Apr-12	2030
ML3305	2337.5	IOL - Surface	1988-Apr-12	2030
ML3306	571	IOL - Surface	1988-Apr-12	2030
ML3307	604	IOL - Surface	1988-Apr-12	2030
ML3748	677	Crown	1998-Sep-04	2019
ML3749	597	Crown	1998-Sep-04	2019
ML3750	573	Crown	1998-Sep-04	2019
ML3751	688	Crown	1998-Sep-04	2019
ML3752	651	Crown	1998-Sep-04	2019
ML3753	608	Crown	1998-Sep-04	2019



Projection: NAD 1983 UTM Zone 14N
Creator: CDC
Date: 09/01/2011 Scale: 1:250,000
File:
Data Sources: *Natural Resources Canada, Geobase®, Nation Topographic Database, AREVA Resources Canada Inc.*

FIGURE 2.2-2
ST. TROPEZ LEASES

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2.3 Policy and Regulatory Framework

2.3.1 Overview

Nunavut Tunngavik Incorporated (NTI) and the Government of Canada signed the Nunavut Comprehensive Land Claim Agreement (NLCA) in 1993. The agreement included the establishment of five Institutions of Public Government and it is the primary legislation directing the regulatory process in Nunavut. Federally, the Canadian Nuclear Safety Commission (CNSC), the federal nuclear regulatory agency, has jurisdiction over all nuclear energy projects in Canada, including the Kiggavik Project, through the federal Nuclear Safety Control Act (NSCA) Additional federal and territorial legislation and federal, territorial and Inuit guidelines applicable to the proposed Kiggavik Project are outlined in Tables 2.3-1 and 2.3-2.

2.3.1.1 *Nunavut Land Claims Agreement*

Among numerous other rights outlined in the NLCA, the agreement included rights to environmental protection resulting from non-renewable resource development, establishment of new public boards and a development decision-making process.

Nunavut Tunngavik Incorporated (NTI) represents the Inuit beneficiaries under the *Nunavut Comprehensive Land Claim Agreement*. NTI implements Inuit obligations under the Land Claim and ensures that other parties to the NLCA meet their obligations. NTI is governed by a Board of Directors elected by Nunavut Inuit beneficiaries. NTI has a Regional Inuit Association in each of three regions, the Kivalliq, Kitikmeot and Qikiqtani. Leaders of these organizations are elected by Nunavut Inuit beneficiaries. The Kiggavik Project is located in the Kivalliq region.

Five Institutions of Public Government were established under the NLCA with a general mandate to manage resources together for the benefit of all Nunavummiut.

The Nunavut Planning Commission (NPC) is responsible for land use planning. The NPC develops broad planning policies for Nunavut and develops and administers land use plans to guide and direct short and long-term resource use and development. NPC also cooperates with Government in general monitoring on the long term state and health of the ecosystemic and socio-economic environment in the Nunavut Settlement Area. The nine Board members are appointed by NTI, the Government of Nunavut and the Government of Canada.

The Nunavut Impact Review Board (NIRB) has the responsibility to assess and monitor the ecosystem and socio-economic impacts of project proposals. On receipt of a complete project application, the NIRB screens the impact potential of the project. If the project is approved following a screening the NIRB may recommend terms and conditions to be included in the authorizations for the project. The NIRB may recommend that a further review is required under Part 5 or Part 6 of Article 12 of the NLCA. A report detailing the issues and concerns, and the rationale behind the recommendation, is sent to the responsible Minister who then makes a determination on the type of review to be conducted. Part 5 reviews are conducted by the NIRB reporting to the Minister of Aboriginal Affairs and Northern Development, and Part 6 reviews are conducted, under the authority of the *Canadian Environmental Assessment Act*, by a federal environmental assessment panel (with the participation of the Nunavut Impact Review Board) reporting to the Minister of Environment Canada. Projects that are approved to proceed following a Part 5 or Part 6 review are issued a project certificate stipulating terms and conditions, as accepted or varied by the relevant Minister. These terms and conditions are implemented by government departments and agencies in accordance with their authorities for granting approvals for the project. The board consists of nine members who are supported by technical and administrative staff. The board make up includes four members appointed by the Federal Minister after nomination by the Designated Inuit Organization, two members appointed by one or more Ministers of the Government of Canada, two members appointed by one or more Ministers of the Territorial Government (at least one by the Minister responsible for Renewable Resources). The chairperson is nominated by the appointed board members and then appointed by the Minister responsible for Northern Affairs in consultation with the Territorial Minister.

The Nunavut Water Board (NWB) has responsibilities and powers over the use, management and regulation of inland water in Nunavut, including licensing. In accordance with the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*, the NWB licenses the use of water and the deposit of waste into inland waters in Nunavut. Companies or individuals cannot begin any operations until approval has been granted and a water licence issued. The nine Board members are appointed by NTI, GN and the Government of Canada.

The Nunavut Surface Rights Tribunal (NSRT) is an independent quasi-judicial body with a mandate to settle disputes on access, on compensation for access, wildlife compensation claims and rights to carving stone or specified substances. The disputing parties are encouraged to negotiate and try to settle before applying to the NSRT for assistance. On receipt of an application, the NSRT arranges a pre-hearing conference for the parties to submit documents, identify the issues and be briefed on the NSRT process. Under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* the tribunal can have three to 11 members including a chair that is appointed by the Government of Canada.

The Nunavut Wildlife Management Board (NWMB) is the main instrument of wildlife management and the main regulator of access to wildlife in Nunavut. Ultimate responsibility for wildlife management rests with the Government of Nunavut and the Government of Canada. It is the government that carries out NWMB decisions. The Nunavut Wildlife Management Board consists of nine members appointed from the four Designated Inuit Organizations, the federal departments of Environment Canada, Fisheries and Oceans Canada and Aboriginial Affairs and Development Canada as well as representatives from the Government of Nunavut.

2.3.1.2 *Summary of Requirements*

The Kiggavik Project has numerous obligations to departments within federal and territorial governments, Inuit Organizations and Inuit Institutions of Public Government. To proceed, the Kiggavik Project must be compliant with any applicable uranium-related policies and land use plans, successfully obtain a NIRB project certificate through the environmental assessment process and finally obtain required permits and licences.

Table 2.3-1 Applicable Federal Acts and Regulations

ACT	REGULATION	RESPONSIBLE AGENCY
Nunavut Land Claims Agreement		
Nunavut Land Claims Agreement	Implementation of the agreement	NTI
	Article 11 – Land Use planning	NPC
	Article 12 – Development Impact	NIRB
	Article 13 – Water Management	NWB
	Article 20 – Inuit Water Rights	Designated Inuit Organization (KIA)/NWB
	Article 26 – Inuit Impact and Benefit Agreements	Designated Inuit Organization(KIA)
Federal		
Aeronautics Act	Canadian Aviation Regulations	TC
	Aerodrome Standards	TC
Arctic Waters Pollution Prevention Act	Arctic Waters Pollution Prevention Regulations	EC/TC/AANDC
	Arctic Shipping Pollution Prevention Regulations	
Canada Water Act	N/A	EC
Canada Wildlife Act	Wildlife Area Regulations	EC

Table 2.3-1 Applicable Federal Acts and Regulations

ACT	REGULATION	RESPONSIBLE AGENCY
Canadian Environmental Protection Act	Environmental Emergency Regulations	EC
	Federal Registration of Storage Tank Systems for Petroleum Products and Allied Petroleum Products on Federal Lands or Aboriginal Lands Regulations	
	Fuels Information Regulations No.1	
	Interprovincial Movement of Hazardous Waste regulations	
	Storage Tank Systems for petroleum Products and Allied Petroleum Products Regulation	
	Sulphur in Diesel Fuel Regulations	
Canada Labour Code	N/A	Labour Program
Canada Shipping Act	A Guide to Canada’s Ballast Water Control and Management Regulations	TC
Explosives Act	Explosives Regulations, 2013	NRCan
Firearms Act	N/A	Public Safety Canada/ RCMP
Fisheries Act	Metal Mining Effluent Regulations	EC/DFO
Marine Transportation Security Act	Marine Transportation Security Regulations	TC
Migratory Birds Convention Act	Migratory Birds Regulations	EC
Navigation Protection Act	Navigable Waters Bridges Regulations	TC/DFO
	Navigable Waters Works Regulations	
Nuclear Safety And Control Act	General Nuclear Safety And Control Regulations	CNSC
	Nuclear Non-Proliferation Import And Export Control Regulations	
	Nuclear Security Regulations	
	Nuclear Substances And Radiation Devices Regulations	
	Packaging And Transport Of Nuclear Substances Regulations	

Table 2.3-1 Applicable Federal Acts and Regulations

ACT	REGULATION	RESPONSIBLE AGENCY
	Radiation Protection Regulations	
	Uranium Mines And Mills Regulations	
	CNSC Cost Recovery Fees Regulations	
Nunavut Act	Nunavut Archaeological and Paleontological Sites Regulations	GN-DCH
Nunavut Scientist's Act	Scientists Act Administration Regulations	Nunavut Research Institute (NRI)
Nunavut Waters And Nunavut Surface Rights Tribunal Act	Nunavut Water Regulations	AANDC/NWB
Species At Risk Act	N/A	EC
Territorial Lands Act	Nunavut Mining Regulations	AANDC
	Territorial Dredging Regulations	
	Territorial Land Use Regulations	
	Territorial Lands Regulations	
	Territorial Quarrying Regulations	
Transportation Of Dangerous Goods Act	Transportation Of Dangerous Goods Regulations	TC

In addition to the federal legislation above, a number of federal policies and guidelines were also considered for the proposed Kiggavik Project including:

- AANDC Mine Site Reclamation Policy for Nunavut (2002)
- AANDC Guideline for Spill Contingency Planning
- Canadian Council of Ministers of the Environment (CCME) – Canadian Environmental Quality Guidelines
- DFO Freshwater Intake End-of-Pipe Fish Screen Guideline (1995)
- DFO Guidelines for the use of explosives in or near Canadian Fisheries Waters (1998)
- DFO Operational Statements (2007)
- DFO Fisheries Protection Policy Statement (2013
- DFO Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting (2013)
- EC Guidelines for the Assessment of Alternatives for Mine Waste Disposal (2011)

- EC Guidelines for the Preparation of Hazardous Material Spill Contingency Plans (1990)
- EC Metal Mining Technical Guidance for Environmental Effects Monitoring (2012)
- HC Federal Contaminated Site Risk Assessment in Canada: Guidance Documents related to Human Health Risk Assessment
- National Fire Code of Canada (2010)
- National Building Code of Canada (2010)

Additional guidelines under Inuit and Land Claim Organizations that must be followed include:

- NTI A Guide to Mineral Exploration and Development on Inuit-Owned Lands in Nunavut (2001)
- NTI Reclamation Policy (2008)

Table 2.3-2 Applicable Territorial Acts and Regulations

ACT	REGULATION	RESPONSIBLE AGENCY
Apprenticeship, Trade and Occupations Certification Act	Apprenticeship, Trade and Occupations Certification Regulations	GN-DE
Business Corporations Act	N/A	GN-DOJ
Commissioners Land Act	Commissioners Land Regulations	GN-CGS
NWT Environmental Protection Act	Spill Contingency Planning And Reporting Regulations	GN-DOE
Environmental Rights Act	N/A	GN-DOE
Emergency Medical Aid Act	N/A	GN-DOH
Explosive Use Act	Explosive Use Regulations	GN-WCB
Fire Prevention Act	Fire Prevention Regulations	GN-CGS
	Propane Cylinder Storage Regulations	
Gas Protection Act	The Gas Protection Regulations	GN-CGS
Labour Standards	N/A	Labour Standards Board
Liquor Act	N/A	Liquor Licensing Board
Mine Health And Safety Act	Mine Health And Safety Regulations	GN-WCB
	Environmental Tobacco Smoke Worksite Regulations	
Public Health Act	Camp Sanitation Regulations	GN-DOH
	General Sanitation Regulations	
	Public Water Supply Regulation	
	Public Sewerage Systems regulations	
Safety Act	General Safety Regulations	GN-WCB

Table 2.3-2 Applicable Territorial Acts and Regulations

ACT	REGULATION	RESPONSIBLE AGENCY
Transportation Of Dangerous Goods Act	Transportation Of Dangerous Goods Regulations	GN-CGS
Wildlife Act	N/A	GN-DOE
Workers' Compensation Act	Workers Compensation General Regulations	GN-WCB
NOTES: AANDC=Aboriginal Affairs and Northern Development, CNSC=Canadian Nuclear Safety Commission, DCGS=Department of Community and Government Services, DCH==Department of Culture and Heritage, DE=Department of Education ,DFO=Fisheries and Oceans Canada, DOE=Department of Environment, DOH= Department of Health, DOJ=Department of Justice, EC=Environment Canada, GN=Government of Nunavut, HC=Health Canada, , NRCAN=Natural Resources Canada, NTI= Nunavut Tunngavik Incorporated, NWB=Nunavut Water Board, TC=Transport Canada, WCB=Workers Compensation Board		

The Government of Nunavut also has numerous environmental guidelines that apply to the Kiggavik Project including guidelines for site remediation, management of hazardous waste and dust suppression.

It is noted that the majority of the items in Tables 2.3-1 and 2.3-2 impose specific regulatory requirements, but do not require that an approval be issued. Section 2.3.5 describes the major approvals and agreements which are specifically required for the Kiggavik Project to proceed.

2.3.2 Policy Framework for Uranium Development

Since the Nunavut Lands Claim Agreement, a number of policy developments have provided clarity and direction for the development of uranium projects in Nunavut. The Nunavut Territory has given special consideration and planning to uranium development as evidenced in the consideration of uranium development in the broad principles, objectives and conditions for uranium exploration and mining outlined in the NTI Uranium Policy and the six guiding principles for uranium developed by the Government of Nunavut.

2.3.2.1 *Nunavut Tunngavik Inc. Uranium Policy*

In 1997, NTI released its Mining Policy. The policy did not specifically address uranium mining, but remained applicable to uranium exploration and mining as the policy addressed the general subject of the development of mineral resources in Nunavut. NTI presented general support of mining through the policy's guiding principle that "*NTI will support and promote the development of mineral resources in Nunavut if there are significant long-term social and economic benefits for the Inuit of*

Nunavut, and is consistent with protecting the eco-systemic integrity of the Nunavut Settlement Area".

NTI provided a clear and consistent position on uranium mining by approving 'A Policy Concerning Uranium Mining in Nunavut' in 2007. The guiding principle of the policy is that "uranium exploration and mining must be carried out in an environmentally and socially responsible way and the uranium that results from the mining shall be used only for peaceful and environmentally friendly purposes". NTI further established five objectives supported by 16 policy statements. The five objectives are as follows:

1. Support Responsible and Peaceful Uses of Nuclear Energy
2. Require Benefits from Uranium Exploration and Mining
3. Ensure Protection of Human Health
4. Limit Impacts of Uranium Exploration and Mining
5. Promote Participation of Inuit

Refer to Section C-5 of Tier 1, Appendix 1C for a concordance table that lists objectives and policy statements contained in the NTI uranium policy and provides an explanation of how these requirements will be met.

2.3.2.2 *Government of Nunavut Guiding Principles for Uranium Development*

Parnautit: the Nunavut Mineral Exploration and Mining Strategy was released by the Government of Nunavut (GN) Department of Economic Development and Transportation in 2007 to guide development and create participation opportunities for Nunavummiut in the sustainable development of Nunavut mineral resources. The goal of the strategy is "To create the conditions for a strong and sustainable minerals industry that contributes to a high and sustainable quality of life for all Nunavummiut." Eighteen policy statements are given under the four pillars of jurisdictional framework, community benefit, infrastructure development and environmental stewardship.

On June 4, 2007 the GN released Six Guiding Principles for Uranium Development. It was read at the Legislature by the Minister of Finance/Economic Development and Transportation; under its principles the GN:

1. Regards mining, including uranium mining, as an important potential source of revenues to meet the needs of Nunavut's growing population and also as a potential source of employment and associated skills development for Nunavummiut.
2. Recognizes that uranium development places special responsibilities on government because of the nature of uranium and its by-products, the history of its use for both peaceful and non-peaceful purposes, and its potential risks to human health and the environment.

3. Understands that uranium development must have the support of Nunavummiut, especially in communities close to uranium development.
4. Will support uranium development in Nunavut provided that the following conditions are satisfied:
   a. health and safety standards that are at least at Canada's national standard must be assured for workers involved in uranium development in Nunavut;
   b. environmental standards must be assured, especially for the land, water and wildlife; and
   c. nunavummiut must be the major beneficiaries of uranium development activities.
5. Believes that nuclear power generation will be an important part of global strategies for ensuring energy supplies while reducing reliance on greenhouse gas-emitting fossil fuels.
6. Believes that Canadian law and international agreements provide a reasonable level of assurance that uranium mined in Nunavut will be used for peaceful purposes.

The Nunavut Mineral Exploration and Mining Strategy includes a commitment for consultations as part of the uranium policy. In August of 2010 the Premier committed to carrying out public forums into uranium mining in Nunavut. These public forums were carried out in March and April of 2011 in Iqaluit, Baker Lake and Cambridge Bay..

2.3.3 Conformance with the Keewatin Regional Land Use Plan

The *Keewatin Regional Land Use Plan* was approved in June, 2000. Uranium mining is the subject of two specific conditions, Terms 3.5 and 3.6. Term 3.5 of the Keewatin Regional Land Use Plan states: "Uranium development shall not take place until the Nunavut Planning Commission (NPC), the Nunavut Impact Review Board (NIRB), the Nunavut Water Board (NWB) and the Nunavut Wildlife Management Board (NWMB) have reviewed all of the issues relevant to uranium exploration and mining. Any review of uranium exploration and mining shall pay particular attention to questions concerning health and environmental protection".

The Nunavut Planning Commission (NPC) organized a uranium workshop, for the benefit of NPC and the Boards and included participation by a range of stakeholders and experts. This workshop was held in Baker Lake on June 4 to 7, 2007. On June 27, 2007 the Nunavut Planning Commission unanimously passed a resolution stating that NPC "believes it has thereby complied with its obligations pursuant to Term 3.5 Keewatin Regional Land Use Plan" (see AREVA 2008) for a copy of this resolution).

Term 3.6 of the Keewatin Land Use Plan states: "Any future proposal to mine uranium must be approved by the people of the region".

Uranium development proposals must be accompanied by approvals from the people of the region in order to conform to the Keewatin Regional Land Use Plan. The Nunavut Planning Commission has indicated that this requirement may be satisfied by the following:

- The Kivalliq Inuit Association (KIA), as the representative of Inuit in the region, passes a motion in favour of the uranium development, and
- Baker Lake plus three or more other communities representing 50% of the remaining population in the remaining Hamlets also pass Hamlet Council Motions in favour of uranium development and mining.

Motions of support and resolutions were passed by the KIA and all seven Kivalliq communities as follows (documentation is included in AREVA 2008):

- KIA passed a motion of support on January 9, 2007
- The Hamlet of Baker Lake passed a resolution of support on December 7, 2006
- The Hamlet of Repulse Bay passed a resolution of support on February 28, 2007
- The Hamlet of Rankin Inlet passed a resolution of support on March 26, 2007
- The Hamlet of Arviat passed a motion of support on May 9, 2007
- The Hamlet of Whale Cove passed a motion of support on August 27, 2007
- The Hamlet of Chesterfield Inlet passed a motion of support on April 17, 2008
- The Hamlet of Coral Harbor passed a motion of support on May 8, 2008

The KIA motion of support was for Project advancement into the Nunavut environmental assessment process and support was conditional on and subject to all regulatory requirements. The seven community motions/resolutions also included conditions. Arviat specified that support extended to the environmental review and the other six Kivalliq communities supported advancement of the Project given the ability of AREVA to meet the highest standards for the protection of the environment and people and also to ensure that economic and social benefits were realized by the Kivalliq communities.

Pursuant to Article 11 of the NLCA, all applications for project proposals must be forwarded to and reviewed by the NPC for conformity with any applicable land use plan. The Kiggavik Project received a positive conformity determination against the Keewatin Regional Land Use Plan (2000) and NPC forwarded the project proposal and their conformity determination to the NIRB on January 16, 2009.

2.3.4 Environmental Assessment Requirements

The Nunavut Impact Review Board (NIRB) was established under Article 12 of the NLCA and has the responsibility to assess and monitor the ecosystemic and socioeconomic impacts of project proposals inside the Nunavut Settlement Area. The primary objective of NIRB is “[a]t all times to protect and promote the existing and future well-being of the residents and communities of the Nunavut Settlement Area, and to protect the ecosystemic integrity of the Nunavut Settlement Area. NIRB shall take into account the well-being of residents of Canada outside the Nunavut Settlement Area (NLCA 12.2.5).”

The Kiggavik Project is subject to a NLCA Article 12 Part 5 review which is coordinated by the NIRB. Numerous federal and territorial departments and Inuit Organizations participate in the NIRB review providing technical expertise. Non-Governmental Organizations and any interested person can also participate in the NIRB review. Government bodies participating in the NIRB review include:

- Government of Canada
- Aboriginal Affairs and Northern Development Canada
- Canadian Nuclear Safety Commission
- Fisheries and Oceans Canada (DFO)
- Environment Canada
- Health Canada
- Natural Resources Canada
- Northern Projects Management Office
- Parks Canada
- Transport Canada
- Government of Nunavut
- Culture Language Elders and Youth
- Community and Government Services
- Department of Environment
- Economic Development and Transportation
- Education
- Executive and Intergovernmental Affairs
- Finance
- Health and Social Services
- Justice
- Nunavut Arctic College, Nunavut Housing Corporation, and Nunavut Research Institute (Crown Corporation)
- Inuit and Land Claim Organizations
- Nunavut Tunngavik Inc.
- Kivalliq Inuit Association
- Baker Lake Hunter and Trapper Organization

Pursuant to Article 12 of the NLCA the NIRB has screened and scoped the proposed Kiggavik Project and issued guidelines for the preparation of the Draft Environmental Impact Statement (EIS). Upon receipt of the DEIS, NIRB conducted an internal review to determine whether the EIS addressed the provisions of the guidelines. As a result of the review, an Addendum was submitted in April 2012 to meet conformity. The DEIS, including the addendum was distributed for technical review and community visits were coordinated leading up to a Pre-Hearing Conference (PHC). Following the PHC, the Board issued a PHC decision in July 2013 which provided direction regarding what was required in the Final Environmental Impact Statement (FEIS). Following review of the FEIS the NIRB will make a recommendation to the Minister of AANDC. Should a positive development recommendation be approved by the Minister, the NIRB will issue a project certificate and AREVA may then apply for licences, permits and other approvals.

2.3.5 Licensing – Required Approvals and Agreements

AREVA is currently proceeding with a sequential EA and licensing/permitting process for the Kiggavik Project.

Upon completion of the environmental impact assessment, which is concluded with the issuance of a Project Certificate by NIRB, AREVA will require a number of major licences, approvals and agreements prior to development of the Project.

The major approvals which would be required for development of the Project are summarized in Table 2.3-3.

Table 2.3-3 Licensing Process – Summary of Major Approvals

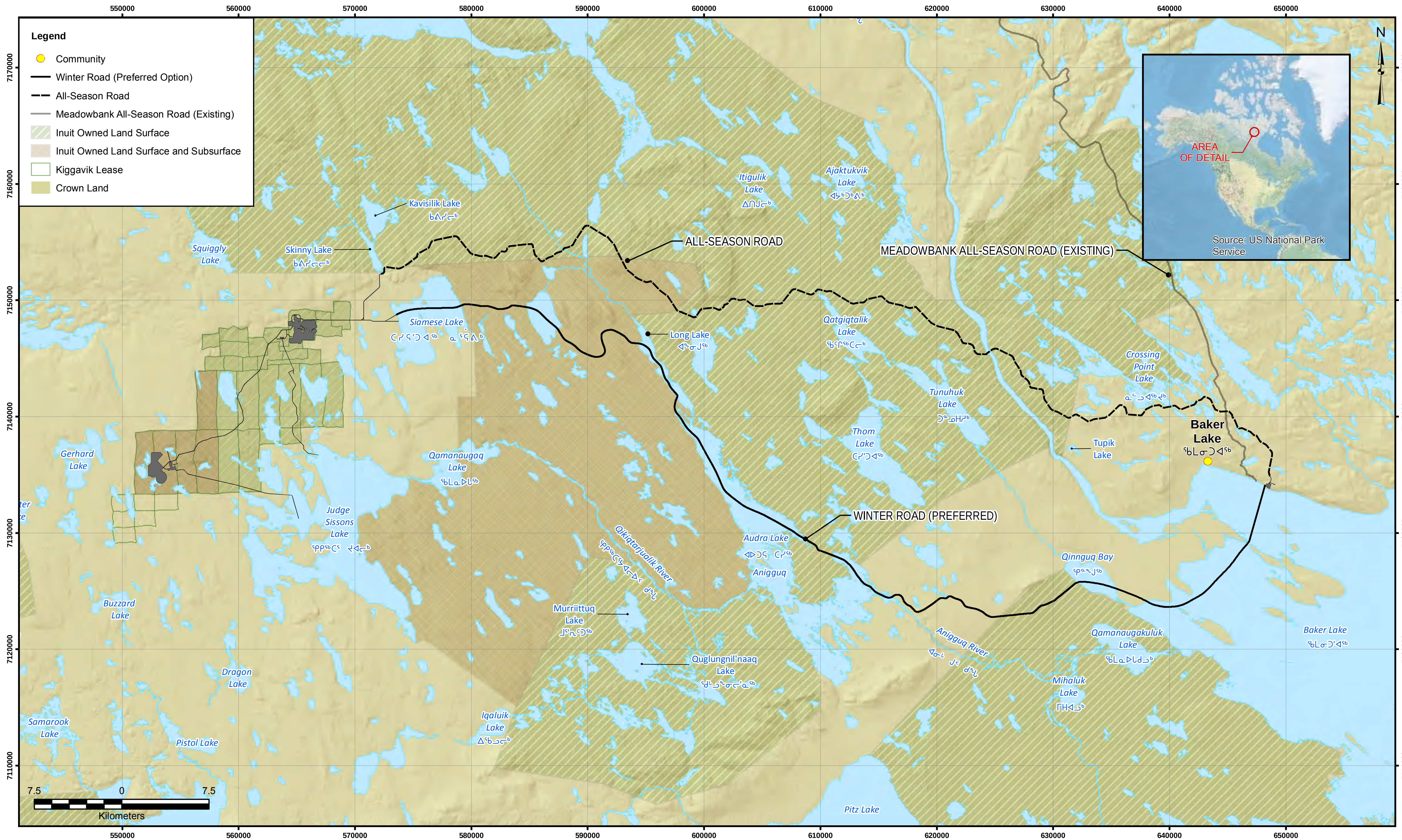
PERMIT/LICENCES	RESPONSIBLE AGENCY
Inuit Impact Benefit Agreement	Kivalliq Inuit Association
Water and Wildlife Compensation Agreements	
Land Use Licence and Surface Lease	
Class A Land Use Permit and Surface Lease	Aboriginal Affairs and Northern Development Canada
Licence to Prepare Site and Construct	Canadian Nuclear Safety Commission
Licence to Operate	
Type A Water Licence	Nunavut Water Board
Fisheries Authorization	Fisheries and Oceans Canada
Navigation Protection Permit	Transport Canada

Once a positive Minister's decision and NIRB project certificate are obtained, the final terms and conditions and project constraints will be known to AREVA. This will provide the necessary information upon which a development decision can be made, and detailed engineering can be finalized. The detailed engineering phase generates many of the details required to ensure the terms and conditions, and project constraints are effectively addressed and will also provide the basis upon which an effective licensing and permitting process (e.g. Nunavut Water Board, Canadian Nuclear Safety Commission, Fisheries and Oceans and others) can be achieved. This level of project approval is used to demonstrate proponent competence and ability to implement the EA-approved project. The ability to obtain all required permits and licenses demonstrates that the proponent has the necessary procedures and quality management in place. It is at the completion of this stage that monitoring and management plans contain the full detail that is required for an operating site.

2.3.5.1 ***Kivalliq Inuit Association***

The Kivalliq Inuit Association (KIA) administers and monitors certain provisions of the NLCA within the Kivalliq Region of Nunavut including the administration of IOL surface rights and the negotiation of Inuit Impact Benefit, Wildlife, and Water Compensation Agreements.

Subject to the issuance of a project certificate, AREVA will require a Land Use Licence for site activities located on IOL. Right-of-way and quarry agreements will also be required for the sections of the access road on IOL. Project components proposed to be located on IOL are shown in Figure 2. 3-1.



Projection: NAD 1983 UTM Zone 14N
Creator: CDC Revised: TL
Date:8/30/2014 Scale: 1:300,000
Data Sources: Natural Resources Canada, Geobase®, Nation Topographic Database, AREVA Resources Canada Inc.

FIGURE 2.3-1
PROJECT COMPONENTS ON INUIT OWNED LAND

ENVIRONMENTAL IMPACT STATEMENT
VOLUME 2

KIGGAVIK PROJECT

AREVA

AREVA Resources Canada Inc - P.O. Box 9204 - 817 - 45th Street West - Saskatoon, SK - S7K 3X5

File: Q:\SHEQ\GIS\KIGGAVIK\2014\EIS\Volume 2 - Project Description\Maps\MXD\v2_2.3-1-project_components_on_IOL_Revised_06_24_2014.mxd

2.3.5.2 ***Aboriginal Affairs and Northern Development Canada***

Aboriginal Affairs and Northern Development Canada (AANDC) administers Crown Land through the *Territorial Lands Act* and the *Canada Mining Regulations* for surface and subsurface rights respectively. Approvals from AANDC will include land use permits, a land lease, quarry permit and right-of-way for surface and a mineral lease for subsurface.

