Inkai Operation,
South Kazakhstan Oblast,
Republic of Kazakhstan

National Instrument 43-101
Technical Report

Effective Date: January 1, 2018
Date of Technical Report: January 25, 2018

PREPARED FOR CAMECO CORPORATION BY:

DARRYL CLARK, PhD, FAusIMM
ALAIN G. MAINVILLE, P. GEO.
STUART B. SOLIZ, P. GEO.
ROBERT J. SUMNER, PhD, P. ENG.

Table of Contents

List of Tables

List of Figures

Units of Measure and Abbreviations

°C	Degree Celsius
$	Canadian dollar (unless otherwise indicated)
>	Greater than
<	Less than
%	Percent
a	Annum (year)
cm	Centimetre
d	Day
g	Gram
GT	Grade times Thickness
h	Hour
IX	Ion exchange
K	Thousand
km	Kilometre
km^2	Square kilometre
L	Litre
Lbs	Pounds
M	Million
m	Metre
m^2	Square metre
m^3	Cubic metre
$m\%U_3O_8$	Metre times percent uranium oxide
mg	Milligram
mm	Millimetre
sec	Second
t	Metric tonne
TDS	Total dissolved solids
U	Uranium (1 tonne U = 2,599.8 Lbs U_3O_8)
%U	Percent uranium (%U x 1.179 = % U_3O_8)
U_3O_8	Uranium oxide (yellowcake)
$\%U_3O_8$	Percent uranium oxide ($\%U_3O_8$ x 0.848 = %U)
UF_6	Uranium hexafluoride

DEFINITIONS AND INTERPRETATION

In this technical report the following capitalized words, terms and expressions, and any derivations thereof as the context may require, will have the following meanings:

2009 Tax Code means the Code of the Republic of Kazakhstan dated December 10, 2006 No.99-IV "On Taxes and Other Obligatory Payments to the State Budget";

Amendment No. 6 means Amendment No. 6 to the Resource Use Contract, dated November 30, 2017, that reflects the Restructuring;

Block 1 means the 16.58 km^2 area of land in the Suzak District of the Republic of Kazakhstan, which is designated as Block 1 in Licence Series AY 1370D;

Block 2 means the 230 km^2 area of land in the Suzak District of the Republic of Kazakhstan, which is designated as Block 2 in Licence Series AY 1371D;

Block 2 MA means the portion of Block 2 that is included in the MA Area;

Block 3 means the 240 km^2 area of land in the Suzak District of the Republic of Kazakhstan, which is designated as Block 3 in Licence Series AY 1371D;

Block 3 MA means the portion of Block 3 that is included in the MA Area;

Cameco means Cameco Corporation;

CIM means Canadian Institute of Mining, Metallurgy and Petroleum;

CIM Definition Standards means CIM Definition Standards for Mineral Resources and Mineral Reserves;

Competent Authority means the appropriate state agency designated under the Subsoil Law as the competent authority; currently, the Ministry of Energy of the Republic of Kazakhstan is the Competent Authority for uranium resources;

Geology Committee means the Geology Committee of the Republic of Kazakhstan;

Implementation Agreement means the agreement between Cameco, Kazatomprom and JV Inkai dated May 27, 2016, to restructure and enhance JV Inkai;

Inkai means collectively the mine operated by JV Inkai and the MA Area or, as the context requires, the uranium deposit;

IRR means internal rate of return;

ISR means in-situ recovery, a mining process described in Section 1.10 Mining;

JV Inkai means Joint Venture Inkai Limited Liability Partnership, a limited liability partnership registered under the laws of the Republic of Kazakhstan. JV Inkai is currently owned by Cameco (40%) and Kazatomprom (60%);

KATEP means National Joint Stock Company Atomic Power Engineering and Industry "KATEP";

Kazatomprom means Joint Stock Company "National Atomic Company "Kazatomprom";

Licences means Licence Series AY 1370D, which allowed for the mining of uranium on Block 1, and Licence Series AY 1371, which allowed for the exploration and further mining of uranium on Blocks 2 and 3;

LOM Plan means the life of mine plan for Inkai that was completed in conjunction with the Restructuring;

MA Area means the 139 km^2 area in which JV Inkai currently has the right to mine, as covered by the Mining Allotment, which includes Block 1 and portions of Blocks 2 and 3;

Mining Allotment means the document issued by the Geology Committee to JV Inkai in July 2017, which is a part of the Resource Use Contract, as provided for in Amendment No. 6, and which graphically and descriptively defines the area in which JV Inkai has the right to mine;

MPP means JV Inkai's Main Processing Plant that is located on Block 1;

NI 43-101 means National Instrument 43-101 – Standards of Disclosure for Mineral Projects;

NPV means net present value;

New Subsoil Code means the Subsoil Code No. 125-VI, approved by the Parliament of Kazakhstan and signed by the President of Kazakhstan on December 27, 2017, officially published on December 27, 2017 and expected to become effective 6 months after the date of its official publication, on June 28, 2018, as further described in *Section 4.6 New Subsoil Code;*

New Tax Code means the Code of the Republic of Kazakhstan dated December 2017 No.120-VI "On Taxes and Other Obligatory Payments to the State Budget";

Old Subsoil Law means the previous Law of the Republic of Kazakhstan "On Subsoil and Subsoil Use" dated January 27, 1996, as amended;

QP means Qualified Person for the purposes of NI 43-101;

Ramp-up means the increase in production at Inkai from its current rate of production to 10.4 M Lbs U_3O_8 that is planned to take place from 2018-2020 and is detailed in the LOM Plan;

Redox means the oxidation-reduction reaction;

Resource Use Contract means the resource use contract between the Republic of Kazakhstan and JV Inkai that was signed in July 2000 and that provides for JV Inkai's mining rights, as amended by Amendment Nos. 1-6. The Resource Use Contract includes the Mining Allotment;

Restructuring means the transaction set out in the Implementation Agreement and described further in *Section 1.2 Implementation Agreement;*

Sat1 means JV Inkai's Satellite Plant 1 processing facility that is located on Block 2 MA;

Sat2 means JV Inkai's Satellite Plant 2 processing facility that is located on Block 3 MA;

SRC means the State Reserve Commission of Kazakhstan;

Subsoil Law means the Law of the Republic of Kazakhstan "On Subsoil and Subsoil Use", dated June 24, 2010, as amended; and

Volkovgeology means Volkovgeology Joint Stock Company.

Additionally, in the technical report:

- All monetary references are expressed in Canadian dollars, unless otherwise indicated; and
- Illustrations (Figures) are from Cameco, Kazatomprom and JV Inkai, and are dated December 31, 2017, unless otherwise specified.

1 Summary

Inkai is a material property for Cameco under Canadian securities laws.

This technical report has been prepared for Cameco by internal QPs in support of the disclosure of scientific and technical information relating to Inkai contained in Cameco's December 11, 2017 news release, announcing the restructuring of JV Inkai taking effect January 1, 2018, in Cameco's December 11, 2017 material change report, and in Cameco's January 25, 2018 news release, announcing the filing of this technical report.

1.1 Operation overview

Inkai is an ISR producing mine in the Central Asian Republic of Kazakhstan, made up of a single parcel of land. The parcel of land set out in the Mining Allotment, the MA Area, covers 139 km2 and includes the original Block 1 and portions of Blocks 2 and 3. Inkai is owned and operated by JV Inkai, an entity which is owned by Cameco (40%) and Kazatomprom (60%). The Republic of Kazakhstan owns Joint Stock Company Sovereign Wealth Fund "Samruk-Kazyna", who is the sole shareholder of Kazatomprom.

Inkai's total packaged production from 2009 to the end of 2017, not including Block 3 MA test mining, is 42.8 M Lbs U_3O_8 (Cameco's share 24.8 M Lbs).

1.2 Implementation Agreement

The restructuring of JV Inkai, as contemplated by the Implementation Agreement, closed on December 11, 2017, with an effective date of January 1, 2018, and consists of the following:

- JV Inkai has the right to produce 10.4 M Lbs U_3O_8 per year (Cameco's share 4.2 M Lbs), an increase from the prior licensed production of 5.2 M Lbs (Cameco's share 3.0 M Lbs)
- JV Inkai has the right to produce from the MA Area until 2045 (previously, the licence terms were to 2024 for Block 1 and to 2030 for Blocks 2 and 3)
- Cameco's ownership interest in JV Inkai is 40% and Kazatomprom's ownership interest in JV Inkai is 60%. However, during the Ramp-up, Cameco's share of annual production remains at 57.5% on the first 5.2 M Lbs U_3O_8. As annual production increases above 5.2 M Lbs U_3O_8, Cameco is entitled to 22.5% of any incremental production, to the maximum annual share of 4.2 M Lbs U_3O_8. Once the Ramp-up is complete, Cameco's share in all production will be 40%, matching its ownership interest.
- a governance framework that provides protection for Cameco as a minority owner of JV Inkai
- the boundaries of the MA Area match the agreed production profile for Inkai to 2045
- the loan made by a Cameco subsidiary to JV Inkai to fund exploration and evaluation of Block 3 is being paid on a priority basis

Cameco and Kazatomprom have also completed and reviewed a feasibility study for the purpose of evaluating the design, construction and operation of a uranium refinery in Kazakhstan. Given current market conditions, the parties have agreed that the project is not economically attractive at this time. Kazatomprom also has an option under the Implementation Agreement, expiring in 2021, to license Cameco's proprietary uranium conversion technology for purposes of constructing and operating a UF_6 conversion facility in Kazakhstan.

1.3 Property tenure

The Resource Use Contract grants JV Inkai the rights to explore for and to extract uranium from the subsoil contained in the MA Area. JV Inkai owns uranium extracted from this subsoil and has the right to use the surface of the MA Area. JV Inkai has obligations under the Resource Use Contract which it must comply with in order to maintain these rights.

In addition to complying with its obligations under the Resource Use Contract, JV Inkai, like all subsoil users, is required to abide by the work program appended to its Resource Use Contract, which relates to its mining operations.

Under Kazakhstan law, subsoil and mineral resources belong to the state. Currently, the state provides access to subsoil and mineral resources under a resource use contract. Minerals extracted from subsoil by a subsoil user under a resource use contract are the property of the subsoil user unless the Subsoil Law or a resource use contract provides otherwise.

A resource use contract gives the contractor a right to use the surface of the property while exploring, mining and reclaiming the land. However, this right must be set forth in a land lease agreement with the applicable local administrative authorities.

On a regular basis, JV Inkai obtains from local authorities the necessary land lease agreements for new buildings and infrastructure. JV Inkai does not hold land leases for the entire MA Area. JV Inkai obtains land leases gradually only for surface area required for exploration, mining or construction of new infrastructure.

For more information, see *Sections 4.1 Location to 4.5 Subsoil Law*.

1.4 Location and existing infrastructure

Inkai is located in the Suzak District of South Kazakhstan Oblast, Kazakhstan, near the town of Taikonur. It is approximately 350 km northwest of the city of Shymkent and approximately 155 km east of the city of Kyzl-Orda. Inkai is accessible by road from Shymkent (470 km) and from Kyzl-Orda (290 km). JV Inkai's corporate office is located in Shymkent.

There are three processing facilities at Inkai, the MPP, Sat1 and Sat2. The existing MPP, Sat1 and Sat2 circuit capacities were estimated using Inkai daily process summaries. The MPP has an IX capacity of 2.7 M Lbs U_3O_8 per year and a product drying and packaging capacity of 8.1 M Lbs U_3O_8 per year. Sat1 and Sat 2 have respective IX capacities of 6.3 and 0.9 M Lbs U_3O_8 per year.

The following infrastructure currently exists on the MA Area: administrative, engineering and construction offices, a laboratory, shops, garages, holding ponds and reagent storage tanks, enclosures for low-level radioactive waste and domestic waste, an emergency response building, food services facilities, roads and power lines, wellfield pipelines and header houses. At Taikonur, JV Inkai has an employee residence camp with catering and leisure facilities.

1.5 Geology and mineralization

South-central Kazakhstan geology is comprised of a large relatively flat basin of Cretaceous to Quaternary age continental clastic sedimentary rocks. The Chu-Sarysu Basin extends for more than 1,000 km from the foothills of the Tien Shan Mountains located on south and southeast sides of the basin, and merges into the flats of the Aral Sea depression to the northwest. The basin is up to 250 km wide, bordered by the Karatau Mountains on the southwest and the Kazakh Uplands on the northeast. The basin is composed of gently dipping to nearly flat lying fluvial-derived unconsolidated sediments composed of inter-bedded sand, silt and local clay horizons.

The Cretaceous and Paleogene sediments contain several stacked and relatively continuous, sinuous “roll-fronts” or redox fronts hosted in the more porous and permeable sand and silt units. Several uranium deposits and active ISR uranium mines are located at these regional oxidation roll-fronts, developed along a regional system of superimposed mineralization fronts. The overall stratigraphic horizon of interest in the basin is approximately 200 to 250 m in vertical section.

The Inkai deposit is one of these roll-front deposits. It is hosted within the Lower and Middle Inkuduk horizons and Mynkuduk horizon which comprise fine, medium and coarse-grain sands, gravels and clays. The redox boundary can be readily recognized in core by a distinct colour change from grey and greenish-grey on the reduced side to light-grey with yellowish stains on the oxidized side, stemming from the oxidation of pyrite to limonite.

The sands have high horizontal hydraulic conductivities. Hydrogeological parameters of the deposit play a key role in ISR mining. Studies and mining results indicate Inkai has favourable hydrogeological conditions for ISR mining.

Mineralization in the Middle Inkuduk horizon occurs in the central, western and northern parts of the MA Area. The overall strike length is approximately 35 km. Width in plan view ranges from 40 to 1,600 m and averages 350 m. The depth ranges from 262 to 380 m, averaging 314 m.

Mineralization in the Lower Inkuduk horizon occurs in the southern, eastern and northern parts of the MA Area. The overall strike length is approximately 40 km. Width in plan view ranges from 40 to 600 m and averages 250 m. The depth ranges from 317 to 447 m, averaging 382 m.

Mineralization in the Mynkuduk horizon stretches from south to north in the eastern part of the MA Area. The overall strike length is approximately 40 km. Width in plan view ranges from 40 to 350 m and averages 200 m. The depth ranges from 350 to 528 m, averaging 390 m.

Mineralization comprises sooty pitchblende (85%) and coffinite (15%). The pitchblende occurs as micron-sized globules and spherical aggregates, while the coffinite forms tiny crystals. Both uranium minerals occur in pores on interstitial materials such as clay minerals, as films around and in cracks within sand grains, and as replacements of rare organic matter, and are commonly associated with pyrite.

1.6 Exploration and delineation

Exploration at Inkai began in the 1970s and progressed until 1996. Since 2006 exploration and delineation drilling has been conducted by JV Inkai.

Blocks 1 and 2 MA exploration and delineation programs

No exploration activity was conducted by JV Inkai at Blocks 1 and 2 MA before 2013. From 2013 to 2017, delineation drilling was conducted at Block 1 (86 drillholes) and Block 2 MA (323 drillholes) to better establish the mineralization distribution and to support further development and wellfield design.

Block 3 exploration and delineation programs

Exploration and delineation work was completed at the northern flank (Block 3) of the Inkai deposit by JV Inkai from 2006 to 2016. A total of 1,120 drillholes were drilled during this period by developing progressively tighter drilling grids. The majority of Block 3 was covered by a 200 m x 50 m grid. The 400 m x 50 m grid was completed by core drilling with infill 200 m x 50 m fences drilled by coreless drilling.

1.7 Blocks 1 and 2 development

A pilot test, using the ISR mining method, was performed in the northeast area of Block 1 starting in December 1988. The pilot leach test in Block 2 MA was initiated in 2002.

In September 2005, JV Inkai decided to proceed with the MPP to be located at Block 1, and construction began soon after. In 2009, construction of the MPP was completed and the processing of solutions from Block 1 commenced. In February 2010, regulatory approval was received, allowing full processing of uranium concentrate on site.

Also in 2009, JV Inkai constructed and began commissioning Sat1 to process solution recovered from Block 2. In 2011, JV Inkai received regulatory approval for processing at Sat1.

1.8 Block 3 appraisal program and development

Exploration work on Block 3 identified extensive mineralization hosted by several horizons. This discovery required further assessment of its commercial viability. JV Inkai completed the appraisal of the mineralization developed at Block 3. The appraisal comprised the exploration-delineation program from 2006 to 2016, studies of hydrogeological characteristics of the hosting lithology, laboratory studies of rock composition and amenability to ISR method of mining, including column leach tests and field ISR tests. A Cameco subsidiary funded JV Inkai's Block 3 exploration work. JV Inkai was operating a test mine at Block 3 MA from 2015 to 2017 as part of the appraisal work.

Approvals

Since 2009, JV Inkai has received a number of approvals extending the exploration period at Block 3. In March 2017, the SRC approved the submitted estimate of in-situ uranium mineralization and the feasibility study. This approval represented the final approval required for appraisal work completion under regulations in Kazakhstan. In November 2017, Amendment No. 6 to the Resource Use Contract was signed, providing rights for mining in the MA Area, including Block 3 MA.

Appraisal Work

An extensive exploration and delineation drilling program accompanied by hydrogeological tests and laboratory studies was completed at Block 3 by JV Inkai from 2006 to 2016. In 2015, JV Inkai completed construction of Sat2 and began pilot production from test wellfields. In 2017, JV Inkai completed the pilot production from Sat2. At December 31, 2017, total production from test mining at Block 3 MA was 1.1 M Lbs U_3O_8.

1.9 Mineral resources and mineral reserves

The estimated mineral resources and reserves at Inkai are located in the MA Area. The preparation of the resource models and estimates followed the SRC guidelines. The models and estimates for Blocks 1 and 2 MA were completed by Volkovgeology. Two Key LLP completed the model and estimate for Block 3 MA. Volkovgeology is a subsidiary of Kazatomprom and is involved in prospecting, exploration and development of uranium deposits in Kazakhstan. Two Key LLP is an engineering consultancy firm based in Almaty, Kazakhstan, providing services in mineral resource estimation, mine planning and engineering. The estimates were done using the GT estimation method on two-dimensional blocks in plan.

In 2003, Cameco performed a validation of the Kazakhstan estimate for Block 1 and confirmed the estimated pounds of uranium to within 2.5% of the Kazakhstan estimate. The same Kazakhstan estimate was validated by an independent consulting firm in 2005. In 2007, Cameco and an independent consulting firm verified the Kazakhstan estimate for Block 2 and obtained results in agreement with the Kazakhstan estimate. In 2016, Cameco reviewed the criteria to bridge the Kazakhstan mineral resources and mineral reserves classification system with the CIM Definition Standards. Previously the Kazakhstan C2 category was aligned with the inferred resource category and the C1 category with the indicated resource category. Now the C2 category can be aligned with the inferred or indicated resource categories and C1 to the indicated or measured resource categories.

The current mineral resources and reserves estimates are based on 2,352 surface drillholes.

Summaries of the estimated mineral resources and mineral reserves for Inkai with an effective date of January 1, 2018 are shown in *Table 1-1* and *Table 1-2*. Cameco's share of uranium in the mineral resources and mineral reserves is based on its ownership interest in JV Inkai (40%).

Table 1-1: Summary of Mineral Resources – as of January 1, 2018

Category	Total tonnes (x 1,000)	Grade % U_3O_8	Total M Lbs U_3O_8	Cameco's share M Lbs U_3O_8
Measured	36,680.9	0.026	21.3	8.5
Indicated	21,132.2	0.023	10.7	4.3
Total Measured & Indicated	57,813.2	0.025	32.0	12.8
Inferred	116,394.6	0.029	75.0	30.0

Notes: (1) Cameco reports mineral reserves and mineral resources separately. Reported mineral resources do not include amounts identified as mineral reserves. Totals may not add up due to rounding.
(2) Cameco's share is 40% of total mineral resources.
(3) The geological model used for Inkai involves geological interpretations on section and plan derived from surface drillhole information.
(4) Mineral resources have been estimated at minimum grade-thickness cut-offs per hole of 0.047 m%U_3O_8 for Block 1 and 0.071 m%U_3O_8 for Blocks 2 MA and 3 MA, with the grade-thickness method using 2-dimensional block models.
(5) Mineral resources have been estimated based on the use of the ISR extraction method.
(6) Inferred mineral resources are estimated on the basis of limited geological evidence and sampling, sufficient to imply but not verify geological grade and continuity. They have a lower level of confidence than that applied to an indicated mineral resource and cannot be directly converted to a mineral reserve.
(7) There are no known environmental, permitting, legal, title, taxation, socio-economic, political, marketing or other relevant factors that could materially affect the above estimate of mineral resources.
(8) Mineral resources that are not mineral reserves have no demonstrated economic viability and do not meet all relevant modifying factors.

Table 1-2: Summary of Mineral Reserves – as of January 1, 2018

Category	Total tonnes (x 1,000)	Grade % U_3O_8	Total M Lbs U_3O_8	Cameco's share M Lbs U_3O_8
Proven	214,104.1	0.035	167.5	67.0
Probable	166,913.0	0.028	102.1	40.9
Total Reserves	381,017.2	0.032	269.6	107.9

Notes: (1) Cameco reports mineral reserves and mineral resources separately. Totals may not add up due to rounding.
(2) Total M Lbs U_3O_8 are those contained in mineral reserves and are not adjusted for the estimated metallurgical recovery of 85%.
(3) Cameco's share is 40% of total mineral reserves.
(4) Mineral reserves have been estimated at a grade-thickness cut-off of 0.13 m%U_3O_8, with the grade-thickness method using 2-dimensional block models.
(5) The geological model used for Inkai involves geological interpretations on section and plan derived from surface drillhole information.
(6) Mineral resources that are not mineral reserves have no demonstrated economic viability and do not meet all relevant modifying factors.
(7) Mineral reserves have been estimated based on the use of the ISR extraction method with allowance for the volume contacted by the solution. Production is planned to increase to 10.4 M Lbs U_3O_8 per year. Annual production levels will be dependent on results of further delineation drilling and market conditions.
(8) An average price of $54 (US) per pound of U_3O_8 was used to estimate the mineral reserves with exchange rates of $1.00 US=$1.25 Cdn and 265 Kazakhstan Tenge to $1.00 Cdn.
(9) There are no known mining, metallurgical, infrastructure, permitting or other relevant factors that could materially affect the above estimate of mineral reserves.

1.10 Mining

Mining at Inkai is based upon a conventional and well-established ISR process. ISR mining of uranium is defined by the International Atomic Energy Agency as:

"*The extraction of ore from a host sandstone by chemical solutions and the recovery of uranium at the surface. ISR extraction is conducted by injecting a suitable leach solution into the ore zone below the water table; oxidizing, complexing and mobilizing the uranium; recovering the pregnant solutions through production wells; and finally, pumping the uranium bearing solution to the surface for further processing*."

ISR mining at Inkai is comprised of the following components to produce a uranium-bearing lixiviant (an aqueous solution which includes sulphuric acid), which goes to settling ponds and then to the processing plants for production of uranium as yellowcake:

- Determination of the GT cut-off for the initial design and the operating period. The design cut-off sets a lower limit to the pounds per pattern required to warrant installation of a pattern before funds are committed, and the operating cut-off applies to individual producer wells and dictates the lower limit of operation once a well has entered production.
- Preparation of a production sequence which will deliver the uranium-bearing lixiviant to meet production requirements, considering the rate of wellfield uranium recovery, lixiviant uranium head grades, and wellfield flow rates.
- Wellfield development practices that use an optimal pattern design to distribute barren lixiviant to the wellfield injectors, and to collect lixiviant carrying the dissolved uranium back to the MPP, Sat1, or Sat2, as the case may be.

The above factors are used to estimate the number of operating wellfields, wellfield patterns and header houses over the production life. They also determine the unit cost of each of the mining components required to achieve the production schedule, including drilling, wellfield installation and wellfield operation.

There is ongoing wellfield development to support the current production plan.

1.11 Processing

As a result of extensive test work and operational experience, a very efficient process of uranium recovery has been established. The process consists of the following major steps:

- uranium in-situ leaching with a lixiviant
- uranium adsorption from solution with IX resin
- elution of uranium from resin with ammonium nitrate
- precipitation of uranium as yellowcake with hydrogen peroxide and ammonia
- yellowcake thickening, dewatering, and drying
- packaging of dry yellowcake product in containers

All plants load and elute uranium from resin while the resulting eluate is converted to yellowcake at the MPP. Inkai is designed to produce a dry uranium product that meets the quality specifications of uranium refining and conversion facilities.

Engineering work for a process expansion of the Inkai circuit to 10.4 M Lbs U_3O_8 per year is in progress. The expansion project includes an upgrade to the yellowcake filtration and packaging units and the addition of a pre-dryer and calciner.

1.12 Environmental assessment and licensing

In the Resource Use Contract, JV Inkai committed to conducting its operations according to good international mining practices. It complies with the environmental requirements of Kazakhstan legislation and regulations, and, as an industrial company, it must also reduce, control or eliminate various kinds of pollution and protect natural resources. JV Inkai is required to submit annual reports on pollution levels to the Republic of Kazakhstan environmental, tax and statistics authorities. Regulatory authorities have the power to issue an order reducing or halting production at a facility that violated environmental standards.

Environmental protection legislation in Kazakhstan has evolved rapidly, especially in recent years. As the subsoil use sector has evolved, there has been a trend towards greater regulation, heightened enforcement and greater liability for non-compliance. The most significant development was the adoption of the Ecological Code in 2007. This code replaced the three main laws related to environmental protection. Amendments were made to the code since its adoption and in 2011 revisions included more stringent environmental protection regulations, particularly relating to the control of greenhouse gas emissions, obtaining environmental permits, state monitoring requirements and other similar matters.

JV Inkai is required to comply with environmental requirements during all stages of operation, and develop an environmental impact assessment for examination by a state environmental expert before making any legal, organizational or economic decisions that could have an effect on the environment and public health.

