Cameco Corporation
Key Lake Operation

LIC-001

Mining Facility Licensing Manual

May 2022

Title: Mining Facility Licensing Manual		Doc. No. LIC-001
Date Issued: June 2001	Date Revised: May 2022	Rev. No. 7

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1.0 INTRODUCTION

1.1 Purpose

The Cameco Corporation (Cameco) Key Lake Operation (Key Lake) *Mining Facility Licensing Manual* (KEY-MFLM) serves as a top-level document providing a guide to the documents, programs and supporting information necessary to ensure the activities of the licence are carried out in compliance with the licensing basis. This document supersedes previous versions of the KEY-MFLM and becomes effective when the Canadian Nuclear Safety Commission (CNSC) approves the current version.

1.2 Scope

The KEY-MFLM has been prepared to provide the information to support the licensing requirements as set out in the following:

- The *Nuclear Safety and Control Act* (NSCA) and associated regulations, including
  - *General Nuclear Safety and Control Regulations* (GNSCR)
  - *Uranium Mines and Mills Regulations* (UMMR)
  - *Nuclear Substances and Radiation Devices Regulations* (NSRDR)
  - *Radiation Protection Regulations* (RPR), and
  - *Packaging and Transport of Nuclear Substances Regulations* (PTNSR).

This manual deals with health and safety, security and protection of the environment. It contains an overview of:

- The facilities and activities to be authorized by the license,
- The policies, responsibilities and managed processes that Cameco is committed to, in order to meet the requirements of the *Nuclear Safety and Control Act* (NSCA), regulations and license conditions,
- The programs for the protection of the health and safety of persons, the protection of the environment, and the maintenance of national security and measures required to implement international obligations to which Canada has agreed, and
- The organization and staffing in place to meet these responsibilities.

1.3 Definitions

Barren strip

Ammonia solution used in solvent extraction (SX) circuit to remove uranium from pregnant organic phase; barren indicates that it is not loaded with uranium

Barren organic

Organic solution in the SX circuit that has had the uranium content removed

Emergencies

Refers to site and nuclear material security issues, significant discharges, fires, major accidents, and other types of disasters that may have a significant impact on the environment and/or personnel at site

Loaded strip

Ammonium sulphate solution loaded with uranium that has been recovered from the organic phase in the SX circuit

Non-conformance

Refers to system compliance deficiencies, objectives and targets missed, incidents and accidents, ineffective procedures, and other elements of the quality management system (QMS) not performing to specification

Operational Controls

Include, but are not limited to, procedures, training, inspections, preventative maintenance programs, engineered controls or monitoring, and measurements put in place to manage significant environmental aspects and to mitigate and/or prevent adverse environmental impacts

Pachucas

Air agitated cylindrical storage or process tanks

Pregnant solution

Product of counter current decantation (CCD) circuit consisting of an aqueous solution containing dissolved uranium and other dissolved impurities

Personnel

Both employees and contractors

Raffinate

Solvent extraction circuit waste product

Spent ammonia strip

Strip solution from the SX circuit that has had the uranium removed from it in the yellow cake precipitation circuit

Wash solution

Acidic solution used in the CCD circuit to separate (i.e., 'wash') the uranium that has been dissolved, from the mill feed in the leach circuit; when this solution leaves the CCD circuit it is then referred to as pregnant solution enroute to the SX circuit

Yellowcake

U_3O_8 is the calcined product of ammonium diuranate from the yellowcake precipitation circuit

1.4 Responsibilities

The general manager, Key Lake and McArthur River operations is responsible for ensuring that the policy and program commitments referenced in this manual are implemented. The manager, safety, health, environment & quality (SHEQ) is responsible for the administration of this manual.

Correspondence related to Key Lake matters are to be directed to the general manager and copied to the manager, SHEQ, and to Cameco SHEQ regulatory records.

1.5 References

Unless identified as a specific version, the following references are deemed "as amended" and refer to the latest CNSC approved version:

1.5.1 Acts and Regulations

The following legislation is referenced in the KEY-MFLM. References to other regulatory documents are provided in the various site programs and procedures:

- The *Nuclear Safety and Control Act*,
  - The *General Nuclear Safety and Control Regulations*,
  - The *Uranium Mines and Mill Regulations*,
  - The *Nuclear Substances and Radiation Devices Regulations*,
  - The *Packaging and Transport of Nuclear Substances Regulations*,
  - The *Radiation Protection Regulations*
- The *Fisheries Act*
  - The *Metal and Diamond Mining Effluent Regulations*

Further, as is the case for all Cameco operations, Key Lake is subject to the obligations arising from the International Atomic Energy Agency (IAEA) safeguards agreements.

1.5.2 Key Lake Programs

The following programs and codes of practice are the main reference sources in the KEY-MFLM:

- LIC-002 *Facilities Program* (KEY-FP)
- LIC-003 *Maintenance Program* (KEY-MP)
- LIC-004 *Waste Management Program* (KEY-WMP)
- LIC-005 *Environmental Protection Program* (KEY-EPP)
  - *Environmental Code of Practice* (ECOP)
- LIC-006 *Radiation Protection Program* (KEY-RPP)
  - *Radiation Code of Practice* (RCOP)
  - *Nuclear Substance Possession Limits*
- LIC-007 *Occupational Health and Safety Program* (KEY-OHSP)
- LIC-008 *Emergency Preparedness and Response Program* (KEY-EPRP)
- LIC-009 *Training and Development Program* (KEY-TDP)
- LIC-010 *Quality Management Program* (KEY-QMP)
- LIC-011 *Security Program* (KEY-SP)
- LIC-012 *Transportation Program* (KEY-TP)
- LIC-013 *Public Information Program* (KEY-PIP)
- LIC-015 *Fire Protection Program* (KEY-FPP)

1.6 Document Control

The KEY-MFLM is managed as a controlled document in accordance with the Key Lake *Quality Management Program* (KEY-QMP), which ensures that users of this document are using the most current version and that obsolete versions of this document are removed from service. Administrative changes to this document require notification to be sent to the designated CNSC project officer. Other revisions to this document require the acceptance of the designated CNSC project officer.

At a minimum, this document will be reviewed every 10 years. The list of revisions to this document is managed and recorded through the site document control system. However, to facilitate regulatory review of this document, a list of revisions is provided in Appendix B.

2.0 BACKGROUND

2.1 Facility and Business Address

Key Lake is a uranium milling facility located in the northern region of the Province of Saskatchewan approximately 70 kilometres (km) east-southeast of Cree Lake. It lies within the southern boundary of the Athabasca Formation 570 km to the north of Saskatoon, Saskatchewan. Figure 2.1 provides a general location of where Key Lake is located within the Province of Saskatchewan. There is no permanent settlement in the immediate area of Key Lake. The northern village of Pinehouse, the nearest community, is 220 km away by road.

Under the Key Lake Surface Lease Agreement between Cameco and the Province of Saskatchewan, the province has leased to Cameco approximately 3476 hectares (ha) of land located at approximate UTM Grid Zone 13/6338653mN/46558mE. The leased surface area is described in the legal Key Lake Operation Surface Lease Maps, as approved by the Controller of Surveys as MG896 and MG915. The surface lease maps have been previously provided to the CNSC. Drawing KL200-G-SK004 (Appendix A) provides the general boundaries of the surface lease, and the major structures and excavations located within the lease

Cameco Corporation, with 83.3% ownership, is the operator and licensee of the Key Lake Operation. Orano Canada Inc. owns 16.7% of the Key Lake Operation.

The business address of the licensee is:

Cameco Corporation – Key Lake Operation
2121 – 11th Street West
Saskatoon, Saskatchewan S7M 1J3

If during the course of the licence period, the above information changes, the CNSC will be notified of the change.

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Figure 2.1: Key Lake location map.

2.2 Summary of Licensed Activities

The following outlines the scope of authorized activities within the CNSC licence UML-MILL-KEY.01/2023 or as amended or renewed.

a) Prepare a site for, construct, operate, modify and decommission a nuclear facility for the milling of uranium ore at a site known as the Key Lake Operation in the Province of Saskatchewan as shown on the drawing referenced in Appendix A to this licence.
b) Produce a uranium concentrate.
c) Possess, transfer, import, use, store, and dispose of nuclear substances; and
d) Possess, transfer, import, use prescribed equipment that is required for or associated with laboratory studies, field studies, fixed gauge usage and borehole logging devices in relation to (a) and (b).