Surface tenure in the *Territorial Land Use Regulations* includes either a Class A Land Use Permit (Section 8) or a Class B Land Use Permit (Section 9) which can be used for advanced exploration but a Surface Lease under the *Territorial Land Regulations* is required for long term use and development of the site. Land use permits have maximum terms of two years and surface leases are issued for a maximum term of 30 years, both of which are renewable.

2.3.5.3 ***Canadian Nuclear Safety Commission***

The Canadian Nuclear Safety Commission (CNSC) was established in 2000 under the *Nuclear Safety and Control Act* (NSCA) and reports to the Parliament of Canada through the Minister of Natural Resources. The CNSC was created to replace the former Atomic Energy Control Board (AECB), which was founded in 1946. The CNSC's Commission Tribunal has up to seven permanent members, appointed by the federal government, whose decisions are supported by more than 600 employees. These employees review applications for licences according to regulatory requirements, make recommendations to the Commission, and enforce compliance with the NSCA, regulations, and any licence conditions imposed by the Commission. The Commission Tribunal holds public hearings regarding licensing decisions. The NSCA provides the CNSC with the mandate to regulate the use of nuclear energy and materials to protect the health, safety and security of Canadians and the environment; and to implement Canada’s international commitments on the peaceful use of nuclear energy.

Given an approved environmental assessment, the CNSC determines whether the proponent is qualified, and can construct, operate and decommission the mine in a manner that meets the requirements of the NSCA. This is determined on the basis of supporting documentation and the assessments and recommendations of the CNSC staff. The licensee must develop comprehensive licensing documents, quality management systems, robust monitoring programs, and if necessary, follow up programs. The compliance program is performed by CNSC staff.

The CNSC licence would regulate the following nuclear activities related to the Kiggavik Project:

- mining activities and facilities;
- milling activities and facilities;
- waste management systems (including tailings management areas, water management systems, hazardous materials, etc.);
- storage facilities for nuclear materials (including radiologically contaminated materials); and
- transport of nuclear substances.

For planning purposes, the CNSC licensing process for the Kiggavik Project can be considered as separate phases:

- Licence to Prepare the Site;
- Licence to Construct the Site;
- Licence to Operate; and
- Licence to Decommission.

It should be noted, however, that the Commission Tribunal can make a decision on more than one phase during one public hearing process (ex., combining the site preparation and facilities construction phases into a Licence to Prepare and Construct), if the supporting evidence for the phases to be combined is satisfactory. The CNSC requires a Preliminary Decommissioning Plan and a corresponding Financial Assurance appropriate for all phases of the Project under consideration.

2.3.5.4 ***Nunavut Water Board***

The Nunavut Water Board (NWB) mandate is the management and regulation of inland surface and ground water in Nunavut; its objectives are to provide for the conservation and utilization of waters in Nunavut – except in national parks – in a manner that will provide optimum benefits for the residents of Nunavut in particular and Canadians in general. The Project will require a Type A Water Licence, as determined by Schedule V of the *Northwest Territories Water Regulations*[1], from the NWB for the use of water and disposal of waste into water.

Issuance of a Type A water Licence will require a public hearing. A water licence can be issued for a term of 25 years with a maximum renewal term of an additional 25 years.

AANDC is responsible for enforcing the terms and conditions of the Type A Water Licence under Article 13 of the NLCA and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*. The posting of a security deposit based on water-related liabilities must be acceptable to the Minister of AANDC.

If the NWB licence applies to any waters also covered by the *Fisheries Act*, the NWB terms and conditions must be as stringent as required under the *Fisheries Act* and regulations, and under the *Canada Water Act*.

If a determination that the proposed project will result in substantial impacts to the quality, quantity or flow of water that flows on or through IOL, and compensation is required, the NWB licence cannot be issued until a compensation agreement is negotiated with the KIA.

2.3.5.5 *Fisheries and Oceans Canada*

The Department of Fisheries and Oceans Canada (DFO) has legal responsibilities under the *Fisheries Act*, the *Species at Risk Act* (SARA), the *Oceans Act* and the *Canadian Environmental Assessment Act* (CEAA) to ensure that Canada's oceans and inland waterways and resources are protected and managed for the benefit of present and future generations.

On June 29, 2012, amendments to the federal *Fisheries Act* received Royal Assent. On November 25, 2013, new Fisheries Protection Provisions included in the amended *Act* came into force. The purpose of the Fisheries Protection Provisions included in the *Fisheries Act (2012)* is to support the sustainability and ongoing productivity of commercial, recreational and Aboriginal (CRA) fisheries. The prohibition under Section 35 (1) of the *Fisheries Act (2012)* states that "No person shall carry on any work, undertaking, or activity that results in serious harm to fish that are part of a commercial,

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[1] Section 174(1) of the Nunavut Waters and Nunavut Surface Rights Tribunal Act references the Northwest Territories Waters Act and section 33(1)(c) of this Act references the Northwest Territories Waters Regulations where the criteria for Type A and Type B licences are located.

recreational or Aboriginal fishery, or to fish that support such a fishery". This prohibition replaces previous prohibitions against killing fish by means other than fishing (Section 32, *Fisheries Act* 1985) and the harmful alteration, disruption or destruction of fish habitat (Section 35, *Fisheries Act* 1985), such that "serious harm to fish" includes the killing of fish and the permanent alteration or destruction of habitats that are part of, or support, a CRA fishery.

New regulatory tools have been included in the *Act* to streamline project reviews and modernize the regulations. These tools include listings of information proponents must provide to Fisheries and Oceans Canada (DFO) when requesting an Authorization, as well as prescriptive timelines for issuance of an Authorization. Under the *Fisheries Act (2012),* DFO scientists are required to consider public interest; fisheries management objectives; mitigation measures or standards that may be available to avoid, minimize, or offset harm to fish; and whether fish are relevant to the ongoing productivity of a fishery prior to issuing an Authorization.

As prescribed under the new Fisheries Protection Provisions of the *Act*, one of the major approaches to maintaining or enhancing the ongoing productivity and sustainability of CRA fisheries is to ensure that proponents of projects that cause serious harm to fish are required to offset that harm to maintain and enhance the productivity of the fishery. Project proponents now have clearly defined responsibilities to make the necessary investments to protect CRA fisheries and to offset any residual impacts that may result from their project. To align the Project with the new Fisheries Protection Provisions and the *Fisheries Act (2012)*, a Conceptual Fisheries Offsetting Plan (CFOP) was developed for the Kiggavik Project.

2.3.5.6 ***Transport Canada***

Transport Canada (TC) is responsible for transportation policies and programs. It promotes safe, secure, efficient and environmentally responsible transportation in Canada. The Project will comply with policy administered by TC such as the *Navigation Protection Act, Canada Shipping Act*, and the *Transportation of Dangerous Goods Act.*

Navigable Waters

On April 1, 2014, the Navigation Protection Act (NPA) came into force. This replace the Navigable Waters Protection Act NWPA). A primary purpose of the NPA "is to regulate works and obstructions that risk interfering with navigation the navigable water listed on the schedule to the Act. The NPA also prohibits the depositing or throwing of materials that risk impacting navigation in navigable waters and the dewatering of navigable waters" (Transport Canada 2014a)

The *Navigation Protection Act* (NPA) is a federal law designed to protect the public right of navigation. The Project will require an Approval Authorizing Construction in Navigable Waters for those project activities that occur in, on, over, under, through or across a navigable waterway, should these works interfere with navigation. In accordance with Transport Canada requirements, AREVA will submit applications for approval under the *Navigation Protection Act* when final design details for project components, such as dykes, water intakes, temporary works and outfalls that are listed in the Schedule of the *Navigation Protection Act* and/or considered as navigable waters.

It is anticipated that most of the crossings associated with the all-season road will be constructed in waters that are not considered navigable, with the exception of the Thelon River crossing. If the all-season road is constructed, an application under the *Navigation Protection Act* will be submitted prior to construction. Prior to licensing, AREVA will discuss the use of waters at crossing locations with community members to determine if any of the waters may be considered navigable. Judge Sissons Lake has been identified as a fishing area (IQ –Riewe 1992[2]). To ensure compliance with the NPA, an application will be submitted for the Judge Sissons Lake discharge points and associated infrastructure at Project licensing.

The process to obtain a Proclamation of Exemption by the Governor in Council under Section 23 of the NPA to dewater Andrew Lake for mining can commence following an EA decision but prior to commencing construction activities. AREVA will continue dialogue with Transport Canada with respect to the permits required under the NPA and the assessment of potential impacts to navigation including dewatering of Andrew Lake and works associated with the possible construction and operation of the all-season road..

The anticipated approach for Project works potentially subject to the NPA at the time of Project licensing are summarized in Table 2.3-4.

[2] IQ-Riewe 1992: *Important fishing sites include Tehek Lake, Whitehills Lake, Baker Lake, Parker Lake, Judge Sissons Lake, Bissett Lake, and the mouths of the Prince River and Kazan River.*

Table 2.3-4: Summary of Works Potentially Subject to an Application under the Navigation Protection Act

Work	Navigable Water (Y/N)	Minor Work (Y/N)	Path Forward
Baker Lake Dock Site	Y	Y	Design falls within NPA criteria for minor works and will be included in list of minor works to be submitted at Project licensing.
Thelon River Crossing	Y	N	If construction of an all-season road is required, application for construction of a cable ferry under the NPA will be submitted at Projectlicensing.
All-Season Road Crossings (except Thelon)	Unlikely	N	Consultations with local stakeholders will be held prior to licensing to confirm that proposed water crossings are not being used for navigation.Application will be required for water crossings considered navigable under NPA at the time of Project licensing. Prior to constructing works, notification will be submitted to Transport Canada for waters which are not considered navigable.
Site Road Crossings	Unlikely	N	
Mushroom Lake Fresh Water Intake	Unlikely	N	
Siamese Lake Fresh Water Intake	Unlikely	Y	Fresh water intake may be considered a Minor Work if Siamese Lake is deemed navigable.
Judge Sissons Lake Discharge Points	Y	N	Application will be required for construction of discharge points under NPA at the time of Project licensing.
Andrew Lake Dewatering for Development of the Andrew Lake Pit	Unlikely	N	If Andrew Lake is considered navigable, application for a NPA Section 23 exemption by the Governor in Council will be submitted at Project licensing.

Canada Shipping Act

Transport Canada is the agency responsible for the *Canada Shipping Act*, 2001, an act respecting shipping and navigation. The *Canada Shipping Act* requires all marine vessels to meet standards for construction, including that all fuel-carrying vessels are of double-hull construction. As part of the *Canada Shipping Act*, a Ballast Water Management plan is required.

Transportation of Dangerous Goods

Transport Canada is also the responsible agency for the *Transportation of Dangerous Goods Act* and the associated *Transportation of Dangerous Goods Regulations*. The *Transportation of*

Dangerous Goods Act requires an approved Emergency Response Assistance Plan (ERAP) for all dangerous goods listed in Column 7 of Schedule I of the TDG regulations. AREVA will continue to engage Transport Canada representatives to ensure an Emergency Response Assistance Plan is in place prior to the transport of dangerous goods.

2.3.5.7 *Government of Nunavut*

Commissioner's land is defined in the *Nunavut Act* and generally includes land in and around most Nunavut communities. The current Project design does not consider use of any Commissioner's Land.

2.3.5.8 *Other*

In accordance with the *Explosives Act*, Natural Resources Canada provides licensing services to manufacturers, importers and distributors of explosives within Canada. The Project will require an Ammonium Nitrate & Fuel Oil (AN/FO) Certificate and the appropriate Explosives Factory License to manufacture AN/FO explosives at the Kiggavik site, and potentially an Explosives User Magazine Licence to store any pre-manufactured industrial explosives.

In addition to the main authorizations there will be a number of other approvals required including those for on-going studies and exploration.

2.3.6 Regulatory History

The Nunavut environmental impact assessment process on the proposed Kiggavik Project was initiated with applications for authorizations, licenses and permits submitted to the Canadian Nuclear Safety Commission (CNSC), the Kivalliq Inuit Association (KIA), AANDC, Fisheries and Oceans Canada (DFO) and the Nunavut Water Board (NWB) along with a supporting Project Proposal on November 14, 2008.

All applications for project proposals within the Nunavut Settlement Area must be forwarded to and reviewed by the Nunavut Planning Commission (NPC) for conformity with any applicable land use plan. The Kiggavik Project received a positive conformity determination in accordance with the Keewatin Regional Land Use Plan and NPC forwarded the project proposal and their conformity determination to the NIRB on January 16, 2009.

The NIRB then gave notice of the Kiggavik Project screening on January 20, 2009 and invited comments with a deadline of February 10, 2009. During screening the project proposal is evaluated to determine whether the project has significant impact potential and therefore requires a review under Part 5 or Part 6 under NLCA Article 12. At the request of the Government of Nunavut the deadline for comments was extended to February 18, 2009. A total of 38 individuals and organizations provided screening comments for consideration by the NIRB.

The NIRB made its screening decision and a recommendation for a public review to the Minister of Indian and Northern Affairs Canada (now Aboriginal Affairs and Northern Development Canada, AANDC) on March 13, 2009. The NIRB makes a recommendation on whether a review is required but it is the Minister of AANDC that decides the type of review that will take place. The Minister issued a decision for a NIRB-led (NLCA Article 12 Part 5) public review on February 23, 2010 and on March 3, 2010 the NIRB distributed the Minister's decision and started its review of the Kiggavik Project.

The NIRB called for participant funding requests to participate in the Kiggavik Project review on March 12, 2010 with a public notice printed in Nunavut newspapers. The deadline for intervener funding applications was extended from April 12 to June 1 at the request of a stakeholder. NIRB made funding recommendations to AANDC on June 14, 2010 and AANDC announced the funding decisions on August 3, 2010. Participant funding was awarded to the Beverly Qamanirjuaq Caribou Management Baord, the Baker Lake Hunter and Trappers Organization, Nunavummiut Makitagunarningit, Hamlet of Baker Lake, Canadian Arctic Resources Committee, Athabasca Denesuline, and LutselK'e Denesuline First Nation.

The first step of the NIRB review process is to scope the proposed project and identify potential impacts associated with developing the project. Input was solicited from members of the public, the proponent, federal and territorial agencies and the Regional Inuit Association. The NIRB visited all seven Kivalliq communities from April 25 to May 10, 2010 to conduct scoping meetings and information sessions on the proposed Kiggavik Project. The draft scope was released for public review by the NIRB on March 12, 2010, the report summarizing results from the community visits was released on June 15, 2010 and the revised draft scope was released on November 15, 2010. A total of eight comments were directly submitted to NIRB on the draft scope including comments from two individual citizens. The scope was finalized and released by the NIRB on February 9, 2011.

The NIRB issues project-specific guidelines to AREVA and the EIS must be prepared in accordance with these guidelines. The NIRB prepared and then released the draft guidelines for public review on November 15, 2010 with a deadline of January 25, 2011 for commenting. On February 9, 2011 the revised draft guidelines were released with a March 2, 2011 deadline for comments. Seventeen interveners submitted comments for consideration on the draft guidelines and 13 comments were submitted on the draft revised guidelines.

The NIRB hosted a guideline workshop from March 22 to 24, 2011 in Baker Lake, NU. Workshop participants included Nunavut Tunngavik Incorporated; Kivalliq Inuit Association; the Government of Nunavut; the federal departments of Aboriginal Affairs and Northern Development Canada, the Canadian Nuclear Safety Commission, Environment Canada, Fisheries and Oceans Canada, and

Transport Canada; the Beverly Qamanirjuaq Caribou Management Board; Nunavummiut Makitagunarningit; Mining Watch Canada and the Canadian Arctic Resources Committee. The final guidelines for the preparation of the Kiggavik Project Environmental Impact Statement (EIS) were released on May 3, 2011 (NIRB, 2011).

Upon receipt of the DEIS, NIRB conducted an internal review to determine whether the EIS addressed the provisions of the guidelines. As a result of the review, an Addendum was submitted on April 25, 2012 to meet conformity. The NIRB accepted the DEIS on May 4, 2012 and started the technical review.The DEIS, including the addendum was distributed for technical review with a request to submit Information Requests (IRs) by June 4, 2012. NIRB hosted community visits from May 22 to 31, 2012 in the seven Kivalliq communities.. At the request of the CNSC, GN, and KIA, the IR submission deadline was extended to June 29, 2012. On July 13, 2012 the NIRB forwarded IRs from 14 interveners to AREVA and other addressed parties with direction on whether the IR was more suitable to be answered during the technical review period or that responses were not required where confidentiality was concerned. AREVA submitted an IR response package to the NIRB on January 31, 2013 and, following a completeness check by the NIRB, the 60-day technical review period was initiated on February 6, 2013. Technical review comments were received from 13 interveners by April 11, 2013 and AREVA submitted a response package on May 8, 2013. The technical comment response package contained 177 commitments for the preparation of the FEIS to address intervener concerns and 38 commitments for post-EA (i.e. licensing, construction, operational monitoring, etc.).

Technical meetings were held in Rankin Inlet, NU from May 28 to 31, 2013 with participation from AANDC, Baker Lake HTO, CNSC, DFO, EC, GN, KIA, NTI, and TC with the BQCMB and NRCan participating by teleconference. During these meetings an additional 94 commitments were made for the preparation of the FEIS and AREVA and interested interveners agreed to modify the wording of 20 of the 177 commitments made earlier in AREVA's technical comments response submission. From June 4 to 6, 2013 a community roundtable took place in Baker Lake, NU. The roundtable included two to three community members from each Kivalliq community. The community roundtable was followed by the Pre-Hearing Conference with interveners presenting resolved and unresolved issues for consideration in NIRB's Pre-Hearing Conference Decision for the preparation of the Kiggavik FEIS. In addition to the public, the same organizations represented at the technical meetings also participated in the PHC with the BQCMB and NRCan represented in person. Two new commitments and a modification of wording for an earlier commitment were drafted and provided to the NIRB prior to conclusion of the PHC.

The PHC Decision was issued by the NIRB on July 5, 2013 containing a regulatory history, summary of submissions, and guidance for the preparation and submission of the Kiggavi Project FEIS. Preparation of the FEIS is based on:

- the 177 proponent commitments made in the technical comment response submission on May 8, 2013 (PHC Decision Appendix 1);
- the re-wording or modification of 21 (of 177) commitments drafted during technical meetings and prior to the conclusion of the PHC (PHC Decision Appendix 2);
- the 94 requirements for the preparation of the FIS resulting from the technical meetings (PHC Decision Appendix 2);
- the 25 statements of further direction for the preparation of the FEIS from the NIRB (PHC Decision Section 3.2.1);
- integration of content provided in the DEIS Addendum and IR responses into the FEIS (IR regulatory submission on January 31, 2013); and
- opportunities for improvement including the addition of newly available information (regulatory, community, western science, IQ, or traditional ecological knowledge) and improved wording and clarity in some places.

Following submission of the FEIS the NIRB will provide a check for completeness and conformity against the PHC Decision. Should this submission be determined to conform to the PHC Decision, NIRB will initiate the remainder of the review, including a final hearing, and ultimately make a recommendation to the Minister of AANDC on whether or not the Project should proceed. Given a Ministerial approval, the NIRB will issue a Project Certificate and AREVA may then apply for licenses, permits and other approvals.

3 Exploration and Current Site Activities

3.1 Introduction

An exploration camp currently exists at the Kiggavik site (Figure 3.1-1). The camp was first established in 1977 and was occupied intermittently for summer drill programs until 1997. This camp was renovated and expanded as part of the re-start of exploration activities in 2007 to accommodate approximately 30 persons. It was further expanded in 2008 and 2009 to accommodate 60 persons.

Three 50,000 litre double walled steel EnviroTanks are used for jet fuel storage used primarily to supply fuel for Helicopter support. All diesel fuel used for drilling and camp support is stored in five 50,000 litre double walled EnviroTanks.

Access to the Kiggavik Project is currently restricted to the following modes of transport:

- helicopters;
- fixed wing aircrafts with tundra tires; a landing strip was created at the fuel cache esker to accommodate Turbo Otter flights;
- float planes;
- overland winter travel (snowmobile and Delta trucks).

In September 2009 the Kiggavik Project was assessed and certified as meeting the requirements of the internationally recognized environmental management standard ISO 14001:2004 under the scope “Uranium deposit appraisal and exploration activities in Nunavut”. The Kiggavik Project also obtained the international Occupational Health and Safety standard OHSAS 18001:2007 certification in August 2011 under the scope "Uranium Exploration and Development in Canada".

With the resumption of field exploration activities in 2007, occupational health and safety and radiation protection programs have been a continually integrated aspect of exploration activities, ensuring that work is performed in a safe and responsible manner and that workers are not adversely exposed to radiation from uranium exploration activities.

An annual report and accompanying operational plans has been distributed every January since 2008 to NIRB, AANDC, KIA, NWB and GN. This report fulfills the NIRB screening recommendation, AANDC permit conditions and NWB License for an annual report, which addresses the previous year of operation.

Currently held and required permits and licences including dates of issue and expiry are summarized in Table 3.1-1

Table 3.1-1 Currently Held Approvals

	Exploration(Currently Held Permits)			
	File No.	**Date of Issue**	**Date of Extension or Amendment/Previous Permits**	**Expiry**
NIRB File No.	06AN085	April 3, 2007	August 30, 2007 January 9, 2009	N/A
AANDC Permit No.	N2014C0001	January 21, 2010	N2009C0017 N2006C0037 N2000J0040	May 29, 2016
KIA Licence No.	KVL306C02	January 3, 2007	KVL204X36	January 3, 2015
NWB Licence No.	2BE-KIG1318	April 25, 2008	2BE-KIG0812 2BE-KIG0708 2BE-SIS0607	June 13, 2018
GN Business Licence	14-017 14-016	March 14, 2014		March 31, 2015
DIAND Licence to Prospect	N30085 N30012			

Projection: NAD 1983 UTM Zone 14N
Creator: CDC
Date: 09/01/2011 Scale:
File:
Data Sources: *Areva Resources Canada Inc.*

FIGURE 3.1-1
KIGGAVIK EXPLORATION CAMP

ENVIRONMENTAL IMPACT STATEMENT
VOLUME 2

Kiggavik Project

AREVA

AREVA Resources Canada Inc - P.O. Box 9204 - 817 - 45th Street West - Saskatoon, SK - S7K 3X5

3.2 Historical and Current Site Activities

3.2.1 Exploration Activities

Metallgesellschaft Canada Limited initially carried out regional exploration in the Kiggavik area in 1974. Uranium in the area was first suspected when radioactive frost boils and rock chips were discovered at Lone Gull (Kiggavik) during systematic coverage with an airborne radiometric survey.

In 1975, Metallgesellschaft was succeeded by Urangesellschaft Canada Ltd. (UGC). Systematic coverage of much of the region, including the Kiggavik area, was conducted with lake sediment and water surveys, airborne radiometric surveys and followed up by geological mapping and/or prospecting in anomalous areas. Drilling at the Kiggavik site commenced in 1977 and led to the discovery of the Main Zone mineralization.

By 1985 the regional programs were terminated and UGC started to concentrate most of its work on the Main Zone deposit. In 1986 and 1987 further airborne geophysics surveys were conducted. Resistivity lows at End Grid and Andrew Lake were followed up by ground gravity surveys and the resulting anomalies were drilled. Uranium mineralization at End Grid and Andrew Lake was discovered in 1987 and 1988 respectively. Delineation of these two deposits was the focus of drilling up to 1993. Other uranium mineralization on the property was discovered at Granite (1984), Bong (1985) and at Jane (1992).

In 1993, AREVA (formerly COGEMA Resources Inc.) became the operator of the Kiggavik Project. A mixture of exploration and delineation drilling programs were conducted from 1993 to 1997 on the Kiggavik Project properties. Many exploration targets were defined by resistivity lows and gravity anomalies. However, no new mineralization was discovered. Delineation drilling in 1997 completed the definition of the Andrew Lake deposit and no further drilling was recommended.

The Kiggavik Project entered a care and maintenance mode in 1998, which continued to 2002, when a field inspection was completed to define the work required to safely mothball the site until exploration activities resumed (COGEMA, 2002). The activities focused on eliminating radiological concerns, removing unused buildings and materials, and general clean up. In 2003, the core storage areas and historical drill sites were radiologically surveyed, core racks repaired, and buildings repaired and/or removed (COGEMA, 2003). Radioactive core exceeding a specified criterion was moved to a newly constructed fenced compound at the Kiggavik site. Radioactive cuttings exceeding a specified criterion were collected and buried within one of the historical bulk sampling trenches, an area of naturally elevated radioactivity. In 2004, further work was completed in the clean-up, including removing remaining drill pipes and filling in the remaining trench.

Exploration work resumed in 2007 with an evaluation of historical drilling, as well as some outcrop visits in the Kiggavik Project area. In addition to core relogging and outcrop visits, sampling for clay mineral species using spectrometry methods was undertaken. An aerial geophysical program was also conducted to better highlight gravity anomalies on the property using an airborne gravity gradiometry survey. Since 2007, exploration programs have focused on diamond drilling in the Bong, Granite, End Grid and Andrew Lake areas. Ground geophysical surveys were also conducted to locate new drilling targets.

Deposit appraisal and feasibility work also resumed in 2007. Activities focused on diamond drilling in the Kiggavik and Sissons areas for the purposes of ore and mine rock sampling to improve the understanding of the known mineral deposits. Activities also included geotechnical logging, hydrogeological testing and ground temperature measurements.

Approximately 56,000 metres of drilling has been completed between 2007 and 2013 on 174 drill holes using diamond drilling equipment.

3.2.2 Environmental Baseline Studies

Environmental baseline studies in the Kiggavik area were initiated during the 1970s. Various aquatic and/or terrestrial wildlife investigations were conducted from 1975, 1979 to 1980, 1986, and 1988 to 1991. In 1988, 1989 and 1991 stream discharge data were collected at the outlets of a number of lakes.

Field work to establish a current environmental baseline resumed in 2007 and continued from 2008 to 2013 during summer and some winter seasons. Baseline and Inuit Qaujimajatuqangit data related to the following environmental components have been collected:

- meteorology
- topography
- hydrology
- hydrogeology
- permafrost and thermal regime
- surface water quality
- sediment quality
- limnology
- benthic invertebrates
- aquatic macrophytes
- plankton and periphyton communities
- fish habitat
- fish distribution, health and tissue chemistry
- soils and vegetation

- wildlife
- air quality
- marine environment
- archaeology

Recent baseline data from 2007 to 2013 and applicable historical baseline data gathered during the 1980s and early 1990s have been incorporated in the baseline reports attached to this EIS.

3.3 Future Exploration Activities

Exploration activities are expected to continue through the pre-construction, construction and operational phases of the Project. These future activities will be similar to those conducted on the Project sites since 2007 with the focus being the identification of additional uranium resources capable of profitably extending the project life. The mitigation measures undertaken by AREVA to date are expected to continue, with the addition of any further measures required by future permits and authorizations.

Anticipated exploration activities include:

- mapping
- ground geophysical surveys
- aerial surveys
- exploration drilling
- delineation drilling and hydrogeological testing
- sampling of mineralized and non-mineralized core
- geotechnical drilling
- environmental baseline studies to support any future mine development proposals

These activities are expected to take place within the Kiggavik, Sissons and St. Tropez lease areas currently held by AREVA (Section 2).

Management of drill core and wastes will follow existing protocols, whereby non-radioactive cuttings are placed in low-lying areas that do not drain directly to a waterbody. Radioactive cuttings will be collected and transported to the Kiggavik site, for storage in a radioactive storage compound prior to ultimately being processed through the mill. Drill core will be logged and stored in core racks.

3.3.1 Exploration Support

Future exploration is expected to be supported primarily from the Kiggavik site, which will provide accommodations at the camp and air support via helicopter.

During the summer field season, it is expected that exploration targets will be accessed via helicopter; no overland access will occur unless a target is located directly off a future site road. If winter drilling is conducted in the future, overland transport may be used to move equipment and personnel.

Helicopters will be required to provide support for the exploration activities. The helicopters will be operated intermittently over a 24 hour period, with the bulk of flight activity occurring during the day shift.

3.3.2 Exploration Mitigation and Monitoring Measures

AREVA remains committed to the mitigation and monitoring measures currently undertaken at the existing Kiggavik Project exploration site. These measures are fully outlined in the following publicly available field program management and mitigation plans:

- Abandonment and Restoration Plan
- Noise Abatement Plan
- Radiation Protection Plan
- Spill Contingency Plan
- Uranium Exploration Plan
- Waste Management Plan
- Wildlife Mitigation and Monitoring Plan

Compliance with existing permits and authorizations is outlined in AREVA's Kiggavik Project Field Program annual report (AREVA, 2014). Continuous improvement has been a key feature of the field programs. The exploration program holds current certifications in both ISO 14001 (Environmental Management Systems) and OHSAS 18001 (Occupational Health and Safety Management Systems).

3.3.2.1 *Exploration Near Waterbodies*

Future exploration will continue to comply with licence conditions and the Fisheries and Oceans Canada (DFO) operational statement for mineral exploration activities (DFO, 2009). AREVA remains committed to the appropriate DFO timing windows and water withdrawal guidelines. Current and future exploration activities ensure water pump intakes prevent streambed disturbance and fish mortality by following the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline (DFO, 1995).

AREVA will not conduct drilling within 30 m of the normal high water mark unless approved by licence amendments, there is sufficient ground stability, and the timeline is outside the spring and fall spawning periods for known fish species. To avoid impact to fish or fish habitat, water required for drilling will be withdrawn from non-fish bearing water bodies when feasible, or from larger water bodies capable of withstanding an outflow of water. Sumps and fuel caches will remain a minimum of 30 m from the ordinary high water mark and be inspected on a regular basis. Spill kits at the drill site will provide response capabilities to manage and minimize unanticipated events. Drill cuttings will be pumped to a natural low lying depression to prevent erosion, sedimentation, or release into aquatic habitat, and potentially contaminated cuttings will be collected and stored for ultimate processing in the Kiggavik mill. Drill holes will be plugged and permanently sealed upon completion, which will also prevent artesian flows from entering water bodies when encountered. Debris and waste associated with drilling activity will be collected following completion of activities.