Under the Ecological Code, JV Inkai needs an environmental permit to operate. The permit certifies the holder's right to discharge emissions into the environment, provided that it complies with the requirements of the permit and the Ecological Code. JV Inkai has a permit for environmental emissions and discharges for the operation that is valid until December 31, 2022. JV Inkai also holds the required permits under the Water Code which have various expiry dates.

As Inkai is a nuclear facility, JV Inkai is required to and currently holds the following additional material licences relating to its mining activities:

- “Licence for radioactive substances handling” valid until January 23, 2020
- “Licence for operation of mining production and mineral raw material processing” with an indefinite term
- “Licence for transportation of radioactive substances within the territory of the Republic of Kazakhstan” valid until January 23, 2020
- “Licence for radioactive waste handling” valid until January 23, 2020.

In accordance with applicable legislation regulating permits and licences, JV Inkai is required to submit annual reports to relevant state authorities. As is typical with any mineral extraction site, construction, operation, and reclamation are subject to an ongoing process during which permits, licences, and approvals are requested, monitored and reported on, expire, and are amended or renewed.

Amendment No. 6 grants JV Inkai mining rights over the MA Area. For more information, see *Section 4.24, Resource Use Contract*.

The ISR mining method at Inkai uses acid in the mining solution to extract uranium from underground non-potable aquifers. The injection and recovery system is engineered to prevent the mining solution from migrating to the aquifer above the orebody, which has water with higher purity.

Kazakhstan does not require active restoration of post-mining groundwater. After a number of decommissioning steps are taken, natural attenuation of the residual acid in the mined out horizon, as a passive form of groundwater restoration, has been accepted. Attenuation is a combination of neutralization of the groundwater residual acid content by interaction with the host rock minerals and other chemical reactions which immobilize residual groundwater contaminants in the mined-out subsoil horizon. This approach is considered acceptable because it results in water quality similar to the pre-mining baseline status.

JV Inkai’s decommissioning obligations are largely defined by the Resource Use Contract. JV Inkai is required to maintain a fund, which is capped at $500,000 (US), as security for meeting its decommissioning obligations.

Under the Resource Use Contract, JV Inkai must submit a plan for decommissioning the property to the government six months before mining activities are complete. JV Inkai developed a preliminary decommissioning plan to estimate total decommissioning costs, and updates the plan every five years, or when there is a significant change at the operation that could affect decommissioning estimates. The preliminary decommissioning estimate was $10 M (US) in 2016 and is in the process of being revised.

JV Inkai has environmental insurance, as required by the Ecological Code and the Resource Use Contract as well as the required civil liability insurance.

The decommissioning regulations have been changed by the New Subsoil Code. The general provisions related to decommissioning have been modified and special provisions on decommissioning of uranium fields have been introduced. During the drafting and approval process for the New Subsoil Code, it was anticipated that the new decommissioning procedure would have retroactive effect and JV Inkai would be required to comply with it. However, now that the final version of the New Subsoil Code has been published, the special provisions relating to decommissioning of uranium fields do not have retroactive effect and it is unclear whether the general provisions related to decommissioning have retroactive effect.

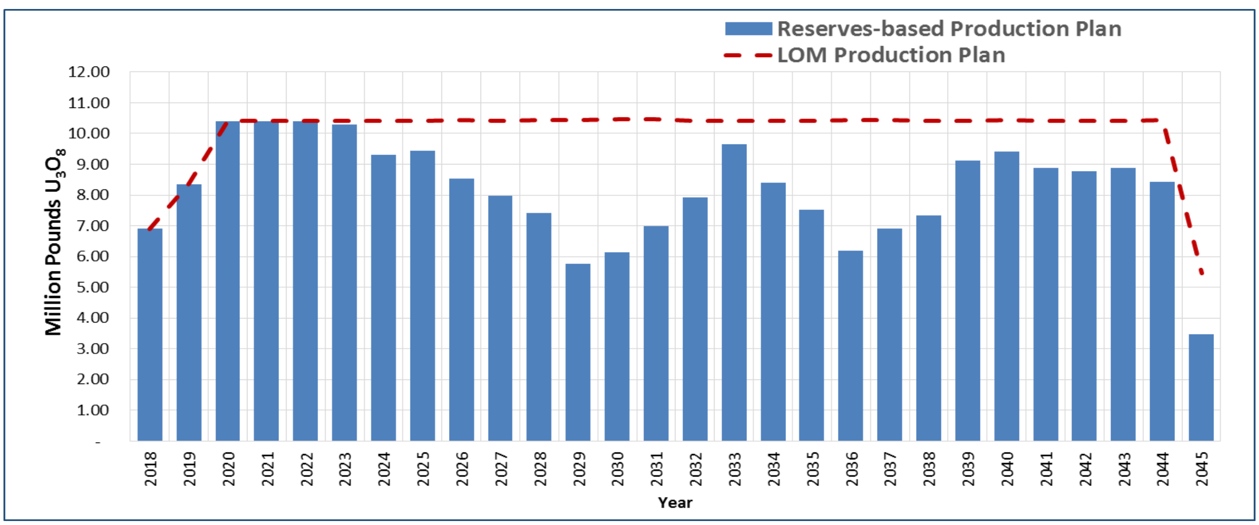
1.13 Production plan and mine life

The production plan presented in this technical report is based on Inkai mineral reserves from which production of an estimated 229.2 M Lbs U_3O_8 is forecast. The projected mine life extends until mid-2045.

The LOM Plan details the Ramp-up, with production increasing to 10.4 M Lbs U_3O_8 per year; variations of plus or minus 20% from the levels in the LOM Plan are allowed. The LOM Plan is partially based on inferred mineral resources. Therefore annual production levels will be dependent on results of further delineation drilling and market conditions. There is no certainty that the LOM Plan production will be realized. With continued delineation drilling, it is reasonable to expect that the majority of inferred mineral resources could be upgraded to indicated mineral resources. The annual production plan may be adjusted depending on technical and market conditions. The reserves-based production profile and economic analysis supporting the reported mineral reserves do not include the inferred resources and their associated extraction costs and revenues.

Figure 1-1 presents the reserves-based production plan and the LOM Plan over the mine life (2018 to mid-2045).

Figure 1-1: Annual Production Plan - 100% basis



1.14 Economic analysis and cost estimates

The economic analysis for JV Inkai is partially based upon the current LOM Plan, which contemplates mining and processing Inkai's mineral reserves to mid-2045. The financial projections do not contain any estimates involving the potential mining and processing of inferred mineral resources. Only mineral reserves have demonstrated economic viability.

The economic analysis, undertaken from the perspective of JV Inkai, is based on JV Inkai's share (100%) of Inkai mineral reserves, and results in an after tax NPV (at a discount rate of 12%), for the net cash flows from January 1, 2018 to mid-2045, of $2.2 billion. Using the total capital invested, along with the operating and capital cost estimates for the remainder of mineral reserves, the after tax IRR is estimated to be 27.1%.

Payback for JV Inkai, including all actual costs was achieved in 2015, on an undiscounted, after tax basis. All future capital expenditures are forecasted to be covered by operating cash flow.

Capital costs for Inkai are estimated to be $1.064 billion over the remaining life of the current mineral reserves. The remaining capital costs, as of January 1, 2018, includes $811 M for wellfield development, $149 M for construction and expansion, and $104 M for sustaining capital. The cost estimates are on a 100% basis with a currency exchange rate assumption of 265 Kazakhstan Tenge to $1.00 Cdn. All cost projections are stated in constant 2017 Canadian dollars and assume the throughput from the production schedule for the current mineral reserves outlined on *Figure 1-1*: *Annual Production Plan - 100% basis*.

Capital for construction and expansion is heavily weighted to 2018-2020 due to the capital required for the Ramp-up, as well as upgrades planned for existing facilities.

Operating expenditures for ISR mining, surface processing, site administration and corporate overhead are estimated to be $9.55 per pound of U_3O_8 over the remaining life of the current mineral reserves. The operating costs have decreased from the 2017 technical report as a result of further optimization in the consumption of sulphuric acid and other reagents, as well as certain economies of scale in operating costs projected as production volumes increase over time.

1.15 Regulatory risks

The identified regulatory risks are compliance with the requirements of the Resource Use Contract, permits, laws and regulations of Kazakhstan, uncertainty in and changes to Kazakhstan laws and regulations, and political risk. Cameco believes that these risks are manageable. More information on these risks are included in *Section 24.4 Regulatory risks*

1.16 Conclusions and recommendations

Based on the rigorous procedures and experience demonstrated by Volkovgeology, JV Inkai and Cameco personnel, Cameco's review of the reliability, quality and density of data available, the thorough geological interpretative work, and the different validation tests performed over the years, the QPs responsible for the mineral resource and mineral reserve estimates consider that the current estimates of mineral resources and reserves are relevant and reliable.

From 2009 until end of 2017, JV Inkai produced, not including Block 3 MA test mining, 42.8 M Lbs U_3O_8 (Cameco's share 24.8 M Lbs). Cameco believes that the MA Area has the potential to sustain production levels, as outlined in this technical report. The reserves-based production plan represents an operating mine life until mid-2045, during which Inkai is forecast to produce an estimated 229.2 M Lbs U_3O_8 (Cameco's share 92.6 M Lbs). In order to achieve the production plan and its economic benefits, the authors of this technical report concur with JV Inkai's plan for construction and expansion of the required project facilities and infrastructure.

The confidence on some characteristics of the mineralization, such as grade continuity and hydrological conditions, can be increased in areas of probable mineral reserves and inferred mineral resources. Additional delineation drilling is recommended and is already included in the LOM Plan budget. The authors of this technical report consider that it is not necessary at this time to recommend further exploration activities.

2 Introduction

2.1 Introduction and purpose

Inkai is a material property for Cameco under Canadian securities laws.

This technical report has been prepared for Cameco by internal QPs in support of the disclosure of scientific and technical information relating to Inkai, contained in Cameco's December 11, 2017 news release, announcing the restructuring of JV Inkai taking effect January 1, 2018, Cameco's December 11, 2017 material change report and in Cameco's January 25, 2018 news release, announcing the filing of this technical report.

The technical and scientific information in this technical report reflects the material changes that resulted upon closing of the Implementation Agreement after obtaining all required government approvals.

The report has an effective date of January 1, 2018, and has been prepared in accordance with NI 43-101 by the following individuals:

- Darryl Clark, PhD, FAusIMM, president, Cameco Kazakhstan LLP
- Alain G. Mainville, P. Geo., director, Mineral Resources Management, Cameco Corporation
- Stuart B. Soliz, P. Geo., principal geologist, Power Resources, Inc. (operating as Cameco Resources)
- Robert J. Sumner, PhD, P. Eng., principal metallurgist, Technical Services, Cameco Corporation.

These individuals are the QPs responsible for the content of this technical report. All four have visited Inkai.

Alain G. Mainville has visited the Inkai site and JV Inkai's head office on four occasions in the last four years, the latest being on November 20-22, 2016. The scope of his personal visits included meetings with JV Inkai, Kazatomprom and Volkovgeology personnel and field inspections of drilling, sampling, core logging, sample preparation and assaying, radiometric downhole surveys, geological modelling, mineral resources and mineral reserves estimation, production reconciliation and mine plans. Mr. Mainville has been involved with Inkai since 2002.

Darryl Clark is based in Astana, Kazakhstan. He routinely visits the Inkai site and JV Inkai's office in Shymkent to meet with JV Inkai management and personnel to review aspects of the operation, including exploration, operations and mine development. Dr. Clark has been involved with Inkai since 2014, as General Director until the end of 2016.

Stuart B. Soliz has visited the Inkai site on eight occasions, the latest occurring March 1-8 2017. The scope of his last personal visit to the Inkai site included meetings with JV Inkai personnel to review the development status of technical documents related to the Implementation Agreement, including the LOM Plan. Mr. Soliz has been involved with Inkai since 2014.

Robert Sumner has visited the Inkai site on one occasion on February 3-6, 2016. The scope of the visit included meetings with JV Inkai personnel to review the surface processing facilities. Dr. Sumner has been involved with Inkai since 2015.

2.2 Report basis

This technical report has been prepared with available internal Cameco and JV Inkai data and information, as well as data and information prepared for Inkai. The principal technical documents and files relating to Inkai that were used in preparation of this technical report are listed in *Section 27 References*.

3 Reliance on other experts

The authors have relied, and believe they have a reasonable basis to rely, upon the following individuals who have contributed the legal and taxation information stated in this technical report, as noted in *Table 3-1* below.

Table 3-1: Reliance on Other Experts

Name	Title	Section # (description)
Larry Korchinski, LLB	Director Legal Services and General Counsel, Cameco	*1.2 (description of Implementation Agreement)* *1.3 (description of Property tenure)* *4.2 (description of Exploration and mining licences)* *4.3 (description of Surface tenure)* *4.4 (description of Resource Use Contract)* *4.5 (description of Subsoil Law)* *4.6 (description of New Subsoil Code)* *4.7 (description of Strategic object)* *6.1 (description of Ownership)* *19.2 (description of Uranium sales contracts)* *19.3 (description of Material contracts)* *24.1 (description of 2016 Implementation Agreement)* *24.2 (description of Cameco funding of Block 3 appraisal program)* *24.3 (description of Currency control regulations)* *24.4 (description of Regulatory risks)*
Jill Johnson, MPAcc, CPA, CA	Director, Corporate Tax, Cameco	*4.8 (description of Taxes and royalties)* *22.5 (description of Taxes and royalties)*

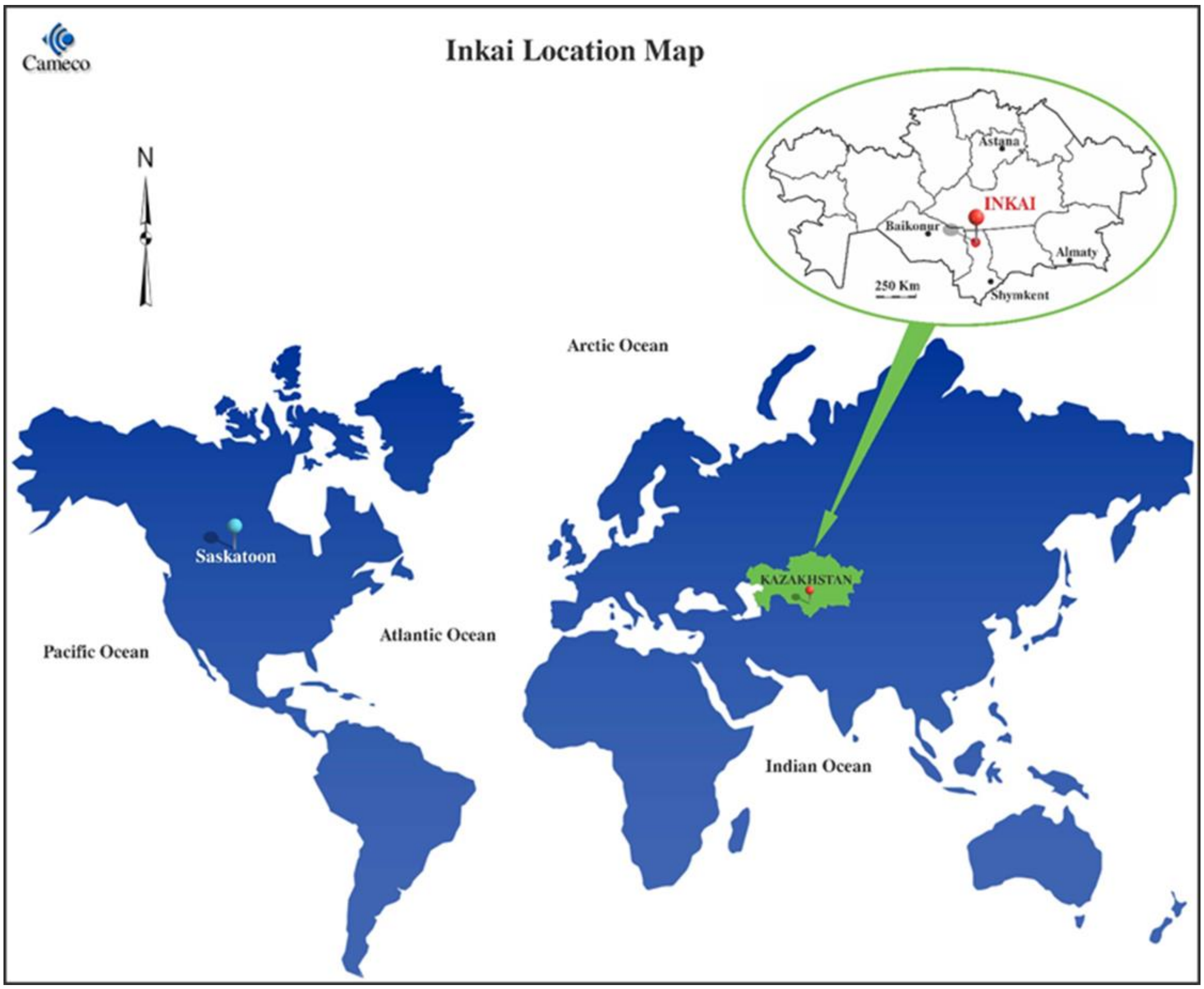
4 Property description and location

4.1 Location

The Inkai operation is located in the Suzak District of South Kazakhstan Oblast, Republic of Kazakhstan. The geographic coordinates are at approximately 45º 20' north latitude and 67º 30' east longitude (*Figure 4-1*).

The Resource Use Contract, giving JV Inkai its rights to the Inkai deposit, was signed by the Republic of Kazakhstan and JV Inkai in July 2000. Amendment No. 6 was signed on November 30, 2017 and provided for the MA Area covering 139 km^2 that includes the original Block 1 and portions of Blocks 2 and 3 (Block 2 MA and Block 3 MA). The MA Area is located near the town of Taikonur.

Figure 4-1: Location Map



4.2 Exploration and mining licences

The original Resource Use Contract was issued in conjunction with two licences: Licence AY 1370D and Licence AY 1371D. Licence Series AY 1370D allowed for the mining of uranium in a 16.58 km^2 area, designated as Block 1 in the Suzak District of the Republic of Kazakhstan. Licence Series AY 1371D allowed for the exploration and further mining of uranium in a 470 km^2 area, designated as Block 2 (about 230 km^2) and Block 3 (about 240 km^2) in the Suzak District of the Republic of Kazakhstan. These areas were replaced by the MA Area upon the signing of Amendment No. 6.

Amendment No. 6 grants JV Inkai mining rights over the MA Area until mid-2045.

4.3 Surface tenure

Under Kazakhstan law, subsoil and mineral resources belong to the Republic of Kazakhstan. Currently, the Republic of Kazakhstan provides access to subsoil and mineral resources under a resource use contract. Minerals extracted from subsoil by a subsoil user under a resource use contract are the property of the subsoil user unless the Subsoil Law or a resource use contract provides otherwise.

Under the Resource Use Contract, JV Inkai has the rights to explore for and to extract uranium from the subsoil contained in the MA Area and JV Inkai owns uranium extracted from this subsoil.

A resource use contract gives a subsoil user a land use right while exploring, mining and reclaiming the land. However, this right must be set forth in a land lease agreement with the applicable local administrative authorities.

On a regular basis, JV Inkai obtains from local authorities the necessary land lease agreements for new buildings and infrastructure. JV Inkai does not hold land leases for the entire MA Area. It obtains them gradually only for surface area required for exploration, mining or construction of new infrastructure.

For more information on subsoil use rights, terms, and termination of the Resource Use Contract, please refer to *Sections 4.2 Exploration and mining licences, 4.4 Resource Use Contract, and 4.5 Subsoil Law*.

4.4 Resource Use Contract

The Resource Use Contract was signed by the Republic of Kazakhstan and JV Inkai and then registered on July 13, 2000 and provides for JV Inkai's mining rights to the MA Area, as well as containing obligations with which JV Inkai must comply in order to maintain such rights. There have been six amendments to the Resource Use Contract, the most recent in November 2017, being Amendment No. 6 to:

- define the boundaries of the MA Area to match the agreed production profile for Inkai to 2045
- increase annual production rate from the MA Area to 10.4 M Lbs U_3O_8
- extend the extraction term from the MA Area until mid-2045

The other prior significant amendments to the Resource Use Contract are as follows:

In 2009, Amendment No. 2 to the Resource Use Contract was signed, adopting the 2009 Tax Code, implementing local content and employment requirements, and extending the exploration period at Block 3.

In 2011, Amendment No 3 to the Resource Use Contract was signed, increasing production and giving JV Inkai government approval to carry out a five-year assessment program on Block 3 that included delineation drilling, uranium resource estimation, construction and operation of a processing plant at Block 3, and completion of a feasibility study.

In 2013, Amendment No. 4 to the Resource Use Contract was signed to increase annual production from Blocks 1 and 2 to 5.2 M Lbs U_3O_8.

In November 2016, Amendment No. 5 to the Resource Use Contract was signed, extending the exploration period at Block 3 to July 13, 2018.

In addition to complying with its obligations under the Resource Use Contract, JV Inkai, like all subsoil users, is required to abide by the work program appended to its Resource Use Contract, which relates to its mining operations. See *Section 4.5.5 Work programs and project documentation* for more information.

4.5 Subsoil Law

The principal legislation governing subsoil exploration and mining activity in Kazakhstan is the Subsoil Law which superseded the Old Subsoil Law. In general, the rights held by JV Inkai are governed by the Subsoil Law, except to the extent such law deteriorates JV Inkai's position from the Old Subsoil Law that was in effect at the time the Licences were issued in April 1999.

The Subsoil Law defines the framework and the procedures connected with the granting of subsoil rights and the regulation of the activities of subsoil users. The subsoil, including mineral resources in their underground state, are Kazakhstan state property, while minerals brought to the surface belong to the subsoil user, unless otherwise provided by contract or laws of the Republic of Kazakhstan.

In order to develop mineral resources, the Competent Authority grants exploration and production rights to third parties. Subsoil rights are granted for a specific period, but may be extended prior to the expiration of the applicable contract or licence.

Subsoil rights become effective upon execution and registration of a contract with the Competent Authority. Pursuant to the Subsoil Law, a subsoil user is accorded, inter alia, the exclusive right to conduct mining operations, to erect production facilities, to freely dispose of its share of production and to conduct negotiations for extension of the contract, subject to restrictions and requirements set out in the Subsoil Law.

Until amendments to the Old Subsoil Law in August 1999, both a licence and a contract were required for exploration and production. Combined licences (both exploration and production) were granted for a period that included exploration and production licence periods (up to six and 25 years respectively), including any permitted extensions. Both exploration and production licences were required to contain, among other things, information concerning the licensee, the boundaries of the contract area, the term of the licence and the date of commencement of work, the type of contract (exploration or production), the minimum work program, environmental and safety obligations and conditions for extending the licence term.

In August 1999, the Kazakhstan government abolished the licence regime for subsoil use rights granted after September 1999. Thus, from September 1999 onward, subsoil use rights have been granted on the basis of a resource use contract alone. However, all licences previously issued remain valid. An entity which obtained its subsoil use right prior to August 1999 holds such rights on the basis of a subsoil use licence and a resource use contract. An entity which obtained a subsoil use right after August 1999 holds its rights on the basis of a resource use contract alone.

The subsoil use rights held by JV Inkai came into effect upon the initial issuance of the Licences (April 1999), the execution of its Resource Use Contract (July 2000), and the registration of the Resource Use Contract by applicable state entities.

The New Subsoil Code will become effective on June 28, 2018, superseding the Subsoil Law. For more information, see *Section 4.6 New Subsoil Code*.

Some of the general provisions of the Subsoil Law are described below in the remaining parts of this *Section 4.5.*

4.5.1 Stabilization clause

The general stabilization provision was changed in the Subsoil Law. Under the Old Subsoil Law, changes in legislation that worsened the position of the subsoil user did not apply to resource use contracts signed or licences granted before the changes were adopted. Additionally, the Resource Use Contract contains its own stability provision that reflects this approach.

While the Subsoil Law still contains the above guarantees, there are a number of listed exceptions such as national defence or security, ecological safety, public health, taxation, and customs. The Republic of Kazakhstan has gradually weakened the stabilization guarantee, particularly in relation to the new projects, and the national security exception is applied broadly to encompass security over strategic national resources.

Amendment No. 2 to the Resource Use Contract eliminated the tax stabilization provision that applied to JV Inkai.

4.5.2 Transfer of subsoil use rights and pre-emptive rights

Amendments to the Old Subsoil Law of December 2004 and October 2005, provide the Republic of Kazakhstan with a pre-emptive right to acquire subsurface use rights and equity interests in entities holding subsoil use rights and in any entity which may directly or indirectly determine or exert influence on decisions made by a subsoil user, if the main activity of such entity is related to subsoil use in Kazakhstan, when such entity wishes to transfer such rights or interests. This pre-emptive right is also provided by the Subsoil Law and it permits the Republic of Kazakhstan to purchase any subsoil use rights or equity interests being offered for transfer on terms no less favourable than those offered by other purchasers. The pre-emptive right has been recently limited to the deposits of strategic importance; however, Inkai is a deposit of strategic importance and therefore still subject to the pre-emptive right of the state.

The Subsoil Law provides that assignments and transfers of subsoil use rights may be made only with the prior consent of the Competent Authority. During its tenure as the Competent Authority, the Ministry of Energy of the Republic of Kazakhstan customarily interpreted this requirement widely to include any alienation of rights, including, for example, in bankruptcy or by merger or amalgamation. Transactions entered into and implemented without such consent as well as those implemented six months after the consent is granted are invalid.

The Competent Authority has the right to terminate a subsoil contract if a transaction takes place without such consent. According to the Subsoil Law requirements, the provisions described above apply both to Kazakhstan and overseas entities, including publicly traded companies.

The Subsoil Law also provides that once the approved transaction is completed, the Competent Authority must be informed within five business days. Failure to notify the Competent Authority in time is grounds for invalidation of the transaction.

The Restructuring was implemented in compliance with these requirements.

The New Subsoil Code provides new regulations on transfer of subsoil rights and pre-emptive rights.

See *Section 4.7 Strategic object* for information on additional requirements to dispose of an interest in JV Inkai.