Further, as described in the CNSC Key Lake Licence Conditions Handbook (LCH), the authorized activities at Key Lake include:

- Operation and changes to the mill and associated site infrastructure within the objectives of the licensing basis to produce up to a nominal annual production of 9.6 million kilograms of uranium.
- Receipt, storage and processing of ore slurry and mineralized rock.
- Receipt, storage and processing of recycle products from the Blind River and Port Hope Conversion Facilities.
- Disposal of tailings in the Deilmann tailings management facility.
- Operation of the above ground tailings management facility.
- Operation of the dewatering and water management systems.
- Operation of the water treatment plant.
- Storage of clean and special waste rock.
- Disposal of contaminated waste.
- Authorized decommissioning and reclamation.
- Possession, storage, transfer, importation, use and disposal of nuclear substances and radiation devices.

2.3 Site Activities

2.3.1 Pre-Operational Activities

Uranerz commenced exploration of the Key Lake area in 1970 using aerial surveys, followed by geological mapping in 1971. Radiometric anomalies identified in 1973 assisted in focusing the search in the ore body area with drilling ultimately intersecting

the Gaertner ore body in the summer of 1975. Further exploration activities were undertaken at the time.

Guidelines for the environmental impact statement (EIS) entitled, "Guidelines for the Proposed Uranerz Project at Key Lake" were issued by the Saskatchewan Environmental Protection Services on October 15, 1976. Baseline environmental data collection commenced in late 1976, as did dewatering and surface water channeling projects.

The final EIS was submitted to Saskatchewan Environment on October 15, 1979. On December 11, 1979, by Order in Council 2115/79, a Key Lake Board of Inquiry was established to conduct a public inquiry into the probable environmental, health, safety, social and economic impacts of the proposed project. The inquiry was conducted in 1980 with a Final Report issued on January 12, 1981 (Key Lake Board of Inquiry Report).

The results of the environmental baseline work were summarized in the EIS report and presented to the Board of Inquiry. The baseline conditions and predicted impacts were identified for air quality, surface water, aquatic ecology, hydrology, geology and soils, vegetation, archaeology, socio-economic factors, and radiological concerns. On February 12, 1981, the province approved the uranium mining and mill development for Key Lake.

2.3.2 Activities Completed Under Previous Licenses

Mining of the Gaertner pit began in 1982, along with the construction of ancillary facilities required for handling, storing and milling ore, special waste storage and contaminated water handling. In 1983, the milling of the Gaertner ore commenced following the receipt of regulatory approvals.

The Gaertner ore body was mined from 1983 to 1987. During this time, dewatering wells were being installed around the area of the Deilmann ore body and overburden stripping was performed in preparation for mining. Mining of the Deilmann ore body took place until April 1997 when the last ore was mined.

In 1983, the Above Ground Tailings Management Facility (AGTMF) started to receive tailings from the milling of the Gaertner and Deilmann ore bodies. The AGTMF was in use until 1995 when the Deilmann Tailings Management Facility (DTMF) became operational.

In 1994, Cameco prepared and submitted an EIS to the provincial and federal regulatory agencies describing the conversion of the Deilmann pit to an in-pit tailings management facility. The DTMF received regulatory approval for sub-aerial deposition of the remaining Key Lake ore tailings and Key Lake special waste in 1995. The placement of Key Lake tailings into the eastern portion of the DTMF began on December 31, 1995, while mining of the remaining ore in the pit continued through to 1997.

In 1995, the McArthur River Operation (McArthur River) EIS was submitted proposing the transportation of high-grade ore, mined from the McArthur River underground mine, to Key Lake, where it would be blended and subsequently milled. The resulting tailings would then be sub-aqueously deposited in the DTMF. The McArthur River project underwent public hearings in 1996 and received favorable response from the Joint Federal/Provincial panel in early 1997. The provincial and federal agencies responsible for regulating the uranium mining and milling industry approved the development of the McArthur River project in the summer of 1997.

Also in 1995, a reverse osmosis (RO) plant was constructed to treat dewatering water prior to its release to the environment. In 1998, an initiative commenced to remove nickel-rich basement rock from the Deilmann north waste pile and place it in the Gaertner pit. This waste rock was subsequently covered with sand and flooded to reduce oxidation of the waste rock.

In 1999, regulatory approval was issued to convert the DTMF to sub-aqueous tailings deposition using McArthur River tailings. This transition from sub-aerial to sub-aqueous deposition started in the fall of 1999, as the McArthur River project was brought on-line. Full flooding of the DTMF started in summer of 2000, following the completion of the new pit crest tailings distribution system.

2.3.3 Activities Completed Under UML-MILL-KEY.01/2023

CNSC licence UMLOL-MILL-KEY.00/2013 was issued in October of 2013. This licence was amended to UML-MILL-KEY.01/2023 in July of 2020, to reflect the revised Key Lake financial guarantee. In 2014, Key Lake submitted and received regulatory approval for an EIS for the Key Lake Extension Project (KLEP). The scope of the KLEP included the following.

- Increasing the capacity in the DTMF by raising the approved average consolidation height from 466 metres above sea level (masl) to 505 masl.
- Increasing the nominal mill production capacity to 9.6 million kg U
- Construction or modification of facility components to support the increased production capacity and to support milling of ores from other potential deposits in addition to McArthur River.

During the licence term, Key Lake entered into a temporary state of care and maintenance in 2018 as a result of ongoing uranium market conditions. During this period, Cameco utilized the opportunities realized while the mill was in shutdown in order to undertake improvements to equipment with a specific focus on digitization and automation of existing processes as listed below.

- Automation of the yellowcake packaging area resulting in a system to automatically de-stack; fill; lid and clean; and weigh and label the drums.

- Additional recycle lines, pumps and chemical addition within the bulk neutralization circuit to mitigate gypsum scaling.
- Automation of discharge/recycle piping and valving within the effluent release pumphouses.
- Replacement of the tailings splitter box with a distribution header.
- Improvements to the crystallization and calciner scrubber systems.
- Installation of additional nuclear densometers to better analyze and monitor uranium grades within the mill process streams.
- Replacement of existing aspirators in lime handling with wet scrubbers.

In February of 2022 Cameco made announcement of intent to begin the process of transitioning Key Lake from care and maintenance to production.

2.4 Future Outlook

During the next licence term Key Lake may undertake the activities noted below. When the decision is made to proceed and sufficient information has been gathered and plans developed, Cameco will provide notification (with supporting information to demonstrate that the licence basis is respected) to the CNSC.

- Conduct work to the bulk neutralization circuit to improve the quality of effluent released to the environment.
- Conduct work to the contaminated water routing at site in order to improve the quantity of effluent released to the environment.
- Upgrades to containment systems and associated inspection and maintenance programs.
- Continued examination for opportunities to digitalize and/or automate processes.
- Evaluation of ore blend strategies to optimize feed grade to the mill.
- Changes to water management strategies within the DTMF and Gaertner Pit.
- Demolish and dispose equipment and buildings made obsolete by the replacement facilities.

3.0 FACILITY COMPONENTS AND PROCESSES

Set out below is an overview of the milling and ancillary facilities at Key Lake. Additional detail is provided in Key Lake *Facilities Program* (KEY-FP).

3.1 Milling Facilities

Key Lake uses a sulphuric acid leach and a SX process to extract and purify a uranium oxide (U_3O_8) product from the ore. Ore (including special waste, low grade ore, and mineralized waste for blending purposes) is delivered to the mill from stockpiles and/or McArthur River, treated to extract the uranium, and the tailings disposed of in an engineered tailings management facility. Key Lake also receives recycled products from the Cameco Port Hope Conversion Facility and Blind River Refinery that are processed in the mill. The Key Lake mill contains six main process components. Each processing circuit is contained in a separate plant facility that is linked to the next stage of the process. The six components are:

1) ore receiving/grinding/blending
2) leaching
3) counter-current decantation
4) solvent extraction
5) yellowcake precipitation/calcination/crystallization
6) bulk neutralization

The annual licence limit of the Key Lake mill is 9.6 million kg U (25 million lbs U_3O_8). In addition to the production of uranium oxide, the Key Lake mill also produces an ammonium sulphate from the recovery of ammonia from solution in the milling processes. The ammonium sulphate is transported off-site and sold as fertilizer.

