# APPENDIX II

# TECHNICAL PROCEDURES FOR THE KIGGAVIK WILDLIFE BASELINE STUDIES

# TECHNICAL PROCEDURES FOR THE KIGGAVIK WILDLIFE BASELINE STUDIES

## HEIGHT-OF-LAND GROUND SURVEYS

TIMING
Weekly during field season (~May to October).

FIELD PROCEDURES
Height-of-land surveys have two objectives: (1) to identify wildlife species utilizing the LSA, and (2) to identify wildlife aggregations or predator presence that may have implications for camp or mine operation. An effort will be made to select approximately 20 height-of-land locations within the LSA where surveys can be conducted. Surveys will be stationary and consist of an approximately 10 minute observation period where all wildlife presence is documented. These surveys will be conducted a minimum of one time per week with consideration will be given to increasing the frequency of surveys during periods of high wildlife activity. The methodology will allow suspension of daily and weekly aerial surveys of the LSA, which are an unnecessary disturbance to wildlife, particularly caribou. The following information will be collected during the height-of-land surveys:

- date and time
- number of animals, group size
- sex (male or female)
- age (calf, yearling, adult)
- habitat use (Ecological Land Classification unit)
- behaviour (resting, foraging, walking, running, etc.)
- direction of travel (N, NE, E, SE, S, SW, W, NW )
- location and proximity to mine facilities.

The sex and age of ungulates will be determined by a number of distinctive factors including size, coloring, and antler size and growth. Field technicians will be experienced in determining the sex and age of ungulates.

Detailed behavioural observations (e.g., timed observation periods) are not being proposed, because of the inherent difficulties in avoiding observer bias and analyzing results.

## TECHNICAL PROCEDURES – LOCAL STUDY AREA AERIAL SURVEYS

TIMING

Monthly during the field season (February to November).

### FIELD PROCEDURES

Prior to each aerial survey, weather conditions will be documented and the helicopter or aircraft windows and/or wing struts will be calibrated to the proper transect strip width of 1,000 m (includes putting a piece of tape on the window for each observer). Everything below the tape on the window is considered to be within the transect (i.e., within 500 m of the aircraft). Flight altitude and ground speed will average approximately 150 m (agl) and 130-160 kph, respectively. The aerial survey route will be consistent across years and consist of 18 transects spaced at 1.5 km intervals across the entire LSA. With an effective viewing or survey distance of 1,000 m (i.e., 500 m on each side of the aircraft), approximately 67% of the LSA will be covered during the surveys. A minimum of three observers will participate on each survey: the pilot, a navigator/ observer, and an observer on the pilot's side of the aircraft. The pilot will concentrate on maintaining altitude, ground speed and staying on transect. The navigator/observer will assist the pilot in staying on track, plotting individual observations on a map, collecting waypoints for each observation, and reporting animals on his side of the aircraft. The second observer will communicate his observations for the navigator to record.

The GPS locations of all wildlife sightings or observations of clearly identifiable wildlife sign (e.g., dens, nests, caribou craters) will be recorded. At a minimum, the number of individuals will be recorded and, if possible, information on sex and age class. The sex and age of ungulates will be determined by a number of distinctive factors including size, coloring, and antler size and growth. Aerial observers will already be experienced in determining the sex and age of ungulates, but each employee will also receive specific training on how to determine distinctive features related to sex and age under aerial survey conditions.

## TECHNICAL PROCEDURES – REGIONAL STUDY AREA AERIAL SURVEYS

### TIMING

Monthly during the field season (February to November).

### FIELD PROCEDURES

A minimum of two surveys will be conducted in each of four ‘caribou seasons’ – Winter (October to March), Spring Migration (April to May), Summer (June to July), and Fall Migration (August to September). The 14 transects (i.e., variable length and spaced every 10 km) are oriented perpendicular to the proposed access road in order to better determine whether caribou or muskox are utilizing all habitats (both near and far) at similar levels. The aerial survey route will be consistent across years. With an effective viewing or survey distance of 1,000 m (i.e., 500 m on each side of the aircraft), approximately 10% of the RSA will be covered during the surveys.

Similar pre-survey methods, as described for the LSA aerial survey, will be followed. Prior to each aerial survey, weather conditions will be documented and the helicopter or aircraft windows and/or wing struts will be calibrated to the proper transect strip width (includes putting a piece of tape on the window for each observer to aid in determining animals that are ‘in’ or ‘out’ of the transect). All animals seen below the tape are considered to be within the transect. Flight altitude and ground speed will average approximately 150 m (agl) and 130-160 kph, respectively, although when aircraft such as an Otter are used, flight speeds may be somewhat higher.

