



RADIATION HAZARD CONTROL PLAN ANGILAK PROPERTY VALORE METALS CORPORATION

(formerly Kivalliq Energy Corporation)

Effective Date: February 1, 2022

Table of Contents

1.	Introduction.....	1
1.1.	Corporate Details.....	1
1.2.	Project Description.....	1
2.	Regulatory Sources and Guidelines	2
3.	Radiation	2
3.1.	Alpha Particles.....	3
3.2.	Beta Particles.....	3
3.3.	Gamma Rays	3
3.4.	Internal and External Exposure	3
4.	Radiation Protection Basics	4
5.	Radiation in Uranium Exploration.....	4
5.1.	Annual Worker Radiation Exposure Categories	4
5.2.	Exposure limits for Nuclear Energy Workers (NEW)	5
5.3.	Exposure limits for general public (including workers in uranium exploration)	5
6.	Radiation Safety	5
6.1.	Potential Sources of Radiation Exposure for Exploration Crews	6
6.2.	Radiation Protection (RP) Controls	6
6.3.	Radiation Protection Guidelines	6
7.	Training	7
8.	Worker Responsibilities	7
9.	ALARA.....	8
10.	Work Site Mitigation and Personal Hygiene	8
11.	Personal Protective Equipment – PPE’s.....	8
11.1.	Decontamination	9
12.	Drilling and Handling Radioactive Drill Core and Rock Chips	9
12.1.	Drilling	9
12.2.	Core Storage	10
13.	Environmental Considerations	10

14. Additional Information.....	10
15. Shipping and Transport	11
15.1. Requirements for an Excepted Package.....	11
15.2. Requirements for Shipping Low Specific Activity – (LSA-1) Packages.....	12
15.3. Standard Units of Measure.....	12
16. References and Resources	13
APPENDIX I	AT END

1. Introduction

This Radiation Hazard Control Plan (RHCP) applies specifically to the ValOre Metals Corp. (ValOre, formerly Kivalliq Energy Corp.) Angilak Property (the Property of the Project) and is in effect as of February 1, 2022.

The purpose of this this RHCP is to establish procedures to provide a safe workplace for employees while using best practices to minimize disturbance to the environment. A copy of this RHCP will be kept in the office at site and at the head office in Vancouver. Copies of this RHCP may be obtained from ValOre.

ValOre endeavors to take every reasonable precaution toward ensuring the protection and conservation of the natural environment, and the safety and health of all employees, contractors, and the public from any potential harmful effects of materials and operations on the Project.

This RHCP should be used in conjunction with other Property plans and Best Management Practices (BMP). Other plans at the Angilak Property include:

- Abandonment and Restoration Plan (ARP)
- Waste Management Plan (WMP)
- Environmental and Wildlife Management Plan (EWMP)
- Fuel Management Plan (FMP)
- Spill Contingency Plan (SCP)

1.1. Corporate Details

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1.2. Project Description

ValOre has been exploring in Nunavut since 2008. The Property consists of both Crown land and Inuit Owned Land (IOL) in the Kivalliq Region. Authorizations for the use of land and water for the purpose of exploration have been granted by the Kivalliq Inuit Association (KIA), Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) and the Nunavut Water Board (NWB). In accordance with the terms and conditions of these authorizations, ValOre will return the land to as near its original natural state as is practical and possible.

The Angilak Property, consisting of 53 active mineral claims, 1 mineral lease and IOL RI-30, is located approximately 225 kilometres south-southwest of Qamani'tuaq (Baker Lake) and 350 kilometres west of Kangiqitiniq (Rankin Inlet, Figure 1, Appendix I).

The Property is bound approximately between latitudes 62° 27' and 62° 48' North and longitudes 98° 21' and 99° 24' West or Universal Transverse Mercator (UTM) coordinates 6925000mN to 6965000mN and 479300mE to 533000mE, North American Datum (NAD 83, Zone 14), and within 1:50,000 National Topographic System (NTS) mapsheets 65 J/06, 65 J/07, 65 J/09, 65 J/10, 65 J/11 and 65 J/15 (Figure 2, Appendix I). The Nutaag

camp, which has supported the Project seasonally since 2010, is located at 527975m E, 6937950m N. See Figure 3, Appendix I for a layout of the camp.

Due to the extent of the Property a temporary/mobile camp is required to facilitate exploration activities on the western portion of the Property. As this temporary/mobile camp will be moved several times, all waste will be transported to the Nutaaq Camp for proper disposal or storage before final transport off site for disposal at an authorized facility. All materials and structures will be removed each time the temporary/mobile camp changes location. Due to the nature of the exploration targeting, the potential locations of where the temporary/mobile camp will be set up are currently unknown. Once suitable locations have been determined the NWB and CIRNAC will be notified.

Exploration work completed and/or proposed on the Project consists of diamond drilling, reverse circulation (RC) drilling, prospecting, geological mapping, trenching, rock, soil and till geochemical sampling, airborne and ground geophysical surveys, and fuel transport (fixed and rotary-wing, overland). No buildings, equipment or waste will remain once the Project is complete.

2. Regulatory Sources and Guidelines

Information contained in this document is compiled from several sources: the Canadian Nuclear Safety Commission (CNSC), Health Canada Radiation Protection Committee, Canadian Centre for Occupational Health and Safety (CCOHS), Saskatchewan Labour Occupational Health and Safety, and Cameco Corporation (Cameco).