3.3.2.2 ***Wildlife Mitigation and Monitoring***

Current exploration-related mitigation and monitoring measures for wildlife interactions are outlined in the exploration Wildlife Mitigation and Monitoring Plan (AREVA, 2013). These measures include the following general practices:

- AREVA employees and contractors will not feed or harass wildlife.
- wildlife has the “right-of-way” and will not be blocked or deterred from moving through the Project area.
- Activities may be restricted or postponed if caribou are present within a specified distance of the activity. The specified distance is generally dependent on the season and number of caribou present.
- Although AREVA does not plan to conduct activities within designated Caribou Protection Areas, any future activities will comply with timing windows as required by the Kivalliq Inuit Association (KIA) and Aboriginal Affairs and Northern Development Canada (AANDC).

Baker Lake residents have expressed concern with respect to potential disturbance from helicopters (EN-BL NIRB Apr 2010[3], EN-BL CLC Oct 2012[4], EN-BL NIRB April 2010[5]) and altitude recommendations exist. Flight specific mitigation measures for Kiggavik currently include:

- For long-range transportation flights (>25 km), aircrafts are required to fly at a minimum of 610 m (2000 ft) above ground level.

[3] EN-BL NIRB Apr 2010: *Helicopters have bothered people in the area when out hunting. Pretty sure there are guidelines in place and mining companies should abide by these guidelines. The pilots should be made aware of the guidelines and follow them, especially over the hunting grounds and they should avoid flying low*.

[4] EN-BL CLC Oct 2012: *A chopper was hovering during a hunt so low and they scared away the caribou.*

[5]BL NIRB April 2010: Helicopters and planes disrupt caribou in the mating areas/hunting grounds with their noise pollution. Very concerned about the impacts to caribou from helicopters and planes and noise and impacts to their traditional migration routes.

- For shorter transportation flights (between 4 to 25 km) (e.g. movement of staff and equipment between camp and deposits within the Kiggavik lease), the normal practice is to fly all aircraft at a minimum of 300 m (1000 ft) above ground level.
- Unless caribou are present there are no altitude restrictions for flights less than 4 km.
- In the presence of 50 or more caribou, best practice is to avoid the caribou by a minimum distance of 610 m above or around the herd.
- Taking-off or landing of aircraft does not occur if 50 or more caribou are within 1 km of the landing area, except where safety is at risk.
- From April 15th to September 1st, AREVA will not fly within 1.5 km of nesting raptors when in air transit and will avoid disturbance in poor weather.
- Aircraft pilots are instructed not to fly over the Beverly calving grounds about 70 km northwest of the Project area.
- A requirement of the project's main helicopter contractor is to provide altitude reports for all flights. Track logs of helicopter flights are maintained.

Specific mitigation for airborne geophysical surveys include:

- If a concentration of caribou (50 or more individuals in close proximity to one another) are within the area to be flown at that time the aircraft will relocate to another part of the survey block and repeat the reconnaissance flight or the survey will be postponed until the caribou are at a distance of 2 km from the survey area.
- If caribou calves are present within the area to be flown between May 15 to July 15 the survey will be postponed until either the calves are gone or the survey can be conducted outside of this time period.
- If concentrations of caribou are not observed within the flight route(s), then the survey proceeds at the approved altitude
- A continuous watch will be kept for caribou during the survey. If concentrations of caribou are observed within the area to be flown during the course of the work, the survey is aborted and another part of the block is selected.

3.3.2.3 *Mitigation and Monitoring for Archaeological and Cultural Resources*

Exploration-related mitigation and monitoring measures related to archaeological and cultural resources will include:

- No operation of any vehicle over a known or suspected archaeological or palaeontological site.
- No removal, disturbance, or displacement of any archaeological artifact, site, fossil, or palaeontological site.

- AREVA will follow direction from the Department of Culture, Language, Elders and Youth, Government of Nunavut (CLEY) in restoring a disturbed archaeological or palaeontological site to an acceptable condition.
- No activity that disturbs an archaeological or palaeontological site will occur unless permitted through authorization of CLEY.

3.3.2.4 *Drill Site Reclamation*

The following progressive reclamation activities will be conducted as part of the exploration program:

- All drill sites from the current year's field program will be inspected for fuel stained soil and undergo a radiation survey for radioactive contamination. Contaminated soil or cuttings will be collected in appropriate containers and stored in the radioactive storage compound prior to disposal or processing through the mill.
- Drill holes will be sealed by cementing/grouting the upper 30 m of bedrock or the entire depth of the hole, which ever is less or otherwise approved of by the Nunavut Water Board (NWB) in writing.
- Drill holes that encounter uranium mineralization with a uranium content greater than 1.0% over a length of more than 1 m with a meter percent concentration greater than 5% will be sealed by cementing over the entire mineralization zone; this should be at least 10 m above and below each mineralization zone. This sealing will be conducted as the holes are completed.
- Any remaining waste will be managed in accordance with the Waste Management Plan (Tier 3, Technical Appendix 2S).

Activities to be conducted upon final site closure include:

- All drill sites will be inspected for radiological or hydrocarbon contamination. Any contaminated material will be collected and managed in accordance with the Waste Management Plan (Tier 3, Technical Appendix 2S).
- An inspection will be conducted to ensure that all drill sites have been restored and sumps have been covered and levelled.

4 Project Design Overview

4.1 Methodology

In accordance with AREVA's approach to sustainable development as described in Volume 1, Project design is recognized as one of the first opportunities to mitigate potential environmental effects and enhance benefits to the community. Proven best available technologies economically achievable are considered within the context of their potential site-specific application. From this basis, the potential positive and negative effects of various design scenarios are included as design considerations in Project engineering studies and in the assessment of alternative designs.

To ensure that appropriate information is available to the project design team, AREVA's approach incorporates integrated design and environmental assessment activities. Preliminary assessments of potential Project effects were conducted at the pre-feasibility level and in an iterative fashion during the initial feasibility phase. The preliminary assessment results are used by the design team to improve predicted environmental performance and enhance mitigation by design, optimize costs, maximize operability and ensure that robust information is used in the selection of preferred options.

A precautionary design approach, using conservative assumptions for design criteria and performance forecasting provides for a robust design and conservative predictions of environmental interactions (see Section 20 Assessment Basis). A continuous improvement process will be used throughout the life of the Project to optimize environmental performance and operability on an on-going basis. Monitoring programs will include the routing monitoring of geotechnical structures, ground conditions, site drainage and water management infrastructure, and environmental monitoring to ensure that these facilities are performing as designed. Monitoring results will be compared to predicted performance, and an adaptive management approach implemented, if needed, to ensure that predicted performance is achieved.

The following items have been considered in the Project design and selection of viable options:

- the influence of the tundra environment, including permafrost, wind, extreme temperatures, wildlife, and the extended ice covered season
- the sensitivity of the tundra environment to disturbance, including both the physical environment (soil, water, air) and biota (vegetation, wildlife)
- potential effects, both negative and positive, on socio-economics and communities
- comments, suggestions and concerns from communities and regulators
- project economics
- operational flexibility
- potential for long term liabilities/ease of decommissioning
- uncertainty and risk

Some of the central principles used to develop environmental design features include containment of site facilities, segregation of wastes, segregation of water streams of differing quality, recycling of water and materials, and closure planning early in the design cycle. These features are discussed in Section 4.4.

Tier 3 technical appendices 2D, 2E, and 2I discuss the design basis of all mine rock and ore pads, collection ponds, and channels. These designs, while not detailed final designs, provide sufficient information for assessment of potential project effects on the environment. Facility details will become more detailed as the Project advances to constuction; however, the function of the facility will remain as described and considered in the assessment of potential environmental effects.

The following sections outline key components of the design approach, including the use of IQ and public engagement data, alternatives assessment, and development of the overall Project layout and infrastructure. Examples of how community concerns and environmental considerations have been incorporated in the Project design are provided.

4.2 Use of Public Engagement and Inuit Qaujimajatuqangit

Comments, concerns, and input from the public regarding the Kiggavik Project have been gathered by AREVA since 2006. This information has been used to optimize Project design, incorporate community input into alternatives assessment, and focus the assessment of effects on issues of concern to regulators and communities. This section summarizes the key comments and concerns associated with Project design. This section also provides selected examples of the comments received, and includes examples of how this input has influenced Project design.

Frequent themes related to Project design include concerns regarding mining in the harsh arctic environment, the potential for wind-blown dust, protection of wildlife, management of tailings and wastes, road options, transportation of hazardous materials, radiation protection, and employment opportunities.

Details of community engagement activities, summary of comments received by AREVA, and further detail regarding integration of these comments into the Project and assessments are included in Tier 2 Volume 3 and associated appendices.

4.2.1 Mining in the Arctic

AREVA's experience in uranium mining in northern Saskatchewan has been used as one of several benchmarks for Project design and planning. Kivalliq residents expressed uncertainty as to whether or not the comparison to northern Saskatchewan is relevant, since there are some important differences between the boreal and tundra environments.(EN-BL NPC June 2007[6], EN-WC KIA Jan 2010[7], EN-RI OH Nov 2010[8], EN-BL NIRB Apr 2010[9]) People are concerned that uranium mining has not previously occurred under climate conditions similar to Kiggavik, and they want assurances that the technology used will be effective in protecting the environment (EN-BL OH Nov 2013[10],EN-CH NIRB May 2010[11]) People have expressed the need for assurance that AREVA is designing specifically for the unique environmental conditions at Kiggavik, and that Inuit knowledge of the environment is incorporated. Controlling dust and managing effects to the Project from snow, spring freshet, and wind were identified as priority concerns.

While best practices from Saskatchewan uranium mines have been incorporated into the Kiggavik Project design, site-specific data from the region has been used for engineering design. Input from stakeholders has been utilized to identify important interactions between the Project and the environment. To support the environmental assessment of these interactions, meteorological stations have been installed at the Kiggavik site to be able to start to compare important meteorological

[6] EN-BL NPC June 2007: *The dust pollution coming from uranium mines, it's totally different from southern Canada. Our air is different up here. In the mainland, it can be very cold in the winter and in summer it can be extremely hot. It fluctuates very easily.*

[7] EN-WC KIA Jan 2010: *Saskatchewan doesn't have permafrost and they have fewer storms than we do here. Winters are much longer here.*

[8] EN-RI OH Nov 2010: *North is different from south and there will be more snow piling up and spring runoff*.

[9] EN-BL NIRB Apr 2010: *Need to consider other companies with similar uranium projects and look at the potential impacts these have had on the environment. Need to also consider that these mines are in warmer climates, and how it will be different for the Arctic climate*

[10] EN-BL OH Nov 2013: *We have heard that uranium mining has never been done where it is minus 40 degrees and this is worrisome*. *How will you deal with this?*

[11] EN-CH NIRB May 2010: *How will we be assured that new technology will actually be efficient and effective in our area? How will it be determined that the new technology will be safe in the north?*

conditions to the long term record of meteorological conditions that have been recorded at the Baker Lake climate station. Combined, the data from these stations provide important information used as design input for the Project. Specifically, this data provides a strong foundation to predict the potential effects from wind-blown dust through air dispersion modeling. Dust monitoring programs (Tier 3, Techncial Appendix 4C) will be used to ensure performance within the predictions.

Concerns over dust and the impacts to human health and wildlife have been expressed in a number of public engagements (EN-RB NIRB Apr 2010[12], EN-BL EL Oct 2012[13]). People have expressed that it is windy in the North, lots of dust is seen in the air, and the dust travels to different parts of Nunavut. (EN-KIV OH Oct 2009[14],[15], IQ-RIHT 2009[16], EN-CI OH Nov 2013[17]). One of the main concerns related to dust is the generation of dust from unpaved roads (EN-RI KWB Oct 2009[18], EN-BL EL Oct 2012[19])AREVA has committed to controlling dust using water and/or dust suppressants at the mine site, regular road maintenance along all Project roads, and minimizing vehicle movement in ore zones where practical.

AREVA commits to dust mitigation and monitoring throughout the Project life. Mitigation measures for road dust are outlined in Technical Appendix 2M. Dust monitoring, as described in Technical Appendix 4C, will occur throughout Project life and inform potential additional dust mitigation to be implemented as required to ensure effects to air, water, vegetation, and wildlife are acceptable and within approved environmental assessment predictions.

A site-specific hydrology baseline program has been conducted to ensure that the design of site water management structures and water management plans account for the long ice-covered season and sharp increase in flows expected during spring freshet. Further, the site specific data have been

[12] EN-RB NIRB Apr 2010: *Concerned with air pollutants travelling by way of dust particles. Dangers associated with the dust to human health and wildlife.*

[13] EN-BL EL Oct 2012: *I am pretty sure there will be dust that will spread everywhere. There will be lots of dust and animals like rabbits and wolves will be affected*

[14] EN-KIV OH Oct 2009: *No trees up here but the trees stop the wind blowing the ore in Saskatchewan. What will be used to manage dust?*

[15] EN-KIV OH Oct 2009: *We have a lot of wind in Nunavut and I am sure there is dust all around that area.*

[16] IQ-RIHT 2009: *Hunters explained that the wind travels from Baker Lake towards Rankin Inlet, and that any airborne contaminants, such as dust, would find their way to Rankin Inlet*.

[17] EN-CI OH Nov 2013: *What about the dust? Lots of wind and can carry dust. The dust will be an issue because there is constant wind that will lift the dust and keep it suspended.*

[18] EN-RI KWB Oct 2009: *How is contaminant dust controlled? Will there be dust control on the road? How does dust affect the environment?*

[19] EN-BL EL Oct 2012: *There would be changes near the project site in the spring and summer. Near my house there is lots of dust on the plants from traffic on the roads.*

considered in the selection of freshwater sources, process water recycling strategies, and in the selection of treated effluent discharge receptors.

Public input and IQ on potential risks to logistical infrastructure and benchmarking against existing projects in Nunavut and the Northwest Territories has been used to provide confidence in logistical and operational plans. Foundations, pads, and road design have been based on existing designs in northern areas of continuous permafrost.

4.2.2 Climate Change and the Project

People have expressed the need for assurance that AREVA is taking into consideration the implications of climate change over the life of the Project and post-decommissioning.(EN-BL NIRB April 2010[20]). Residents have expressed concern about the impacts of climate change on the winter road, in particular the safety and operating time of the road (EN-AR HTO Nov 2010[21], EN-RI NIRB May 2010[22], EN-RI COC Mar 2013[23]). The management of tailings (EN-CI KIA Feb 2010[24]), and scheduling of the barging season in a changing climate are also of particular interest (EN-CH OH Nov 2010[25]).

Climate change has been considered in both medium-term and long-term Project planning. Over the medium-term operational period, conservative values have been used for planning winter road operation, such that the parameters used for design account for a decrease in the available operating window. Climate change models predict an annual mean precipitation increase of 34% for the years 2071-2099 compared to modeled baseline conditions (Technical Appendix 5K). Although runoff volumes are predicted to increase, potential changes in the intensity of precipitation events is unknown. Containment ponds and diversion structures have been designed to handle a probable maximum precipitation (PMP) event. This design criterion is not sensitive to annual runoff rates, but rather the intensity of specific rainfall events. Therefore, if the intensity of rainfall events remains

[20] EN-BL NIRB April 2010: *How will climate change affect the project?*

[21] EN-AR HTO Nov 2010: *About the winter road and global warming. There used to be ice on the bay by now but it is not frozen yet. The change is noticeable*.

[22] EN-RI NIRB May 2010: *Concerned over the potential effects of climate change on ice-roads and safety to workers when crossing ice-roads*.

[23] EN-RI COC Mar 2013: *You are looking at all season and winter road. Conditions may change with time. How many days are you looking at for using winter road?*

[24] EN-CI KIA Feb 2010: *Will climate change affect the tailings management facility?*

[25] EN-CH OH Nov 2010: *It is November and we still have boats out across the bay. Normally by this time of the year the ice is pretty thick and we hunt for seal by skidoo and foot over the ice. This year there is no ice only a bit so they still have the boats out its not normal. It is because of the climate change, global warming. It's too warm so there is no ice.*

consistent with historical conditions, climate change will not affect the effectiveness of Project designs based on a PMP event.

Environment Canada Canadian Ice Service provides Seasonal Summary reports for North American Arctic Waters (EC 2014). Spring and summer ice conditions are compiled annually that provide an indication of the average open water season in Chesterfield Inlet over the past ten years. In 2011, the lowest ice coverage over Canadian Arctic waters since 1968 was observed. The conclusion drawn from these reports is that an extended operating season from mid-July to mid-October is likely to occur in future years. Over the long-term, the tailings management and mine rock facilities have been planned to ensure a robust design for protecting the environment in either the presence or the absence of permafrost. Sucessful long-term stability of the tailings and mine rock facilities do not require permafrost encapsulation.

Assessments of the Project environmental effects have considered how potential changes in climate may influence the predicted effects.

4.2.3 Uranium Concentrate

People have expressed the need for more information about uranium concentrate (also known as yellowcake) and identified concerns about potential effects from uranium concentrate and radiation. (EN-AR KIA Jan 2010[26]). In particular, community members were concerned about the potential impact of a spill of uranium concentrate (EN-CH OH Oct 2012[27], EN-RB KIA Feb 2010[28]). Community members require emergency response plans and assurance that measures are being taken to prevent accidents and successfully respond to one should it occur (EN-BL NIRB Apr 2010[29]).

AREVA recognizes that there is a need for further information in the Kivalliq communities on yellowcake and radiation. Providing information to communities has given people a better understanding of uranium concentrate and radiation (EN-WC CLARC Nov 2010[30]) and AREVA

[26] EN-AR KIA Jan 2010: *We need more information and discussion on how the uranium will be transported (route, safety measures, etc.).*

[27] EN-CH OH Oct 2012: *What would happen if you had a spill of uranium in the water? How much damage would be done?*

[28] EN-RB KIA Feb 2010: *Will the water be contaminated if there is an accident with the transport drums?*

[29] EN-BL NIRB Apr 2010: *What contingency plans/protection plans are in place for accidents while transporting, storing and transferring of yellowcake (roads, ships, water and land)?*

[30] EN-WC CLARC Nov 2010: *She is happy to talk to the AREVA team because she understands now that the team is trying to control radiation not spread it.*

continues to strive to provide this information through open houses, workshops and worker training (see Volume 3 and associated appendices).

Community members have expressed interest in the storage and transportation of uranium concentrate and want assurances that the uranium concentrate will be stored and transported in a safe manner (EN-RI RLC Feb 2009[31] EN-RI HS Nov 2012[32]). Handling and transportation of yellowcake in Canada is well regulated by the Canadian Nuclear Safety Commission (CNSC) and Transport Canada. There is also extensive experience demonstrating that uranium concentrate is routinely transported safely within, and beyond, the many countries in which it has been, and currently is, produced. For example, over 24 million pounds were produced in Canada in 2013, and subsequently transported safely to refineries distant from the mine sites.

Kivalliq residents have expressed concerns about the storage of yellowcake in Baker Lake and the transportation of yellowcake by barge (EN-RI KWB May 2009[33],EN-BL NIRB April 2010[34]). AREVA is of the view that land and sea transport could be safely carried out for the Kiggavik Project. However, the shipping season from Baker Lake is short, and air transport is thus the preferred method for much of the year. Since it is a viable option, AREVA has committed to only air transport of uranium concentrate. To transport uranium concentrate by air, an Emergency Response and Assistance Plan will be developed by AREVA to meet CNSC and Transport Canada requirements.

The uranium concentrate packaging circuit in the Kiggavik mill has been designed based on best practices for personnel protection and containment of the product.

4.2.4 Tailings and Mine Rock

People have expressed concern that contamination from the tailings and mine rock may affect the environment (EN-KIV OH Oct 2009[35], EN-WC OH Nov 2010[36]). Tailings and mine rock management facilities are designed to control interactions with the environment, both during operational and post-

[31] EN-RI RLC Feb 2009: *What do the yellowcake containers look like? How will YC be stored? Security?*

[32] EN-RI HS Nov 2012: *How do you transport uranium and is it dangerous?*

[33] EN-RI KWB May 2009: *Concerned about the possibility of shipping uranium passed and through communities. Considers the material dangerous and concerned about spills*.

[34] EN-BL NIRB April 2010: *Concerns about the storage of uranium concentrate/yellowcake at the dock in Baker Lake and the potential impacts it might have to people, wildlife and the environment.*

[35] EN-KIV OH Oct 2009: *Where are you going to put tailings?*

[36] EN-WC OH Nov 2010: *What happens to all this exposed rock?*

decommissioning periods. These interactions are assessed and then monitored to ensure that the facilities are performing as expected and that the environment is protected in both the short-term during operations, and in the long-term after decommissioning.

People want assurances that the tailings facilities will have radiation protection measures incorporated into the design, will not contaminate the groundwater, and will be safe over the long-term. (EN- RB NIRB April 2010[37], EN-RI OH Nov 2010[38]). The tailings management facilities (TMFs) have been designed using in-pit technology. During operations, the tailings pits will include a water cover to reduce the dust and radon releases. The decommissioned TMFs will have wasterock and overburden covers. Decommissioning activities are designed to ensure that the tailings mass remains stable over time.

Residents want assurances that waste rock and runoff from the waste rock piles will be managed properly (EN-RB NIRB April 2010[39], EN-BL CLC Mar 2009[40], EN-BL HTO Mar 2009[41]) Residents want assurances that their drinking water will not become contaminated (EN-AR OH Nov 2010[42]). Water containment and treatment, including contingency measures, have been designed to minimize the potential for un-controlled releases of un-treated water. Treatment processes have been selected based on site-specific conditions to minimize the potential for adverse effects to the environment.

4.2.5 Transportation

Transportation logistics and infrastructure were identified early as one of the key issues of concern to the public as well as one of the key cost drivers for the Project. Therefore, numerous public engagement sessions have been focused upon these components and a number of options have been evaluated for cost, operability, environmental impacts, and public acceptability.

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[37] EN- RB NIRB April 2010: *Concerns over the tailings facility and proper coverage to prevent radiation from releasing. Will the tailings pond be safe after it is properly covered or will it only be effective for a certain time period?*

[38] EN-RI OH Nov 2010: *Concern with groundwater contamination, how do you prevent tailings from seeping out?*

[39] EN-RB NIRB April 2010: *Concerns regarding treatment of mine rock and impacts to the environment.*

[40] EN-BL CLC Mar 2009: *What will happen with water from wasterock?*

[41] EN-BL HTO Mar 2009: *The special management area, is it going to be managed or covered? Protected from the environment?*

[42] EN-AR OH Nov 2010: *There is concern about drinking water. People in Baker Lake not being able to use the water from their usual source because of pollution.*

Marine Transportation

A key concern expressed by the communities along the shipping route is the potential for spills during offshore transfers from large vessels to barges or spills from barges transiting from Churchill through to Baker Lake. Section 10.3 provides more information on marine transport.

Since the community members know the waters well, they want IQ to be incorporated into the routing and scheduling decisions. Community members stated that the route to Baker Lake (from Chesterfield Inlet) has shallow areas (EN-AR KWB Oct 2013) and it is better for ships to stay in deeper water (IQ-CHJ 2011). Residents stated that the area between Chesterfield Inlet and Baker Lake (470 km) has already claimed some ships over the years and there are many critical areas along the way (EN-CI NIRB May 2010), concerned over how the barges will fare transiting the narrows. Residents stated that the buildup of sand where the barges arrive could be dangerous (EN-BL CLC Apr 2010) *and there needs to be a spot for anchoring barges so they do not move around the lake.* (EN-BL CLC Apr 2010). AREVA has consulted with community members and HTO members in determining conceptual marine shipping routes and safety considerations for the Kiggavik Project. Information on the proposed shipping routes and barge types is detailed in Tier 3, Technical Appendix 2J, Marine Transportation.

Residents do not want to see barges stuck in Baker Lake (EN-BL CLC Apr 2010). Concerns over the potential impacts to the lake from the icebreakers (EN-CH NIRB May 2010) have been raised during engagement sessions. Residents stated that shipping during the regular season between ice break-up and freeze-up will not affect ice formation (IQ-ARVJ 2011). Residents indicated that summer barging would have less of an impact on marine life (IQ-CHJ 2011) and if ships travel during the winter months, wildlife will be affected (IQ-CHJ 2011). Residents advised that July and August are the only months that ships can travel, (EN-CI HTO Nov 2013) and Sept-Nov are not good because of high winds (EN-CH OH Nov 2010). AREVA has considered these concerns and is committed to barging during the open water season only (i.e. no ice breaking). The shipping window assumed for Project planning is conservative to avoid the need to ship late in the season.

Community members have expressed concerns with the increased marine traffic expected due to the Project (EN-CH NIRB May 2010[43], EN-CI OH Nov 2012[44]). People are very concerned about the

[43] EN-CH NIRB May 2010: *Community members stressed that the barge traffic be minimized in the area to reduce impacts to marine wildlife.*

[44] EN-CI OH Nov 2012: *When Kiggavik opens, there will be many barges with all the mining activity. For shipping: reduce the number of trips per year; increase the load on each shipment.*

effects of increased marine traffic on the marine mammals living in Chesterfield Inlet. E.g. many of the people believe that increased marine traffic in the inlet resulting from existing projects has already caused many beluga whales and seals to move away, and further increases will make the problem worse. (IQ-CI01 2009; IQ-CI04 (2009); IQ-CI05 (2009); IQ-CI07 (2009); IQ-CI08 (2009); IQ-CIHT 2009). Project studies have focused on the reduction of shipping volumes to address community concerns and reduce Project costs. It is anticipated that the number of barge trips may be reduced during operations as opportunities to optimize mill reagent use are identified. Community members expressed that noise created by the barges are impacting wildlife and moving them away from their regular migration routes (EN-CI NIRB May 2010) and would like to see the noise levels from barges reduced (EN-RI KIA Sep 2013[45]). Community members expressed concerns over the vibration and disturbance to marine life. (EN-CI NIRB May 2010) Mitigation measures will be put in place to reduce the noise and vibration levels from the barges, such as reducing speed, optimizing tug engine power and propeller design, and route and schedule planning to avoid areas of high use by Valued Ecosystem Components (VECs).

Residents have expressed that AREVA should include other Kivalliq elders on boats to monitor the shipping routes (IQ-CHT 2011). Chesterfield Inlet residents stated that it would be best to have a person from Chesterfield because they know the route very well. (EN-CI HTO Nov 2012). AREVA plans to train and employ Chesterfield Inlet residents as independent marine mammal observers during transit through Chesterfield Inlet and on to Baker Lake.

With marine transport there are concerns with fuel spills and potential impacts to marine mammals and the environment. (EN-RI NIRB May 2010[46], EN-BL NIRB April 2010[47], EN-CI NIRB May 2010[48]). Residents stated that if there is an oil spill, a shield (instrument to contain oil spills, such as a boom) should be in place near Chesterfield (EN-CI OH Nov 2012). Residents would like AREVA to provide a spill kit at Chesterfield dock and provide training to use the spill kit (EN-CI OH Nov 2010). Residents want Chesterfield Inlet involved in any emergency spill response plan and want it to be local and fast. *(*EN-CI OH Jun 2009). Residents are concerned that if they plan to fly trained people in when there is an emergency, it will be too late (EN-CI OH Nov 2013). Preliminary marine emergency response plans include consideration for community involvement in the development and execution of any emergency response action. All ships and barges will carry spill containment

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[45] EN-RI KIA Sep 2013: *At the NIRB meeting in Baker Lake there was concern over sea transport. Can you reduce noise from barges?*

[46] EN-RI NIRB May 2010: *Concerns over fuel barges and potential leaks into the environment.*

[47] EN-BL NIRB April 2010: *Concerns regarding the barges and potential spills into the lake*.

[48] EN-CI NIRB May 2010: *Concerns over potential spills and impacts to Baker Lake, the lake, the fish and aquatic environment and potential for the spill to travel downstream.*

supplies and additional supplies will be strategically located along the route to aid a rapid response in the event of an emergency.

Road Options

People expressed the need for IQ and community input to be utilized in the alternatives assessment for road options (see Technical Appendix 2A). Although there is not a consensus among community members as to which road option is best, it is generally desired that the caribou and other wildlife not be disturbed by the road (EN-CH OH Nov 2010[49]). Some specific comments about road options follow:

- A group from Baker Lake indicated that their preference and likely that of most of the community is the northern route with the bridge. A bridge over the Thelon is seen as an advantage to most in the community. They do not wish to take the lead on discussions with the community and would like the project team to involve the community of Baker Lake more. (EN-BL HL Jan 2009)
- I used to support the north all weather road but now I prefer the winter. The South is too shallow and the north all weather road crosses the Thelon in an area of a caribou crossing. I thought I would use the north all weather road, but when I think of the caribou and fish, I prefer the winter road (EN-BL OH Nov 2010)
- I would prefer the winter road to Kiggavik than the all weather road because although it would provide road use for the short term it might be better for the caribou in the long term. Maybe you should consider using as much of the Meadowbank road as possible. (EN-CH OH Nov 2010)
- One Elder suggested that if a road is built from Baker Lake to the Kiggavik mine site, it may cause the caribou to stop and go to Chesterfield. Another Elder pointed out that the caribou using the calving area around Josephine Lake have not been affected by the exploration camp located there. [(IQ-CI03 (2009); IQ-CI01 (2009)].
- Participants in the young adults' focus group were concerned that Project-related roads may affect caribou migration, which in turn may require Elders to travel farther for food. [(IQ-RIYA (2009)].
- One of the Elders said they would not support any development south of Baker Lake as that is an important caribou route, and that the area around Hagliq is too shallow for barges or boats. [(IQ-BL09 (2008)].

