AREVA

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March 26, 2008

Ms. Phyllis Beaulieu
Manager of Licensing
Nunavut Water Board
P.O. Box: 119
Gjoa Haven, NU X0B 1JO

Dear Ms. Beaulieu:

Re: Annual Report for the Kiggavik Project 2007 Field Program

Please find enclosed a copy for your review, comment and distribution the 2007 Kiggavik Project Annual Report. As previous discussed the Annual Report will be delivered via PDF, followed by a hard-copy.

Please note that the NWB Annual Report is submitted prior to March 31st, 2008 as per Part B, Item 2 of License #2BE-KIG0708.

We trust that this annual report is a concise and useful summary of the activities conducted in 2007. Should you have any questions, please contact myself at (306) 343-4043.

Yours truly,

Mark Warbanski
Environmental Health & Safety Coordinator, Kiggavik Project

Attachment

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Areva Resources Canada Inc.

Kiggavik Project, Nunavut

Field Program

2007 Annual Report

Date of Issue: January 2008

Executive Summary

The 2007 field program of the Kiggavik Project was focussed on diamond drilling, ore and waste rock sampling in the Kiggavik and Sissons areas in order to improve the understanding of the known mineral deposits. Drilling started on July 13, 2007. During the drilling period 1,700 metres was completed on nine drill holes using NQ sized diamond core equipment. All holes have been geotechnically logged. Ore and waste rock samples were collected from core drilled in holes and sent to the laboratory for testing. Thermistor strings were installed to measure ground temperatures.

Exploration geological work in 2007 included work in the field in order to evaluate previous drilling on the Bong and Granite grids, as well as some regional outcrop visits. In addition to core relogging and outcrop visits, sampling for clay species using spectrometry methods was undertaken.

An aerial geophysical program was conducted to better highlight gravity anomalies on the property using an airborne gravity gradiometry survey. An initial test in the south of the property concluded that the data was indeed high-quality and the survey continued. As a result of significant delays due to weather, caribou mitigation and fuel shortages, the survey was not completed in 2007, and will be continued in 2008.

Environmental baseline work in 2007 was focussed on aquatic, terrestrial, wildlife and hydrological assessments.

All operations were conducted out of the Kiggavik camp and were supported by helicopter services. In 2007 the camp accommodated up to 32 persons. There were no time loss incidents during the 2007 season. A Wildlife Mitigation and Monitoring Plan was successfully implemented to ensure environmental protection and sustainability of all wildlife within the project area.

Occupational health and safety and radiation protection programs were implemented to ensure work activities are performed in a safe and responsible manner and that workers are not adversely exposed to radiation from uranium exploration activities.

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1 SUMMARY OF ACTIVITIES UNDERTAKEN IN 2007

1.1 General

Pre-feasibility work in 2007 was focussed on diamond drilling, ore and waste rock sampling in the Kiggavik and Sissons areas in order to improve the understanding of the known mineral deposits. Activities also included geotechnical logging and ground temperature measurements.

Exploration geological work in 2007 was focussed on preparation for the 2008 diamond drilling program. Activities included three weeks in the field in order to evaluate previous drilling on the Bong and Granite grids, as well as some regional outcrop visits. In addition to core relogging and outcrop visits, sampling for clay species using spectrometry methods was undertaken.

The aim of the geophysics work was to better highlight gravity anomalies on the property using an airborne gravity gradiometry survey. An initial test in the south of the property concluded that the data was indeed high-quality and the survey continued. As a result of significant delays due to weather, caribou mitigation and fuel shortages, the survey was not completed in 2007, and will be continued in 2008.

Environmental baseline work in 2007 was focussed on aquatic, terrestrial, wildlife and hydrological assessments.

All operations were conducted out of the Kiggavik camp and were supported by helicopter services. In 2007 the camp accommodated up to 32 persons. Main project contributors were as follows:

Activity	Contributors
• Management	Areva
• Drilling	Bradley Bros
• Geological logging and probing	Areva
• Ore and waste rock sampling	Areva
• Geotechnical logging	SRK
• Thermistors installations	SRK
• Environmental Baseline Work	Golder
• Wildlife Monitoring	Areva & Community
• Helicopter	Forest Helicopters
• Environment, Health and Safety	Areva & Senes
• Occupational First Aid & Catering	1984 Enterprises
• Camp renovation	SK Construction, NPS & BLCS / Baker Lake
• Fuel Transportation	Peter's Expediting

1.2 Camp Activities

A temporary wooden camp was established at the Kiggavik site by refurbishing an existing camp and supplementing with additional new buildings, including: 1 storage shed/generator/shop shack (former kitchen), 1 ablution building, 1 kitchen, 1 sleeping unit, 1 Weatherhaven tent and 1 incinerator. Figure 2.1 shows an aerial view of the Kiggavik camp in July 2007.

During the first week of October the site was prepared for seasonal abandonment with equipment and supplies that can withstand winter conditions placed in storage, while supplies and equipment requiring heated storage were brought to Baker Lake. The generator was shut down and winterized. Waterlines were drained, flushed, and winterized with antifreeze. All buildings were secured. Windows and doors of all buildings were boarded up for the winter. All personnel vacated the site by October 05. Figure 2.2 shows an aerial view of the winterized Kiggavik camp in October 2007.

1.3 Fuel Cache

Three primary fuel caches locations were utilized:

- Fuel cache at Kiggavik: 14W 564464, 7146782
- Fuel cache at esker: 14W 561512, 7145240
- Fuel cache at Sissons: 14W 554300, 7134400 (NAD 83)

All drums of jet fuel and diesel fuel were stored in approved 205 litre steel drums. All fuel containers were labelled, identifying the contents and AREVA's name. Fuel drums were stored within a secondary containment system. Figure 2.4 shows an aerial photo of the fuel cache at esker.

A spill of approximately 100 litres of diesel fuel was reported in June. This spill originated out of 45 gallon drums stored on site, outside of the secondary containment, at the very beginning of the program. Details of the spill are discussed further in Section 13 of this report.

1.4 Airborne Geophysics

Airborne geophysics started in July and included a test over the Andrew Lake area. Airborne geophysics continued in August and September and included flight lines over the southern part of the Kiggavik and Sissons properties. The aerial geophysical program was terminated in September for 2007 due to adverse weather conditions, allowing for only partial completion. The survey is anticipated to be completed during the summer of 2008.

Evaluation of the partial dataset is currently ongoing, final assessment is expected in late 2008 or early 2009. At this time the data is considered high quality, and may be sufficient to outline future ground resistivity programs and drilling.

1.5 Drilling and Sampling

Drilling started on July 13, 2007. During the drilling period 1,700 metres was completed on nine drill holes using NQ sized diamond core equipment. Drilling rates were generally low. All holes have been geotechnically logged. Ore and waste rock samples were collected from core drilled in holes and sent to the laboratory for testing. Table 1.5-1 includes a summary of the 2007 drilling program.

Table 1.5-1
Summary of 2007 Drill Holes

Site	Deposit	Hole ID	Easting (m)	Northing (m)	TOC (masl)	Length (m)	Vertical depth (m)	Azimuth	Dip	Drilling start	Drilling finish
Kiggavik	Main Zone	MZ-07-01	564969.4	71446907.0	185.9	238	237.1	65	-85	13-Jul	21-Jul
Kiggavik	Main Zone	MZ-07-03	565282.3	7147097.0	187.9	243	210.4	148	-60	21-Jul	28-Jul
Kiggavik	Main Zone	MZ-07-04	564909.0	7146880.0	185.5	95	95.0	0	-90	7-Aug	11-Aug
Kiggavik	Main Zone	MZ-07-05	565130.0	7146928.0	182.5	89	89.2	0	-90	11-Aug	31-Aug
Kiggavik	Center Zone	CZ-07-01	565807.6	7147336.0	180.4	135	116.7	20	-60	3-Aug	7-Aug
Kiggavik	Center Zone	CZ-07-02	565825.0	7147275.0	180.5	104	104.0	0	-90	7-Aug	11-Aug
Sissons	Andrew Lake	ANDW-07-01	553402.0	7134908.0	169.0	331	300.0	192	-65	1-Sep	12-Sep
Sissons	Andrew Lake	ANDW-07-02	553342.0	7134664.0	168.0	190	190.0	0	-90	12-Sep	18-Sep
Sissons	End Grid	ENDG-07-01	554286.0	7135728.0	172.0	269	269.0	0	-90	19-Sep	30-Sep

1.6 Thermistor Installation and Monitoring

Thermistor strings were installed for several new boreholes to measure ground temperatures. Three types of temperature probes were used:

- Deep thermistor cables with pressure sensors at end of cable;
- Shallow thermistor cables of 30 m length attached to data loggers; and
- Single point temperature probes attached to data loggers.

One deep thermistor was placed in the deepest borehole drilled at Kiggavik site (east of camp), MZ-07-03. This inclined borehole had a drilled length of 243 metres, with maximum vertical depth of 210 metres. One deep thermistor string with pressure

transducer was also installed in the deepest borehole drilled at Andrew Lake site, ANDW-07-01.

The depth of permafrost was inferred from temperature profiles measured with deep thermistor strings in selected boreholes. At Kiggavik, the estimated depth to the bottom of permafrost is about 210 metres. At Sissons site, 10 km south-west of Kiggavik, the permafrost depth is estimated to be between 250 and 270 metres below ground surface.

1.7 Environment, Health and Safety Monitoring

The 2007 Environmental, Health and Safety monitoring program involves two independent wildlife monitors from the Baker Lake community and AREVA field staff.

One of Golder Associates staff completed a two day training sessions on wildlife and caribou behaviour. The training session involved AREVA field staff and the two wildlife monitors. Caribou behaviour observations and wildlife records were recorded during the field program and submitted to GN/DOE on a bi-weekly basis. This data was also provided to KIA.

Caribou protection measures were in place throughout the drilling period:

- Altitude restrictions were in place. In July ceilings were generally high allowing project altitudes to be maintained most days. During August, ceilings required lower altitudes. During September low ceilings required lower altitudes to be flown for the most of the flights. Weather also grounded the helicopter on some days.
- Caribou monitors were on site each day. In general, few caribou were observed from July until September but only in small numbers. Muskox and grizzly bears were seen near the site on several occasions. Drilling operations were suspended for two hours on July 19th due to the presence of caribou and muskox within 1 km of the drill rig. Drilling operations were also suspended for two hours on July 25th and 27th due to caribou within 1 km of the drill rig.
- Daily aerial caribou surveys were carried out on days when drilling took place.
- Weekly caribou surveys were carried out on July 14th, July 21st, July 27th, August 10th, August 19th, August 28th, September 5th, September 9th and September 21st. Initial flights were flown using linear patterns. The protocol then switched to circular patterns.
- Records were kept of wildlife spotted near camp and during flights.

A radiation protection program was conducted using:

- Gamma dosimetry: OLDs (Optically stimulated Luminescent Dosimeter) and DRDs (Direct Reading Dosimeter) for personnel dosimetry

- Automess survey instruments for gamma radiation monitoring
- Ludlum survey Instrument / pancake probe for contamination monitoring
- Portable sample counters for radon progeny and LLRD
- Track etch cups for environmental radon monitoring purposes

1.8 Environmental Baseline Work

Figure 2.3 summarizes the sampling locations for the 2007 environmental baseline work. Results of the environmental studies are detailed in Section 4.

1.8.1 Hydrology Component

The first hydrological field trip was undertaken by Golder hydrologists during the second week of June to collect stream discharges and measure flows during the snowmelt period. Streamflow monitoring stations were established in the vicinity of Kiggavik. Instantaneous discharge measurements and survey water elevations were collected to develop stage discharge relationships at each monitoring station.

A second hydrological field trip was undertaken in August. A total of 11 streamflow monitoring stations were installed. A total of seven lake elevation stations were established, at each location a benchmark was chosen.

The final surface hydrological investigations were conducted over the period of September 17th to 21st, 2007. The objective of the September trip was to collect instantaneous discharge measurements and survey stream and lake water elevations for the development of stage discharge relationships at each monitoring station. This being the final trip of the season, the other objective was also to retrieve water level and barologger sensors. At the invitation of AREVA, Golder hydrologists spoke with the Kiggavik Community Liaison Committee at a regular meeting held at the AREVA Baker Lake office. Golder discussed the baseline monitoring program and how the data would be used to support the project development and environmental assessment.

1.8.2 Aquatic Component

The objectives of the August field program were to collect information on water quality, sediment quality, benthic invertebrate communities, fish community and fish habitats as well as conduct bathymetry surveys. Five Golder staff completed the field program. Adverse weather conditions shortened the August field session. The aquatics field trip started on August 20th and ended on September 4th.

<u>Fish Surveys</u>
A non-lethal small-bodied fish inventory was conducted in all study lakes other than Skinny Lake. Fish sampling methods consisted of three to seven minnow traps,

depending on the lake. A non-lethal large-bodied fish inventory was also conducted in the same lakes, using one or two short duration gill nets and angling. All captured fish were measured for length and weight and subjected to an external health assessment. Ageing structures were taken on all adult fish captured. Information on all fish captured was recorded on appropriate data sheets.

Fish Habitat Survey

Habitat maps of the shoreline and littoral zone of all sampled lakes other than Skinny Lake were completed. Inlets and outlets were also checked.

Bathymetry Survey

A bathymetry survey was conducted on Pointer Lake (August 24th to August 26th).

Benthic Invertebrate Community Survey

A cursory BIC survey was conducted at two locations on all sampled lakes other than Skinny Lake (deepest station and 1 metre deep station), with the exception of only one location for the sediment collection for Willow Lake due to absence of sediment in the deepest station (possibly cobble and boulder).

Water Quality

One composite (top/middle/bottom) water sample was collected on Pointer Lake, at the deepest station (3.1 metre). Surface grabs were used on all other lakes due to the shallowness of these lakes and station locations. Limnology measurements were conducted at the deepest station of each lake and at the shallow station (1 metre).

Sediment Quality

A cursory sediment chemistry survey was conducted at two locations on all sampled lakes (deepest station and 1 metre deep station), with the exception of only one location for the sediment collection for Willow Lake due to absence of sediment in the deepest station (possibly cobble and boulder). The 0 to 5 cm section of each sediment sample was collected from depositional areas at two locations on all sampled lakes.

1.8.3 Wildlife Component

Caribou and Muskox

Two aerial surveys were flown by helicopter to determine the number, distribution, and group composition of caribou and muskoxen in the study area. Each survey was flown in a north-south direction following a predetermined flight path using Global Positioning System (GPS) co-ordinates. Surveys were completed by helicopter at 120 m above ground level (agl), and at 160 km/hour. All caribou and muskoxen within 600 m of either side of the helicopter were counted and the GPS location of groups, group size, group composition, dominant behaviour, and habitat type were recorded. Dominant behaviour

is classified as feeding, bedded, standing, walking, trotting, or running. Incidental observations of all wildlife including grizzly bears and bear dens, wolves and wolf dens, wolverines, raptors and raptor nest sites, and groups of caribou off-transect or out of the survey block were also recorded during each of the aerial surveys.

Wildlife Habitat

Training areas for the vegetation/habitat classification of the study area were collected from August 24 to 31, 2007. The task involves using a Landsat Thematic Mapper image (28 m x 28 m pixel size), and recording the GPS location of various habitats within the study area. These GPS locations are referred to as training areas, which will facilitate classifying the image into vegetation polygons.

Raptor Nest Reconnaissance

The objective of the raptor nest reconnaissance was to find potential nests and/or suitable nesting locations in the study area.

1.8.4 Soil and Vegetation Component

Permanent sample plots (PSPs) were established to measure baseline radionuclide and trace metal concentrations in soil and vegetation. Three PSPs were established within the Kiggavik local study area (LSA) and three within the Sissons LSA (near the ore bodies). Plant species selected for collection were primary forage for herbivorous mammals and birds such as caribou, moose, small mammals, hares, ptarmigan and grouse. Species selected for chemical analysis included: fruit and vegetation from blueberry plants, willow, dwarf birch, sedge, and lichen. Soil samples (and in some instances peat) were collected from the same area the vegetation was collected. Lichen and soil samples were sent to the Saskatchewan Research Council (SRC) for chemical analysis.

1.8.5 Archaeological Component

The archaeological survey started on August 6th and ended on August 10th. The team included two Golder employees and a local archaeological assistant hired by Golder from the Baker Lake community.

The archaeological ground reconnaissance focused on; an existing runway located approximately 12 km west of the camp, an alternate runway north of this location, the Sissons and Kiggavik ore body areas, the area surrounding the camp, several sites that were recorded during the original EA baseline, four potential runways as well as the south end of Skinny Lake. A helicopter survey was completed of the possible all season road corridor to Baker Lake and Sagliq Island on Baker Lake.

2 SUMMARY OF PLANNED ACTIVITIES FOR THE 2008 PROGRAM

2.1 General

The 2008 field program is relatively similar to the activities conducting during the 2007 program; consisting of diamond drilling and environmental baseline studies to improve the understanding of the project site and the known mineral deposits. The intent of the project is to gather information required to determine whether these deposits can be safely and economically extracted and processed, while protecting the environment. A program of prospecting, geological mapping and geophysical surveys will also be carried out throughout the lease areas to identify potential for additional mineral deposits and to further evaluate known potential areas.

The 2008 program is tentatively scheduled to begin in April or May when new building and construction material will be moved to the Kiggavik camp from Baker Lake. It is expected that the drill and environment crews will be mobilized to the site during May and June. The program is expected to be shut down and prepared for the winter season by the end of September or beginning of October. All operations will be conducted out of the Kiggavik camp and will be supported by helicopter services. The maximum number of people at the camp will be approximately 59 in 2008.

2.2 Camp Expansion

It is planned to expand the 2007 temporary wooden camp by installing new sleeping accommodations and an addition to the latrine infrastructure.

2.3 Fuel cache

The installation of two temporary bulk fuel tank storage systems is planned for 2008. However it may be necessary to continue using drums if the planned double walled fuel tanks cannot be transported on site prior to the summer season.

The proposed bulk fuel tank storage system includes double-walled steel EnviroTanks, each with a capacity of 50,000-litres, to be installed at an esker located on the Kiggavik lease, east of the Kiggavik camp (see Figure 2.4). Tanks for the storage of diesel and three (3) tanks for the storage of Jet-B will be installed at this location. It is also planned to install two (2) 50,000-litre double walled steel EnviroTanks for diesel storage at the Sissons site to accommodate drilling activities.

2.4 Geophysics

Ground geophysics in 2008 will likely be limited due to the incomplete dataset obtained by the airborne program in 2007, however the airborne gravity survey is slated to be finalised in the summer of the 2008.

2.5 Drilling, Sampling and Testing

2.5.1 Bong and Granite Areas

- Diamond drilling will focus on existing targets on the Bong and Granite Grids, South and West of Kiggavik respectively.
- Diamond drilling will include 7 to 12 drill holes on the Granite Grid and similar amounts of drilling on the Bong Grid (total of 14 to 24 drill holes).
- Total meterage is expected to range between 3000 and 5000m.
- The drill hole size may be NQ or HQ
- Holes may be inclined (from vertical to 60^{o})
- Maximum depth of drilling is 400m

2.5.2 Kiggavik Area

- Diamond drilling will focus on the existing Main Zone and Center Zone deposits
- Diamond drilling will include a total of 10 to 25 drill holes
- Total meterage is expected to range between 2000 and 4000m.
- The drill hole size will be HQ
- Holes may be inclined (from vertical to 60^{o})
- Maximum depth 300 m
- Holes below the permafrost will be packer-tested
- Water samples will be collected using packer systems and swabbing tools. A pump will be required to pump all drill water from the hole during sampling. In order to pump out approximately 2 volumes before sampling, holding capacity on the order of 5 m^{3} will be required.

2.5.3 Andrew Lake and End Grid Areas

- Diamond drilling will focus on the existing Andrew Lake and End Grid deposits, South West of Kiggavik.
- Diamond drilling will include 6 to 12 drill holes at Andrew Lake and similar amounts of drilling at End Grid (total of 12 to 24 drill holes).
- Total meterage is expected to range between 2000 and 4000m.
- The drill hole size will be HQ
- Holes may be inclined (from vertical to 60^{o})
- Drill water will be directed to settling tanks prior to being re-circulated

- Maximum depth 400m
- Holes below the permafrost will be packer-tested
- Water samples will be collected using packer systems and swabbing tools. A pump will be required to pump all drill water from the hole during sampling. In order to pump out approximately 2 volumes before sampling, holding capacity on the order of 5 m^3 will be required.

2.6 Thermistor Installation and Monitoring

Additional deep and shallow thermistors will be installed at Kiggavik and Sissons sites to confirm the 2007 findings.

2.7 Environment, Health and Safety Monitoring

The 2008 Environmental, Health and Safety (EH&S) monitoring program will involve independent wildlife monitors from the Baker Lake community and AREVA field staff. The EH&S staff will be responsible for the implementation of the following plans: Radiation Protection Plan, Spill Contingency Plan, Waste Management Plan, Noise Abatement Plan, Wildlife Mitigation and Monitoring Plan, and the Abandonment and Restoration Plan.

2.8 Environmental Baseline Work

The 2008 environmental baseline work will focus on the collection of wildlife, aquatic and terrestrial baseline data.