4.5.3 Dispute resolution

The dispute resolution procedure in the Subsoil Law does not specifically disallow international arbitration. Instead it states that if a dispute related to a resource use contract cannot be resolved by negotiation, the parties can resolve the dispute according to the laws of Kazakhstan and international treaties ratified by the Republic of Kazakhstan.

The Resource Use Contract allows for international arbitration. Cameco believes the Subsoil Law does not affect this right.

4.5.4 Contract termination

Under the Subsoil Law, the Competent Authority can unilaterally terminate a contract before it expires if:

- a subsoil user does not fix more than two breaches of its obligations provided by the resource use contract specified in a notice by the Competent Authority within a specific period (non-compliance with project documents are excluded from the grounds for termination)

- subsoil rights or an object connected with the subsoil use rights (direct and indirect ownership interests in a subsoil user) are transferred without consent of the Competent Authority if such consent was required

- less than 30% of the financial obligations under a contract are fulfilled during two consecutive years

- activities of a subsoil user exploring or developing a strategic deposit entails such changes in the economic interests of the state that it poses a threat to national security and the subsoil user does not satisfy the Competent Authority's request to amend the resource use contract in this regard.

Under the Resource Use Contract, if JV Inkai breaches its obligations, the Competent Authority has to notify JV Inkai of the breach and provide a reasonable period for JV Inkai to fix the breach before it can terminate the contract**.** Cameco believes that the terms of the Resource Use Contract should continue to apply unless the state seeks to apply the national security or environmental protection exception to the guarantee of legal stability.

See *Section 4.7 Strategic object* for more information on termination of contract regarding fields of strategic importance.

4.5.5 Work programs and project documentation

In addition to following its obligations under the Resource Use Contract, JV Inkai, like all subsoil users, is required to abide by the work program, which is a mandatory part of the Resource Use Contract, and which relates to its operations over the life of the mine.

Work programs must be developed in accordance with project documents. The Subsoil Law establishes three types of project documents, depending on the type and stage of the work:

- exploration project: none for JV Inkai

- appraisal project: none of JV Inkai

- mining project documents: Mining Allotment

The project documents are developed and undergo a review and approval process. All work must be in compliance with the project documents, and conducting any work without an approved project document, or in non-compliance with it, is not permitted. Since January 2015, subsoil users conducting production of hard materials, including uranium, are allowed to produce within 20% (above or below) of their approved project targets in a year without triggering a requirement to redo the approved project documents. Any changes to the project documents that affect investment project targets included in the work program require amendments to the work program. Any amendments to aspects of the work program that are an integral part of the resource use contract require an application to the Competent Authority for approval, signing and registering amendments to the resource use contract.

The current work program, to increase the annual production rate to 10.4 M Lbs U_3O_8 (100% basis), was submitted to the Competent Authority and approved in 2017 in connection with Amendment No. 6.

The Subsoil Law repealed the previous requirement for annual work plans. Instead, expected exploration and production for each year are now set out in one work program.

4.5.6 Procurement requirements

Under the Subsoil Law, all subsoil users, including JV Inkai, must procure goods, works and services for subsoil use operations under prescribed statutory procedures.

Kazakhstan law unifies the procurement process and now requires procurements from open tender, single source, price request and digital procurement to be conducted with mandatory use of the register of goods, works and services (the register of potential suppliers) or other digital procurement systems which is synchronized with this register. Subsoil users are also required to develop annual, mid-term and long-term procurement programs based on the work program and respective budget.

JV Inkai currently procures goods, works and services according to Kazakhstan law and the Resource Use Contract, following the annual approval of its procurement plan.

4.5.7 Local content requirements

Since 2002, Kazakhstan has implemented a policy aimed at replacing imports, and fostering greater involvement, support and stimulation of local producers and local employees. Under this policy, subsoil users are obliged to purchase local works and services and hire local personnel in such percentages as may be specified in their resource use contracts.

In 2012, Kazakhstan amended the Subsoil Law to retroactively mandate all subsoil users to use unified terminology and to report on local content pursuant to a newly introduced unified methodology. However, since accession to the World Trade Organization, Kazakhstan amended its local content requirements, abolishing the local content requirements for goods. If this requirement remains in resource use contracts entered into prior to January 1, 2015, it will be automatically abolished on January 1, 2021, unless amended earlier. Nonetheless, the Subsoil Law and New Subsoil Code both impose local content requirements for works, services and employees.

The Resource Use Contract imposes local content requirements on JV Inkai with respect to employees, goods, works and services. As a result, at least 40% of the costs of goods and equipment must be for equipment and materials purchased of local origin, 90% of the contract work (i.e. works and services) must be of local origin, and 100%, 70% and 60% of employees depending on qualifications (workers, engineers and management, respectively) must be of local origin. The Resource Use Contract has not been amended to remove the local content requirements for goods yet and it will continue to apply to goods procured by JV Inkai until January 1, 2021, unless amended earlier.

4.5.8 Strategic deposits

On August 13, 2009, a governmental resolution “On Determination of the List of Subsoil (Deposit) Areas having Strategic Importance” No. 1213 came into force whereby 231 blocks, including all three of JV Inkai’s Blocks, were prescribed as strategic deposits. The Kazakhstan government re-approved this list in 2011 by its decree No. 1137, which was subsequently amended in 2012 and 2015, and JV Inkai’s Blocks remain on it.

Under the Subsoil Law, if a subsoil user's actions in the performance of subsoil use operations with respect to strategic deposits result in a change to the economic interests of the Republic of Kazakhstan which create a threat to national security, the Competent Authority is entitled to require an amendment to the resource use contract for the purpose of restoring the economic interests of the Republic of Kazakhstan. The Subsoil Law prescribes strict deadlines for the parties to negotiate and execute any such required amendments and failure to comply with such deadlines entitles the Competent Authority to terminate the resource use contract unilaterally.

The Subsoil Law also allows the Competent Authority, upon a decision of the Government of the Republic of Kazakhstan, to unilaterally terminate a resource use contract if it determines that the subsoil use operations conducted thereunder will result in a change in the economic interests of Kazakhstan, which create a threat to national security. In such circumstances, the Competent Authority must provide not less than two months prior notice of such termination. Under this provision, the Competent Authority also has the right to unilaterally terminate a resource use contract without having to comply with the civil law provisions requiring a party to apply to a court or arbitration panel for termination.

The basis for exercise by the Competent Authority of any of these powers is a “change in the economic interests of the Republic of Kazakhstan which creates a threat to national security”, which might be interpreted broadly. Moreover, this right of unilateral termination applies retroactively to old resource use contracts.

4.6 New Subsoil Code

The New Subsoil Code has been approved by the Parliament of Kazakhstan and signed by the President of Kazakhstan and was officially published on 28 December 2017. It is expected to become effective 6 months after the date of its official publication, being June 28, 2018. Thus, the subsoil use sector in Kazakhstan will continue to be regulated by the Subsoil Law and related regulations until June 28, 2018, at which time it will be superseded by the New Subsoil Code.

4.6.1 Re-introduction of the licensing regime

The New Subsoil Code reintroduces the licensing regime for widespread and solid minerals except uranium. The regime of the resource use contracts would only apply to exploration and production rights of hydrocarbons and uranium. Thus, the rights to explore for and produce uranium will continue to be provided on the basis of a resource use contract.

The New Subsoil Code provides that any licences issued and contracts executed, before the enactment of the New Subsoil Code, would remain valid. Therefore, the Resource Use Contract remains valid.

4.6.2 Stabilization clause

The New Subsoil Code maintains a stability clause very similar to the Subsoil Law. The New Subsoil Code provides that the Republic of Kazakhstan guarantees stability "to the conditions of subsoil use under the contract" (i.e. limited to the contract). Therefore, similar to the Subsoil Law, changes not affecting the subsoil use contract but affecting subsoil use in general would not be covered by the proposed stability clause.

The New Subsoil Code adds competition laws as an exemption from stability provisions in addition to already existing exemptions of national security, defence, environmental protection, health, tax and customs. The stability clause in the New Subsoil Code does not have retroactive effect and should not affect the stability provisions of the Resource Use Contract.

4.6.3 Dispute resolution

The New Subsoil Code contains some specific provisions on resolutions of disputes by court order (meaning state courts) such as disputes regarding revocation of licences or termination of resource use contracts. While provisions on termination of resource use contracts for hydrocarbons have retroactive effect with some exceptions, those on the termination of resource use contracts for uranium do not have retroactive effect. At the same time, the New Subsoil Code is silent on the status of arbitration clauses contained in resource use contracts currently in effect and does not disallow international arbitration. The adoption of the New Subsoil Code should not affect the arbitration clause under the Resource Use Contract.

4.6.4 Transfer of subsoil use rights and pre-emptive rights

The New Subsoil Code maintains the state's control over transactions involving subsoil use rights and direct and indirect ownership interests in a subsoil user. Like the Subsoil Law, the New Subsoil Code establishes that transfers of subsoil use rights and transfers of shares/interests in subsoil users require consent of the Competent Authority. At the same time, unlike the current law, the New Subsoil Code significantly liberates consent requirements, eliminating the requirement for consent in the following cases:

- Change in the sizes of shareholding interests (in the percentage of interests in the charter capital) as between the existing shareholders (participants) without an actual transfer of shares (participatory interest) from one participant to another;
- Change of charter capital, including placement of shares, as well as sale of the previously issued shares or other securities as a result of which the ratio of shareholding (participatory interest holding) of the shareholders (participants) does not change;
- Transfer of subsoil use rights (shares in subsoil use rights) or objects connected with the subsoil use rights under a transaction with one of the parties to which is the Republic of Kazakhstan government, state body,

national management holding company or national company.

Similar to the Subsoil Law, the New Subsoil Code establishes the state's priority right to purchase any subsoil use right, interest in the respective subsoil user, or interest in persons controlling such subsoil user under the contract on use where the site is of strategic importance.

The New Subsoil Code requires subsoil users to inform the Competent Authority on change of control (direct or indirect) within 30 days from a change. Control means any of the following:

- holding more than 25% interest (shares, securities confirming or convertible in shares or equity interest);
- holding 25% from total voting rights in the highest management body of an organization;
- receiving more than 25% from distributable subsoil user's net profit;
- having the right to define decisions of another organization in accordance with a contract or Kazakhstan laws

4.6.5 Decommissioning

The decommissioning regulations have been changed by the New Subsoil Code. The general provisions related to decommissioning have been modified and special provisions on decommissioning of uranium fields have been introduced. During the drafting and approval process for the New Subsoil Code, it was anticipated that the new decommissioning procedure would have retroactive effect and JV Inkai would be required to comply with it. However, now that the final version of the New Subsoil Code has been published, the special provisions relating to decommissioning of uranium fields do not have retroactive effect and it is unclear whether the general provisions related to decommissioning have retroactive effect.

4.6.6 Uranium Special Regulations

In addition to the general provisions described above, the New Subsoil Code differentiates uranium from the rest of solid minerals and provides an additional, distinct set of rules to govern uranium mining specifically. The New Subsoil Code provides that a uranium deposit is granted for mining to a uranium national company (a joint stock company created by the Government of Kazakhstan's decree and controlling stock of which belongs to the state or national management fund and conducting activities in uranium sphere) on the basis of direct negotiations. The Subsoil Code does not envisage that such direct negotiations can be initiated by persons other than national companies. It follows then that new subsoil use rights for uranium mining can only be granted to a national company.

The New Subsoil Code further stipulates that a subsoil use right for uranium mining (or a share in such subsoil use right) granted to a uranium national company on the basis of direct negotiations may only be transferred to a legal entity in which more than 50% of the shares (participating interests) belong directly or indirectly to a uranium national company. Such a transferee, in turn, may only transfer the subsoil use right (or share in the subsoil use right) to a legal entity in which more than 50% of the shares (participating interests) belong directly or indirectly to a uranium national company.

The New Subsoil Code also regulates issues of termination of the uranium subsoil use right, provision of a uranium deposit and its extension/reduction, conditions, and periods of mining and project and design documents. The New Subsoil Code does not establish a retroactive effect for these special uranium rules, subject to a few exceptions.

4.7 Strategic object

Kazakhstan law (Civil Code and the Law on State Property) defines the term “strategic object” and provides that imposition of encumbrances and their alienation is subject to the approval of the Kazakhstan government. In addition, the Law on State Property provides that the Republic of Kazakhstan shall have the priority right to purchase the strategic object being disposed of.

The Civil Code provides a general description of objects which might be recognized as strategic objects while Decree No. 651 of the Republic of Kazakhstan dated June 30, 2008 approves a specific list of objects qualified as strategic (the “List of Strategic Objects”). While Kazatomprom’s interest in JV Inkai was on the List of Strategic Objects since 2008, Cameco’s interest in JV Inkai was included on the List of Strategic Objects only since 2012.

Accordingly, any encumbrances and disposal of an interest in JV Inkai requires a decree of the Republic of Kazakhstan and waiver of the priority right by the Republic of Kazakhstan. Such a decree was obtained for the Restructuring.

4.8 Taxes and royalties

Stability of the tax regime envisaged by a number of resource use contracts, including the Resource Use Contract, was abolished with the entry into legal force of the 2009 Tax Code on January 1, 2009. Amendment No. 2 to the Resources Use Contract, signed in 2009, eliminated the tax stabilization provision of the Resource Use Contract by adoption of the 2009 Tax Code.

The New Tax Code, effective January 1, 2018, provides that subsoil users pay all taxes and payments provided in the tax legislation effective as of the date of occurrence of tax obligations. Although under the New Tax Code the main principles of subsoil users’ taxation remain the same (for example, the rate of corporate income tax, 20%, and the rate of mineral extraction tax on uranium, 18.5%, have not changed), there are several important changes relevant to special taxes and payments of subsoil users as briefly described below:

- The New Tax Code provides for the exemption of dividends payable by a subsoil user to a foreign shareholder from income tax withholding at the source of payment. This exemption was first introduced in 2016 and is maintained in the New Tax Code. To obtain this exemption, a subsoil user must comply with a number of conditions, including that a certain portion of minerals extracted in the 12 months prior to the accrual of dividends must be subsequently processed (after primary processing) at the production facilities of the subsoil user or its affiliated entities in Kazakhstan. In addition, the foreign shareholder must have owned its shares in the dividend-paying entity for more than three years and the foreign shareholder must not be resident in a jurisdiction with preferential taxation. Cameco believes that dividends that will be paid to it by JV Inkai will qualify for this exemption.

- The Excess Profits Tax has been abolished in respect of several categories of subsoil use contracts, including, “*contracts for exploration and (or) production of solid minerals, subsoil water and (or) therapeutic muds provided that such contracts do not envisage extraction of other categories of minerals*”. The New Tax Code does not define the term “*solid minerals*”. Therefore, based on Subsoil Law, Cameco believes that for the purposes of the New Tax Code the term *solid minerals* includes uranium.

- The commercial discovery bonus has been abolished.

- Payment for the use of the land by subsoil users has been expressly provided for in the New Tax Code.

4.9 Known environmental liabilities

For a discussion of known environmental liabilities, see *Section 20.1.5 Known environmental liabilities.*

4.10 Permitting

For a discussion on permitting, see *Section 20.1.2 Permitting*.

4.11 Factors affecting the right to work on the property

Known factors and risks that may affect access, title and right to work on the property are described below.

Under the Resource Use Contract, JV Inkai has the rights to explore for and to extract uranium from the subsoil and it owns the uranium extracted from the subsoil. Its ability to conduct these activities, however, depends upon compliance with its obligations under the Resource Use Contract and laws of Kazakhstan, as well as ongoing support, agreement and co-operation from the government of Kazakhstan.

Under Kazakhstan law, the state has the right to nationalize private property by enacting a law on nationalization. As of the date of this technical report, Kazakhstan has not exercised such right but the risk of nationalization of Cameco's interest in JV Inkai exists.

The Subsoil Law lists the violations which entitle the Competent Authority to unilateral termination of a resource use contract (for more details please refer to *Section 4.5.4 Contract termination*). If JV Inkai or its participants commit any of these violations, there is a risk of JV Inkai losing its subsoil use rights due to unilateral termination by the Competent Authority.

The Subsoil Law provides the state with the right to demand amendments to a resource use contract if activities of a subsoil user, exploring or developing a strategic deposit, result in changes in the economic interests of the Republic of Kazakhstan that pose a threat to national security. This, in turn, might entail a risk of diminishment of JV Inkai's rights. The right to demand amendments might be applied broadly by the Republic of Kazakhstan leading to a risk of (i) curtailment of JV Inkai's rights or (ii) termination of the Resource Use Contract. This right is provided by the Subsoil Law and it applied retroactively to old resource use contracts. For more details please refer to *Section 4.5.4 Contract termination*.

JV Inkai is required to hold, and it does hold, a number of licences and permits (including but not limited to ecological permits) and therefore must comply with their requirements. Failure to obtain and to comply with the requirements of licences and permits could result in the activities JV Inkai performs under a licence or permit being limited. For example, without an ecological permit, JV Inkai will be unable to conduct subsoil operations.

Generally, other breaches of law and/or contractual obligations (such as failure to pay taxes or causing damages to a third party) may also lead to limitation of the right to use JV Inkai's property.

Please see *Section 24.4. Regulatory risks* for a discussion of other risks that may affect access, title and right to work on the property.

5 Accessibility, climate, local resources, infrastructure and physiography

5.1 Access

Inkai is located near the town of Taikonur, approximately 350 km northwest of the city of Shymkent and approximately 155 km east of the city of Kyzl-Orda in the south-central region of Kazakhstan. Taikonur can be reached from Astana or Almaty by flying to one of the regional cities of Shymkent or Kyzl-Orda, then driving on paved roads (*Figure 5-1: General Location Map).* The road to Taikonur is currently the primary access road for transportation of people, supplies and uranium product for JV Inkai.

Major airline service is available to Astana and Almaty from Europe, Russia, China and other countries in the region. From Astana or Almaty, commercial airline services are available to Shymkent and Kyzl-Orda. The flight from Almaty to Kyzl-Orda is a two-hour trip. The four-hour drive from Kyzl-Orda is on paved roads for 130 km to the town of Shieli and then for 160 km to Taikonur. The total trip time through Shymkent from Almaty is about eight hours for 470 km on a paved road.

Rail transportation is available from Almaty to Shymkent then northwest to Shieli, Kyzl-Orda and beyond. A rail line also runs from the town of Dzhambul to Kazatomprom’s Centralia facility to the south of Taikonur.

5.2 Climate

Inkai lies in the Betpak Dala Desert. The ground consists of extensive sand deposits with vegetation limited to grasses and occasional low bushes. Major hydrographic systems in the area include the Shu, Sarysu and Boktykaryn rivers. These rivers typically exhibit surface water flow in May and June and revert to isolated reaches with salty water during the rest of the year.

The climate in south central Kazakhstan is semi-arid, with temperatures ranging from -35°C in the winter to +40°C in the summer. January is the coldest month, with an average temperature of -9°C. July is the warmest month, when temperatures climb to an average of +28°C. The climate of the region is continental, characterized by harsh winters and hot summers, low humidity and low precipitation. The daily fluctuation in air temperature during the summer can be up to 14°C.

The average precipitation varies from 130 to 140 mm/a, with snow accounting for 22 to 40% of this amount. The average air humidity is typically in the range of 56 to 59%.

The region is also characterized by strong winds. The prevailing direction of the wind is northeast, averaging 3.8 to 4.6 m/sec. Dust storms are common.

Site operations are carried out throughout the year, despite the cold winter and hot summer conditions.

5.3 Physiography

The surface elevation at Inkai ranges from 140 to 300 m above mean sea level. The Inkai deposit is sub-divided into two morphologically diverse regions:

- the sandy-brackish intercontinental deltas of Shu and Sarysu rivers
- the Betpak Dala Plateau

The sandy-brackish intercontinental deltas of the Shu and Sarysu rivers are located in the hollow between the elevation of the Betpak Dala plateau and the Karatau Mountain range. This plain has numerous brackish and lacustrine basins, dry river-beds, former river-beds, and aeolian relief of various configurations. The Betpak Dala is a slightly sloping and slanted north to south plain with deflationary basins and rare arched ridges.

5.4 Local resources

Currently, Taikonur has a population of about 680 people who are mainly employed in uranium development and exploration. Whenever possible, JV Inkai hires personnel from Taikonur and surrounding villages. The town has a school, medical clinic and small store. Most of the food is purchased in Shymkent or Shieli.

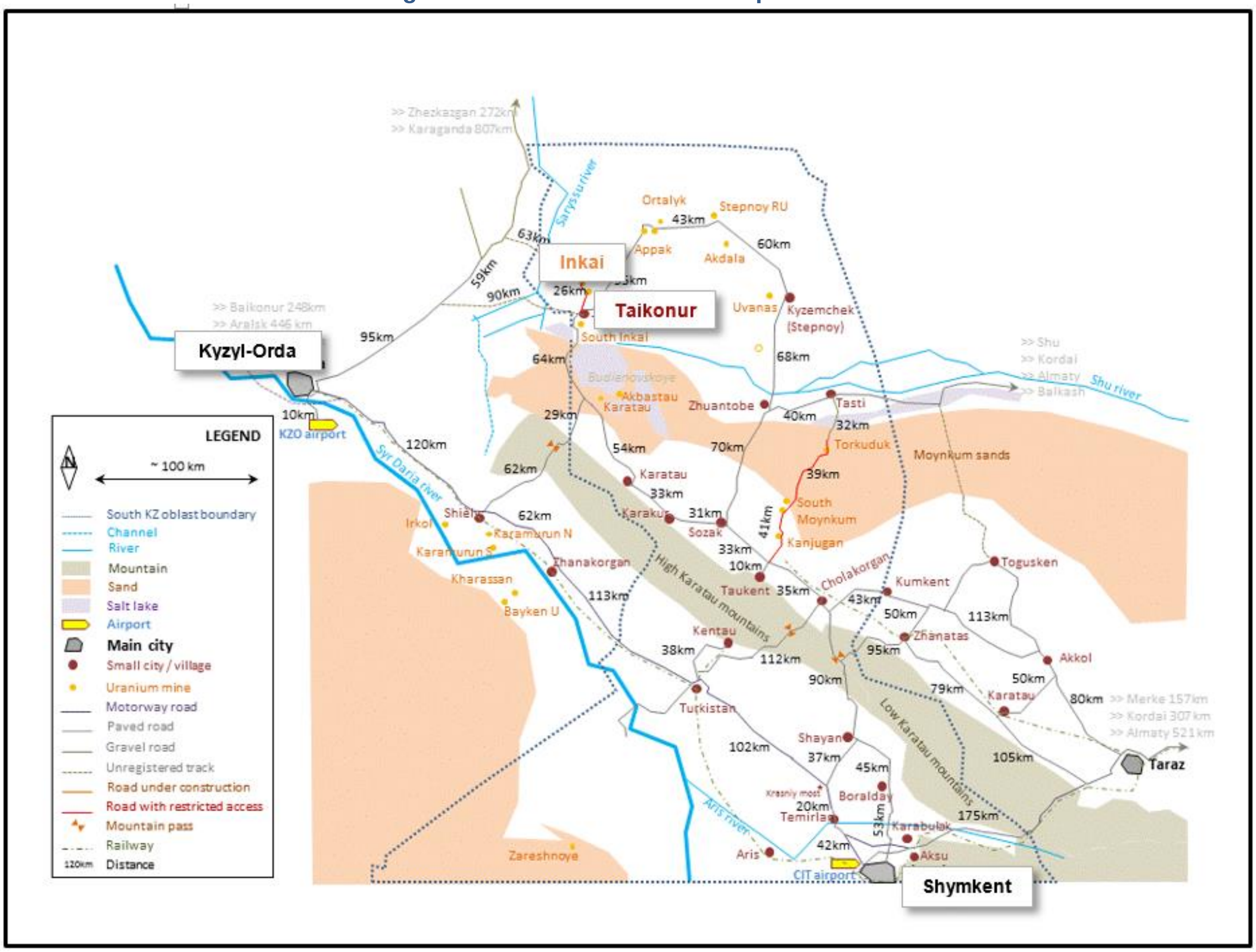
5.5 Infrastructure

Inkai is a developed producing property with site facilities and infrastructure. It has sufficient surface rights to meet future operational needs given the current mineral reserves. The electrical supply for Inkai is from the national power grid. Inkai is connected to the grid via a 35-kilovolt power line, which is a branch of the circuit that supplies the Stepnoye mine east of Inkai. In case of power outage, there are standby generators. Telephone communications utilize a satellite internet system and fiber optics.

Inkai has access to sufficient water from groundwater wells for all planned industrial activities. Potable water for use at the camp and at the site facilities is supplied from shallow wells on site. The water systems include well houses, pump stations, storage for reserve demands and fire protection and distribution to points of use and fire protection mains. Sewage disposal is in a standard septic tank and leach field system.

Further details about infrastructure can be found in Section 18 Project infrastructure.

Figure 5-1: General Location Map



(Source: Cameco, 2016)

6 History

6.1 Ownership

There have been several changes in the ownership interests in JV Inkai. The current owners and their respective ownership interests are as follows:

- Cameco (40%)
- Kazatomprom (60%)

In 1996, JV Inkai was first registered by the Kazakhstan Ministry of Justice. The original owners were Cameco, Uranerzbergbau-GmbH, and KATEP, who each held an ownership interest of 33 1/3%.

In 1997, Kazatomprom was established. The Republic of Kazakhstan owns 100% of Joint Stock Company Sovereign Wealth Fund “Samruk-Kazyna”, who is the sole shareholder of Kazatomprom.

In 1998, KATEP’s ownership interest in JV Inkai was transferred to Kazatomprom. Cameco acquired the ownership interest in JV Inkai held by Uranerzbergbau-GmbH, increasing Cameco’s ownership interest in JV Inkai to 66 2/3%. Cameco agreed to transfer 6 2/3% of its ownership interest in JV Inkai to Kazatomprom, leaving Cameco with a 60% ownership interest.