It should be noted that the CNSC no longer regulates uranium exploration properties.

Transport of mineralized core and samples is governed by the *Packaging and Transportation of Nuclear Substance Regulations*, administered by the CNSC.

ValOre is registered with the National Dosimetry Services, Occupational Radiation Hazards Division of Health Canada (NDS).

3. Radiation

Health Canada recognizes that there are two sources of radiation:

- Radiation from Naturally Occurring Radioactive Materials
- Radiation from Artificially Produced Radionuclides and Nuclear Fuels

For the purposes of this document, only the Natural Radiation sources will be discussed. Ionizing radiation is often just referred to as radiation. The primary radioactive elements found in the earth's crust are uranium, thorium and potassium and their radioactive derivatives. There are basically three types of ionizing radiation that emerge from radioactive substances such as uranium ores, namely, alpha, beta and gamma radiation. Alpha particles are relatively heavy charged particles, i.e., helium nuclei that are readily stopped by material, such as a sheet of paper or layers of dead skin. Beta particles are lighter charged particles, i.e., electrons or positrons, with slightly more penetrating power, typically up to 10 mm of body tissue. Gamma rays are

electromagnetic radiation with high penetrating ability, such as being able to pass through steel pipes and body tissues. Detailed descriptions of the three types of ionizing radiation follow:

3.1.Alpha Particles

Alpha particles are energetic, positively charged particles (helium nuclei) that rapidly lose energy when passing through matter. They are commonly emitted in the radioactive decay of the heaviest radioactive elements such as uranium and radium as well as by some manmade elements. Alpha particles lose energy rapidly in matter and do not penetrate very far, however they can cause damage over their short path through tissue. These particles are usually completely absorbed by the outer dead layer of human skin and so, alpha emitting radioisotopes are not a hazard outside the body. However, they can be harmful if they are ingested or inhaled. Alpha particles can be stopped completely by a sheet of paper.

3.2.Beta Particles

Beta particles are fast moving, positively or negatively charged electrons emitted from the nucleus during radioactive decay. Humans are exposed to beta particles from manmade and natural sources such as tritium, carbon-14 and strontium-90. Beta particles are more penetrating than alpha particles but are less damaging over equally travelled distances. Some beta particles are capable of penetrating the skin and causing radiation damage, however, as with alpha emitters, beta emitters are generally more hazardous when they are inhaled or ingested. Beta particles travel appreciable distances in air but can be reduced or stopped by a layer of clothing or by a few millimeters of a substance such as aluminum.

3.3.Gamma Rays

Like visible light and x-rays, gamma rays are weightless packets of energy called photons. Gamma rays often accompany the emission of alpha or beta particles from a nucleus. They have neither a charge nor a mass and are very penetrating. One source of gamma rays in the environment is naturally occurring potassium-40. Manmade sources include plutonium-239 and cesium-137. Gamma rays can easily pass completely through the human body or be absorbed by tissue, thus constituting a radiation hazard for the entire body. Several feet of concrete or a few inches of lead may be required to stop the more energetic gamma rays.

3.4.Internal and External Exposure

An external exposure to radiation occurs if a person is subjected to radiation originating outside the body. External exposures primarily arise from gamma radiation emitted from a radioactive material, for example a high-grade core sample. Though alpha and beta particles have limited penetration into body tissues, beta radiation can result in exposures to both skin and eyes. An internal exposure to radiation occurs if a person is subjected to radiation arising from a radioactive material that has entered the body. Intake routes for radioactive materials are by inhalation of dusts and gases, ingestion of particles, or through an open wound, for example dust from cuttings or radon progeny in an enclosed space with ore present. The internal exposure arises from alpha and beta particles that penetrate into sensitive body tissue before being stopped.

4. Radiation Protection Basics

The greatest potential of an external exposure to radiation during uranium exploration is from uranium mineralization. Simple radiation protection is achieved by adhering to the three principles of Time, Distance, and Shielding:

Time - radiation exposure is reduced by minimizing your time spent close to a radioactive material;

Distance - radiation exposure falls off drastically as the distance between you and the radioactive material is increased; and

Shielding - radiation is absorbed by materials. External exposure is reduced by introducing thick steel sheeting, or concrete structures, between you and the radioactive material.

Good radiation protection practice during uranium exploration is not to loiter in the vicinity of uranium mineralization and radioactive sources. Uranium mineralization and radioactive sources should be stored 30 metres or more away from active work areas. When there is cause for an employee to approach uranium mineralization while undertaking core drilling, core inspection, core stacking, labeling, packing, or transporting, work should be planned standing at least 2 metres away from the material. The task should be carried out in close proximity to the material in minimum time. The employee should then withdraw 2 metres away to plan the next task. Always minimize time in close proximity to, and maintain distance from, radioactive material.

5. Radiation in Uranium Exploration

Uranium exploration personnel are potentially exposed to radiation from uranium and its associated radioactive decay products in naturally occurring mineralized outcrop, boulder float, drill core and drill cuttings. These radiation exposures will normally be quite small. Since the potential for significant radiation exposures is low and because they are working with naturally occurring radioactive material, exploration crews are classified as “incidentally exposed workers” and are regulated provincially and territorially. This is in contrast to workers in uranium mines who are usually classified as “nuclear energy workers” (NEW) and whose radiation exposures are regulated under the federal *Nuclear Safety and Control Act*.