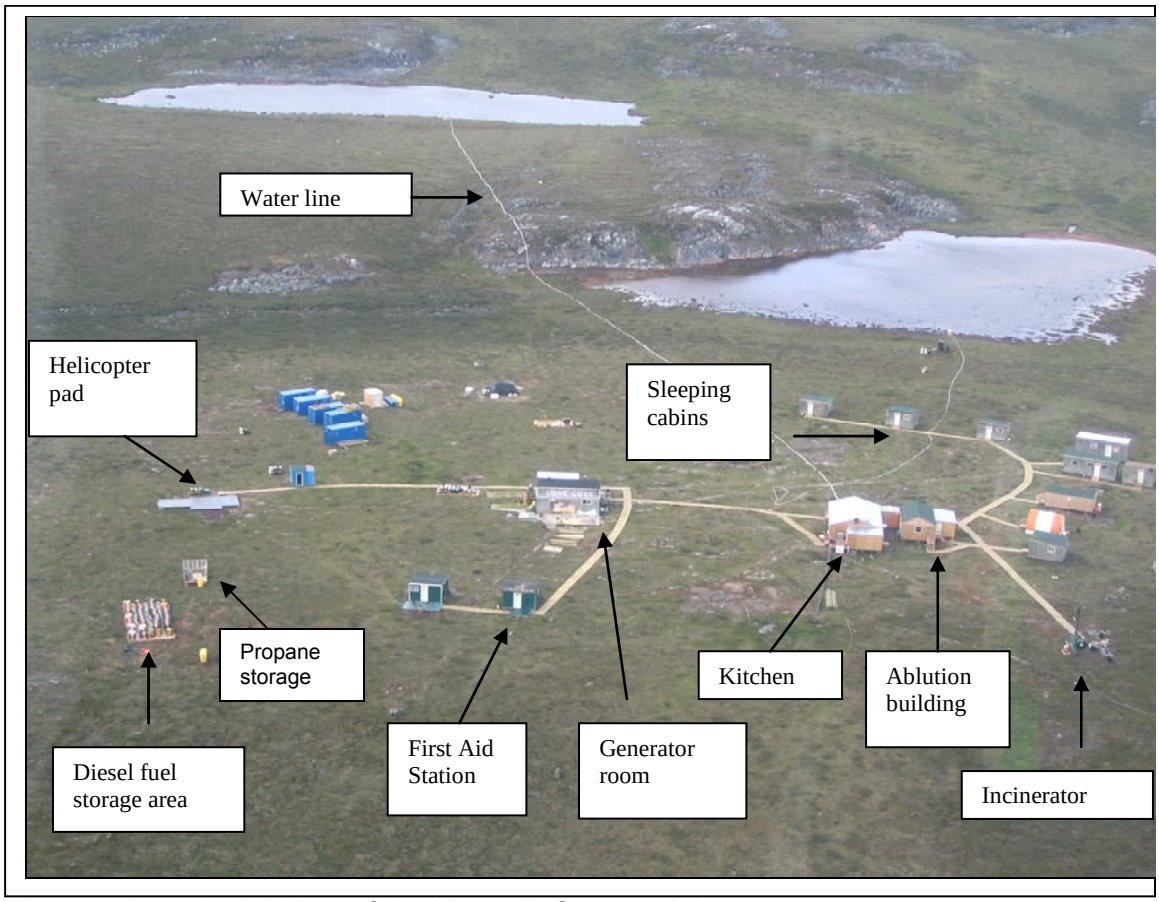

Figure 2.1 Aerial View of the Kiggavik Camp – July 2007

Figure 2.2 Aerial View of the winterized Kiggavik Camp – October 2007

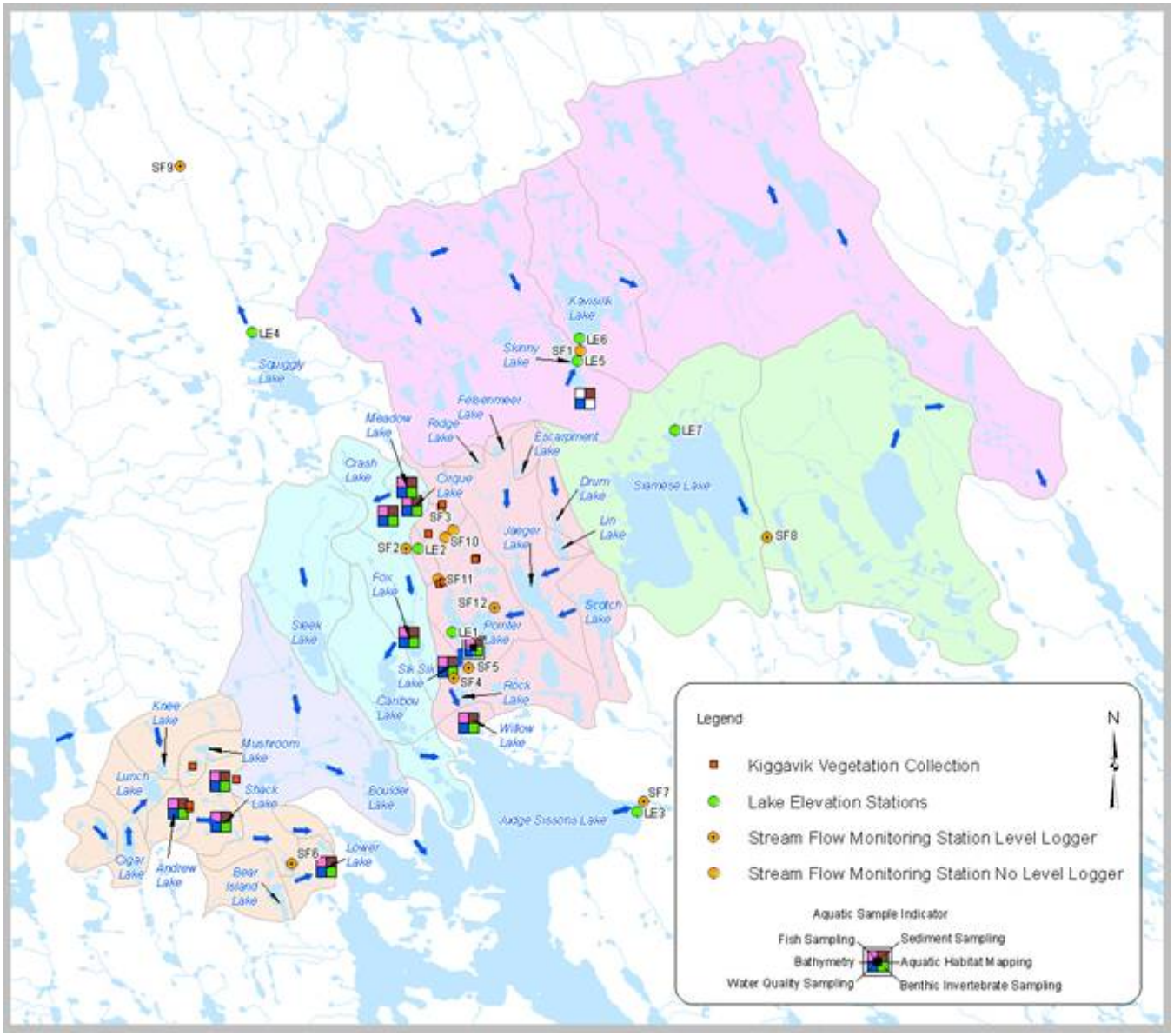

Figure 2.3 2007 Environmental Baseline Work Summary

Figure 2.4: Fuel Cache at Esker with secondary containment

3 OPERATIONAL PLANS

Prior to the start up of the 2007 field season, six Environmental Management Plans were prepared and submitted to the regulatory agencies to aid in developing best management practices and procedures to mitigate any potential adverse environmental impacts. It is AREVA's intentions to operate in accordance with commitments made in the Plans; however, such plans are living documents and lessons learned during the field season and AREVA's commitment to continual improvement warranted some revisions of these Plans prior to the 2008 season.

The six plans are as follows and are discussed below:

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

3.1 Spill Contingency Plan

In accordance with existing legislation and AREVA's Environmental Policy, a Spill Contingency Plan was developed for the Kiggavik Project. The objectives of the Plan are to:

- identify the potential for and the response method to spills at the Project;
- have procedures to follow to prevent or mitigate adverse environmental effects through effective and efficient response;
- identify personnel and their responsibilities;
- identify emergency contacts; and,
- describe reporting requirements.

To effectively implement this Plan all site staff and contractors are required to review the Plan upon arrival at site, including the location of Material Safety Data Sheets, the location of spill kits and spill response supplies and tools. Training for all site staff consists of how to identify potential or existing leaks or spills, where they are most likely to occur and instruction on how to effectively use spill response supplies and tools. Additional training is provided as necessary.

Spill prevention is addressed by the implementation of secondary containment (e.g., Figure 2.4) and spill kits at locations identified to be potential hazards, daily inspections are carried out at all storage locations, MSDS sheets are readily available, spill response is reviewed with all site staff and contractors and site supervisors and their designates are aware of spill reporting procedures.

The Plan was implemented twice during the 2007 field season as a result of one diesel spill and one release of radiologically contaminated drill cuttings. Implementing the Plan identified some areas that required revision or improvement (i.e. when to report a spill, contact list). A summary of these spills are discussed in following sections of this Report.

A revised Plan was submitted prior to the submission of the Annual Report to reflect opportunities for improvement and requirements related to the planned installation of two fuel tank storage systems.

3.2 Radiation Protection Plan

The Radiation Protection Plan is designed to meet the requirements of the applicable Nunavut Occupational Health and Safety Regulations, Saskatchewan Mineral Exploration best practices, the Canadian Nuclear Safety Commission (CNSC) Regulations and the AREVA Resources Canada Inc Integrated Quality Management System (IQMS).

<u>Administrative Elements</u>

- Program documentation
- Training
- Designation of Nuclear Energy Workers (NEW)
- Dose limits and dose levels
- Obligations of NEW
- Pregnant workers

<u>Program Elements</u>

- ALARA
- Radiological monitoring
- Dosimetry monitoring
- Code of Practice
- Management of radioactive materials
- Shipping of radioactive materials
- Site abandonment and restoration
- Emergency response

All employees and contractors receive appropriate radiation protection training prior to beginning work at the exploration site to ensure worker safety and protection of the environment. Any personnel involved with the shipment of radioactive materials are required to receive training and certification in the Transportation of Dangerous Goods (TDG).

The Plan is implemented by the development and implementation of a routine monitoring schedule carried out by the EHS Group; dosimetry monitoring to determine worker exposure; proper management of radioisotopes (Cesium-137 used for testing the operation of down hole probes); proper shipping and receiving of radioactive material, the proper storage and collection of radioactive materials and the development of a corporate emergency response plan.

A more detailed description and outcomes or results of the Plan are discussed in the section Effects of the Project on Human Health.

Storage location for radioactive material

A revised version of this Plan was submitted prior to the submission of the Annual Report which includes sections related to the disposition of drill cuttings, response to radiological spills and site abandonment and restoration procedures in regards to radiation protection.

3.3 Waste Management Plan

In accordance with AREVA's Environmental Policy a Waste Management Plan has been developed and implemented to adequately address any concerns regarding waste and mitigate any potential adverse environmental impacts. AREVA is committed to ensuring that all wastes generated at the Kiggavik Project site are collected, stored, transported and disposed of in a safe, efficient and compliant manner.

In the development of this plan, potential waste streams were identified, followed by developing a treatment strategy and disposal plan. All site staff and contractors review this Plan and are trained in the aspects required to effectively adhere to the Plan (i.e. proper identification of waste, proper storage methods, proper handling and transport methods).

All food, paper and non-treated wood waste are incinerated in an approved incinerator. All other wastes are properly sorted and stored for future handling.

The Waste Management Plan was originally developed prior to beginning the 2007 field season; upon arrival at site, some of the original commitments made in the Plan and in AREVA's own Polices and Codes of Practices could not be met due to logistical restrictions (i.e. shipment off-site). AREVA is committed to the removal off all non-incinerating waste off-site to approved facilities. Due to the limited number of approved facilities for recyclable or hazardous waste dangerous goods in the immediate area, AREVA will ensure that all materials are properly sorted, packaged and stored on-site until approved facilities or handlers can be identified and contracted.

Internal Waste Disposal forms have been implemented for any domestic waste requiring transport from site to the Baker Lake landfill. Waste generated during the refurbishment of camp, prior to the installation of the incinerator, included kitchen waste, scrap wood and cardboard, construction debris, old appliances (refrigerators and propane stoves), old beds and scrap metal.

As required, an inventory of all waste and material remaining on site was recorded upon seasonal shutdown and is summarized in Table 3.3-1.

Table 3.3-1

Kiggavik Site End of Season Inventory 2007

Type of Waste	Quantity	Storage Method
Waste oil and fuel	4 – 205 litre bung drums	Shipped back to Baker Lake – used by BCLS in their furnaces
Incinerator Ashes	4 – 205 litre ring top drums	In sea-can type storage container until can be shipped off site for disposal
Empty metal drums	Over 125 – 205 litre drums	Stacked and stored, to be shipped during winter back-haul
Scrap metal	2 – 205 litre ring top drums	In sea-can type storage container until can be shipped off site for handling
Recyclable materials (pop cans and juice boxes)	2 – 205 litre ring – top drums	In sea-can type storage container until can be shipped off site for handling
Engine filters	1 – 205 litre ring top drum	In sea-can type storage container until can be shipped off site for handling
Oil cans	1 – 205 litre ring top drum	In sea-can type storage container until can be shipped off site for handling
Oil contaminated rags	1 – 205 litre ring top drum	In sea-can type storage container until can be shipped off site for handling
Empty/used paint cans	1 – 205 litre ring top drum	In sea-can type storage container until can be shipped off site for handling
Generator Oil	15 – 20 litre pails 10 – 10 litre pails 2 cases of 12 – 1 litre jugs	In secondary containment in generator building
Diesel contaminated soil and rags from spill clean-up	1 – overpack drum	In sea-can type storage container until can be shipped off site for handling
Calcium Chloride and cement bags	40 bags CaCl 83 bags of cement	In sea-can type storage container until can be shipped off site for handling
Jet Fuel	3 – 205 litre drums	In secondary containment at fuel cache
Diesel Fuel	133 – 205 litre drums	In secondary containment at fuel cache

All radioactively contaminated drill cuttings are collected and stored in the appropriate area for future handling.

On August 23rd, 2007 a shipment of core samples (low specific activity) was sent via air from Kiggavik to Saskatoon for analysis at the Saskatchewan Research Council. Shipper's Declaration for Dangerous Goods where completed and filed by appropriately trained AREVA staff.

A variety of household type chemicals were transported to Baker Lake and will continue to be stored in a heated warehouse until needed for the 2008 field season.

During the preparation of this report, notification was received that during a winter fuel haul to the Kiggavik site (January 2008), Peter's Expediting was able to backhaul to a storage location in Baker Lake, approximately 148 empty metal drums and four (4) rock bags containing cement and Calcium Chloride, which had been ruined by moisture.

This Plan is frequently reviewed and will be revised upon the identification of new waste streams, new handling methods or requirements and improved logistics. A revised version was submitted prior to the submission of the 2007 Annual Report which includes improvements made to the waste identification, sorting and storage processes.

AREVA is currently in the process of seeking registration with the Government of Nunavut – Department of Environment for the storage and shipping of hazardous materials.

Incinerator

3.4 Abandonment and Restoration Plan

An Abandonment and Restoration Plan has been developed to address conditions of permits, regulations and industry standards throughout the operational season, at seasonal shut-down and at final closure of the site.

The objectives of the Plan are to:

- Protect human health
- Reduce or eliminate environmental effects
- Re-establish conditions which permit the land to return to a similar pre-exploration land use
- Establish physical and chemical stability of disturbed areas.

3.4.1 Abandonment

As required by the Abandonment and Restoration Plan the following activities were conducted for the seasonal shutdown of the Kiggavik camp:

- All equipment has been stored in secure buildings or containers
- Plywood has been nailed over windows and doors have been secured to prevent inadvertent opening
- Pumps and hoses have been drained and dismantled
- Full inventory of chemicals, products and wastes remaining on site has been conducted
- Final inspection of all storage areas and secondary containment
- Removal of chemicals or storage in secure buildings
- A final inspection of drill sites, including gamma surveys and the removal of any fuel or radiologically contaminated soil
- Drill rig has been dismantled

Camp during use

The following four (4) photos were taken at the time of season shutdown:

3.4.2 Restoration

AREVA intends to implement progressive restoration practices and incorporate new abandonment and or reclamation methods and procedures, when applicable. The current Plan has been implemented at all drill sites operated during the field season to establish chemical stability. All drill sites from the current year's field program are inspected for fuel stained soil and undergo a gamma survey for radioactive contamination. Contaminated soil or cuttings are collected in appropriate containers and stored in the long-term core storage area for future handling, which may include transfer to a operating mine site.

Drill sites must be remediated to the extent that gamma dose at a height of 1m from surface is less than 1 µSv/h. To the greatest extent possible, all residual radioactive materials accumulated during drilling are disposed of down the drill hole. Where this is not practicable, radioactive material is collected, appropriately packaged and stored in the existing core storage areas. Gamma radiation levels at 1 m from the surface of the core storage area should be reduced to 1 µSv/h and in no instances exceed 2.5 µSv/h. As is necessary, residual radioactive material will be transported to the McClean Lake Operation for storage and disposal.

Challenges surrounding physical reclamation of disturbed surfaces include lack of local knowledge or available information. To minimize the effected footprint and therefore the amount of required physical reclamation there is a focused effort on proper planning of placement of infrastructure and drill sites. It is AREVA's intention to reclaim disturbed sites in an acceptable manner, when adequate information becomes available. Proper reclamation techniques are currently being investigated and will be implemented under

the direction and approval of experienced consultants, community members and regulatory agencies. Restoration work will be completed prior to the expiry of the land use licence.

This Plan is frequently reviewed and will be revised upon the expansion of infrastructure, changing field programs and the identification of improved reclamation practices. A revised version was submitted prior to the submission of the 2007 Annual Report.

3.5 Noise Abatement Plan

A Noise Abatement Plan was developed to mitigate the effects from noise generated during camp set-up, camp operation, winter road use and drilling activities. Noise controls and abatement serve a combination of environmental and occupational health and safety purposes. The main focus of this Plan is the control of environmental noise for the protection of wildlife.

Implementation of this Plan ensures that drill rigs and vehicles are equipped with mufflers and or silencers and is subject to commitments made in the Wildlife Mitigation and Monitoring Plan regarding minimum required flying altitudes and the take-off and landing of aircraft.

This Plan is reviewed with all site staff and contractors, as well as head office contract administrators to ensure all contractors operating drill rigs, vehicles or aircraft are aware of the minimum requirements of this Plan.

Frequent review allows for revision to occur with the expansion of infrastructure, changing field programs and the identification of improved practices. A revised version, with minor changes, was submitted prior to the submission of the 2007 Annual Report.

3.6 Wildlife Mitigation and Monitoring Plan

A Wildlife Mitigation and Monitoring Plan was developed to address wildlife mitigation, protection and monitoring procedures. Mitigation and monitoring plans were based on recommendations made by the Government of Nunavut, Environment Canada, the Beverly Qamanirjuaq Caribou Management Board and the experience and knowledge obtained from wildlife effects monitoring programs at the BHP Billiton Ekati Diamond Mine, Diavik Diamond Mine and the De Beers Snap Lake Project. The Plan was designed to protect wildlife from the project activities, increase the current understanding of the wildlife interactions with human development and to determine effectiveness of mitigation measures.

As part of the monitoring program, independent wildlife monitors carried out aerial and ground-based caribou surveys to determine the presence of caribou near exploration activities for the Project. Daily and weekly aerial surveys were carried out within the Project area from July to September, 2007. Daily high-level (>300 m) reconnaissance surveys were completed in June and July to determine the presence of wildlife within 4 km of drilling activities. For the remainder of the field season, daily reconnaissance surveys were conducted during regular air transport of field personnel. Site staff are instructed to report any wildlife sightings in the Wildlife Logbook.

The Plan also outlines mitigation measures to be taken when conducting aerial geophysical surveys. The crew performing the AGG surveys conducted pre-survey reconnaissance flights and kept watch for any wildlife that may enter the survey area. No caribou were identified in the area during reconnaissance flights or the geophysical survey.

Weekly aerial surveys were flown by helicopter to determine the number, distribution, and group composition of caribou and muskoxen within the Project area. Ground observations were conducted to gather information on group size, group composition, and dominant behaviour.

The findings of these measures are detailed in the section Wildlife Mitigation and Monitoring Results.

A revised Plan has been developed to improve aspects of the program to achieve goals of continual improvement and address concerns of stakeholders. The revised Plan also reflects lessons learnt and improved knowledge during the implementation of the Plan during the 2007 field season.

4 ENVIRONMENTAL STUDIES

There were four main components of the environmental studies undertaken in 2007, including hydrology, aquatics, terrestrial and archaeological.

4.1 Hydrology Component

The focus of the hydrological assessment was to gather baseline stream flow and lake water level information from drainage areas which could be impacted by the project, both in terms of reduced flow due to water usage or augmented flows due to treated water releases.

The collection of stream discharge data and lake level monitoring was to meet the following objectives for the project:

- collect sufficient water data to document the natural range in stream flow from selected locations to satisfy regulatory requirements;
- collect hydrology information that can be used for engineering design purposes; and
- collect baseline hydrology information that will be used in support of the Environmental Assessment (EA).

Three hydrology field programs were conducted over the course of the 2007 open water season: June 11th to 18th, July 30th to August 3rd, and September 17th to 20th. Three types of hydrological monitoring were performed for the Kiggavik Project, including instantaneous stream discharge measurements, continuous water level measurements, and lake water level measurements. A total of twelve stream discharge monitoring stations and seven lake elevation monitoring stations were installed near the Kiggavik Project. The locations of each monitoring station are presented in Table 4.1-1.

During the spring field program an initial site reconnaissance was conducted in which stream discharge and lake elevation monitoring locations were established and continuous stage recorders were installed. Water elevations were measured relative to local benchmarks, which in each case were large boulders located in the vicinity of the monitoring location. Stream velocity and depth measurements were made using a standard flow meter and these measurements were used to calculate discharge. During the summer field program, water elevation and stream discharge measurements were taken at the monitoring locations and data from the continuous stage recorders were downloaded. Measurements were again taken at each location during the fall program, continuous stage recorders were again downloaded and were removed for the winter. All stream discharge measurements and lake elevation measurements are presented in Tables 4.1-2 and 4.1-3, respectively. Preliminary results for the estimations of discharge in the streams that had continuous stage recorders are provided in Table 4.1-4. Note that these results are preliminary only. As more data are collected, better estimations of

mean discharge may be provided. Also of note is that although there were seven continuous stage recorders installed during the 2007 field programs, discharge estimates are only available for four stations. More data is required for the three stations at which stage recorders were installed and which do not yet have estimates.

Table 4.1-1

Stream Discharge and Lake Elevation Monitoring Locations at the Kiggavik Project

Stream Discharge Monitoring Stations		
Station	**Description**	**Crossing Location (UTM - NAD 83)**
SF1	Outflow of Skinny Lake	14 W 571655 7155266
SF2	Fox Lake Inflow[(a)]	14 W 563554 7146242
SF3	Northeast Inflow of Pointer Lake	14 W 565717 7147088
SF4	Outflow of Siksik Lake[(a)]	14 W 565790 7140386
SF5	Outflow of Pointer Lake[(a)]	14 W 566477 7140840
SF6	Outflow of Shack Lake[(a)]	14 W 558223 7131912
SF7	Aniguq River[(a)]	14 W 574605 7134734
SF8	Outflow of Siamese Lake[(a)]	14 W 580364 7146775
SF9	Outflow of Squiggly Lake[(a)]	14 W 552993 7163630
SF10	Tributary to the Northeast Inflow of Pointer Lake	14 W 565328 7146771
SF11	Northwest Inflow of Pointer Lake	14 W 565015 7144882
SF 12	Outflow of Jaeger Lake	14 W 567690 7143581
Lake Elevation Monitoring Stations		
Station	**Description**	**Benchmark Location (UTM - NAD 83)**
LE1	Pointer Lake	14 W 565652 7142467
LE2	Cirque Lake	14 W 563603 7146244
LE3	Judge Sissons Lake	14 W 574537 7134751
LE4	Squiggly Lake	14 W 556354 7156066
LE5	Skinny Lake	14 W 571626 7154893
LE6	Kavisilik Lake	14 W 571712 7155299
LE7	Siamese Lake	14 W 576086 7151648

Note: (a) = Continuous water level measurement location.