Key Lake also operates a reverse osmosis (RO) water treatment plant for water collected as part of the Gaertner/Deilmann pond pumping systems. The water collected is treated at the RO plant and released to the environment. Treated effluent is also discharged to the environment from the bulk neutralization (BN) circuit within the Key Lake mill. The BN circuit receives the residual dissolved solids from the RO plant as well as other potentially contaminated water pumped to the mill from other areas of the site. The treated effluent is sent to one of four monitoring ponds where the quality of water is confirmed by sampling and analysis prior to release to the environment or recycling for re-treatment.

Drawing KL200-G-SK004 (Appendix A) illustrates a surface layout of Key Lake including the mill, while Figure 3.1 shows the simplified mill process flow sheet. The mill facilities are located in two distinct areas. The crushing/grinding and McArthur River ore off-loading facilities are located in close proximately to the Gaertner and

Deilmann pits while the other plant facilities are approximately 1.5 km to the north of the grinding plant. These locations are connected by two covered and insulated service utilidors that contain the slurry, water and steam pipes, as well as the instrumentation system data transmission cables.

The mill operation is controlled by a distributed process control instrumentation system (DCS) that is monitored in strategically located control room(s). These systems are detailed in the KEY-FP.

Environmental protection features at Key Lake include the above mentioned utilidors, other containment systems, spill detection equipment and lined pond and ore/special waste storage areas; these are detailed in the Key Lake *Environmental Protection Program* (KEY-EPP) and the *Waste Management Program* (KEY-WMP). Emission controls are detailed in the KEY-FP. Radiation safety and health and safety measures are detailed in the Key Lake Radiation Protection Program (KEY-RPP) and the *Occupational Health and Safety Program* (KEY-OHSP).

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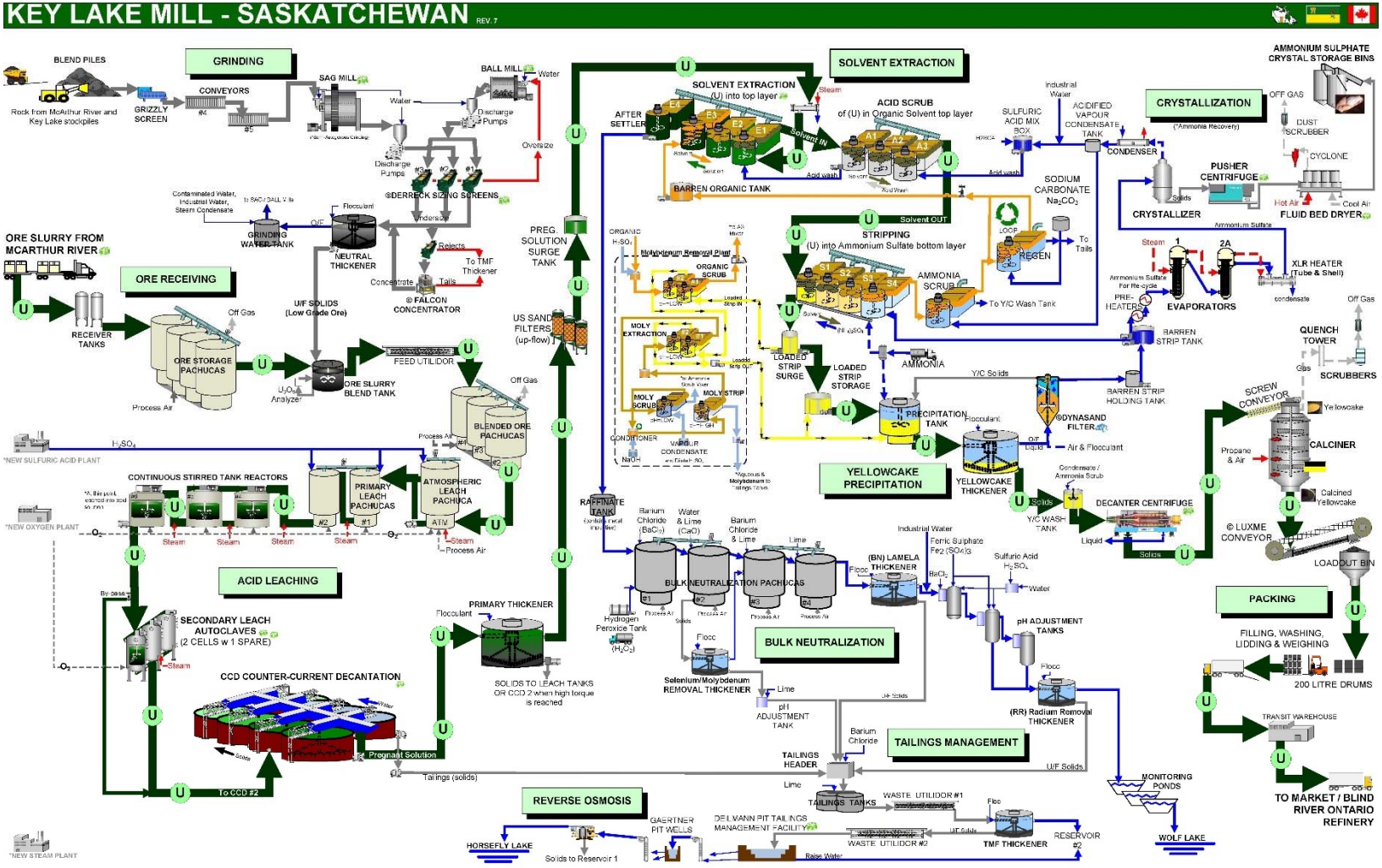

Figure 3.1: Key Lake simplified mill process.

3.1.1 Crushing

The crushing circuit is operated to crush mineralized material that is too large to be fed directly into semi-autogenous grinding (SAG) mill. The crushing circuit is contained in a concrete building with a dump pocket on top of, and a surge bin immediately below, the crusher. Oversize material is fed into the dump pocket and the crushed rock is discharged from the bottom of the crusher into a surge bin and then it is transported back to the stockpile area for eventual processing through the grinding circuit.

3.1.2 Grinding/Ore Receiving/Blending

The purpose of the grinding circuit is to grind ore, mineralized material, and special waste to a fine particle size or slurry that is suitable for milling or blending with high-grade ore slurry. The grinding circuit consists of a SAG mill, a ball mill and a thickener. Vibrating screens are used in both the SAG mill and ball mill circuits for classification, whereby the ore is kept in closed circuit until it is sufficiently ground to pass through the screens and proceed to the thickener. The resulting slurry is pumped to the grinding circuit neutral thickener underflow tank (blend tank) while the water that is decanted from the top of the thickener flows to a grinding water tank and is used again in the grinding circuit.

The ore receiving facility is designed to receive high-grade ore, trucked in slurry form. The high-grade ore is removed from the individual slurry containers or “totes” by a vacuum pump system, sampled, and pumped into air agitated storage pachucas. Under the control of an on-stream analyser, high grade ore from the pachucas is pumped to the blend tank and blended down with the low-grade grinding circuit product. The blended slurry is then pumped through the feed utilidor to the ore storage pachucas in the mill prior to leaching.

3.1.3 Leaching

The purpose of the leaching circuit is to dissolve the uranium from the ore. This is achieved by treating the ore with sulphuric acid under oxidizing conditions. Iron is a necessary component of the ore slurry, since it acts as a catalyst in the leaching reaction as it cycles from the ferric to ferrous oxidation state and back again. Depending on the iron content of the blended ore, additional iron can be added through ferric sulphate addition. The leaching process is conducted in a combination of atmospheric tanks and pressurized vessels.

The product from the leach circuit is a slurry that consists of essentially uranium free leach residue and an acid solution containing the dissolved uranium and other metals leached from the ore. All of the metals in the leach solution are in a highly oxidized state. This product is transferred to the counter-current decantation (CCD) circuit.