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[49] EN-CH OH Nov 2010: *I am concerned about migration of caribou. More conceded about migration impacts from the road than the mine site. The caribou here seem to move over the road ok*.

Based on community concerns and the shallow depth of the water on the south shore of Baker Lake, AREVA has removed the south all-season route from further consideration. AREVA has further developed studies of the winter road option to provide additional confidence in its viability. Road options are further discussed in Section 10. The influence of IQ and stakeholder engagement on winter and all-season road options is further discusses in Technical Appendix 2K and Technical Appendix 2L.

Thelon River Crossing

If the all-season road is built and a Thelon crossing is made, the community members want the traditional uses of the Thelon to be remembered and preserved (EN-BL CLC May 2008[50]). Residents stated that the Thelon River is recognized as the Heritage River and this has to be considered. (EN-BL CLC Feb 2007). IQ and Elders' opinions should be incorporated. They believe that this knowledge will be useful in choosing the best route/place and avoiding damage to infrastructure. Specific comments include:

- The bridge proposed at Kiggavik is too shallow and the bridge would be plugged with ice bergs in no time; perhaps deeper spot would be safer place to put it in; if the bridge is build where it is shallower it would break in no time at all; and the big broken part would be too costly and too much to take them out of the strong current of the Thelon River (EN-BL CLC Mar 2009).
- Most of the Elders indicated that they would support a bridge over the Thelon River, and would not like to see any developments near Hagliq. In particular, a bridge at either Anaqtalik or Kinngarjuit (Half Way Hills) was described as a good option. Another person thought that a ferry would be better than a bridge. [(IQ-BL13 (2008); IQ-BL18 (2008)].
- People were concerned that a bridge over the Thelon River would cause problems with ice being pushed up on shore, or possible damage to the bridge by ice. [(IQ-BL04 (2008); IQ-BL10 (2008)]

As recommended by the Community Liaison Committee, a number of visits to the proposed Thelon River crossing have been made with the Project engineering team and community members. AREVA respects the concerns raised regarding ice break-up on the Thelon and has monitored break-up over the last several years in order to ensure that any infrastructure is designed appropriately. Based on community concerns and benchmarking against other northern bridges, an additional contingency

[50] EN-BL CLC May 2008: *I don't want any fishing spots to be destroyed.*

factor was included in the bridge cost estimate in order to account for unforeseen construction difficulties. The bridge option was subsequently removed from further consideration. Therefore the remaining options are the winter road (preferred) and the all-season road with a cable ferry – ice bridge crossing if the winter road is unable to adequately serve Project needs.

4.2.6 Health and Safety

Comments regarding Project health and safety tend to focus on radiation. Residents want to know the effects of radiation exposure (EN-KIV OH October 2009[51], EN-AR OH Nov 2010[52]) Residents want assurance that radiation safety courses will be provided to people working at site (EN-KIV OH October 2009[53], EN-BL EL Oct 2012[54]). Elders expressed concern about the potential effects of uranium dust travelling and affecting many people. (IQ-RIE (2009)). Hunters and elders expressed concerns about the potential for airborne contamination settling on vegetation and being consumed by caribou (IQ-ARHT 2009).

AREVA has developed a preliminary radiation protection plan to provide additional information regarding measures taken during operation to protect personnel from radiation (Section 15). As is the standard at AREVA's operating mine in Saskatchewan Radiation Protection training courses will be considered as complusory training for all employees working at the Kiggavik site. Refer also to Section 4.2.1 for a discussion on concerns related to dust.

4.2.7 Decommissioning

Concerns have been expressed related to the decommissioning of the Project. Residents expressed concern about previous projects that were not decommissioned properly (EN-RI KIA Jan 2010[55], EN-BL NIRB April 2010[56]). Residents would like assurance that decommissioning will be done properly and would like to be able to use the land for traditional use after decommissioning is complete (BL

[51] EN-KIV OH October 2009: *If I get a job, how will I know if radiation is affecting me?*

[52]EN-AR OH Nov 2010: *Do I accumulate radiation in my body when working at a uranium mine?*

[53] EN-KIV OH October 2009: *Are safety courses provided?*

[54] EN-BL EL Oct 2012: *Are you teaching radiation safety at the site?*

[55] EN-RI KIA Jan 2010: *There used to be a nickel mine in Rankin Inlet, but when they closed, they just left it (i.e. no decommissioning). I don't want to oppose the mine; I know that people came to Rankin Inlet because of the mine. I want to say I support it.*

[56] EN-BL NIRB April 2010: *Concerns with areas that have not been cleaned up properly/reclaimed. Community members, especially hunters travel everywhere on the land by ATVs/Hondas and sometimes go through old exploration sites that have not been reclaimed properly. Areas need to be reclaimed properly so that people can travel through without any incidents or concerns. Also noticed garbage around the road to Meadowbank and this should be cleaned up.*

NPC June 2007[57], EN-CH OH Nov 2010[58], EN-BL OH Oct 2012[59]). People who have toured or seen pictures of AREVA's decommissioned Cluff Lake Project site have been impressed with what they have seen and would like to see a similar approach used for decommissioning at the Kiggavik site. (EN- BL CLC Apr 2010[60], EN-CH OH Nov 2010[61] EN-RB MC Nov 2013[62]). Concerns have been raised that a decommissioning plan is difficult to evaluate and decommissioning in the arctic may take a long time (EN-RI NIRB April 2010[63], EN-CI OH Nov 2013[64]).

AREVA's integrated approach includes decommissioning considerations during the initial design phase. The objective is to ensure that the end state of the Project area is suitable for traditional activities. Development of a Preliminary Decommissioning Plan (PDP) and provision of a Financial Assurance (FA) are regulatory requirements to begin construction. These are updated for subsequent phases of the Project. As required by the NIRB, a preliminary decommissioning plan (Technical Appendix 2R) has been included with the FEIS submission.

AREVA will require approvals from the Canadian Nuclear Safety Commission, Nunavut Water Board, and Kivalliq Inuit Association prior to beginning decommissioning. Detailed decommissioning and monitoring plans will be developed as part of AREVA's application for this licence.

4.2.8 Employment and Benefits

The Kivalliq communities expect locals to be hired at all stages of the Project (EN-BL CLC Sep 2007[65], EN-AR NIRB May 2010[66]) . Residents have expressed that youth need employment opportunities (EN-BL CLC Feb 2007[67], EN-RB KIA Jan 2010[68], EN-BL OH Oct 2012[69]). It is

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[57] BL NPC June 2007: *If there was a uranium mine I would like this to be cleaned thoroughly before you abandon it, I don't want our game, our caribou habitat to be damaged*

[58] EN-CH OH Nov 2010: *The most important part is the environment and returning it to its state before mining.*

[59] EN-BL OH Oct 2012: *After closing, will aboriginals be able to use the land*?

[60] EN- BL CLC Apr 2010: *The Cluff Lake Poster brought comments on how well the site looked before and after. Could not believe it was the same site 10 years later*.

[61] EN-CH OH Nov 2010: *Would you do same part at the Kiggavik project as on the Cluff Lake board (reclamation?)*

[62] EN-RB MC Nov 2013: *I have toured Cluff Lake site and I want to know if you will do the same for Kiggavik*.

[63] EN-RI NIRB April 2010: *Hard to evaluate the type of reclamation plan that need to be put in place when the mine will be open for 17 years or more.*

[64] EN-CI OH Nov 2013: *I think decommissioning in the arctic will take a long time. It will take a long time for the vegetation to grow.*

[65] EN-BL CLC Sep 2007: *I was impressed to see some Baker Lake people working up there*.

[66] EN-AR NIRB May 2010: *Would like to know if people from this region will be considered for employment at the mine.*

[67] EN-BL CLC Feb 2007: *We need to focus on our young people; I dealt with young people, and some have talked to me about creation of jobs.*

perceived that the opportunities for jobs created by AREVA will encourage the communities' youth to become educated (EN-AR KIA Apr 2007[70], EN-AR OH Nov 2010[71]). Young people indicated that traditional skills are being adapted into modern ones that providing for their family now means earning money. They added that they feel under a lot of pressure to get a higher education, get employment and learn traditional ways (IQ-BLYA 2009). Rotational workers said that having employment means they can afford hunting gear, such as ATVs or snowmobiles, and that combined with a two week on and two week off rotation, they can go on the land and hunt more than they were able to prior to employment. (IQ-BLRW 2009).

Residents have expressed interest in on site training in a variety of fields. (EN-RI RLC Feb 2009[72],EN-AR KIA 2010[73], EN-AR NIRB May 2010[74]).

People would also like AREVA to support recreational, health, and social services in the community so all residents could benefit. People are aware that royalties are paid to NTI and KIA, and want assurances that the benefits are passed on to the community (EN-RB HL Nov 2010[75], EN-CI OH Nov 2013[76]). People would like the elders to see benefits, even if they are unable to work (EN-KIV OH Oct 2009[77]).

AREVA anticipates a number of benefit enhancements will be included in the IIBA currently being negotiated with KIA. Benefit enhancement measures will be derived from lessons learned elsewhere in Nunavut and northern Canada, and suggestions raised during engagement. AREVA's corporate

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[68] EN-RB KIA Jan 2010: *We had 13 grade 12 graduates last year. They are unemployed because there are no jobs here. Thank you for coming here. We are now getting information we never knew. We can now give you support because we have this information.*

[69] EN-BL OH Oct 2012: *I support this project because young people need employment.*

[70] EN-AR KIA Apr 2007: *Hoping to see high school students take part in training. I am encouraging students to finish high school. Keep in mind that this region is very large. Ensure students take school seriously*.

[71] EN-AR OH Nov 2010: *Kids are encouraged to finish school and see they can work and still live at home – seeing options.*

[72] EN-RI RLC Feb 2009: *Will there be training available in advance of the mine? On-site training?. Although Inuit are generally less educated and may not speak English, there are many jobs (driving a truck for example) that can still be taken up by Inuit.*

[73] EN-AR KIA 2010: *Are they prepared to train Inuit people for heavy machinery operation and safety? I wouldn't just want to be a janitor or cook's helper. Will you help people develop the required skills to be employed at the mine?*

[74] EN-AR NIRB May 2010: *Would like Inuit trained in environmental monitoring to monitor the project properly. Planning needs to be put in place to ensure things run smoothly*

[75] EN-RB HL Nov 2010: *I know that NTI/KIA get taxes and stuff from the mines but do you guys ever support sporting events and other community things? Sports are so important to these communities. It is what makes kids belong and gives opportunity for travel.*

[76] EN-CI OH Nov 2013: *How will this project benefit the community? The IIBA is between the KIA and AREVA, but what about the community? What investments will you make for training here? You are mining and making money and what do we get?*

[77] EN-KIV OH Oct 2009: *What about the people who are unable to work? What about the elders, will they see any benefits?*

experience in Saskatchewan has also been drawn upon. These measures and others are described in more detail in Section 18.2 and Tier 2 Volume 9.

AREVA recognizes the importance of local employment and has committed to developing training programs that maximize the participation of Kivalliq residents in the Project. Included will be preferential hiring; points of hire in each of the Kivalliq communities; education, training and scholarship programs; and, accommodating Inuit culture in the workplace as practical for improved job satisfaction. Employee benefits will include an Employee Family Assistance Program that provides counselling services to both the employee and their family, staffing the mine site with peer or elder counsellors; providing communication systems for people to stay in touch with families; and supporting community initiatives to address community priorities towards enhanced wellbeing, including as examples, assistance to elder and child care and recreational opportunities for youth.

Kivalliq residents have expressed interest in contracting opportunities available during all phases of the project.(EN-BL KIA Feb 2010[78],EN-RB HL Nov 2010[79], EN-RB OH Nov 2010[80]). Development and support of local businesses will be facilitated through a Business Development program. This will include provisions for preferential contracting, and for helping businesses overcome barriers to accessing Project contracting and wide dissemination of information on available business opportunities.

AREVA recognizes that Elders play an important role in the community and encourages Elder participation in monitoring committees, in addition to providing positions for Elder advisors at the mine site.

4.3 Alternatives Assessment

The assessment of Project alternatives is detailed in Technical Appendix 2A Alternatives Assessment. This appendix was prepared to document, in a transparent manner, the alternative means for carrying out various Project components, which have been considered during this

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[78] EN-BL KIA Feb 2010: *I support this project. I think it's great that companies want to employ Inuit-Owned businesses. They told us, if you are Inuit-Owned, registered and have Inuit employees, you can sub-contract to the mines. I think the youth are encouraged by this.*

[79] EN-RB HL Nov 2010: *This mine seems like it will go ahead. Will you continue to involve the communities and local businesses?*

[80] EN-RB OH Nov 2010: *You give jobs to individuals but I want contracts too. Maybe there could be more partnerships. We need catering and janitorial contracts with AREVA. We need more contracts with Inuit Owned.*

preliminary design and environmental assessment phase of the proposed Kiggavik Project. For each Project component considered, there are four possible outcomes for each alternative:

1. One of the alternatives becomes the preferred option for carrying out that Project component. This preferred option is described in more detail in a subsequent section of the FEIS and is considered in the assessment of Project environmental effects.
2. One or more of the alternatives may become a secondary option which is also further described in the EIS, and considered in the assessment of Project environmental effects. A prime example in this EIS is the Baker Lake to Kiggavik access road where the preferred option is the winter road. However, an all-season road has been fully considered as a secondary option, in the event that Project transportation requirements cannot be adequately met with the winter road. A different type of example is the location of the Baker Lake dock. Several locations were identified, with the analysis of environmental effects based on the location with the greatest potential impact. This location was concluded not to have significant impacts, thus any of the identified locations can be the preferred option, based on other factors, and the other locations remain viable secondary locations.
3. One or more of the alternatives is identified as a secondary option that has not been fully assessed. These secondary options have been evaluated on a qualitative level, and further design and quantitative analysis would be required at the licensing stage before this option could be implemented. The purpose of these further analyses would be to confirm that the secondary option, if implemented, would not cause significant impacts, using the same basis for determination of significance as that used in this EIS for the preferred option. An example of this is the Kiggavik water treatment process options during operations. The preferred option is membrane treatment with chemical treatment of the RO reject. A secondary option is to include a softening stage for RO pre-treatment. This option would result in a change in effluent characteristics and has not been described in the EIS. If this option were to be considered at the time of licensing, the effluent characteristics and the effects of effluent discharge would need to be evaluated.
4. The alternative is eliminated from further consideration in the EIS as a viable option for carrying out that Project component. Alternatives were eliminated that were not considered acceptable based on environmental, technical, cultural, economic and/or social considerations. The north winter road and dock sites #3 to #5 were not preferred compared to other alternatives and were eliminated to reduce the number of options presented in the FEIS.

The following sections 4.3.1 and 4.3.2 summarize the methodology and results from Technical Appendix 2A as provided in the DEIS. Some additional work on consideration of alternatives has subsequently been done, either directly or indirectly in response to review comments on the DEIS. This additional work is summarized in Section 4.3.3 and discussed further in an addendum which prefaces Technical Appendix 2A.

4.3.1 Alternatives Assessment Criteria

Numerous criteria were used in Technical Appedix 2A to evaluate alternatives; these criteria can be broadly summarized as follows:

- potential effects on the physical environment including:
- groundwater
- surface water
- geology
- terrain
- air quality
- noise
- potential effects on the biological environment, including fauna and flora
- potential effects on socio-economics, including demographics, employment and family
- potential effects on land use, including harvesting, recreational and community uses
- potential effects on culture
- public acceptability
- technical challenges and considerations
- economics and costs

Additional details on the criteria for the alternatives assessment are provided in Technical Appendix 2A. In the Addendum produced for the FEIS, a section was included to provide clarity on the socio-economic criteria.

4.3.2 Results of Alternatives Assessments

Table 4.3-1 summarizes the results of the alternatives assessments. As discussed previously in this section, the preferred option and secondary option(s) assessed are presented in more detail in subsequent sections of this document and are considered in the assessment of Project effects presented in the EIS. Project components which have received further consideration since the DEIS submission are identified by a footnote in Table 4.3-1. The alternatives listed in the last column of Table 4.3-1 are those that were identified and eliminated from further consideration in the EIS by the alternatives assessment process.

Table 4.3-1 Summary of Project Options and Alternatives

Project Component	Preferred Option	Secondary Option Fully Assessed	Secondary Option Not Fully Assessed[2]	Other Alternatives Considered
Power generation[1]	Diesel generators in centralised or de-centralised powerhouse	• None	• Wind and diesel co-generation	• Gas turbines in centralised or de-centralised powerhouse • Solar Energy • Hydropower • Geothermal Energy
Source of freshwater	Siamese and Mushroom Lakes	• None	• None	• Judge Sissons Lake • Kavisilik Lake • Scotch Lake • Skinny Lake • Squiggly Lake
Kiggavik Effluent treatment (Construction)	Temporary water treatment plant used for construction at the Kiggavik site and operations at the Sissons site	• Staging of the permanent Kiggavik (Operations) water treatment plant	• None	• None
Kiggavik Effluent treatment (Operations) [1]	Membrane treatment followed by chemical treatment	• Replacement of ultrafiltration with multimedia filtration	• Addition of softening stage • Segregation of feed streams • Chemical treatment only	• Membrane treatment with evaporation of brine • Ultra filtration pre-treatment with single stage Reverse Osmosis, chemical treatment with recycle to tails neutralisation

Table 4.3-1 Summary of Project Options and Alternatives

Project Component	Preferred Option	Secondary Option Fully Assessed	Secondary Option Not Fully Assessed[2]	Other Alternatives Considered
Sissons Effluent treatment (Construction and Operations)	Chemical treatment at Sissons site	• Piping or trucking untreated effluent to the Kiggavik site for treatment	• Membrane treatment followed by chemical treatment	• None
Discharge of treated effluents	Year-round discharge to Judge Sissons Lake; single or dual outfall	• None	• None	• Zero liquid discharge • Seasonal discharge to Pointer Lake • Year-round discharge to Sik Sik Lake engineered
Mine waste management	Defined in waste management plans.	• None	• None	• None
Dewatering of Andrew Lake	Partial dewatering (maintain natural inflow/outflow)	• None	• None	• Full dewatering • Partial dewatering (construct drainage connections) • No dewatering (underground mining)
Mining of Andrew Lake Deposit. [1]	Open-Pit.	• None	• Open-pit + underground • Open-pit + borehole mining.	• Underground. • Other means of accessing ore underneath Andrew Lake.
Mining of Kiggavik Deposits[1]	Open-Pit	• None	• Open-pit + underground • Open-pit + borehole mining	• None
Mill Location	Kiggavik site	• None	• None	• Sissons site

Table 4.3-1 Summary of Project Options and Alternatives

Project Component	Preferred Option	Secondary Option Fully Assessed	Secondary Option Not Fully Assessed[2]	Other Alternatives Considered
Mill Process	• Resin-in pulp • Non-calcined uranium concentrate	• Resin-in pulp with solvent extraction • Counter-current decantation with solvent extraction • Calcined uranium concentrate	• None	• Filtration with solvent extraction
Mine rock storage	Temporary surface storage of Type 3 mine rock; permanent surface storage Type 1 and 2 mine rock	• None	• None	• Type 3 above-ground storage • Type 3 deposited in a natural waterbody
Tailings management[1]	In pit disposal	• None	• None	• Above ground • Natural waterbody
TMF design[1]	Natural surround in-pit subaqueous	• Pit liner • Underdrain	• None	• None
Access from Baker Lake to the Kiggavik site[1]	Winter road (south)	• All season road north route with cable ferry	• None	• North winter road • All season road north route with Thelon River bridge • All season road south route • Winter road from end of Narrows
Airstrip location	Pointer Lake Airstrip	• None	• None	• Drumlin Airstrip • Jaeger Lake Airstrip • Skinny Lake Airstrip
Baker Lake dock location[1]	North shore site 1	• North shore site 2, Agnico-Eagle Dock Site	• None	• North Shore sites 3-5 • South shore • Sagliq Island • Chesterfield Inlet dock

Table 4.3-1 Summary of Project Options and Alternatives

Project Component	Preferred Option	Secondary Option Fully Assessed	Secondary Option Not Fully Assessed[2]	Other Alternatives Considered
Yellowcake shipment	Air only	• None	• None	• Air and marine
Marine transportation routes	Dry Cargo: Ship to Helicopter Island, lighter, barge to Baker Lake Barge direct from Southern ports to Baker Lake Ship or rail cargo to Churchill and barge to Baker Lake Fuel Shipment: Ship to Ellis Island, lighter, barge to Baker Lake Ship or rail to Churchill, barge to Baker Lake	• None	• None	• Barge from Chesterfield Inlet dock site
Decommissioning and reclamation[1]	Main Zone TMF-backfill remaining volume with mine rock	• None	• Main Zone flooded pit	• None
	Andrew Lake pit-reflood by partially diverting Andrew Lake flow		• Andrew Lake pit reflooding augmented by pumping from Judge Sissons Lake	• Natural reflooding of Andrew Lake pit
	Progressive reclamation with decommissioning and closure plan		• None	• None

[1] See Section 4.3.3.

[2] Further quantitative assessment required for licensing

4.3.3 Additional Alternatives

As noted previously, some additional work has been done on consideration of alternatives since submission of the DEIS. The Project components affected by this work are footnoted in the revised Table 4.3-1, and are as follows:

- Additional power generation alternatives were considered as part of the addendum to the DEIS. These alternatives have been incorporated into Technical Appendix 2A.
- A description of effluent treatment process alternatives has been added to Technical Appendix 2A. Secondary options and alternatives considered have been updated to include other options consided during the feasibility study
- Secondary options to access ore zones below the optimized open pit designs have been added.
- The discussion of alternatives for mine rock and tailings management has been expanded.
- The tailings management Project component has been divided to show the high level alternatives for tailings management in one row, and the alternatives for TMF design in a separate row.
- Alternatives have been analysed for refilling of the dewatered Andrew Lake pit during decommissioning.
- Some revisions have been made to the preliminary decommissioning plan.
- The north winter road is no longer a secondary option. For clarity, the roads are described as the winter road and all-season road throughout EIS documents.
- The preferred dock site location has not changed. The secondary options have been changed to include the existing Agnico-Eagle dock site and dock sites 3 to 5 have been removed from consideration.

Further details on these changes, and some clarifications related to the DEIS text, are described in the addendum to Technical Appendix 2A Alternatives Assessment.

4.4 Project Layouts and Infrastructure

4.4.1 Environmental Design Features

Environmental design features are considered a key component of mitigation by design. These features are represented in part by best practices as incorporated from AREVA's experience in Saskatchewan and also consider site-specific environmental conditions in the Kivalliq region. In this section, the design features have been broadly classified into categories, although environmental features placed in one category may benefit additional categories (i.e. air quality design features may also reduce impacts to wildlife).

4.4.1.1 *Air Quality Design Features*

The design of the Kiggavik Project incorporates features designed to minimize dust and air emissions, as well as the effects of dust and air emissions on other aspects of the environment. The layout of the Kiggavik and Sissons infrastructure was located to optimize air quality by placing primary air emitters downwind of other infrastructure and camps. This included several iterations of air quality modelling to ensure the powerhouse was placed in an optimal location for air quality at the camp. The landfarm will be located away from sensitive areas to avoid any potential air quality nuisance issues. Energy efficient features are incorporated into the design of the building and facilities. As an example, excess steam from the acid plant will be used as the primary source of heat for the mill buildings reducing the heating requirements from supplementary steam.

An incinerator will be installed that complies with Canada-wide standards for dioxins and furans. To minimize the dust emissions from the mill, dedicated scrubbers will be installed in both the Crushing and Grinding and Yellowcake Drying circuits. A HEPA filter will be used in the drying circuit in conjunction with the scrubber for further dust reduction. The crushing circuit was sized appropriately to eliminate the need for an intermediate stockpile, and potential dust generation from this stockpile. The area containing the crushing and grinding circuit is isolated and has concrete walls for dust control purposes. A scrubber will be installed on the acid plant to remove acid mist and excess SO2. To prevent dust and reduce dust and radon emissions, tailings will be disposed of subaqueously using in-pit technology.

The burning of diesel fuel is an additional source of air emissions. Diesel fuel is used to power heavy equipment, power generation equipment and marine vessels. Diesel fuel will meet the Canada-wide Diesel Sulphur Content standard of 15 ppm for off-road engines. Diesel powered heavy equipment will meet emissions standards. Where available, diesel-powered heavy equipment will be equipped with appropriate exhaust emissions controls such as catalytic converters and diesel particulate filters.

The winter road between the Baker Lake dock site and Kiggavik is the preferred option. The road routing was selected to maximize the amount of over-ice distance. The use of a winter road only and maximizing the distance over ice will reduce the amount of dust generated from the access road.

4.4.1.2 *Aquatic Design Features*

The design of the Kiggavik Project incorporates features designed to minimize effects to surface hydrology, surface water quality, groundwater quality, and fish habitat. A site-specific hydrology baseline program has been conducted to ensure that the design of site water management structures and water management plans account for the long ice-covered season and sharp increase in flows expected during spring freshet. Site specific data have been considered in the selection of freshwater sources, process water recycling strategies, and in the selection of treated effluent discharge locations. The site water management system is designed to recycle water where applicable and fresh water use will be minimized to limit withdrawal requirements and discharge quantities. Water containment and treatment, including contingency measures, have been designed to minimize the potential for uncontrolled releases of untreated water.

- The mill terrace is located upgradient of the Kiggavik open pits to ensure contingency containment of potentially contaminated materials.
- At the Kiggavik site, a water storage pit will be constructed to maximize the recycling of site drainage and mine water to the mill, which both reduces the fresh water requirements and effluent quantity. The water storage pit is designed to contain all of the runoff expected during spring freshet. The Resin-in-Pulp process was selected for the mill based on its reduced water requirements and effluent volume relative to the conventional CCD-SX process.
- The tailings management facilities have been designed to avoid interactions between tailings and natural waterbodies using in-pit technology. Design contingencies have been developed to account for uncertainties with respect to sub-permafrost pressures and potential fractures in bedrock. The tailings are thickened prior to deposition to enhance consolidation. Tailings will be disposed of subaqueously. To prevent freezing of tailings and enhance consolidation, minimum water cover requirements have been developed. At closure, the tailings will be covered using mine rock to enhance consolidation and prevent wind and water erosion. A final cover of overburden will be added to facilitate revegetation.
- At the Sissons site, sedimentation ponds will be constructed to maximize the recycling of site drainage and mine water. The sedimentation ponds are designed to contain all of the runoff expected during spring freshet. With the sedimentation ponds, the fresh water requirements at Sissons site consist of potable water and water for dust suppression only.
- Water treatment options have been developed based on site-specific conditions to ensure compliance with the Metal Mining Effluent Regulations (MMER) discharge limits, reduce potential toxicity, maximize recycling, and to maintain ecological risk assessment objectives to minimize potential environmental effects of treated effluent discharge. Monitoring ponds are incorporated into the water treatment plant design to allow water quality testing to ensure that the water quality meets objectives prior to discharge.
- Freshwater diversion channels have been designed to isolate clean runoff which drains toward site facilities (see Technical Appendix 2E). The runoff would be intercepted and directed around the main facilities area and returned to the channels which carried the flow from these areas prior to development. The channels are designed to carry runoff from a Probable Maximum Precipitation (PMP) event.
- While mining activities progress, mine rock will be segregated at the source to facilitate containment and decommissioning of potentially problematic materials. The ore and Type 3 mine rock pads will be lined with a synthetic membrane and bermed for collection of drainage. Runoff will be collected in sedimentation ponds and recycled or treated prior to discharge. Leak detection will be incorporated into the design of the liner to monitor the pads and ponds.

- Culverts will be constructed where required along the site roads and all-season road (if constructed). The culverts are designed to permit fish passage and improvements will be made to in-stream fish habitat where required. The dewatering of Andrew Lake pit will occur outside of spawning season and a fish habitat compensation plan will be developed.
- The dock site design is temporary in nature to minimize the effects on fish habitat.

4.4.1.3 *Soils, Terrain, and Vegetation Design Features*

The Project is designed to minimize impacts to soils, terrain, and vegetation. Consideration has been given to the local and regional climatic conditions of the Project location and the presence and expected changes to permafrost terrain. The disturbance through eskers, wetlands, and shoreline areas have been minimized.

A construction plan for topsoil stripping prior to construction activities will be developed. In the overburden pile, stripped topsoil will be segregated from subsoils.

The foundations, pads, roads, pipelines and diversion ditches are designed with sufficient thickness to prevent melting of permafrost. Due to the permafrost foundation conditions, the liners for the pads and ponds will be constructed on a rockfill pad. Excavations in permafrost ground will be quickly covered using Type 1 mine rock fill to prevent permafrost degradation. The haul road design calls for fill construction only, wherever the road passes over overburden soils. Minimum depth of embankment fill is specified for various “terrain types”, and is designed to be sufficient to construct a stable road embankment and to protect the underlying permafrost.

Over the long-term, the tailings management and mine rock facilities have been planned to ensure a robust design for protecting the environment in either the presence or the absence of permafrost. Long-term stability of the tailings and mine rock facilities do not require permafrost encapsulation.

Roads are designed to minimize the potential for ground ice melting, erosion, and ponding of water. Waterbodies and watercourses were selected as much as possible during routing of the winter road to avoid disturbing the tundra soil and vegetation communities. Portage locations along the winter road are be selected to minimize the disturbance of the tundra soil and its vegetation and provide grades that are acceptable to traffic.

The fuel farm is designed with appropriate spill containment to prevent absorption of fuel by the soil in the event of a tank leakage.

Preliminary decommissioning plans developed incorporate returning the land near to its original state and promotingvegetative growth.

4.4.1.4 ***Wildlife Design Features***

The Project is designed to minimize impacts to wildlife. Many site buildings will be interconnected via corridors, reducing interactions between Project personnel and wildlife. Project facilities will be designed to minimize the potential for predatory or scavenging animals' use of the facilities for shelter or a source of food. AREVA acknowledges the potential for an increase in the number of predators as a result of human activity in the area. To minimize the potential for increasing densities of bird nest predators (e.g., foxes, wolverines, ravens), AREVA will implement strict waste management procedures as outlined in the Waste Management Plan (Technical Appendix 2S).