Table 4.1-2

Stream Discharge Measurements in 2007

Monitoring Station	Description	Date	Discharge (m^3/s)
SF1	Outflow of Skinny Lake	3-Aug-07	0.023
		19-Sep-07	0.524
SF2	Fox Lake Inflow	14-Jun-07	0.704
		2-Aug-07	0.004
		18-Sep-07	0.046
SF3	Northeast Inflow of Pointer Lake	15-Jun-07	0.460
SF4	Outflow of Siksik Lake	16-Jun-07	0.362
		31-Jul-07	0.000
		18-Sep-07	0.000
SF5	Outflow of Pointer Lake	31-Jul-07	0.058
		18-Sep-07	0.240
SF6	Outflow of Shack Lake	16-Jun-07	2.946
		3-Aug-07	0.023
		18-Sep-07	0.234
SF7	Aniguq River	14-Jun-07	8.630
		31-Jul-07	7.193
		17-Sep-07	2.766
SF8	Outflow of Siamese Lake	2-Aug-07	0.889
		19-Sep-07	0.413
SF9	Outflow of Squiggly Lake	18-Jun-07	3.003
		1-Aug-07	0.240
		19-Sep-07	0.436
SF10	Tributary to the Northeast Inflow of Pointer Lake	15-Jun-07	0.054
		1-Aug-07	0.000
		18-Sep-07	0.003
SF11	Northwest Inflow of Pointer Lake	15-Jun-07	1.442
		1-Aug-07	0.000
		18-Sep-07	0.012
SF12	Outflow of Jaeger Lake	20-Sep-07	0.065

m^3/s = cubic metres per second.

Table 4.1-3
Lake Elevation Readings in 2007

Monitoring Station	Lake	Date	Elevation (m)
LE1	Pointer Lake	18-Jun	98.906
		31-Jul	98.197
		18-Sep	98.223
LE2	Cirque Lake	14-Jun	99.068
		2-Aug	98.738
		18-Sep	98.754
LE3	Judge Sissons Lake	17-Jun	99.797
		31-Jul	99.670
		17-Sep	99.548
LE4	Squiggly Lake	18-Jun	96.653
		1-Aug	96.428
		19-Sep	96.435
LE5	Skinny Lake	3-Aug	99.211
		19-Sep	99.308
LE6	Kavisilik Lake	3-Aug	98.170
		20-Sep	98.255
LE7	Siamese Lake	3-Aug	97.050
		19-Sep	96.980

m = metres.

Table 4.1-4
Monthly Mean Discharge Estimates in 2008

Station ID	Stream	Jun[(a)]	Jul	Aug	Sep[(a)]
SF2	Fox Lake Inflow	0.992	0.065	0.089	0.073
SF6	Outflow of Shack Lake	3.5	0.355	0.138	0.32
SF7	Aniguq River	12.279	6.702	2.892	2.001
SF9	Outflow of Squiggly Lake	3.211	0.486	0.489	0.386

(a) = Mean based upon an incomplete month of data.

4.2 Aquatic Component

The general objective of the 2007 aquatic field program was to collect baseline information on water quality, sediment quality, benthic invertebrate communities, fish community and fish habitats as well as conduct bathymetry surveys on Pointer Lake and Baker Lake. The survey focused on watersheds or lakes that may be affected by future mining activities (i.e., Skinny Lake, Pointer Lake drainage, Shack Lake drainage, and Fox Lake drainage).

Specific investigations included the following:

- fish community – captured fish to determine species occurrences, physical condition and age;
- aquatic habitat – documented the type and distribution of various aquatic habitats at selected locations in the study area;
- sediment and benthic invertebrate community - collected samples for subsequent laboratory analysis; and
- water quality – recorded field measurements and collected water samples for laboratory analysis.

Fish Surveys

A non-lethal small-bodied fish inventory was conducted in all study lakes except Skinny Lake. Fish sampling methods consisted of the minnow traps and gill nets. A non-lethal large-bodied fish inventory was also conducted in the same lakes, using one or two short duration gill nets and angling. All captured fish were measured for length and weight and subjected to an external health assessment. Ageing structures were taken from all adult fish captured.

Fish Habitat Survey

Habitat maps of the shoreline and littoral zone of all sampled lakes other than Skinny Lake were completed. Inlets and outlets were also checked, but habitat map information was not collected.

Bathymetry Survey

A bathymetry survey was conducted on Pointer Lake. Specific details for the bathymetry survey were as follows:

- Bathymetric outline of Pointer Lake was recorded from an average distance from shore of 10 m (aerial).
- Bathymetric transects and individual waypoints for each transect were recorded on a Garmin GPS map 168.
- Bathymetric transects were conducted using a zig zag pattern. The general shore distance between these transects was 200 m in smaller bays, but varied between 200 m and 400 m in wider sections of the lake.

Water Quality

Composite (top/middle/bottom) water samples were collected from Pointer, Skinny, Cirque, and Ridge Lakes at the deepest station. Surface grabs were used on all other lakes due to the shallowness of these lakes at sampling station locations.

Sediment Quality

Initial sediment sampling was conducted at two locations in each lake (deepest station and 1 metre deep station) using an Ekman grab. Only one sample was collected from Willow Lake. The second sample was not collected due to the absence of soft sediment at the deepest station.

Benthic Invertebrate Community Survey

Initial BIC sampling was conducted at two locations on all sampled lakes other than Skinny Lake (deepest station and 1 metre deep station). The deep station on Willow Lake was not sampled for sediment, physical and chemical characteristics due to the absence of soft sediment (possibly cobble and boulder).

Results of Fish Sampling

Eleven lakes were sampled in 2007 and a total of 28 fish representing five species were captured (Table 4.2-1). The most common fish species captured was ninespine stickleback (*Pungitius pungitius*) (*n*=15), followed by Arctic grayling (*n*=10), burbot (*Lota lota*) (*n*=1), cisco (*Coregonus artedii*) (*n*=1), and lake trout (*n*=1). Length and weight data and external health data was collected from every fish captured. Mortalities were frozen and archived in freezers at the Golder Saskatoon office.

Table 4.2-1

Summary of Fish Captured in the AREVA Kiggavik-Sissons Project Area in 2007

Location	Species	Actual Capture	Authorized Capture(a)	Mortalities
Pointer Lake System				
Pointer Lake	Arctic grayling	2	100	1
	cisco	1	50	0
	lake trout	1	75	0
	ninespine stickleback	5	100	0
Sik Sik Lake	ninespine stickleback	3	100	0
Willow Lake	Arctic grayling	1	100	0
Fox Lake System				
Ridge Lake	No fish captured			
Cirque Lake	ninespine stickleback	7	100	0
Crash Lake	Arctic grayling	2	100	0
Fox Lake	No fish captured			
Shack Lake System				
End Grid Lake	Arctic grayling	3	100	0
Shack Lake	No fish captured			
Andrew Lake	burbot	1	25	0
Lower Lake	Arctic grayling	2	100	0

Note: (a) = Authorized captures under Licence #: S-07/08-1005-NU from Fisheries and Oceans Canada.

Water and Sediment Sample Analysis Results

The station locations for water and sediment samples are presented in Table 4.2-2. The following section is intended to provide highlights of results, following an initial review of the water quality data and comparison to the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life and Saskatchewan Surface Water Quality Objectives (SSWQO) (the latter criteria have been used as Saskatchewan has criteria applicable for monitoring uranium mines). The sediment chemistry data was compared to the CCME Interim Freshwater Sediment Quality Guidelines (ISQG), and the Probable Effect Levels (PEL). Interpretation of the results and comparison to other regional specific water or sediment data has not yet been done.

Table 4.2-2
Location of the Sampling Stations for the Kiggavik Baseline Study, 25 August 2007 to 3 September 2007

Lake Name	Station Location	Zone	Easting	Northing	Station Name		
					Water Quality	Sediment	Benthic Invertebrate
Pointer Lake Watershed							
Willow Lake	middle	14W	566331	7138216	P-WQ1	-	WIL-BIC1
	western	14W	566108	7138320	-	WIL-SD2	WIL-BIC2
Sik Sik Lake	middle	14W	565455	7140950	P-WQ4	SSL-SD1	SSL-BIC1
	northern	14W	565197	7141353	-	SSL-SD2	SSL-BIC2
Pointer Lake	outlet	14W	566478	7140854	P-WQ3	-	-
	southern	14W	566339	7141455	P-WQ5	PRL-SD1	PRL-BIC1
	northern	14W	565420	7143980	P-WQ6	PRL-SD2	PRL-BIC2
Shack Lake Watershed							
Lower Lake	southern	14W	559776	7131880	S-WQ2	LWL-SD1	LWL-BIC1
	northern	14W	559571	7132826	-	LWL-SD2	LWL-BIC2
Shack Lake	outlet	14W	555698	7133011	S-WQ3	-	-
	middle	14W	555088	7133674	S-WQ4	SHL-SD1	SHL-BIC1
	western	14W	554563	7133798	-	SHL-SD2	SHL-BIC2
Andrew Lake	northern	14W	552902	7134586	S-WQ7	ANL-SD1	ANL-BIC1
	western	14W	552546	7134282	-	ANL-SD2	ANL-BIC2
End Grid Lake	northern	14W	554791	7135839	S-WQ8	EGL-SD1	EGL-BIC1
	southern	14W	554695	7135573	-	EGL-SD2	EGL-BIC2
Fox Lake Watershed							
Fox Lake	outlet	14W	563126	7142014	F-WQ5	-	-
	southern	14W	563622	7142060	F-WQ6	FXL-SD1	FXL-BIC1
	northern	14W	563587	7142805	-	FXL-SD2	FXL-BIC2
Crash Lake	outlet	14W	562798	7147504	F-WQ7	-	-
	middle	14W	562679	7147741	F-WQ8	CRL-SD1	CRL-BIC1
	northern	14W	562721	7147964	-	CRL-SD2	CRL-BIC2
Cirque Lake	eastern	14W	563885	7148299	F-WQ10	CQL-SD1	CQL-BIC1
	western	14W	563630	7148302	-	CQL-SD2	CQL-BIC2
Ridge Lake	middle	14W	563569	7149164	F-WQ12	RDL-SD1	RDL-BIC1
	western	14W	563226	7149196	-	RDL-SD2	RDL-BIC2
Other Watershed							
Skinny Lake	southern	14W	571965	7153130	O-WQ2	SKL-SD1	-

Water Quality Results

Analytical results for the water chemistry stations are presented in Table 4.2-3.

Table 4.2-3 Water Chemistry (Raw Data) for Water Samples Collected Between 25 August 2007 and 3 September 2007 for the Kiggavik Baseline Study

Parameter	Units	Water Quality Guidelines		Pointer Lake Watershed					Shack Lake Watershed						Fox Lake Watershed						Other	Duplicate		Blank	
		SSWQO	CWQG	Willow Lake P-WQ1	Pointer Lake Outlet P-WQ3	Sik Sik Lake P-WQ4	Pointer Lake P-WQ5	Pointer Lake P-WQ6	Lower Lake S-WQ2	Shack Lake Outlet S-WQ3	Shack Lake S-WQ4	Andrew Lake S-WQ7	End Grid Lake S-WQ8	Fox Lake Outlet F-WQ5	Fox Lake F-WQ6	Crash Lake Outlet F-WQ7	Crash Lake F-WQ8	Cirque Lake F-WQ10	Ridge Lake F-WQ12	Skinny Lake O-WQ2	1	2	Field Blank	Trip Blank
Physico-Chemical																									
Dissolved oxygen, field	mg/L	[a]	[a]	12.05	12.11	11.92	11.85	11.84	11.84	11.98	11.97	11.63	11.89	12.02	11.64	12.11	12.08	11.77	11.88	11.65	12.11	12.02	-	-
pH, lab	pH units	6.5 to 8.5	6.5 to 9	7.12	7.00	7.17	6.88	6.94	6.80	6.78	6.82	7.24	7.28	7.08	7.14	7.26	7.24	6.89	7.16	7.06	6.52	7.09	5.77	6.44
Specific conductivity, lab	µS/cm	-	-	19	14	63	13	15	38	37	39	32	28	16	18	29	27	12	19	17	14	16	<1	<1
Temperature, field	°C	[b]	[b]	7.60	7.37	6.30	7.16	7.70	8.34	8.71	7.37	7.42	6.80	7.34	7.72	4.95	5.16	6.96	7.74	8.01	7.37	7.34	-	-
Total alkalinity	mg/L	-	-	6	4	32	6	5	13	14	18	13	14	8	6	13	9	4	2	<1	6	8	1	3
Total hardness	mg/L	-	-	8	6	28	6	6	18	16	18	14	13	7	8	13	13	5	8	7	6	7	<1	<1
Total suspended solids	mg/L	-	-	2	4	10	3	2	<1	2	3	4	3	1	<1	<1	<1	1	<1	<1	3	<1	<1	<1
Turbidity	NTU	-	-	1.8	1.6	4.6	1.6	1.5	1.2	1.3	1.6	1.8	1.9	0.6	0.7	4.4	3.0	2.2	1.1	0.9	1.7	0.6	0.1	0.1
Nutrients																								
Total Kjeldahl nitrogen	mg/L	-	-	0.40	0.42	0.69	0.84	0.40	0.95	0.50	1.3	0.60	0.46	0.32	0.32	0.25	0.62	0.35	0.22	0.12	0.44	0.52	0.10	0.63
Nitrite+Nitrate nitrogen	mg/L	-	-	<0.01	<0.01	0.02	0.02	0.04	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.02	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01
Ammonia as nitrogen	mg/L	0.023 to12.24[c]	0.023 to 12.24[c]	0.10	0.09	0.07	0.23	0.07	0.08	0.03	0.35	0.10	0.09	0.14	0.04	0.10	0.08	0.03	0.08	0.08	0.06	0.07	0.06	0.08
Phosphorus, total	mg/L	-	[d]	<0.01	<0.01	0.06	<0.01	<0.01	0.05	0.06	0.06	<0.01	0.03	0.02	<0.01	<0.01	0.02	0.03	0.01	<0.01	0.02	<0.01	0.06	<0.01
Major Ions																								
Bicarbonate	mg/L	-	-	7	5	39	7	6	16	17	22	16	17	10	7	16	11	5	2	<1	7	10	1	4
Calcium	mg/L	-	-	2.1	1.4	7.2	1.4	1.5	4.6	4.1	4.6	3.8	3.3	1.8	2.0	3.1	3.3	1.3	1.9	1.8	1.4	1.8	<0.1	<0.1
Carbonate	mg/L	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloride	mg/L	-	-	0.4	0.3	1.2	0.3	0.4	1.3	1.7	1.7	2.3	0.8	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.2	<0.1	<0.1
Hydroxide	mg/L	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Magnesium	mg/L	-	-	0.7	0.5	2.5	0.5	0.5	1.5	1.3	1.5	1.2	1.2	0.7	0.8	1.2	1.2	0.5	0.8	0.7	0.5	0.7	<0.1	<0.1
Potassium	mg/L	-	-	0.2	<0.1	0.5	0.3	0.3	0.4	0.2	0.4	0.4	0.3	0.2	0.5	0.4	0.3	0.2	0.5	0.3	0.2	0.2	<0.1	<0.1
Sodium	mg/L	-	-	0.3	0.2	0.8	0.3	0.3	0.6	0.5	0.6	0.5	0.5	0.3	0.4	0.5	0.5	0.2	0.4	0.4	0.3	0.3	<0.1	<0.1
Sulphate	mg/L	-	-	0.7	0.5	0.7	0.5	0.8	1.0	0.6	0.6	0.5	0.8	0.4	0.4	1.1	1.1	0.6	0.7	0.5	0.5	0.4	<0.2	<0.2
Sum of Ions	mg/L	-	-	12	8	52	11	10	26	25	32	25	24	14	11	23	18	8	7	4	10	14	1	4
Total Metals																								
Aluminum	mg/L	0.1[e]	0.1[f]	0.021	0.024	0.048	0.024	0.027	0.027	0.029	0.026	0.030	0.029	0.017	0.019	0.18	0.12	0.066	0.035	0.028	0.024	0.020	0.0011	<0.0005
Antimony	mg/L	-	-	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Arsenic	µg/L	5	5	0.2	0.1	0.5	0.1	0.1	0.1	0.1	0.2	<0.1	0.2	0.1	0.2	0.2	0.2	0.1	<0.1	<0.1	0.1	0.1	<0.1	<0.1
Barium	mg/L	-	-	0.042	0.033	0.093	0.032	0.036	0.039	0.048	0.050	0.050	0.025	0.034	0.038	0.072	0.072	0.044	0.050	0.044	0.033	0.035	<0.0005	<0.0005
Beryllium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Boron	mg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/L	0.000017[g]	0.000017[h]	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	[i]	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Cobalt	mg/L	-	-	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	mg/L	0.002[j]	0.002[j]	0.0008	0.0007	0.0010	0.0007	0.0008	0.0009	0.0009	0.0008	0.0009	0.0006	0.0006	0.0006	0.0014	0.0017	0.0009	0.0007	0.0006	0.0007	0.0007	<0.0002	0.0006
Iron	mg/L	0.3	0.3	0.086	0.075	0.43	0.061	0.067	0.19	0.14	0.15	0.11	0.15	0.070	0.056	0.17	0.14	0.14	0.042	0.054	0.071	0.080	0.0019	0.0034
Lead	mg/L	0.001[k]	0.001[k]	0.0001	0.0001	0.0002	0.0009	0.0026	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0008	0.0005	0.0003	0.0008	0.0001	0.0001	0.0002
Manganese	mg/L	-	-	0.0031	0.0042	0.016	0.0031	0.0032	0.0044	0.0042	0.0036	0.0031	0.0035	0.0046	0.0006	0.0036	0.0027	0.0085	0.0013	0.0024	0.0041	0.0040	<0.0005	<0.0005
Mercury	µg/L	0.026[l]	0.026[m]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]	<0.05[n]
Molybdenum	mg/L	-	0.073	0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0005	0.0002	0.0001	<0.0001	0.0006	<0.0001
Nickel	mg/L	0.025[o]	0.025[o]	0.0004	0.0003	0.0006	0.0004	0.0003	0.0006	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0011	0.0012	0.0006	0.0004	0.0003	0.0003	0.0004	<0.0001	0.0005
Selenium	mg/L	0.001	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Silver	mg/L	0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium	mg/L	-	-	0.018	0.012	0.052	0.012	0.013	0.041	0.049	0.052	0.056	0.020	0.013	0.014	0.020	0.020	0.012	0.014	0.013	0.012	0.013	<0.0005	<0.0005
Thallium	mg/L	-	0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Tin	mg/L	-	-	<0.0001	<0.0001	<0.0001	0.0016	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0022	0.0018	0.0021	<0.0001	<0.0001	<0.0001	0.0002
Titanium	mg/L	-	-	0.0005	0.0004	0.0016	0.0003	0.0005	0.0005	0.0006	0.0005	0.0004	0.0006	0.0003	0.0002	0.0022	0.0014	0.0017	0.0004	0.0004	0.0005	0.0008	<0.0002	<0.0002
Uranium	µg/L	15[p]	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium	mg/L	-	-	0.0001	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	<0.0001	<0.0001	0.0001	0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Zinc	mg/L	0.03	0.03	0.0024	0.0012	0.011	0.0014	0.0067	0.0042	0.0009	0.0008	0.0087	<0.0005	0.0007	0.0009	0.0010	0.011	0.0011	<0.0005	0.0031	0.0016	0.0007	<0.0005	0.0042

Table 4.2-3 Water Chemistry (Raw Data) for Water Samples Collected Between 25 August 2007 and 3 September 2007 for the Kiggavik Baseline Study (Continued)

Parameter	Units	Water Quality Guidelines		Pointer Lake Watershed					Shack Lake Watershed					Fox Lake Watershed						Other	Duplicate		Blank	
		SSWQO	CWQG	Willow Lake P-WQ1	Pointer Lake Outlet P-WQ3	Sik Sik Lake P-WQ4	Pointer Lake P-WQ5	Pointer Lake P-WQ6	Lower Lake S-WQ2	Shack Lake Outlet S-WQ3	Shack Lake S-WQ4	Andrew Lake S-WQ7	End Grid Lake S-WQ8	Fox Lake Outlet F-WQ5	Fox Lake F-WQ6	Crash Lake Outlet F-WQ7	Crash Lake F-WQ8	Cirque Lake F-WQ10	Ridge Lake F-WQ12	Skinny Lake O-WQ2	1	2	Field Blank	Trip Blank
Dissolved Metals																								
Aluminum, dissolved	mg/L	-	-	0.019	0.016	0.012	0.011	0.012	0.016	0.011	0.0086	0.013	0.0083	0.0087	0.0085	0.074	0.062	0.021	0.015	0.0098	0.0084	0.010	-	-
Antimony, dissolved	mg/L	-	-	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	-
Arsenic, dissolved	µg/L	-	-	0.2	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.1	0.1	0.2	0.2	0.1	0.1	<0.1	0.1	0.1	-	-
Barium, dissolved	mg/L	-	-	0.040	0.031	0.087	0.030	0.032	0.038	0.047	0.048	0.048	0.026	0.033	0.036	0.069	0.069	0.041	0.049	0.042	0.030	0.032	-	-
Beryllium, dissolved	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Boron, dissolved	mg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	-	-
Cadmium, dissolved	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Chromium, dissolved	mg/L	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-
Cobalt, dissolved	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Copper, dissolved	mg/L	-	-	0.0009	0.0008	0.0012	0.0007	0.0009	0.0009	0.0010	0.0010	0.0009	0.0007	0.0007	0.0007	0.0014	0.0017	0.0009	0.0008	0.0006	0.0008	0.0008	-	-
Iron, dissolved	mg/L	-	-	0.022	0.013	0.12	0.010	0.014	0.12	0.045	0.039	0.040	0.047	0.032	0.028	0.083	0.079	0.047	0.011	0.017	0.012	0.029	-	-
Lead, dissolved	mg/L	-	-	<0.0001	0.0001	0.0001	0.0002	<0.0001	0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0001	0.0001	<0.0001	0.0001	0.0002	0.0001	0.0002	<0.0001	0.0001	-	-
Manganese, dissolved	mg/L	-	-	0.0028	0.0024	0.0039	0.0009	0.0009	0.0036	0.0028	0.0023	0.0018	0.0013	0.0034	0.0008	0.0031	0.0026	0.0027	0.0013	0.0006	0.0011	0.0066	-	-
Molybdenum, dissolved	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0001	0.0004	0.0001	0.0001	<0.0001	-	-
Nickel, dissolved	mg/L	-	-	0.0003	0.0003	0.0006	0.0003	0.0004	0.0004	0.0003	0.0002	0.0004	0.0004	0.0004	0.0004	0.0010	0.0010	0.0005	0.0004	0.0003	0.0003	0.0004	-	-
Selenium, dissolved	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001	<0.0001	0.0001	-	-
Silver, dissolved	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Strontium, dissolved	mg/L	-	-	0.018	0.012	0.047	0.012	0.013	0.037	0.044	0.046	0.054	0.020	0.013	0.014	0.020	0.019	0.012	0.015	0.012	0.012	0.014	-	-
Thallium, dissolved	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	-
Tin, dissolved	mg/L	-	-	0.0008	<0.0001	<0.0001	0.0017	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0022	0.0018	0.0022	<0.0001	<0.0001	-	-
Titanium, dissolved	mg/L	-	-	0.0005	<0.0002	0.0004	<0.0002	<0.0002	0.0003	0.0002	<0.0002	0.0002	0.0004	<0.0002	<0.0002	0.0010	0.0007	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	-
Uranium, dissolved	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Vanadium, dissolved	mg/L	-	-	0.0001	<0.0001	0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Zinc, dissolved	mg/L	-	-	0.0049	0.0061	0.0088	0.0030	0.0041	0.0046	0.0028	0.0028	0.0065	0.0023	0.0049	0.0039	0.0017	0.0064	0.0027	0.0024	0.0022	0.0033	0.0036	-	-
Radionuclides																								
Radium-226	Bq/L	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.007	<0.005	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Lead-210	Bq/L	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Polonium-210	Bq/L	-	-	<0.005	0.005	<0.005	<0.005	0.007	0.005	0.006	0.006	0.009	0.007	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.008	<0.005	<0.005
Thorium-230	Bq/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01

Notes: mg/L = milligrams per litre; °C = Degrees Celsius; µg/L = micrograms per litre; NTU = Nephelometric turbidity units; < = less than; Bq/L = Becquerel per litre; µS/cm = micro Siemens per centimetre; - = not available.SSWQO = Saskatchewan Surface Water Quality Objectives (Saskatchewan Environment 2006); CWQG = Canadian Water Quality Guidelines for the protection of aquatic life (Canadian Council of Ministers of the Environment 2006).