3.1.4 Counter-current Decantation (CCD)

The purpose of the CCD circuit is to separate and recover the uranium bearing solution from the barren waste solids. The CCD circuit consists of a series of thickeners, approximately 20 m in diameter, arranged on either side of a central pump and service gallery. Process piping is designed so that any stage may be by-passed for operating and maintenance needs. There are two products from the circuit, pregnant aqueous solution, and solids slurry.

Wash solution is fed to the final thickener and the slurry mixture from leaching is fed to the first thickener. The solution advances through each of the thickeners in series from last thickener to the first. Conversely, the leach residue solids progress from the first thickener towards the last unit, also in series. The wash solution becomes progressively impregnated in uranium at each washing stage, i.e., thickener vessel. The pregnant solution from the first thickener is then pumped to solution pre-treatment and on to SX. The tailings slurry from the final thickener is pumped to the tailings handling areas for neutralization, thickening, and eventual placement in the DTMF.

3.1.5 Solution Pre-treatment

The purpose of the solution pre-treatment circuit is to provide a clean pregnant solution feed to the SX circuit in order to prevent gypsum scaling, emulsion formation and operating difficulties in the SX circuit.

The solution pre-treatment area consists of a storage tank and three sand filters. The leach aqueous solution from the CCD circuit can be pumped through the solution pre-treatment sand filters, if required. The sand filters cycle continuously between operating and backwashing/stand-by. The filtered leach aqueous reports to the pregnant aqueous storage tank and the backwash solution reports back to the CCD circuit.

3.1.6 Solvent Extraction

The purpose of the SX circuit is to purify and concentrate uranium in the solution through the removal of other dissolved impurities. The SX plant consists of two independent processes: uranium recovery and molybdenum removal. The molybdenum removal circuit operates only when high molybdenum levels are present in the ore.

The uranium recovery circuit uses an organic solvent, composed of calumet, isodecanol and tertiary amine to carry out the selected extraction of uranium from solution.

The pregnant solution from solution pre-treatment, consisting of an aqueous solution containing dissolved uranium and other dissolved impurities, is fed to the extraction circuit. The uranium is extracted from the aqueous solution into a barren organic solution by contacting the two solutions using a counter-current method in a series of four mixer settlers. The amine in the barren organic selectively binds the uranium from the pregnant

solution leaving the majority of other dissolved metals in the aqueous stream. The resulting organic solution is called loaded organic. The loaded organic is stripped of uranium producing a loaded strip solution and a uranium depleted aqueous solution, called raffinate, is then pumped to the bulk neutralization circuit for treatment prior to its release as a mill effluent.

When required, the loaded strip solution is treated for molybdenum removal in the molybdenum circuit prior to being pumped to yellowcake precipitation. The organic in this process is made up of calumet and a molybdenum extractant consisting of an aliphatic hydroxylamine.

3.1.7 Yellowcake Precipitation

The purpose of the yellowcake precipitation circuit is to recover dissolved uranium from the purified loaded strip solution and produce a barren strip solution that can be returned to SX for uranium stripping or processed in the ammonium sulphate crystallization circuit.

The loaded strip solution from SX is fed into the precipitation tank. Ammonia gas is added to the solution to raise the pH; this causes the uranium to precipitate as ammonium diuranate particles.

The precipitated solids and strip solution slurry are fed into the thickener from the precipitation tank. The solids settle to the bottom where they are pumped to the yellowcake centrifuge. The thickener overflow solution is collected in a launder and fed through a sand filter for the removal of fine yellowcake particles. The solid from the filter are returned to the precipitation tank. The filtrate is pumped to the barren strip surge tank where it is pumped either to the SX strip circuit or the ammonium sulphate crystallization circuit.

3.1.8 Calcining/Packaging

The purpose of the calcining/packaging circuit is to convert the ammonium diuranate to a uranium oxide (U_3O_8) and to package the product into IP-2 drums for shipment to a refinery.

The yellowcake slurry from the thickener is fed into a centrifuge where it is dewatered. The concentrate flows back to the yellowcake thickener while the solids are fed into the heating unit (calciner). As solids progress through the calciner and the temperature increases, the uranium is dried and converted to uranium oxide (U_3O_8). The calcine product is passed through a screen to break any lumps and conveyed to a product storage bin.

The calcined product is drawn from the bottom of the storage bin and packed in 200 litre (L) drums. The drums are placed in a covered storage area until loaded for transport.

Filled calcine drums are inspected, checked for surface contamination, and loaded for transport off site.

The packaging circuit is designed to automatically de-stack drums, fill drums with yellowcake to the desired weight, lid and clean the drums, complete final weighing of the drums and apply the necessary labelling. An enclosed containment area, equipped with a dust collection system, encompasses the portions of the circuit from drum filling to the cleaning area.

In addition, the packaging system has a product recovery process that is used to collect materials from the dust collection system. The product recovery system also handles drums of recycle material from Cameco's Port Hope and Blind River facilities. The recycle material is received at the Key Lake facility in IP-2 drums that are emptied using an automated drum emptying system. The product that is recovered is added to the leaching circuit for processing.

3.2 Mill Utilities

3.2.1 Ammonium Sulphate Crystallization

The purpose of the crystallization plant is to remove ammonia from the barren strip solution as ammonium sulphate crystals at the same rate as the ammonia is added to the SX and yellowcake circuits.

The crystallization circuit consists of vertical tube-in-shell evaporators, a draft tube baffle crystallizer, a pusher centrifuge, a fluid bed dryer and dust scrubber. The product from the plant is conveyed to storage bins located outside the plant by a bucket elevator.

3.2.2 Ventilation

Each of the mill circuit areas are housed separately to minimize any cross contamination between areas. This results in each area having its own ventilation system to supply fresh heated air and to exhaust radon progeny bearing air. Process ventilation is also utilized to exhaust contaminants directly from process equipment in order to prevent release of contaminants into the plant/building environment.

The design intent of the mill ventilation systems is to produce an acceptable working environment for employees by ensuring that the air quantity and quality meet acceptable standards. The quality of air is maintained through the application of the *Radiation Code of Practice* (RCOP), located within the KEY-RPP and the application of ALARA principles.

The maintenance of the ventilation system components is managed through the Key Lake *Maintenance Program* (KEY-MP), wherein the various systems within each area, and the

specific fans in each system are assessed to determine the preventative maintenance requirements and frequency.

3.2.3 Electrical Power Supply

Under normal operating conditions, Key Lake is supplied with electric power from the SaskPower grid. Key Lake also maintains a powerhouse that was originally designed to supply all of the site's electrical needs. This powerhouse consists of diesel generator sets capable of providing backup power to the site in the event of a power interruption. The Key Lake powerhouse is equipped with a lightning detection system and currently, in the event of a power failure from a lightning strike to the SaskPower grid, the system is designed to supply power to the site. Rapid power backup generators will automatically start and provide power generation to critical operational systems until such time the main diesel generators can be started.

3.2.4 Sulphuric Acid Production

The primary use of sulphuric acid is in the leaching circuit. Sulphuric acid is also required for pH adjustment at various points in the milling process, as well as in the bulk neutralization circuit. This reagent is produced on site using molten sulphur, air (oxygen), and water. The products of this process are sulphuric acid (H_2SO_4) and heat recovered as steam.

The gasses generated in the acid production process are scrubbed prior to release to remove SO_2. The sulphur required to generate acid is unloaded from trucks in an unloading bay and is stored in molten sulphur tanks. If required, acid can also be purchased from a third-party vendor and be loaded into the acid storage tank. The plant also has the capability to load acid from the plant into a transport trailer to provide acid to other regional operations.

3.3 Waste Management Facilities and Systems

The KEY-WMP identifies and provides details on the managed process in which wastes generated at Key Lake are handled, disposed, and tracked. The management and disposal of wastes are performed in compliance with applicable laws and regulations in such a manner, which reduces adverse impacts to the environmental and human health.

Non-contaminated domestic and industrial materials are disposed of in a landfill where waste management practices are applied. Radiologically contaminated materials are disposed of in the contaminated landfill located on the AGTMF.