Buildings will be designed to avoid/eliminate denning, roosting and nesting sites. For example: bird spikes will be installed on horizontal surfaces near heat sources, and AREVA will limit the number of sheltered surfaces on buildings where nests could be established. AREVA will conduct regular monitoring of Project facilities and waste disposal sites to ensure that predator control measures are effective. If Project facilities are found to be used by predators AREVA will work with consulting biologists to identify adaptive management options that will displace the predators and deter them from using the site in subsequent years.

The guidance provided in Environment Canada’s document “Preventing Wildlife Attraction to Northern Industrial Sites” outlines the design of Project facilities and infrastructure to discourage attraction of nesting and/or predatory birds. This document also provides specific examples of how other northern mines have designed infrastructure to support responsible waste management (e.g. the kitchen at the Ekati mine connected to the incinerator room). Other mines have incorporated wildlife-specific waste management actions into mitigation plans (e.g. Jericho, Snap Lake, Diavik). This has included employing a wildlife interaction expert to conduct regular audits on Project facilities, inspecting waste sites or containers to evaluate the effectiveness of waste management plans, or monitoring for and clearing of litter on Project-related roads.

The use of fencing will be limited to minimize changes in wildlife movement. Fencing can be used as a deterrent to keep wildlife away from infrastructure that could result in injury. Project facilities are sited a minimum of 10km away from designated caribou water crossings.

The winter road is the preferred road option, which minimizes habitat loss. If the all-season road is constructed, the embankment height will be constructed to prevent visual obstruction for migrating caribou, as well as to facilitate ease of crossing. The roads have been designed for best visibility to reduce the potential for wildlife-vehicle collisions, and with appropriate gradients to accommodate wildlife crossings.. Materials used on road surfaces and road slopes will be suitable to create a good travel surface for wildlife attempting to cross the road (i.e., road materials won’t cause potential injury or difficulty for animals when crossing). The roads from the Kiggavik and Sissons sites to Judge Sissons Lake contain a treated effluent pipeline and pipeline berm. The berm is designed such that the pipeline can be crossed by wildlife.

4.4.1.5 *Marine Transport Design Features*

Conservative values have been used for planning of marine transportation to account for any potential decreases to the operating window for marine transport. All vessels used for carrying fuel will be of double hull construction to prevent fuel spills. Marine shipping will occur along pre-determined routes to avoid sensitive habitat by vessels. Propellers for marine vessels will be selected which minimize noise disturbance to marine mammals and marine fish.

4.4.1.6 *Radiation Protection Design Features*

Radiation protection considerations have been incorporated into the mill design. The ore pad, crushing and grinding, drying/calcining, and packaging circuits are located downwind of the other mill operating areas to reduce the potential for dust exposure. Crushing and grinding circuits have been designed to operate without the need for a crushed ore stockpile, thereby removing potential source of dust and radon. Circuits have been arranged to segregate ore and tailings slurry flows (crushing and grinding through to tailings neutralization) from primarily solution flows (Elution through to uranium precipitation).Shielding of process vessels containing slurry, such as in grinding, leaching, (resin in pulp) RIP, and tailings neutralization, will be used as required to reduce gamma exposure. Separation will be used throughout the mill to distance workers from radioactive materials and to control and contain materials during regular operation, and in the event of a process upset. Considerations for spill containment and prevention are incorporated into the mill design by including containment provisions and process control features.

Mill ventilation will be a single-pass system to minimize potential worker exposure to airborne radiation and dust. The air-flow through the mill will be from areas of low potential contamination to areas of higher potential contamination. Exhausted air will be replaced and pressure gradients will be maintained between the process areas and the non-process areas (i.e. control rooms).

In the open pit mines, water inflows will be isolated to prevent radon exposure. Shielding is installed, as required, in vehicles used in the mines. Windows of vehicles are kept closed and a positive pressure ventilation system is maintained.

The ventilation of all ore production areas in the end grid mine areas will be separated from the main decline by ventilation doors at each level access. All ore headings will be ventilated with fresh air and exhaust air will be pulled through rigid ductwork directly to an exhaust airway so that used air is not re-circulated to other headings. All primary access ways will be maintained in fresh air and will be located in non-mineralized mine rock material. The ore stockpile bay at each access level will be ventilated with fresh air to carry all dust and radon directly to an exhaust raise connected to the end of these drives. The excavation of production stopes will begin at the downwind edge of the ore on each level. As these stopes are mined out, production will move towards fresh air. This will avoid the contamination of fresh air by radon leaking out of the older mined-out stopes. Shotcrete will be used in all ore drifts to act as a gamma radiation barrier.

Mobile production equipment cabs can be lined were required with a thickness of lead to reduce gamma radiation. This will include drill jumbos, LHDs, trucks and bolters. Equipment cabs will be ventilated through HEPA filters. This will reduce long-lived-radioactive-dust (LLRD) doses. All mining equipment will be setup for work within low-dose-rate mobilization areas outside the mineralization (access drifts and declines in waste rock). At these locations, workers can assemble their gear and fuel and check their equipment.

4.4.1.7 ***Archaeological Design Features***

The preservation of archaeological sites is important to the Inuit. Archaeology studies have been completed to identify archaeological sites within the Project area. A summary of the Archaeological studies is provided in Technical Appendix 9B Archaeology Baseline. Avoidance of archaeological sites has been considered in the development of the Project layout and will be considered in final road alignments within approved corridors.

4.4.2 Kiggavik Site

The Kiggavik site location and layout has been selected based on the following considerations:

- to ensure containment of the mill terrace by placing it up-gradient from the open pits/TMFs
- to minimize pumping distance from the mill to the TMFs while maintaining appropriate blast clearances around the open pits
- to maintain safe workflow within the site footprint
- to maintain an appropriate distance from the airstrip flight direction while minimizing travel distance from the airstrip to the Kiggavik site
- to take advantage of predominant wind directions and minimize the potential for emissions to affect air quality in the main camp areas
- to minimize distance to freshwater sources and treated effluent discharge receptors
- to minimize the potential effect of the site footprint on fish-bearing waterbodies
- to retain the potential for future site expansion

Infrastructure associated with the Kiggavik Site is shown in Figures 4.4-1 and 4.4-2. The facilities are summarized in Table 4.4-1.. Tables 4.4-1 to 4.4-3 provide a tabular summary of the infrastructure. Within the tables, there is a column that indicates whether the infrastructure includes containment. Facilities which have a low spill risk or are not expected to contain any hazardous or contaminated materials do not have containment.

Facilities that contain hazardous material which, without appropriate measures, have potential to effect the surrounding environment require containment. Examples of containment includes double walled tanks, buildings, bermed areas, liners, and pits. Additional means to prevent hazardous materials from entering the surrounding environment may be considered on a material-specific basis to ensure appropriate containment. The type of containment required depends on the type and location of hazardous material, applicable regulations and legislation, and available technologies. All containment structures will be designed to meet or exceed applicable regulations.

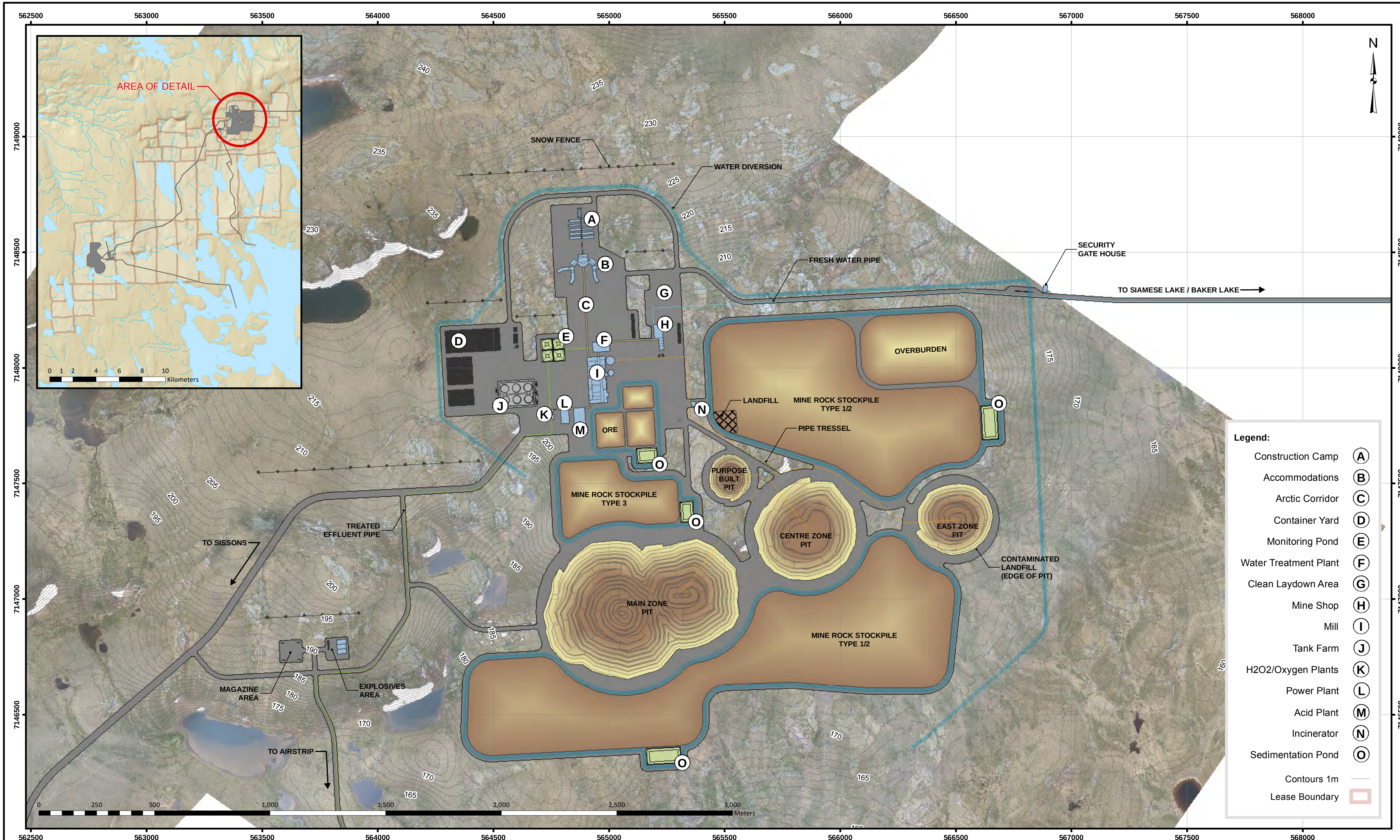

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FIGURE 4.4-1
KIGGAVIK GENERAL SITE LAYOUT

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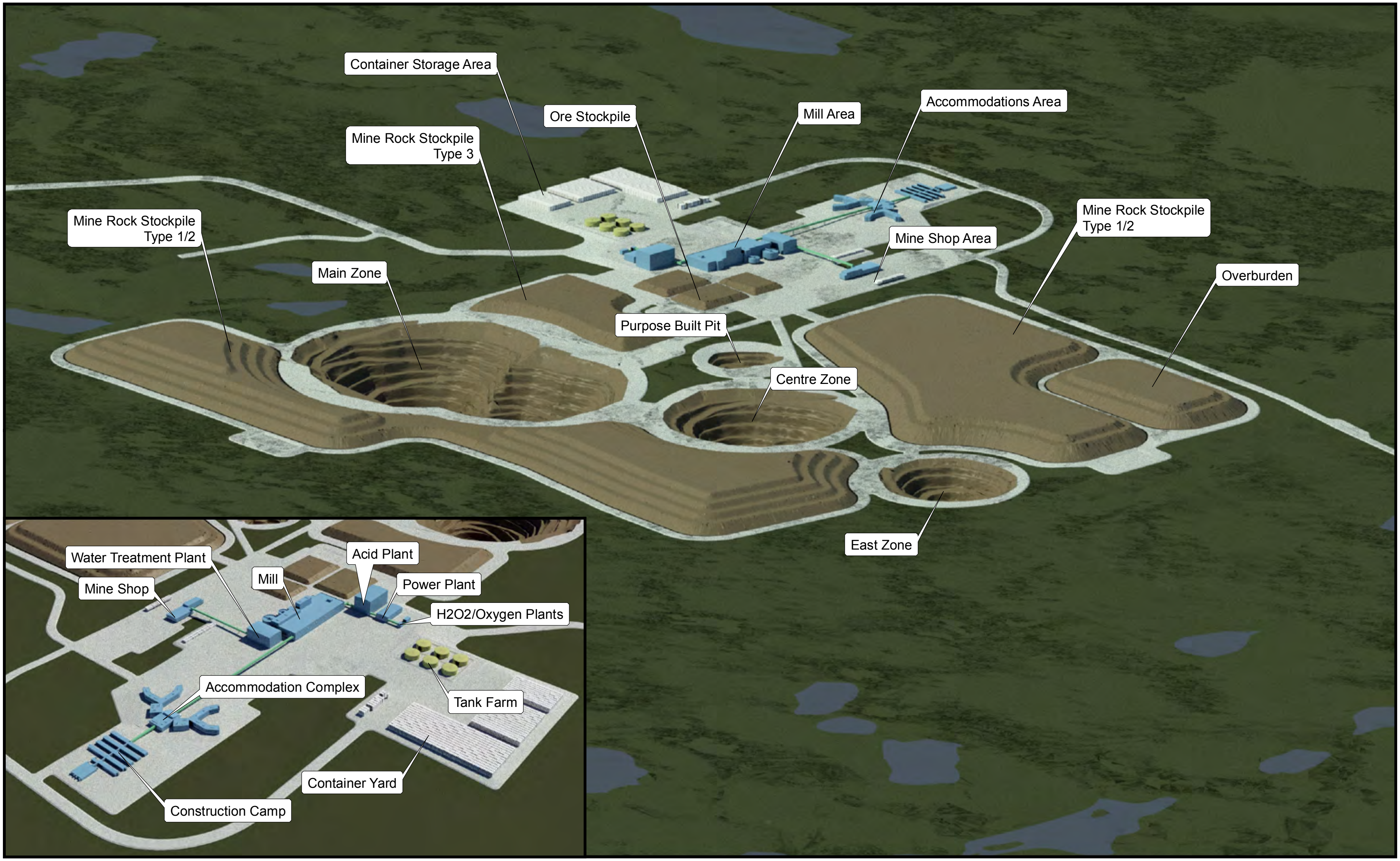

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FIGURE 4.4-2
KIGGAVIK 3D VIEW

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Table 4.4-1 Summary of Kiggavik Site Infrastructure

Facility	Containment Yes	Containment No	Key Features	Reference for Detail
Mining				
Mine Shop	✓			Section 5
Explosive Storage		✓		Section 5
Milling				
Mill	✓		• To produce up to 4,000 tonnes U per year	Section 7
Acid Plant	✓			Section 7
Oxygen Plant	✓			Section 7
Peroxide Storage	✓			Section 7
Tailings Management	✓		• 3 in-pit TMFs: East Zone, Centre Zone, Main Zone	Section 8
Water Management				
Water Treatment Plant	✓			Section 9
Monitoring Ponds	✓			Section 9
Freshwater Pipe		✓	• To Siamese Lake • 8.7 km long	Section 9
Treated Effluent Discharge Pipe	✓		• Discharge to Judge Sissons Lake • 14 km long	Section 9
Purpose Built Pit	✓		• Storage of site drainage	Section
Water Diversion Structures		✓	• Freshwater diversion	Section 9
Snow Fences		✓		Section 9
Power				
Power Plant	✓			Section 11
Tank Farm	✓		• 6-10 ML tanks	Section 11
Warehousing				
Container Yard	✓			
Clean Storage		✓		
Accommodation				
Permanent Camp		✓		Section 11

Table 4.4-1 Summary of Kiggavik Site Infrastructure

Facility	Containment		Key Features	Reference for Detail
	Yes	No		
Construction Camp		✓		Section 12
Access				
Kiggavik – Sissons Access Road		✓	• 18 km long	Section 10
Access Road to Siamese Lake		✓	• Service road for freshwater line, includes power line • Overlays portion of the winter road route • 7 km long	Section 10
Access Road Kiggavik to Judge Sissons Lake		✓	• Service road for treated effluent discharge line, includes power line • 13 km long	Section 10
Pointer Lake Airstrip	✓		• Contained storage of de-icing fluid and aviation fuel • Gravel airstrip (not contained)	Section 10

4.4.3 Sissons Site

The Sissons site location and layout has been selected based on the following considerations:

- to ensure containment of the site by placing it up-gradient from the open pit
- to maintain safe workflow within the site footprint
- to take advantage of predominant wind directions and minimize the potential for emissions to affect air quality in the camp areas
- to minimize distance to freshwater sources and treated effluent discharge receptors
- to minimize the potential effect of the site footprint on fish-bearing waterbodies
- to retain the potential for future site expansion

Infrastructure associated with the Sissons Site is shown on Figures 4.4-3 and 4.4-4. The facilities are summarized in Table 4.4-2; those facilities that will be contained within the site pad or will include specifically designed secondary containment are indicated.

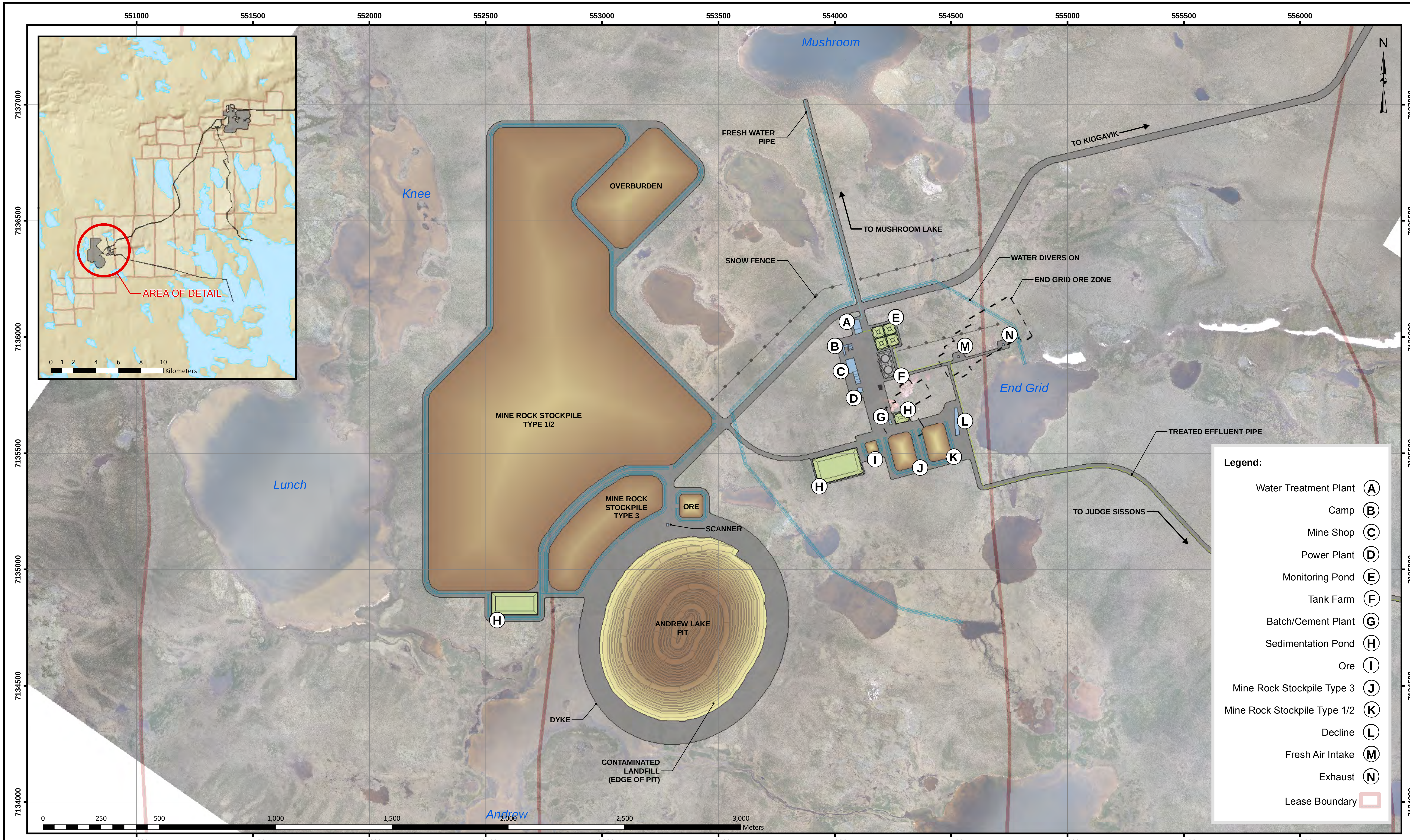

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FIGURE 4.4-3
SISSONS GENERAL SITE LAYOUT

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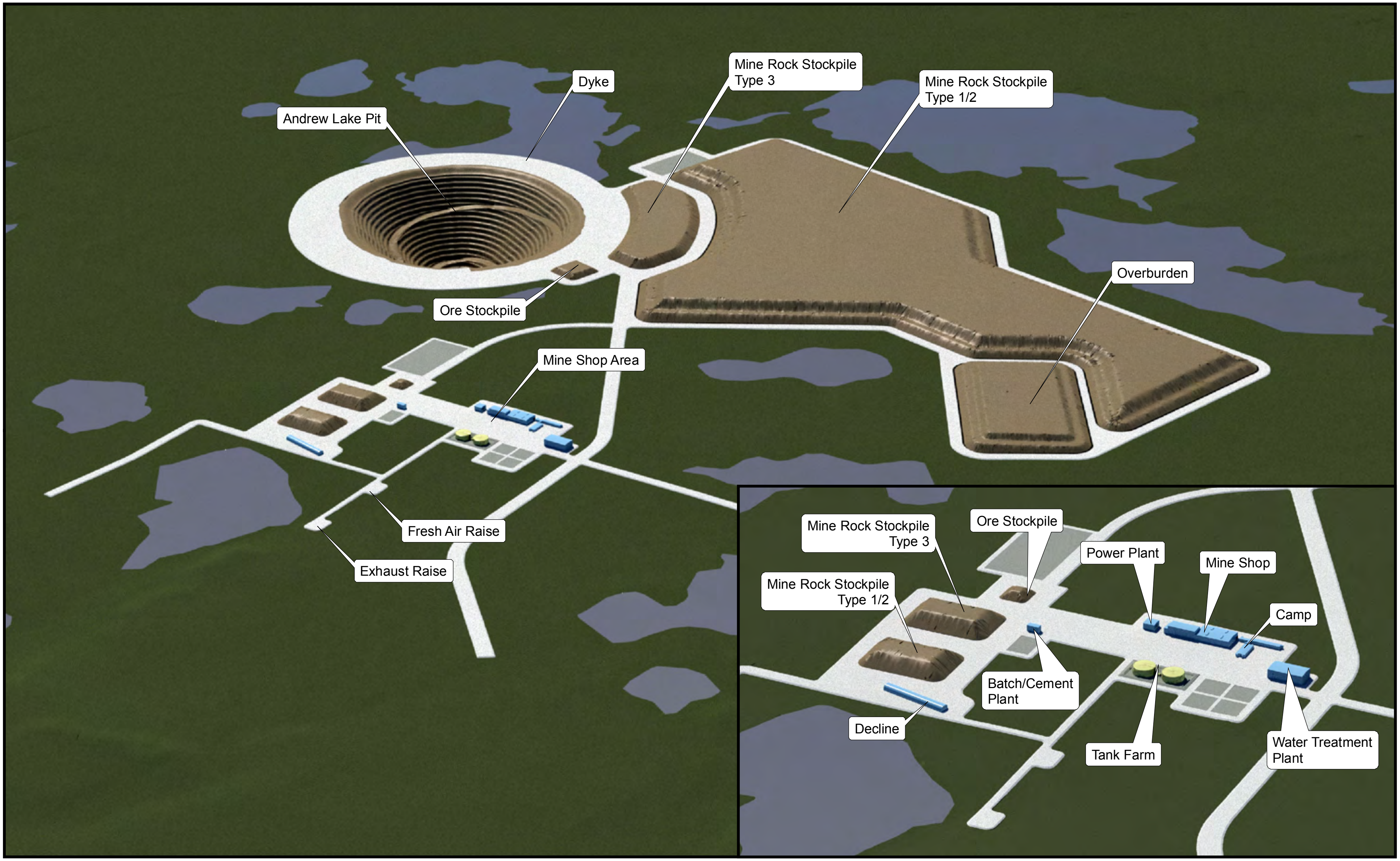

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FIGURE 4.4-4
SISSONS 3D VIEW

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Table 4.4-2 Summary of Sissons Site Infrastructure

Facility	Containment Yes	Containment No	Key Features	Reference for Detail
Mining				
Mine Shop and Offices/dry	✓		• Services underground and surface fleets – light duty function	Section 5
			•	
Cemented Rock Fill Plant		✓	• 60 tonnes CRF per hour	Section 5
Water Management				
Water Treatment Plant	✓		• Chemical treatment • 1,700 m^3/d nominal capacity	Section 9
Monitoring Ponds	✓			Section 9
Treated Effluent Discharge Pipe	✓		• Discharge to Judge Sissons Lake • 12 km long	Section 9
Water Diversion Structures		✓	• Freshwater diversion	Section 9
Snow Fences		✓		Section 9
Power				
Power Plant	✓		•	Section 11
Tank Farm	✓		• 2 – 10 ML tanks	Section 11
Warehousing				
Container Yard		✓		
Emergency Camp		✓		Section 11
Access				
Access Road to Mushroom Lake		✓	• Service road for freshwater line, includes power line • 1 km long	Section 10
Access Road Sissons to Judge Sissons Lake		✓	• Service road for treated effluent discharge line, includes power line • 10 km long	Section 10

4.4.4 Baker Lake Dock Facility and Site Access

The preferred Baker Lake dock location and layout has been selected based on natural topographic features, Lake Bathymetry, and proximity to existing industrial infrastructure. The winter access road is the preferred access option, and has been selected following extensive community engagement and logistical studies. The all-season access road is assessed as a secondary option.

The infrastructure and road routes are shown on Figure 4.4-5 and summarized in Table 4.4-3. These facilities are described in more detail in Section 10.

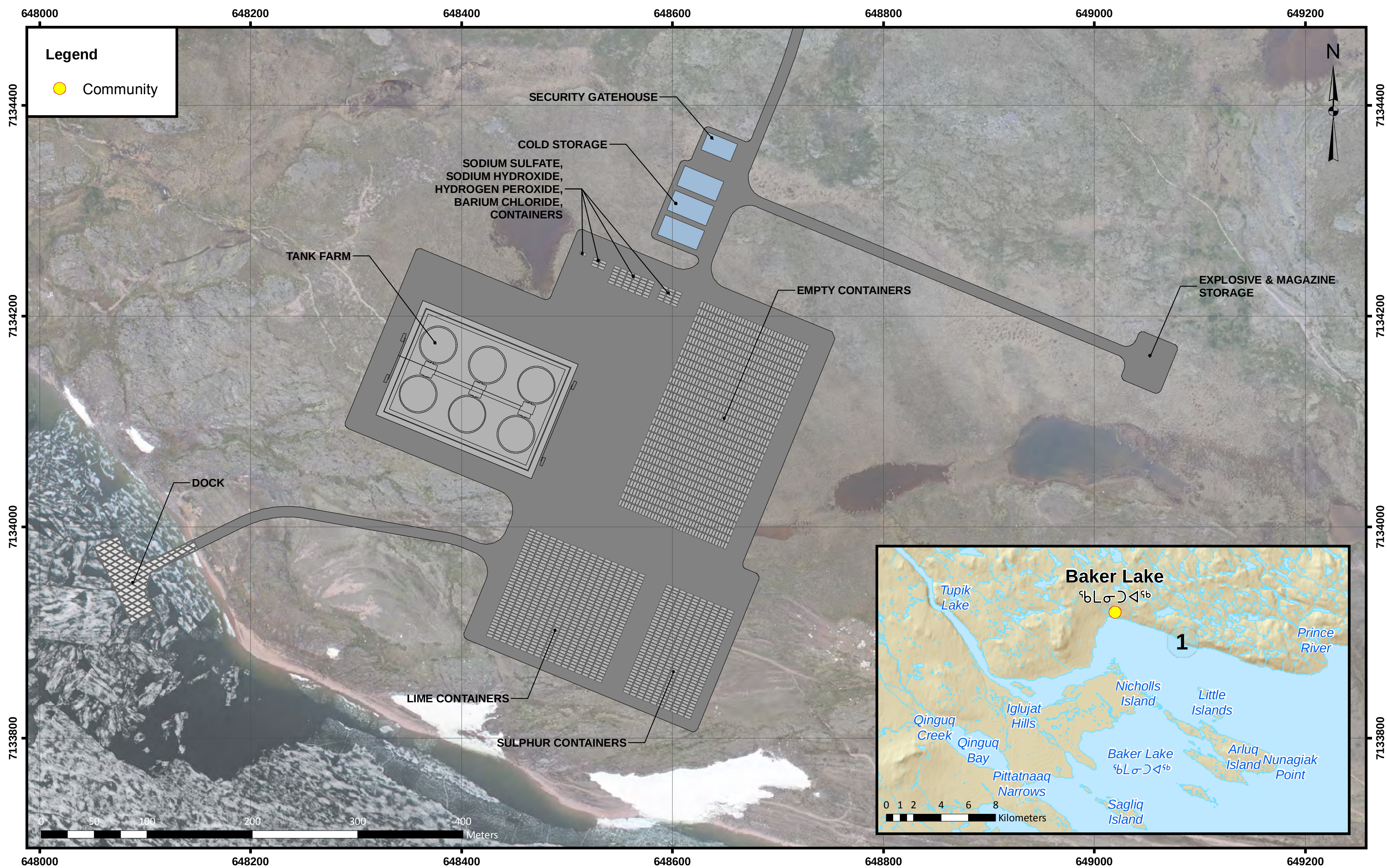

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FIGURE 4.4-5
BAKER LAKE DOCK AND STORAGE FACILITY LAYOUT

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Kiggavik Project

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Table 4.4-3 Summary of Baker Lake Dock Facility and Access Infrastructure

Facility	Containment Yes	Containment No	Key Features
Temporary Dock		✓	• 7,500 t barge docking • 80 – 100 m long
Marshalling Area			
Tank Farm	✓		• 7 -10 ML tanks
Reagents Container Storage	✓		• Sized for approximately 4200 containers stacked 4 high
Other Container Storage		✓	• Sized for approximately 4200 containers stacked 4 high
Explosive Storage		✓	• 10,000 tonne capacity
Offices		✓	
Access			
Baker Lake – Kiggavik Winter Access Road		✓	• 3 month seasonal road • Includes emergency shelters • 99 km long
Baker Lake – Kiggavik All-Season Access Road		✓	• All-season road with cable ferry – ice bridge crossing Thelon • 8 month service • Includes emergency shelters • 114 km long
Road to Baker Lake		✓	• connects into AEM Meadowbank dock road • 1.5 km long

4.5 Project Schedule

Pre-development could commence upon receiving a positive NIRB recommendation and acceptance by the Minister. The date for the start of Project construction will be influenced by favourable market conditions, completion of detailed engineering, and successful completion of liscening and other Project approvals. Construction would begin with preparation of the Baker Lake dock facility in time for the first marine shipping season. Construction at the Kiggavik site is then expected to begin after the first marine shipping season in concert with the winter haul season. The anticipated Project schedule is shown in Figure 4.5-1. The phases consist of the activities shown in Table 4.5-1.