(a) = Guideline for Cold-water biota- early stages (9.5 mg/L), other stages (6.5 mg/L).

(b) = Thermal additions should not alter thermal stratification or turnover dates, exceed maximum weekly average temperatures, nor exceed maximum short-term temperatures.

(c) = Guideline is temperature and pH dependent - values shown are for the range in pH and temperature in the study area during the field program.

(d) = Canadian trigger ranges for total phosphorus (µg/L): Ultra-oligotrophic <4; Oligotrophic 4-10; Mesotrophic 10-20; Meso-euthrophic 20-35; Eutrophic 35-100; Hyper-euthrophic >100.

(e) = Aluminum objective: 0.005 mg/L at pH <6.5, Ca <4 mg/L and DOC <2 mg/L; 0.1 mg/L at pH ≥ 6.5, Ca ≥ 4 mg/L and DOC ≥ 2 mg/L.

(f) = Aluminum guideline: 0.005 mg/L at pH <6.5; 0.1 mg/L at pH ≥ 6.5.

(g) = Guideline is hardness dependent. Cadmium guideline: 0.017 µg/L where hardness is 0-48.5 mg/L; 0.032 µg/L where hardness is 48.5-97; 0.058 µg/L where hardness is 97-194; 0.10 µg/L where hardness is >194.

(h) = This interim guideline (0.000017 mg/L) is used unless the natural level is much higher, then use the following formula: Cadmium guideline = $10^{\{0.86[\log(\text{hardness})]-3.2\}}$. (()i) = Guideline of 0.001 mgg/L for Hexavalent Chromium ((Cr ((VI)))) and 0.089 mgg/L for Trivalent Chromium ((Cr ((III)))).

(j) = Guideline is hardness dependent. Copper objectives and guidelines: 2 µg/L where hardness is 0-120 mg/L; 3 µg/L where hardness is 120-180 mg/L; 4 µg/L where hardness is >180 mg/L.

(k) = Guideline is hardness dependent. Lead objective and guideline: 1 µg/L where hardness = 0-60 mg/L; 2 µg/L where hardness = 60-120 mg/L; 4 µg/L where hardness = 120-180 mg/L; 7 µg/L where hardness ≥180 mg/L.

(l) = Mercury objective is for inorganic mercury only.

(m) = Mercury guidelines differs depending on mercury type: inorganic mercury = 0.026 µg/L; methylmercury = 0.004 µg/L.

(n) = Mercury was determined on a nitric-acid preserved sample as a potassium dichromate/nitric-acid perserved sample was not supplied.

(o) = Guideline is hardness dependent. Nickel objective and guideline: 25 µg/L where hardness = 0-60 mg/L; 65 µg/L where hardness = 60-120 mg/L; 110 µg/L where hardness = 120-180 mg/L; 150 µg/L where hardness ≥180 mg/L.

(p) = This objective was developed by the Industrial, Uranium and Hardrock Mining Unit of Saskatchewan Environment. Shaded values are over the SSWQO; bolded values are over the CWQG guidelines.

The observations for the nutrients and metals are:

Nutrients:

- Pointer Lake exceeded the provincial objectives and the federal guidelines for the ammonia as a nitrogen parameter. This parameter is pH and temperature dependant, which means that for this lake the upper limit was 0.023 milligrams per litre (mg/L).
- Of the thirteen lakes sampled, six lakes are considered oligotrophic according to the CWQG ranges, two are mesotrophic, two are meso-eutrophic, and three are eutrophic.

Metals:

- The concentration of aluminum exceeded Provincial and Federal guidelines in Crash Lake and its outlet. This parameter is dependent upon pH, calcium, and dissolved organic carbon (DOC), therefore for these locations the upper limit was 0.1 mg/L.
- The detection limit of these analyses are above guideline values for mercury and cadmium.
- The concentration of iron in Sik Sik Lake exceeded the provincial objectives and the federal guidelines.
- The concentration of lead in Pointer Lake exceeded the provincial objectives and the federal guidelines. This parameter is hardness dependant; therefore the upper limit for iron is 0.001 mg/L as the hardness was below 60 mg/L.
- The highest concentration of total uranium of 0.1 micrograms per litre (µg/L) occurred in End Grid Lake. All other samples for total and dissolved uranium were below detection limit.
- The highest concentration of total selenium was 0.0001 mg/L (Andrew Lake, End Grid Lake, Ridge Lake, Skinny Lake, and the outlet of Crash Lake), while all other samples were below detection limit.
- The highest concentration of dissolved selenium was 0.0001 mg/L (End Grid, Fox Lake outlet, Ridge Lake, and Skinny Lake), while all other samples for dissolved selenium were below the detection limit.
- The highest concentration of total aluminum was 0.18 mg/L (Crash Lake outlet) with a second highest concentration of 0.12 mg/L in Crash Lake, while the lowest value (0.019 mg/L) was found in Fox Lake.
- The highest concentration of dissolved aluminum was 0.016 mg/L (Pointer Lake outlet), while the lowest value was 0.0083 mg/L (End Grid Lake).
- The highest concentration of total and dissolved arsenic was 0.5 µg/L and 0.3 µg/L, respectively and occurred in Sik Sik Lake.

- The highest concentration of total lead was 0.0026 mg/L at Pointer Lake and 0.0002 mg/L (Pointer Lake, Cirque Lake, and Skinny Lake) for dissolved lead.
- The highest concentration of dissolved lead was 0.0002 mg/L in Pointer, Cirque, and Skinny Lakes.

Sediment Results

Chemical characteristics for the sediment stations are presented in Table 4.2-4.

- The sediments from Sik Sik Lake and Cirque Lake had some of the highest concentration of metals and the sediments from Cirque Lake and Skinny Lake had some of the highest concentration of radionuclides.
- The concentration of arsenic exceeded the ISQG in 13 samples and a sample from Ridge Lake also exceeded the PEL.
- A sample from Cirque Lake exceeded the ISQG limits for cadmium. Seven samples from Sik Sik Lake, Lower Lake, Fox Lake, Cirque Lake, and Ridge Lake exceeded the ISQG value for chromium. Eight samples from Sik Sik Lake, Shack Lake, Andrew Lake, Fox Lake, Cirque Lake, Ridge Lake, and Skinny Lake exceeded the ISQG limits for copper.
- Six samples exceeded the ISQG guidelines for zinc; including a sample from Shack Lake and a sample value from Andrew Lake, which also exceed the PEL guideline.
- The highest concentration for total uranium was 5.6 micrograms per gram (µg/g) (Cirque Lake), while the lowest value was 0.7 µg/g (Andrew Lake).
- The highest concentration for total selenium was 1.3 µg/g (Shack Lake), while three samples from Willow Lake, End Grid Lake, and Crash Lake were below the detection limit.
- The highest concentration for total aluminum was 32,000 µg/g (Cirque Lake), while the lowest concentration (4,100 µg/g) was found in Andrew Lake.
- The highest concentration for total arsenic was 31 µg/g (Ridge Lake), while the lowest concentration was 1.3 µg/g (Andrew Lake).
- The highest concentration of total lead was 17 µg/g (Cirque Lake) and 0.24 µg/g (Skinny Lake) for lead-210.

Table 4.2-4Sediment Chemical Characteristics at Replicate Stations Collected Between 25 August 2007 and 3 September 2007 for the Kiggavik Baseline Study

Parameter	Units	Sediment Quality Guidelines		Pointer Lake Watershed					Shack Lake Watershed								Fox Lake Watershed								Other Watershed
				Willow Lake	Sik Sik Lake		Pointer Lake		Lower Lake		Shack Lake		Andrew Lake		End Grid Lake		Fox Lake		Crash Lake		Cirque Lake		Ridge Lake		Skinny Lake
		ISQG	PEL	WIL-SD2	SSL-SD1	SSL-SD2	PRL-SD1	PRL-SD2	LWL-SD1	LWL-SD2	SHL-SD1	SHL-SD2	ANL-SD1	ANL-SD2	EGL-SD1	ENL-SD2	FXL-SD1	FXL-SD2	CRL-SD1	CRL-SD2	CQL-SD1	CQL-SD2	RDL-SD1	RDL-SD2	SKL-SD1
Nutrients																									
Nitrite+Nitrate nitrogen	µg/g	-	-	9	10	10	10	9	7	10	5	4	5	4	4	8	10	10	9	8	10	10	20	20	5
Ammonia as nitrogen	µg/g	-	-	30	140	90	60	70	100	100	6	10	7	20	10	30	80	60	40	80	120	70	120	100	120
Phosphorus, total	µg/g	-	-	710	990	1000	940	1040	920	950	350	350	270	240	290	330	840	800	460	530	820	730	2520	1130	1420
Metals																									
Aluminum	µg/g	-	-	10300	29400	22400	14100	18900	19500	18000	5000	4300	4100	4100	6000	7200	20100	20500	13900	21500	32000	17100	20800	24200	21200
Arsenic	µg/g	5.9	17.0	5.3	11	9.7	6.5	7.4	7.8	7.3	2.7	1.5	1.3	2.4	2.0	2.8	6.6	5.9	8.4	8.6	10	5.0	**31**	8.2	8.7
Barium	µg/g	-	-	180	360	290	140	310	240	200	76	68	54	58	62	83	280	290	230	320	470	280	480	440	330
Beryllium	µg/g	-	-	0.9	1.6	1.3	0.8	1.1	1.2	1.0	0.3	0.3	0.3	0.3	0.3	0.4	1.0	1.1	0.8	1.2	2.3	1.3	1.5	1.6	2.3
Boron	µg/g	-	-	<1	30	15	9	28	<1	2	8	<1	<1	<1	<1	1	1	24	<1	28	35	18	<1	10	<1
Cadmium	µg/g	0.6	3.5	<0.1	0.2	0.2	<0.1	0.2	0.2	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.2	0.2	0.6	<0.1	<0.1	<0.1	0.3
Chromium	µg/g	37.3	90.0	23	39	37	34	37	40	44	8.7	8.6	6.2	6.6	10	12	40	47	31	27	44	31	27	43	29
Cobalt	µg/g	-	-	4.3	8.8	7.5	5.2	5.4	8.9	7.8	3.1	1.9	1.8	1.5	2.8	2.8	5.6	5.8	7.6	7.1	11	4.6	7.1	6.6	5.4
Copper	µg/g	35.7	197	9.6	44	24	19	33	19	25	120	8.9	21	130	4.7	20	30	44	12	32	58	47	29	45	62
Iron	µg/g	-	-	15000	34700	23200	15900	15400	27600	26400	5500	5800	5700	5200	6200	8800	12300	12600	15900	16700	24500	14400	52800	26800	32900
Lead	µg/g	35.0	91.3	8.3	14	11	10	14	11	11	11	4.0	4.0	13	2.7	4.7	16	16	6.3	9.5	17	13	12	14	16
Manganese	µg/g	-	-	150	390	260	140	160	280	230	52	54	43	51	60	83	140	150	140	170	330	160	480	280	200
Mercury	µg/g	0.17	0.486	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Molybdenum	µg/g	-	-	0.4	0.5	0.5	0.6	0.7	0.5	0.6	0.2	<0.1	<0.1	0.2	<0.1	0.4	0.7	0.4	1.0	1.4	8.2	2.5	5.9	2.9	1.7
Nickel	µg/g	-	-	16	40	32	19	29	34	32	14	7.2	7.1	11	9.3	12	31	32	24	30	48	23	29	33	23
Selenium	µg/g	-	-	<0.1	0.4	0.3	0.5	0.4	0.2	0.2	1.3	0.4	0.3	1.2	<0.1	0.2	0.3	0.3	<0.1	0.2	0.9	0.3	0.4	0.5	0.8
Silver	µg/g	-	-	<0.1	0.6	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.8	<0.1	<0.1	<0.1	0.2	<0.1	0.3	<0.1	0.2	0.2	0.2
Strontium	µg/g	-	-	110	240	230	170	190	200	170	44	50	38	37	39	49	140	120	70	99	160	110	150	140	99
Titanium	µg/g	-	-	320	610	550	460	570	670	660	200	180	150	170	190	240	380	390	180	360	410	310	270	340	230
Uranium	µg/g	-	-	1.9	3.3	2.7	1.9	2.7	2.9	2.5	1.1	0.9	0.8	0.7	0.9	1.9	2.1	2.2	1.6	2.2	5.6	2.0	2.2	2.5	5.5
Vanadium	µg/g	-	-	22	45	41	29	34	40	41	9.6	9.2	8.2	8.4	11	15	30	32	25	30	44	27	34	38	27
Zinc	µg/g	123	315	45	120	69	62	76	83	100	**410**	29	74	**440**	13	70	83	130	51	110	150	130	76	100	170
Radionuclides																									
Radium-226	Bq/g	-	-	0.03	0.05	0.04	0.06	0.04	0.04	0.04	0.03	<0.01	0.02	0.02	<0.01	0.02	0.04	0.04	0.04	0.05	0.07	0.03	0.06	0.04	0.10
Lead-210	Bq/g	-	-	0.02	0.12	0.06	0.07	0.08	0.17	0.12	<0.02	<0.02	<0.02	0.02	<0.02	0.03	0.12	0.06	0.05	0.12	0.13	0.12	0.10	0.12	0.24
Polonium-210	Bq/g	-	-	0.06	0.09	0.09	0.08	0.08	0.11	0.11	0.02	0.01	0.02	0.02	0.02	0.05	0.15	0.06	0.03	0.09	0.14	0.09	0.08	0.14	0.28
Thorium-230	Bq/g	-	-	0.04	0.06	0.05	0.05	0.06	0.07	0.07	0.04	<0.02	0.03	0.02	<0.02	0.02	0.03	0.05	0.04	0.04	0.09	0.05	0.06	0.06	0.09

Notes: µg/g = Micrograms per gram; Bq/g = Becquerel per gram; < = less than; - = not available. ISQG = Canadian Council of Ministers of the Environment Interim Freshwater Sediment Quality Guidelines (CCME 2002); PEL = Canadian Council of Ministers of the Environment Probable Effect Levels (CCME, 2002).Shaded values are over the ISQG guidelines; bolded values are over the PEL levels.

Physical and chemical characteristics for the sediment samples collected in conjunction with the benthic invertebrate stations are presented in Table 4.2-5.

- Seven lakes (Willow Lake, Sik Sik Lake, Pointer Lake, Lower Lake, Fox Lake, Cirque Lake, and Ridge Lake) have silt as the dominant substrate material.
- Two lakes (Shack Lake and End Grid Lake) have fine sand as a dominant substrate.
- Two lakes (Andrew Lake and Crash Lake) have either fine sand or coarse sand as dominant substrate depending on the location of the sample in the lake.
- The total organic carbon ranged from 44.7 percent (%) (Willow Lake) to 75.8% (Pointer Lake) in the Pointer Lake watershed; from 25.0% (Andrew Lake) to 65.1% (Lower Lake) in the Shack Lake watershed; and from 39.9% (Crash Lake) to 76.2% (Ridge Lake) in the Fox Lake watershed.
- The percent moisture ranged from 1.15% (Willow Lake) to 6.06% (Pointer Lake) in the Pointer Lake watershed; from below the detection limit (Andrew Lake) to 4.88% (Lower Lake) in the Shack Lake watershed; and from 1.63% (Ridge Lake) to 4.61% (Fox Lake) in the Fox Lake watershed.
- The loss of ignition ranged from 4.59% (Willow Lake) to 23.46% (Pointer Lake) in the Pointer Lake watershed; from 0.53% (Andrew Lake) to 14.91% (Lower Lake) in the Shack Lake watershed; and from 5.86% (Crash Lake) to 13.55% (Fox Lake) in the Fox Lake watershed.

Table 4.2-5
Sediment Physical and Chemical Characteristics at Benthic Invertebrate Replicate Stations Collected Between 25 August 2007 and 2 September 2007 for the Kiggavik Baseline Study

Waterbody	Station	TOC	Moisture	LOI	Silt	Clay	Fine Sand	Coarse Sand	Gravel
		%	%	%	%	%	%	%	%
Pointer Lake Watershed									
Willow Lake	WIL-BIC2	44.7	1.15	4.59	55.48	12.56	31.79	0.13	0.04
Sik Sik Lake	SSL-BIC1	62.0	5.71	15.44	69.81	29.09	1.05	0.06	<0.01
	SSL-BIC2	59.4	4.27	11.92	69.18	17.42	1.88	0.08	11.43
Pointer Lake	PRL-BIC1	75.8	2.99	8.87	45.53	10.78	14.07	2.86	26.76
	PRL-BIC2	63.9	6.06	23.46	86.08	11.09	2.79	0.04	<0.01
Shack Lake Watershed									
Lower Lake	LWL-BIC1	65.1	4.88	12.96	77.10	17.70	5.17	0.02	<0.01
	LWL-BIC2	60.4	4.28	14.91	79.72	18.76	1.52	<0.01	<0.01
Shack Lake	SHL-BIC1	28.2	0.86	3.14	12.32	2.57	57.07	26.41	1.63
	SHL-BIC2	37.5	0.67	2.38	8.67	2.41	50.79	31.56	6.58
Andrew Lake	ANL-BIC1	25.0	<0.01	0.53	6.57	2.02	42.22	49.03	0.16
	ANL-BIC2	37.3	0.49	2.42	14.84	3.58	44.81	36.20	0.57
End Grid Lake	EGL-BIC1	32.4	0.95	2.82	14.54	2.51	48.96	30.61	3.38
	EGL-BIC2	46.2	2.89	7.23	21.18	4.13	49.57	20.18	4.94
Fox Lake Watershed									
Fox Lake	FXL-BIC1	73.1	4.61	13.52	74.07	19.10	6.35	0.49	<0.01
	FXL-BIC2	59.8	4.34	13.55	69.06	16.97	13.15	0.82	<0.01
Crash Lake	CRL-BIC1	41.6	2.64	5.98	21.68	4.43	55.73	9.52	8.65
	CRL-BIC2	39.9	2.13	5.86	16.47	5.49	31.46	40.06	6.52
Cirque Lake	CQL-BIC1	75.7	4.06	11.81	48.24	20.52	23.41	6.59	1.24
	CQL-BIC2	67.0	3.03	12.53	51.23	18.38	25.66	2.39	2.34
Ridge Lake	RDL-BIC1	75.6	1.63	9.51	47.19	21.82	10.85	0.83	19.31
	RDL-BIC2	76.2	2.47	13.31	68.06	25.17	6.20	0.13	0.44

Notes: TOC = total organic carbon, % = percent, LOI = loss of ignition. Shaded values are the highest particle values for each sample.

4.3 Terrestrial Component

In general, the principal objectives of the terrestrial baseline studies are:

- to collect information on the current physical conditions (e.g., soils), species, and habitats in the study area, including the identification of listed and uncommon species, and critical terrestrial habitats (i.e., sensitive ecological attributes);
- to obtain estimates of natural variation in biophysical variables, and species presence, richness, abundance, and distribution;
- to implement environmental design features and management plans (mitigation measures) during the design of the project to avoid or limit disturbance to biophysical variables and habitats, particularly sensitive ecological attributes;
- to help predict effects from the project on current ecological conditions, species, and habitats; and
- to provide data for comparison to environmental effects monitoring programs during construction and operation to test impact predictions (i.e., before-after-control-impact studies), and the effectiveness of environmental design features and management plans.

Study Area

The study area is centered on the anticipated location of the Kiggavik Project, and is adjacent to the southern extent of the calving grounds for the Beverly caribou herd. The study area is 90 kilometres (km) long and 80 km wide (7,200 square kilometres [km^2]), and includes all of Judge Sissons Lake, and parts of Aberdeen, Schultz, Mallory, and Princess Mary lakes (Figure 4.3-1). The spatial extent of the study area was based on the following rationale:

- current study areas for caribou and other large mammals (muskoxen, grizzly bears, wolves) for mining projects in Nunavut and the Northwest Territories (e.g., Diavik and Ekati combined = 6,000 km^2; Snap Lake = 3,100 km^2; Gahcho Kué = 5,600 km^2; Doris North = 4,300 km^2);
- logistical constraints related to survey coverage of the study area, pilot and observer fatigue;
- anticipated mine plan for the Kiggavik Project (four open pits, processing plant, tailings management facility) and current estimates for the zone of influence from major developments on caribou (13 to 33 km [Boulanger et al. 2004; Golder 2005; Johnson et al. 2005]). The study area must be large enough to capture the zone of influence and provide data for caribou behaviour and probability of occurrence outside the zone of influence (i.e., control data); and
- avoidance of the calving grounds for the Beverly caribou herd, known location of caribou water crossings along the Thelon River basin (i.e., Aberdeen and Schultz lakes), and the associated predicted importance of the study area for caribou during the northern (mid-April to late-May) and post-calving (July to October) migration periods.

Caribou

On August 26th, 2007 a systematic aerial survey was flown to determine the number, distribution, and group composition of caribou and muskoxen in the study area. The survey was conducted on 11 transect lines flown in a north-south direction following a predetermined flight path using Global Positioning System (GPS) co-ordinates (Figure 4.3-2) Transects 1 and 2, and 10 and 11 are spaced 8 km apart, while the remaining transects are separated by a distance of 6 km. The study design intends to provide good coverage of the main project area while maintaining data quality by limiting observer fatigue. An important aspect of the study design and study area is to capture the natural variation in movement and abundance (frequency of use) of caribou along the Thelon River basin (i.e., crossings at Aberdeen and Schultz lakes) as they enter the anticipated project area during the post-calving migration. This information will be critical for predicting effects from the proposed project.

All caribou and muskoxen within 600 m of either side of the helicopter were counted, amounting to approximately 15 percent (%) coverage of the study area. The survey was conducted by helicopter at 150 m above ground level (agl), and 130 to 150 kilometres per hour (km/hour). The GPS location of caribou and muskoxen groups, group size, group composition, dominant behaviour, and habitat type were recorded. The composition of the groups was classified as nursery (groups with calves) or non-nursery (groups without calves). Dominant behaviour is classified as feeding, bedded, standing, walking, trotting, or running. Incidental observations of all wildlife including grizzly bears and bear dens, wolves and wolf dens, wolverines, raptors and raptor nest sites, and groups of caribou off-transect or out of the survey block were recorded during the aerial survey.

Twenty-four groups of caribou, totalling 37 individuals, were observed in the RSA during the survey. Group size ranged from one to eight, and 96% did not contain calves (i.e., non-nursing). The majority of the caribou observed were found in heath tundra habitat (46%), and observed to be either standing, feeding, or resting (79%). Caribou were also frequently found in tussock hummock (21%) and sedge wetland (17%) habitats. Ten groups of muskoxen, totalling 130 individuals, were also documented during the surveys (Table 4.3-1). Group size ranged from 1 to 28 individuals, and 25% contained calves. Similar to caribou, the majority of muskoxen groups were feeding, standing, or resting (90%) in heath tundra (38%) and tussock hummock (31%) habitats.