Effective January 1, 2018, as part of the Restructuring, Kazatomprom made an additional contribution to JV Inkai’s charter capital, increasing its ownership interest to 60% and reducing Cameco’s ownership interest to 40%.

6.2 Exploration and development history

6.2.1 Historical exploration

The Inkai deposit was discovered during drilling campaigns conducted in 1976 – 1978 by Volkovskaya Expedition. By that time, prospecting and exploration programs had also resulted in the identification of the Uvanas, Zhalpak, Kanzhugan and Mynkuduk deposits. Together with the Inkai deposit, they formed a large new uranium mineralization prospect in the Shu-Sarysu depression. Exploration drilling progressed until 1996.

In Blocks 1 and 2, the main exploration grid was developed along fence lines 400 m to 800 m apart, with drillholes centered 50 m apart. In several areas, this was increased to 200 by 50 m. In contrast, by 1996, Block 3 was characterized by significantly lower densities of drilling, ranging from 800 m by 50 m to 1,600 – 3,200 m by 100 – 800 m. All historical exploration and delineation drilling within the MA Area, as listed in *Table 6-1*, was carried out prior to JV Inkai obtaining its licences for Inkai. A map of the location of the historical and current drill holes within the MA Area is presented in *Section 10 Drilling*, in *Figure 10-1: Drill Hole Collar Location Map*.

Table 6-1: Historical Drilling

Area	Number of holes
Block 1	1,464
Block 2 MA	1,429
Block 3 MA	124

Regional and local hydrogeology studies were completed on Inkai dating back to 1979. Numerous borehole tests characterize the four aquifers within the Inkai deposit: the Uvanas, Zhalpak, Inkuduk and Mynkuduk.

6.2.2 Main processing plant and Satellite 1

A pilot test, using the ISR mining method, was performed in the northeast area of Block 1 starting in December 1988.

The pilot leach test in Block 2 MA was initiated in 2002.

In September 2005, JV Inkai decided to proceed with the MPP to be located at Block 1, and construction began soon after. Commissioning of the front half of the MPP was completed during the fourth quarter of 2008, and the processing of solutions from Block 1 commenced.

In 2009, construction of the MPP was completed, and in February 2010, regulatory approval to commission the MPP was received, allowing full processing of uranium concentrate on site. Also in 2009, JV Inkai constructed and began commissioning Sat1 to process solution recovered from Block 2. In 2011, JV Inkai received regulatory approval for processing at Sat1. In 2010 planning began for the engineering and construction of Sat2 at Block 3 MA. In 2015 JV Inkai completed construction of Sat2 and began pilot production from test wellfields.

6.2.3 Block 3 appraisal program and development

Inkai completed the appraisal of the mineralization developed at Block 3. The appraisal comprised the exploration-delineation program from 2006 to 2016, studies of hydrogeological characteristics of the hosting lithology, laboratory studies of rock composition and amenability to ISR method of mining, including column leach tests and field ISR tests. JV Inkai was operating a test mine at Block 3 MA from 2015 to 2017 as part of the appraisal work.

Approvals

Since 2009, JV Inkai has received a number of approvals extending the exploration period at Block 3.

In February 2017, JV Inkai submitted to the SRC for their approval an updated estimate of in-situ uranium mineralization and a feasibility study, the nature of which is further described in *Section 14.1.2 Technical studies*.

In March 2017, the SRC approved the submitted estimate of in-situ uranium mineralization and the feasibility study. This approval represented the final approval required for appraisal work completion under regulations in Kazakhstan. The approved uranium mineralization estimate was required for obtaining a mining allotment and the preparation and approval of a project document for mining.

In March through to July 2017, Two Key LLP developed a project document for Inkai envisaging mining from the MA Area.

In July 2017, Inkai obtained the Mining Allotment.

In September 2017, Inkai obtained an approval from the Geology Committee of the project document for mining from the MA Area.

In November 2017, Amendment No. 6 to the Resource Use Contract was signed, providing rights for mining in MA Area as envisaged by the project document for mining.

Appraisal Work

An extensive exploration and delineation drilling program accompanied by hydrogeological tests and laboratory studies was completed at Block 3 by JV Inkai from 2006 to 2016. See *Section 10 Drilling* for more information on drilling at Block 3.

In 2011, JV Inkai began infrastructure development and completed engineering for Sat2 for the Block 3 assessment program. In addition, a preliminary estimate of the mineralization on the southwestern corner of Block 3 was prepared, which was reviewed and approved by the SRC.

In 2012, JV Inkai started drilling at test wellfields and started construction of Sat2.

In 2013, JV Inkai continued construction of Sat2 and test wellfields, and started work on an appraisal of mineral potential according to Republic of Kazakhstan standards.

In 2014, JV Inkai continued construction of Sat2 and test wellfields, and advanced work on a preliminary appraisal of the mineral potential according to Republic of Kazakhstan standards. An interim report on exploration results and estimate of the mineralization content at Block 3 was conditionally approved by the SRC.

In 2015, JV Inkai completed construction of Sat2 and began pilot production from test wellfields, as well as advanced work on a preliminary appraisal of the mineral potential of Block 3.

During 2017, JV Inkai completed the pilot production from Sat2.

6.3 Historical mineral resource and mineral reserve

There are no historical mineral resources and mineral reserve estimates within the meaning of NI 43-101 to report.

6.4 Historical production

A pilot test, using the ISR mining method, was performed in the northeast area of Block 1 starting in December 1988. The test lasted for 495 days and recovered approximately 92,900 pounds of U_3O_8. The pilot leach test in Block 2 MA started in 2002 and was completed in 2006. Commercial production started in 2009. Inkai production from Blocks 1 and 2 MA to year-end 2017 is shown in *Table 6-2*.

Table 6-2: Inkai Block 1 and Block 2 MA Uranium Production

Period	Blocks	Production (M Lbs U_3O_8)	Cameco's share (M Lbs U_3O_8)
1988 – 1990	1	0.1	-
2002 – 2006	2 MA	2.0	1.2
2007	2 MA	0.3	0.2
2008	2 MA	0.5	0.3
2009	1 & 2 MA	1.9	1.1
2010	1 & 2 MA	4.3	2.6
2011	1 & 2 MA	4.2	2.5
2012	1 & 2 MA	4.4	2.6
2013	1 & 2 MA	5.3	3.1
2014	1 & 2 MA	5.0	2.9
2015	1 & 2 MA	5.8	3.4
2016	1 & 2 MA	5.9	3.4
2017	1 & 2 MA	5.5	3.2
2009-17	Total	42.3	24.8

During 2015, the Subsoil Law in Kazakhstan was amended to allow producers to produce within 20% (above or below) of their licensed production rate in a year. At that time JV Inkai was licensed to produce at an annual rate of 5.2 M Lbs U_3O_8. As of January 1, 2018, JV Inkai is licensed to produce at an annual rate of 10.4 M Lbs U_3O_8.

The Block 3 MA ISR test was started in 2015 and is now complete. At December 31, 2017, total pilot production from test mining at Block 3 MA was 1.1 M Lbs U_3O_8.

7 Geological setting and mineralization

7.1 Regional geology

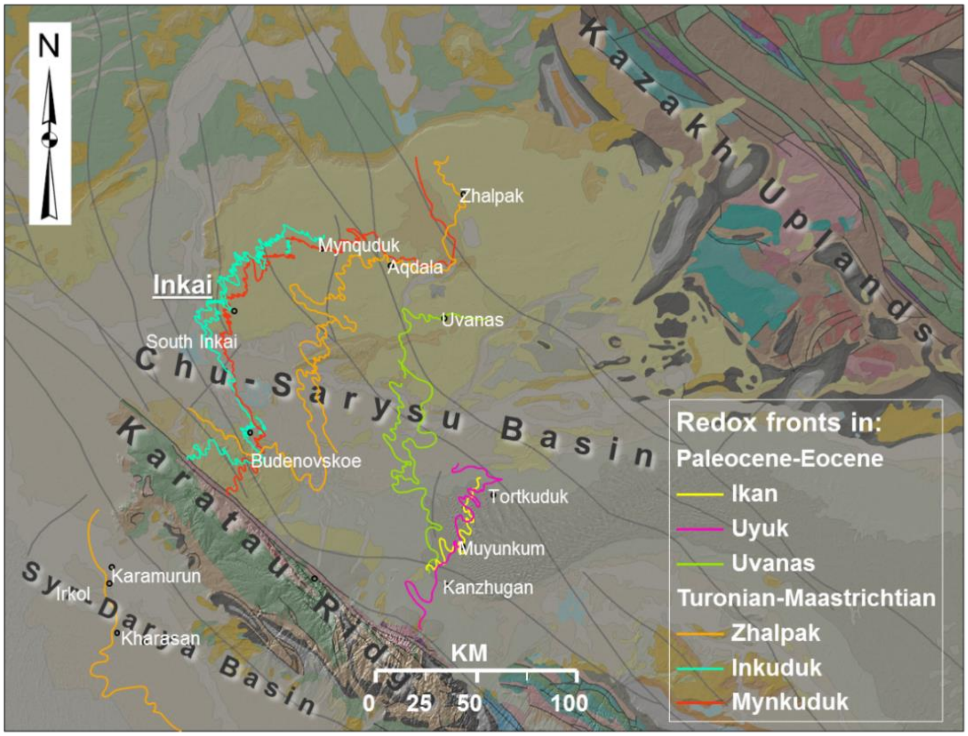
The geology of south-central Kazakhstan is comprised of a large relatively flat basin of Cretaceous to Quaternary age continental clastic sedimentary rocks. The Chu-Sarysu Basin extends for more than 1,000 km from the foothills of the Tien Shan Mountains located on the south and southeast sides of the basin, and merges into the flats of the Aral Sea depression to the northwest.

The basin is up to 250 km wide, bordered by the Karatau Mountains on the southwest and the Kazakh Uplands on the northeast. The basin is composed of gently-dipping to nearly flat-lying fluvial-derived unconsolidated sediments comprising inter-bedded sand, silt and local clay horizons. These sediments contain several stacked and relatively continuous, sinuous “roll-fronts” or redox fronts hosted in the more porous and permeable sand and silt units (*Figures 7-1 and 7-2*).

Economic uranium mineralization within the Chu-Sarysu Basin was studied extensively from 1971 to 1991. Several uranium deposits were identified across the Chu-Sarysu and its neighbour, the Syr-Darya basin, separated by the Karatau Range uplift. These deposits have been grouped into the Chu-Syr Darya mineralized region. The Zhalpak, Mynkuduk, Akdala, Inkai, South Inkai and Budyonovskoe deposits are hosted by Upper Cretaceous sequences, and form the Zhalpak-Budyonovskoe mineralized belt situated in the northwestern part of the Chu-Sarysu Basin. The Kanzhugan, Muyunkum, Totrkuduk and Uvanas deposits are hosted by Upper Cretaceous and Paleocene-Eocene sequences, forming the Uvanas-Kanzhugan mineralized belt situated in the central part of the Chu-Sarysu Basin.

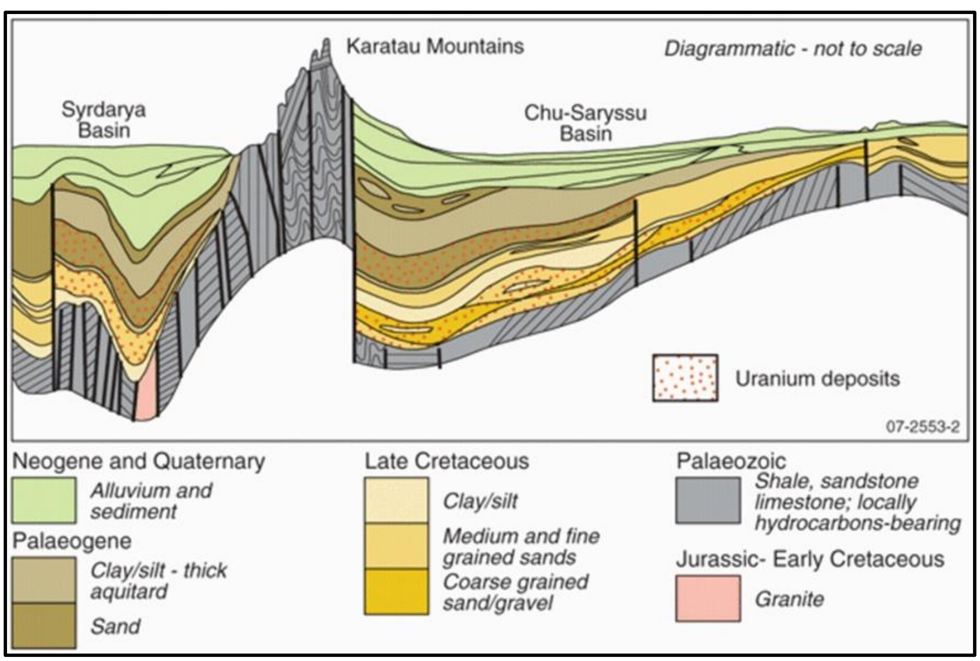
The Cretaceous and Palaeogene sediments hosting the uranium deposits are associated with large fluvial systems.

Figure 7-1: Geological Map of Chu-Sarysu Basin and Its Surroundings



(Source: JV Inkai, 2012, modified by Cameco in 2017)

Figure 7-2: Schematic Cross-section of the Chu-Sarysu Basin – Looking West



(Source: Kislyakov and Shetochkin, 2000; modified by Cameco in 2016)

7.1.1 Hydrostratigraphy of the Chu-Sarysu Basin

Hydrostratigraphy plays key roles both in the formation of the uranium sandstone deposits and in mining them using the ISR method.

The Inkai deposit is located in the north-western part of the Suzak artesian basin that comprises two hydrogeological stages, an upper platform stage and a lower basement stage.

The upper platform stage is related to Quaternary-Neogene and Palaeogene-Cretaceous deposits. The hydrogeological section of the platform stage reveals two hydrogeological sub-stages. The upper hydrogeological sub-stage is the Betpak Dala aquifer (fine-grain sands) and other aquifers of sporadic occurrence. In general, these aquifers contain brackish and saline water not suitable for drinking. These upper aquifers are hydraulically isolated from the lower hydrogeological sub-stage aquifers by the regional Intymak clay aquitard of the Lower and Upper Eocene which is about 100 to 150 m thick.

The lower basement stage contains groundwater in fractured rocks of Palaeozoic age. It contains four aquifers within Palaeocene and Upper Cretaceous strata, listed from top to bottom as follows:

- **Uvanas aquifer:** contains fresh groundwater suitable for household and drinking purposes. The Uvanas aquifer is widely used in the region for domestic and livestock water supply. In the nearest vicinity of the deposit, in the town of Taikonur, there are six domestic water supply boreholes operated on the Uvanas aquifer. Additionally, outside Inkai, but in its vicinity, there are a few free-flowing artesian boreholes tapping groundwater from the Uvanas aquifer for livestock watering
- **Zhalpak aquifer:** contains slightly brackish water which can be used for watering livestock. The aquifer is accessed by wells in proximity to Inkai. Groundwater from the Zhalpak aquifer is used for industrial and partial drinking water supply in the vicinity of the deposit site
- **Inkuduk aquifer:** contains brackish and slightly brackish water not suitable for drinking
- **Mynkuduk aquifer**: contains brackish and slightly brackish water not suitable for drinking.

Groundwater movement in the Chu-Sarysu Basin is towards the north-westerly discharge areas. The annual natural groundwater movement averages one to four metres, depending on the various permeabilities of the different sand horizons.

The lower aquifers have a common recharge area (the Karatau ridge and the Tien-Shan Mountains) and discharge into topographic depressions of the region-saline lands of Ashikol, Askazansor, and Lake Arys. Regional groundwater flows north-north-west. Permian claystones and siltstones underlay Mynkuduk aquifer and appear to be a regional aquitard. Elsewhere in the region, the groundwater is tapped by numerous boreholes for livestock watering. Groundwater of lower aquifers is not used at Inkai or in the surrounding area.

7.2 Local and property geology

The stratigraphic sequence at Inkai ranges from Cretaceous to Quaternary sediments. A schematic stratigraphic cross-section of Inkai is presented in *Figure 7-3*.

Neogene-Quaternary sediments of continental origin form the uppermost cover. They do not host significant uranium occurrences. These are underlain by 100 to 150 m of Palaeogene clay-dominated marine sediments. Elsewhere in the basin, these display a lower facies transition zone of brackish sediments that hosts the uranium deposits of Tortkuduk and of the Taukent area (Kanzhugan and Moynkum).

The underlying Upper Cretaceous strata are divided into three horizons, listed from youngest to oldest: the Zhalpak horizon; the Inkuduk horizon; and the Mynkuduk horizon.

Zhalpak horizon

The Zhalpak horizon is Campanian-Maastrichtian in age, and is generally comprised of a medium grained sand, with occasional clay layers.

Inkuduk horizon

The Inkuduk horizon is Coniacian-Santonian in age, and is typified by medium to coarse-grained sands, with occasional gravels.

In the Inkuduk horizon, there are three sub-horizons representing indistinct transgressive alluvial cycles composed of several incomplete elementary rhythms. Lower and middle sub-horizons are composed mainly of coarse clastic sediments of channel facies while the upper sub-horizon is made of floodplain channel formations. The thickness of the Inkuduk horizon is up to 120 m, and the depth to the bottom varies from 300 to 420 m at the Inkai deposit, being a function of both basin architecture and the topography.

The general plan of the river network at the time within the deposit did not change significantly. Relatively dissected topography, closeness of uplifted alimentation zones facilitated deposition of mottled and coarse clastic poor sorted sediments alternating in the section. Interbeds of siltstone-sand clays, medium and fine grained sands are subordinate in the Inkuduk horizon.

Mynkuduk horizon

The Mynkuduk horizon is Turonian in age, uncomfortably overlying the Permian argillites and dominated by fine to medium-grained sands. These sands are generally well sorted, reflecting a probable overbank environment.

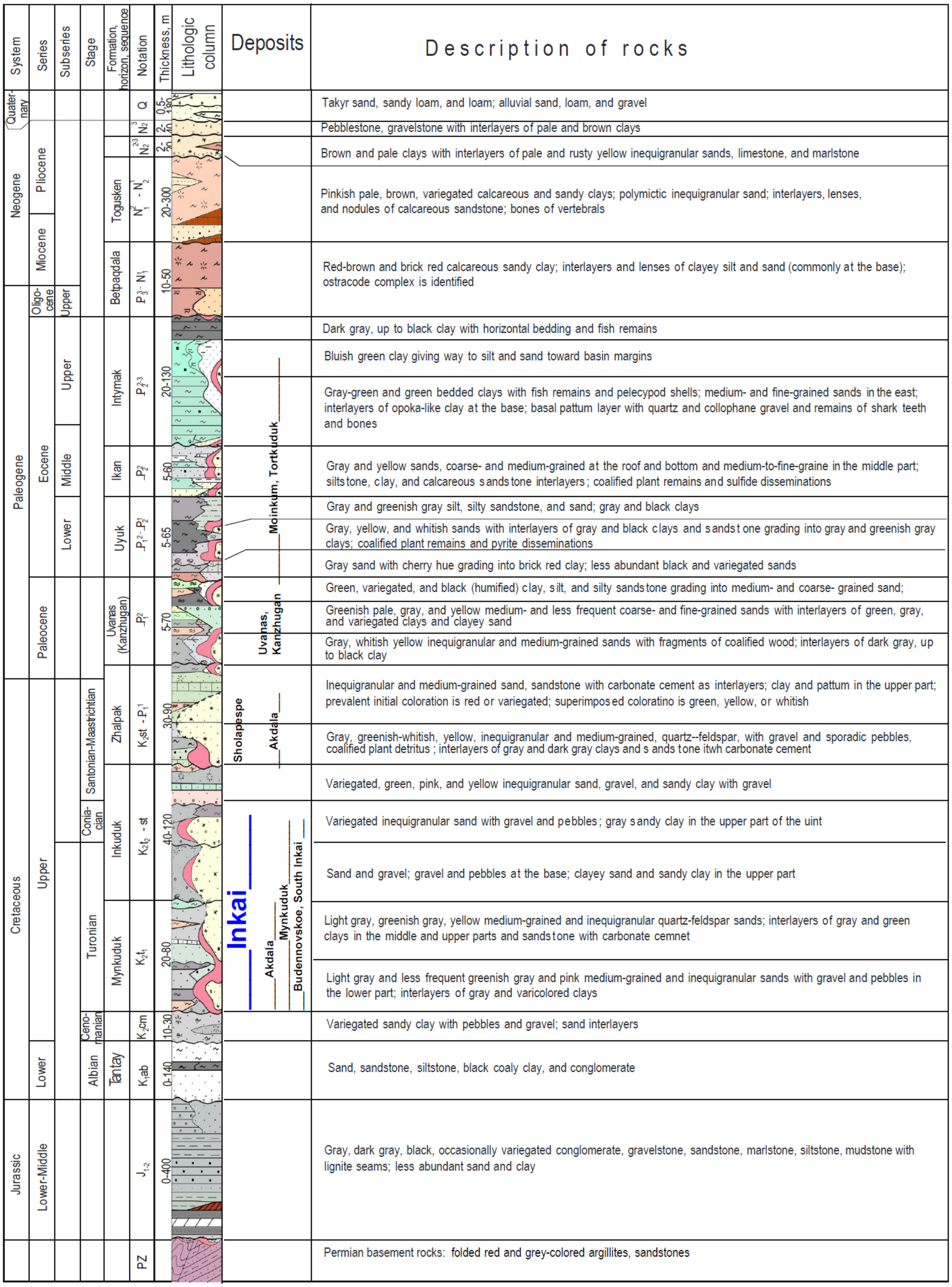
Sediments of the Mynkuduk horizon represent an alluvial cycle of the first order where several (up to ten) elementary rhythms with a thickness up to several metres can be identified. Each of them begins with coarse, poorly sorted gravel, inequigranular sands with gravel and pebble and ends with small, clastic rocks, sometimes interbeds (up to 20 cm) of dense sands with carbonaceous cement. In some areas in the basal part of the horizon, mottled sandy clays and siltstones of floodplain facies are developed.

The dominating colour of the rocks is greyish-green to light-grey for the channel sand-gravel sediments. The total thickness of the sediments of the Mynkuduk horizon in the area is 60 to 80 m.

Regular alternation of channel sediments with floodplain sediments is characteristic of lateral direction, where initial mottled and green sand-clay formations in floodplains and watersheds are replaced by channel midstream, grey bar-sand rocks.

The depth to the Paleozoic unconformity increases to the west and south. At the east end of the Mynkuduk deposit, the unconformity is at a depth of about 250 m. It deepens to 350 to 400 m where the Mynkuduk and the Inkai deposits meet, to 500 to 600 m at the south end of Inkai, and to more than 700 m at the Budyonovskoe deposit.

Figure 7-3: Schematic Stratigraphic Column for the Chu-Sarysu Basin



(Source: Kislyakov and Shetochkin, 2000; modified by Cameco in 2016)

7.2.1 Local hydrogeology

The unconsolidated Upper Cretaceous sediments provide an excellent groundwater-storing reservoir, some 250 to 300 m thick. This reservoir is regionally confined by the underlying Palaeozoic rocks and the overlying thick Palaeogene marine clays (Intymak, Uyuk and Ikan aquitards). To varying degrees, there is local confinement created by the sedimentation cycles, with each cycle including fine sands to silts and occasional clay seams at the top.

The Upper Cretaceous groundwater regime exhibits a layered sequence of aquifers due to gravity separation by different salinity levels, or TDS. At Inkai, from youngest to oldest, top to bottom these are:

- Uvanas & Betpak Dala fresh water (0.6 – 0.8 g/L TDS) aquifer
- Zhalpak brackish water (1.1 – 1.5 g/L TDS) aquifer
- Inkuduk salt water (2.3 – 3.6 g/L TDS) aquifer
- Mynkuduk salt water (2.7 – 4.5 g/L TDS) aquifer.

The confined Upper Cretaceous aquifers produce artesian conditions where the topography is depressed below the piezometric surface of about 135 – 140 m above sea level. The general water table is at a depth of eight to ten metres at Inkai.

The Inkai deposit includes the lower hydrogeological sub-stage (Paleocene and Upper Cretaceous). The hydrogeological conditions for the Quaternary-Upper Eocene sediments are not described here because aquifers of the upper sub-stage are not hydraulically connected to the Inkai deposit (Volkovgeology, 2007, 2015).

Available hydrogeology information is summarized below for the entire Inkai deposit with references for different blocks as specified.

The typical feature of the Upper Cretaceous aquifers (Zhalpak, Inkuduk and Mynkuduk) is a quasi-uniform lateral structure, i.e. high heterogeneity but in a very local scale. Thus, in a scale of pumping tests, hydraulic properties vary laterally very little, even though borehole logs reveal sediments of very different grain sizes. All these aquifers present a vertical anisotropy due to low-permeable lenses and thin layers between the aquifers and sub-horizons.

Intymak aquitard (Middle to Upper Eocene)

The Intymak aquitard is composed of greenish-grey, bluish-grey intercalated, rarely massive marine clays, varying in thickness from 70 to 120 m. Intymak clays outcrop immediately to the north-west of Block 3 in the Batykaryn river terrace. The Intymak clays comprise a regional aquitard in the Chu-Sarysu Basin.

Uyuk-Ikan aquitard (Lower Eocene)

The Uyuk-Ikan aquitard is represented by massive grey and greenish-grey marine clays. The thickness varies from 22 m in the northern part to 70 m in the southern part MA Area.

Uvanas and Byurtusken aquifers (Lower Paleocene)

The thickness of the Uvanas and Byurtusken aquifers varies from 15 m in the northern part MA Area up to 80 m in the south and south east, beyond the deposit boundary. At Inkai, the aquifers occur at depths of 170 to 280 m and have a thickness from 20 to 30 m. Water bearing sediments are fine to medium grain sands.