The definitive document on radiation protection requirements for incidentally exposed workers is the *Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM)*, published by Health Canada. This document was developed by the Federal Provincial Territorial Radiation Protection Committee and has been endorsed by all provinces and territories as well as the federal government.

The NORM Guidelines define four categories for annual worker radiation exposures in order of increasing radiological concern. The radiation protection requirements for the different annual doses are summarized in the table below;

5.1. Annual Worker Radiation Exposure Categories

Annual Dose (mSv/y)	Radiation Protection Program
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Dose < 0.3	None - Unrestricted
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No requirements for dose management.

0.3 < Dose < 1.0	NORM Management <i>Radiation Surveys of work areas.</i>
1.0 < Dose < 5.0	Dose Management <i>Dose estimates via radiation surveys and worker occupancy times*. Worker dose to be reported to National Dose Registry. Expert advice recommended.</i>
Dose > 5.0	Radiation Management <i>Formal radiation protection program and the use of Thermoluminescent Dosimeters (TLDs) for worker dose measurement. Expert advice will be necessary.</i>

5.2.Exposure limits for Nuclear Energy Workers (NEW)

The maximum amount of radiation people are allowed to receive in the workplace is regulated. For a Nuclear Energy Worker (NEW)(a special designation for those working in a Nuclear power plant or uranium mine requires specific controls on the worker) the Canadian Nuclear Safety Commission (CNSC) sets a limit of 50 mSv in a single year and 100 mSv over 5 years (a 20 mSv per year average). The limit for a pregnant worker, once pregnancy has been declared, is 4 mSv for the remainder of the pregnancy. While exposure levels vary by job, the average yearly radiation exposure of a monitored NEW is about 0.3 mSv.

The radiation exposure limit designated for persons working in uranium exploration is the same as that of the general public.

5.3.Exposure limits for general public (including workers in uranium exploration)

For members of the general public (including persons involved in uranium exploration), the exposure limit is 1mSv above normal background radiation. Generally, the CNSC and other provincial regulatory authorities use the same exposure limit for workplace radiation protection as that for a member of the public.

The annual exposure limit from both internal and external radiation for a uranium exploration worker is 1 mSv.

6. Radiation Safety

ValOre is committed to providing a safe workplace. The goal on the Angilak Property is to advance the historic Lac Cinquante Uranium Deposit however, as part of that mandate it is important to protect all associated personnel and minimize any impact to the environment. Radiation exposure can be controlled and minimized by reducing the time spent in contact with radioactive material, maintaining safe and approved distances and monitoring.

Exposure to alpha and beta particles can be controlled by wearing proper clothing and ensuring that it is cleaned appropriately. Hand washing is extremely important and eating, drinking and smoking is to be avoided while working around radioactive material. Exposure to gamma rays is controlled by maintaining a safe distance and limiting the time spent in contact with any radioactive source. Monitoring exposure with a Dosimeter badge (TLD badge) is an effective method of measuring exposure. In addition to the TLD badge, ValOre will also be

using 25-IS-1 Personal Radiation Monitors (PRM) from Ludlum Measurements Inc. These monitoring devices will be used on all drill sites and in the core logging and core splitting shacks. The PRM's provide staff with real time dose measurements and a warning system should staff members encounter high levels of radiation.

6.1. Potential Sources of Radiation Exposure for Exploration Crews

Exploration crews working with uranium may receive radiation exposures from:

- Gamma radiation emitted from the uranium mineralization
- The inhalation of radon (and the resulting radon progeny decay products) emanating from the drill core and drill cuttings
- The inhalation of radioactive dust
- The ingestion of radioactive dust

The primary source of worker radiation exposure will be from external gamma radiation. The external gamma radiation dose received by exploration crews will depend on:

- The grade of the mineralization
- The amount of time spent by workers close to mineralized drill core and cuttings
- The amount of mineralized drill core and cuttings in the vicinity
- The distance between workers and the drill core and cuttings

Worker radiation exposures from the inhalation or ingestion of radioactive dust (or dirt) should not be a concern since enclosed areas such as core shacks are suitably ventilated and all work areas will be kept clean. Workers should wash their hands after handling radioactive drill core and cuttings and before eating or smoking.

6.2. Radiation Protection (RP) Controls

Uranium exploration and drilling program involves various grades of uranium ore and various levels of potential radiological hazards. A radiation level has been determined above which Radiation Protection (RP) controls are initiated and all the elements of the Radiation Protection Guidelines described below come into effect. If the ore being handled is below this action level, normal Health and Safety related practices will be in effect.

The RP level has been determined on the basis of available Federal and Provincial guidelines that address uranium exploration and radiological safety controls in mining areas. This indicates that areas with exposure rates that are less than 1 $\mu\text{Sv/h}$ don't require controls.

An exposure rate greater than 1 $\mu\text{Sv/h}$ corresponds to a reading of 1000 cps at one metre on an exploration scintillometer and initiates Radiation Protection (RP) controls.

6.3. Radiation Protection Guidelines

The most important factor to consider when handling Naturally Occurring Radioactive Materials is personal hygiene. Wear Personal Protective Equipment, minimize time handling radioactive materials and maximize your distance from radioactive materials. Radioactive particles are easily transported from contamination control zones on a Worker's clothing or skin. Do not wear work clothes in non-work settings (kitchen tent, sleep tent, etc.) Wash hands frequently.