Raptors

A raptor nest reconnaissance survey was completed to find potential nests and/or suitable nesting locations in the study area. This survey was completed in conjunction with other wildlife and wildlife habitat surveys conducted from August 24th to 31st, 2007. A total of four inactive falcon nests were located, and several potential nesting areas identified. This information provides a starting point for the raptor surveys to be completed in late-May or early-June of 2008, and again in mid-summer. The intent of these raptor surveys is to provide baseline information on species diversity, distribution, and productivity of raptors in the study area.

Vegetation and Soil Chemistry

The accumulation of metals and radionuclides by plants is important because of the potential food chain transfer to wildlife and humans. As such, permanent sample plots (PSPs) were established to measure baseline radionuclide and trace metal concentrations in soil and vegetation. Three PSPs were established within the Kiggavik lease area and three within the Sissons lease area (Figure 4.3-3). Plant species selected for collection were primary forage for herbivorous mammals and birds such as caribou, small mammals, hares, and ptarmigan. Species selected for chemical analysis included: fruit and vegetation from blueberry plants (*Vaccinium myrtilloides*), willow (*Salix spp*.), dwarf birch (*Betula nana*), sedge (*Carex spp*), and lichen. Soil samples

(and in some instances peat) were collected from the same area the vegetation was collected. Vegetation and soil samples were sent to SRC Laboratories for chemical analysis, however, results have not yet been received. It is recommended that additional PSPs be established within the lease areas (potential exposure), as well as outside the lease areas (reference), as more detailed information regarding the Project becomes available.

Wildlife Habitat

Training areas for the vegetation/habitat classification of the study area were collected from August 24th to 31st, 2007. The task involves using a Landsat Thematic Mapper image (28 by 28 m pixel size), and recording the GPS location of various habitats within the study area. These GPS locations are referred to as training areas, which facilitates classifying the image into vegetation polygons. Once the classification is complete, the polygons (habitat patches) are digitized and transferred into an ArcView/geographical information systems (GIS) platform. The incorporation of habitat data into a GIS platform will facilitate study designs and determine sampling locations, habitat assessments for wildlife, and the analysis of species distribution and probability of occurrence. The information on habitat availability and habitat use (i.e., from aerial surveys, ground surveys, winter track counts) can be used to develop habitat suitability indices to help assess and predict impacts from the Project.

Table 4.3-1
Aerial Survey Results for the Study Area

Species	Number	Group Composition	Habitat	Dominant Behaviour
Caribou	1	nursing	TH	feeding
Caribou	1	non-nursing	TH	walking
Muskoxen	1	non-nursing	TH	feeding
Caribou	1	non-nursing	TH	feeding
Muskoxen	13	nursing	HT	feeding
Caribou	1	non-nursing	HT	feeding
Muskoxen	1	non-nursing	TH	feeding
Muskoxen	1	non-nursing	TH	feeding
Caribou	1	non-nursing	SW	feeding
Caribou	1	non-nursing	TH	feeding
Muskoxen	1	non-nursing	TH	feeding
Caribou	1	non-nursing	HT	feeding
Muskoxen	18	non-nursing	LS	standing
Muskoxen	2	non-nursing	HT/BE	standing
Caribou	1	non-nursing	SW	feeding
Caribou	1	non-nursing	SW	feeding
Muskoxen	16	non-nursing	HT	feeding
Caribou	4	non-nursing	HT	feeding

Muskoxen	1	non-nursing	TH	feeding
Caribou	1	non-nursing	LV	feeding
Caribou	1	non-nursing	SW	feeding
Caribou	8	non-nursing	HT	feeding
Caribou	2	non-nursing	HT	feeding
Caribou	1	non-nursing	HT	feeding
Muskoxen	2	non-nursing	SW	feeding
Muskoxen	1	non-nursing	HT	walking
Caribou	2	non-nursing	HT	walking
Caribou	1	non-nursing	LV/BO	feeding
Muskoxen	17	nursing	LS/BO	feeding
Caribou	1	non-nursing	LV	standing
Muskoxen	44	nursing	HT/LV	feeding
Caribou	1	non-nursing	LAKE	swimming
Caribou	2	non-nursing	HT/BE	walking
Caribou	1	non-nursing	HT/BE	feeding
Caribou	1	non-nursing	TH	feeding
Caribou	1	non-nursing	HT	walking
Muskoxen	1	non-nursing	HT	feeding
Muskoxen	10	nursing	SW	feeding
Muskoxen	1	nursing	LV/HT	feeding
Caribou	1	non-nursing	HT/BE	standing

TH = tussock hummock; HT = heath tundra; SW = sedge wetland; LV = lichen veneer; BE = bedrock; BO = boulder; LS = low shrubs.

Airstrip Reconnaissance Surveys

Ground reconnaissance surveys were completed for each of the four proposed airstrip locations, as well as the proposed stockpile area. The objective of these surveys was to identify the presence of federal and/or provincial listed plant species, as well as record potential impacts to wildlife and wildlife habitat. Although no federal and/or provincial listed plant species were recorded during the ground reconnaissance, detailed rare plant surveys will be completed once the preferred airstrip location has been selected.

4.4 Archaeological Component

The 2007 archaeological survey started on August 6th and ended on August 10th. The team included two Golder employees and a local archaeological assistant hired by Golder from the Baker Lake community.

The archaeological survey was completed under Class 2 Permit 2007-015A issued by the Department of Culture, Language, Elders and Youth (CLEY). The primary purpose of the survey was to address the immediate infrastructure needs of the current drilling program and camp. Secondly, a general reconnaissance was completed to determine heritage resource potential of the region.

The archaeological ground reconnaissance focused on; an existing runway located approximately 12 km west of the camp, an alternate runway north of this location, the Sissons and Kiggavik ore body areas, the area surrounding the camp, several sites that were recorded during the original EA baseline, four potential runways as well as the south end of Skinny Lake. A helicopter survey was completed of the possible all season road corridor to Baker Lake and an island in Baker Lake.

On August 6th, 2007, the team attended the Kiggavik Community Liaison Committee meeting held at the AREVA office and gave a presentation on the planned archaeological field work to be carried out that week. The meeting was well attended and the team answered questions from the committee. On August 10th, following the field work, a public meeting was advertised and held at the community center in Baker Lake. A presentation describing the results of the fieldwork was given and photos, maps and artefacts from the project area were available for the public to view.

Survey of Existing Aircraft Runway

The field survey began on August 7th, 2007 with an examination of a set of elevated ancient Aberdeen Lake strandlines located approximately 12 km west of the Kiggavik camp. Aberdeen Lake is currently located 4 km to the west. These strandlines had been in use as a landing strip by AREVA and others for a number of years. In total, 3.7 km of strandlines were surveyed. Six previously unrecorded sites (GAL 1-61) were discovered and two previously recorded sites were revisited (LcLf 1 and 22).

GAL 1 is a small artifact scatter located at the north end of the strandlines surveyed. It is situated at the southwest corner of a small pond. Three pieces of lithic debitage were observed over a distance of 40 m on the west edge of the strandline. These were collected to obtain a sample of lithic material.

GAL 2 is an artifact scatter located 50 m east of the portion of strandline used that had been used as a runway. Observed over a 70 m by 30 m area was a lithic scatter consisting of approximately 20 artifacts. Two lithic bifaces were collected indicating the area likely served as a camp location for a period of time. These tools, however, are not temporally diagnostic. A low wet area separates the runway from the artifact scatter.

GAL 3 is a large lithic scatter consisting of over 200 artifacts observed on the surface. The site is located 70 m west of GAL and measures 60 m by 45 m. Several formed lithic tools were collected in addition to a sample of flaking debris. Collected tools include the tip of a broken spear point and two quartzite bifaces.

GAL 4 is a lithic scatter located along the south end of the runway on the strandline. GAL 3 is approximately 375 m north of this location. Observed over a 120 m by 30 m

[1] GAL 1 refers to a temporary field name given to a site.
[2] LcLf 1 refers to a unique site name designated by the Canadian Museum of Civilization.

area were an estimated 150 to 200 artifacts. No formed tools were observed, but a sample of flaking debris was collected.

GAL 5 is a tent boulder outline site located at the north end of GAL 4 at the eastern edge of the strandline. The boulder alignment was rectangular, measures 3 m by 4 m and consists of 16 cobbles. A second cluster of cobbles 16 m north of the tent outline may be related to this site. A piece of wire wrapped around one of the rocks. No other historic items were observed.

GAL 6 is located approximately 100 m northwest of GAL 4 and 5. The site consists of a stone spear point. The artifact was found on the western edge of the strandline, several metres off the edge of the runway. The artifact is complete with the exception of the tip which had been broken. The artifact was collected for further analysis.

LcLf 1 and 2 were previously recorded sites identified during an archaeological survey in 1988. These sites are located on the strandline north of the portion used for a runway. Small lithic scatters were documented at these locations.

Survey of Sissons Site Area

The survey of the Sissons Site area was completed on August 8th, 2007 through helicopter reconnaissance and pedestrian survey. Overall, the general area where the ore bodies are located is considered to have low potential to contain significant heritage resources. The terrain is characterized by low, flat wet areas. A pedestrian survey was completed from Andrew Lake to Mushroom Lake. Three previously unrecorded sites, GAL 7-10, were found in the vicinity of Mushroom Lake. In addition, within the uplands east and southeast of Mushroom Lake there are eight previously recorded sites: LcLf 3-9, 11.

GAL 7 is a marker observed at the east edge of Mushroom Lake at the tip of a lobe of land extending into the lake. The marker consists of five large cobbles placed on an outcrop. The marker has collapsed. GAL 7 is located approximately 800 m northwest of the north Sissons ore body.

GAL 8 is a small lithic scatter located on an outcrop at approximately 90 m northeast of Mushroom Lake. Observed over a 3 m area were 23 pieces of flaking debris. No diagnostics or formed tools were noted and no artifacts were collected. GAL 8 is approximately 370 m northeast of GAL 7.

GAL 9 is a marker located on a boulder outcrop at the north edge of Mushroom Lake. The marker was constructed by placing two small boulders at the edge of the lake. The two rocks were placed 11 m apart. Travis Mannik, field assistant from Baker Lake, suggested that the marker may indicate a good fishing spot on the lake.

Previously recorded sites LcLf 3-9 and 11 were flown over by helicopter, but were not revisited on foot. According to the site database, these sites contain both small lithic scatters and boulder alignments found within the upland east and southeast of Mushroom Lake.

Kiggavik Site Area Survey

The survey of the Kiggavik Site area included the camp, existing fuel cache, possible landing strip and an area around ore body areas. These areas were surveyed on August 8th and 9th, 2007. Overall, the heritage potential of the region was considered moderate with the upland features around the camp and north of the ore bodies receiving the most attention. The low, wet areas were considered to be low potential. Five previously unrecorded sites were recorded during the survey: GAL 10-14.

GAL 10 is a small site containing boulder outlines of two tents. The site was discovered during helicopter reconnaissance of the Kiggavik Site Area. The two boulder features are located on a sandy outcrop at the north end of a small lake. They are square and rectangle in outline and measure 3.5 m by 3.5 m and 3.5 m by 4 m respectively. The site is located 725 NNE from the existing fuel cache and 3 km WSW from camp.

GAL 11 is a prominent marker located 1.6 km southeast of camp on the edge of an upland feature. Pointer Lake is prominently viewed to the south and is located 1.8 km away. The markers consist of a large linear boulder placed upright on top of a small stack of flat rocks. Surrounding this large marker are three small rocks placed on boulders.

GAL 12 is a small marker located on the prominent upland feature 770 m north east of camp. The marker has collapsed. This location has a prominent view to the south.

GAL 13 is the location of an old cache. This site was discovered by Travis Mannik and he stated that it was likely used to cache caribou until it could be retrieved at a later date. The cache had been opened, however, and no faunal remains were present. The cache measures 1.5 m long, 70 cm wide and 40 cm deep. An old scrap of paper was found under a rock at the bottom of the cache which suggests it is of more recent vintage. The site is located 1250 m northeast of camp.

GAL 14 is a small collapsed marker found along the south edge of a prominent upland feature 2 km northeast of camp. Jaeger Lake can be seen to the south and is located 3.1 km away. It was noted that a large quartzite vein was present in the vicinity of the marker.

Proposed Airstrip Surveys

Four potential airstrips were surveyed for their potential to contain significant heritage resources. These included the following locations:

- Pointer Lake Airstrip – located along the west side of Pointer Lake.
- Jaeger Lake Airstrip – located north of Jaeger Lake.
- Drumlin Airstrip – located along a low ridge between Jaeger and Siamese Lakes.
- Skinny Lake Airstrip – located along west side of Skinny Lake.

Each potential airstrip was examined by low level helicopter survey. It was determined that the Jaeger Lake and Drumlin Airstrips contained low potential to contain significant heritage sites and a pedestrian survey was not completed at these two locations. A pedestrian survey was completed for the Pointer Lake airstrip and no sites were discovered. Two previously recorded sites were discovered during the Skinny Lake airstrip survey: GAL 15 and 16. In addition, 22 previously recorded sites are known from previous surveys in the vicinity of Skinny Lake (LcLe 1-8, 10, 12-17, LdLe 1-7).

GAL 15 is a small lithic scatter located on the south side of a small drainage valley on the west side of Skinny Lake. The site is located on a level sandy plain 780 west of the lakeshore. Included with the scatter was fragment of a large biface. This artifact plus a sample of the flaking debris was collected for further analysis.

GAL 16 is a small lithic artifact scatter located along the same sandy plain as GAL 15 west of Skinny Lake. GAL 16 is located 1.2 km south of GAL 15 and is 380 west of the shore of Skinny Lake. The scatter consists of approximately 20 flakes of flaking debris along with a quartzite cobble that was likely used as an anvil in the knapping process.

The previously recorded sites are located along both shores of Skinny Lake, but are concentrated at the southern end. The sites include boulder outlines, artifact scatters. Here, in 1989, archaeological excavations were completed at several sites. Numerous artifacts were recovered including several temporarily diagnostic projectile points. These artifacts suggest a use of the area for at during last 1,300 years. The area surrounding Skinny Lake is unusually rich in archaeological resources compared to the other areas examined.

Aberdeen Lake Reconnaissance

On August 10th, 2007 a reconnaissance survey was made to the north shore of the east arm of Aberdeen Lake. Here, a number of archaeological sites were recorded in the 1988 and 1989 archaeological survey for the proposed winter road to the limestone

quarry north of Aberdeen Lake. In all, 21 sites were recorded. These sites are large and highly significant and contain features such as inukshuit, kayak stands, qarmats, burials, hunting blinds, fox traps and tent rings. Due to the high density of heritage resource artifacts and features at Aberdeen Lake it is considered a valuable resource for comparison to other sites and materials in the region.

One previously unrecorded site was noted during a low level helicopter during the survey. GAL 17 is located near the east terminus of Aberdeen Lake on the north shore. Observed at this site was a tent ring and two small clusters of boulders.

All Weather Road Reconnaissance

Also on August 10th, 2007 a helicopter reconnaissance was completed along the general corridor of one of the all weather road options to Baker Lake. Areas of high heritage potential were noted along the route and archaeological sites were observed from the air at locations in close proximity to the Thelon River. In addition, a brief helicopter survey was made over Sagliq Island on Baker Lake, which is a possible docking station. Potential archaeological features were observed on the surface of the island.

