



Orano Canada Inc.

Abandonment and Restoration Plan

Exploration Department
Kiggavik Project

Version 9

December 2020


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History of Revisions

Version	Revision	Date	Details of Revision
1	0	March 2007	Original submission
2	0	October 2007	Updated to reflect changes in field activities/capabilities and areas of continual improvement
2	1	May 2008	Updated to reflect comments and conditions received by the Nunavut Water Board associated with the issuance of water licence no. 2BE-KIG0812
3	0	January 2009	Updated to reflect changes in field activities/capabilities and areas of continual improvement
4	0	January 2010	Updated to reflect changes in infrastructure
4	1	May 2011	Updated personnel titles and grammatical changes
4	2	May 2012	Updated to reflect personnel changes.
4	3	May 2013	Updated to reflect personnel title changes, update land ownership details, and input coordinates
4	4	May 2014	Updated infrastructure list and surface land administration
5	0	January 2015	Inclusion of greater detail for reclamation practices, waste disposal, and long-term drill core management. Reformatted to new template
6	0	January 2017	Updated to reflect transition to Care and Maintenance phase
7	0	January 2019	Updated to reflect corporate name change and title changes
8	0	November 2019	Updated to reflect personnel change
9	0	December 2020	Updated to reflect change in site monitoring schedule

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Acronyms and Abbreviations

Term	Definition
Orano	Orano Canada Inc.
CLARC	Community, Land and Resources Committee
HTO	Hunters and Trappers Organization
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
KIA	Kivalliq Inuit Association
NWB	Nunavut Water Board
SHEQ	Safety Health Environment and Quality

1 Preamble

The Kiggavik Project is currently in a care and maintenance phase. The Abandonment and Restoration Plan will be kept in this state during this phase. The care and maintenance phase is an extended seasonal shutdown. Annual site maintenance and inspections performed since placing the site into care and maintenance have demonstrated site stability. As such, Orano has shifted to a five year maintenance and inspection schedule. The applicable requirements in Section 3 were fulfilled in 2016 and will be considered to be met until the project changes phase. This plan will be updated prior to a change in project phase to reflect the most recent information.

The Orano Canada Inc. (Orano) Abandonment and Restoration Plan (Plan) is in effect from the time licences and permits are issued to the expiry date. The Plan applies to the Kiggavik Project located approximately 80 km west of Baker Lake, Nunavut.

1.1 Purpose and Scope

Abandonment and restoration considerations are on-going during the life of the project. Progressive reclamation provides an opportunity to reduce the extent of disturbed land over the life of the project.

The objectives of the Plan are to:

- Protect public health and safety by using safe and responsible reclamation practices;
- Reduce or eliminate environmental effects, such as ground disturbance;
- Following cessation of project activities, re-establish conditions which permit the land to return to a similar pre-exploration land use; and
- Reduce the need for long term monitoring and maintenance by establishing physical and chemical stability of disturbed areas.

The Plan complies with the conditions of permits, licences, regulations and industry standards. The following principles have been established to guide the development of the overall Plan:

- Plan and implement in accordance with regulations;
- Apply cost effective and appropriate abandonment and reclamation practices to reduce environmental risks and allow for traditional use of the land;
- Implement progressive abandonment and reclamation as an integral part of the project; and,
- Incorporate new abandonment/reclamation methods and procedures, when applicable.

1.2 Revisions to Plan

During the active exploration phase, the Abandonment and Restoration Plan is reviewed regularly and updated as required to keep the information current and consistent with regulatory and procedural changes. A History of Revisions can be found at the beginning of this Plan.

1.3 Responsibilities

The Manager – New Projects is responsible to ensure that this Plan is implemented, and the implementation may be completed by:

- Project Geologist
- Coordinator, SHEQ Exploration or designate

The Vice President, Exploration is ultimately responsible for any activity being carried out by Kiggavik Project personnel.