The GPS locations of all wildlife sightings or observations will be recorded. All individuals or groups seen within the effective survey strip will be recorded as "In" while those beyond the transect boundary will be recorded as "Out." At a minimum, the number of individuals will be determined and, if possible, information on sex and age class. In certain situations when animals (e.g., large caribou herd) are sighted outside the strip width, the navigator may decide to deviate from the transect to investigate further. Once these observations are completed, the transect will be resumed from the waypoint of the deviation. Observations of animals made while ferrying between transects will be recorded separately.

**TECHNICAL PROCEDURES – RAPTOR NEST SURVEYS**

TIMING

Monthly surveys during field season (February to November).
June aerial survey along proposed access road.
Weekly visits to nests during breeding and fledging season (June to July).

FIELD PROCEDURES

Raptor nests will be identified during aerial surveys of the LSA and RSA and height-of-land surveys.

Helicopter surveys of the proposed access road route will also be conducted to locate potential raptor nests. The survey will involve three transects along the alignment, one situated on the alignment and two situated 500 m on either side of the proposed centreline.

Where an active nest is located within 1 km of mine facilities or the access road, a site-specific nest management plan will be developed that meets the approval of DoE biologists. The status of these nests will be monitored weekly until young have fledged. Nests within 100 m of mine facilities will be monitored on a daily basis. Nests will be observed from a distance of at least 100 m with a spotting scope, and information on behaviour, number of eggs, number of chicks, and number of fledged young will be determined.

**TECHNICAL PROCEDURES – WATERBIRD NEST SURVEYS**

TIMING

Specific nest surveys along shorelines in early July.
PRISM plots and transects during last two weeks of June.
Height-of-Land Surveys between May and July.

FIELD PROCEDURES

In order to better understand the abundance and distribution of nesting waterbirds within the LSA, nest surveys will be conducted. This usually involves a complete survey of nesting birds along shorelines (i.e., pond edges, shoreline of islands) within 200 m (considered to be the "zone of influence" for waterbirds) of proposed mine and access road facilities. A team of two people will be involved in the survey. Observers use maps (developed prior to fieldwork) and Universal Transverse Mercator (UTM) coordinates for orientation. The two observers walk around the edges of islands, wetlands or shorelines, with one observer 5 m from the water's edge and the second observer 15 m from the water's edge (10 m between observers). The UTM locations (taken with a handheld GPS unit) of all waterfowl and shorebirds and their nests will be recorded on datasheets. The surveys will be conducted in the first two weeks of July when most waterfowl are expected to be nesting.

Ongoing aerial surveys will continue to document water bird distribution within the area. As well, systematic surveys along the access road (i.e., breeding bird transects) and within the mine site (i.e., height-of-land surveys and PRISM plots) will document waterbird occurrence, particularly areas of nesting birds.

**TECHNICAL PROCEDURES – PRISM PLOT SURVEYS**

TIMING

Mid to late June. Upland breeding birds include all passerines (migratory songbirds), ptarmigan and shorebirds. Data collection begins in 2008 and continues in 2009 for baseline studies.

FIELD PROCEDURES

A proposed 25 plots will be established at the proposed mine site and 20 plots will be established at a nearby reference site, in an area not likely to be influenced by future mine-related activities (but within RSA). The reference site will have similar terrain and vegetation communities to the mine site. All plots will be chosen in a random manner. Another purpose of the methodology is to establish a baseline data set for long-term monitoring purposes.

The methodology (CWS, 2006) will use plot dimensions of 300 x 400 m. Two observers, spaced at 25 m intervals, walk slowly back and forth (north-south direction) across each plot (~1.5 hours per plot) and record all birds and nests observed. Orientation on the plots is accomplished with handheld GPS units. Sightings are recorded on plot maps using predetermined codes for nests, probable nests, pairs, males, females, birds of unknown sex, and groups. Plot maps are always oriented with the north direction at the top of the page. Direction of flight, interactions, and other behaviour are also recorded. Following each daily survey, the total number of birds of each species using each plot is determined and recorded on a separate datasheet. PRISM plots will be conducted in both 2008 and 2009 to ensure that a solid baseline data set is collected for potential long-term monitoring purposes. In both years, surveys will be conducted in the latter half of June, which is the primary nesting period for most bird species. All plots will be surveyed during this monitoring period.