3.3.1 Wastewater Management

Water, contaminated with radionuclides, metals, or other parameters is generated from facilities and activities throughout the site operation. Dewatering water, seepage and

runoff from ore, waste rock, tailings management facilities and process water from the milling operation are some of the types and sources of contaminated water from the facility.

Dewatering water is either pumped to the Gaertner Pond, DTMF, or to the RO plant for treatment and release to the environment.

The RO plant consists of a storage tank, pH and chemical conditioning, pre-treatment filtration, polishing filtration and RO membranes. During the RO treatment process, contaminated water is forced through a semi-permeable membrane leaving the dissolved solids behind. The treated water from the RO process is then discharged to the environment.

The contaminated water that is pumped to the mill is stored in lined reservoirs #1 or #2. Contaminated water from the reservoirs is either used in the mill process or treated in the bulk neutralization circuit. The *Environmental Code of Practice* (ECOP) contained in the KEY-EPP details the safe operating volumes of these reservoirs and the actions that are required to ensure this safe operating condition is maintained.

The bulk neutralization circuit consists of five main sections: raffinate neutralization, molybdenum and selenium removal, radium removal, pH adjustment, and tailings neutralization and pumping. The raffinate neutralization circuit consists of neutralization pachucas and a bulk neutralization thickener. The molybdenum/selenium removal consists of a thickener and pumps. The radium circuit consists of agitated reactors, mix tanks and a radium removal thickener. The pH adjustment circuit consists of agitated tanks and a discharge launder system. The tailings neutralization section consists of two holding tanks connected to the tailings pumps.

The treated effluent flows through the discharge launder to one of four monitoring ponds where the quality of water is confirmed by sampling and analysis prior to release to the environment or recycling for re-treatment.

3.3.2 Tailings Management

Prior to 1996, tailings were discharged into the AGTMF. This facility was engineered and constructed with a bentonite liner and drainage collection. In 1996, the tailings deposition was changed to the DTMF. Following this change, the operation of the AGTMF has been to collect and convey for treatment, contaminated water from the facility and dispose of contaminated debris on the tailings surface.

Currently the tailings from bulk neutralization are pumped to the DTMF thickener to increase the density. The thickened tailings are pumped to the tailings distribution system where they are discharged into the DTMF through one of several discharge pipes. The tailings management process is described in more detail in the KEY-WMP.

3.3.3 Ore and Waste Rock Management

The objectives of the waste management system, with respect to waste rock, have been to; minimize the short-term interaction of potentially hazardous waste rock with the environment, to evaluate long-term decommissioning requirements and implement these options, where appropriate, for the stored waste rock. (i.e., where waste rock classification deems it appropriate, engineered containment is provided to ensure the waste rock is contained).

During previous mining of the Gaertner and Deilmann open pits, large quantities of waste rock were produced which required surface storage, as classified in the KEY-WMP. Clean waste rock was placed in the Deilmann North, Deilmann South and Gaertner waste piles. Special waste was placed in the lined Deilmann and Gaertner special waste facilities. Nickel-rich waste rock was originally stored on the Deilmann North waste pile and later hauled to the Gaertner pit for disposal under a water cover to reduce long-term contaminant generation. Mineralized waste pads (Phase 1-4), designed with engineered containment, are used to provide an interim storage are for blend material. This includes material such as ore from the previous mining operations, Deilmann and Gaertner special waste, and McArthur River mineralized material.

3.3.4 Hazardous Substances and Waste Dangerous Goods Management

At Key Lake, other hazardous substances are consumed and/or produced while carrying out licensed activities. These include, but are not limited to specific chemicals and reagents, gasoline and diesel fuel, and waste oil. The storage of these hazardous substances requires specific operational controls, such as containment, leak detection and inventory reconciliation, as required by provincial regulations. The Province of Saskatchewan has approved Key Lake as a storage facility for hazardous substances through compliance to these stringent requirements. Specific hazardous substance and waste dangerous goods storage locations are included within the Approval to Operate issued by the Province.

4.0 OPERATING POLICIES AND PRINCIPLES

4.1 Cameco's Vision, Values, and Policy Statements

This information is intended to provide an understanding of the strategic direction Cameco is pursuing, and the approach Key Lake takes in this regard, with respect to SHEQ.

4.1.1 Vision and Values Statement

4.1.1.1 Vision

Cameco's vision is to energize a clean-air world.

4.1.1.2 Values

Our values guide our decisions and actions. They are:

Safety and Environment

The safety of people and protection of the environment are the foundations of our work. All of us share in the responsibility of continually improving the safety of our workplace and the quality of our environment.

People

We value the contribution of every employee and we treat people fairly by demonstrating our respect for individual dignity, creativity and cultural diversity. By being open and honest, we achieve the strong relationships we seek.

Integrity

Through personal and professional integrity, we lead by example, earn trust, honour our commitments and conduct our business ethically.

Excellence

We pursue excellence in all that we do. Through leadership, collaboration and innovation, we strive to achieve our full potential and inspire others to reach theirs.

4.1.2 Safety, Health, Environment and Quality Policy

Cameco has established a corporate policy regarding the environment, worker health and safety and quality. This policy is posted at Key Lake, as well as on Cameco's website (www.cameco.com). The policy statement, policy implementation and policy accountability text are reproduced in the following three subsections.

4.1.2.1 Policy Statement

Consistent with our vision, values and measures of success, Cameco's highest priorities during all stages of our business are the safety and health of our workers and the public, protection of the environment, and quality of our processes. Our businesses include exploration, development, operations, restoration, decommissioning and reclamation. As such, we are pursuing excellence in all that we do through promotion of a strong safety culture and our commitment to the following:

- Preventing injury, ill health, and pollution.
- Fulfilling regulatory, contractual and corporate requirements as well as commitments to local communities (defined as compliance obligations).
- Keeping risks at levels as low as reasonably achievable, taking into account economic and societal factors (ALARA).
- Ensuring quality of processes, products and services.
- Continually improving our overall performance.

4.1.2.2 Policy Implementation

To implement the policy statement, we:

- Ensure the effective implementation of the Cameco Management System, which is consistent with international and national standards.
- Implement Cameco's policies, programs and standards to meet our compliance obligations while balancing all our measures of success.
- Set risk-informed objectives that will lead us to continually improve our overall performance in our program areas.
- Maintain a robust radiation program to monitor and measure radiation doses while keeping doses ALARA.
- Promote a strong safety culture through a respectful and inclusive workplace, effective two-way communication, a questioning attitude and informed decision making.
- Manage waste, with a focus on tailings, waste rock and low-level radioactive waste.
- Regularly identify and assess potential impacts and required mitigations for climate-related physical risks.
- Contribute to the conservation of biodiversity, including no exploration or development of mines in World Heritage sites.
- Maintain financial guarantees to cover decommissioning liabilities and undertake progressive reclamation, as reasonably practicable.
- Continually improve water stewardship practices at our operations.

- Identify and reduce the potential for accidents and emergency situations, including those involving the transport of our products, and implement emergency response plans to mitigate their impact.
- In accordance with our Sustainability Policy, work with local communities, regulators and other stakeholders on the impact of our activities and our overall performance while responding to customer's changing needs.
- Systematically identify and address non-conformances.
- Collaborate with all levels of government within the jurisdictions that we do business to enhance regulatory mechanisms.
- Provide a systematic approach when training employees, including when communicating this policy to employees and others performing tasks on behalf of Cameco.
- Monitor and measure the key performance indicators of our operations.
- Conduct regular audits to assess and ensure compliance with this policy.
- Conduct research and develop new processes and products in SHEQ areas to solve technical barriers preventing the achievement of objectives and targets.
- Provide adequate and appropriate resources to implement this policy.

4.1.2.3 Accountability

The chief executive officer shall be responsible to ensure that this policy is maintained and require compliance with this policy and implementation of its supporting programs and to monitor, from time to time, that status of the implementation of this policy.

The chief operating officer shall ensure senior management of each division, operation and subsidiary is accountable for and has necessary authority for the establishment, maintenance and implementation of documented programs, plans and procedures that support this policy.