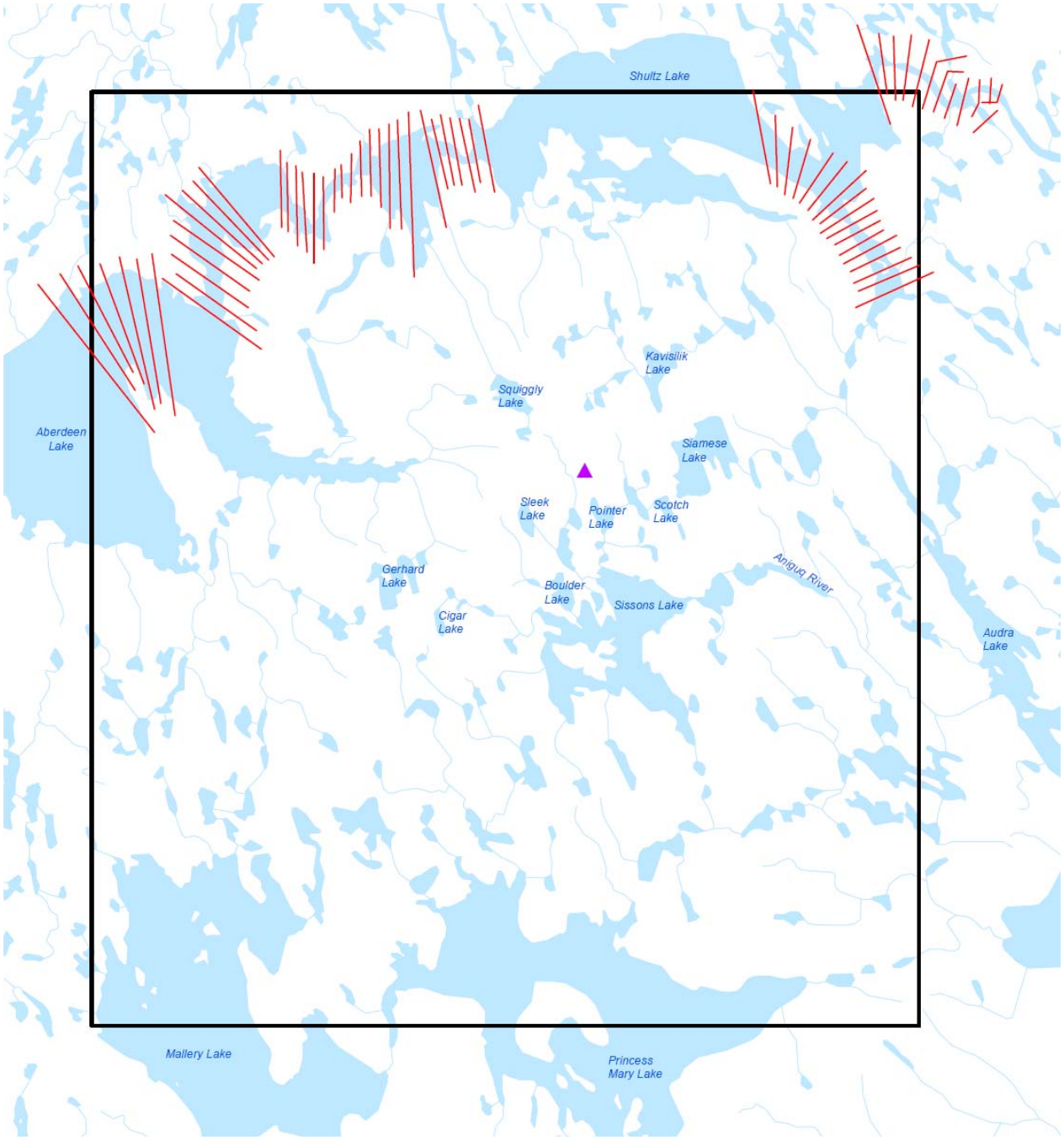

Figure 4.3-1: Wildlife Study Area

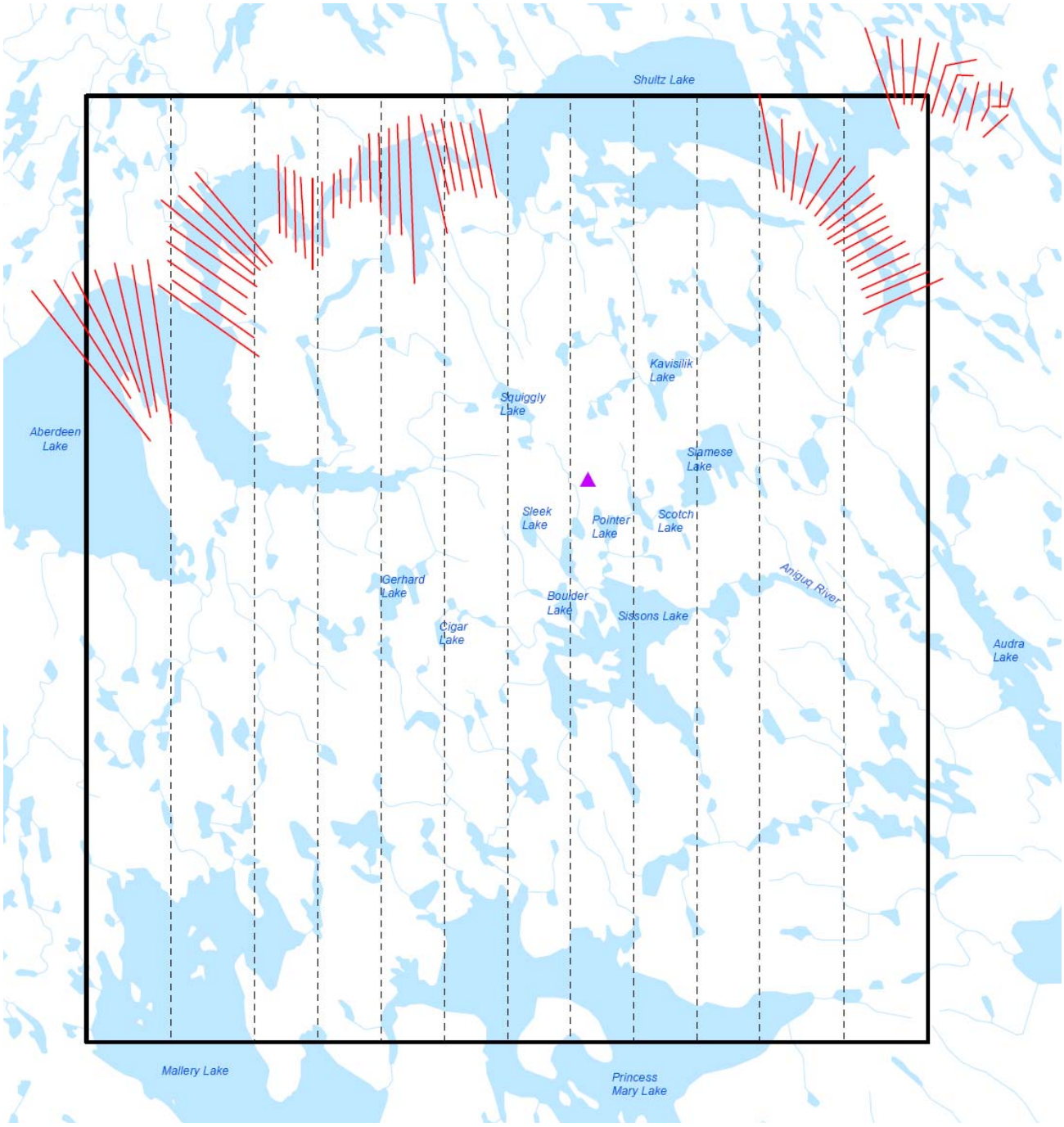

Figure 4.3-2: Aerial Survey Transects

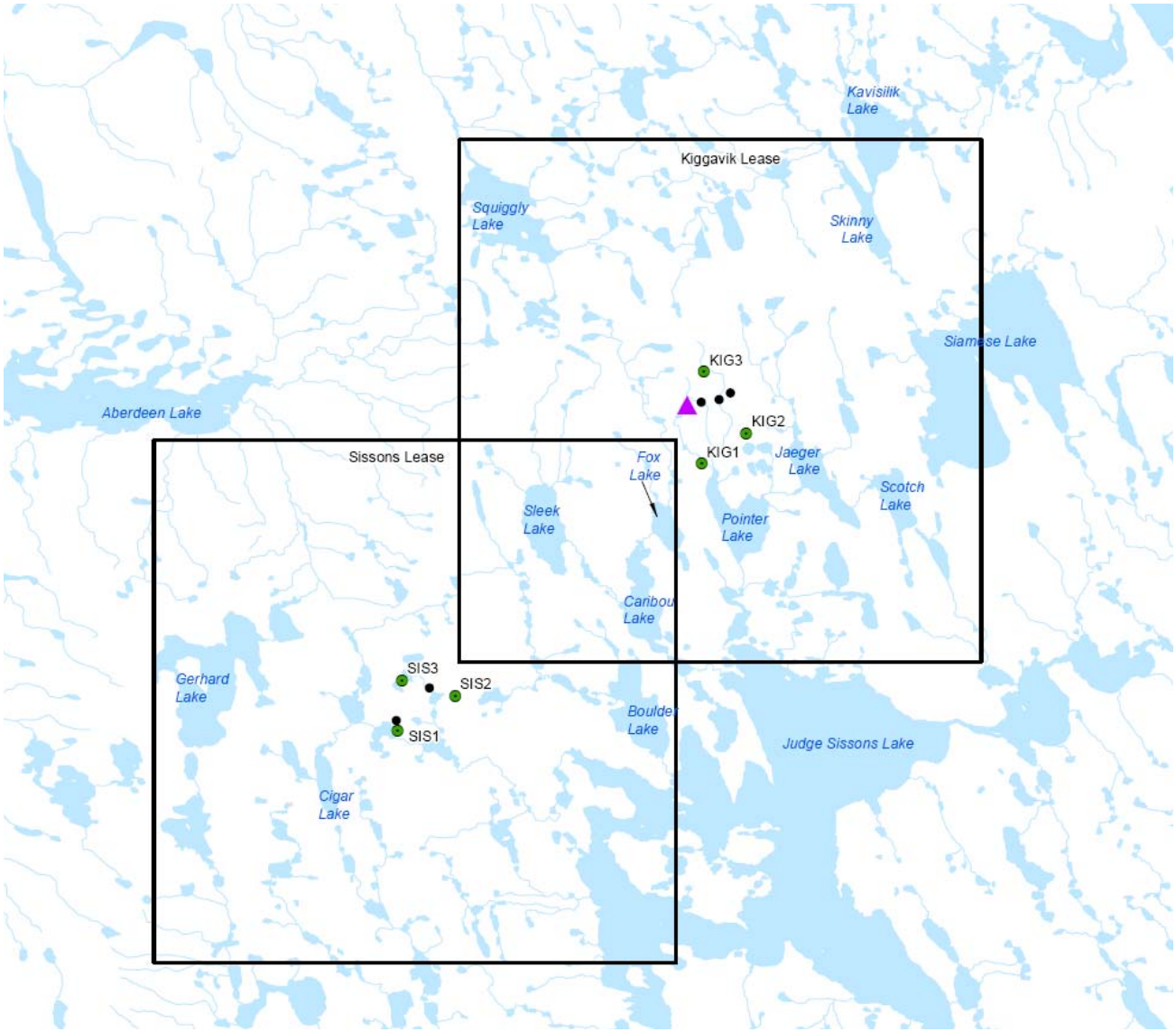

Figure 4.3-3: Permanent Sample Plot Locations For Vegetation and Soil Chemistry

5 WILDLIFE MONITORING AND RESULTS

As part of the monitoring program, independent wildlife monitors completed aerial and ground-based caribou surveys to determine the presence of caribou near exploration activities for the Project. Daily and weekly aerial surveys were completed within the Project area from July to September, 2007. Daily high-level (>300 m) reconnaissance surveys were completed in June and July to determine the presence of wildlife within 3.5 km of drilling activities. For the remainder of the field season, daily reconnaissance surveys were conducted during regular air transport of field personnel.

Weekly aerial surveys were flown by helicopter to determine the number, distribution, and group composition of caribou and muskoxen within the Project area. Surveys were completed within two survey blocks (20 km x 20 km) centered on the Kiggavik Lease and Sissons Lease. To limit the disturbance from aircraft on caribou, surveys were only completed in the block containing drilling operations (i.e., only one block was ever surveyed at one time). From July to September, a total of eight surveys were completed, which were typically flown at 150 m above ground level. Five of these surveys were flown in a north-south direction following a predetermined flight path using Global Positioning System (GPS) co-ordinates (i.e., systematic survey). Three surveys were flown in a circular pattern within the survey block (i.e., non-systematic survey).

All caribou and muskoxen within 600 m of either side of the helicopter were counted and the GPS location of groups, group size, group composition, dominant behaviour of the group, and habitat type were recorded. The composition of the groups was classified as nursery (groups with calves) or non-nursery (groups without calves). Dominant behaviour of the group was classified as feeding, bedded, standing, walking, trotting, or running.

Weekly aerial survey results for the five systematic surveys are presented in Table 5.4-1. Nineteen groups of caribou were observed during the surveys. Group size ranged from one to nine, and 95% did not contain calves (i.e., non-nursing). The majority of the caribou observed were either standing, feeding or bedded (67%), while 33% were moving (i.e., walking, trotting or running). Ten groups of muskoxen were also documented during the surveys. Group size ranged from 1 to 28 individuals, and 25% contained calves. A large proportion of muskoxen groups were feeding, bedded, or standing (90%).

Table 5.4-1

Weekly Aerial Survey Results for Caribou and Muskoxen

Survey Date	Surface Lease	Species	Number	Group Composition	Dominant Behaviour
10-Aug-07	Kiggavik	Muskoxen	1	non-nursing	walking
10-Aug-07	Kiggavik	Muskoxen	2	non-nursing	feeding
10-Aug-07	Kiggavik	Muskoxen	14	nursing	feeding
10-Aug-07	Kiggavik	Muskoxen	2	non-nursing	feeding
19-Aug-07	Kiggavik	Muskoxen	1	non-nursing	standing
19-Aug-07	Kiggavik	Caribou	1	non-nursing	running
28-Aug-07	Kiggavik	Caribou	1	non-nursing	standing
28-Aug-07	Kiggavik	Muskoxen	28	nursing	feeding
28-Aug-07	Kiggavik	Caribou	2	non-nursing	standing
28-Aug-07	Kiggavik	Caribou	3	non-nursing	feeding
28-Aug-07	Kiggavik	Muskoxen	1	non-nursing	standing
05-Sep-07	Sissons	Muskoxen	1	non-nursing	standing
05-Sep-07	Sissons	Muskoxen	1	non-nursing	standing
05-Sep-07	Sissons	Muskoxen	3	non-nursing	bedded
05-Sep-07	Sissons	Caribou	3	non-nursing	standing
05-Sep-07	Sissons	Caribou	1	non-nursing	walking
21-Sep-07	Sissons	Caribou	9	non-nursing	not recorded
21-Sep-07	Sissons	Caribou	5	nursing	not recorded
21-Sep-07	Sissons	Caribou	1	non-nursing	not recorded
21-Sep-07	Sissons	Caribou	5	non-nursing	not recorded
21-Sep-07	Sissons	Caribou	5	non-nursing	not recorded
21-Sep-07	Sissons	Caribou	1	non-nursing	not recorded
21-Sep-07	Sissons	Caribou	4	non-nursing	not recorded
21-Sep-07	Sissons	Caribou	1	non-nursing	not recorded
21-Sep-07	Sissons	Caribou	9	non-nursing	not recorded
21-Sep-07	Sissons	Caribou	2	non-nursing	not recorded
21-Sep-07	Sissons	Caribou	9	non-nursing	not recorded
21-Sep-07	Sissons	Caribou	2	non-nursing	not recorded
21-Sep-07	Sissons	Caribou	2	non-nursing	not recorded

Because the weekly surveys completed on July 21, July 27, September 9, 2007 were completed in a non-systematic manner (i.e., circular pattern), the results are considered as incidental observations. Incidental observations included all wildlife and groups of caribou off-transect or outside the survey block for both systematic and non-systematic aerial surveys (Table 5.4-2). During the surveys, grizzly bears were documented on two separate occasions, in addition to an inactive den located approximately 8.5 km south of the camp. Three groups of caribou comprising a total of 8 individuals were observed off-transect. No calves were present within these groups. Six separate observations of muskoxen were recorded off-transect, with 50% of these groups containing calves.

Table 5.4-2

Incidental Observations Recorded During Weekly Aerial Surveys

Survey Date	Surface Lease	Species	Number	Group Composition	Behaviour/Comments
21-Jul-07	Kiggavik	Muskoxen	1	non-nursing	feeding
21-Jul-07	Kiggavik	Arctic Fox	1	n/a	running
27-Jul-07	Kiggavik	Muskoxen	17	nursing	walking
27-Jul-07	Kiggavik	Muskoxen	1	non-nursing	bedded
27-Jul-07	Kiggavik	Caribou	2	non-nursing	running
19-Aug-07	Kiggavik	Muskoxen	22	nursing	bedded
28-Aug-07	Kiggavik	Muskoxen	16	nursing	standing
28-Aug-07	Kiggavik	Grizzly Bear	1	n/a	inactive den
05-Sep-07	Kiggavik	Grizzly Bear	1	n/a	walking
05-Sep-07	Kiggavik	Muskoxen	1	non-nursing	standing
05-Sep-07	Kiggavik	Grizzly Bear	1	n/a	walking
09-Sep-07	Sissions	Caribou	1	non-nursing	walking
09-Sep-07	Sissions	Caribou	5	non-nursing	not recorded
09-Sep-07	Sissions	Bald Eagle	1	n/a	flying

Ground-based monitoring completed by the independent wildlife monitors recorded the presence of caribou and muskoxen (and other wildlife) in the vicinity of the camp and drilling operations from June through September. These incidental observations included information on group size, group composition, and dominant behaviour. For caribou, 81 groups were observed, ranging in size from 1 to 19 individuals. Most of the groups (84%) did not contain calves, and 56% of the groups were feeding, bedded, or standing at the time of observation. Nineteen groups of muskoxen were observed, and ranged in size from 1 to 20 individuals. Groups with calves comprised 58% of the observations, and 58% of the groups were feeding, bedded, or standing at the time of observation. Other observations included four separate records of grizzly bears, and a single wolverine sighting. Incidents are defined as any wildlife interaction that requires a response by Project personnel, and may include simple deterrent measures, to the injury or death of an individual. In 2007, there were no wildlife incidents associated with the Project.

In the revised Wildlife Mitigation and Monitoring Plan that is being submitted for the 2008 field program, AREVA is proposing to discontinue the daily high-level (>300 m) aerial reconnaissance surveys used in June and July, 2007. AREVA has employed independent wildlife monitors from Baker Lake to help monitor and document wildlife habits. During the 2008 drilling program, AREVA proposes to monitor approaching caribou with the use of satellite collar information in conjunction with daily ground surveillance for caribou cows and calves, and observations during transport of contractors and site staff (see Section 3.1 and 5.1.1 of the Wildlife Mitigation and Monitoring Plan). A wildlife monitor will be notified of any wildlife identified and observations will be entered into the Wildlife Logbook. If caribou or muskoxen are

observed with these monitoring methods, then applicable mitigation measures will be implemented.

In 2008, weekly aerial surveys to monitor caribou within the Project area (mineral leases) will not be conducted. Instead, aerial surveys for caribou (and muskoxen) will focus on collecting baseline data to fulfill the expected requirements for an environmental impact assessment (see Section 5.1.2 of the Wildlife Mitigation and Monitoring Plan).

6 Effects of the Project on Human Health

6.1 Occupational Health and Safety Program

Health and safety activities at the Kiggavik Project are conducted in accordance with the Health and Safety Program and applicable regulations.

All employees and contractors working at the Kiggavik site received orientation and appropriate safety training prior to beginning work to ensure worker safety and protection of the environment. Employees and contractors were also required to participate in safety meetings (Safety Huddles) to discuss and reinforce safety issues.

Occupational health and safety was monitored and enforced by a full-time Environment, Health and Safety department.

There were no lost time accidents in 2007 involving AREVA Resources Canada Inc. personnel.

A summary of incidents occurred during the 2007 program is given in Table 6.1-1.

Table 6.1-1
Injury Summary for 2007

Group	First Aids	Medical Aids	Lost Time Accidents
AREVA	0	1	0
Contractors	2	2	0

During the 2007 program there were no dangerous occurrences as defined in the Nunavut Mine Health and Safety Regulations.

6.2 Radiation Protection

The Radiation Protection Plan for the Kiggavik Project is designed to meet the requirements of the applicable Nunavut Occupational Health and Safety Regulations, the Canadian Nuclear Safety Commission (CNSC) Regulations, exploration best practices and the AREVA Resources Canada Inc Integrated Quality System Manual (IQMS).

6.2.1 Administrative Elements

Program Documentation

The Radiation Protection Program for the Kiggavik is supported through a comprehensive series of work instructions for worker dosimetry, radiological monitoring and the safe handling of radioactive materials [reference RP Program].

Training

All AREVA employees and contractors working at the Kiggavik site received orientation and appropriate radiation protection training prior to beginning work to ensure worker safety and protection of the environment.

Personnel involved with the shipment of radioactive materials were required to have appropriate training and certification in the Transportation of Dangerous Goods (TDG).

6.2.2 Program Elements

Dosimetry Monitoring Program

Dosimetry monitoring is conducted to determine and document worker exposures to radiological components which include gamma radiation, radon progeny (RnP) and long-lived radioactive dusts (LLRD).

Worker doses to external gamma radiation are measured using optically stimulated luminescent dosimeters (OLDs) provided by the licensed dosimetry provider, Landauer. Workers handling and logging radioactive drill core and rock samples are also issued direct reading dosimeters (DRDs).

Worker doses to RnP and LLRD are estimated from accepted area monitoring techniques and occupancy time information. The estimation of worker doses to RnP and LLRD is only performed when working with mineralized core with contact dose rates exceeding 10 μSv/h [reference RP program – Work instruction EXP-740-03].

During the 2007 program, worker gamma doses for OLD series 997 dosimeters assigned in July ranged from 0.62 mSv to 2.02 mSv. The worker gamma doses from

OLD series 287 dosimeters assigned in September, ranged from 0 mSv to 0.02 mSv. The average OLD exposure during the program was 0.89 mSv[3]. It is acknowledged that the measured gamma dose for those individuals assigned series 997 dosimeters is artificially high as the dosimeters were not corrected for natural background. During processing by the dosimetry service provider, the control OLD dosimeter for this series (997) yielded anomalous results and therefore could not be used to accurately correct for natural background[4].

It is believed that the exposure results obtained from the OLD series 997 dosimeters are not representative of the actual exposures received by workers. Several individuals known to be working directly with radioactive core had lower measured gamma exposures than individuals who did not work with or in the vicinity of radioactive materials. Several of the highest OLD exposures recorded during the 2007 program were for individuals, such as helicopter pilots and camp workers, who spent little or no time near radioactive materials. In contrast, several of the workers assigned OLD dosimeters from series 287 did work with or around radioactive core. The gamma exposures from OLD series 287 were on average, 90 times smaller than the gamma exposures from OLD series 997. Even with the reduced wear period for the 287 series OLDs, one would not expect to see such a variation in exposure results. It is therefore believed that the series 997 dosimeters were either damaged prior to or contaminated during the 2007 program.

During the program, routine field measurements of gamma radiation dose rates ranged from 0.1 – 0.6 μSv/h with an average measured dose rate of 0.15 μSv/h. These measurements are in the range of natural background for the region. Based on these field measurements, it is believed that worker occupational doses to gamma radiation for those individuals assigned series 997 OLDs is more realistically around 0.1 mSv. This exposure is consistent with doses received at other similar exploration camps in Saskatchewan.

Worker doses from RnP and LLRD during the 2007 program were conservatively estimated from workplace monitoring to be less than 0.1 mSv and 0.2 mSv respectively.

No dosimetry action levels were exceeded during the 2007 program. The worker radiation doses observed during the 2007 program were well below regulatory dose limits for nuclear energy workers of 20 mSv.

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[3] The highest gamma dose reported, 2.02 mSv was flagged by the dosimetry provider during processing as an irregular exposure.

[4] The OLD control badge, serial number 9972059, had a measured background exposure of 0.79 mSv. The control badge was not used by the service provider as the measured exposure had an anomalous high beta radiation response. By comparison, the measured exposure from control badge 2877924 was 0.00 mSv.

6.2.3 Radiological Monitoring Program

Workplace monitoring

As part of the Radiation Protection Program, routine radiological monitoring is performed for gamma radiation, radon gas (Rn), radon progeny (RnP), and long-lived radioactive dust (LLRD) in order to detect potentially abnormal radiological conditions, estimate worker doses, and document radiological conditions [reference RP program document].

Radiological monitoring was conducted during the program at and around the drilling sites, in the camp and mobile core shacks and the driller dry shacks. A summary of the radiological monitoring results from the 2007 program is given in Table 6.2.3-1.

Table 6.2.3-1
Radiological Monitoring Results for 2007 Program

Radiation Type	Average	Maximum
Gamma (μSv/h)	0.15	0.60
Radon Gas (Bq/m^3)	15	30
Radon Progeny (WL)	0.0026	0.016
Long-Lived Radioactive Dust (Bq/m^3)	0.057	0.191

Gamma dose rate measurements ranged from 0.1 – 0.6 μSv/h with an average dose rate of 0.15 μSv/h. It is noteworthy that natural background gamma dose rates were observed in excess of 10 μSv/h around some drill sites and during the sitting of mobile structures. Gamma dose rates were typical of ambient background levels.

Indoor radon progeny measurements ranged from 0 – 0.016 WL with an average radon progeny potential alpha energy concentration of 0.0026 WL. Radon progeny levels were typical of natural background indoor levels.

Environmental radon gas measurements were collected around the Kiggavik site. Radon gas concentration measurements ranged from 15 – 30 Bq/m^3. The results are consistent with ambient background outdoor radon concentrations.

Long-lived radioactive dust concentrations ranged from 0.003 – 0.191 Bq/m^3 with an average concentration of 0.057 Bq/m^3. A number of slightly elevated LLRD samples were collected in the core shacks during the 2007 program. Upon further investigation, it was determined that the detection system used had been contaminated causing elevated readings.

Contamination Monitoring

Contamination control measures are implemented to minimize the spread of radioactive materials into unintended locations. Routine contamination monitoring was performed throughout the site including at the drill site, core shacks and at the camp facilities.

6.3 Conclusion

AREVA endeavors to take every reasonable precaution toward ensuring the protection and conservation of the natural environment and the safety and health of all employees and contractors from any potential harmful effects of uranium exploration activities. This commitment is reflected in AREVA's health and safety and environmental policies and is supported through a comprehensive Environment, Health and Safety Program for the Kiggavik Project.

Occupational health and safety and radiation protection programs were implemented to ensure work activities are performed in a safe and responsible manner and that workers are not adversely exposed to radiation from uranium exploration activities.

The uranium exploration activities conducted with the Kiggavik Project do not pose a significant health risk to people working with the project or living in nearby communities.

7 SUMMARY OF LOCAL HIRES AND INITIATIVES

7.1 General

An important aspect of the Kiggavik project is that it brings employment and business opportunities to local residents. In 2007, local people were hired for the pre-feasibility work carried out at the Kiggavik camp and to work in the Baker Lake office. Local companies were successful in winning contracts. In addition to providing direct employment and business contracts, the Kiggavik project sponsored several events in the Kivalliq region in 2007.

7.2 Local Employment

The Kiggavik project provided employment to local people through direct hiring as well as by hiring local companies to supply labour services to the project. During 2007, the project hired three local people directly – a Community Liaison Officer who worked afternoons throughout the year, a logistics assistant who worked part of the field season and a receptionist who worked for two weeks.

The project also contracted labour from four local companies for camp construction and renovations, camp operation, wildlife protection and kitchen support. This provided employment for an additional 37 people, 32 of whom were residents of Baker Lake or other communities in the Kivalliq Region.

Table 7.2-1 summarizes the employment provided to local people and employees of local companies during 2007.

Table 7.2-1
Local Employment for 2007

	Locally hired Workers		**Hours worked**	
	Number	**% Northerners**	**Number of Hours**	**% by Northerners**
Local AREVA Employees	**3**	**100%**	**1731**	**100%**
Locally Contracted Workers	**37**	**86%**	**8464**	**85%**
Total	**40**	**88%**	**10194**	**88%**

In addition to the employment listed here, the contracted work described in the next section also provided employment to residents of Baker Lake and other Kivalliq communities.

Camp Operator Roger Owingayak operating the generator at the Kiggavik site, Aug 2007


Wildlife Monitor Martin Kreelak observing caribou behaviour during a training session, July 2007

7.3 Locally Contracted Work

Many goods and services obtained for the Kiggavik project in 2007 were contracted to local suppliers. The total value of the local contracts in 2007 was $1.85 Million. The majority of this work went to companies with offices in Baker Lake. Some work including purchase of fuel, accommodation and meals and translation services were given to companies in other Kivalliq communities.

A listing of the work that was contracted to local companies in 2007 is as follows:

- Diesel fuel
- Jet fuel
- Expediting and transportation
- Aircraft charters
- Groceries
- Meals and accommodations
- Core box construction
- Construction materials
- Vehicle rental
- Translation services
- Cleaning services
- Camp construction and renovation
- Labour
- Office utilities

7.4 Sponsorships and Donations

The Kiggavik project sponsored community events in Baker Lake and other communities in the Kivalliq. Sponsorships were given to educational events, cultural events, celebrations and sport events. The list of events sponsored and donations given in 2007 is shown in Table 7.4-1.

Table 7.4-1

Sponsorships and Donations for 2007

Category	Organization	Activity	Date
Community	Baker Lake Hamlet	Hamlet Days Feast	May
	Baker Lake Hamlet	Square Dance at NPC Workshop	June
	Chesterfield Inlet Hamlet	Hamlet Days	May
	Search and Rescue	Air Support for Search	October
	Mayors Meeting	Coffee Break Sponsor	November
	Pre-Schoolers	Christmas Party	December
	RCMP	Christmas Food Drive	December
Sports and Recreation	Super Soccer	Games	April
	Chesterfield Inlet	Fishing Derby	May
	Chesterfield Inlet	Summer Games	August
	Women's Soccer	Games	August
	Minor Hockey	Games	December
Education	INAC	Highschool Calendar Contest	February
	Inuit Sivungiksavut	Trip	April
	Highschool Graduates	Trip	July
	Kivalliq Science Fair	Summer Camp	July
	Baker Lake High School	Award of Excellence	August
Culture	Inuit Heritage Centre	Mural at Airport	August
	Homecoming Society	Homeland Visit	June
Environment	Health Committee	Environmental Cleanup	June

8 SUMMARY OF COMMUNITY CONSULTATIONS

8.1 General

For the Kiggavik project to be successful, it will need the support of the people in the region. A key to gaining community support is dialogue and community involvement.