Table 4.5-1 Key Project Phases

Phase	Activities
Pre-development	• Begins upon issuance of NIRB Project Certificate • Feasibility study and engineering activities • Completion of licensing documentation; issuance of licences and authorizations • Contracting and procurement for long-lead items
Construction	• Preparation of Baker Lake dock site • Shipment of construction materials and operating supplies • Construction of winter road • Construction of Kiggavik site facilities • Construction of surface Sissons facilities • Dewatering of Andrew Lake
Operations	• Mining • Mine rock management • Milling • Tailings management • Water and waste management • Support activities (power generation, logistics) • Completion of license for decommissioning
Decommissioning and Reclamation	• Removal of infrastructure • Closure of rock stockpiles • Treatment of tailings porewater • Closure of TMFs
Post-decommissioning	• Monitoring and any required follow-ups • Completion of application for transfer to Institutional Control

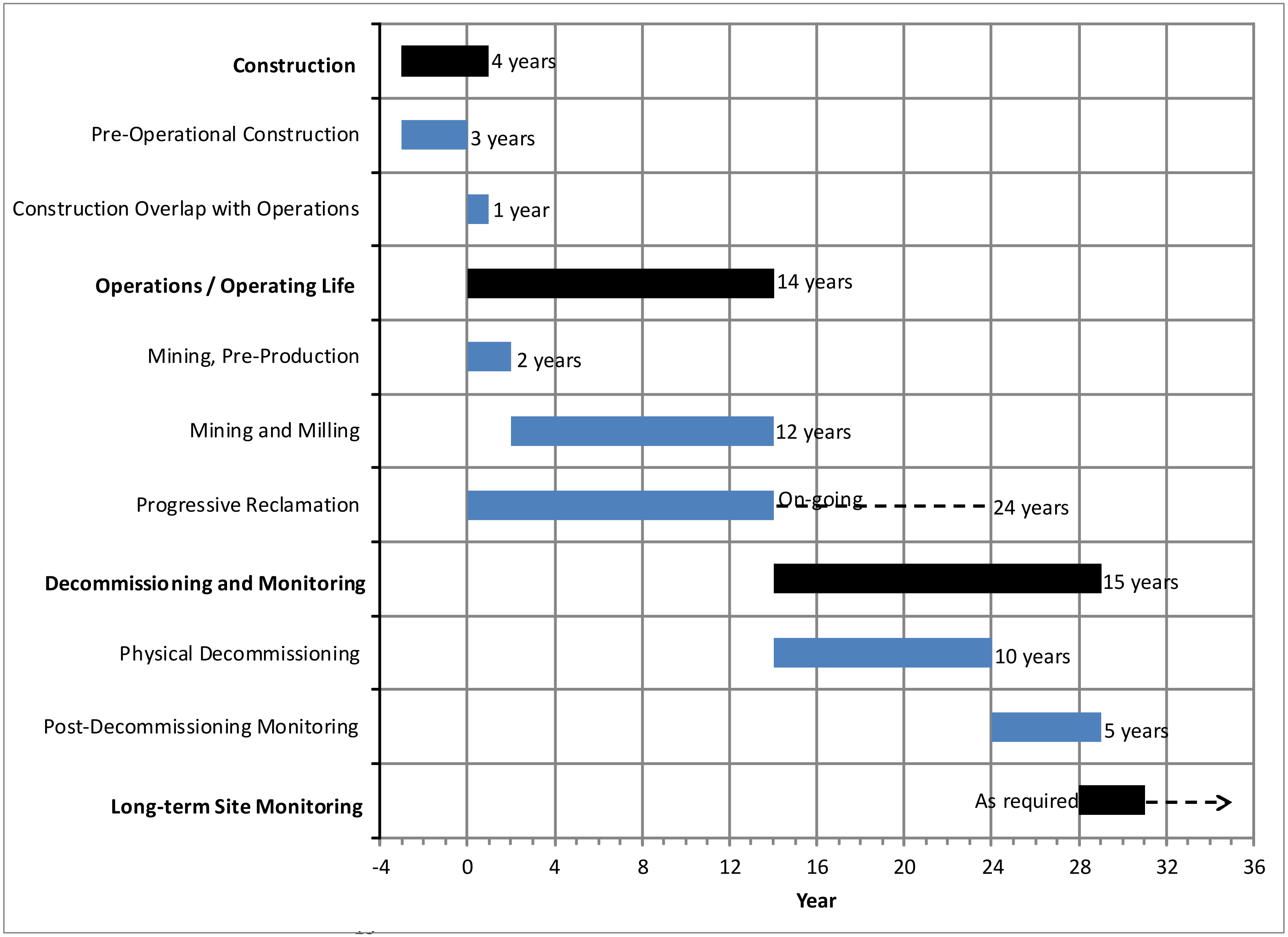

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FIGURE 4.5-1
ANTICIPATED PROJECT SCHEDULE

ENVIRONMENTAL IMPACT STATEMENT
VOLUME 2

KIGGAVIK PROJECT

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File: Q:\SHEQ\GIS\KIGGAVIK\2014\EIS\Volume 2 - Project Description\Maps\MXD\Figure 4.5-1 Anticipated Project Schedule.mxd

5 Mining

5.1 Resources

The current resource estimates for the Kiggavik Project deposits were performed according to Form F1 of National Instrument 43-101 (NI43-101) Standards of Disclosure for Mineral Projects.

The following mineral resource estimates were used to design the project:

- It is estimated that at a 1,000 ppm U cut-off, the East Zone, Centre Zone, Main Zone and Andrew Lake deposits contain a combined Indicated and Measured Mineral Resource of 7.9 million tonnes, approximately, grading 4,700 ppm U (37,200 t U) and 0.18 million tonnes, approximately, grading 2,640 ppm U (474 t U) classified as Inferred Mineral Resource.
- It is estimated that at a 2,000 ppm U cut-off, the End Grid deposit contain a combined Indicated Mineral Resource of 2.52 million tonnes, approximately, grading 4,660 ppm U (11,750 t U) and 0.5 million tonnes, approximately, grading 3,750 ppm U (1,900 t U) classified as Inferred Mineral Resource.

These estimates result in total estimated Project resources of approximately 48,950 t U classified as Indicated and Measured Mineral Resource and 2,374 t U classified as Inferred Mineral Resource. Mining resources are estimated at approximately 10 million tonnes grading 4,250 ppm U (42,625 t U) (Table 5.3-1).

5.2 General Mine Design Considerations

Both open pit and underground mining methods have been selected for the Kiggavik Project. Open pit mines are proposed for the three Kiggavik deposits (Main, Center and East) and the Andrew Lake deposit, while an underground mine is proposed for the End Grid deposit. The Kiggavik and Sissons general site layouts are shown in Figures 4.4-1 and 4.4-3, respectively. Three-dimensional perspectives of the Kiggavik and Sissons site are included in Figures 4.4-2 and 4.4-4, respectively.

The development of the mining plan has drawn upon operational experience gained during the mining of the open pit mines at the McClean Lake Operation, benchmarking against underground uranium mines operating in northern Saskatchewan, and benchmarking against recent open pit and underground mining projects in sub-arctic conditions in Nunavut and the Northwest Territories. Key site-specific considerations include the influence of perma-frost, severe weather and associated operating delays, snow drifting and required road maintenance, high winds and dusting, and management of spring freshet.

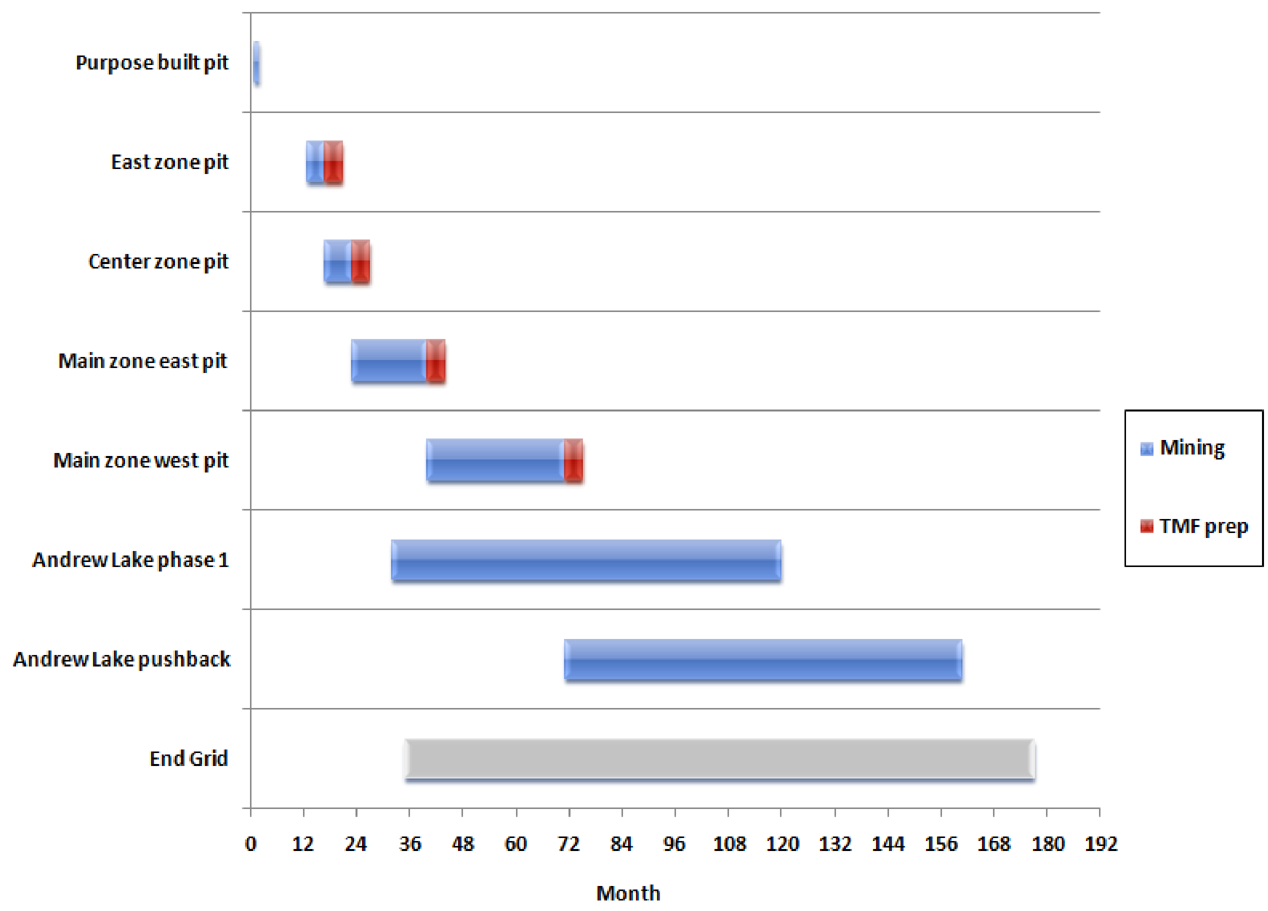
5.3 Mining Schedule

The mining plan has been integrated with the tailings management strategy to ensure that there is sufficient mined-out pit volume available at all times for tailings storage. To achieve this outcome, mining and stockpiling of the East Zone deposit at the Kiggavik site would begin as early as possible in the Project schedule, while mill start-up would be delayed until the first tailings management facility is available. Figure 5.3-1 shows the overall development schedule for both the Kiggavik and Sissons sites, including both open pit and underground excavations.

Ore mined at the Sissons site will be hauled to the Kiggavik mill for processing. There will also be a pad constructed at the Sissons site to provide ore storage capacity and facilitate blending of ore prior to transport to the stockpile at the Kiggavik site. This pad will be constructed to the same general specifications as the larger Kiggavik ore pad, including installation of a synthetic membrane, berms, and ditches for drainage control and water management. More detail of mitigation and environmental effects regarding the ore pads can be found in Technical Appendix 2H (Ore Storage Management Plan). Ore will be hauled from Sissons to the Kiggavik ore pad on a dedicated access road using mining trucks or dedicated trailers that can be transported using standard tractors (Section 10.5).

Mine rock will be managed at the Kiggavik and Sissons sites. Mine rock material deemed acceptable in terms of uranium content, acid-generating potential and metals leaching will be used for construction (Type 1). Mine rock not utilized for construction will be managed on surface (Type 2). Mine rock that requires specific management due to uranium content, acid-generating potential or metals leaching potential (Type 3) will be segregated during mining and managed in a separate temporary stockpile. Drainage from the stockpile will be collected, treated as necessary, and released. During decommissioning, Kiggavik Type 3 mine rock will be backfilled into the Main Zone TMF, while Sissons Type 3 mine rock will be backfilled into Andrew Lake pit. Section 6 addresses mine rock management in more detail.

The proposed production schedule is shown in Table 5.3-1. This schedule is based upon a nominal annual mill production rate of 3,800 tonnes U, supported by an approximate mine production rate of one million tonnes of ore per year. Up to one million tonnes of ore will be stockpiled at the beginning of mine life and a residual pile of not less than 200,000 tonnes will be stockpiled throughout most of the mine life. The maximum total movement/extraction considered to develop the proposed production schedule is 90,000 tonnes per day based on operability and equipment fleet. To account for severe weather conditions and associated delays, the average number of operating days per year for open pit mining is conservatively assumed to be less than 310 (approximately 85% of total days). This schedule will be reviewed and further optimized at the time of licensing application.



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Data Sources: *Areva Resources Canada Inc.*

FIGURE 5.3-1
OVERALL PROJECT MINE SCHEDULE

ENVIRONMENTAL IMPACT STATEMENT
VOLUME 2

Kiggavik Project

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Table 5.3-1 Preliminary Production Schedule

		1 YR	2 YR	3 YR	4 YR	5 YR	6 YR	7 YR	8 YR	9 YR	10 YR	11 YR	12 YR	13 YR	14 YR	15 YR
EAST ZONE																
Ore bcm's	34,850		34,850													
Ore Kt	84		84													
Grade U%	0.258%		0.258%													
Metal TU	216		216													
Waste Kt	6,665		6,665													
Special Waste bcm	58,295		58,295													
Waste rock bcm	2,000,250		2,000,250													
Overburden bcm	592,055		592,055													
Total bcm's	2,685,451		2,685,451													
CENTRE ZONE																
Ore bcm's	356,852		356,852													
Ore Kt	824		824													
Grade U%	0.476%		0.476%													
Metal TU	3,925		3,925													
Waste Kt	16,044		16,044													
Special Waste bcm	120,864		120,864													
Waste rock bcm	4,564,140		4,564,140													
Overburden bcm	1,811,612		1,811,612													
Total bcm's	6,853,468		6,853,468													
MAIN ZONE																
Ore bcm's	1,190,333		2,070	168,070	175,263	485,673	359,257									
Ore Kt	2,750		5	388	405	1,122	830									
Grade U%	0.421%			0.512%	0.681%	0.350%	0.346%									
Metal TU	11,566		14	1,989	2,757	3,932	2,875									
Waste Kt	69,481		3,917	23,372	10,315	22,646	9,231									
Special Waste bcm	266,782		272	807	13,206	142,417	110,080									
Waste rock bcm	21,282,018		0	8,081,308	1,610,453	8,265,521	3,324,735									
Overburden bcm	6,001,693		2,061,419	815,940	3,124,334	0	0									
Total bcm's	28,740,826		2,063,761	9,066,125	4,923,257	8,893,611	3,794,072									
Purpose built-pit																
Total bcm's	349,058	349,058	0	0	0	0	0	0	0	0	0					
TOTAL Kiggavik																
Ore bcm's	1,582,035		393,773	168,070	175,263	485,673	359,257									
Ore Kt	3,658		913	388	405	1,122	830									
Grade U%	0.429%		0.455%	0.512%	0.681%	0.350%	0.346%									
Metal TU	15,707		4,155	1,989	2,757	3,932	2,875									
Waste Kt	93,133	942	26,627	23,372	10,315	22,646	9,231									
Special Waste bcm	445,941		179,431	807	13,206	142,417	110,080									
Waste rock bcm	28,195,467	349,058	6,564,390	8,081,308	1,610,453	8,265,521	3,324,735									
Overburden bcm	8,405,361		4,465,086	815,940	3,124,334	0	0									
Total bcm's	38,628,803	349,058	11,602,680	9,066,125	4,923,257	8,893,611	3,794,072									
ANDREW LAKE																
Ore bcm's	1,560,199				0	0	57,051	209,640	142,383	291,651	205,244	63,208	121,378	227,223	242,421	
Ore Kt	3,666				0	0	134	493	335	685	482	149	285	534	570	
Grade U%	0.503%						0.512%	0.655%	0.655%	0.543%	0.640%	0.345%	0.271%	0.332%	0.436%	
Metal TU	18,458				0	0	686	3,229	2,191	3,722	3,087	513	774	1,772	2,485	
Waste Kt	96,738			3,780	16,820	3,772	17,345	27,047	8,305	5,435	5,638	2,911	2,775	2,526	383	
Special Waste bcm	510,483				0	0	51,487	48,787	1,278	70,609	47,723	54,501	48,130	123,383	64,585	
Waste rock bcm	33,088,008			81,854	6,229,695	1,397,113	5,401,037	9,975,073	3,074,963	1,951,366	2,046,492	1,030,883	985,799	828,176	85,558	
Overburden bcm	3,263,292			1,873,195	0	0	1,390,096	0	0	0	0	0	0	0	0	
Total bcm's	38,421,981			1,955,049	6,229,695	1,397,113	6,899,671	10,233,500	3,218,623	2,313,626	2,299,459	1,148,592	1,155,307	1,178,782	392,565	
Total OPEN PIT																
Ore Kt	7,324		913	388	405	1,122	964	493	335	685	482	149	285	534	570	
Grade U%	0.466%		0.455%	0.512%	0.681%	0.350%	0.369%	0.655%	0.655%	0.543%	0.640%	0.345%	0.271%	0.332%	0.436%	
Metal TU	34,166		4,155	1,989	2,757	3,932	3,561	3,229	2,191	3,722	3,087	513	774	1,772	2,485	
Waste Kt	188,928	942	26,627	27,152	27,135	26,418	26,576	27,047	8,305	5,435	5,638	2,911	2,775	2,526	383	
Total bcm's	77,050,784	349,058	11,602,680	11,021,174	11,152,952	10,290,724	10,693,743	10,233,500	3,218,623	2,313,626	2,299,459	1,148,592	1,155,307	1,178,782	392,565	-
END GRID																
Ore Kt	2,713					1	2	124	247	357	366	375	355	380	358	148
Grade U%	0.312%					0.192%	0.331%	0.307%	0.299%	0.300%	0.303%	0.330%	0.318%	0.317%	0.316%	0.302%
Metal TU	8,459					1	8	381	737	1,070	1,109	1,240	1,130	1,205	1,131	447
Special Waste kt	148			0	0	1	10	33	23	22	20	27	13	0		
Waste Rock kt	688			16	95	149	184	65	30	37	39	35	39	0		
Total bcm's	1,447,315			5,856	35,153	55,725	73,057	89,290	123,534	171,720	175,491	180,414	167,927	158,407	149,024	61,717
Total O/P and U/G																
Ore Kt	10,038		913	388	405	1,122	966	617	581	1,043	849	524	640	914	927	148
Grade U%	0.425%		0.455%	0.512%	0.681%	0.350%	0.369%	0.585%	0.504%	0.460%	0.494%	0.335%	0.297%	0.326%	0.390%	0.302%
Metal TU	42,625		4,155	1,989	2,757	3,933	3,569	3,610	2,928	4,792	4,196	1,753	1,904	2,977	3,616	447
Mined Ore Accumulated	10,038		913	1,301	1,706	2,828	3,795	4,411	4,993	6,035	6,884	7,408	8,048	8,962	9,889	10,038
Milling																
Mill Feed Ore Kt	**10,038**		71	750	687	946	963	718	655	792	664	754	977	747	946	368
Grade U%	**0.425%**		0.471%	0.454%	0.521%	0.367%	0.352%	0.501%	0.540%	0.446%	0.499%	0.445%	0.269%	0.322%	0.377%	0.278%
Metal Produced TU	**41,133**		333	3,404	3,583	3,474	3,395	3,594	3,536	3,533	3,309	3,357	2,627	2,403	3,562	1,023
Stockpile (ore Kt)			842	481	198	375	377	276	203	454	638	408	72	239	220	0

5.4 Kiggavik Site

5.4.1 Local Geology

The geology of the Kiggavik deposits has been studied since the 1970s. Drilling and ore sampling activities conducted since 2007 have essentially confirmed the local geological conditions and previous interpretations in terms of distribution of grade and lithology. The current section summarizes local geology; a more detailed account is included in Technical Appendix 5B (Geology and Hydrogeology Baseline).

The Main Zone, Centre Zone and East Zone deposits are located between two regional ancient fault zones. The Thelon fault is located to the north, while the Sissons fault is located to the south. The Main and Center zones are located 600 m apart and follow the same 65 degrees east-northeast trending shear zone. The East Zone is located approximately 500 m further to the east of Center Zone.

From Robinson et al. (2014), the overburden in the Kiggavik area varies from outcrop exposure to a depth of 68 m. The average depth recognized by drilling activity (846 hole locations) is 10.5 m. Active seasonal permafrost activity occurs between 15-200 cm depending on the drainage conditions and sediments within the overburden. The organic layer in the tundra is very limited to 1-2 mm in thickness on top of the overburden and would be generated by general tundra vegetation consisting of grasses, shrubs, northern plants and lichens.

The overburden is classified as glacial tills deposited by multiple glacial events, up to four (4) major glacial trends have been noted in the Kiggavik area. The till itself in the region varies in colour from a light grey to reddish brown and is composed of a sillty sand matrix containing on average 57% sand, 40% silt and 2.5% clay. An average of 0.4% of total carbon has also been determined. Rock clasts identified within the tills are sourced locally within the framework of the Kiggavik geology sequences.

Basement host rocks are composed of metasediments, and to a lesser extent altered granite and intrusive rocks. Metasediments are sedimentary rocks that have been metamorphosed (altered by heat, pressure or chemically active fluids). Intrusive rocks are igneous rocks that intrude into rocks, along some pre-existing structure. Uranium mineralization in the Kiggavik area is hosted for the most part in altered metasedimentary rocks (mainly meta-arkose, metapelites and sericite schist), and to a much lesser extent in altered granite and intrusive rocks. There is no mineralization hosted in the Mackenzie diabase intrusion which cuts through the Kiggavik property.

In general the mineralization is finely disseminated along foliation planes and/or in veinlets parallel to the foliation, but can also be found as fracture infill and coating along cross-cutting structures. The two major uranium minerals are pitchblende and coffinite. Secondary uranium minerals are not common. Fine-grained uranophane occurs in weathered rocks outcropping at surface but also occasionally at greater depth. Pitchblende and coffinite are often associated with marcasite and pyrite. Other sulphides or accessory metals are present only in minor amounts, indicating the single elemental composition characteristic of the Kiggavik ore zones. The uranium mineralization is associated with an intensive alteration halo. The alteration is characterized by desilification and by the conversion of feldspar and mica to clay minerals consisting mainly of illite and sericite which is somewhat typical of unconformity type deposits.

5.4.2 Mine Development

Of the alternatives examined, the open pit mining method has been chosen to mine the Kiggavik deposits for the following reasons:

- the mineralization is relatively close to surface such that open pit mining methods are economically favourable;
- open pit mining is a proven and reliable mining method and provides enhanced opportunities for local employment of equipment operators;
- potential radiation exposure to workers can be minimized due to natural ventilation and increased working distances from the ore in the open pit mining method versus conventional underground methods;
- water inflows are more easily controlled and can be readily isolated to prevent radon exposure to workers; and
- AREVA has extensive experience operating open pit mines with a number of deposits successfully mined at the McClean Lake Operation in northern Saskatchewan (JEB, Sue C, Sue A, Sue B, Sue E).

The proposed Kiggavik site includes three deposits: East Zone, Center Zone and Main Zone. The proposed mine plan at the Kiggavik site is to:

- excavate East Zone and stockpile the ore until completion of the open pit. Once this initial zone has been mined out, the pit will be converted into an in-pit tailings management facility (TMF).
- excavate Center Zone and process the East and Center ore; the tailings produced will be disposed of in East Zone TMF. Once Centre Zone has been mined out, the pit will be converted to a second TMF.
- excavate Main Zone East and process the ore; the tailings produced will be disposed of in Center TMF. Once Main Zone East has been mined out, the pit will be converted to a third TMF to accommodate some of the tailings produced from the processing of Main Zone West.

- Pushback Main Zone West and process the ore; the tailings produced will be disposed of in Center TMF and/or Main Zone East TMF. Once Main Zone has been completely mined out, the pit will be converted into a larger TMF to accommodate tailings from the Andrew Lake, End Grid and other potential deposits.

In addition to the mineralized zones described in the preceding section, a purpose-built-pit (PBP) will be mined to provide construction materials and to act as a reservoir for plant process water. This facility will be excavated and developed prior to the start of mining in East Zone and Centre Zone.

5.4.2.1 ***Mine Design***

The design for the Kiggavik pits draws upon operational experience gained during the mining of the open pit mines at the McClean Lake Operation and from recent mining projects in sub-arctic conditions in Nunavut and the Northwest Territories.

The open pit designs are based on geological models of the deposits complete with an associated mineral inventory. This information combined with all the relevant economic factors, site topography, slope stability analysis, and pertinent government regulations relating to the design of open pit mines, were used in an open pit economic evaluation software package to form the basis of the proposed pit designs.

The three Kiggavik open pits, which will be converted into TMFs, will be excavated in what has been generally classified as competent to very competent rock, which exhibit brittle rock characteristics. The othoquartzites and the granitic intrusive in particular are very strong rocks. The metasediments are not of the same strength, but are still very competent with respect to providing a stable wall for an open pit. The only low strength materials within the ultimate pits are the altered rocks associated with the mineralization and thus these will generally be removed as ore. It should be noted that all rock strength testing was conducted on thawed core. The strength characteristics of rock types tested are unlikely to differ significantly in a frozen state due to very low content/void ratios. The altered rocks such as the ore zone materials have a relatively higher void ratio which implies that they are likely to be significantly stronger in a frozen state than in an unfrozen condition. The potential reduction in strength with thawing may contribute to unravelling of the rock on the slope face, which would be exacerbated in the blocky rock conditions associated with high alterations.

The stability of slopes excavated under these conditions will therefore be primarily controlled by the orientations, spacing, persistence and strength of the discontinuities that exist within the rock mass.

Interpretations of outcrop mapping and oriented core data suggest that the major controlling structural systems in the vicinity of the open pits are very consistent. A stereographic study of the kinematics of failure was conducted for a range of proposed slope orientations to identify discontinuities oriented such that they could give rise to slope failure. The kinematics of failure study showed that the most likely potential modes of failure are planes and wedges. Information on horizontal and sub-vertical joint spacing suggests that block shapes with potential toppling are not likely. Rather, blocks will occur, and ravel rather than topple. This type of failure is likely to be confined to near surface, bench scale instability in some walls of the pits. The potential for small scale wedge and planar type failures has also been identified but is again likely to be confined to bench scale. The conclusion of the kinematic study is that slopes of 50° to 55° could be mined however the requirement for safety berms to contain bench scale failure will ultimately determine the inter-ramp slope geometry.

The open pit final walls will be benched in a stepped profile, with bench faces and catch berms to control and contain potential local failures, with overall slopes of between 42° and 51°. The open pits will be accessed by 25 m wide ramps to allow for two-way truck traffic with a safety berm on the pit crest side and a water collection ditch on the pit wall side.

In the formulation of the slope configurations, a series of mine design guidelines were used on the basis of standard practices and the *Nunavut Mine Health and Safety Regulations* (2009). The current pit parameters are summarized in Table 5.4-1. The current mine designs will be further optimized and a review of the pit design will be required at the time of licensing application and after final equipment selection.