Based on 15 single borehole pumping tests at Blocks 1 and 2 (Volkovgeology, 1991, 2007) and five cluster pump tests at Block 3 (Volkovgeology, 2007, 2015), the calculated transmissivity of the Uvanas and Byurtusken aquifer varies from 47 to 168 m^2/d, with horizontal hydraulic conductivities between 2.4 and 8.6 m/d. Borehole yields were 1.6 to 11.0 L/sec.

Zhalpak aquifer (Campanian-Maastrichtian)

The depth to the bottom of the Zhalpak aquifer varies from 195 m in the northern part to 270 m in the central part, and to 355 m in the southern part of MA Area. The aquifer thickness is 40 to 60 m. Water bearing sediments are fine and medium grained sands with gravels. In the top of the Zhalpak Formation, there is a one to 10 m layer of clays and fine sands that separates the Zhalpak aquifer from the overlying Uvanas aquifer. This layer is assumed to be the Upper

Zhalpak aquitard (Geolink, 2003, Volkovgeology, 2007, 2015). There are clays and argillaceous sands underlying the Zhalpak aquifer that serve as local aquitards. Those low-permeable sediments are somewhat discontinuous; therefore, some hydraulic connection between the Zhalpak and underlying aquifers is possible.

The hydraulic properties of the Zhalpak aquifer were characterized by 10 pumping tests within Block 2, and seven pumping tests within Block 3. From their interpretation (Volkovgeology, 1991, 2007, 2015), the estimated transmissivity varies from 226 to 575 m^2/d, with an average value of 413 m^2/d. Elsewhere in the mine, transmissivities of the Zhalpak aquifer were estimated within a similar range for Block 2. Horizontal hydraulic conductivities on Block 2 were estimated at the range 5.5 to 11.4 m/d, with an average value of 8.9 m/d.

Inkuduk aquifer (Upper Turonian-Santonian)

The top of the Inkuduk aquifer is located at an approximate depth of 250 to 380 m, with an average thickness between 110 and 130 m. The aquifer contains fine-to-coarse granular sands with gravels and pebbles. Three sub-layers are identified and listed from top to bottom as: sands with clay lenses; fine and medium-grained sands; and sands with gravels and pebbles.

These sub-layers are not always present, and there are no clear boundaries between them. Towards northeast of Block 2 and the entire site, the clay content is slightly increasing in all sub layers. Clay lenses typically separate the Inkuduk aquifer from the upper and lower horizons. This aquifer hosts a portion of the mining zone. In Blocks 2 and 3, uranium mineralization develops within the middle and the lower parts of the Inkuduk aquifer, down to the depths of 270 to 370 m, depending on local conditions.

The Inkuduk aquifer is characterized by 27 borehole tests conducted by Volkovgeology prior to 1991, and 38 borehole tests comprising eight cluster aquifer pump tests, as well as 28 single well tests conducted at Block 3 from 2010 to 2013 by Volkovgeology, under the contract with JV Inkai. Horizontal hydraulic conductivities obtained from different parts of test interpretation graphs were between 6.3 and 22.8 m/d, with 80% of values in the range 10 to 18 m/day.

Borehole yields for the Inkuduk aquifer in Block 2 vary between 3.2 and 18.30 L/sec, and specific borehole yields vary between 0.8 and 2.4 L/sec. Generally, hydrogeological tests revealed that horizontal hydraulic conductivities of the Inkuduk aquifer were consistent through the whole cross-section. Hydraulic conductivity of the lower sub-horizon was estimated in the range of 9.2 to 16.1 m/d; for the middle sub-horizon, 11.8 to 15.8 m/d; and for the upper sub-horizon, approximately 13 m/d. Transmissivities for different sub-horizons were estimated, on average, as 472 m^2/d, 613 m^2/d, and 336 m^2/d for the lower, the middle, and the upper horizons, respectively.

Mynkuduk aquifer (Lower Turonian)

The top of the Mynkuduk aquifer is encountered at depths of 360 to 370 m, with a thickness of 30 to 40 m in the northeast, increasing to 70 to 90 m in the south-west. The average thickness of the aquifer at Block 2 is 48 m.

The aquifer lies on the Paleozoic argillaceous sediments that are recognized as a regional aquitard. The water bearing sediments are sands of various grain sizes with clays, gravels and pebbles. Generally, coarse sand and gravel fractions are associated with the upper part of the aquifer, while more clayish fractions are associated with the lower part of the aquifer. Towards the north-east of Block 2 and the entire site, the clay content is slightly increasing in all sub layers, particularly in the upper sub-horizon of the Mynkuduk aquifer.

The Mynkuduk aquifer is characterized by 95 boreholes, 20 hydrogeological single borehole tests, 36 multi-borehole tests and five injection tests (Volkovgeology, 1991). Borehole yields vary from 1.5 to 16.7 L/sec, with borehole specific yields between 0.2 to 2.6 L/sec.

Horizontal hydraulic conductivities at the deposit area vary from 7.1 to 13 m/d, with the average value of 10.9 m/d. Site transmissivities vary between 394 and 694 m^2/d, with the average value of 564 m^2/d. Block 2 was characterized by 20 borehole tests prior to 1991.

Resulting horizontal hydraulic conductivities are generally higher for Block 2 than for Block 1, with values varying between 7.4 and 17.3 m/d, and an average value of 13 m/d. Block 2 transmissivities obtained from pumping tests were in the range 460 to 755 m^2/d.

Vertical hydraulic conductivities were not well defined during exploration activities. They were calculated through calibration of the regional groundwater flow model by Geolink (2003).

Prevailing values of both horizontal and vertical hydraulic conductivities used by Geolink for the regional groundwater flow model are shown in *Table 7-1*.

Table 7-1: Hydraulic Conductivity

Model	Hydraulic conductivity (m/d)		
Aquifer/Aquitard	Horizontal	Vertical	Anisotropy ratio
Uvanas	4.0	0.62	6 : 1
Upper Zhalpak aquitard	1×10^{-5}	2.5×10^{-5}	1 : 2.5
Zhalpak	14.6	0.023	635 : 1
Upper Inkuduk	3.0	0.5	6 : 1
Middle Inkuduk	10.5	0.5	20 : 1
Lower Inkuduk	14.4	0.5	30 : 1
Upper Mynkuduk	10.7	1.0	10 : 1
Lower Mynkuduk	10.3	1.0	10 : 1

Calibrated values of horizontal hydraulic conductivity are generally higher than vertical hydraulic conductivity values by about one order of magnitude, with the exception of the Zhalpak aquifer. This aquifer has discontinuous lenses of low-permeable clays and argillaceous sands with a calculated anisotropy ratio of 635:1.

7.2.2 Hydraulic connectivity

The Uvanas aquifer is confined by 100 to 150 m of clays (regional aquitard), so it can be considered hydraulically isolated in the region from the overlying Betpak Dala aquifer.

However, Geolink (2003) data analysis and the modelling study revealed an insignificant leakage of groundwaters of the Uvanas aquifer into the overlying Betpak Dala aquifer for the northern flank of Block 1. The reason for this leakage appears to be open exploration wells that allow some hydraulic connection.

The aquifers of the lower hydrogeological sub-stage are hydraulically connected. This connection is more obvious between three lower aquifers (the Zhalpak, the Inkuduk and the Mynkuduk) that, according to borehole logs and geophysics results, do not have continuous separating low-permeability layers. These aquifers are separated from each other by clay lenses and by sediments with higher clay contents. Furthermore, a multi-stage pumping test conducted by KAPE (2002) demonstrated a hydraulic connection between the Zhalpak aquifer and the horizons of the Lower Cretaceous (e.g., Inkuduk and Mynkuduk). Re-interpretation of the Volkovgeology (1991) pumping tests conducted by KAPE (2002) also supports this hypothesis.

The hydraulic connection of the Uvanas aquifer with the underlying aquifers is complicated by the presence of a thin (one to 10-m) layer of low-permeable deposits in the upper part of the Zhalpak aquifer. Previous site studies (Volkovgeology, 1991; KAPE, 2002) conclude that these two aquifers are considered hydraulically isolated. However, this conclusion was based on the presence of low-conductive sediments between these two aquifers and the results of one pumping test in the Uvanas aquifer when no drawdown was observed in the underlying aquifers. Subsequent site studies (Geolink, 2003) indicate that this conclusion may be incorrect.

Piezometric levels of the Uvanas aquifer are very close to that of the Zhalpak aquifer (the difference may run to less than 10 to 20 cm) and piezometric level data for both aquifers show a synchronous decrease over the last 20 years. This evidence suggests a hydraulic connection between the aquifers in the lower hydrogeological sub-stage. However, the degree of interconnection between the Uvanas aquifer and Zhalpak aquifer is significantly less than between the Zhalpak and Inkuduk, and Inkuduk and Mynkuduk aquifers.

7.2.3 Piezometric measurements

The majority of water level measurements which were taken in Block 1 concerned the Mynkuduk aquifer, while measurements at Blocks 2 and 3 were carried out on Inkuduk and Zhalpak aquifers (Volkovgeology, 1991, 2007, 2015; KAPE, 2002). Overall, piezometric data indicate that the Uvanas, Zhalpak, Inkuduk and Mynkuduk aquifers are confined, with piezometric levels varying from approximately 20 m above ground surface on the southeast to about 20 m below ground surface on the north and north-west. The horizontal hydraulic gradients at Inkai are relatively small (e.g., 2 to 3 x 10^{-4}). Estimated lateral groundwater movement is approximately 0.5 to 3.0 m/a.

Concurrent piezometric measurements from four aquifers in cluster wells K1, K2 and K15 indicate similar piezometric levels with differences of 0.7 m (Volkovgeology, 1991; Geolink, 2003). This observation suggests that the natural piezometric surfaces for these aquifers coincide.

Monitoring of piezometry variations by Volkovgeology (1991) revealed that, between 1981 and 1991, the site piezometry was gradually declining in all four aquifers. This drop was observed throughout at the mine, including boreholes in Block 2. The drop of piezometric levels between 0.3 and 1.2 m/a was observed in the majority of exploration boreholes, with a site average of 0.5 to 0.7 m/a. This drop in the piezometric surface was likely related to aquifer exploitation beyond the mine site, in the southern, south-eastern and south-western parts of the West-Chu artesian basin. Other reasons could be the presence of free-flowing artesian boreholes used for livestock watering.

Between 2001 and 2004, piezometric levels of the Upper Cretaceous complex continued to decline, but at a slower rate of 0.1 to 0.3 m/a (KAPE, 2006). Decline of piezometric levels is expected to continue to slow down due to abandonment of free-flowing boreholes within and adjacent to the mine.

7.2.4 Groundwater chemistry

Typical vertical hydrochemical zoning is observed in the water-bearing complex of the lower hydrogeological sub-stage. There is a regular top-down increase in total dissolved solids from 0.6 to 4.7 g/L. These aquifers have also lateral hydrochemical zoning. As groundwater flows from its source towards north-west the salinity of water increases and the hydrochemistry changes.

Apart from upper zones of the Zhalpak aquifer, the groundwaters are not suitable for drinking due to high TDS, but up to certain depth (usually top of the Inkuduk aquifer) can be used for livestock watering.

Groundwater in the Zhalpak aquifer is fresh to slightly brackish (TDS=0.9 to 1.8 g/L). Uranium concentrations are 1.0 x 10^{-7} to 2.1 x 10^{-6} g/L; radium concentrations 1 x 10^{-12} to 6 x 10^{-12} g/L.

These concentrations are consistent with typical background concentrations of these elements in sedimentary rocks. Brackish and salt water is found in the two lower aquifers.

TDS of the Inkuduk aquifer vary between 1.2 and 3.6 g/L, increasing with depth of burial. The groundwaters of the upper sub-horizon with TDS less than 1.6 g/L are suitable for industrial needs. TDS of the Mynkuduk aquifer is quite high: 2.7 to 4.7 g/L, increasing from north to south with deepening of the layer. The groundwaters from both aquifers are of a SO_4-Cl-Na type. Uranium mineralization in Block 2 MA occurs in the middle and upper parts of the Inkuduk aquifer. In Block 1, uranium mineralization generally associates with Mynkuduk aquifer.

7.3 Mineralization

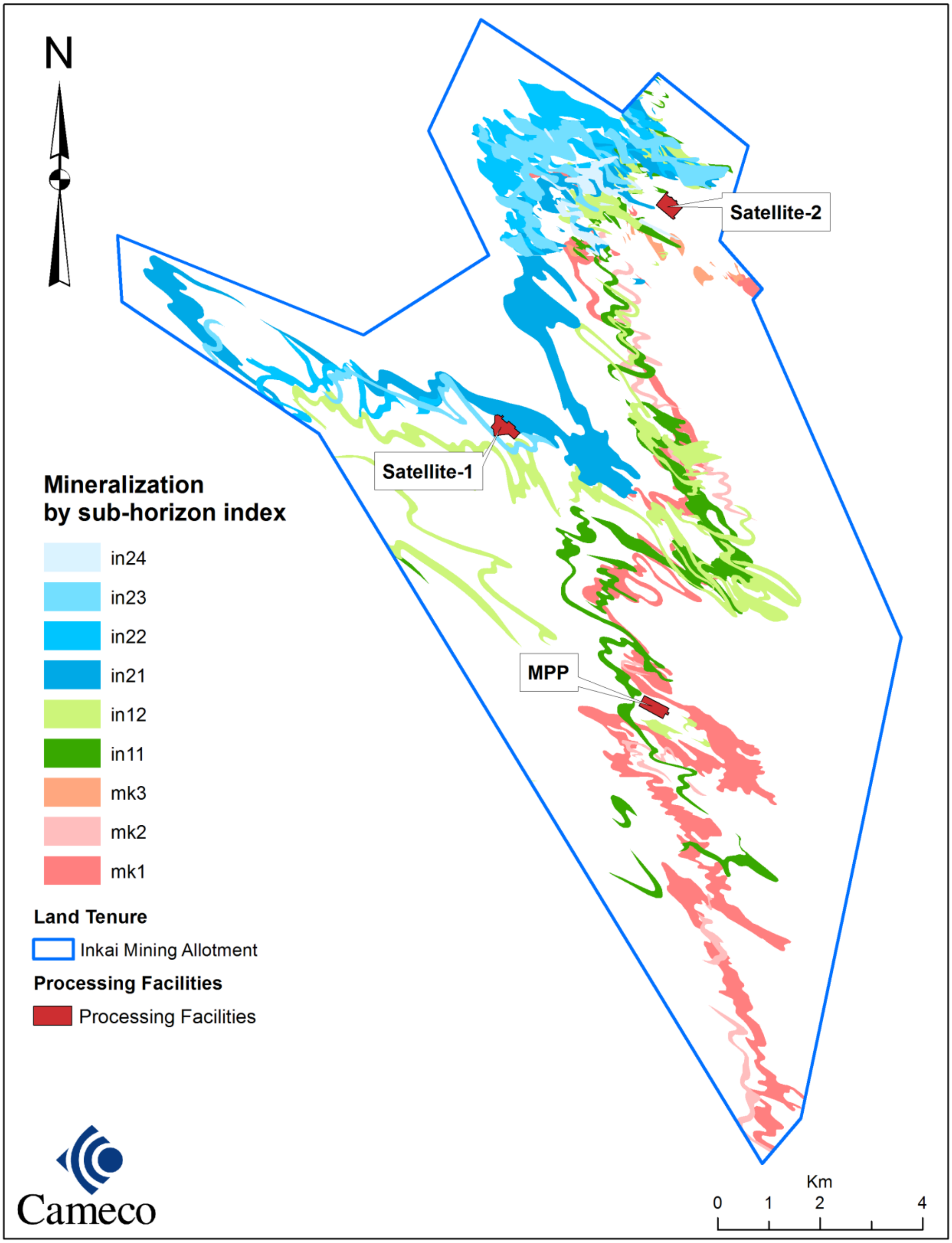
7.3.1 Host rocks

As presented in *Figure 7-4*, the roll fronts mineralization is hosted by three horizons: the Middle Inkuduk horizon; the Lower Inkuduk horizon; and the Mynkuduk horizon. Horizons are divided into sub-horizons as shown in *Table 7-2*.

Table 7-2: Horizons and Sub-horizons Division

Horizon	Horizon index	Sub-Horizon	Sub-Horizon index
Middle Inkuduk	in2	Uppermost part of Middle Inkuduk	in24
		Upper part of Middle Inkuduk	in23
		Middle part of Middle Inkuduk	in22
		Lower part of Middle Inkuduk	in21
Lower Inkuduk	in1	Upper part of Lower Inkuduk	in12
		Lower part of Lower Inkuduk	in11
Mynkuduk	mk	Upper Mynkuduk	mk3
		Middle Mynkuduk	mk2
		Lower Mynkuduk	mk1

Figure 7-4: Inkai Uranium Roll Fronts



Regional structures in the Chu-Sarysu Basin have had some control to the development of the sedimentary facies and to the movement of uranium bearing groundwater to form the roll fronts. Structure contour maps, on the surface of the basement Palaeozoic rocks, indicate that perhaps linear depressions in the surface have coincidence with overlying roll fronts; the hydrostratigraphy of the Cretaceous formations being the primary control to mineralization.

7.3.2 Oxidation and mineralization

Different lithologic and geochemical types have been studied for the content of their organic carbon, total iron, and iron contents.

The zone of uranium mineralization is located along the geochemical barrier marked by the contact zone of the incompletely oxidized rock and the primary grey-coloured rock. Iron oxides are nearly absent in this zone. Organic carbon content is decreased. Some associated pyrite, and sometimes carbonates, are observed. Four geochemical host rocks types can be identified at the deposit:

- diagenetically reduced grey sands and clays containing coalified plant detritus
- green-grey sands and clays, reduced both diagenetically and epigenetically by “gley” soil (anaerobic organic) processes
- non-reduced initially mottled sediments
- yellow-coloured lithologies that underwent stratal epigenetic oxidation

The initial colours are typical of channel of flood-plain facies. Diagenetically reduced grey sands and gravel of channel facies are more favourable for uranium deposition compared to greenish-grey or grey-green sands.

Occurrence and development of facies of Upper Cretaceous continental mottled alluvial formation is controlled by syn-sedimentary structures consistent with the tectonic pattern of the depression. Structural-facies control of mineralization is clearly expressed in mineralization of the Mynkuduk horizon. In the upper horizons such control is weakly expressed.

From observations of core, the redox boundary can be readily recognized by a distinct colour change from grey and greenish-grey on the reduced side to light-grey with yellowish stains on the oxidized side, stemming from the oxidation of pyrite to limonite and consumption of organic carbon.

The propagation of the oxidation fronts is affected by hydrostratigraphy (controlling fluid paths and velocities), and rock composition (controlling redox reactions). The implied groundwater movement direction was from the southeast to northwest, leading to the formation of oxidation tongues also oriented to the northwest. It gives rise to characteristic geometries of the redox fronts and associated mineralization described in more detail in the following section.

7.3.3 Geometry

The Inkai deposit has developed along a regional system of superimposed redox fronts in the porous and permeable sand units of the Chu-Sarysu Basin. The overall strike length of the redox fronts and related to them mineralization envelopes at Inkai is approximately 40 km. The stratigraphic horizons of interest in the basin, located between 250 and 550 m below surface, have a combined total thickness which ranges from approximately 200 to 250 m.

Extent and dimensions by horizon

Mineralization in the Middle Inkuduk horizon occurs in the central, western and northern parts of the MA Area. The overall strike length is approximately 35 km. Width in plan view ranges from 40 to 1,600 m and averages 350 m. The depth ranges from 262 m in the northern and eastern parts to 380 m in the central part of the MA Area. Average depth is 314 m.

Mineralization in the Lower Inkuduk horizon occurs in the southern, eastern and northern parts of the MA Area. The overall strike length is approximately 40 km. Width in plan view ranges from 40 to 600 m and averages 250 m. The depth ranges from 317 m in the northern part to 447 m in the southern part of the MA Area. Average depth is 382 m.

Mineralization in the Mynkuduk horizon stretches from south to north in the eastern part of the MA Area. The overall strike length is approximately 40 km. Width in plan view ranges from 40 to 350 m and averages 200 m. The depth ranges from 350 m in the northern part to 528 m in the southern part of the MA Area. Average depth is 390 m.

Morphology in plan view

In a plan view the mineralized fronts have an irregular sinuous shape, comprising southwestern and northeastern limbs joining to form prominent northeast-oriented frontal crests and southeast-oriented posterior troughs observed at a variety of scales. The wavelength of the larger-scale sinusoid varies from 1 to 5 km, with the corresponding peak-to-peak amplitude varying from 2 to 10 km. Often, the irregular shape of a larger scale sinusoid is further complicated by smaller scale irregular sinusoids with more variably oriented limbs, crests and troughs, with wavelengths ranging from 100 to 500 m and amplitudes from 200 to 1,000 m. The width in a plan view of the limbs is typically narrower than that of the frontal crests and rear troughs. The crests and the troughs usually contain most of the metal accumulations. There are notable differences in the mineralization width in a plan view between different horizons and sub-horizons, as well as between different locations for the same sub-horizon, as presented in *Figure 7-4: Inkai Uranium Roll Fronts*. Overall, the mineralization in the Mynkuduk and Lower Inkuduk horizon is less than 40 to 100 m wide in the limbs, and reach 600 m in the crests and troughs. The mineralization in the Middle Inkuduk horizon tends to be comparatively wider, especially in the central part of the deposit. It is 50 to 400 m in the limbs, and reaches 1,400 m in the crests and troughs in the northern part of the MA Area.

In the Middle Inkuduk horizon, the mineralization is found in coarse sands of the main channel or streambed facies. Here, the mineralized fronts are the farthest advanced to the northwest in the direction of groundwater flow. In the Lower Inkuduk and Mynkuduk horizons, mineralization usually lags somewhat behind, along a complex system of superimposed suturing oxidation tongues. Stacked mineralization is also observed where it occurs in different horizons over the same area; for example, in Block 2 MA and Block 3 MA, where up to five mineralization levels are stacked.

Morphology in cross-section view

A variety of roll-front morphologies are observed, as represented in *Figure 7-5: Roll-Front Morphology of Mineralization,* and are classified in five major groups:

- simple rolls, mineralization along the nose or edge of a single oxidation tongue, including the classic C-shaped rolls (A, E and H)
- cascade type, where two or more superimposed oxidation tongues form overlapping rolls (stacked mineralization) (B and D)
- adjacent type, where two or more tongues develop in the same level enclosing mineralization in between (C)
- combined cascade-adjacent type (G)
- tabular (F)

7.3.4 Mineralogy

Uranium

The main uranium minerals are sooty pitchblende (85%) and coffinite (15%). Sooty pitchblende occurs as micron-sized globules and spherical aggregates, while coffinite forms tiny crystals. Both uranium minerals occur in pores on interstitial materials such as clay minerals, as films around and in cracks within sand grains, and as pseudomorphic replacements of rare organic matter, and are commonly associated with pyrite. The latter seems to have formed after the growth of pitchblende as it often coats or rims the uraniferous films and aggregates. No other potentially deleterious trace elements have been detected. All potential contaminants such as molybdenum (Mo), selenium (Se) and vanadium (V) occur in background levels consistent with average values for the Earth's crustal rocks. The uranium mineralization is essentially clean and monometallic. Vanadium and molybdenum show elevated values where occasional organic debris has accumulated. The general distribution of potential contaminants in the roll-fronts is represented in *Figure 7-6: Inkai Uranium Roll Fronts*.

Poor and rich mineralization are distinguished not by the composition of uranium minerals but by their distribution. Poor mineralization is more dispersed than the rich one. Authigenic mineralization is composed of pyrite, siderite, calcite, native selenium, chlorite, sphalerite, pyrolusite and apatite.

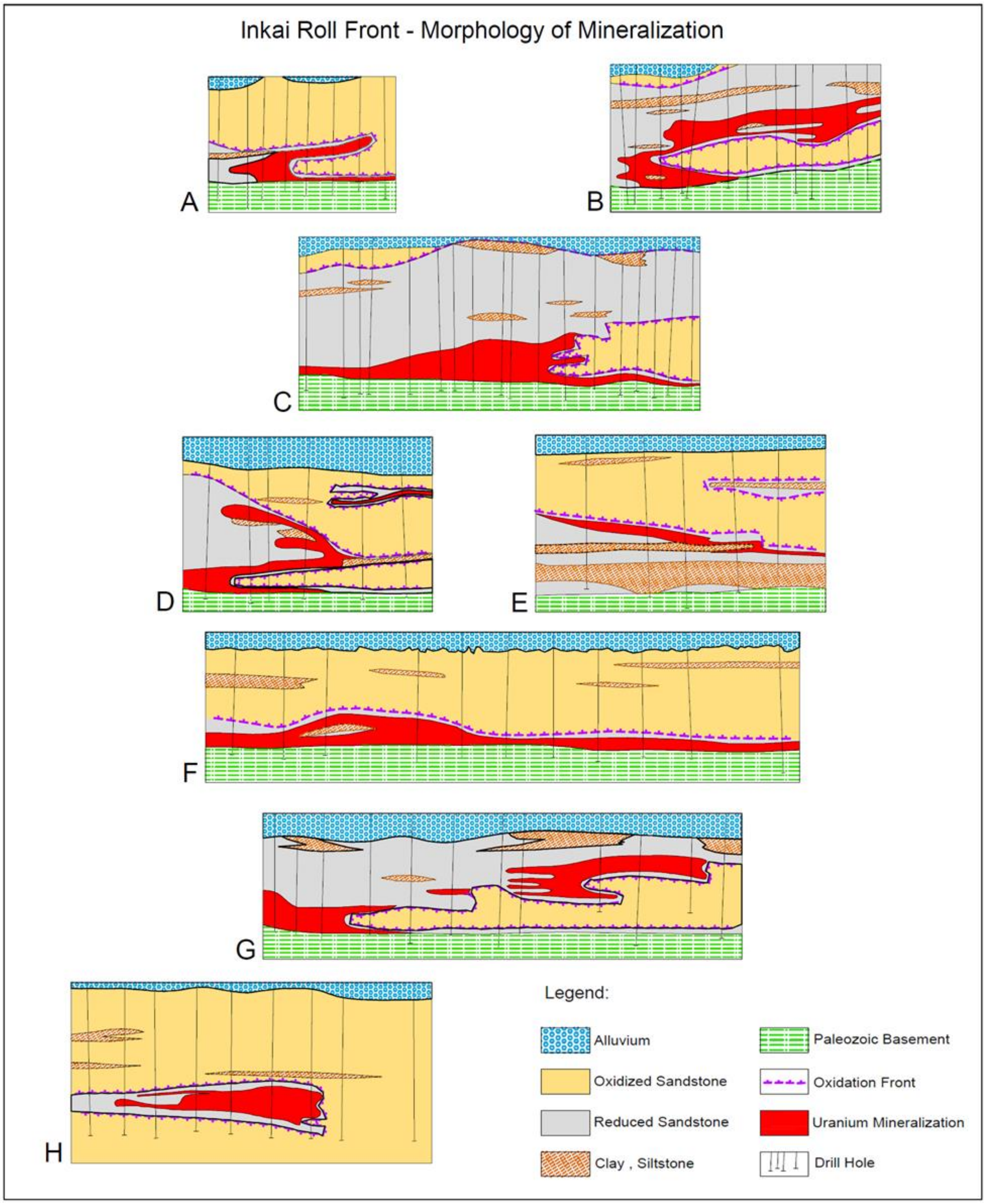
Trace elements

Quantitative methods of analysis in mineralized and waste sands were used to study the content of rhenium, scandium, yttrium, and the total of rare earths with yttrium, selenium and molybdenum.