**TECHNICAL PROCEDURES – BREEDING BIRD TRANSECTS**

TIMING

During breeding season (late June).

FIELD PROCEDURES

Bird transects are proposed primarily for the access route(s). A minimum of ten, 3 km long breeding bird transects running perpendicular to the proposed all-weather private access road (i.e., 1.5 km on either side of the road). Survey results are recorded in 100 m intervals, so that potential 'zone of influence' or 'reduced habitat effectiveness' impacts can be determined. Bird transects will be conducted in 2008 and 2009 to ensure that a solid baseline data set is collected for potential long-term monitoring purposes. Surveys will be conducted in the latter half of June, which is the primary nesting period for most bird species.

**TECHNICAL PROCEDURES – WILDLIFE HEALTH**

TIMING

Field collection during July to August.

FIELD PROCEDURES

To assess the future impacts of airborne contaminants on wildlife, plant tissue (i.e., berries, sedges, lichen), insect tissue, animal tissue (from hunters), and soil samples will be collected at a minimum of 10 locations (seven mine or treatment sites and three external reference or control sites) in the vicinity of the Areva mine site, and analyzed for metal content. At each of the 10 sampling locations, five samples will be selected within a 200 to 300 m radius, at least 150 m from each other. Within each sample site, five grab samples each of tissue and soil samples will be collected within a 10 to 30 m area depending on the tissue. Soil samples will be collected using a composite sampling method at each sample site. Representative grab samples will be collected from five separate test pits per sample site using a stainless steel ladle. Plant tissues will be collected by randomly selecting and simply grabbing/pulling representative plant tissues within an approximate 5 m radius area. For berries, approximately two cups will be collected at each site. Insects will be collected using 'malaise' traps erected at each of the 10 sampling locations. (Note: a malaise trap is a passive small mesh net that traps flying or wind-blown insects against a screen. Insects fly upwards to escape and are trapped in a collecting jar and perish due to lack of oxygen.)

Laboratory analysis will likely be conducted by ALS Environmental Laboratories in Vancouver, B.C. but other laboratories may be considered (e.g. in Saskatoon). The following laboratory analyses will likely be requested: 1) soil – soil pH and total metals; 2) plant tissue – moisture content and total metals; and 3) insect tissue – total metals.

**TECHNICAL PROCEDURES – HABITAT CLASSIFICATION**

TIMING

Ground-truthing during July and August.

FIELD PROCEDURES

Ground-truthing will involve classification of vegetation on pre-selected plots distributed within different plant associations. A set of pre-selected inspection sites or plots will be created from an unsupervised classification mapping of the satellite imagery. Sites are pre-selected to ensure that the full range of potential ecological land classification units will be adequately sampled. Species and the percent cover by species will be recorded at each plot. The data form created by the Nunavut DOE (Kivalliq Region) will be used to collect data. Species not identified in the field (e.g., willows, grasses, sedges etc.) will be collected for later identification by specialists. An effort will be made to sample all plant associations.

Digital satellite images will likely need to be purchased to develop an Ecological Land Classification using PCI Geomatica 9.1.6 imaging software. Landsat 7 satellite data provides image data from eight spectral bands that capture different ranges of the electromagnetic spectrum. Each spectral band can be used to detect different features in the imagery. An unsupervised classification is first conducted as a first run and to select the location of inspection plots. Unsupervised classification algorithms compare the spectral signatures of individual pixels to the signatures of computer-determined classes and assign each pixel to one of these classes. A supervised classification will be performed once there is additional information of the classes in a scene (e.g., from field survey data). This knowledge is used to identify representative samples of different surface cover types. To obtain a high level of accuracy from a supervised classification, it will be important to have a good knowledge of the area and its vegetation. A significant amount of appropriate field data or ground-truthing data is therefore necessary to ensure an accurate classification.

In summary, habitat classification will require obtaining satellite imagery, conducting an unsupervised classification to determine the location of sampling sites, undertaking field plots and ground-truthing (two weeks), and completing a final supervised classification. Caslys Consulting, a company currently conducting ELC work for the Meadowbank Gold Project and the Nunavut DoE, will be conducting the work for Areva. Collaboration and data sharing with the Nunavut DoE (e.g., Mitch Campbell) will be important in ensuring a successful habitat classification program.