The best way to prevent ingestion of potentially radioactive dust particles is through frequent hand-washing and good personal hygiene.

The following safety measures are mandatory when working directly with or in an environment that may contain radioactive materials and will be provided to all employees on site:

- Minimize time handling radioactive material
- Maximize distance from radioactive material
- Wash hands regularly
- Wear personal protective equipment
- Don't wear work clothes in non-work settings (kitchen tent, sleep tent, common areas, etc.)
- Wear gloves, such as cotton gloves, when handling soil, silt, rock or taking chip samples.
- Wash hands, hair daily and clothes regularly
- Do not lick any rock
- Bandage open wounds
- Wash hands after handling rock and before eating or smoking
- Do not eat, drink or smoke in core shacks, splitting shacks, the dry, on the drill platform or any other location with elevated radiation levels
- When working with drill core, coveralls, rubber gloves, and safety glasses must be worn at all times. Boot covers may also be necessary
- Safety glasses are mandatory when working with drill core to protect the eyes from beta radiation
- Use a ½ face particulate respirator when core splitting. Store respirator in a clean plastic bag away from the work area when not in use
- Reduce dust by wetting the area with water on a regular basis
- Check field clothes periodically with a scintillometer. Rinse clothes at site if reading is greater than 100 CPS and continue rinsing until readings fall below the acceptable level
- Always work in well-ventilated environment, monitor work areas on a regular basis with contamination metres
- Control the spread of contamination at all times by following field protocols.
- TLDs (thermoluminescent radiation dosimeters) must be worn by all field workers

7. Training

All employees entering the Angilak Property will be provided with an orientation program that includes Radiation Protection Training. Safety meetings in which Radiation Protection is reviewed and Radiation Hazards are discussed will be held on a weekly basis. Daily toolbox sessions are used as important daily reminders about Radiation Hazards in the work place. A radiation safety consultant from ALARA Consultants Inc. will oversee radiation safety training and will be onsite regularly to provide radiation training to all personnel.

8. Worker Responsibilities

All employees and contractors active on the Angilak Property must:

- Attend all required training, safety meetings and briefing sessions
- Be familiar with and adhere to the Radiation Protection Guidelines
- Perform only those tasks that can be performed safely
- Report any unsafe conditions to the supervisor or Project Manager
- Wear a TLD (dosimeter) badge

9. ALARA

The objective of the Radiation Safety Program is to minimize personal and environmental radiation exposures to levels that are As Low As Reasonably Achievable (ALARA), economic and social factors considered. This is accomplished by the implementation of personal and area monitoring procedures and, where applicable, the use of personal protective equipment.

ValOre is committed to the ALARA principle for Radiation Hazard Control.

10. Work Site Mitigation and Personal Hygiene

As internal exposure to radiation can occur from the inhalation or ingestion of radioactive materials, work practices should be adopted that restricts the amount of airborne dust and the potential for cross contamination of the hands, nose and mouth. This is best achieved by handling materials in the wet state. When the radioactive material cannot be made damp, and airborne dusts occurs, wear respiratory protection. However, respiratory protection cannot filter out radon gas, and the best method of avoiding a radon intake when handling uranium mineralization is to work in a well ventilated area. Extractor fans are used in areas where radioactive dust can be generated i.e. core splitting bench

Radiation protection involves minimizing the external and internal exposures to radiation. It is important that the uranium mineralization is kept in its correct storage locations. Any spillage or accumulation of the materials should be cleaned up immediately. A gamma radiation exposure will arise from small piles of materials. Internal exposure will occur from inhalation of airborne dusts. Prevention of ingestion of radioactive bearing material can be achieved by washing hands prior to smoking and eating.

11. Personal Protective Equipment – PPE's

While working with mineralization, there are a number of actions that each worker can take to protect themselves. To limit the spread of contamination when working with NORM in rock or core samples, workers should wear coveralls and gloves to keep mineralized dust from their hand and clothes. Safety glasses are mandatory when working with mineralized drill core to protect the eyes from beta radiation. Respiratory protection is vital for limiting exposure from dust and radon progeny, particularly when working in an enclosed area.

Workers will change from their work clothes into clean clothes at the end of each shift in the camp dry.

11.1.Decontamination

Personnel decontamination will be done by washing if necessary. Work clothing will be washed and rinsed in water. Contaminated PPE's will be washed or disposed of accordingly.

12. Drilling and Handling Radioactive Drill Core and Rock Chips

The following procedure for handling and logging of radioactive rocks (drill core, hand samples, chips etc.) have been developed by the Health and Safety Committee of Prospectors and Developers Association of Canada (PDAC). ValOre is adopting this procedure for their uranium exploration camps. In addition to the Radiation Protection Guidelines the Project Manager will ensure that all personnel are made familiar with the following procedures and ensure the updating and implementation of this procedure.