The chief corporate officer shall ensure that this policy is implemented, that the senior management of SHEQ is accountable for and has necessary authority for the establishment, maintenance and implementation of programs, and to periodically report on the status to senior management.

Senior management is accountable for and has necessary authority for the establishment, maintenance and implementation of documented programs, plans and procedures that support this policy.

All employees and contractors are accountable for the performance of their jobs in compliance with this policy.

4.2 Operating Principles

4.2.1 General

General operating principles followed by Key Lake are to:

- Comply with the requirements of the *Nuclear Safety and Control Act* and Regulations, with the Canada Labour Code and regulations made under the Code, and with laws of other jurisdictions as required by the CNSC, which are not inconsistent with the CNSC Act and Regulations.
- Accept the principle that doses of ionizing radiation should be kept as low as is reasonably achievable, economic and social considerations being taken into account. Cameco will continue to guide its operations with this principle as it applies to all health, safety, and environmental hazards.
- Set action levels for radiation and environmental parameters which should allow adequate time to correct problems prior to reaching regulatory objectives.
- Design and manage working conditions at Key Lake to provide for the safety and health of all employees, and to promote a safety culture throughout the facility.
- Endeavour to provide a proper climate and appropriate mechanism for the free flow of relevant information through all levels of the facility organization, enabling all employees to effectively carry out their tasks in a safe and environmentally conscious manner.
- Commit to honest and ethical communication, both in principle and practice. Cameco advocates open, responsive, clear communication that supports and furthers the vision and strategy of the corporation and acknowledges our stakeholders' need for timely and accurate information presented in a meaningful way.

4.3 Facility Action Levels

4.3.1 Radiation Action Levels

Radiation action levels are a requirement of the GNSCR (paragraph 3(1)(f)), the RPR (Section 6) and the UMMR (Section 4). Radiation action levels are based on effective dose and are set at levels to indicate where a potential loss of control of the KEY-RPP may be occurring. These levels are defined in the Key Lake RCOP within the KEY-RPP, where measures to mitigate the potential for reaching action levels (i.e., administrative levels) are described.

4.3.2 Environmental Action Levels

The UMMR also require a code of practice that defines environmental action levels. The regulations define an action level as a specific dose or parameter that, if reached, may indicate a potential loss of control of the environmental protection program. With respect

to Key Lake, the ECOP is designed to address treated effluent, which is the most significant environmental aspect of the operation in terms of potential impacts to the environment. The ECOP is detailed in the KEY-EPP.

5.0 FACILITY MANAGEMENT

Key Lake strives to continually improve all aspects of governance, quality management and safety culture. Corporate policies and programs provide guidance and direction for the site programs that define the site QMS.

There are associated corporate-level programs that outline requirements for site-based programs, in areas of quality, safety, environment, radiation protection, contractor management and emergency response. In addition, there is a corporate audit program that outlines both corporate and site-level audit activities. The corporate programs are based on the ISO model (e.g., ISO 9001, ISO 14001). The Cameco *Quality Management Program* (CAM-QMP) provides the overall guidance to the other programs in core areas such as risk assessment, communication, controls, non-conformance and corrective action.

5.1 Safety Culture

Cameco and Key Lake's management promote and support a strong safety culture through the continued development and enhancement of robust, integrated management systems, leveraged by passionate and committed leadership personnel that build and sustain trust through consistent behavior modeling and leadership presence that has genuine impact in the workplace.

Underpinning all these formal mechanisms is senior management's commitment to safety as the highest priority and clear communication of this to the workforce.

Cameco has adopted five key messages that form the framework of how we articulate and manage safety. They are:

- Safety is our first priority.
- We are accountable for safety.
- Safety is part of everything we do.
- Safety leadership is critical to Cameco.
- We are a learning organization.

From a safety culture perspective, this provides clear priorities and a realistic framework to deliver improvements. This will help to reinforce the appropriate behaviours needed for a strong safety culture.

Overall, Cameco has taken tangible steps to continue to improve quality and safety culture at Key Lake and continues to look at opportunities for further improvement. Part of this process includes formally assessing the safety culture at Key Lake to measure its status and to gain insight into continued effective implementation of the planned changes

and its ongoing development. Key Lake leadership personnel are actively engaged in ongoing evaluation and searching for opportunities for continued improvement.

5.2 Governance

Cameco operates Key Lake and consequently, the corporate and site management structures are integrated as shown in Appendix C. The current structure has been undertaken to support quality management and safety culture as well as to improve governance within the corporation and at site.

5.2.1 Corporate Oversight and Support

From a corporate governance perspective, all operational groups report to Cameco's senior vice-president and chief operating officer. Specific corporate departments provide guidance and oversight in their respective areas to Key Lake. Corporate oversight and support are provided to the Key Lake operational management team in the following areas:

- Technical services
  - Project management and implementation, mine engineering, geology, metallurgy, and rock mechanics
- SHEQ and regulatory relations department
  - Compliance and licensing (licence requirements and regulatory compliance)
  - SHEQ systems (leadership and guidance on SHEQ management through corporate-level programs)
  - Environmental assessment (assistance and guidance in preparing environmental assessment submissions)
  - Transportation and security
- Human resources
  - Administration
  - Training
- Risk management, through verification of:
  - The site QMS
  - Compliance to the corporate SHEQ system
  - Compliance to regulatory requirements

5.2.2 Operational Organization and Management Roles

At the site level, a senior management team reports to the general manager. Included in the senior management team are personnel responsible for the management of the following:

- facility operations
- SHEQ and regulatory affairs
- technical services
- human resources
- maintenance
- projects

These individuals consult with and seek guidance from their respective counterparts in the corporate structure. The Key Lake senior management team is responsible for implementing the requirements of the regulatory licence and permits through the application of the supporting programs outlined in section 6.0.

The attached Appendix C provides brief descriptions of the Cameco management roles identified in the organizational chart also in Appendix C. These roles may be revised from time to time to further improve the organization and will be communicated to the regulators.

5.2.2.1 Management of Contractors

Cameco has a contractor management program to guide site management in dealings with any contractors working at the site. Key elements of the program are as follows:

- scope of work for the contractor
- risk assessments to the level commensurate with the level of risk
- responsibilities of Cameco and the contractor
- information for effective contract management in the procurement stage
- responsibilities of the Cameco contract managers
- training for safety-related activities
- contractor orientation
- supervision of the contractor
- communications
- documentation and document control
- change control
- emergency preparedness, and
- non-conformance and corrective action.

5.2.2.2 Exchange of Information

The exchange of information with regard to health, safety and environmental matters is developed by the participation of the employees in groups and committees. Reports

generated by the committees are posted on bulletin boards to encourage employee review and comment.

Weekly meetings of the senior site departmental representatives are held to discuss pertinent operations and administration information, and related issues. Departmental heads discuss related operational, health, safety, and environmental issues at informal meetings and safety meetings with their personnel on a regular basis.

Safety and environmental control statistics are readily available for employees to review, and, in fact, they are encouraged to read and understand this information.

5.2.2.3 Committees and Teams

On-site committees such as the Occupational Health and Safety Committee (OHC) and teams make recommendations to the general manager on an as needed basis on matters that affect various areas of Key Lake. Formal approval by management is still required to implement any changes.

Membership of the OHC include an appropriate cross-section of employees and managers to ensure that the workforce is adequately represented. As well, a number of the committee positions are rotated amongst employees so that, over time, all employees have an opportunity to participate in the committee(s).

The employee co-chairperson of the Occupational Health and Safety Committee is designated as the "workers' representative", as referred to in the NSCA and associated regulations. The Occupational Health and Safety Committee is also a requirement of the provincial *Occupational Health and Safety Regulations*. There is a requirement that there be a worker chairperson on the committee who is designated as the "workers' representative" as is also referred to in the UMMR. All communications from the CNSC are available to both the employer and employee co-chairpersons.

5.2.2.4 Training

Foundations of training and competency development are required to properly build an environment conducive to improvement and to fully promote human performance capabilities. At Cameco and at Key Lake, training is a high priority. Qualifications are established and assessed for all functions related to safety critical work and training for personnel is systematically provided.