Selenium was studied by X-ray spectral analysis on the grid 800 x 100 – 50 m (the total number of samples comprised about 30,000). Selenium is almost absent in uranium mineralization. It is located only along the margins of grey sands, where it is fixed in the sub-zone of radium enrichment of up to two metres thick. The average selenium bodies are one to two metres thick and grades of 0.01 to 0.03%. They typically do not coincide with the contours of uranium mineralization.

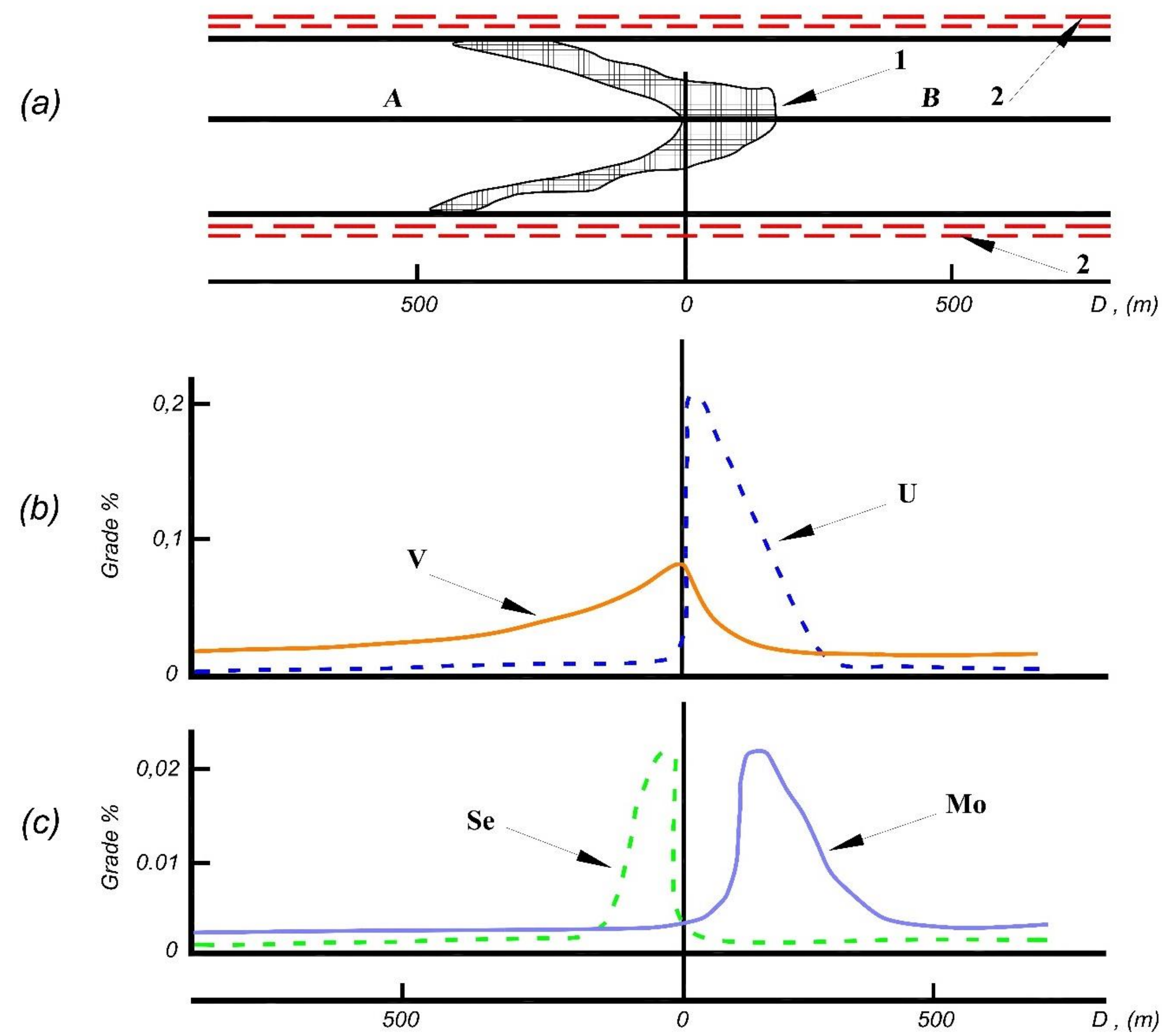
Molybdenum accompanies uranium mineralization in trace amounts. Molybdenum content in mineralized uranium rocks is two to five times that in waste rocks. The molybdenum content in oxidized permeable rocks is 20 to 50% lower than that in non-oxidized waste rocks. Anomalous molybdenum content does not extend outside uranium occurrences.

Figure 7-5: Roll-Front Morphology of Mineralization



(Source: Kislyakov and Shetochkin, 2000; modified by Cameco in 2016)

Figure 7-6: Typical characteristics of a roll-front deposit



(a) A -- oxidized zone ; B -- reduced zone ; (b) distribution of uranium and vanadium ; (c) selenium and molybdenum ; 1 -- epigenetic ore mineralization ; 2 -- argillites ; D -- distance in metres from margin of oxidized zone.

(Source: Cameco, 2017)

8 Deposit types

8.1 Roll-front deposits

The Inkai uranium deposit is a roll-front stratiform system. Roll-front deposits are a common example of stratiform deposits that form within permeable sandstones in localised reduced environments. Microcrystalline uraninite and coffinite are deposited during diagenesis by oxygenated and uraniferous groundwater, in a crescent-shaped lens that cuts across bedding and forms at the interface between oxidized and reduced lithologies. Sandstone host rocks are medium to coarse grained and were highly permeable at the time of mineralization.

They form in continental-basin margins, fluvial channels, braided stream deposits and stable coastal plains. Contemporaneous felsic volcanism or eroding felsic plutons are sources of uranium. In tabular mineralization, source rocks for uranium-bearing fluids are commonly in overlying or underlying mud-flat facies sediments.

Fifteen economic uranium deposits have been discovered within Cretaceous and Palaeogene sediments of the Chu-Sarysu and Syr-Darya Basins across Kazakhstan. These are grouped into the Chu-Syr Darya mineralized region, and situated within the two basins that are separated by the Karatau Range uplift.

Soviet geologists established the spatial relation for uranium mineralization between the boundaries of the yellow oxidized sand sediments of aquifers and unoxidized grey sand sediments in Uzbekistan in 1956. These were named "bed oxidation zones" deposits by Soviet geologists, and characterised by:

- hydrodynamic conditions of infiltration artesian basins
- arid climate conditions at epoch of mineralization deposition

The mineralizing system responsible for the formation of the uranium deposits in Chu-Sarysu basin is related to rise of the Tien-Shan Mountains which started in Oligocene and still continues to present. The mineralizing system is thus still active. The age of mineralization is polychronous and ranges from Oligocene to present (Kislyakov and Shetochkin, 2000).

8.1.1 Oxidation state

The geological model for stratabound roll-front deposits, applied at the exploration stage, relates to the identification of the following zoning:

- **Oxidation:** Siderite, pyrite, biotite, chlorite and glauconite are absent in the completely oxidized zone. The mineralization contains iron hydroxides. The granular fraction includes some kaolinized feldspars. The predominant colour of the rock is yellow, ochre yellow and orange. The completely oxidized sub-zone can extend for tens and hundreds of kilometres into the basin, measured from the outcrop at the basin margin.
- **Incomplete oxidation:** In the sub-zone of incomplete oxidation, iron hydroxides occur locally, resulting in the rock having a mottled appearance. Minor quantities of plant detritus, siderite, and glauconite may be present. The predominant colours are yellowish-green and whitish-yellow. Between the zone of complete and partial oxidation, one sometimes observes a sub-zone of re-deposited red hematite ochres. The sub-zone of incomplete oxidation can extend from a few kilometres to some tens and hundreds of kilometres.
- **Primary reduced:** The zone of barren grey rock has a characteristic mineral composition of rock common for the stratigraphic horizon under consideration. The colour is grey or light grey. Unoxidized pyrite and small quantities of bitumen or carbon trash are common and contribute to the grey colour.

The zone of uranium mineralization is located along the geochemical barrier marked by the contact zone of the incompletely oxidized rock and the primary grey-coloured reduced rock. Iron oxides are nearly absent in this zone.

Carbonaceous plant detritus remains non-oxidized. Some associated pyrites, and sometimes carbonates, are observed. Uranium minerals, including sooty pitchblende, pitchblende and coffinite, may be associated with pyrite and organic matter. The uranium-bearing zone generally extends for tens of metres or, rarely, for a few hundred metres (in cross-section across the roll front), but may extend for many kilometres along the roll-front.

The geochemical properties of the host rocks are determined by their primary composition and particle size distribution, as well as by their permeability and other hydrologic characteristics. The reduced chemical state of the host rocks develops during diagenesis following deposition, or possibly as the result of some event or events taking place later in the geologic history, such as introduction of hydrocarbons and/or hydrocarbon gases.

The reduction processes are accompanied by the development of grey, dark-grey and greenish-grey coloured host rocks. Epigenetic alteration taking place during reduction, include bituminization, carbonation, sulphidation, argillisation and decomposition of iron minerals result in bleaching of the sediments.

9 Exploration

The MA Area is in production. All exploration work on Blocks 1 and 2 MA was carried out prior to JV Inkai being established and is described in *Section 6.2 Exploration and development history*. No further exploration is planned besides drilling with the objective to convert mineral resource categories to a higher level. Block 3 MA exploration work was conducted with drilling only from 2006 to 2016 and is covered in *Section 10 Drilling*.

10 Drilling

10.1 Uranium exploration and delineation drilling

JV Inkai's Block 1, 2 MA and 3 MA uranium exploration and delineation drilling programs were conducted by drilling vertical holes from surface. Delineation of the deposits and their geological structural features were carried out by drilling on a grid at prescribed density of 3.2 to 1.6-km line spacing and 200 to 50-m hole spacing with coring. Increasing level of geological knowledge and confidence is obtained by further drilling at grids of 800 to 400 x 200 to 50 m with coring and 200 to 100 x 50 to 25 m grid, usually without core.

Vertical holes are drilled with a triangular drill bit for use in unconsolidated formations down to a certain depth and the rest of the hole is cored. At the Inkai deposit, approximately 50% of all exploration holes are cored through the entire mineralized interval, and 70% core recovery is required for assay sampling as described in *Section 11.1 Sample density*. Radiometric probing, hole deviation, geophysical and hole diameter surveys are done by site crews and experienced contractors.

As the mineralized horizons lie practically horizontal and the drill holes are nearly vertical, the mineralized intercepts represent the true thickness of the mineralization.

The total number of holes drilled at Inkai is presented in *Table 10-1*. The locations of the drillholes are shown in *Figure 10-1*.

Table 10-1: Delineation Drilling at Inkai

Area	Type	Number of holes
Block 1	Historical	1,464
	JV Inkai	86
Block 2 MA	Historical	1,429
	JV Inkai	323
Block 3 MA	Historical	124
	JV Inkai	1,071

The drilling results were used for the identification of the horizons and mineralization encountered and served for the geological modelling, the estimation of uranium distribution and content, and the understanding of hydrogeological and metallurgical characteristics.

10.2 Methodology and guidelines

The methodology of delineation programs and all related procedures for geological, geophysical, and analytical work follows the recommendation of the SRC guidelines for exploration and delineation of uranium deposits. For further discussion of the application of the SRC guidelines see *Section 14.1 Key assumptions, parameters and methods*.

10.2.1 Exploration-delineation drilling programs

No exploration activity was conducted by JV Inkai at Blocks 1 and 2 MA before 2013. Instead, historical data was relied upon to estimate Inkai's mineral resources and reserves. From 2013 to 2017, delineation drilling was conducted at Block 1 (86 drillholes) and Block 2 MA (323 drillholes) to better establish the mineralization distribution and to support further development and wellfield design.

Extensive exploration and delineation work was completed at the northern flank (Block 3) of the Inkai deposit by JV Inkai from 2006 to 2016.

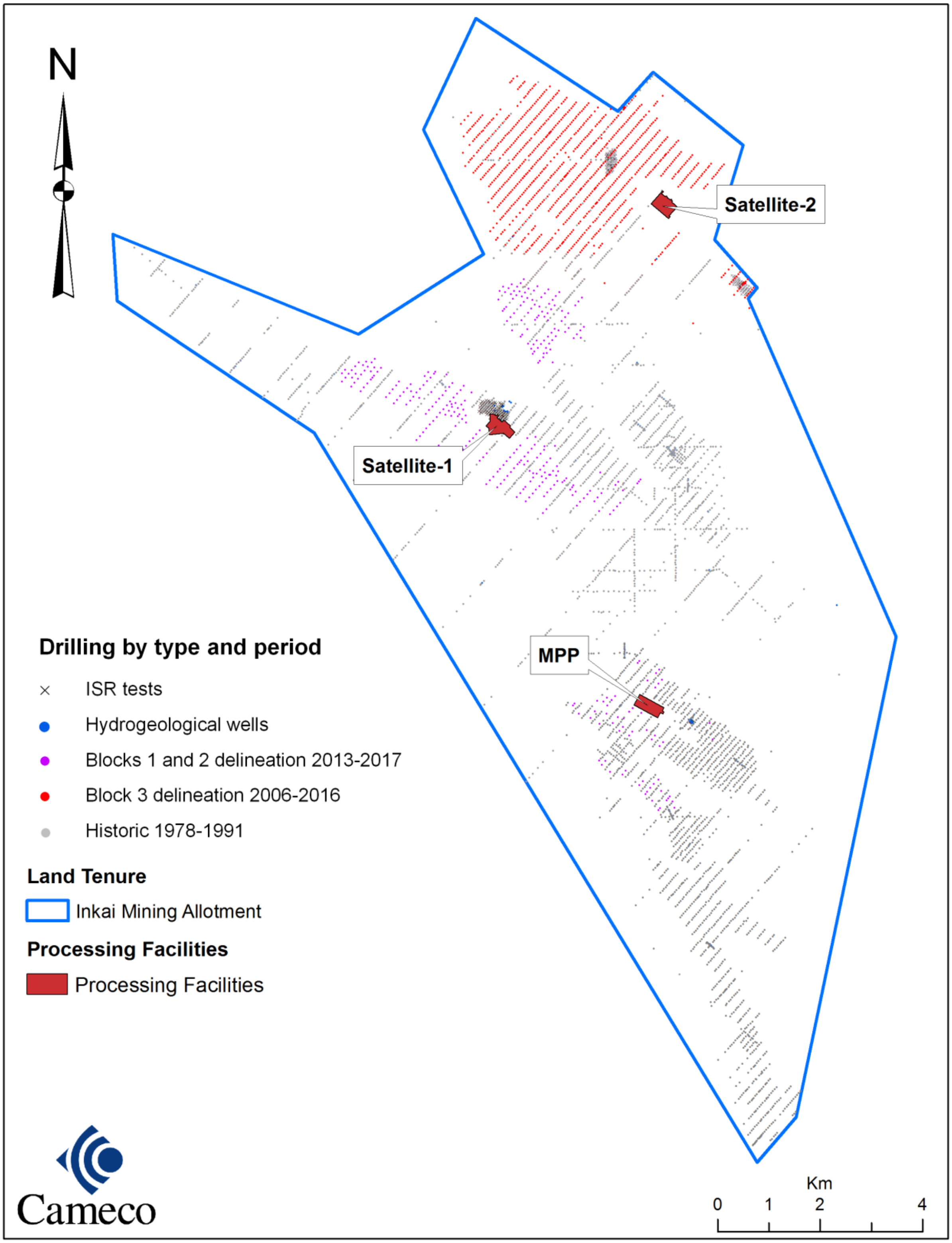
JV Inkai's Geology department oversaw the exploration drilling program, including the drilling program and management of contractors. JV Inkai retained a contractor, Volkovgeology, to direct and coordinate day-to-day drilling activities, and to ensure the quality of drilling, core recovery, surveying, geological logging, sampling, assaying and daily data processing. All downhole geophysical logging was performed by JV Inkai logging crews, as described in *Section 11.5 Geophysical logging*. Drilling was performed by a number of contractors, supervised by Volkovgeology.

All drilling conducted on grids of 400 x 50 m and larger were cored with the core recovery of at least 70% in at least 70% of the drillholes, where the infill drillholes in 200 x 50 m drilling patterns consist of predominately coreless drillholes, in compliance with the requirements of the SRC.

10.3 Factors that could materially affect the accuracy of the results

There are no known drilling, sampling or core recovery factors that could materially affect the accuracy and reliability of the results. For a further discussion of sampling and core recovery factors, see *Section 11 Sample preparation, analyses and security.*

Figure 10-1: Drill Hole Collar Location Map



11 Sample preparation, analyses and security

The sampling, sample preparation, analyses, geophysical downhole logging during the exploration and delineation programs follow the procedures and manuals which adhere to the requirements set out in the SRC guidelines as described in *Section 14.1 Key assumptions, parameters and methods.*

11.1 Sample density

Sampling of the mineralization is based on drilling grids that progressively tighten with increasing levels of geological knowledge and confidence. The line spacing with drillhole spacing decreases as follows:

- 3.2 – 1.6 km x 200 – 50 m, all drillholes are cored through the target horizon
- 800 – 400 m x 200 – 50 m, all drillholes are cored through the target horizon
- 200 – 100 m x 50 – 25 m, most drillholes are coreless

11.2 Core recovery

At Block 1, 66% of cored drillholes have recovery higher than 70%. At Block 2, 54% of cored drillholes have recovery higher than 70%. At Block 3, 85% of cored drillholes have recovery higher than 70%. Core recovery is generally considered to be acceptable, given the unconsolidated state of the mineralized material. Resource estimates are based on gamma log results. Core sample assays are composited for correlation purposes if core recovery was at least 70%.

11.3 Procedure for sampling and sample preparation

Drill core is logged in log journals following the developed manuals and representative core samples are selected for the following analyses and tests:

- determination of the content of uranium, radium and associated elements
- determination of bulk density, rock moisture, porosity and acid-base balance of monolith rocks
- determination of mineralization and host rock physical composition, rock grading and carbonate content
- column leach tests for uranium leachability

Detailed sampling procedures guide the sampling interval within the mineralization. Where core recoveries are better than 70% and radioactivity is greater than 40 micro-roentgens per hour, core samples are taken at irregular intervals of 0.2 to 1.2 m. Sample intervals also are differentiated by barren or low-permeability material. The average core sample length is 0.4 m. The sampling is conducted from the half of core divided along its axis and cleared from the clay envelope. Core diameter was 60 mm, 70 mm and 100 mm. The required sample weight was determined based on the length of the samples and the diameters of the core sampled.

The split core is also sampled for grain-size analysis and carbonate content following the same procedure.

Sample preparation and assaying are done by Volkovgeology following procedures set out in the SRC guidelines. When core samples are being analyzed for geochemistry, they are primarily analyzed for grain size and assayed for uranium, radium, thorium, potassium and carbonate content. On selected fence lines, a more extensive study of geochemistry is undertaken.

The core samples for uranium and radium determination are taken from representative intervals, based on their quantity and quality. The sampling is conducted in sections from the half of core divided along its axis. The maximum sample length is 1.0 to 1.2 m, and the minimum is 0.2 m, with an average of 0.4 m. To control the sampling quality, a sample is collected from the second half of core. The core samples are ground down to 1.0-mm grain size and are further subdivided by one or three times quartering until the final representative weight of samples and duplicates is reached (0.2 kg).

11.4 Assaying

The laboratory tests for uranium and radium were performed by the Central Analytical Laboratory (CAL) of Volkovgeology, located in Almaty. The laboratory is certified and licensed by the National Centre for Accreditation of the Republic of Kazakhstan to comply with the STRK ISO/IEC 17025-2007 standard, Certificate number KZ.I.02.1029. Volkovgeology is a subsidiary of Kazatomprom, which is part owner of JV Inkai. The uranium content was determined by using the X-ray fluorescence spectrum analysis. The radium content was determined by the multi-step method using gamma intensity and X-ray spectrum analysis. Since uranium grade calculated from gamma probing of the drillholes is used for resource estimation, assays from core sampling are only used for correlation and radioactive disequilibrium determination purposes.

11.5 Geophysical logging

Downhole geophysical logging is performed by JV Inkai. JV Inkai owns three geophysical downhole logging trucks, fully equipped for conducting the following types of logging used in exploration/delineation and wellfield drilling programs:

- gamma logging
- resistivity and spontaneous potential
- caliper
- hole deviation
- thermometry
- inductive resistivity

Gamma and electric logging is conducted in all drillholes over their entire length and is performed with no casing in the drillholes.

AtomGeo, the specialized software developed by Volkovgeology, is universally used throughout uranium mines and exploration projects in Kazakhstan. It centralizes entry, storage, processing and retrieval of drillhole-related geological information. The raw geophysical data (logs) are entered into the AtomGeo database by JV Inkai staff after conducting a first level QA/QC and checking for errors.

A copy of the database is given to the Volkovgeology data processing centre in Almaty for more rigorous data processing. Correction coefficients are determined considering all factors, including correction for disequilibrium. Thus, calculated and corrected grades are checked against the chemical assays. Then a specifically formatted drillhole file (the passport) is prepared, which is later used in building cross-sections and plans. The plans and section thus prepared will be later used in reserve estimation. Volkovgeology performs this work under a separate contract with JV Inkai.

11.5.1 Radiometric probing

Every drillhole at Inkai is logged for total count gamma radiation, which is used as the primary uranium measurement in resource estimation. Therefore, the quality of the grade calculations is thoroughly controlled. The probes use sodium-iodine crystals which are 30 x 70 mm in size and are shielded by lead filters 0.9 to 1.1 mm in thickness. The preparation of devices and equipment for operation, methods and techniques of logging are kept in strict compliance with the requirements from the instruction manuals on operation and gamma-logging. The readings are measured in micro-roentgen per hour and are taken at 10-centimetre intervals down the length of the drillhole.

The source materials for logging calibration are considered to be of good quality and are used to test the probing equipment both prior to and after logging. The variation in gamma logging estimates, based on basic control and check logging, does not exceed +/- 5% grade-thickness, and the variation in recording electrical logging parameters does not exceed +/- 7%.

The data from the gamma logging is processed and interpreted using the AtomGeo software, which uses an algorithm of differential interpretation (deconvolution), as recommended by the SRC logging instruction manual. During the interpretation, adjustments are made for absorption of gamma radiation by mud and for moisture within the mineralization. The first adjustment is made based on the nominal diameter for the drilled mineralized intervals because the adjustment by an actual well diameter, established by caliper logging, differs from it by less than 2%. A 15% adjustment for humidity is applied on the basis of numerous measurements. In addition, adjustments for radioactive equilibrium and radon release are made manually on the diagrams of differential interpretation.

Further comparisons have been made between gamma logging data and neutron logging data to confirm the absence of systematic errors. Prompt fission neutron logging was performed for a number of drillholes as a direct method for logging uranium and to check comparisons with gamma log determinations of the uranium grade.

11.5.2 Caliper logging

Caliper logging is performed over the entire length of a drillhole in approximately 10% of the drillholes. Calipers are calibrated before and after each logging run by using reference rings. When comparing the results of the calliper logging to the corresponding nominal diameters of the drillhole intervals, the difference was insignificant and the standard deviations did not exceed the allowable values indicated by the instruction manual. On this basis, it was concluded that for the calculation of the gamma-ray absorption coefficient, the nominal diameter of drillholes could be used.

11.5.3 Hole deviations

Directional surveys are carried out on every drillhole at Inkai to determine the actual position of the well in three-dimensional space. This is carried out by measuring the zenith and azimuth angles for the deviation of the well from vertical. Measurements are made every 20 m down the length of the drillhole. During the deviation survey, every fifth point is re-measured as a check measurement. These check measurements are conducted two to three metres above the original key point. Similar check measurements are conducted in cases where serious changes to the zenith angle occur when compared to the previous point. The drift indicator is calibrated at least once per month.

11.5.4 Resistivity and self-polarization

These methods are used on all holes to identify the lithologies and stratigraphic features, and to assess the permeability of the rocks in place.

11.6 Density determinations

Density determinations are typically made on 100 to 150 samples per mineralized horizon, and are analyzed by using bulk density methods. The density of the mineralized material is regarded as constant at 1.70 t/m^3.

11.7 Quality assurance / quality control

The sampling reproducibility for the uranium and radium assays was determined by two methods: (1) having the remaining half of the core sampled by another sampler and by (2) by compositing samples consisting of the original sample rejects and samples of the remaining half of the core. The standard deviation for (1) did not exceed 6.4% and the standard deviation for (2) did not exceed 5.6%.