Table 5.4-1 Slope Design Parameters used for the Open Pits

Pit	East Zone	Center Zone	Main Zone	Andrew Lake
Bench Face Angle (BFA)	75°	75°	75°	70° – 75°
Inter Ramp Angle (IRA)	49.6°	49.6° – 52.5°	49.6° – 54°	44° – 47°
Overall Slope Angle (OSA)	42°	49.5°	51°	40° – 45°
Catch berm	12 m-14 m	12 m-14 m	11 m-1 4 m	8 m
Bench height*	24 m	24 m	24 m	12 m
Pit surface Area	8 ha	15 ha	39.2 ha	44 ha
Mine Rim Dimensions				
North-to-South	308 m	425 m	600 m	790 m
East-to-West	326 m	445 m	840 m	715 m
NOTES: * working bench height is 12 m, with double bench configuration for slope design				

Additional design criteria for the open pits is available in Tier 3, Technical Appendix 2V, Mine Geotechnical Reports.

Concerns related to wildlife interaction with open pit mining activities have been noted during public engagement sessions, specifically relating to the potential for caribou to fall into the pit (EN-AR RLC Feb 2009[81], EN-RI HTO Nov 2013[82]). AREVA does not anticipate wildlife are at risk of falling into the open pit mines. Berms are constructed around the pits primarily as safety precautions, and also act as deterrents to animals. If an incident occurs or is likely to occur, measures to prevent harm to wildlife will be taken. For further information regarding the interaction between open pits and caribou see Terrestrial Environment (Tier 2, Volume 6, Section 13).

5.4.2.2 ***Mining Fleet***

The proposed open pits at the Kiggavik site will be mined using conventional drilling and blasting techniques, with ore and mine rock removal using mechanical excavators and trucks. Mine rock will be excavated using hydraulic shovels that will load a fleet of 150 ton class off-highway mining trucks. Ore will primarily be loaded with a backhoe for ore selectivity purposes.

Blastholes will be drilled using a fleet of drills capable of drilling 140 mm to 270 mm diameter holes. These drills will be allocated to the various pits as required by the mining schedule.

Dozers will service the mine rock stockpiles, clean-up around loading equipment and perform berm clean-up as required. Also during winter and spring freshet, considerable road and ramp maintenance is anticipated. Wheel loaders will be available for general site duty, stockpile re-handling, loading Sissons haul trucks and backup to primary loading equipment. Other mining equipment will include graders, water trucks, fuel/lubrication/service trucks, explosives transport and mixing truck and pick-up trucks.

Mine rock materials mined at all stages of pit development will be sampled and monitored, to ensure the materials are properly classified and separated for transport to the appropriate stockpile area. Mine rock and overburden will be loaded, using hydraulic shovels, into haul trucks. Type 1 and Type 2 mine rock (Section 6) will be hauled to designated piles adjacent to each pit.

Ore material will be radiometrically scanned and weighed using an overhead truck scanner and scale located near the pit entrance. The overhead scanner is used to assign the truck destinations, based on uranium grade. Ore will be assigned to an ore stockpile.

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[81] EN-AR RLC Feb 2009: *What will you do to keep the caribou and other wildlife out of the pit?*

[82] EN-RI HTO Nov 2013: *What do you do to keep the caribou from falling in the pits?*

5.4.2.3 *Mining Fleet Maintenance*

The mining fleet at the Kiggavik site will be maintained in a shop facility located near the open pits and situated within the area of the site set aside for surface facilities. The Kiggavik mobile fleet maintenance shop will be an enclosed structure that will house the shops, warehouse and offices for the maintenance crews and staff.

The proposed maintenance shop building will contain facilities that will include large equipment service drive-through bays that will accommodate the haul trucks. The shop-bay area will include wash bays, lube bays, tire repair bays and high repair bays. Wastewater will be collected in local holding tanks for treatment at the Kiggavik water treatment plant (WTP). Overhead cranes will be included. The building will also contain smaller service bays to service the support fleet of tracked dozers and motor graders as well as welding, electrical and mechanical maintenance. A light vehicle maintenance bay and an instrumentation shop will also be part of the shop building.

In addition to the shop facilities, the maintenance building will contain offices, meeting rooms, and interior warehouse space for parts and small material storage and an outside storage area. Adequate clearance around the shop building will be required for both storage and for drive-through traffic in the high-bay section of the building.

5.4.2.4 *Blasting and Explosives*

Mining involves drilling large diameter holes (blast holes) and loading these holes with an explosive to blast the material into sizes that can be handled. The depth of these blast holes is determined by the bench height. Blasted materials are then loaded into trucks using a hydraulic shovel, loader, or backhoe, and hauled to an appropriate stockpile. The blasting practices at the Kiggavik site will change as the mine ramps up and test blasting will be required to optimize loads, burdens, powder factors and delay sequencing of the holes. At the beginning of the operation, it is anticipated that the mined rock will be blasted using a bulk form of Emulsion and Ammonium Nitrate (AN) mixture (70% Emulsion to 30% ANFO). A bulk explosive truck will mix the appropriate blend of emulsion and AN prill and transfer this product to the pit for loading of blast holes. A powder factor of 0.66 kg/bcm (0.25 kg/t) has been used for design purposes. Blasts are typically envisioned to be 200,000 to 300,000 tonnes each and will occur approximately two or three times per week.

The potential for wet holes at the Kiggavik site is considered to be relatively low due to the land-based nature of the pits and the presence of permafrost. However, it is anticipated that during run-off events, or the drilling of material with high ice content, a water resistant emulsion/AN blend will be required. Typically the explosive delivered to the blast hole will be a 70% emulsion 30% ANFO blend. Blasting operations in the pit will be simplified by using one primary explosive product and one optimized drill pattern in both dry and wet hole conditions. The percentage of wet holes encountered during the first year of operations will be used as an indicator for determining the most suitable method to manage wet holes in subsequent years. This could include using 100% emulsion product to simplify the blasting procedure. Emulsion materials will be stored at the emulsion plant.

Explosive components will be shipped to the Kiggavik site and the Emulsion/ANFO blend will be mixed at site. Bulk storage facilities for emulsion and ammonium nitrate products will be constructed at the Kiggavik main site. The explosive supplier will be responsible for designing and constructing the on-site emulsion manufacturing facility. Detonators, primers, pre-split packaged explosives and miscellaneous blasting products will be shipped to site and stored in the Kiggavik magazines. It is expected that four 4 m by 11 m magazines will be required for the following: two magazines for pre-split and miscellaneous explosives; one for primers and detonating cords; and, one for detonators.

Concerns have been noted by the public about the storage of explosives (EN-AR NIRB May 2010[83],EN-BL NIRB April 2010[84]).Figure 4.4-1 shows the proposed location of the ammonium nitrate storage area and emulsion plant. The powder magazine will be located on the same road 100 m beyond the detonator magazine. The roadway will be approximately 5 m wide, , allowing only one-way traffic. It is estimated that the facility will contain a 40,000 kg capacity explosives magazine (presplit powder and miscellaneous cartridge powder, primers and detonating cord), a magazine for blasting accessories (detonators, wire, etc.), bulk storage silos and a garage to house explosives delivery vehicles. The access road leading to this area will be located within the Kiggavik surface lease and access to the storage area will be controlled. The explosives truck wash will be located at the emulsion plant. Water from the truck wash will be collected in a sump, pumped out as required and trucked to the water treatment facility.

Regulations governing the storage of explosives require that powder and detonators are stored in independent magazines separated by a minimum distance based on the amount of powder being stored. For a powder magazine containing up to 40,000 kg, the minimum distance between magazines is 83 m provided there is an effective barricade between them. Regulations also require the explosives magazines to be a minimum distance away from the camp and mill site buildings, as well as from traveled roadways. For instance a powder magazine containing up to 40,000 kg must be a minimum of 760 m from the camp and mill buildings (i.e. buildings where people may assemble), and a minimum of 275 m from a very lightly travelled road (i.e. 20 to 500 vehicles per day).

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[83] EN-AR NIRB May 2010: *Concerns over the use of explosives and proper storage at the mine site*

[84] EN-BL NIRB April 2010: •*How will the blasting materials be stored? Will be have easy access to the blasting materials? Concerned over safety and storage of blasting materials.*

The explosives magazines will be comprised of a 2 m thick pad with surface areas of approximately 430 m^2 and 630 m^2 for the detonator and powder magazines, respectively. The explosives magazines will be designed to Type 4 magazine standards. There will be only one main magazine location for both the Kiggavik and Sissons sites. Explosives and accessories will be delivered to the pits by designated truck. Similarly, portal delivery to the underground mine will also be done by truck and temporary storage locations will be used as required.

Further details on drilling and blasting are included in Technical Appendix 2B (Drilling and Blasting and Related Regulatory Considerations).

5.4.2.5 *Slope Monitoring During Mining*

The ongoing development of the open pits will require an iterative observational approach. With this method, which is common practice in the mining industry, the initial pit excavations are monitored and the pit slope designs are modified on an ongoing basis throughout the life of the open pit. As mining exposes subsurface geology in the proposed open pits, it is expected that the wall and bench designs may be revised based on continued review, mapping and stability performance monitoring.

A pit slope monitoring program will be established early in the life of the pits. The monitoring program is intended to both confirm the assumptions made regarding the structural and geologic models and to detect unexpected conditions so that remedial measures can be adopted. This program will include both open pit mapping to confirm the engineering geology model upon which the designs are based, as well as monitoring to detect any movement in the slopes.

The program will be conducted largely by the mine geotechnical staff; with periodic reviews by an experienced rock slope design engineer. The monitoring program will include aspects relating to the following two components:

- Geologic Mapping – in order to confirm the geological model on which the current slope designs are based and assess the potential for slope modifications (flattening or steepening), routine geologic mapping will be carried out as the slopes are excavated; and,
- Slope Monitoring – regular visual inspections of the bench faces and the crest areas will be conducted for early evidence of slope instability. Occurrences of tension cracks behind the slope crest are indicators of movements and the beginning of instability in the slopes. Instrumentation will also be installed in and around the perimeter of each open pit to monitor slope movement as the excavation progresses.

Structural measurements will be collected over the full depth of the open pits.

5.4.2.6 ***Material Handling***

During the development of the open pit, the overburden and mine rock will be stripped to expose and extract the uranium bearing material called ore. Mining advances in ‘steps’, commonly referred to as mining benches. The mining bench height, or the height of the working face, will be up to 12 m high in waste; once the mineralized zone is reached, the bench height may be reduced to optimize recovery and to minimize dilution of ore by mine rock.

The majority of the material removed from the Kiggavik pits will be overburden material or mine rock material (granite and metasediments). Together, they constitute more than 95% of the overall volume of material to be removed from the Kiggavik pits. Overburden from the Kiggavik pits will be stockpiled and utilized during site decommissioning activities. Mine rock from all three open pits will be managed at the Kiggavik site according to the following three criteria (Section 6):

- Mine rock material deemed acceptable from the perspective of acid rock drainage and metal leaching (Type 1) will be used for construction.
- Mine rock not utilized for construction and deemed acceptable from the perspective of acid rock drainage and metal leaching (Type 2) will be permanently stockpiled at two locations to the north and to the south of the pits.
- Mine rock with a potential for acid rock drainage and metal leaching (Type 3) will be segregated and temporarily stored during operation in a stockpile adjacent to the Main Zone pit. Runoff and water percolating through the temporary pile will be collected using ditches and a holding pond, such that the water can be recycled for use in the mill and/or treated before release. During decommissioning of the site, all Type 3 mine rock from the Kiggavik pits will be hauled and disposed of within the Kiggavik Main Zone pit.

The average grade of ore from the Kiggavik deposits will be approximately 0.42% U. Monitoring efforts during mining aim to maximize the grade and recovery of all the mineable resources through radiometric probing, continuous supervision of the mining operation, and overhead scanning of trucks loaded with ore. Prior to the loading of the drilled blast holes with explosives probing will be completed using instruments that are calibrated and correlated with uranium grade. The probing results will be used to produce maps which outline the ore and waste zones and show the grade distribution for the mining bench. Separation of ore from waste and grade control will be achieved during mining by geological technicians. As well, all trucks loaded with mineralized material will be scanned by the overhead scanner which has the capacity to confirm classification of the load, based on uranium content, as Type 1, Type 2 or Type 3 mine rock, and low, medium or high grade ore material.

5.4.2.7 *Ore Stockpile*

Ore placed on the ore stockpile will be categorized by uranium grade using scanner results. The ore pad will be lined with a synthetic membrane and bermed for collection of drainage. All drainage will be collected and either treated or recycled for use in the mill. Management of drainage from the ore pad does not rely on permafrost encapsulation and it has been conservatively assumed that the pile will not freeze or otherwise store water; therefore potential climate change, including a predicted increase in temperature (Technical Appendix 5K), is not expected to affect stockpile management. Containment ponds and diversion ditches for runoff have been designed to handle probable maximum precipitation events. Any increase in average precipitation and runoff, as predicted by the climate change models presented in Technical Appendix 5K, will be within the design criteria used for the structures.

The design for the ore pad and pond at the Kiggavik site includes a double liner system with a leak detection system. Due to the permafrost foundation conditions, the liners will be constructed on a rockfill pad. The pad grading will be designed to drain into the sedimentation ponds.

During operation of the mill, all drainage from the ore stockpile will be recycled to the mill via the purpose-built pit for use as process water. Prior to mill commissioning, drainage will be treated in the site water treatment plant prior to discharge. The Kiggavik ore pad is sized to accommodate approximately one million tonnes of ore.

Additional details are included in the Ore Storage Management Plan (Technical Appendix 2H).

5.4.2.8 *Dust Management*

Concerns related to dust generation from mining activities have been noted during public engagement sessions.(EN-BL NIRB April 2010[85], EN-AR OH Nov 2010[86], EN-CI OH Nov 2010[87]). AREVA is committed to implementing dust mitigation and monitoring measures. Dust generation from the mines and ore pads will be monitored as outlined in Technical Appendix 4C. Operational practices, such as minimizing the amount of vehicle traffic in ore zones and ore stockpiles, will assist

[85] EN-BL NIRB April 2010: *Concerns over blasting and the dust from blasting (dust travels far over the land). What will be done for the uranium dust when blasting is occurring?*

[86] EN-AR OH Nov 2010: *How far will dust travel from the mine?*

[87] EN-CI OH Nov 2010: *What will happen to dust from mining?*

in reduction of dust. Proposed dust suppression, if required, consists of water spray; however, approved chemical dust suppressants may be applied if monitoring results indicate effects exceed modelling predictions as indicated in Technical Appendix 4C. Information regarding the evaluation of dust mitigation measures is included in Attachment A of Technical Appendix 2M..

as part of the Atmospheric Monitoring and Mitigation Plan. This will include monitoring of dust levels during all stages of the Project and mitigating measures to reduce the amount of dust from the mine, ore pad, and waste rock piles. Lessons learned gained from operation at other mine sites operating in Nunavut and in the Northwest Territories will be used to aid in the development of dust management strategies.

5.4.2.9 ***Mine Water Management***

The open pits proposed for the Kiggavik area will be excavated in competent low permeability bedrock and therefore significant issues relating to dewatering and groundwater quality and quantity management are not expected. Furthermore the mines will be excavated entirely (East Zone and Centre Zone) or partially (Main Zone) in permafrost, where the frozen ground conditions are expected to further reduce the permeability of the rock mass.

For the open pits snowmelt in early summer months is expected to be the dominant source of water inflow. Diversion ditches and berms will be used to direct surface runoff away from the open pits. In total some limited inflow of water into the pits may occur from the following sources of water flows:

- Pit wall – seepage from melting of permafrost, seepage from unfrozen zones
- Direct precipitation (rainfall and snowfall), drifting snow and un-diverted surface run-off
- Groundwater (sub-permafrost) inflow

The results of water balance and groundwater flow model simulations suggest that the groundwater flow component will be very limited (< 100 m^3/day). Snowmelt within the pits in early summer months will be the dominant source of water inflow to the pits. For Main Zone ultimate pit a peak rate of approximately 800 m^3/day is predicted in July. Inflow rates are much smaller for Centre Zone and East Zones pits. There is no groundwater inflow component for these open pits and the total inflows are predicted to be less than 500 m^3/day. Water that drains into the pits will be collected and pumped with submersible sump pumps. Staged pumping using an intermediate sump may be required in the deeper pits. The water will be pumped to the purpose-built pit for recycling or treatment prior to discharge.

Section 9 addresses water management at the Kiggavik site in more detail.

5.4.3 Purpose Built Pit

During the initial mine site development phases of the Project, a purpose built pit (PBP) will be excavated at the Kiggavik site. The PBP serves two project needs; it provides good quality aggregate for the construction of site infrastructure and it serves as a reservoir for mill water needs. The pit will be about 130 m long from east-to-west, about 160 m wide north-to-south and about 30 m deep. The total designed pit volume is approximately 350,000 m3.

The PBP is required to provide construction material (Type 1 mine rock) for site pads and for mine waste water storage during the initial construction of the Kiggavik site. The pit design was premised on a need for aggregate and water storage and not for ore production.

The PBP design will be further reviewed at the time of licensing application.

5.4.4 East Zone Open Pit

East Zone open pit has been scheduled and designed to accommodate the need for a tailings management facility (TMF) early in the Project. The open pit will be mined in a single phase. The open pit was designed to extract the East Zone ore and be large enough to ensure there was sufficient tailings capacity for the duration of the mill start up. The design is sized appropriately to accommodate the tailings generated while Center Zone open pit is being developed. Based on East Zone's proximity to the Center Zone deposit, the East Zone open pit was designed using similar geotechnical parameters as Center Zone.

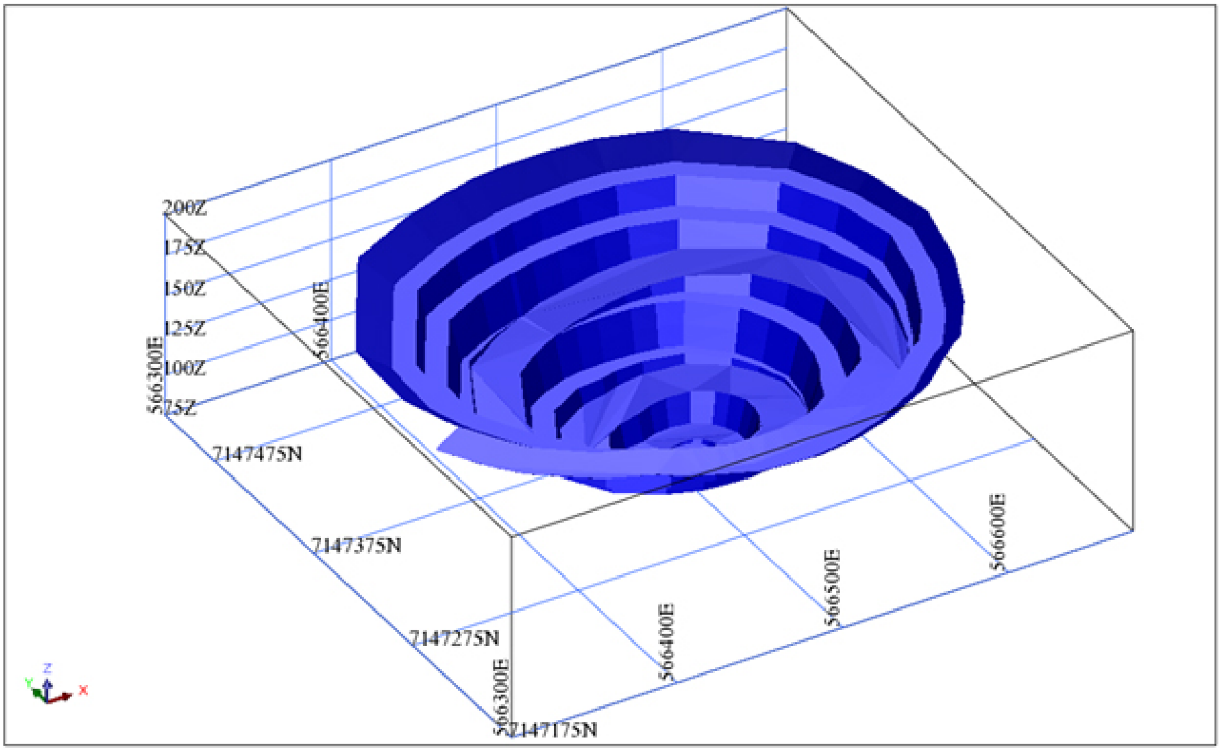
A bench height of 12 m and face angles of 75° were used in the East Zone open pit design. This corresponds to an inter-ramp angle of about 49.6° and overall final pit slopes of about 42°. In the overburden material the bench slope has been designed at 35°.

To enhance the stability of the slopes within the pit, safety berms will be constructed every second bench. These safety berms will be accessible from the haulage roads, provide catchment plateaus for possible falling material, allow access for potential scaling of pit walls, and will be cleared periodically to remove any fallen material, to the extent possible. The width of the safety berms will be 12 m.

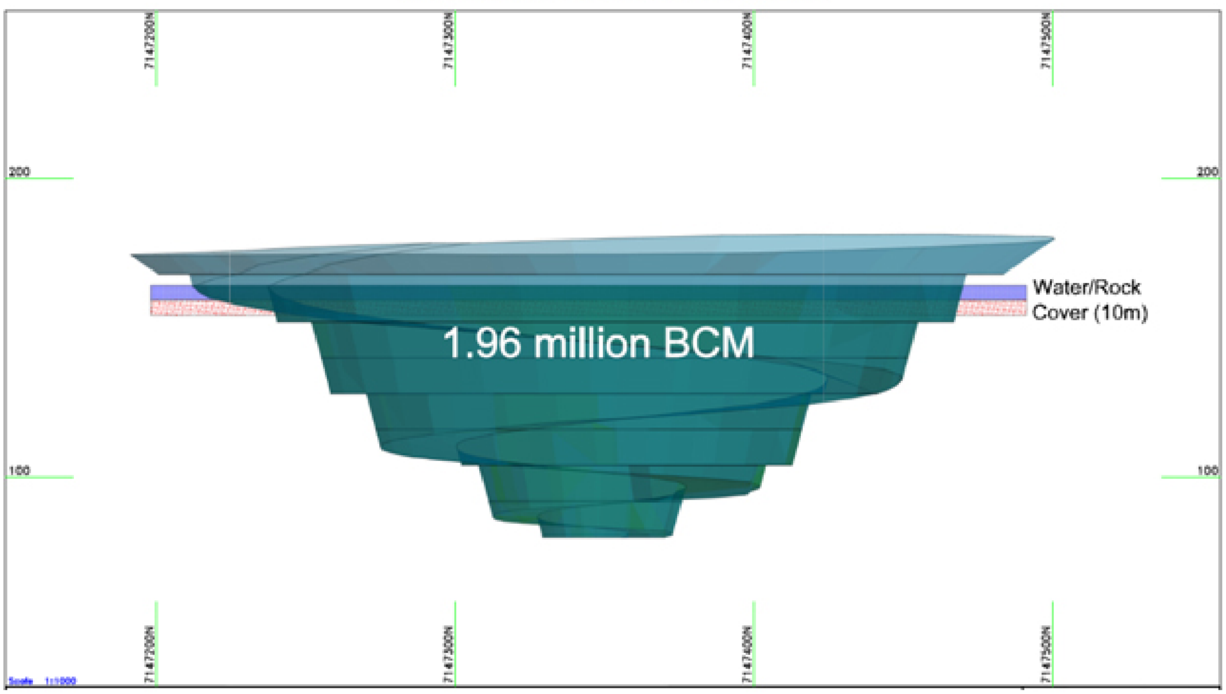
Access to the open pit will be provided by a truck haulage ramp. The 10% gradient ramp is designed to allow for two-way traffic from the pit entrance to the 92 m elevation and then single lane for the final bench. The ramp width was designed to allow two 150 ton trucks to pass each other safely without the need for turnouts. Haul road running surfaces will be graded on a regular basis to remove fallen rock and ensure runoff is directed towards the drainage ditches. Roads will be sanded, as needed, to ensure a safe non-sliding running surface.

5.4.4.1 ***East Zone Tailings Management Facility (TMF)***

Based on the proposed design, the East Zone TMF will have a footprint of approximately 8 ha and be 100 m deep. The dimensions across the open pit rim are approximately 308 m in the north-to-south direction and 326 m in the east-to-west direction. The total pit volume available for tailings will be approximately 1.96 Mm^3, as shown in Figure 5.4-1. This tailings containment volume accounts for leaving a 10 m water/rock cover to achieve the designed decommissioned state. The preliminary East Zone open pit design is based on conservative estimates which will be further reviewed at the time of licensing application.



East Pit Mine single stage pit design



Tailings Management Facility (TMF) in the East Zone pit

Projection: NAD 1983 UTM Zone 14N
Creator: CDC
Date: 09/01/2011 Scale:
File:
Data Sources: *AREVA Resources Canada Inc.*

FIGURE 5.4-1
EAST ZONE PIT AND TMF

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5.4.5 Centre Zone Open Pit

Center Zone open pit has also been scheduled and designed to accommodate the need for a tailings management facility (TMF). First, the optimum open pit from a mining perspective was determined and then the pit was expanded to achieve the required tailings management objectives.

5.4.5.1 *Optimum Open Pit Design*

A geotechnical study of the wall stability of the Centre Zone recommended working bench heights of 12 m with bench face angles of 75°. This corresponds to an inter-ramp angle varying from 49.6° to 52.5° and overall final open pit slopes of approximately 49.5°. The bench slope has been designed at 35° in the overburden material.

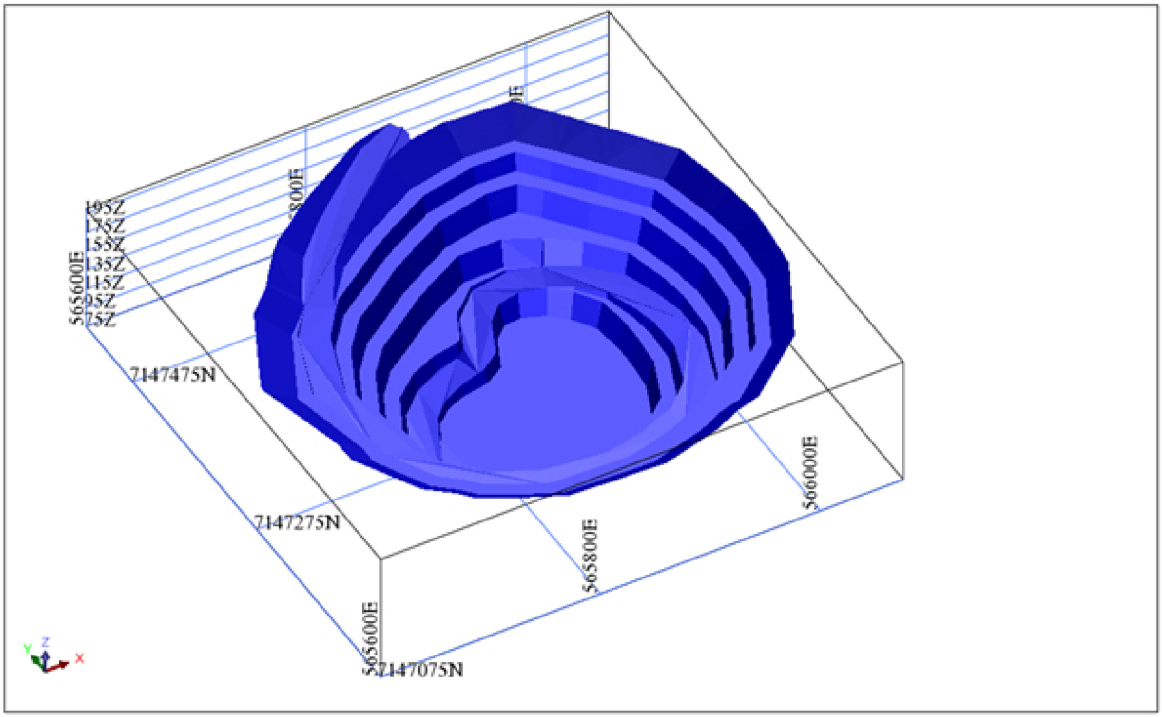
In order to enhance the stability of the pit wall slopes, safety berms will be constructed every second bench. These safety berms will be accessible from the haulage roads, provide catchment plateaus for possible falling material, allow potential access for scaling of pit walls, and be cleared periodically to remove any fallen material, to the extent possible. The width of the safety berms will be 12 to 14 m.

Access to the open pit will be provided by a two-way truck haulage ramp (10% gradient). Haul road running surfaces will be graded on a regular basis to remove fallen rock and ensure runoff is directed towards the drainage ditches.