- All employees who work with radioactive rocks or drill core must wear TLD badges. TLD badges are mandatory at the drill rigs and in the core tents.
- Workers must be aware when working with radioactive materials. Safety glasses, work gloves and coveralls must be worn. $\frac{1}{2}$ face respirators are required when working with radioactive dust. When not in use respirators should be stored in a clean plastic bag and removed from the work site. Gloves and coveralls should be laundered and/or replaced regularly. Gloves, coveralls and other exposed outerwear PPE will not be worn into the kitchen area.
- Wash hands well with soap and water after handling radioactive material.
- Do not eat, drink or smoke when handling or working near radioactive material.
- Ensure that all work stations with exposure to radioactive materials have proper ventilation to ensure constant air turnover. Ventilation fans are installed in the core tent. Ventilation fans and extractor fans are installed at the core splitting station. A dust collecting extraction unit is attached to the cyclone on the RC rig.
- Store radioactive core at least 30 metres away from the drill shack and the core logging tent.
- Post storage areas and the logging / splitting shacks as radioactive areas.
- Radioactive core must be logged into and out of the core logging tent. Date, time and the gamma level at 1 metre intervals are also recorded. A radiation warning sign must be placed on the core shack door when while radioactive core is inside.
- Do not move or store radioactive core unless in core boxes secured with wood or Plexiglas lids.
- Do not loiter in the vicinity of mineralized drill core, mineralized drill cuttings or mineralized drill chips
- Do not wear work clothes in the kitchen, common areas or sleep tents
- Drillers/helpers/others when drilling or handling radioactive drill core or drill chips will change out of their contaminated clothes and leave them at the drill site to avoid contaminating the helicopter.
- Follow all regulations and procedures regarding the shipment of radioactive materials.

The above information, entitled "Drilling and Handling Radioactive Core and Rock Chips" will be posted prominently at the camp and in the core shack.

12.1.Drilling

Before building a drill setup on a drill site, orientation tests will be performed to determine Natural Background Radiation levels at the drill site. Upon commencement of the drill hole, drillers need to be instructed on where

to expect mineralization, the identifying characteristics of that mineralization and how to minimize contact with the drill core and cuttings when the mineralized intersection is drilled. Mineralized core should be stored 30 metres from the drill shack prior to being transported to the core logging tent. A placard noting radiation should be posted at the drill site core storage area.

Where uranium mineralization is encountered in a drill hole, the drill mud solids or cuttings with a uranium concentration greater than 0.05 per cent will be collected and pumped back down the hole or will be collected in appropriate containers and stored in short-term core storage area on a flat dry outcropping ridge on the east side of the Lac 50 Main Zone drill area at 519615E 6939955N NAD 83 Zone 14 to await transport at the end of the field season to an accredited disposal facility.

Any drill hole that encounters mineralization with a uranium content greater than 1.0 percent over a length of > 1.0 metre, and with a metre-per-cent concentration > 5.0, will be sealed by grouting over the entire length of the mineralization zone and not less than 10 metres above or below each mineralization zone. The top 30 metres of the hole within bedrock will also be sealed by grouting once drilling is complete.

As with all drilling procedures, at each drill site a suitable natural depression will be used to serve as a sump for the disposal of cuttings, sludge and return water that cannot be recirculated during the drilling process. The sump will be located at a minimum of 31 metres from the ordinary high water mark of any adjacent water body, where direct flow into a water body is not possible and no additional impacts are created. Upon completion of the hole, the sump will be restored as required to the pre-existing natural contour of the land. Reclaimed drill sites will be inspected and tested for radiation.

12.2. Core Storage

Once the uranium content has been established by assaying, a decision will be made on the long range storage of the core. If stored on the Property, it will be located in the long term core storage area for radioactive rocks. This core storage area will be located at a minimum of 31 metres from other working structures. Radiation levels must be reduced to less than 1.0 μSv measured at 1 metre from the surface and in no instance will be allowed to exceed 2.5 μSv .

13. Environmental Considerations

ValOre will establish, in cooperation with the KIA and CIRNAC, a suitable long-term core storage area for radioactive rocks, separate from the non-radioactive rocks. This area will have the appropriate containment systems in place, will be located at a minimum of 100 metres from the normal high water mark of any water body and will have appropriate signs. Additional measures may be required dependent on the uranium concentration of the rocks. These will be discussed with the regulatory agencies.

14. Additional Information

Workers are encouraged to consult regulatory guidelines for additional Radiation Safety information. Copies of the Canadian Guideline for the Management of Naturally Occurring Radioactive Materials (NORM) from Health Canada, the Radiation Protection Guidelines for Uranium Exploration from Saskatchewan Labour, Occupational

Health and Safety, the CNSC Radiation Protection Regulations and the CNSC Packaging and Transport of Nuclear Substance Regulations are available for review from the Project Manager

15. Shipping and Transport

The shipping of radioactive materials (Class 7) from the Project site is controlled by the CNSC *Packaging and Transport of Nuclear Substances Regulations (PTNSR)* and Transport Canada's *Transportation of Dangerous Goods Act and Regulations*.

The Project Manager will supervise shipping radioactive materials and is certified to the standards required by the Transport of Dangerous Goods Regulations

The *Regulations* stipulate that Low Specific Activity consignments will be shipped as Excepted Packages if the radiation on the external surface does not exceed 5µSv/hr. The container must bear the UN Number as per PTNSR 17(2) and contain a marking of "radioactive" on an internal surface that is visible upon opening the package.

The transportation of uranium mineralization and ores that have an average specific activity in excess of 70 kBq/kg conform to the requirements of the Packaging and Transport of Nuclear Substances Regulations.

Exploration camps have one exemption to the Transport of Dangerous Goods Regulations. Due to remoteness, exploration camps are permitted to transport core samples by air, providing they are less than 100 mm in diameter and are packaged in accordance with the Packaging and Transport of Nuclear Substances Regulations

ValOre has an 'INSPECTOR' radiation meter built by Canadawide Scientific Ltd to determine radiation levels in Sieverts and a RS 230 spectrometer to differentiate radiation by mineral type.