In order to ensure the assay accuracy and adequacy for the purposes of correlation with gamma probing and disequilibrium determination for resource estimation, the following control analyses were carried out:

- Internal laboratory control of the uranium and the radium grade determination is performed by comparing the results of the sample and its blind duplicate. The mean square error between sample and duplicate was calculated by measuring the deviation to ensure it stayed within the prescribed limits. The number of control samples was approximately 9% of all samples for uranium and approximately 6% of all samples for radium.

- Internal inter-method control of assays for uranium and radium were performed in the form of checks between the results of the X-ray fluorescence analysis for uranium against the results of wet chemical analyses conducted by CAL. The results of radium determination were checked against the results of radiochemical analyses also conducted by CAL. The number of control samples was approximately 4% of all samples for uranium and approximately 2% of all samples for radium.
- External (inter-laboratory) controls for the uranium and radium assays were carried out at the VIMS laboratory in Moscow, Russia, Nevskoe PGO laboratory in Saint-Petersburg, Russia and Kyzyltepageologiya Laboratory in Navoi, Uzbekistan. The number of control samples was approximately 2% of all samples for uranium and approximately 1% of all samples for radium.

Based on numerous QA/QC controls applied by Volkovgeology, including internal checks and inter-laboratory checks, the repeatability of the results for uranium and radium confirmed the accuracy specified and no significant systematic deviations were found.

All drilling, logging, core drilling, and subsequent core splitting and assaying, were completed under the direction of various geological expeditions of the USSR Ministry of Geology and later under the supervision of Volkovgeology. Sampling and analysis procedures have been examined by Cameco and an independent consultant and found to be detailed and thorough.

11.8 Adequacy of sample preparation, assaying, QA/QC and security

With respect to historical Kazakhstan exploration on Blocks 1, 2 MA and 3 MA, Cameco has been unable to locate the documentation on sample security at this time. However, based upon the rigorous QA/QC used in other areas of sampling, and on strict regulations imposed by the Kazakhstan government, Cameco believes that the security measures taken to store and ship samples were of the highest quality.

The QP responsible for this section has witnessed core handling, logging and sampling at Inkai, considers that the methodologies are satisfactory and the results representative and reliable. The QP is satisfied with all aspects of probing, sample preparation, assaying, QA/QC and security for samples resulting from drilling by JV Inkai and believes that the security measures taken to handle, store and ship samples are acceptable.

12 Data verification

The data relevant to Block 1 of the Inkai deposit, as well as some of the data relevant to Block 2, have been used to produce the "Report of the Expedition No. 7 on the First Stage of the Detailed Exploration-Delineation of the Inkai Uranium Deposit for the Period 1979–1991", issued by Volkovgeology in 1991.

That report consists of three volumes in Russian:

- Volume I: Geology of the Orebody, comprising 11 books and two binders of plan views and sections
- Volume II: Estimate of the Reserves, comprising 11 books and 11 binders of plan views and sections
- Volume III: Results of a Leach Test on Property 1, comprising three books and one binder of drawings.

In July and August of 2002, Cameco obtained access to the detailed drillhole data which consisted of:

- list of radioactivities for all anomalous zones (with their conversion into radium concentration for 159 drillholes)
- geophysical graphs (radioactivity, resistivity, self-potential)
- assay results (radium and uranium) from individual drillhole log and from binders 186 and 187
- list of filtration coefficients in the anomalous zones

Drawings from the report were also sent to Cameco after JV Inkai obtained the necessary export authorizations.

The following information was digitized from reports, sections and maps, and verified by Cameco with available Volkovgeology reports:

- lists of mineralized intervals used in the 1991 estimate by Volkovgeology
- tables of calculations and lists of filtration coefficients that could be found in books 1 to 10 of Volume II of the report (Volkovgeology, 1991)
- radioactive listings (and calculated radium concentrations) for 159 drillholes only
- drillhole collar co-ordinates and deviations
- lithology, oxidation level and filtration coefficients

The available information as of March 2003 was more than sufficient to allow for a comprehensive data verification, and for validating the historical Kazakhstan mineral resource and reserve estimate.

Part of the assay results has also been processed by Cameco to verify the uranium grade calculations by Volkovgeology. All of the 1,294 drillholes shown on the Volkovgeology cross-sections were studied and coded.

All of the drillhole core that could be recovered (and according to the drill logs, this recovery was good) was sampled and assayed for uranium and radium content. The location of each sample and the assay results were recorded in the drillhole log, referred to as a passport.

Subsequently, in 2007, Volkovgeology issued two reports for Block 2:

- "Technical and Economic Substantiation of Permanent Conditions for Block 2 of the Inkai Uranium Deposit", consisting of five books and five binders of plan views and cross-sections
- "Report on the Results of Exploration and Delineation at Block 2 of the Inkai Uranium Deposit over the Period from 1991 to 2006", consisting of the following two volumes:
    - "Volume I: Geology of the Orebody", comprising five books and five binders
    - "Volume II: Estimate of the Reserves", comprising one book and five binders.

Based on the observations from the amount of Block 1 data verification, resource validation and mining experience, Cameco's data verification for Block 2 was less extensive than the one it did on Block 1. The verification done covered drillhole location and uranium grade calculations for mineralized intervals.

Block 3 datasets were reviewed and verified by Cameco in 2016. The following information was procured in digital format:

- Block 3 drillhole database with;
  - drillhole collar co-ordinates and deviations
  - downhole geophysics (drillhole log or passport)
  - lithology, oxidation level and filtration coefficients
  - radioactive listings (and calculated uranium concentrations)
- Scans of sections and maps

The verification of Block 3 datasets covered drillhole location and data consistency with the database, maps, cross-sections and calculation tables. Geologic interpretation was reviewed in drillholes, sections and maps, and uranium grade calculations for mineralized intervals were checked, as this information serves as the basis for the deposit geologic and resource models.

Few data inconsistencies were noted and reported to JV Inkai. The Block 3 datasets were previously verified by Volkovgeology, JV Inkai and the SRC. Cameco has not reviewed their verification results.

12.1 Radioactivity, radium and uranium grades

Each historical drillhole has been entirely gamma probed, and the graphs (originals and copy on passport) were found in the individual drillhole files. In the anomalous zones and their vicinity, the graphs were digitized and computerized. The result was a list of radioactivity measures in micro-roentgen per hour at 10-cm spacing. All drillholes drilled by JV Inkai were probed by its geophysical crews. The gamma data was recorded in digital form by the logging equipment, with radioactivity measurement in micro-roentgen per hour every 10 cm, and stored in the AtomGeo database.

As a correlation has been established between radioactivity and radium content, it is possible to convert this radioactivity into radium grade. The process used by Volkovgeology is performed by means of AtomGeo. This program takes into account the characteristics of the drillhole (diameter, fluid density and casing), the characteristics of the surrounding ground (density) and the characteristics of each individual probe.

The relationship between radioactive readings and calculated radium grades obtained from the use of the method was studied in detail by Cameco. There is a very good relationship between radioactivity and radium grade in most locations. Arithmetic and logarithmic plots between the two variables give a gradient of 1.086, suggesting the possibility of overestimating radium content in the high radioactivity zones.

The conversion of radium grade into uranium grade is dependent on the radium-uranium equilibrium. A disequilibrium factor related to the interpreted location of the mineralized intervals in the roll-front is applied.

Correlation on grade-thickness from radioactivity and from uranium grade was reviewed and found to be excellent. The data validation work done by Cameco showed that the grade and grade-thickness used by Volkovgeology are considered quite reliable.

12.2 Opinion on adequacy of data

The QPs for this section are satisfied with the quality of data and consider it valid for use in the estimation of mineral resources and mineral reserves for the MA Area. Comparison of the actual mine production with the expected production from the LOM Plan supports this opinion.

All of the drillhole information in use at Inkai is regularly provided to Cameco. The current database has been thoroughly validated a number of times by geologists with JV Inkai, Volkovgeology, the SRC, Two Key LLP and Cameco (including the QPs responsible for this section) and is considered relevant and reliable. Data adequacy is further supported by achieved production objectives.

13 Mineral processing and metallurgical testing

The ISR mining method applied at Inkai uses sulphuric acid as the lixiviant. The resulting uranium rich pregnant solution is processed at surface plants which produce uranium peroxide yellowcake. At Inkai, the pregnant solution from the Block 1 wellfield reports to the MPP, the pregnant solution from the Block 2 MA wellfield reports to Sat1 and the pregnant solution from Block 3 MA wellfield reports to Sat2.

Field test work at the Inkai site started in the late 1970s. By the end of the 1990s, all of the main process parameters for the Inkai deposit had been determined. Block 1 has been in commercial production since 2009. Block 2 MA started commercial production in 2010 and commercial production at Block 3 MA was declared in 2018. Since Block 1/MPP and Block 2 MA/Sat1 have been in commercial production for a significant period, the QP for this section has determined that the metallurgical test results for these two operating process circuits are no longer of significant or relevant. A discussion of metallurgical test results for Block 3 has been provided since it has only recently started commercial production.

Production details for the MA Area are found in *Section 16 Mining methods*. A description of the process recovery methods in the MPP, Sat1, and Sat2 are provided in *Section 17 Recovery methods*. Uranium recovery in the Block 3 surface operations and the metallurgical test results relating to Block 3 are discussed in this section.

13.1 Main processing plant and satellite 1 processing plant

The overall surface process recovery for MPP and Sat1 operations was 98% in 2017. It is expected to remain at this level for the current LOM Plan. Although this recovery level is relatively high, future recovery levels and equipment capacity could be affected by the accumulation of specific species such as nitrate, chloride, ferrous and ferric ions accumulating in production ponds. To the extent known, these species do not currently affect the overall uranium recovery and capacity of the surface equipment. In the future, the accumulation of these species may occur as a result of longer duration of operation and higher production levels. It is recommended that the concentration of species which have the potential to impact equipment performance be monitored.

13.2 Block 3 and satellite 2 processing plant test program

The main objective of the Sat2 test program was to determine whether the operational experience gained in MPP and Sat1 is directly applicable to Sat2 or if there are differences which require changes in the approach to its development. Based on the results of exploration at Block 3, the Volkovgeology 2015 report indicates that geology of the middle Inkuduk region of the Block 3 deposit is almost identical to the adjacent Block 2 geology including geological and hydrogeological characteristics, orebody morphology, and mineralogical and material composition of uranium mineralization and enclosing rocks. Most of the uranium identified in Block 3 exists in the middle Inkuduk region.

Standardized column tests were conducted with three composite samples from Block 3 as described in the 2011 Volkovgeology report, “Laboratory Studies of Technological Parameters of the Ore Deposit Inkai”. The composite samples selected for preliminary test work are not necessarily representative of the entire deposit at Block 3 MA. Analysis of the composite samples was conducted according to Kazakhstan regulations.

Table 13-1 below provides the content of key species in the composite samples as determined in the study, (Volkovgeology, 2011).

Table 13-1: Key species in the Block 3 Composite Samples

Species	Range (wt%)	Species	Range (wt%)
U	0.05 to 0.08	S	< 0.10 to 0.10
Ra	0.04 to 0.07	CO_2	<0.10 to 0.67
Fe	0.74 to 1.50	Se	0.0004 to 0.0008

Two column leach tests were performed with each of the composite samples. Three pore volumes of water were applied in the water-wash stage. In the acidification stage, between one to four pore volumes of lixiviant were used. In this stage, the sulphuric acid concentration was maintained at a specific level for each test. The acid concentrations were varied between 5 to 20 g/L. Uranium recoveries approaching 85% were achieved with all samples and in some cases, recoveries greater than 90% were attained. The average uranium tenor of the resulting pregnant solution for a given experiment varied between 100 to 600 mg/L and acid consumption varied between 15 to 105 kg acid per kg uranium.

As discussed in *Section 7.3.4 Mineralogy* all potential contaminants in the deposit such as molybdenum, selenium, and vanadium occur at background levels consistent with the average values for the Earth's crustal rocks. The effect of calcium, magnesium and aluminum precipitates on permeability was also studied (2011). It was determined that any reduction in permeability caused by the associated salts could be addressed by increasing the lixiviant acid strength.

Based on the success of the column leach tests, a wellfield test program at Block 3 MA was initiated in 2015 and completed in 2017. Sat2 is an IX plant at Block 3 MA built to process Block 3 MA pregnant solution. Sat2 has IX equipment similar to Sat1 and can perform IX loading and elution. The details of the process plants are presented in *Section* 17 *Recovery methods*.

14 Mineral resource estimates

The estimated mineral resources at Inkai are located in the MA Area. The resource models were created following the SRC guidelines. They were prepared by Volkovgeology and Two Key LLP using the GT estimation method on two-dimensional blocks in plan view. They were approved by the SRC in 1993 for Block 1, in 2007 for Block 2, and in 2017 for Block 3. Inkai's mineral resource estimates have been reviewed and accepted by Cameco. Cameco performed a re-interpretation and re-estimation of Block 1 in 2003, and confirmed the estimated pounds of uranium to within 2.5% of the Kazakhstan estimate. Independent verifications of the estimates were performed in 2005 on Block 1, in 2007 on Block 2 and in 2016 on Block 3, and the results were consistent with the Kazakhstan resource estimates.

A revision of the alignment of the historical Kazakhstan mineral resources classification system with the CIM Definition Standards was done by Cameco in 2016.

The classification of mineral resources and their subcategories conforms to the CIM Definition Standards adopted by the CIM on May 10, 2014, which are incorporated by reference in NI 43-101. Cameco reports mineral reserves and mineral resources separately. The amount of reported mineral resources does not include those amounts identified as mineral reserves. Mineral resources that are not mineral reserves have no demonstrated economic viability and do not meet the requirements for all relevant modifying factors. Stated mineral resources are derived from estimated quantities of mineralized material recoverable by ISR methods.

14.1 Key assumptions, parameters and methods

14.1.1 Guidelines

The methodology of delineation programs and all related procedures for geological, geophysical, analytical work and resource classification follow the recommendation of the SRC guidelines for exploration and delineation of uranium deposits (GKZ, 1986). The guideline was first developed by the State Reserve Commission of the USSR. It was followed by the guideline issued in 2008 by the SRC, specifically developed for the roll-front (sandstone) uranium deposits in Kazakhstan (SRC, 2008). `

The SRC guidelines outline the main requirements and standards for exploration/delineation and related work, including:

- deposits classification into geological types and complexity categories
- stages of exploration and delineation work
- recommendations for drilling pattern geometry and densities, depending on the stage, complexity and the category of reserves to be defined
- regular drilling pattern necessitated by the polygonal method of reserve estimation
- geological core logging
- geophysical downhole logging
- content and standards of analytical work
- reserve estimation procedures and requirements for data used

The requirements for geophysical logging, data processing, analytical work, and topographic work must follow corresponding subordinate guidelines specifying the standards for equipment performance, QA/QC protocols and other similar items.

The SRC guidelines represent a significantly more detailed and prescriptive set of requirements in comparison to NI 43-101, the CIM Definition Standards and the CIM "Estimation of Mineral Resources and Mineral reserves – Best Practice Guidelines".

The Kazakhstan Association for Public Reporting of Exploration Results, Mineral Resource and Mineral Reserves (KAZRC) developed the KAZRC Code in June 2016 following the Committee for Mineral Reserves International Reporting Standards (CRIRSCO) template. KAZRC Code contains a checklist outlining the recommended additional criteria for estimation and reporting of uranium for in-situ leaching. The checklist is consistent with the requirements of the SRC guidelines, although represents a much higher level summary.

14.1.2 Technical studies

The regulations in Kazakhstan require that definitive mineral resource estimation reports submitted to the SRC be based on approved set of parameters. The selection of the parameters must be substantiated in a study known as TEO of Permanent Conditions (TEO), from the Russian abbreviations for “Technical and Economic Substantiation”. A TEO must be submitted and approved by the SRC. The following two documents provide a useful reference for the nature, the scope and the meaning of TEO studies:

- “The Guidelines On Alignment Of Russian Minerals Reporting Standards And The CRIRSCO Template” (FGU GKZ and CRIRSCO, 2010)
- “The Guidelines On Alignment Of Minerals Reporting Standards Of The Republic Of Kazakhstan And The CRIRSCO Template” (KAZRC, 2016).

A TEO is defined as follows: “The TEO of Permanent Conditions is prepared according to the results of completed exploration work. Its purpose is to establish the scale and commercial value of a deposit, to define the economic value of its development, and to aid decision-making on financial investments in mining development of the deposit. Thus all financial estimates on the accepted option for commercial development of the deposit are carried out within the framework of realistically assumed values of all the modifying factors. The overall reliability of the completed study must be characterized.”

A TEO study is required to include a mining plan and be based on technical and economic parameters relevant to the deposit studied as well as cost estimates for capital expenditures and operating expenditures and commodity price forecast relevant for the time of the study and the mine planning horizon.

The guidelines state that a TEO study corresponds to a Feasibility Study as defined in the International Reporting Template, published by CRIRSCO. A TEO study provides a set of parameters allowing distinguishing parts of mineralization that can be profitably extracted (the so-called “Balance” part) from parts which cannot be profitably extracted (the so-called “Off-Balance” part) at the time of estimation in accordance with technical-economic calculations carried out in a TEO study. Cameco only uses the “Balance” part of mineralization for defining Inkai’s mineral resources and the basis for mineral reserves.

Once approved, a TEO study provides a set of parameters to be used in preparation of a resource estimation report. A resource estimation report contains detailed data and results for the geological, hydrogeological, geotechnical, including laboratory and field ISR test delineation, analytical, geophysical studies, description of the methodology for delineation and resource estimation, as well as resource estimation itself.

TEO studies were completed and approved by SRC for Block 1 in 1991, for Block 2 in 2007 and for Block 3 in 2017. They were based on the results of exploration-delineation drilling programs and accompanying studies of hydrogeological and technological characteristics, including laboratory column leach and field ISR tests. TEO studies were reviewed and used by Cameco to validate the project economics and to contemplate increasing production levels. The resource estimation reports were reviewed by Cameco as described in *Section 12 Data verification*.

14.1.3 Prospects for eventual economic extraction

To define the mineral resources, forecast prices below $33 (US) per pound of U_3O_8 were used in the TEO studies along with production costs below $11.50 (US) per pound of U_3O_8. As mineral reserves are currently based on $54 (US) per pound with production costs of $9.55 (See *Section 21.2 Operating cost estimates*), the prospect for eventual economic extraction of the mineral resources is reasonable, given also the proximity of surface and mining infrastructure on the site. The amenability to ISR mining has been determined by laboratory leach tests, field ISR tests and further supported by the results of commercial operation since 2009.

Even though the mineral resources were defined at uranium prices lower than the one for the mineral reserves, they remain as mineral resources since either they are in the inferred category or they are not part of the current mining plan for the years 2018 to mid-2045.

14.1.4 Key assumptions

- mineral resources have been estimated based on the use of the ISR extraction method and yellowcake production
- forecast prices below $33 (US) per pound U_3O_8 were used to estimate the mineral resources cut-offs, along with production costs below $11.50 (US) per pound U_3O_8 and 85% metallurgical recovery.

14.1.5 Key parameters

- The mineral resources estimates are based on 2,352 surface drillholes
- grades (% U_3O_8) were obtained from gamma radiometric probing of drillholes, checked against assay results and prompt-fission neutron logging results to account for disequilibrium
- average density of 1.70 t/m^3 was used, based on historical and current sample measurements

Additional key parameters, including cut-offs, are listed in *Table 14-1*.

Table 14-1: Cut-offs and Additional Estimation Parameters

Parameter	Value
Minimum grade to define the mineralized intervals	0.012% U_3O_8
Minimum GT cut-off per hole per productive horizon to define the limits of estimation block	
• Block 1	0.071 m% U_3O_8
• Blocks 2 MA & 3 MA	0.047 m% U_3O_8
Minimum GT cut-off for an estimated block	0.130 m% U_3O_8
Maximum thickness of barren intervals to be included	
• per hole	1 m
• per C1 category block	6 m
• per C2 category block	No limit
Minimum percent of above cut-off holes per estimated block	75%
Minimum size of a standalone estimated block	40,000 m^2
Maximum size of estimated block	300,000 m^2
Content of silt-clay of size < 0.05 mm in mineralized intervals	< 30%
Carbonate content per estimation block, CO_2 equivalent	< 2%
Minimum hydraulic conductivity	1.0 m per day

14.1.6 Key methods

- geological interpretation of the orebody outlines was done on section and plan views derived from surface drillhole information
- a resource block must be confined to one aquifer taking into consideration the distribution of local aquitards
- mineral resources were estimated with the GT method, where the estimated variable is the uranium grade multiplied by the thickness of the interval, and using two-dimensional block models

- geological modelling and mining applications used were AtomGeo, MapInfo and Maptek Vulcan

14.2 Resource classification

In Kazakhstan mineral resources and reserves are classified according to the 1981 "System of Classification of Reserves and Resources of Mineral Deposits" (GKZ). The SRC uses the GKZ system.

The categories are denoted in the order of decreasing geological confidence as A, B, C1, C2, and P1. The KAZRC Code provides a useful frame of reference in converting the resource categories of the GKZ system to other national systems, including the CIM system. The limitation of this frame of reference should not be understated, and caution should be exercised in not applying the proposed conversion mapping automatically, without taking into consideration all relevant geological, technical and economic factors.

Historical drilling pattern densities were sufficient to satisfy the SRC requirements in defining resources in the C2, C1 and B categories within Blocks 1, 2 and 3. In 2016, Cameco revised the criteria it used to align the GKZ system with the CIM Definition Standards and KAZRC Code. The mineral resources have been classified on the basis of sampling density, interpretation of geological continuity and grade continuity and content of barren material between mineralized intervals. Previously the Kazakhstan C2 category was aligned with the inferred resource category and the C1 category with the indicated resource category. Now the C2 category can be aligned to the inferred or indicated resource categories and C1 to the indicated or measured resource categories. *Figure 14-1* shows a plan view of the total mineral resources, inclusive of mineral reserves, reconciled to the CIM Definition Standards within the MA Area.

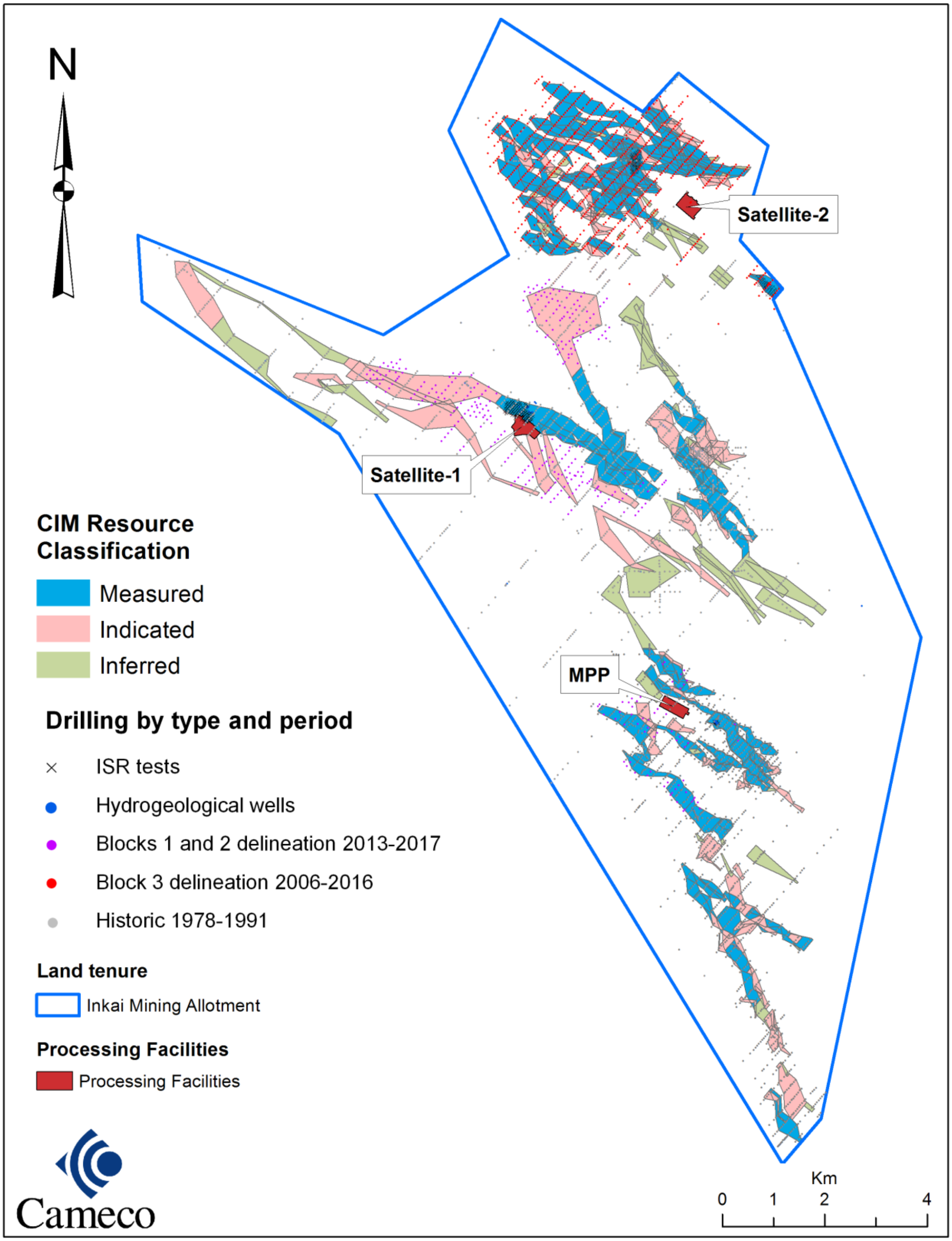
The following additional specific classification criteria for each resource category are applied for alignment with the CIM Definition Standards for the mineral resources categories:

Measured mineral resources: Drilling density equivalent to or denser than a 200 x 50 m grid spacing (or 1 drillhole per hectare) for mineralization zones characterized by a uniform and easily correlatable morphology, from one fence line to another. The barren volume included into the resource block does not exceed 40%. Mineralization must be continuous between fences. If a resource block is defined by three fence lines, more than one mineralized drillhole must occur on each delimiting fence. The hydrogeological properties of the hosting horizon is studied by aquifer pump tests. Sampling for grain size and carbonate content of the mineralization is available from core drilling on at least 400 x 50 m grid density. The amenability of mineralization to ISR mining is demonstrated by laboratory and field ISR leach tests or mining operation results. Mineralization is characterized by sufficient confidence in geological interpretation to support detailed wellfield planning and development with no or very little changes expected from additional drilling.