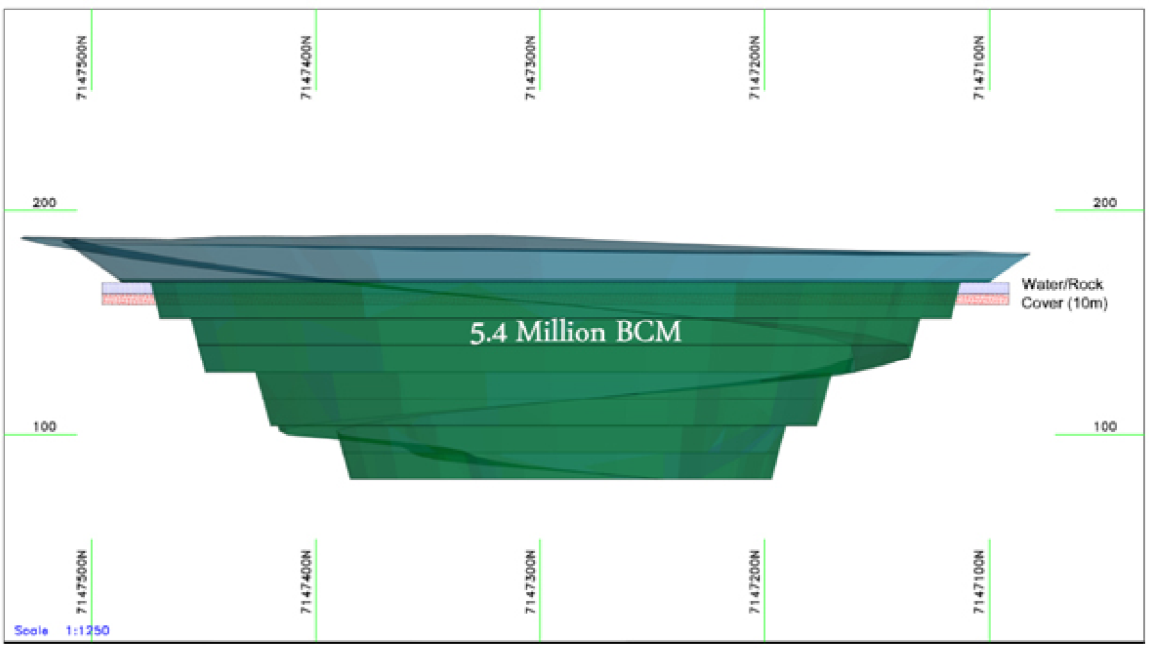
5.4.5.2 *Centre Zone TMF Design*

The Centre Zone TMF design will have a footprint of approximately 15 ha and be 110 m deep. The dimensions across the mine rim are approximately 425 m in a north-to-south direction and 445 m in an east-to-west direction. The total pit volume is about 7 Mm^3, while the available pit volume for tailings will be approximately 5.4 Mm^3, as shown in Figure 5.4-2. As with the East Zone TMF, a freeboard is provided in order to accommodate the water layer during operation and placement of the rock cover during decommissioning. The preliminary Centre Zone pit design is based on conservative estimates which will be further reviewed at the time of licensing application.

A small intermittent stream currently runs through the proposed location of the open pit. It is proposed that this intermittent stream be diverted to the east via the freshwater diversion structures (Section 9).



Center Zone Mine pit design



Tailings Management Facility (TMF) in the Centre Zone pit

Projection: NAD 1983 UTM Zone 14N
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Date: 09/01/2011 Scale:
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Data Sources: *AREVA Resources Canada Inc.*

FIGURE 5.4-2
CENTRE ZONE PIT AND TMF

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5.4.6 Main Zone Open Pit

5.4.6.1 *Extraction of Main Ore Lenses*

The plan for the Main Zone open pit is to mine it in two stages to ensure sufficient tailings storage capacity for the Kiggavik Project. The shallower eastern lens of Main Zone will be mined first. A final pushback will then mine the remaining material in the western lens. The final Main Zone open pit design forms a "figure-8" configuration, as shown in Figure 5.4-3.

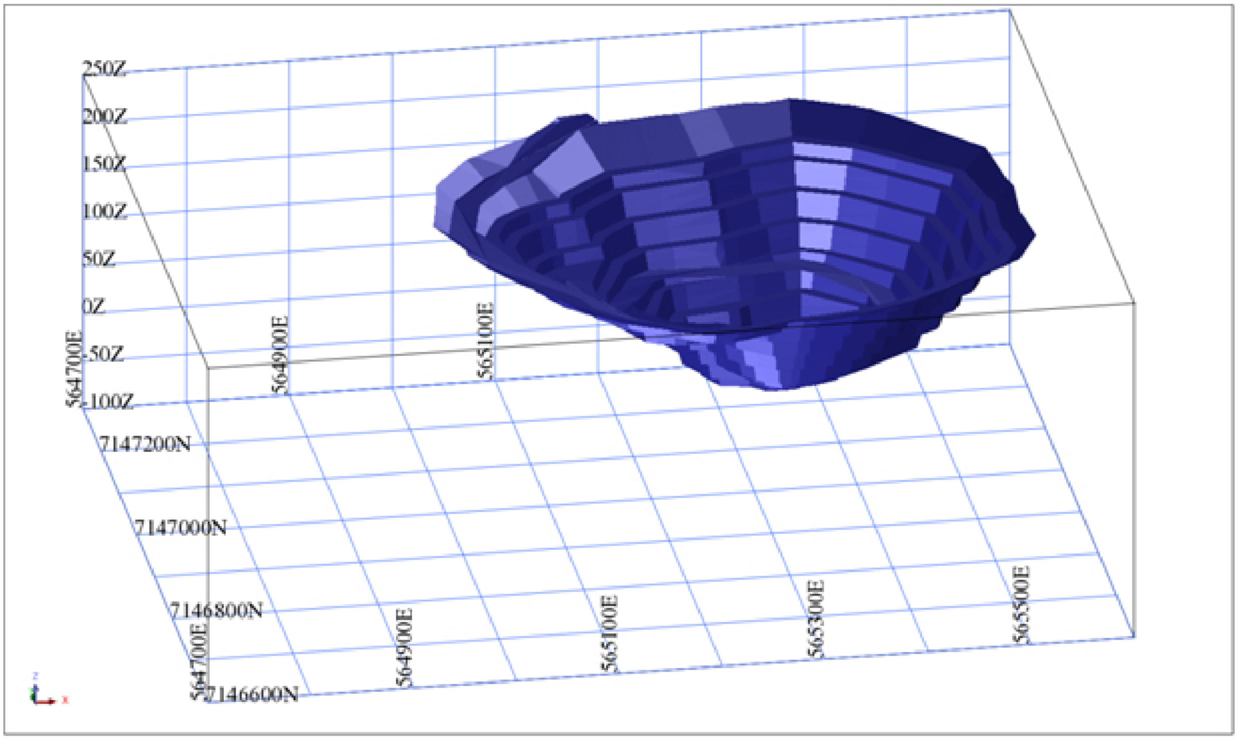
A geotechnical study of the Main Zone wall stability recommended working bench heights of 12 m with back slope (face) angles of 75°. This corresponds to an inter-ramp angle varying from 49.6° to 54° and overall final pit slopes of approximately 51°. In the overburden material the bench slope has been designed at 35°.

Bench and slope stability within the pit is also addressed with safety berms, which were designed on every second bench. These safety berms will be accessible from the haulage roads at regular bench height intervals, and provide catchment plateaus for possible falling material. The design allows for scaling the pit walls where practicable. The width of the safety berms will be a minimum of 11 m in the Main Zone pit.

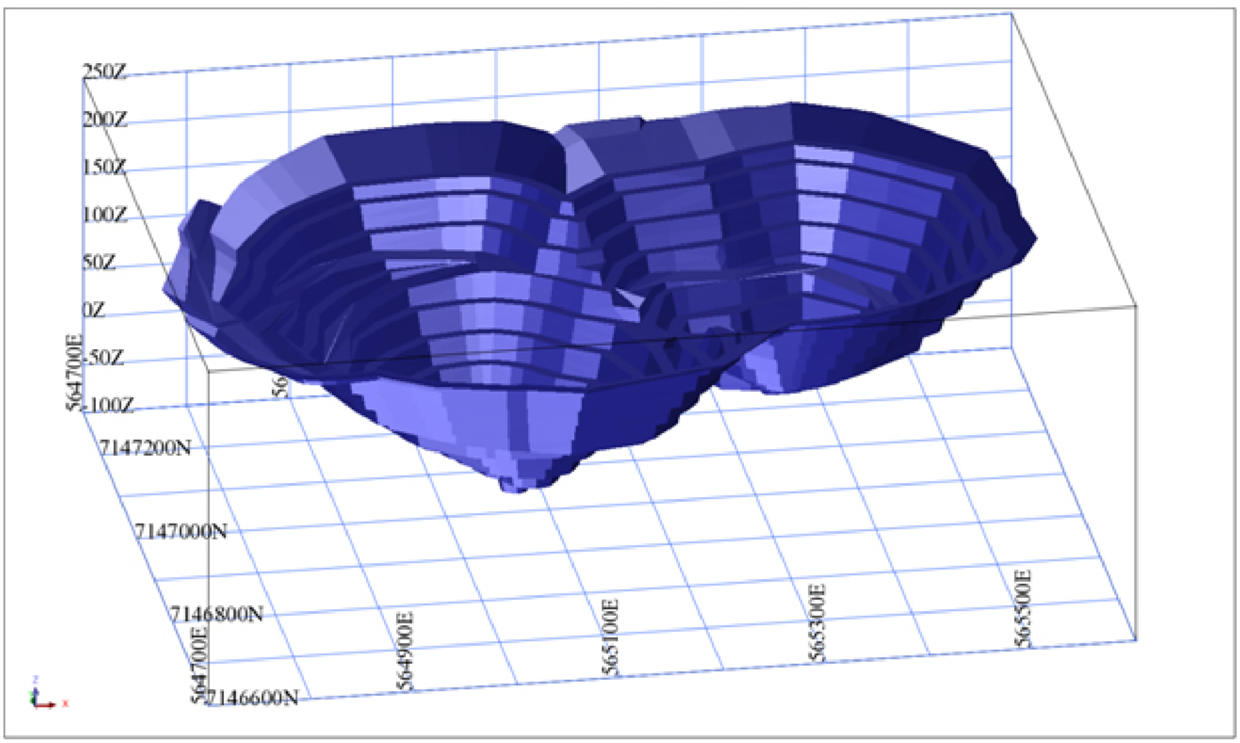
Access to the pit will be provided by a truck haulage ramp. The ramp is designed to allow for two-way traffic above the 10 m elevation with a maximum inside radius gradient of 10%. The ramp width was designed to allow two 150 ton trucks to pass each other safely without the need for turnouts. Below 10 m elevation the ramp is designed for single lane traffic. Haul road running surfaces will be graded on a regular basis to remove fallen rock and ensure runoff is directed towards the drainage ditches.

Based on the preliminary design, the proposed Main Zone open pit will have a footprint of approximately 39.2 ha and be 235 m deep. The dimensions across the mine rim are approximately 600 m in a north-to-south direction and 840 m in an east-to-west direction. The total pit volume will be approximately 30 Mm^3. The main zone design was done in two stages to allow excess tailings material to be backfilled into the shallow section of the pit. The staging of the pits allows for potentially 1.2 Mm^3 tailings to be placed in the Main Zone east pit, if necessary, while Main Zone west pit is being completed.

The preliminary Main Zone pit design is based on conservative estimates which will be further reviewed and optimized at the time of licensing application.



Main Zone East pit (Stage one).



Final stage of Main Zone pit

Projection: NAD 1983 UTM Zone 14N
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Date: 09/01/2011 Scale:
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Data Sources: *AREVA Resources Canada Inc.*

FIGURE 5.4-3
FINAL MAIN ZONE PIT DESIGN

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5.4.6.2 *Pit Floor Heave*

Pressure readings taken from vibrating wire piezometers installed in the proposed Main Zone open pit location indicate that groundwater is present at pressure under the zone of permafrost (Technical Appendix 5B). As the open pit is excavated, this groundwater pressure should remain relatively unchanged, while the rock load above the permafrost interface will be reduced. This may lead to pit floor heave in the Main Zone pit. If pit floor heave is experienced vertical pressure relief drains will be installed in the pit floor as the pit excavation progresses, with preference for a ring of drains on a geotechnical bench at a suitable elevation above the base of permafrost. These will depressurize the pit floor, and reduce the potential for heave. Water from the drain holes will be collected within the Main Zone open pit sumps and removed from the open pit as part of the water management program.

5.5 Sissons Site

5.5.1 Local Geology

5.5.1.1 *Andrew Lake*

The Andrew Lake deposit is located in metasediments overlying granitic gneiss (banded metamorphic rocks) and granodiorite (an igneous rock). These formations have been strongly metamorphosed and altered, tectonized, and intruded. The rocks have gently dipping foliation, small scale recumbent folding, and low angle thrusting. The Andrew Lake deposit is located on a major east-northeast structure. This region has seen several episodes of hydraulic brecciation, mainly within the granite and syenite rocks, and to a lesser extent in the metasediment units. The subvertical faulting associated with the Andrew Lake deposit governs the extension of the mineralization.

Three main mineralized lenses have been identified at the Andrew Lake deposit. These are associated with strongly altered metasediments, altered paragneiss (gneiss metamorphosed from a sedimentary parent), and less altered metasediments. The zones overlie each other, and are separated by a quartz breccia (a poorly sorted rock commonly containing rock fragments), and paragneiss. Mineralization within the Andrew Lake area occurs between 70 and 300 m below ground surface.

Abundant interspersions of syenite and lamprophyre intrusive units are common throughout the Andrew Lake deposit area. The entire deposit area is overlain by approximately 10 to 20 m of unconsolidated overburden material.

5.5.1.2 *End Grid*

The End Grid deposit is located in an east-northeast sequence of metasediments, which are intruded by granite, porphyries, syenites and lamprophyres. It is related to the same major structure as the Andrew Lake deposit, but with a northeasterly trend. The mineralization within the deposit is controlled by horst and graben structures created by subvertical faulting.

Two main mineralized pods (North Pod and South Pod) have been identified at the End Grid deposit. These are located in strongly altered metasediment that are tectonized, with steeply dipping tension faults and hydraulic breccias. Mineralization at the End Grid deposit occurs between 75 m and 475 m below ground surface.

The 2009 drilling program on the North Pod confirmed that a thick oxidised horizon is encountered from surface to 80-300 m below the surface. It is traditionally interpreted as a paleoweathering profile emplaced before the sub-Thelon formations deposit. The mineralization envelopes are limited upwards by this oxidised horizon, which is interpreted to postdate the hydraulic silica breccias and granitic veins.

The primary low grade mineralization is disseminated within the foliation and in association with microfractures. Several examples show an association of granitic to quartzic small intrusions with the mineralization. The global trend of the primary mineralization is ENE/WSW. This trend is parallel to a former quartz breccias trend. No direct relation between breccias and mineralization has been observed. The secondary medium to high grade mineralization is associated with a late tectonic event. NNW/SSE faults are formed and the ENE/WSW silica breccias trend is reactivated by brittle faults cutting across the primary mineralization and oxidising fluids have remobilized it. Fractures with pitchblende are encountered around the main deformation fault zone and in association with Redox fronts surrounding the late faults. Redox fronts and associated mineralization are also common along foliation and former ductile shear zones parallel to foliation.

More detailed information regarding the geology of the Andrew Lake and End Grid sites is included in Technical Appendix 5B (Geology and Hydrogeology Baseline).

5.5.2 Andrew Lake Open Pit

5.5.2.1 *Mine Design*

The Andrew Lake deposit extends to approximately 320 m below surface and therefore potential extraction methods include both open pit and underground techniques. The south-west portion of the proposed Andrew Lake pit is located under a shallow lake that requires dewatering prior to development. The dewatering is described in Section 5.5.2.6. Presently, surface mining at Andrew

Lake is considered to be more advantageous than underground mining in terms of reliability, costs, operating flexibility and radiation protection.

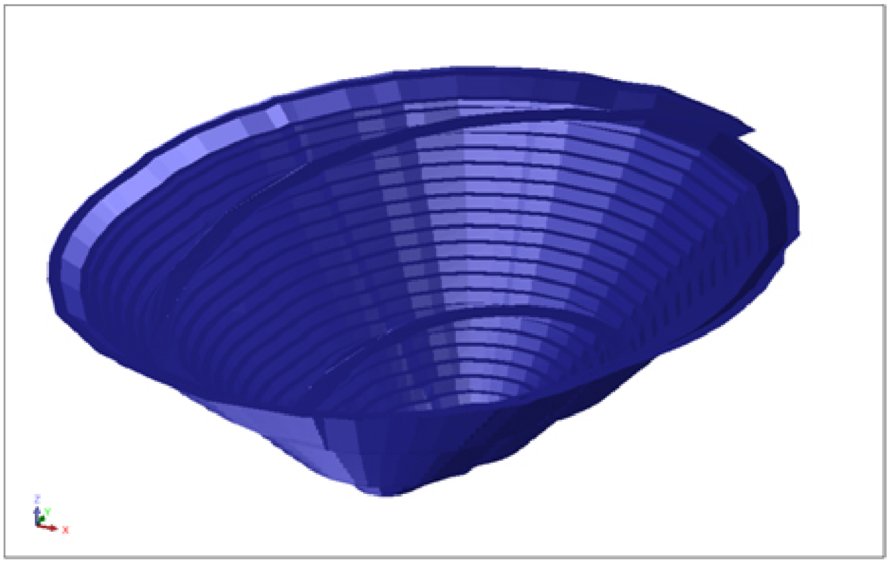
The Andrew Lake open pit design is based on a geological model of the deposit complete with an associated mineral inventory. This information combined with all the relevant economic factors, site topography, slope stability analysis, and pertinent government regulations relating to the design of open pit mines form the basis of the proposed pit design. The mine design process used for designing the Kiggavik pits was also used for Andrew Lake.

A geotechnical review of the pit slope stability was completed to confirm the pit design, which included additional field investigations and a laboratory program. A final review of the pit sequencing will be required prior to start of mining; any changes to this sequencing will remain within the current pit design consideration, and thus it is not anticipated to affect either the ultimate pit dimensions or the stability of the slopes significantly.

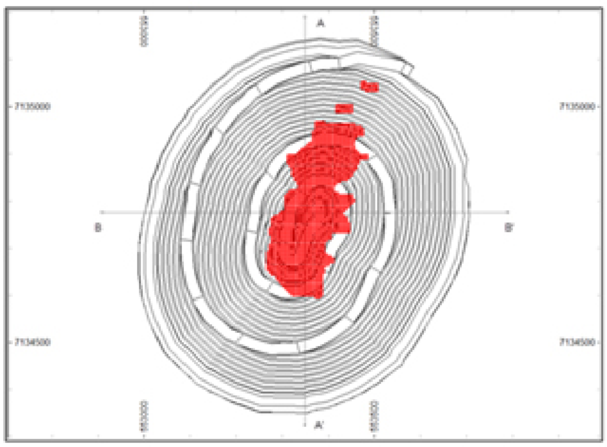
The proposed Andrew Lake final open pit is illustrated in Figure 5.5-1. The open pit will cover an area of about 44 ha on surface and is 275 m deep. The maximum dimensions at the pit rim are expected to be approximately 790 m north to south and 715 m east to west. Including overburden material, the pit has a total in-situ volume of approximately 38.4 Mm^3. The bottom of the Andrew Lake pit is expected to extend below the permafrost horizon, which is estimated to occur at 250 m below surface.

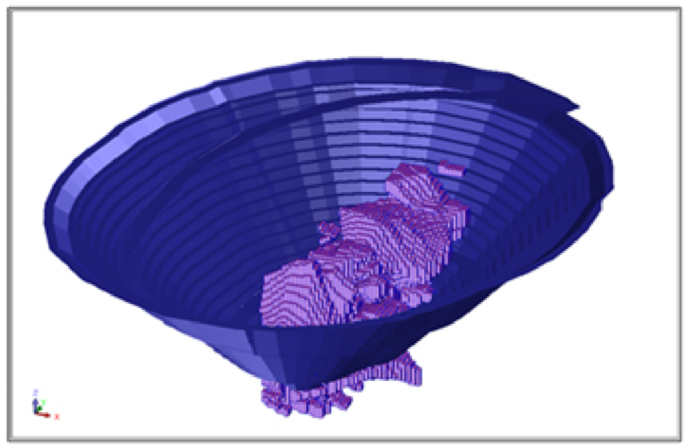
The design bench angle for the overburden located at the rim of the pit will be 35°. Bench face angles within the pit are expected to vary between 70° and 75° depending on rock type and geotechnical domains. An inter-ramp angle varying from 44° to 47° is considered. Safety or catchment berms will be constructed as the pit is continuously mined to depth by sequentially removing 12 m benches of rock. An 8 m berm will remain at the completion of each bench. The berms will enhance the overall pit slope stability by reducing the overall slope angle of the final wall.

An access ramp (truck haul road) will enter the pit perimeter from the north. The ramp gradient will be maintained at 10%, and designed 25 m wide to allow for the safe passage of two 150 ton capacity mining trucks without the need for turnouts. The ramp will provide access to the catchment berms at regular intervals. The overall slope angle for the Andrew Lake open pit design will range from 40° to 45°.The preliminary Andrew Lake open pit design is based on conservative assumptions which will be further reviewed at the time of licensing application.

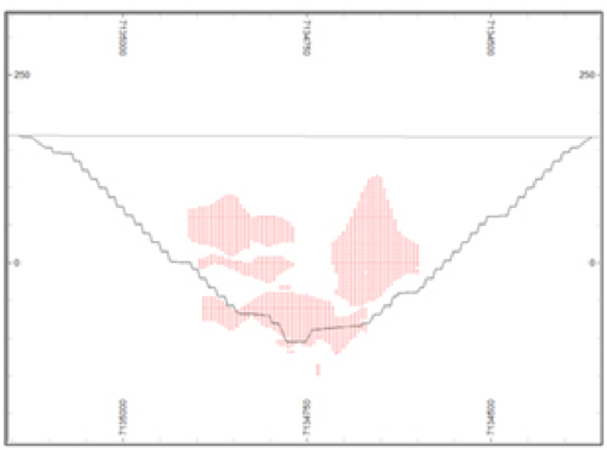


Andrew Lake - plan view

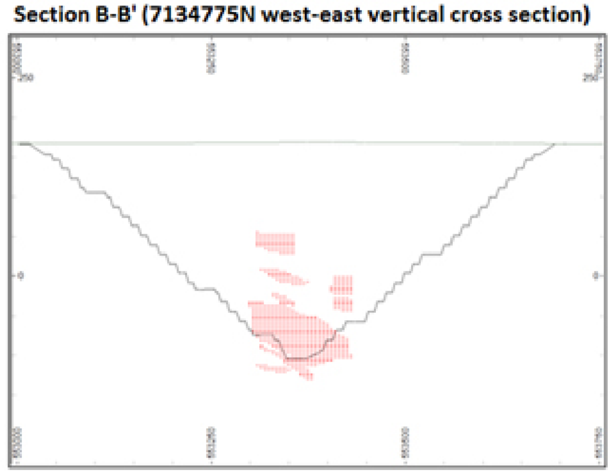




Section A-A' (553350E north-south vertical cross section)



Section B-B' (7134775N west-east vertical cross section)



Projection: NAD 1983 UTM Zone 14N
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FIGURE 5.5-1
ANDREW LAKE PIT

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5.5.2.2 *Mining Fleet*

The mining cycle and equipment used at the Andrew Lake pit will be similar to that proposed for the Kiggavik open pits (Section 5.4). The fleet used at the East, Centre and Main Zone pits will be progressively transferred to the Sissons site to mine at Andrew Lake.

The surface mining fleet at Sissons will be maintained at both the Sissons site and at Kiggavik. The Sissons maintenance buildings will be for small and light duty functions such as oil changes and small repairs. Major repairs will be completed at the Kiggavik facility. Equipment will either drive itself or be transported by heavy-duty low-bed trailer to Kiggavik.

The facility at Sissons will be a temporary building, approximately 560 m^2 in plan area that will house office and meeting space as well as a small warehouse to supply both the Andrew Lake and End Grid underground operations.

5.5.2.3 *Blasting and Explosive Management*

In general, the explosive management practices used at Andrew Lake are expected to be similar to that proposed for the Kiggavik open pits as discussed in Section 5.4. Since Sissons is 17 km away from the Kiggavik site, however, the blasting practices may require alteration as the mine ramps up and test blasting will be required to optimize loads, burdens, powder factors and sleep time of the loaded holes. Explosive products used at the Sissons site will be manufactured and stored at the Kiggavik site and trucked over for blasting operations.

To protect the aquatic environment, alternate blasting procedures will be used when blasting near Andrew Lake or aquatic environments. Blasting near Andrew Lake will occur during the frozen water period when Andrew Lake and the inflow and outflow streams do not support fish populations or during times of year when egg incubation is not occurring. Smaller charges will be used that do not produce, or is likely to produce, an instantaneous pressure charge (i.e. overpressure) greater than 50 kPa in the swimbladder of a fish.

5.5.2.4 *Material Handling*

All rock mined at all stages of the open pit development will be sampled and monitored, to ensure the materials are properly classified and separated for transport to the appropriate stockpile area.

Monitoring efforts during mining at Andrew Lake will be similar to that proposed for the Kiggavik open pits. Ore material will be radiometrically scanned and weighed using an overhead truck scanner and scale located near the Andrew Lake open pit. The scanner will identify and assign ore to the transfer pad. On an intermittent basis, the ore will be subsequently re-scanned and hauled to the Kiggavik ore pad prior to processing through the mill. Section 10.5.1 addresses the Kiggavik-Sissons access road between the Kiggavik site and the Sissons site in more detail.

Haulage roads will be maintained to ensure safe hauling conditions and to minimize road dust generation. A mobile water truck will be used to distribute water on haulage road surfaces as required in dry road surface conditions.

5.5.2.5 *Ore Transfer Stockpile*

The movement of materials from the Sissons site to the Kiggavik site will necessitate a well developed transfer pad. The transfer pad will also make it possible to better classify mined ore in terms of uranium grade to achieve a consistent mill feed grade. The Sissons transfer pad will be built with a synthetic liner to prevent migration of potential constituents of concern to the environment. Typically the synthetic liner will be covered with a prepared soil layer and woven geotextile and surfaced with a coarse granular material to protect the liner from vehicular traffic while dumping. It is proposed to construct the transfer pad near the Andrew Lake open pit. The transfer pad will be surrounded by a perimeter ditches and berms designed to contain any water reporting to the pad. All water collected in the perimeter ditch will be directed towards nearby collection ponds and treated before release to the environment. Both the pad, berms and ditches will meet existing Construction Guidelines for Pollution Control Facilities at Uranium Mining and Milling Operations (SERM, 2000).

An additional ore stockpile may also be located near the End Grid mine decline. Material temporarily placed here from underground would be transferred intermittently to the main Sissons ore pad. Design of the End Grid ore pad will be as described for the Sissons transfer ore pad.

5.5.2.6 *Surface Dewatering*

At the Sissons site, the south west portion of the Andrew Lake open pit extends into Andrew Lake and a structure is required to allow this end of the lake to be dewatered for the proposed pit development. Andrew Lake will be re-filled with water upon decommissioning of the Andrew Lake pit at a rate that will minimize effects to water quality.

Although Andrew Lake is a shallow lake, with an average depth of less than 1 m, aquatics studies have indicated that small fish frequent the lake and, therefore, the dyked area will be fished-out prior to dewatering. The fish-out will be done in consultation with the local communities and regulators. Approximately 135,000 m^2 of lake area, or approximately 30,000 m^3 of volume, will need to be dewatered to provide adequate buffer between the pit edge and the dyke.

The dewatering structure will extend through shallow water which is expected to be less than 1 m deep. The general design basis for this dewatering structure includes:

- maintaining a suitable setback between the open pit limit and the dewatering structure;
- meeting or exceeding the required safety factors for stability and hydrotechnical design criteria according to the consequence classification as set out by the Canadian Dam Association 2007; and,
- managing seepage into the open pit.

The construction of the structure is summarized in Section 12 and the design is described in detail in Technical Appendix 2F (Design of Andrew Lake Pit Dewatering Structure).

5.5.2.7 *Mine Water Management*

The Andrew Lake open pit will be excavated in competent low permeability bedrock and therefore significant issues relating to dewatering and groundwater quality and quantity management are not expected. Furthermore the mine will be excavated partially in permafrost, where the frozen ground conditions are expected to further reduce the permeability of the rock mass.

As outlined for the Kiggavik pits, some limited inflow of water into the Andrew Lake pit may occur from the following sources of water flows:

- Pit wall – seepage from melting of permafrost, seepage from unfrozen zones;
- Direct precipitation (rainfall and snowfall), drifting snow and un-diverted surface run-off; and,
- Groundwater (subpermafrost) inflow.

Water balance estimates for the open pits suggest that the snowmelt in early summer months will be the dominant source of water inflow to the pits. The total inflow predicted for the Andrew Lake open pit is approximately 1,030 m^3/day in July (see Technical Appendix 5E "Prediction of Mine Inflows"). Water that drains into the pits will be collected using a sump to be driven below the active mining level. Water pumped from the sump will be directed to the Sissons Water Treatment Plant prior to discharge.

The pit floor depressurization method for the Andrew Lake pit will be the same as described for the Main Zone pit in Section 5.4.6.2. A floor heave analysis was conducted and the analysis indicates that depressurization may be required beginning at a depth of 145 m below the ground surface for the Andrew Lake pit. Water from the drain holes will be collected within the Andrew Lake open pit sump and removed from the open pit as part of the water management program.

Section 9 addresses water management at the Sissons site in more detail.

5.5.3 End Grid Underground Mine

5.5.3.1 *Proposed Mining Method*

The End Grid mineralization is located from 200 m to 420 m below surface, therefore only underground mining methods are considered for this deposit. Due to the distribution of rock types and rock mass quality within the proposed underground mining areas a Drift and Fill (DAF) mining method is proposed. DAF mining is a subset of various successful fill-dependent underground mining methods where mining areas require backfill and ground support. DAF is very similar to Cut and Fill (CAF), one of the most widely used mining methods in underground mining, except that overall back spans are limited in DAF mining due to ground conditions. The two mining methods within DAF mining are underhand (UHDAF), where the mining direction is downward, and overhand (OHDAF) where the mining advances upward. For the End Grid deposit the proposed primary method is OHDAF. However, in some areas of the deposit, mining underneath cemented rockfill may be needed.

Figure 5.5-2 shows a plan view of a typical OHDAF cut and the herringbone primary-secondary drift mining sequence. At each mining cut a main footwall access drift is driven along the ore contact, within the ore. A typical cross section illustrating the cut sequence for overhand mining is presented in Figure 5.5-3 (Section A-A from Figure 5.5-2).

Projection: NAD 1983 UTM Zone 14N
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FIGURE 5.5-2
PLAN VIEW OF A TYPICAL OVERHAND DRIFT-AND-FILL MINING SEQUENCE

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