15.1. Requirements for an Excepted Package

If the radiation intensity is < 5 µSv/hr, then the shipment may be considered an "Excepted Package" under CNSC regulations and the TDG regulations do not apply. Therefore if the dose rate on the exterior of the package is <5 µSv/hr, it can be shipped under routine conditions of transportation – it can be considered a non-dangerous good. The following procedures must be followed when shipping an Excepted Package:

- A label marked "Radioactive Samples" must be placed inside the package in such a manner that the label is visible to the person opening the package.
- Removable radioactive contamination on the outside of the package must not exceed 0.4 Bq/cm² averaged over 300 cm²
- The United Nations Number "UN2910" is attached to one vertical side of the container
- Both the Consignor and Consignee addresses are to be displayed on the exterior of the package
- The weight must be shown on the exterior of the package if it exceeds 50 kilograms
- The way bill requires the shipping name (Radioactive material, Excepted Package – Limited Quantity of Material) and the UN number
- 3 copies of the documentation is required; one for the shipper, the carrier and the receiver

15.2.Requirements for Shipping Low Specific Activity – (LSA-1) Packages

If the dose rate on the exterior of the package is $> 5 \mu\text{Sv/hr}$ then the package will be shipped as a Low Specific Activity – (LSA-1) shipment. The following procedures must be followed when shipping any Low Specific Activity Package:

- Both the Consignor and Consignee addresses are to be displayed on the exterior of the package
- The weight must be shown on the exterior of the package if it exceeds 50 kilograms
- The Shipping Name (Radioactive Material, Low Specific Activity) and the UN Number “UN2912” is attached to two (2) vertical and opposite sides of the shipping container
- Three copies of the documentation is required; one for the shipper, the carrier and the receiver
- An LSA-1 shipment will require a shipper’s document identifying the shipment as a Class 7 dangerous good
- Radioactive Yellow II labels are attached next to the shipping name and UN number labels
- On the Radioactive Yellow II Labels the following must be written:
 - o Radioactive contents section write “LSA – 1”
 - o Transportation Index - Estimate the activity in the package in Bq (this number must be in Bq units)
 - o The Transportation Index is the gamma radiation intensity in $\mu\text{Sv/hr}$ at a distance of 1 metre from the exterior of the package divided by 10. For example the Transport Index for $4.5 \mu\text{Sv/hr}$ will be 0.5 The package for an LSA-I Shipment must satisfy the IAEA Requirements for Type 1 Industrial Packages (Type IP-1) which are the same as for an Excepted Package plus :
 - o The smallest external dimension of the package cannot be less than 10 centimetres
 - o The container must be durable and legally marked on the outside “Type IP-1”

15.3.Standard Units of Measure

The standard unit of measure of the activity (number of atoms decaying per second) is the becquerel (Bq). Since 1 Bq is a very small quantity, larger multiples are used as follows:

1kBq	= kilobecquerel	= 1000 Bq	= 1×10^3 Bq
1MBq	= megabecquerel	= 1,000,000 Bq	= 1×10^6 Bq
1GBq	= gigabecquerel	= 1,000,000,000 Bq	= 1×10^9 Bq
1TBq	= terabecquerel	= 1,000,000,000,000 Bq	= 1×10^{12} Bq

Becquerels replace the curie (Ci) as the unit of measure of activity. The radiation dose-equivalent is expressed in units of sieverts (Sv). Smaller fractions are often used as follows:

1 mSv = millisievert = $0.001 \text{ Sv} = 1 \times 10^{-3} \text{ Sv}$

1 μSv = microsievert = $0.000001 \text{ Sv} = 1 \times 10^{-6} \text{ Sv}$

The sievert replaces the older unit for dose-equivalent, the “rem”.

16. References and Resources

Associations

Prospectors and Developers Association

Federal Government

Canadian Guidelines for Management of Naturally Occurring Radioactive Materials (NORM)

Canadian Council of Ministers of the Environment, Canadian Water Quality Guidelines

Canadian Nuclear Safety Commission Occupational Exposure to Radiation

National Dosimetry Services (NDS)

Provincial Governments

Saskatchewan Labour - Occupational Health and Safety

Saskatchewan Environment – Mineral Exploration Guidelines for Saskatchewan

Other

Cameco Corporation

Aurora Energy Resources Inc.

Saskatchewan Research Council (SRC)