2 Introduction

This Plan applies to the Kiggavik Project which includes advanced exploration activities and occasional environmental work to support the environmental assessment process. Orano is the operator of the Kiggavik Project with the head office located at the following address:

Orano Resources Canada Inc.
833 – 45th Street West
Saskatoon, Saskatchewan S7K 3X5

2.1 Location

The Kiggavik Project includes 37 mineral leases covering 45,639 acres located in the Kivalliq Region of Nunavut. The surface rights for 31 mineral leases on Inuit Owned Land (IOL) are administered by the Kivalliq Inuit Association (KIA) while the remaining six mineral leases are on Crown land. The Crown land covers 3,794 acres of the Jane and Contact prospects of the south-west portion of the Project with surface rights administered by Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC).

The St. Tropez area, wholly owned and operated by Orano, is composed of 5 mineral leases covering 16,549.21 ha. The surface rights are administered by the KIA.

There is a temporary exploration camp at the Kiggavik site, which can accommodate approximately 60 people. The Kiggavik camp is located at the following coordinates:

- UTM 14W 564530 E 7146879 N
 - Latitude: 64° 26' 29" N
 - Longitude: 97° 39' 34" W

2.2 Schedule

The Kiggavik Camp is seasonally occupied, and supplies are brought to site by a local contractor on a winter road. The project site is secured and prepared for each seasonal shutdown following completion of exploration field program activities. Final restoration will commence once the exploration/feasibility programs have ceased.

No buildings, equipment or waste will remain beyond the expiration date of permits or licences (i.e., KIA Land Use Licence; CIRNAC Land Use Permit; NWB Water Licence), unless approvals have been obtained permitting the camp to remain. If unforeseen delays in permitting renewals occur, Orano will consult with the agencies to arrange for an agreement regarding site infrastructure pending a permitting decision.

2.3 Infrastructure

The temporary camp was initially capable of accommodating approximately 32 persons in 2007, but was later expanded in 2008 and again in 2009 to accommodate approximately 60 people. Should it be required, further camp expansion and increased personnel would be discussed in permit applications prior to the field season. The camp currently consists of the following:

- One storage shed/back-up generator/shop
- One generator building (housing current generator)
- Helicopter storage/shop
- Three helicopter pads
- One washroom/dry building constructed with separate male/female facilities
- One kitchen with storage
- One wooden office
- 15 wooden sleeping units (one is a first aid shack)
- Wooden boardwalk throughout camp
- Five prospector tents (core logging tents)
- Three weather havens (2 for sleeping units, 1 for office)
- One mechanical services room
- Grey water collection area
- Industrial incinerator
- Core storage
- Radioactive materials storage compound
- Eight bulk fuel storage tanks (50,000 L capacity per tank)

There is a fuel esker containing two sheds and eight bulk fuel tanks. Three bulk tanks are for Jet-B fuel and five are for diesel fuel. Occasionally fuel drums within secondary containment may be stored at the esker.

Currently there is one shed and core storage located near Andrew Lake, and there is core storage at the Kiggavik site and Pointer Lake.

Future additions may include the following:

- New sleeping units
- Additional office space
- Additional core storage racks
- Small core logging sheds/tents

3 Seasonal Shutdown

In 2016 the Kiggavik project was placed in a Care and Maintenance phase. This phase is essentially an extended seasonal shutdown.

3.1 Buildings, Contents and Equipment

Following the completion of each field program, equipment is either removed from site, or stored within buildings or sea containers to ensure they can withstand the winter season. Canvas tents are secured and braced internally so they can withstand snow and wind. All wooden buildings are secured with plywood over the windows and doors to prevent inadvertent opening. Pumps and hoses from the water system are drained and dismantled. Pumps may be removed from site for servicing or put into storage along with the hoses.

3.2 Fuel Cache and Chemical Storage

An inventory is conducted prior to leaving at the end of the field season to track the items that are removed or remain at site. A thorough inspection of all fuel caches is completed, and chemicals are removed from site for storage and or disposal. If any chemical products (CaCl_2) remain on site they are stored in secure buildings or sea containers.

3.3 Waste

The Waste Management Plan and Radiation Protection Plan detail waste handling and are in effect from the time the exploration licence is issued to the time it expires.