The project has engaged in a series of initiatives to inform, consult with and involve the community in the Kiggavik project. The initiatives and events carried out in 2007 to inform and involve various stakeholders are detailed in this section. Table 8.1-1 lists the communication and consultation activities carried out during 2007.

8.2 Information Office

An information office has been open since August of 2006. During 2007, this office was open to the public daily. A bilingual Community Liaison Officer was present each afternoon to speak with visitors to the office.

Baker Lake Information Office

8.3 Communication Liaison Committee (CLC)

The Kiggavik project established a community liaison committee in December 2006 as a means of keeping the community of Baker Lake involved in the Kiggavik project. The concept was endorsed by the Hamlet Council and committee members are appointed by their respective organizations. A community member is elected as co-Chair of the Committee. The other co-Chair is an AREVA representative.

The organizations represented on the CLC are:

- Hamlet Council
- Elders Society (Male and Female)
- Youth group (Male and Female)
- District Education Authority
- Hunter and Trappers organization
- Health Committee
- Justice Committee
- Business community
- Aberdeen Lake people

During 2007, the Baker Lake CLC met on 10 occasions. The meetings dates are shown on Table 8.1-1. Meetings were held at the Kiggavik Information Office usually in the evening. The meetings were open to the public. Prior to the meetings, announcements were made on the local radio with the date, time and location of the meetings. Following the meetings, radio announcements were also made with a summary of the meetings. Translation was provided and minutes were kept of each meeting.

The Baker Lake CLC provided community advice to the Kiggavik project throughout 2007. Issues discussed in detail at the meetings included:

- Possible road routes to the Kiggavik site and the means to obtain broad community input on this important topic,
- IQ interviews, how they should be conducted, who should be interviewed and what questions should be asked,
- archaeological studies and artefacts encountered (The CLC received a presentation by the consultant performing the work.),
- Environmental Baseline Monitoring (The CLC received a presentation by the consultant performing the work.),
- Wildlife Monitoring and surveys (The CLC received a presentation by one of the Wildlife Monitors), and;
- How fuel is stored in Baker Lake.

The CLC visited the Kiggavik site on August 12, 2007. A CLC member appointed by the committee attended the Nunavut Mining Symposium in Iqaluit in April and another attended the Geoscience Forum in Yellowknife in November. A CLC member was scheduled to attend PDAC in March but was unable to travel due to weather. The CLC Chair made at presentation about the work of the group at the NPC Uranium Workshop held in Baker Lake in June 2007.

A CLC Meeting at the Baker Lake Information Office, February 2007

CLC members observing cores at the Kiggavik site, August 2007

8.4 Regional Liaison Committee and Regional Visits

In addition to the Baker Lake CLC, a regional committee was formed in 2007. This committee consists of one representative from each Kivalliq community appointed by the

Hamlet Councils. This committee is a means of ensuring ongoing communication between the Kiggavik project and Kivalliq communities. The regional committee will likely meet 3 or 4 times per year. Minutes are kept of the meetings.

The Regional liaison committee held its first meeting in Rankin Inlet in December. Topics highlighted as important and to be discussed further include:

- Plans for the Kiggavik Project
- Ongoing communication with each community
- Training and development of people
- Business opportunities

The Kiggavik project visited communities other than Baker Lake during 2007 and made presentations. The following visits were made:

- Rankin Inlet Council
- Chesterfield Inlet (2 visits)
- Chesterfield Inlet Community Meeting
- Arviat Council (2 visits)
- Whale Cove Council

Regional Liaison Committee meeting, Rankin Inlet, Dec 07

8.5 Homeland Visits

An initiative to bring people with close ties to the area where the Kiggavik project is located to see the project site and visit their traditional homeland began in 2006 and continued in 2007. A total of 17 people participated in 2006. An additional 4 people

participated in 2007. In August, AREVA Community Liaison Officer William Noah hosted four members of a family on a visit to their former homeland at Shultz and Aberdeen Lakes and to the Kiggavik site. This program will continue in future years.

Visit to Shultz and Aberdeen Lake

8.6 Participation in Inuit Organization and IPG Initiatives

Kiggavik Project staff participated in information and consultation events pertaining to uranium mining sponsored by the Kivalliq Inuit Association, Nunavut Tunngavik Incorporated and the Nunavut Planning Commission. This participation is summarized below.

KIA

In April of 2007, KIA sponsored a series of Uranium Information sessions in Rankin Inlet, Chesterfield Inlet, Arviat, Whale Cove, Repulse Bay and Coral Harbour. These information sessions were public meetings. They consisted of a presentation by SENES Consultants Limited about uranium mining, a presentation by the CNSC on regulation of uranium mining, and a presentation by AREVA on the Kiggavik project. These meetings were attended by approximately 350 people.

AREVA also gave project update presentations to the KIA Board at a special meeting in January 2007 and at the Annual General Meeting in October 2007.

KIA Uranium Information Session in Repulse Bay, April 2007

Nunavut Tunngavik Incorporated Consultations

In June 2007, Kiggavik Project staff participated in public meetings held in Baker Lake and Kugluktuk by the Land Planning and Advisory Committee of NTI about the NTI draft Uranium Policy. AREVA gave a presentation on Exploration Overview and the Saskatchewan Experience. SENES gave a presentation on uranium mining and the CNSC gave a presentation on regulation of the uranium industry.

Nunavut Planning Commission Workshop

AREVA participated in a Uranium Workshop held in Baker Lake in June. The Workshop was sponsored by the Nunavut Planning Commission. AREVA gave presentations on caribou protection, community relations, Health and Safety, Environmental Mitigation, Employment and Business Opportunities and AREVA participated in the discussion groups. The Chair of the Community Liaison Committee gave a presentation on CLC

activities. This workshop gave participants and observers an opportunity to hear many views on uranium mining over three days.

8.7 Wildlife Organizations

Baker Lake HTO

In May 2007, the Kiggavik project arranged a meeting between the Baker Lake Hunters and Trappers Organization and traditional aboriginal hunters from Saskatchewan who have lived with uranium mining and do not work for the mining companies. This meeting was requested by the Baker Lake HTO. The Athabascans described their experiences over many decades to the HTO. While in Baker Lake, the Athabascan hunters also held a meeting with the Baker Lake Concerned Citizens Committee and they addressed several hundred Baker Lake residents at the Hamlet Day Community Feast. The Baker lake HTO took the Athabascans on a caribou hunting trip.

The Baker Lake HTO maintains ongoing communication with the Kiggavik project through its member on the Community Liaison Committee.

In April 2007, the Kiggavik Project gave a presentation on the Kiggavik Project and its wildlife protection measures to the Kivalliq Wildlife Management Board.

BQCMB

The Kiggavik project attends meeting of the Beverly and Qamanirjuaq Caribou Management Board, a co-management board with citizen and government representatives from Nunavut, the Northwest Territories, Saskatchewan and Manitoba. During 2007, project staff attended meetings in Thompson and Winnipeg. Project updates including caribou protection updates were given, and AREVA entered into a cooperative research agreement with the BQCMB, whereby AREVA contributes research funds for projects that are agreed between the parties.

Meeting between the Baker Lake HTO and Athabascan Hunters, May 2007

8.8 Minesite Tour

Tours of Saskatchewan uranium mines resumed in 2007 with a tour of Nunavut Planning Commission staff and Commissioners touring the underground mine at McArthur River, the open pit uranium mine and the mill at McClean Lake and the decommissioned mine and mill at Cluff Lake. Tours of uranium mines will continue in 2008.

NPC Tour of McArthur River, September 2007

8.9 Highschools

On March 1st, presentations were made to two classes at the Chesterfield Inlet High School. A project overview, job opportunities and educational requirements were topics of discussion.

On August 25th, the AREVA Award of Excellence was given to the Baker Lake graduating high school student with the highest marks in math, science and Inuktitut. This was the second year this award was presented at the high school graduation.

8.10 Other Communication Events

Other events and audiences in Nunavut where a presentation about the Kiggavik project was made to a group of people included:

- March 26th-28th – Kivalliq Chamber of Commerce, Rankin Inlet, Workforce Estimates
- April 16th-19th – Nunavut Mining Symposium, Iqaluit, Project Update and Community Initiatives
- August 10th – Public Meeting in Baker Lake, Archaeological Findings
- November 14th – Mayors Meeting, Project Update
- November 14th – Inuit Heritage Trust, Archaeological Work

Table 8.1-1

Community Information, Involvement and Consultation Events in 2007

Date	Location	Audience	Purpose/ Topic
Jan 9	Rankin Inlet	KIA Board	Project update
Jan 15	Baker Lake	CLC	Regular meeting/ membership additions
Feb 13	Baker Lake	CLC	Regular meeting/ possible road routes (filmed by CBC)
Feb 28	Arviat	Hamlet Council	Project overview
Mar 1	Chesterfield Inlet	Hamlet Council	Project overview
Mar 1	Chesterfield Inlet	Highschool	Project overview, job opportunities
Mar 26	Rankin Inlet	Hamlet Council	Project overview
Mar 26-28	Rankin Inlet	Kivalliq Chamber of Commerce	Project update/ workforce estimates
Mar 30	Baker Lake	CLC	Regular meeting/ possible road routes, arch monitoring and wildlife
Apr 10	Rankin Inlet	Public meeting	KIA Uranium Information session - Project Overview
Apr 11	Chesterfield Inlet	Public meeting	KIA Uranium Information session - Project Overview
Apr 12	Arviat	Public meeting	KIA Uranium Information session - Project Overview
Apr 12	Whale Cove	Public meeting	KIA Uranium Information session - Project Overview
Apr 13	Repulse Bay	Public meeting	KIA Uranium Information session - Project Overview
Apr 13	Coral Harbour	Public meeting	KIA Uranium Information session - Project Overview
Apr 16-19	Iqaluit	Nunavut Mining Symposium	Project update and Community Initiatives (in Inuktitut)
Apr 23	Baker Lake	CLC	Regular Meeting- Archaeological surveys, environmental baseline monitoring, traditional knowledge and job opportunities
Apr 24	Arviat	Hamlet Council	2nd meeting
Apr 25	Rankin Inlet	Kivalliq Wildlife Management Board	Project Overview - Wildlife Protection Measures
May 4	Baker Lake	Hunters and Trappers	Athabasca Traditional Hunters meeting - experiences with uranium mining
May 7	Baker Lake	Concerned Citizens Committee	Hosted Athabasca Traditional Hunters meeting
May 7	Baker Lake	Hamlet Feast	Athabasca Traditional Hunters speak
May 28	Baker Lake	Public Meeting	NTI Consultation Session – Project and exploration overview
May 29	Kugluktuk	Public meeting	NTI Consultation Session – Project and exploration overview
Jun 4-7	Baker Lake	NTI Workshop	Presentations on caribou protection, Community Liaison Committee, community relations, Health and Safety, Environmental Mitigation, Employment and Business Opportunities
Jun 5	Thompson, MB	BQCMB meeting	Project update - Caribou Protection Measures and cooperative research.
Jun 25	Baker Lake	CLC	Regular meeting – drilling program, environmental baseline monitoring, traditional knowledge sessions, independent wildlife monitors, local employment.
Aug 6	Chesterfield Inlet	Public Meeting	Project Overview and update
Aug 6	Baker Lake	CLC	Regular Meeting – presentations by Golder on Archaeological work, the Kiggavik Environment and Radiation Coordinator on this work, Traditional Knowledge, and Wildlife Monitoring
Aug 9	Whale Cove	Council	Project Overview and Update
Aug 10	Baker Lake	Public Meeting	Findings of Archaeological Surveys
Aug 12	Kiggavik	CLC	CLC visited Kiggavik camp and drilling program
Aug 17	Shultz Lake	Shultz Lake People	Visit to traditional homelands in Shultz and Aberdeen Lakes
Aug 25	Baker Lake	Highschool	Presentation of Award of Excellence
Sep 11-13	Sask Mines	Nunavut Planning Commission	Tour of McClean Lake, McArthur River and Cluff Lake
Sep 20	Baker Lake	CLC	Regular meeting – Presentation by Golder on Environmental Baseline Monitoring, discussion on Traditional knowledge, and a public meeting on road options.
Oct 22	Baker Lake	CLC	Regular meeting – archaeological reports, fuel storage and roads
Oct 24	Rankin Inlet	KIA Annual General Meeting	Project Update
Nov 6-8	Winnipeg	BQCMB	Project update, caribou protection measures and joint research
Nov 14	Baker Lake	Mayors Meeting	Project Update
Nov 14	Baker Lake	Inuit Heritage Trust meeting	Archaeological work at Kiggavik
Nov 16	Baker Lake	CLC	Regular meeting – archaeological studies, traditional knowledge
Nov 20-22	Yellowknife	Geoscience Forum	Presentation on Involving the Community in the Kiggavik Project
Dec 3-4	Rankin Inlet	Regional Liaison Committee	Initial meeting – Employment, business training and communication
Dec 19	Baker Lake	CLC	Regular meeting – AREVA Viability decision

9 INSPECTIONS

9.1 Conducted by Regulatory Bodies

Land Use Inspectors visited the Kiggavik Project site two (2) times during the 2007 field season, on June 27th, 2007 and August 14th, 2007. An inspection was conducted by Andrew Keim on June 27th, 2007. The Industrial Water Use Inspection Report received at the time of inspection indicated the General Condition of the camp to be acceptable. The following is a list of recommendations provided on the Inspection Report and associated actions taken:

RECOMMENDATIONS/CONCERNS	ACTION TAKEN
Relocate incinerator farther away from water body	Completed
Install urinals in latrine	Completed
Address garbage issue (at time of camp ramp-up; incinerator not operational at inspection time)	Incineration and proper sorting and storage
Address fuel storage	All fuel is stored within secondary containment

A formal inspection report was received on September 21st, 2007, highlighting the June 27th, 2007 site inspection.

RECOMMENDATIONS/CONCERNS	ACTION TAKEN
Concerns regarding water supply source volume	Daily inspections and monitoring by site staff
Install flow meters on pump lines	Completed
Incinerator to meet CWS for Dioxins and Furans and the CWS for Mercury Emissions	Development and implementation of a Waste Management Plan that involves adequate waste diversion and sorting prior to incineration
Concerns over location of grey water sump	Relocated and marked. No further concerns during subsequent site visits
The required Uranium Exploration Plan had not yet been received at time of inspection	Submitted to the NWB October 17th, 2007
Filing of contaminated drill cuttings spill report not yet received	In progress; discussed in Section 13 Reportable Spills
Spill report of fuel spill not yet received	In progress; discussed in Section 13 Reportable Spills
Elevated HEM of potable water supply source	Initiated internal lab investigation – results indicate that the sample was subject to error

A second inspection was conducted by David Ningeongan of INAC on August 14th, 2007. The Industrial Water Use Inspection Report received at the time of inspection indicated the General Condition of the camp to be acceptable. The following is a list of recommendation provided on the Inspection Report and associated actions taken:

RECOMMENDATIONS/CONCERNS	ACTION TAKEN
Installation of water meters for potable water	Water meters installed on water pump
Install grey water sump, sufficient to collect solids from kitchen run-off	Placed in natural low-lying depression; has since been inspected with no concerns
Relocate drill supply pump and heater at least 30 meters from high water mark; clean up any contaminated soil and replaced with gravel	Completed

9.2 Conducted by Site EHS Personnel

The EHS Group conducted daily safety and environmental inspections of the Project site, including camp, drill sites and other activities being conducted. Inspection items include but are not limited to the following:

- personnel safety,
- proper PPE,
- availability of and proper operation conditions of first aid kits, smoke detectors, carbon monoxide detectors, air horns, fire extinguisher,
- condition of fuel caches and their contents,
- condition of hazardous materials,
- condition and contents of spill supply kits, and;
- general condition of the camp.

Upon inspection the items receive a satisfactory or not satisfactory standing. All items given a not satisfactory standing are reported to the areas designated employee/supervisor or the site manager and followed up as soon as responsibly possible pending level of priority.

The EHS Group is also responsible for conducted daily Radiation Protection checks. These checks include verification that all site employees are wearing proper PPE, operation of the core logging facility is adequate and the storage of radioactive materials is being conducted as per described in work instructions and procedures.

Each item receives a complete or not complete status, all not complete items are reported to the areas designated employee or the site manager and followed up as soon as responsibly possible pending level of priority. Daily checksheets are completed and filed with the EHS group.

10 PROGRESSIVE RECLAMATION

As discussed in the Abandonment and Restoration Plan, it is AREVA's intentions to establish chemical and physical stability at all sites impacted by exploration activities, to the greatest extent practical. However, due to challenges surrounding physical reclamation of surface disturbance the primary focus is currently on chemical stability. All drill sites from the current year's field program are inspected for fuel stained soil and undergo a gamma survey for radioactive contamination. Contaminated soil or cuttings are collected in appropriate containers and stored in the long-term core storage area for future handling.

Drill sites must be cleaned to the extent that gamma dose at a height of 1 metre from surface is less than 1 µSv/h. To the greatest extent possible, all residual radioactive materials accumulated during drilling are disposed of down the drill hole. Where this is not practicable, radioactive material is collected, appropriately packaged and stored in the existing core storage areas. Gamma radiation levels at 1 m from the surface of the core storage area should be reduced to 1 µSv/h and in no instances exceed 2.5 µSv/h. As is necessary, residual radioactive material will be transported to the McClean Lake Operation for storage and disposal.

10.1 Chemical and Radiological Restoration

All drill sites are subject to gamma surveys prior to conducting any drilling activities and again following the completion of the hole. If elevated levels of gamma radiation are detected, clean-up activities are conducted followed by another gamma survey to ensure levels are below 1 µSv/h.

A simple gamma radiation survey was conducted in the vicinity of each borehole and along the discharge route of the drilling water. Readings with an Automess 6150 AD 6 were made at one meter above the ground at approximately five meter intervals.

A summary of the gamma survey data collected at each drilling location from the 2007 field season is presented in Table 10.1-1. Drill hole locations are presented for the Kiggavik (Figure 10.1-1) and Sissons (Figure 10.1-2) drill sites.

Table 10.1-1

Gamma Survey Data from 2007 Drill Locations

Drill Site	Date	Dose Rates (μSv/h)	Comments
MZ-07-01	07/09/07	0.1 - 0.4	
MZ-07-03	07/09/07	0.1 - 0.4	
MZ-07-04	07/09/07	0.1 - 0.5	
MZ-07-05	08/09/07	0.5 – 12.2	With the exception of a few locations, virtually all of the readings are above the normal area background. The area is in the center of the most elevated surface manifestation (outcropping) of uranium ore in the region. Post operational levels are considered at natural background, despite exceeding 1 μSv/h.
CZ-07-01	07/09/07	0.1 – 0.7	Residues from many historic boreholes are present throughout the area.
CZ-07-02	07/09/07	0.1 – 1.5	Ten elevated readings ranging between 0.9 μSv/h and 1.5 μSv/h were present in the south-west corner of the surveyed grid. This area consists of residue from historic boreholes upstream from the current drilling water discharge. The survey also indicated that gamma dose rates are elevated in nearby undisturbed areas.
ANDW-07-01	13/09/07	0.1 – 1.0	One reading of 1 μSv/h located directly adjacent to the borehole.
ANDW-07-02	28/09/07	0.1 – 1.0	
ENDG-07-01	28/09/07	0.1 – 0.2	

MZ-07-01

The gamma survey conducted at this site on September 7th, 2007 indicate all readings to be at background values, ranging between 0.1 μSv/h and 0.2 μSv/h, except at two locations upstream of the borehole where there is evidence of historic drilling activity the measurements were 0.4 μSv/h.

MZ-07-03

The gamma survey conducted at this site on September 7th, 2007 indicate all readings to be at background values, ranging between 0.1 μSv/h and 0.2 μSv/h, with one measurement of 0.4 μSv/h. All measured dose rates were below 1 μSv/h.

MZ-07-04

The gamma survey conducted at this site on September 7th, 2007 indicates that most readings are at background values, ranging between 0.1 µSv/h and 0.5 µSv/h. All measured dose rates were below 1 µSv/h.

MZ-07-05

The gamma survey conducted at this site on September 8th, 2007 indicated gamma dose rates ranged from 0.5 – 12.2 µSv/h. With the exception of a few locations at the east end of the survey perimeter, nearly all of the readings are above the 1 µSv/h. The area is in the center of the most elevated surface manifestation (outcropping) of uranium ore in the region resulting in elevated natural background levels. The elevated gamma dose rates are not believed to be a result of exploration activities.

CZ-07-01

The gamma survey conducted at this site on September 7th, 2007 indicate all readings to be at background values and below 1 µSv/h, ranging between 0.1 µSv/h and 0.7 µSv/h, with one measurement of 0.5 µSv/h and 0.7 µSv/h.

Residues from many "historic" boreholes are also present throughout the area.

CZ-07-02

Gamma dose rates ranged from 0.1 – 1.5 µSv/h. Ten elevated readings ranging between 0.9 µSv/h and 1.5 µSv/h were observed in the south-west corner of the surveyed grid. This area consists of residue from historic boreholes upstream from the current drilling water discharge. Undisturbed areas with elevated background levels were also identified during the survey.

ANDW-07-01

The gamma survey conducted at this site on September 13th, 2007 indicates that residual levels are consistent with background values and are below 1µSv/h in the discharge areas, with one exception of a reading of 1µSv/h located directly next to the borehole. Gamma does rates ranged from 0.1 µSv/h to 1.0 µSv/h.

ANDW-07-02

Gamma dose rates ranged from 0.1 – 1.0 μSv/h. All measured dose rates were below 1 μSv/h with the exception of one reading of 1uSv/h located adjacent northwest of the borehole.

ENDG-07-01

Gamma dose rates ranged from 0.1 – 0.2 μSv/h. All measured dose rates were below 1 μSv/h.