APPENDIX I

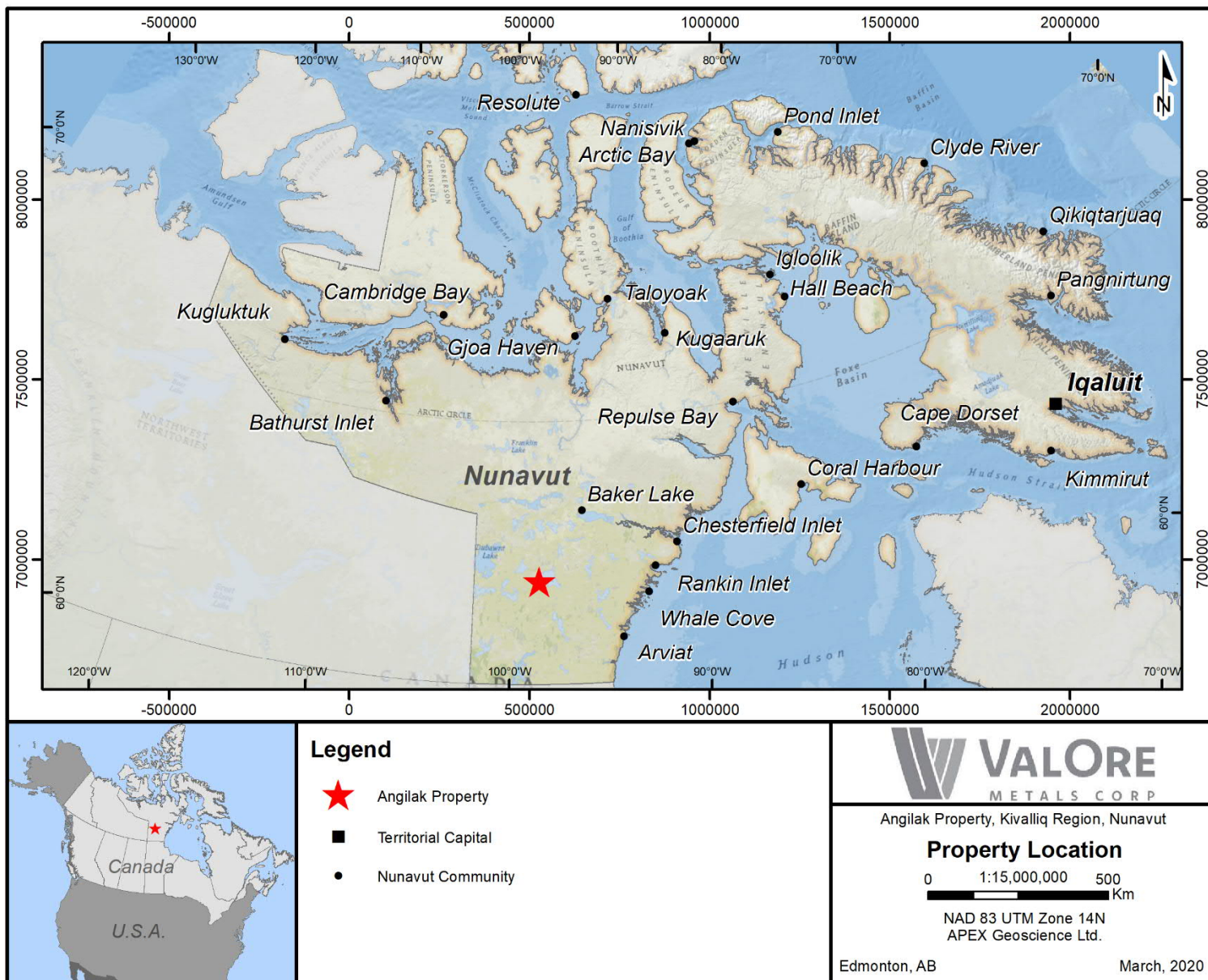


Figure 1: Angilak Property Location

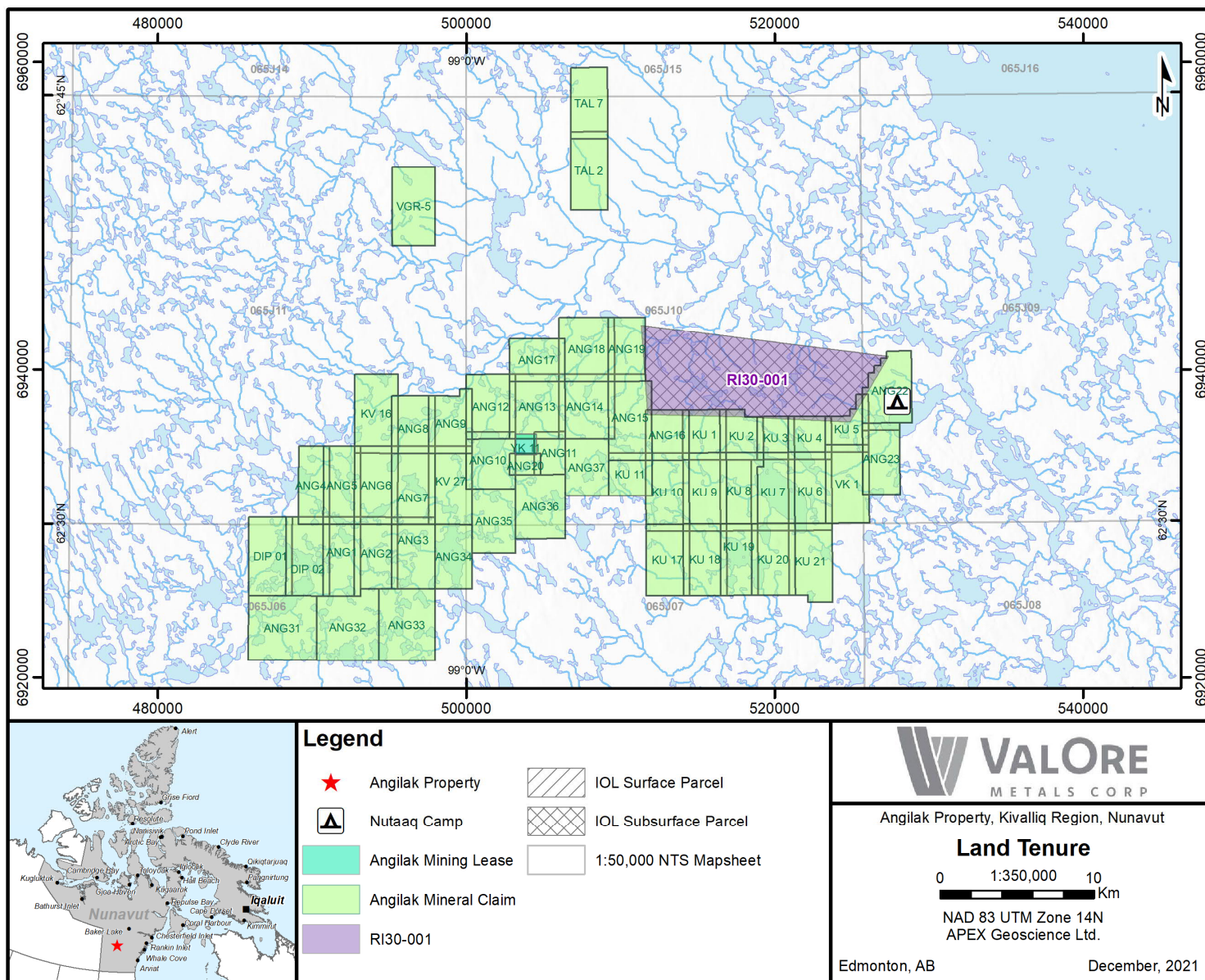