Underpinning the vital role training and development plays in the operation; Key Lake management has adopted the systematic approach to training (SAT) using the ADDIE model:

- *A*nalyze the activity to be done
- *D*esign training objectives

- *D*evelop the training
- *I*mplement the training
- *E*valuate the effectiveness of the training.
- Following Cameco's SAT process, training curricula have been developed to ensure that all employees are capable of performing all tasks relevant to their current roles.

5.2.2.5 Responsibilities for All Personnel and Supervisors

All personnel are responsible for the following, in addition to specific responsibilities outlined in the various program manuals. Personnel are expected to follow company and site rules, procedures and work instructions, as well as applicable laws and regulations. Management and supervisors support an environment of two-way communications and encourage all personnel to have a questioning attitude, be continually learning and work as an effective team.

5.2.2.6 Staffing Contingency Plan

In the event of short-term staffing deficiencies (i.e., sickness), personnel have been trained with multiple skills in order to maintain the site activities. Work schedules of employees could be altered to ensure the security of Key Lake through a managed continuation of operations or an orderly and safe shut down.

In the event of long-term staff deficiencies that impair the ability of Key Lake to maintain safety standards, the activities will be suspended. Staff under the direction of the general manager would maintain security and essential services.

6.0 OVERVIEW OF PROGRAMS

Cameco has developed programs to support the management of Key Lake. Collectively, these programs form the QMS and relate closely to the CNSC safety and control areas. The site programs are summarized below, and details are contained within the program documents.

As a matter of continuous improvement for the organization, Key Lake site programs are reviewed from time to time and undergo revisions. Revised programs are submitted to the CNSC for compliance review.

6.1 Facilities Program

The Key Lake *Facilities Program* (KEY-FP) identifies the organization and personnel responsible for production of the uranium. The KEY-FP explains the milling process in detail, supported by process flow sheets to assist the reader in understanding the process. The KEY-FP also explains the ventilation systems and the methods by which the ventilation systems are maintained. The ancillary services, such as the electrical system are also identified and explained.

6.2 Maintenance Program

The Key Lake *Maintenance Program* (KEY-MP) identifies the managed process by which maintenance activities are executed. The KEY-MP is able to coordinate and control the activities of the different maintenance groups. These major maintenance areas include site services, site buildings and infrastructure, mobile equipment, milling equipment, electrical and instrumentation, drafting, engineering, and warehouse and shipping. The maintenance planning group organizes and stores information on equipment and facilities and uses a computerized maintenance management system to coordinate maintenance activities. Preventative and predictive maintenance techniques are used to optimize maintenance activities.

6.3 Waste Management Program

The Key Lake *Waste Management Program* (KEY-WMP) identifies the managed process in which wastes generated at Key Lake are handled, disposed, and tracked. The management and disposal of wastes are performed in compliance with applicable laws and regulations in such a manner, which reduces adverse impacts to the environmental and human health. Key Lake recognizes the value of the 4R's system to reduce, reuse, recycle and recover materials to the maximum extent practicable.

6.4 Environmental Protection Program

Key Lake recognizes environmental management and the protection of the environment as being among the highest priorities. The Key Lake *Environmental Protection Program* (KEY-EPP) identifies the managed process in which the site activities are monitored for environmental impact and the processes undertaken to minimize potential impacts. The environmental protection program is based on the ISO 14001 Environmental Management System, and the site is currently registered to ISO14001:2004 by SAI Global.

Through a detailed environmental monitoring schedule encompassing the air, water, terrestrial and aquatic environments, Key Lake is able to monitor for potential impacts to the environment. The results of this monitoring follow a quality assurance process to ensure the data is scientifically sound and accurate. Monitoring results are presented on an annual basis to regulatory agencies and are compared to previously made EIS predictions through the environmental performance report, prepared every five years.

6.5 Radiation Protection Program

Key Lake recognizes the protection of the health and safety of its employees and contractors and the protection of the environment as being among the highest priorities. The Key Lake *Radiation Protection Program* (KEY-RPP) identifies the process in which radiation safety is managed at Key Lake.

Core activities within the program include and are not limited to routine radiological measurements and monitoring, dosimetry, implementation of a *Radiation Code of Practice* (see Section 4.3), implementation of an ALARA protocol and reporting radiation exposure and dose results to nuclear energy workers at site and the regulatory agencies.

6.6 Health and Safety Program

Key Lake recognizes the protection of the health and safety of its employees and contractors as being among the highest priorities. The Key Lake *Occupational Health and Safety Program* (KEY-OHSP) identifies the process in which occupational health and safety is managed at Key Lake.

The KEY-OHSP is made up of several components that support Cameco's policy and its intent. This program is designed to meet legislated requirements, company standards and provide a healthy and safe rewarding workplace for all employees. This program follows the model outlined in internationally recognized management standards (including ISO 9001 and ISO 14001).

Core elements within the program include planned inspections, pre-use inspections, safety permit systems, committees and meetings, incident investigations, compliance with regulations and the management of safety equipment.

Supervisory personnel and the safety department carry out routine safety inspections and monitoring activities. The safety department follows up potential safety deficiencies and incidents and injuries are recorded for regulatory reporting and for internal measurement compared to established targets.

Apart from ensuring the safety of employees in terms of conventional and radiation safety, Key Lake is also concerned with issues of employee health and general wellness. Accordingly, Key Lake maintains a well-equipped health center, which is staffed by professional registered nurses and routinely visited by a Cameco appointed doctor.

6.7 Emergency Preparedness and Response Program

The Key Lake *Emergency Preparedness and Response Program* (KEY-EPRP) identifies the process in which emergencies are managed at the Key Lake Operation.

Core elements within this program that require planning and training include emergency response, first aid, fire protection, firefighting, and spill response.

6.8 Training and Development Program

Key Lake has developed and maintains a SAT that is defined in the Key Lake *Training and Development Program* (KEY-TDP). The KEY-TDP identifies the philosophy and the methodology of the training process and identifies the mandatory training courses for site-based personnel and explains the record management system.

6.9 Quality Management Program

The Key Lake *Quality Management Program* (KEY-QMP) is the highest level document in the overall site QMS. Corporate requirements are described in detail in the CAM-QMP. The Key Lake QMS includes the health and safety and environmental management systems and applies to all licensed activities at site. The KEY-QMP describes the requirements necessary for each program to be consistent with internationally recognized management standards (including ISO 9001 and ISO 14001). This approach ensures that processes are systematically identified, controlled and monitored, and that those processes and the QMS are continually improved.

Key elements of the KEY-QMP include, but are not limited to, process identification and risk management, communication, information management, procurement, design, construction management, commissioning, contractor management, project management and audit.

6.10 Security Program and Safeguards

The Key Lake *Security Program* (KEY-SP) describes the measures taken to prevent unauthorized access to the Key Lake facility, theft of supplies or products, and alert Cameco of acts of sabotage or attempted sabotage pursuant to the NSCA and as part of Cameco's obligations arising from the IAEA safeguards agreements. All employees are responsible for reporting apparent or actual sabotage of the Key Lake facilities. Through a set of basic systems and/or procedures, unauthorized entry or unauthorized removal of materials can be detected. Systems are also in place to ensure that shipment of yellowcake and radioisotopes is being performed in a secure manner. Access control to Key Lake is also described in the KEY-SP. IAEA access to Key Lake is granted at all reasonable times to carry out activities pursuant to safeguards agreements.

6.11 Transportation Program

The Key Lake *Transportation Program* (KEY-TP) summarizes the transportation activities at Key Lake. The KEY-TP supports Cameco's SHEQ Policy and the regulatory requirement to describe this licensed activity at the site.

This program applies to transportation of bulk materials and freight, including yellowcake, ore slurry and various waste materials to and from Key Lake. Other core elements of the program include packaging, labeling, and documentation for dangerous goods for shipping; loading transport vehicles; and ensuring the appropriate placards are displayed on vehicles before they leave site.

6.12 Public Information Program

The purpose of the Key Lake *Public Information Program* (KEY-PIP) is to inform persons living in the vicinity of Key Lake about the general nature of operations and the potential effects of the activities to the health and safety of persons and the environment that may result from the licenced activity. It is designed to keep the public informed regarding aspects of its operations.