Combustible waste includes non-hazardous material and is burned in a Single Chamber Cyclonator Incinerator (Series CY1000) which remains on site for use each year. Incinerator ash is collected in drums and stored until shipped off-site to an approved handling facility.

The grey water from the kitchen and washroom facilities is diverted to the grey water collection sump area that is regularly inspected. The grey water sump consists of a barrel that was punctured with drainage holes and buried to allow drainage and filtration of the water.

3.4 Drill Equipment and Drill Sites

The drill is dismantled into its main components as per the drilling contractor procedure, packaged and secured along with its ancillary equipment and rods. The drill components may winter at site, be removed via the winter road or may be flown out by the drilling contractor. Any remaining waste is taken to camp to be burned or if required, flown off-site to an approved disposal location.

Where possible, residual radioactive materials accumulated during drilling are disposed of down the drill hole; however, where this is not practicable, radioactive drill cuttings are collected and stored in the existing radioactive storage compound for future handling, which may include transfer to an operating mine site. Where collected cuttings are non-mineralized, they are used to re-establish the physical stability of drill sites by levelling depressions that may have formed from permafrost thaw. Drill holes that encounter uranium mineralization with a uranium content greater than 1.0% over a length of more than 1 m with a meter percent concentration greater than 5% are sealed by cementing over the entire mineralization zone; this should be at least 10 m above and below each mineralization zone. Drill holes are sealed by cementing/grouting the upper 30 m of bedrock or the entire depth of the hole, whichever is less or otherwise approved of by the Nunavut Water Board (NWB) in writing.

Drill sites are inspected for fuel stained soil and undergo a radiation survey for radioactive contamination. Should contamination be encountered, the material will be collected and stored for disposal at a licensed facility. To achieve radioactive clearance for each drill site, the gamma dose at 1 m above ground must remain less than 1 micro-Sievert per hour ($\mu\text{Sv/h}$) above background radiation levels. Gamma radiation levels at 1 m from the surface of the core storage area should be reduced to 1 $\mu\text{Sv/h}$ above background and in no instances exceed 2.5 $\mu\text{Sv/h}$. Should the levels be exceeded, Orano would contact the CIRNAC Land Use Inspector for review and approval of handling procedures. If necessary, residual radioactive material may be transported to the McClean Lake Operation for storage and/or disposal.

It is Orano's intention to reclaim disturbed sites in an adequate and acceptable manner. 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 will include but is not limited to reclaiming surface disturbance to promote the growth of vegetation. Further detail is provided in section 4.3.

3.5 Contamination Clean up

Any soil around camp that has become contaminated and was previously unnoticed is treated as per the Spill Contingency Plan. Before and after photos are taken to document the contamination and the clean-up. Clean-up will be conducted in accordance with Government of Nunavut's Department of Environment - Environmental Guideline for Site Remediation.

3.6 Inspection and Documentation

A full inventory and complete inspection of all areas are conducted prior to seasonal closure. Photos are taken to document the conditions prior to leaving the site for the winter. These photos are included in the annual report submitted to the NWB, CIRNAC and KIA and included in any required spill reporting

4 Final Abandonment and Restoration

Unless further activities or development are anticipated, final abandonment and restoration will be completed upon cessation of the current exploration/feasibility program. The camp site, fuel caches, and drill sites will be reclaimed to a similar pre-exploration state with all wastes removed from site and any contamination treated as per the Spill Contingency Plan. Following completion of restoration, photos will be taken for submission in the final report.

4.1 Buildings, Contents and Equipment

As per the Waste Management Plan, non-treated wood products will be incinerated while the treated wood will be shipped off-site for proper disposal. Buildings in good structural condition will be offered to the community of Baker Lake or the Baker Lake Hunters and Trappers Organization (HTO). Those buildings that are not donated will be dismantled and removed or incinerated. All wooden helicopter pads will be burned or taken off site to an approved disposal facility. The soil around the helicopter pads and buildings will be inspected for contamination, and where the ground has not been altered, scarification will not be necessary. All equipment, including pumps, generators, etc. will be dismantled and removed from site. All wastes that are not incinerated will be removed from site and taken to an approved disposal facility. Shipping containers from site will be transported by winter road to Baker Lake before shipment to a licensed facility during the open water shipping season. A final inspection of the camp site area will be conducted to ensure that there is no waste left behind.