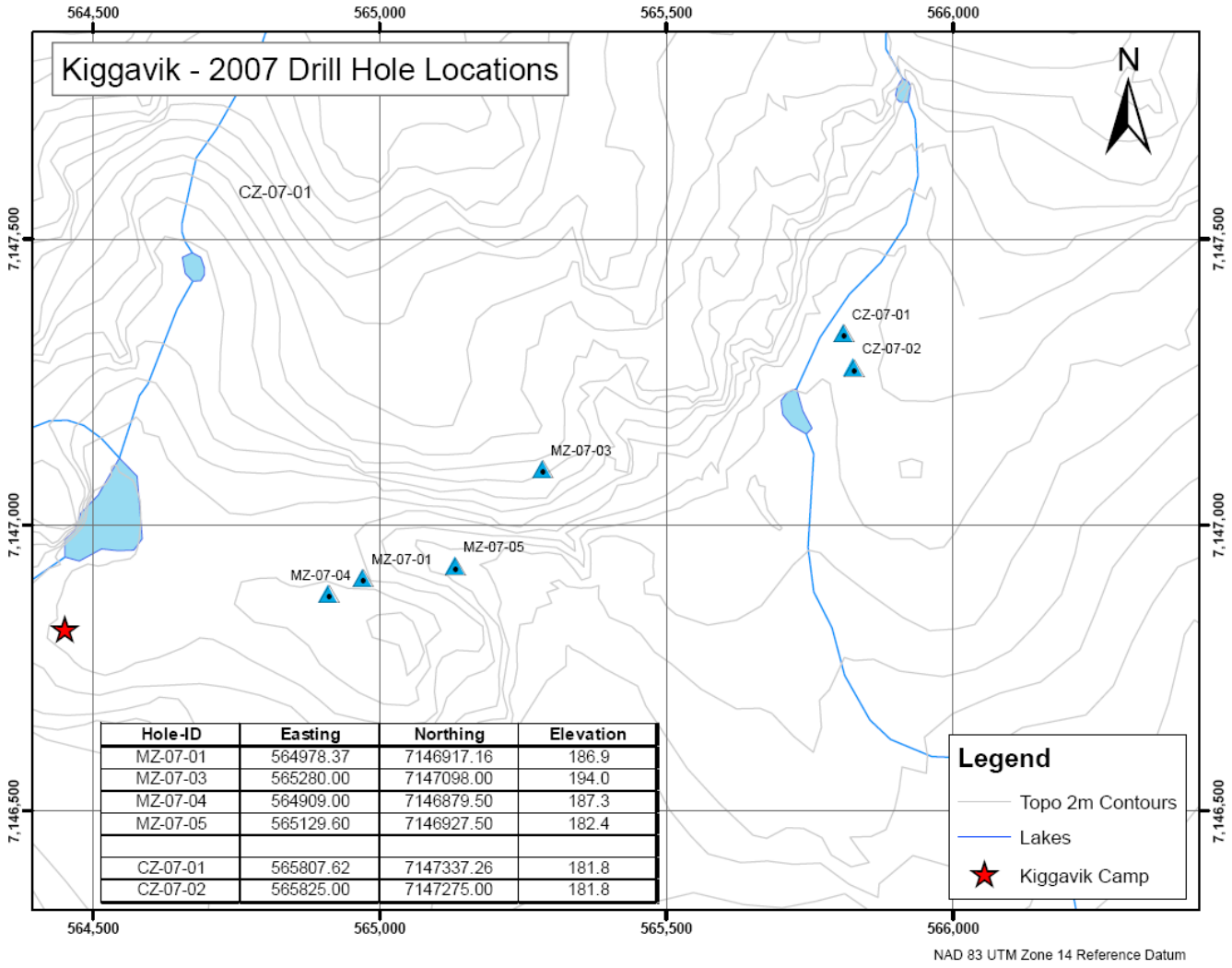


Figure 10.1-1 Kiggavik - 2007 Drill Hole Locations

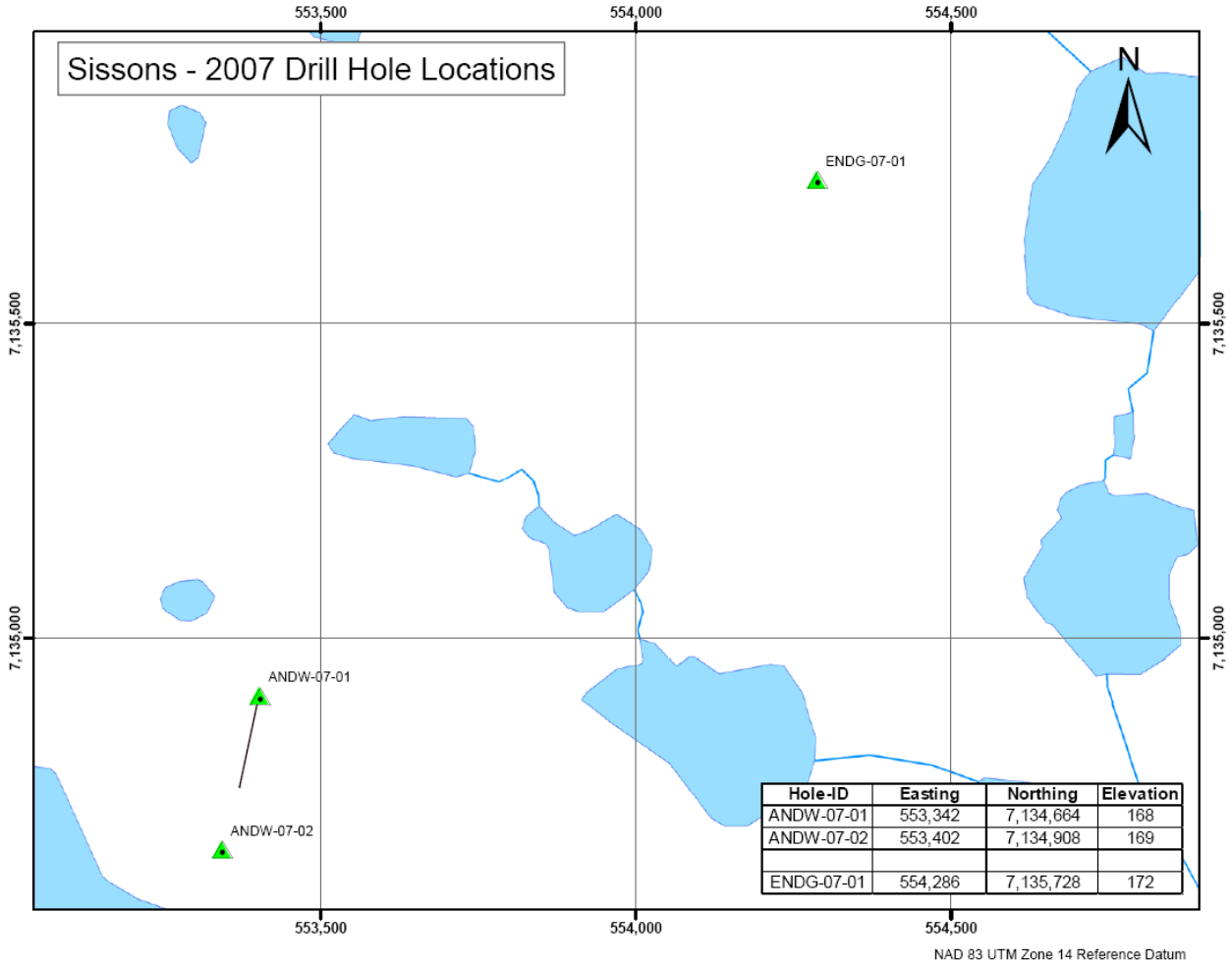


Figure 10.1-2 Sissons - 2007 Drill Hole Locations

10.2 Physical Reclamation

As discussed in Section 3.4.2 of this report and in the Abandonment and Restoration Plan, it is AREVA's intention to reclaim surface disturbed sites in an acceptable manner. This procedure is currently being investigated and will be implemented under the direction and approval of experienced consultants, community members and regulatory agencies. Restoration work will be completed prior to the expiry of the Land Use License.

Example of surface disturbance from an old building that was removed in 2003 and 2004. Reclamation options are being investigated.

11 CANADIAN WIDE STANDARDS

Efforts being made to meet the Canadian-Wide Standard (CWS) for Dioxins and Furans and the CWS for Mercury include the development and implementation of a Waste Management Plan involving waste diversion and sorting prior to incineration. The only allowable materials to be incinerated include paper, food waste, non-treated wood and solid sewage waste. Air emissions sampling will be considered when developing an environmental monitoring plan and will be conducted if deemed necessary.

12 COMPLIANCE WITH CONDITIONS

The following is a list of conditions made in the Nunavut Impact Review Board's Screening Decision, the INAC Land Use Permit, the KIA Land Use Licence and the NWB's Water Licence for the Kiggavik Project and associated activity to indicate compliance.

12.1 Nunavut Impact Review Board Screening Decision

RECOMMENDATION/CONDITION	COMPLIANCE ACTION
Protection measures for Beverly Caribou and the Thelon Heritage River	Development of Operational Plans (known now as Environmental Protection Plans); Environmental Code of Practice; Environmental Policy; work instructions; employee/contractor training and awareness
INAC conducted Land Use Inspections	Occur throughout field season, followed by a Inspection Report, AREVA strives to promptly follow-up on all recommendations/concerns/deficiencies
Additional work outside the original scope of the project proposal requires screening by NIRB; NIRB recommends any renewal request to be forwarded to them	Continual communication efforts are made with all regulatory agencies and boards
KIA imposed mitigation measures and or Environment Terms and Conditions pursuant to the IOL License	Development of Operational Plans (known now as Environmental Protection Plans); Environmental Code of Practice; Environmental Policy; work instructions; employee/contractor training and awareness
GN – DOE CO's should conduct random inspections of the location from May to August to monitor compliance with DIAND Caribou Protection Measures	Inspections are expected during the 2008 field season.
GN-DOE should conduct on-going review of wildlife monitoring results	Results are submitted to the DOE on a regular basis
After receiving the annual report GN-DOE should report to NIRB and INAC its findings regarding the possible impact of the project on the Beverly and Ahiak caribou herds	Yet to Occur
AREVA to maintain a copy of Screening Decision at site	Located in site office
AREVA is to forward copies of all permits obtained and required for the project	Completed July 11th, 2007
AREVA shall operate in accordance with	AREVA is committed to achieving

commitments made in all the Operation Plans	compliance and attempts to adhere to these conditions; however a number of the documents required revisions as a result of logistical challenges and continual improvement objectives
Shall abide by DIAND Caribou Protection Measures	These are addressed in the Wildlife Mitigation and Monitoring Plan;
Prohibited to allow aircraft to take-off or land if groups of caribou are within 1 km of the airstrip or helipad.	Addressed in the Wildlife Mitigation and Monitoring Plan; pilots receive training and awareness; AREVA has hired an independent wildlife monitor
Ensure no hunting or fishing without proper Nunavut authorizations	Enforced to employees and contractors through orientation and on-going awareness
Compliance with the *CWS for Dioxins and Furans*, and the *CWS for Mercury*	Development and implementation of a Waste Management Plan involving waste diversion and sorting that occurs prior to incineration
Adherence to conditions in the *Archaeological and Palaeontological Resources*	Addressed through training and awareness; hiring of a independent consultant to conduct heritage surveys and investigations
Shall avoid known archaeological and or palaeontological sites	Record of known sites is kept updated and avoided or handled with accordingly by consultants and proper authorities

12.2 Indian and Northern Affairs Conditions of Land Use Permit #N2006C0037

RECOMMENDATION/CONDITION	COMPLIANCE ACTION
Shall not conduct land use operation on any lands not designated in accepted application	Plans are made for activity only on approved leases
Shall remove all scrap metal, machinery parts, barrels and building and building materials	Development of a Waste Management Plan and a Abandonment and Restoration Plan to address these issues; efforts are being made to identify local approved handling facilities
Locate all camps on durable land	Camp location has been inspected and approved by regulatory agencies
Advise a Land Use Inspector at least 10 days prior to completion of land use operation	Seasonal shutdown management has been reviewed with regulatory agencies
Shall complete all clean-up and restoration of lands prior to expiry date of permit	Development of a Seasonal and Final Abandonment and Restoration Plan
Only allowed the use of equipment that is listed in the accepted application	AREVA abides by this and has made amendment requests seeking approval for additional equipment prior to its

	purchase/arrival on site
Burn all combustible garbage in a acceptable container	An approved incinerator is used for burning
Not locate any sump within 31 meters of normal high water mark	Addressed through site planning
Backfill and restore all sumps prior to expiry date of permit	Addressed in Abandonment and Restoration Plan
Housekeeping	Addressed through formal daily site inspections conducted by EHS group
Not use unapproved chemicals	Comply with list provided in application
Deposit all sewage in sump	Received verbal approval from inspector to incinerate solid sewage waste and discharge liquid waste with grey water
Not to allow the spreading of drilling waste on surrounding lands	Drill waste is disposed of down hole when achievable or collected and stored in long-term storage facility
Burn all garbage at least daily	Is occurring
Remove all noncombustible garbage and debris from land use area to an disposal site approved in writing by a Land Use Inspector	Currently being segregated and stored for future removal off-site; some items are being backhauled off-site
Report all spills immediately	Development and implementation of a Spill Contingency Plan; training and awareness
Shall not unnecessarily damage wildlife	Development and implementation of Wildlife Mitigation and Monitoring Plan; training and awareness
Shall not feed the wildlife	Enforced through site orientation, training and awareness
Provide in writing the location of all fuel caches within 10 days of establishment	Completed
Fuel storage must be a minimum of 30 meters from normal high water mark	Instructed through Environmental Management Plans and adhered to through site planning
Mark all fuel containers with name	Is occurring
Display land use permit number on all vehicles and equipment	Currently no vehicles or equipment on site
Dispose of drill mud solids or cuttings with uranium concentration >0.05% down hole	Occurs when possible, when not achievable the material is collected in bags and stored in proper facility
Seal by grouting entire mineralization zone and greater than 10 meters both above and below each mineralization zone, any drill hole that encounters mineralization with a uranium	Committed to conduct when required and achievable

content greater than 1.0% over a length of >1 meter, and with a meter-percent concentration >5.0	
Seal by cementing, all drill holes by grouting to an appropriate depth from the surface such that surface waters are prevented from interacting with ground waters	Committed to conduct when required and achievable
Conduct radiometric surveys following backfilling of site	Conducted upon completion of hole – results discussed in 2007 Annual report
Ensure gamma radiation levels of core storage meet the decommissioning requirements of less than 1.0 μSv one meter from surface, not to exceed 2.5 μSv	Conducted as part of routine monitoring schedule
Convert instruments to measure radiation counts per second to μSv/h	Automess has a readout in uSv/h

12.3 Kivalliq Inuit Association Land Use License #KVL306C02

The Land Use License issued by KIA did not list any additional conditions to those brought forward in the NIRB screening decision.

12.4 Nunavut Water Board Licence No. 2BE-KIG0708

RECOMMENDATION/CONDITION	COMPLIANCE ACTION
File an annual report by March 31st	To be completed
Notify NWB of any changes in operating plan	Continual communication efforts are made with all regulatory agencies and boards
Install flow meters for measuring water volumes	Complete and inspected
Copy of Licence is maintained at site	Available in site office
Obtain all water from small unnamed lake	Being conducted and monitored
Streams cannot be used as a water source	Not required
Notify NWB of potential drawdown of a water source within 30 days of its occurrence	Not yet required
Water intake hoses have screens of appropriated mesh size	Completed
Remove any material from below the ordinary high water mark of any water body	Training and awareness. Inspections are conducted to note non-compliance
Shall not cause erosion to banks of any body of water	Currently not an issue
Implement sediment and erosion controls	Currently not an issue

prior to and maintained during operation	
Waste disposal is a minimum of 30 m form high water mark	Training and awareness. Inspections are conducted to note non-compliance
No open burning or on-site land filling	On-site incinerator; development and implementation of a Waste Management Plan
Provide authorization from the community of Baker Lake prior to backhauling any waste	Received written consent from Baker Lake, forwarded to NWB
Waste manifesting	Process has been initiated and will be further developed prior to the 2008 field season
Backhaul and dispose of all hazardous wastes, waste oil and non-combustible waste in an approved waste disposal site	Waste management and sorting is addressed in the Waste Management Plan; local approved waste disposal/handling sites are currently being identified
Contain all greywater in a sump 30 m from high water mark	Currently greywater is being placed in a natural depression; metal screen collects solids in discharge and then is collected and incinerated – approved by Inspector
Handling of toilet wastes	Rather than incinerator toilets, solid sewage waste is collected and incinerated
No camps or stored material on frozen streams or lakes	Operation is seasonal from May to September. Enforced through training and awareness
Conduct activities in a way to minimize impacts on surface drainage	Drainage and flow are considered prior to activities
Winter lake and stream crossings shall be conducted entirely of water, ice or snow	Enforced through training and awareness and discussed with winter transport contractors
Deposition of any debris or sediment into or onto any water body is prohibited	Enforced through training and awareness and project planning
Submission of a Uranium Exploration Plan	Submitted October 17th, 2007 – no feed back from NWB has yet been received
No land based drilling within 30 m of the high water mark	Enforced through training and awareness and project planning; would seek approval from the Board if necessary
Drill waste (water, chips, muds, salts) from land-based drilling are disposed of in properly constructed sump or natural depression	Utilizing natural depressions and visually monitoring flow

Drill mud solids or cuttings with a Uranium concentration > 0.05 percent are collected and disposed down hole	This material is disposed of down hole or collected in bags and stored in appropriate storage facility for future handling
Immediately seal and cap artesian flow and report to NWB in annual report	Will complete when required
Record the depth of permafrost – include in annual report	Part of regular drilling activities
No on-ice drilling	Not required – current program is from May to September
Modification conditions	Project Manager is aware of these conditions and will comply to them if required
Submit Spill Contingency Plan	Submitted, will be reviewed on a regular basis and revised if necessary
Spill reporting procedure	Addressed in Spill Contingency Plan; training and awareness
Submit Abandonment and Restoration Plan	Submitted, will be reviewed on a regular basis and revised if necessary
Complete restoration work prior to the expiry of this Licence	If unforeseen delays in permitting renewals occur, AREVA will consult with the agencies to arrange for an agreement regarding site infrastructure pending a permitting decision.
Progressive reclamation is to be carried out	Reclamation to ensure chemical stability occurs in a progressive manner; best management practices for reclamation to ensure physical stability of surface disturbance is currently being investigated
All sumps are backfilled to satisfaction of an Inspector	Will occur if required and will be inspected during regular visits to site
Shall re-grade roads and airstrip	Currently not required
Remove all culverts	Currently not required
Long term storage of core will not exceed radiation measurements of > 1.0 μSv at 1 meter from surface and not to exceed 2.5 μSv	Implemented Radiation Protection Plan; regular inspections and monitoring are conducted by EHS group
Seal by grouting entire mineralization zone and greater than 10 meters both above and below each mineralization zone, any drill hole that encounters mineralization with a uranium content greater than 1.0% over a length of >1	Committed to conduct when required and achievable

meter, and with a meter-percent concentration >5.0	
Seal by cementing the upper 30 meters of bedrock or entire depth of hole, which ever is less	Committed to conduct when required and achievable
Measure and record daily water quantities	Conducted and recorded daily by site staff.
Provide GPS coordinates of all water sources	Completed
Provide GPS coordinates of all waste locations	Grey Water Discharge Point (south of Kitchen building) 14W 0564544 7146814
All sampling, preservation and analysis to be conducted in accordance with the *Standard Methods for the Examination of Water and Wastewater*	All sampling, preservation and analysis is subject to a Standard
All analysis performed in an accredited lab (ISO/IEC Standard 17025)	SRC is accredited by the Canadian Association for Environmental Analytical Laboratories (CAEAL) for environmental testing procedures. Accreditation ensures that procedures, facilities, and methods conform to ISO 17025, the internationally recognized standard

13 WATER CONSUMPTION

Water used during the 2007 Kiggavik Project was permitted under the Nunavut Water Board License No. 2BE-KIG0708. Water consumption was monitored for the Kiggavik Project which includes camp use and drilling operations. The amount of water used during the 2007 field season is summarized in table 13-1 below:

Table 13-1
Water Used During the 2007 Season of the Kiggavik Project

Date	Water Consumed (m^3)
July 9-15	98
July 16-22	192
July 23-29	209
July 30 - August 5	83
August 6-12	129
August 13-19	28
August 19-25	10
August 26 - September 1	58
September 3-9	170
September 10-16	198
September 17-23	205
September 24-30	111
October 1-5	7
Yearly Total	**1498**

Water consumed during the 2007 field season never exceeded 40 m^3/per day.

14 REPORTABLE SPILLS

This section presents a summary of environmental incidents for 2006.

June 18: Fuel Spill

On June 18, 2007 upon inspection of the Kiggavik site, a diesel spill was located by Dan Zunti, Marcus Dyck and John DeJong; at this time staff was not residing at the camp. Ten (10) 205-litre drums that had been transported to site in May 2007 were discovered to be leaking. The drums where stored on their sides, resulting in approximately 100 to 150 litres of diesel to leak on to the tundra. Upon inspection the leaking drums where identified to have defective gaskets and plugs.

Upon initial detection of the spill, staining of the tundra and the smell of diesel was quite apparent. The affected area was estimated to be approximately 100 square metres. Immediate spill response actions included stopping the leak, the placement of absorbent matting to contain the spill and the removal of the drums into secondary containment occurred over a number of days. Once the drums had been removed, the spill area was measured to affect an area estimated to be approximately 625 square metres..

All clean-up material was collected and is properly stored for future handling.

Test pits were excavated indicated a depth of impact of approximately 10 cm.

A formal Spill Report form was sent to the 24-hour spill report line on June 20, 2007 at 19:00 hours.

The staining and smell of diesel improved with time and by the end of the field season there was almost no evidence of the spill.

Preventative measures that were implemented following this incident include:

- Immediate inspection of all fuel drums upon arrival at site
- Storage of all fuel within secondary containment

The following photos where taken the day after the last load of drums arrived on site (May 24th, 2007) and the day prior to the first inspection, which didn't note any spills or leaks.

The following photos were taken of the affected spill area on August 4th, 2007.

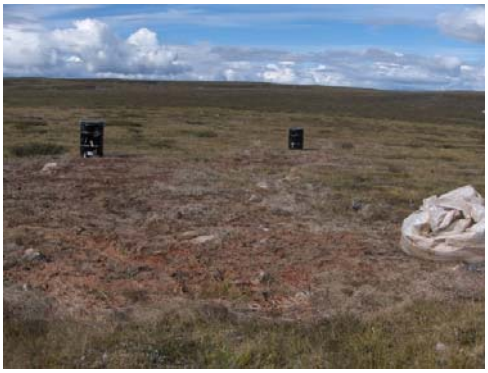
The photos indicate some discoloration and delineation and the type of secondary containment now being used for the storage of all fuel drums at site.

Aug 11: Spill of Drill cuttings

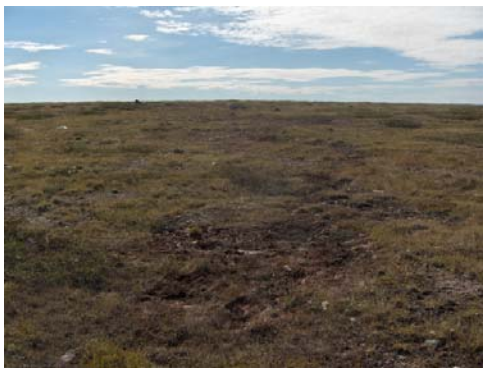
On August 11th, 2007 approximately 100 litres of mineralized drill cuttings in a slurry form was released into the environment when a collection bag collapsed near a borehole at N64 26.476 W97 39.094. The area immediately affected was approximately 2 square meters in a line about 10 meters long. At one meter above the remaining material in the collection bag the gamma dose rate was 1.2 μSv/h; however at one meter above the spilled material, levels were much lower, in the order of 0.5 to 0.8 μSv/h. Materials were manually excavated and placed into two 205 litre ring top drums and placed in the designated fenced area for storage. Follow-up gamma radiation surveys were conducted and results indicate that levels were below the required level of 1 μSv/h at 1 meter above surface, ranging from 0.2 to 0.3 μSv/h through the center of the spill zone and 0.1 to 0.3 μSv/h east and west of the spill zone.

Photo of Spill

Area During Clean-Up



Area Following Clean-Up



15 ADDITIONAL PHOTOS

Greywater Sump

Propane cylinder storage