Figure 2: Angilak Property Land Tenure

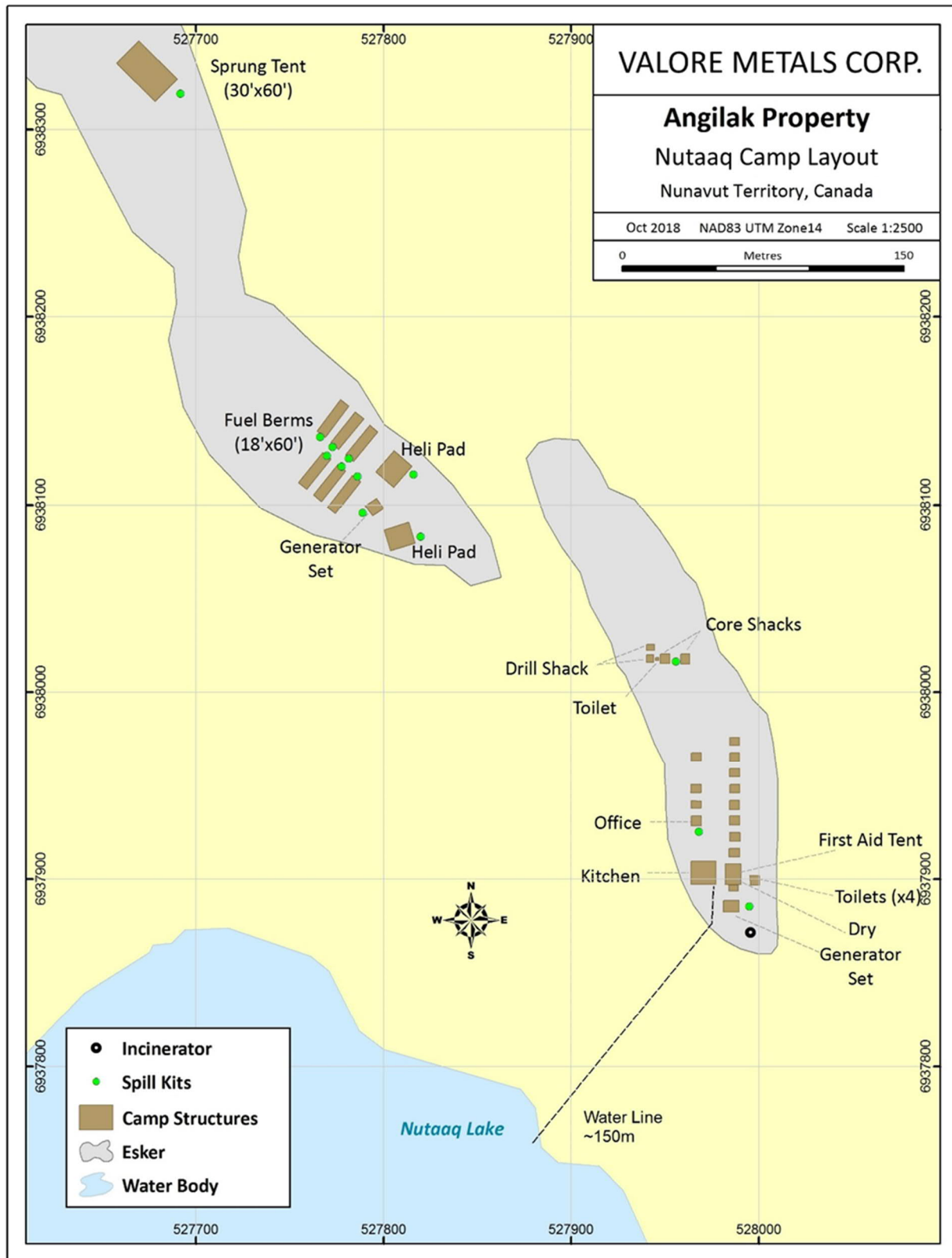


Figure 3: Nutaq Camp Layout