Where sumps were used, they will be properly back-filled at the end of the project and inspected to ensure that there is no leaching, run-off, or radiological and hydrocarbon contamination. Any contaminated material found will be treated as per the Spill Contingency Plan. Sumps will be back-filled and levelled as required and final photos will be taken.

4.2 Fuel Caches and Chemical Storage

The fuel drums, slip tanks, and 50,000 L EnviroTanks will be removed during final abandonment, and all areas used for caching fuel will be thoroughly inspected. Any contamination at fuel cache sites will be cleaned up as well as any debris removed. All chemicals will be removed from site. Areas where chemicals have been stored will be inspected to ensure that there has been no contamination. Should there be any soil contamination the soils will be tested for petroleum hydrocarbons (fraction F1 through F4) as per Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2001) and benzene, ethylbenzene, toluene and xylene as per Canadian Soil quality Guidelines for the Protection of Environmental and Human Health (2004). Any contaminated soil will be handled as prescribed by the Spill Contingency Plan. Final photos will be taken of all fuel caches for inclusion in the final report.

4.2.1 Fuel Cache Landing Esker

The esker located at the fuel cache has been used as a landing strip and will be inspected for surface disruption. If necessary, the landing strip will be restored to pre-use conditions to ensure site stability. As there was no vegetation present, the area will be similar to pre-use condition following the leveling of the esker.

4.3 Drill Equipment and Drill Site Abandonment

The drill will be dismantled into its main components as per the drilling contractor procedure, packaged and secured along with its ancillary equipment and rods. The drill may be flown out by the drilling contractor or taken out overland during the winter.

During the course of drilling operations, all drill sites are inspected for radioactive or hydrocarbon contamination with any contaminated material being treated as per the Spill Contingency Plan. The remaining wastes will be incinerated if possible or transported to an approved disposal location.

To re-establish physical stability where drill sites show evidence of permafrost thaw, clean non-mineralized cuttings are used to level depressions. Where inadequate fill material is available, excess material from clean discharge areas or gravel may be used to fill depressions. Orano personnel conduct regular inspections, and prior to final abandonment, Orano will ensure that all drill sites are/have been restored and sumps have been covered and levelled. Orano will implement progressive reclamation practices and incorporate new abandonment and/or reclamation methods and procedures, where applicable. To ensure site stability, Orano is currently investigating reclamation techniques to return lands to a state similar to pre-exploration use.

Challenges surrounding physical reclamation of disturbed surfaces include lack of local knowledge or available information. To minimize the affected footprint and therefore the amount of required physical reclamation there is a focused effort on proper planning of infrastructure placement and drill sites. It was noted by some members of the Baker Lake Community, Land and Resources Committee (CLARC) that natural re-vegetation is the preferred reclamation method.

4.4 Drill Core Management

At the discretion of the surface holder, Orano proposes to retain all drill core on site as the core represents a signature for the land and significant scientific value for the future title holder. This proposal is consistent with the *Saskatchewan Mineral Tenure Registry Regulations* and the *Territorial Land Use Regulations* which permit the retention of drill core at a drill site or centralized core storage facility. The core represents decades of investment and holds the value of the land for development.

4.5 Inspection and Documentation

A complete inspection will be conducted of all areas prior to permanent closure and a final report prepared for all agencies. Photos will be taken to document the conditions prior to leaving the site and to document any contamination and resulting clean up. These photos will make up part of the final report to be submitted to the Water Resource Inspector; the annual report submitted to the NWB, CIRNAC and KIA and will be included in any required spill reporting. All agencies will be contacted and notified once the final cleanup has been completed. Agency contact information can be found in the Exploration Government Contact List accessible for Orano personnel on the [Exploration SHEQ SharePoint site](#).