The KEY-PIP summarizes the measures Cameco undertakes to engage people of northern Saskatchewan, to provide information, to elicit feedback and in turn, provide meaningful response in an effort to build trust and support from its stakeholders.

6.13 Fire Protection

The purpose of the Key Lake *Fire Protection Program* (KEY-FPP) is to reduce the risk to the health and safety of persons and the environment in the event of a fire, as well as mitigate the risk of fire or any impact of fire on the facility systems and components at Key Lake.

Fire protection is achieved through a combination of fire prevention measures and response systems. These include physical and administrative measures to prevent, detect, suppress and mitigate fires. A design control process identified in the KEY-QMP provides the necessary control mechanisms for modifications or additions to the facility and includes risk assessment and the requirement criteria for third-party reviews. Other controls include third-party reviews of compliance to the *National Fire Code* (NFC) and the *National Building Code* (NBC), which can include inspections, testing and training.

Physical controls include fire detection and alarm systems located throughout facilities to detect and provide notice of a fire. In the event of a fire, a trained emergency response team, and a variety of fire suppression equipment is available at all times.

7.0 DECOMMISSIONING AND FINANCIAL GUARANTEE

Cameco recognizes environmental management and protection of the environment as being among the highest corporate priorities, and as a matter of policy, will decommission and reclaim its operating sites in a planned and timely manner. Decommissioning entails the applications and approvals necessary for an operation to remove from service and close a facility to a condition, which does not require ongoing care and maintenance.

Key Lake will:

- Conduct progressive decommissioning and reclamation, where practicable.
- Maintain a *Preliminary Decommissioning Plan* (KEY-PDP), which provides a conceptual plan for the decommissioning of the entire site.
- Maintain a *Preliminary Decommissioning Cost Estimate* (KEY-PDCE), based on the decommissioning methodologies described within the PDP.
- Maintain a financial guarantee in the amount of the current KEY-PDCE.

Reclamation work is described each year in the Key Lake annual report. The conceptual plan for decommissioning is described in the KEY-PDP which forms the basis for the financial guarantee.

7.1 Decommissioning

The KEY-PDP and corresponding KEY-PDCE are submitted to the federal and provincial regulatory agencies for review and approval. The plan identifies, in general, the activities that would be required to decommission the Key Lake under a "decommission tomorrow" scenario. Prior to decommissioning activities, a detailed decommissioning plan will be prepared and submitted to the CNSC and SMOE for review and approval.

The KEY-PDCE is prepared based on the methodologies described within the KEY-PDP and contains sufficient detail and justification of costs to arrive at a reasonable estimate of cost to decommission the Key Lake site. The plan and cost estimate are reviewed, at a minimum of, every five years, but may be revised earlier if deemed necessary by Key Lake and/or the regulatory agencies. As such, Cameco is committed to reviewing and making appropriate revisions to the KEY-PDP and KEY-PDCE for submission to meet all regulatory requirements.

7.2 Financial Assurance

Key Lake is required to maintain a financial guarantee acceptable to the CNSC and the Government of Saskatchewan. The current financial guarantees in place for Key Lake total $222.5 million and received final approval from the CNSC and Government of

Saskatchewan in 2020. The financial guarantee, in the amount of the KEY-PDCE, is valid until the end of 2023 at which time Key Lake will submit an updated KEY-PDP and KEY-PDCE to the CNSC and SMOE for review and approval. Cameco and its joint venture partners maintain the required financial guarantees made out to the Government of Saskatchewan. Upon final acceptance of the updated KEY-PDP and KEY-PDCE from the SMOE and CNSC and acceptance of the financial guarantee amount by the Commission, the revised financial guarantees will be updated and submitted.

APPENDIX A
SITE LAYOUT

APPENDIX A

Title: Mining Facility Licensing Manual		Doc. No. LIC-001
Date Issued: June 2001	Date Revised: May 2022	Rev. No. 7

APPENDIX B
LIST OF REVISIONS

APPENDIX B

Title: Mining Facility Licensing Manual		Doc. No. LIC-001
Date Issued: June 2001	Date Revised: May 2022	Rev. No. 7

Table B.1: List of Revisions

Section	Description of Changes
General Revision Themes Throughout the Document	
	Revised to current Cameco document format and to align with the recently approved Cigar Lake Operation (Cigar Lake) Mining Facility Licensing Manual (CGR-MFLM). Made wording more concise and general where possible.
Cover Page & Header	
	Revised to reflect current revision to document and current date.
1.0 Introduction	
All	No significant revisions to this section.
2.0 Background	
2.2	Summary of Site Licensed Activities Section revised to align with current licence and LCH.
2.3.3	Activities Completed Under UML-MILL-KEY.01/2023 Section updated to align with current activities.
2.4	Future Outlook Section revised to align with potentially planned activities.
3.0 Facility Components and Processes	
All	No significant revisions to this section.
4.0 Operating Policies and Principles	
4.1.1	Vision Section revised to align with current Cameco vision statement.
4.1.2	Policy and Implementation Section revised to align with current Cameco statements.
4.3	Added Facility Action Levels Section to align with recently approved CGR-MFLM.
5.0 Facility Management	
5.1	Safety Culture Section revised to align with recently approved CGR-MFLM.
5.2.2	Training Section revised to align with recently approved CGR-MFLM.
6.0 Overview of Programs	
All	No significant revisions to this section. Level of detail reduced. Applicable detail maintained in program documents.
7.0 Decommissioning and Financial Assurance	

Title: Mining Facility Licensing Manual		Doc. No. LIC-001
Date Issued: June 2001	Date Revised: May 2022	Rev. No. 7

All	Sections updated to reflect current approved PDP and PDCE. Level of detail revised to align with recently approved CGR-MFLM.
Appendices	
A	Added site layout figure.
B	Updated to current list of revisions.
C	Updated to reflect current organizational chart.
D	Not included with this version of MFLM. Regulatory roadmap provided in a separate correspondence.

APPENDIX C

APPENDIX C
INTEGRATED MANAGEMENT
ORGANIZATIONAL CHART DESCRIPTIONS

Senior Management Responsibilities

Up-to-date organization charts are maintained by Cameco's corporate office, which are available on-line within Cameco's computer network. The organizational and reporting structure for senior management and corporate personnel responsible for Key Lake is noted in the figure below.

President and Chief Executive Officer (CEO)

Reporting to Cameco's Board of Directors, the president and chief executive officer is responsible for all executive management of Cameco.

Senior Vice-President and Chief Corporate Officer

Reporting to the CEO, the senior vice-president and chief corporate officer is responsible for executive management of Cameco's safety, health, environment, quality & regulatory relations (SHEQ) group.

Senior Vice-President and Chief Operating Officer

Reporting to the president and chief executive officer, the senior vice-president and chief operating officer is responsible for all executive management of Cameco's operating units.

Senior Vice-President, Chief Legal Officer and Corporate Secretary

Reporting to the CEO, the senior vice-president and chief legal officer and corporate secretary is responsible for executive management of Cameco's legal affairs.

Senior Vice-President and Chief Financial Officer

Reporting to the CEO, the senior vice-president and chief financial officer is responsible for executive management of Cameco's financial interests.

Vice-President, Mining and Operational Excellence

Reporting to the senior vice-president and chief operating officer, the vice-president, mining and operational excellence is responsible for executive management of Key Lake within Cameco

Vice-President, Technical Services

Reporting to the senior vice-president and chief operating officer, the vice-president, technical services is responsible for executive management of engineering and projects within Cameco.

Vice-President, Safety, Health, Environment, Quality and Regulatory Relations

Reporting to the senior vice-president and chief corporate officer, the vice-president, SHEQ and regulatory relations is responsible for technical support to operations for all matters relating to licensing, environmental monitoring, health and safety, radiation safety, and quality assurance. This position is also the primary corporate contact for the CNSC.

General Manager, Key Lake and McArthur River Operations

Reporting to the vice-president, mining and operational excellence, the general manager, Key Lake and McArthur River operations has overall responsibility for managing Key Lake in accordance with corporate policies and principles. This position also has overall responsibility for ensuring regulatory requirements are met at Key Lake.