Indicated mineral resources: Drilling density is sparser than 200 x 50 m, but denser than 400 to 600 x 50 to 100 m for mineralization zones characterized by relatively uniform and correlatable morphology. In some areas, resource blocks may be drilled on 200 by 50 m spacing but not meet the additional criteria for measured resources due to continuity, uniformity and confidence in geological interpretation. The hydrogeological properties of the hosting horizon is studied by aquifer pump tests. Sampling for grain size and carbonate content of the mineralization is available from core drilling on at least 600 x 100 m grid density. The amenability of mineralization to ISR mining is demonstrated by laboratory and field ISR leach tests or mining operation results. Mineralization is characterized by sufficient confidence in geological interpretation to support wellfield planning and development albeit with some changes expected from additional drilling.

Inferred mineral resources: Drilling grid defining mineralization is sparser than 400 to 600 x 50 to 100 m, but denser than 800 x 100 m. Resource blocks defined in areas drilled with denser than 400 to 600 x 50 to 100 m but not meeting the additional criteria for higher categories for continuity, uniformity and confidence in geological interpretation. The hydrogeological properties of the hosting horizon is studied by aquifer pump tests. Sampling for grain size and carbonate content of the mineralization is available from core drilling on at least 800 x 200 m grid density. The amenability of mineralization to ISR mining must be demonstrated by at least laboratory leach tests. Mineralization is characterized by insufficient confidence in geological interpretation to support wellfield planning and development due to significant changes expected from additional drilling.

Figure 14-1: Total Mineral Resources by CIM Categories



14.3 Mineral resource estimate

A summary of the Inkai mineral resources estimate, with an effective date of January 1, 2018, is shown in *Table 14-2*.

Table 14-2: Summary of Inkai Mineral Resources – as of January 1, 2018

Category	Total tonnes (x 1,000)	Grade % U_3O_8	Total M Lbs U_3O_8	Cameco's share M Lbs U_3O_8
Measured	36,680.9	0.026	21.3	8.5
Indicated	21,132.2	0.023	10.7	4.3
Total Measured & Indicated	57,813.2	0.025	32.0	12.8
Inferred	116,394.6	0.029	75.0	30.0

Notes: (1) Cameco reports mineral reserves and mineral resources separately. Reported mineral resources do not include amounts identified as mineral reserves. Totals may not add up due to rounding.
(2) Cameco's share is 40% of total mineral resources.
(3) The geological model used for Inkai involves geological interpretations on section and plan derived from surface drillhole information.
(4) Mineral resources have been estimated at minimum grade-thickness cut-offs per hole of 0.047 m%U_3O_8 for Block 1 and 0.071 m%U_3O_8 for Blocks 2 MA and 3 MA, with the grade-thickness method using 2-dimensional block models.
(5) Mineral resources have been estimated based on the use of the ISR extraction method.
(6) Inferred mineral resources are estimated on the basis of limited geological evidence and sampling, sufficient to imply but not verify geological grade and continuity. They have a lower level of confidence than that applied to an indicated mineral resource and cannot be directly converted to a mineral reserve.
(7) There are no known environmental, permitting, legal, title, taxation, socio-economic, political, marketing or other relevant factors that could materially affect the above estimate of mineral resources.
(8) Mineral resources that are not mineral reserves have no demonstrated economic viability and do not meet all relevant modifying factors.

14.4 Changes to mineral resources

A summary of the changes to mineral resources between December 31, 2016 and January 1, 2018 is shown in *Table 14-3*. The differences in Cameco's share of the pounds show decreases of 23.3 M Lbs in measured resources, of 45.2 M Lbs in indicated resources and of 56.2 M Lbs in inferred resources. The changes are mainly due to:

- inclusion of a portion of Block 3 in the MA Area and exclusion of a portion of Block 2 from the MA Area
- conversion of mineral resources to mineral reserves given the higher annual production level and the extended contract term
- decrease in Cameco's ownership interest to 40%

Table 14-3: Changes in Mineral Resources

	December 31, 2016			January 1, 2018			Changes	
Category	Total tonnes (x 1,000)	Grade % U_3O_8	Total M Lbs U_3O_8	Total tonnes (x 1,000)	Grade % U_3O_8	Total M Lbs U_3O_8	Total M Lbs U_3O_8	Cameco's share M Lbs U_3O_8
Measured	**34,855**	**0.072**	**55.3**	**36,681**	**0.026**	**21.3**	**+ 34.0**	**- 23.3**
Indicated	**77,915**	**0.050**	**86.0**	**21,132**	**0.023**	**10.7**	**- 75.3**	**- 45.2**
Inferred	**151,583**	**0.045**	**149.9**	**116,395**	**0.029**	**75.0**	**- 74.9**	**- 56.2**

Notes: (1) Cameco reports mineral reserves and mineral resources separately. Reported mineral resources do not include amounts identified as mineral reserves. Totals may not add up due to rounding.

(2) Cameco's share of total mineral resources was 57.5% for 2016 and is 40% as of January 1, 2018.

(3) Inferred mineral resources are estimated on the basis of limited geological evidence and sampling, sufficient to imply but not verify geological and grade continuity. They have a lower level of confidence than that applied to an indicated mineral resource and cannot be directly converted to a mineral reserve.

14.5 Factors that could materially affect the mineral resource estimate

The QP responsible for Inkai mineral resource estimate is satisfied with the high quality of data and considers the data valid for use in the estimation of mineral resources. This is supported by the results of the leach tests done on Blocks 1, 2 MA and 3 MA, and commercial production results from Blocks 1 and 2 MA since 2009.

As is the case for most mining projects, the extent to which the estimate of mineral resources may be affected by environmental, permitting, legal, title, taxation, socio-economic, political, marketing or other relevant factors could vary from material gains to material losses. The QP responsible for the mineral resource estimate is not aware of any relevant factors that could materially affect Inkai's mineral resource estimate.

15 Mineral reserve estimates

15.1 Definitions

Cameco reports mineral reserves and mineral resources separately. The reference point at which Inkai's mineral reserves are defined is the point where the mineralization occurs under the existing or planned wellfield pattern.

Stated mineral reserves are derived from estimated quantities of mineral resources economically recoverable by ISR and satisfying all modifying factors. Only indicated and measured mineral resources are considered for conversion to mineral reserves. Inkai's mineral reserves include allowances for the barren material that will be contacted by the leaching solutions; an approach similar to dilution in hard rock mining. The wellfield uranium recovery is part of the reported metallurgical recovery. Mineral reserves have demonstrated economic viability. The classification of mineral reserves and their subcategories conforms to the CIM Definition Standards. Inkai's mineral reserves estimate has been updated with the LOM Plan provided during 2017 by JV Inkai and reviewed by Cameco.

Recovery

In the ISR process some quantity of mineralization cannot be extracted from the ground due to a number of geological, mining and metallurgical factors. These include, for example, the formation of stagnant zones, reduced permeability due to plugging up pore spaces, re-precipitation of some uranium in the leach zones, screen location in relation to mineralization and hydrogeological settings or unfavorable host rock composition, and residual uranium remaining in the lixiviant returned to wellfields after extraction at the processing facilities. In practice it is difficult or impossible to accurately establish the share of each of the above contributors to the total loss pertinent to the in-situ leaching process. The total loss can nevertheless be established based on the results of laboratory leach tests, field ISR tests and commercial ISR operation which all provide the basis for expected wellfield recovery. The recovery expected from the in-situ leaching process is therefore included in the metallurgical recovery.

Dilution

Dilution occurs in ISR, as the lixiviant cannot be precisely confined to the limits of mineralized volume of rock. The rock volume contacted by the lixiviant is rather controlled by the hydrostratigraphy of the productive horizons, the placement of screens and the balance between injector and producer wells. Dilution results in additional volume of rock mass that has to be acidified and leached relative to the mineralized rock volume. Dilution is accounted for by using permeable thickness and corresponding screen lengths at the mine planning step to provide the effective volume of rock that is subject to acidification and leaching. It is this effective volume that is used for the wellfield uranium recovery curves and computation of production forecasts.

15.2 Key assumptions, parameters and method

15.2.1 Modifying factors

In order to convert mineral resource to mineral reserve the requirements of all modifying factors have to be satisfied. The key assumptions, parameters and methods used for mineral reserve definition are based on the application of relevant modifying factors.

Geological, hydrogeological, mining, metallurgical, technical and economic factors. As discussed in *Section 14 Mineral resource estimates*, the assumptions, parameters and methods used for the definition of mineral resource account for geological, hydrogeological, mining, metallurgical, technical and economic factors pertinent to the project. This is supported by the results of commercial production since 2009. The same parameters and assumptions were used in the mining project for the life of the mine required in Kazakhstan as described in *Section 4.5.5 Work programs and project documentation*. The technical and economic studies carried out and presented in the TEO studies were based on reasonable assumptions for the production costs and uranium prices which remain relevant for this technical report.

The LOM Plan details the Ramp-up, with production increasing to 10.4 M Lbs U_3O_8 per year; variations of plus or minus 20% from the levels in the LOM Plan are allowed. The LOM Plan is partially based on inferred mineral resources. Therefore the annual production levels will be dependent on results of further delineation drilling and market conditions. The production profile and economic analysis supporting the reported mineral reserves do not include the inferred resources and their associated extraction costs and revenues.

Having removed the inferred resources originally included in the LOM Plan, the QPs responsible for the mineral reserve estimates confirm that the geological, hydrogeological, mining, metallurgical, technical and economic factors are relevant and satisfy the requirements for the corresponding modifying factors that are applied in converting mineral resource to mineral reserve.

Processing factor. The existing processing facilities and the planned expansion were designed to be capable of processing the flow of pregnant lixiviants from the wellfields in terms of its volume, head grade and chemistry. The capacities of the processing facilities, as described in the *Section 13 Mineral processing and metallurgical testing* and *Section 17 Recovery methods*, meet the requirements of processing the flow of uranium-bearing lixiviants with volumes and head grades as described in the *Section 16.1.4 Wellfield production*.

Infrastructure factor. The infrastructure necessary to support the wellfield development, transportation of materials, electric power requirements and personnel accommodations is fully accounted for in the LOM Plan and economic model. The infrastructure, as described in *Section 18 Project infrastructure*, covers all that is required to support the planned production.

Legal and governmental factor. Inkai has sufficient security of tenure for the mineral rights provided by the Resource Use Contract and access to the surface area as described in the following *Sections: 4.2 Exploration and mining licences , 4.3 Surface tenure, 4.4 Resource Use Contract* and *4.5 Subsoil Law.* An approved mining project and work program are required under the regulations in Kazakhstan, as described in *Section 4.5.5 Work programs and project documentation.* The production plan presented in *Table 16-1: Reserves-based Production Schedule* and *Figure 16-4: Annual Production Plans – 100% basis* is based on an approved mining project and work program.

15.2.2 Key assumptions

- average metallurgical recovery of 85%, which is based on the production results so far, as presented in the *Section 16.1.4 Wellfield production*
- average uranium price of $54 (US) per pound U_3O_8, derived from the production schedule and annual forecast prices, with exchange rates of $1.00 US=$1.25 Cdn and 265 Kazakhstan Tenge to $1.00 Cdn.

15.2.3 Key parameters

- the production rate, excluding inferred mineral resources, is planned as follows:

Year(s)	Anticipated Production of U_3O_8
2018	6.9 M Lbs
2019	8.4 M Lbs
2020-2044	5.8 – 11.0 M Lbs
2045	3.5 M Lbs [Until mid-July]

- average estimated operating costs of $9.55 per pound
- mineral reserves have been estimated at a minimum grade-thickness of 0.130 m% U_3O_8
- mineral reserves represent the in-situ ore available for production within the term of the Resource Use Contract
- A cut-off for the mineral reserves of 0.13 m%U_3O_8 is applied on the estimated GT value for each block of the mineral resources model. The cut-off is determined with consideration to:
    - uranium price
    - wellfield development and operating costs defined by depth, acid consumption, wellfield pattern layouts, and metallurgical recovery

- pregnant lixiviant processing costs

- reclamation costs as well as other relevant factors

15.2.4 Key methods

- only indicated and measured mineral resources are considered for conversion to mineral reserves
- preparation of a feasible mining plan with required infrastructure
- consideration of the rate of wellfield uranium recovery, lixiviant uranium head grades, wellfield flow rates and production requirements to define the production sequence
- geological and mining applications used were AtomGeo, MapInfo and Maptek Vulcan

15.3 Reserve classification

Mineral reserves have been classified in accordance with the CIM Definition Standards, where in most circumstances the economically mineable part of indicated mineral resources can become probable mineral reserves and the economically mineable part of measured mineral resources can become proven mineral reserves, as long as all modifying factors are satisfied and that, at the time of reporting, extraction could reasonably be justified.

In areas of probable mineral reserves where the confidence on some characteristics of the mineralization, such as grade continuity and hydrological conditions, can be increased, additional delineation drilling is recommended.

15.4 Mineral reserve estimate

A summary of Inkai mineral reserves estimate, with an effective date of January 1, 2018, is shown in *Table 15-1*.

Table 15-1: Summary of Mineral Reserves – as of January 1, 2018

Category	Total tonnes (x 1,000)	Grade % U_3O_8	Total M Lbs U_3O_8	Cameco's share M Lbs U_3O_8
Proven	214,104.1	0.035	167.5	67.0
Probable	166,913.0	0.028	102.1	40.9
Total Reserves	381,017.2	0.032	269.6	107.9

Notes: (1) Cameco reports mineral reserves and mineral resources separately. Totals may not add up due to rounding.
(2) Total M Lbs U_3O_8 are those contained in mineral reserves and are not adjusted for the estimated metallurgical recovery of 85%.
(3) Cameco's share is 40% of total mineral reserves.
(4) Mineral reserves have been estimated at a grade-thickness cut-off of 0.13 m%U_3O_8, with the grade-thickness method using two-dimensional block models.
(5) The geological model used for Inkai involves geological interpretations on section and plan derived from surface drillhole information.
(6) Mineral resources that are not mineral reserves have no demonstrated economic viability and do not meet all relevant modifying factors.
(7) Mineral reserves have been estimated based on the use of the ISR extraction method with allowance for the volume contacted by the solution. Production is planned to increase to 10.4 M Lbs U_3O_8 per year. Annual production levels will be dependent on results of further delineation drilling and market conditions.
(8) An average price of $54 (US) per pound of U_3O_8 was used to estimate the mineral reserves with exchange rates of $1.00 US=$1.25 Cdn and 265 Kazakhstan Tenge to $1.00 Cdn.
(9) There are no known mining, metallurgical, infrastructure, permitting or other relevant factors that could materially affect the above estimate of mineral reserves.

15.5 Changes to mineral reserves

A summary of the changes of mineral reserves between December 31, 2016 and January 1, 2018 is shown in *Table 15-2.* The differences in Cameco's share of the pounds of U_3O_8 show increases of 39.1 M Lbs in proven reserves and of 22.5 M Lbs in probable reserves. The changes are mainly due to:

- inclusion of a portion of Block 3 to the MA Area and exclusion of a portion of Block 2 from the MA Area
- conversion of mineral resources to mineral reserves given the higher annual production level and the extended contract term
- decrease in Cameco's ownership interest to 40%
- reporting tonnage of material that will be leached in-situ versus the historical practice of reporting the tonnage of mineralized material; therefore a higher tonnage and lower grade
- uranium production during 2017

Table 15-2: Changes in Mineral Reserves

	December 31, 2016			January 1, 2018			Changes	
Category	Total tonnes (x 1,000)	Grade % U_3O_8	Total M Lbs U_3O_8	Total tonnes (x 1,000)	Grade % U_3O_8	Total M Lbs U_3O_8	Total M Lbs U_3O_8	Cameco's share M Lbs U_3O_8
Proven	**33,193**	**0.066**	**48.6**	**214,104**	**0.035**	**167.5**	**+ 118.9**	**+ 39.1**
Probable	**30,717**	**0.047**	**32.0**	**166,913**	**0.028**	**102.1**	**+70.1**	**+ 22.5**
Total	**63,910**	**0.057**	**80.6**	**381,017**	**0.032**	**269.6**	**+ 189.0**	**+ 61.5**

Notes: (1) Cameco reports mineral reserves and mineral resources separately. Totals may not add up due to rounding.
(2) Cameco's share of total mineral reserves was 57.5% for 2016 and is 40% as of January 1, 2018.

15.6 Factors that could materially affect the mineral reserve estimate

The extent to which the estimate of mineral reserves may be materially affected by mining, metallurgical, infrastructure, permitting, or other relevant factors could also vary from material gains to material losses. As only variances of plus or minus 20% from the levels in the LOM Plan are allowed, if there are production reductions, the mineral reserve estimate may not be materially affected, as production increases to recover this production is an option for JV Inkai. The QPs responsible for the mineral reserve estimate are not aware of any relevant factors that could materially affect Inkai's mineral reserve estimate.

16 Mining methods

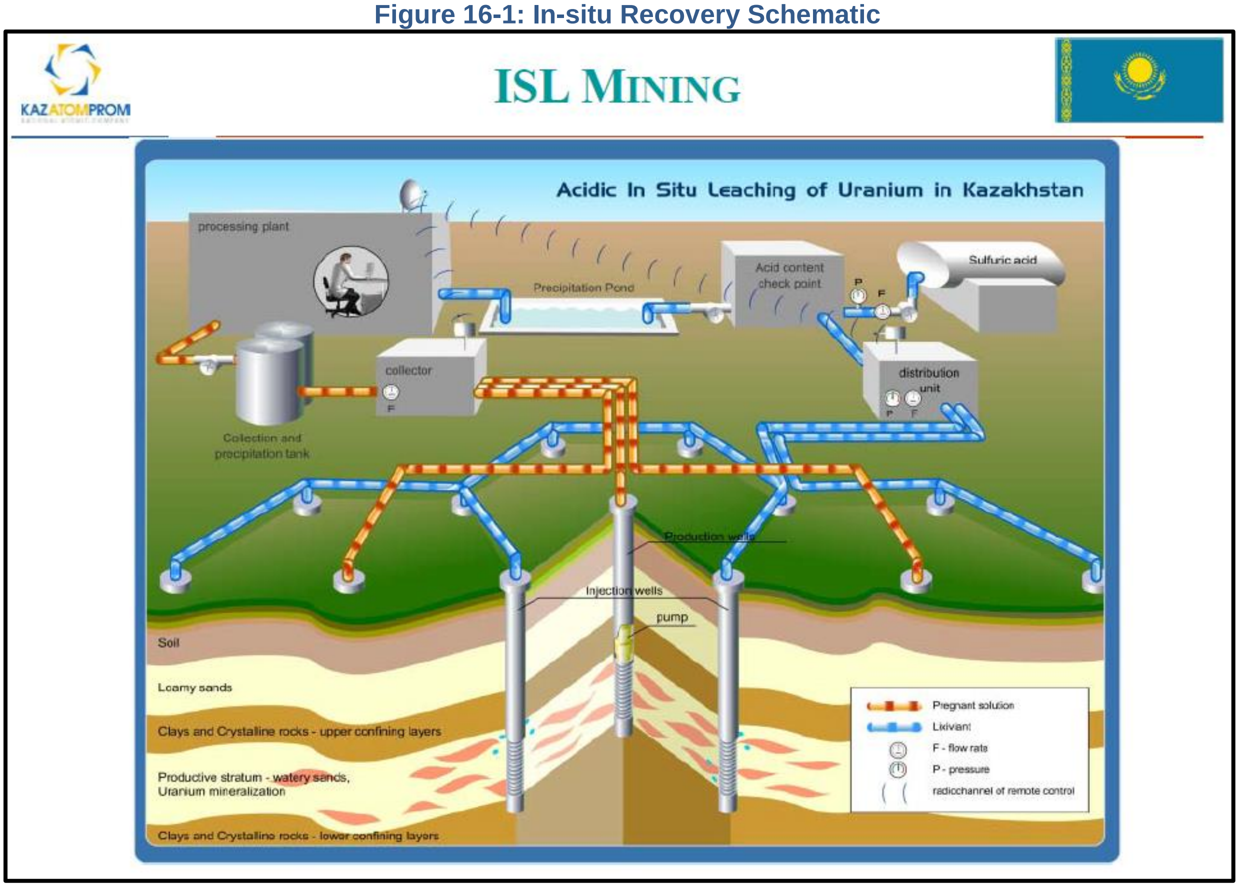
16.1 Mining

ISR mining at Inkai is comprised of the following components to produce a uranium-bearing lixiviant (an aqueous solution which includes sulphuric acid), which goes to settling ponds and then to the respective IX plant before being directed to the MPP for production of uranium as yellowcake (see *Figure 16-1*):

- Determination of the GT cut-off for the initial design and the operating period. The design cut-off sets the lower limit to the pounds per pattern required to warrant installation of a pattern before funds are committed, and the operating cut-off applies to individual producer wells and dictates the lower limit of operation once a well has entered production.
- Preparation of a production sequence which will deliver the uranium-bearing lixiviant to meet production requirements, considering the rate of wellfield uranium recovery, lixiviant uranium head grades, and wellfield flow rates.
- Wellfield development practices that use an optimal pattern design to distribute barren lixiviant to the wellfield injectors, and to collect lixiviant carrying the dissolved uranium back to the MPP, Sat1, or Sat2, as the case may be.

The above factors are used to estimate the number of operating wellfields, wellfield patterns and header houses over the production life. They also determine the unit cost of each of the mining components required to realize the production schedule, including drilling, wellfield installation and wellfield operation.

Figure 16-1: In-situ Recovery Schematic



(Source: Kazatomprom, 2014)

16.1.1 Mining method

ISR mining of uranium is defined by the International Atomic Energy Agency as:

"*The extraction of ore from a host sandstone by chemical solutions and the recovery of uranium at the surface. ISR extraction is conducted by injecting a suitable leach solution into the ore zone below the water table; oxidizing, complexing and mobilizing the uranium; recovering the pregnant solutions through production wells; and finally, pumping the uranium bearing solution to the surface for further processing*."

Two basic types of leaching systems are used in the world today, acid leach and alkaline leach. In an acid leach system, diluted sulphuric acid is normally used as the complexing agent and to generate an oxidant from iron in the deposit. In an alkaline system, bicarbonate, either as a direct addition or as liberated from the reaction of carbon dioxide and carbonates in the formation, is used as the complexing agent. Oxygen is added in some cases when there is low carbonate in the formation.

According to IAEA technical document-1239, "Manual of acid in situ leach uranium mining technology," dated August 2001, acid leach has the following technical advantages over alkaline leach:

- a high degree of uranium recovery from the ore (70 – 90%)
- favourable leach kinetics
- a comparatively short leaching period of two to five years
- limited seepage beyond the wellfield due to the formation of low permeable chemical precipitates that block flow
- addition of oxidants is not necessary (if iron is present)
- possibility of self-restoration (or self-attenuation) of the remaining leach solution due to self-cleaning of the contaminated solutions through the adjacent barren rocks

The manual also lists the disadvantage compared to an alkaline leach:

- acid consumption in carbonate-bearing ores can be high, increasing chemical costs and making the process uneconomical
- the risk of pore plugging (blocking the formation with gas or chemical precipitate)
- increased concentrations of dissolved solids
- use of corrosion resistant equipment, increasing the up-front capital cost

The use of IX for recovery of uranium from leach solutions is based on the existence of uranyl sulphate complexes (*Section 17.1.*1 *Ion exchange resin adsorption (loading)*

16.1.2 Production objectives

The annual production specification is 10.4 M Lbs U_3O_8, derived from a combined flow of 5,680 m^3/h. By calculation, this implies an average head grade of 100 parts per million of uranium delivered to the IX columns. Therefore, the rate of installation of new patterns, coupled with appropriate wellfield management and consideration of depletion of mineral reserves, must be balanced to provide the requisite IX feed.

While considerable variation exists within the flow capacity of any production well, combined statistics indicate that patterns yield between eight and 10.5 m^3/h. Assuming the average, approximately 550 patterns will need to be operating at any one time to provide flow to the IX circuits.

Actual production results from Blocks 1 and 2 MA are shown by the recovery curves for their respective wellfields on *Figure*s *16-2* and *16-3*. The recovery curve graphs show the relationship between the liquid to solid ratio (L/S) and the recovery expressed in percent. L/S is defined as the ratio between the volume of the leaching solution to the rock mass in the leaching zone of the wellfields. The graphs indicate that, in agreement with Kazakhstan mining regulations, an average uranium recovery of 85% is achievable.

16.1.3 Wellfield design and development

With any mining method, there is a fundamental unit of production that is the basis for all design and scheduling. For an open pit operation, this unit would be a blast pattern, while for underground mining, it would be a stope. For ISR mining, the basic unit is a ‘pattern’ with a production well (also called an extractor) and its associated injector wells.

The pattern drives mine operation at a number of levels. At the design level, the pattern governs the economics. A pattern that is economic must cover the cost of well installation, connection of the wells to a piping system to carry the lixiviant to and from the IX plant, the operating cost of the chemicals needed to leach the uranium, the operating cost of the pumps and maintenance on the pumps, the down-stream plant costs (elution, precipitation, filtering and drying), the post-processing costs, and the administrative overhead. Any pattern that cannot demonstrate an economic benefit should not be installed unless there is some compelling reason to do so.

For long-range planning purposes, scheduling assumes that the average flow from past production will apply in the future. While not strictly true, (the flow is a function of screened length and local permeability, among numerous other factors), the approximation is sufficient for predicting the behaviour of large numbers of patterns.

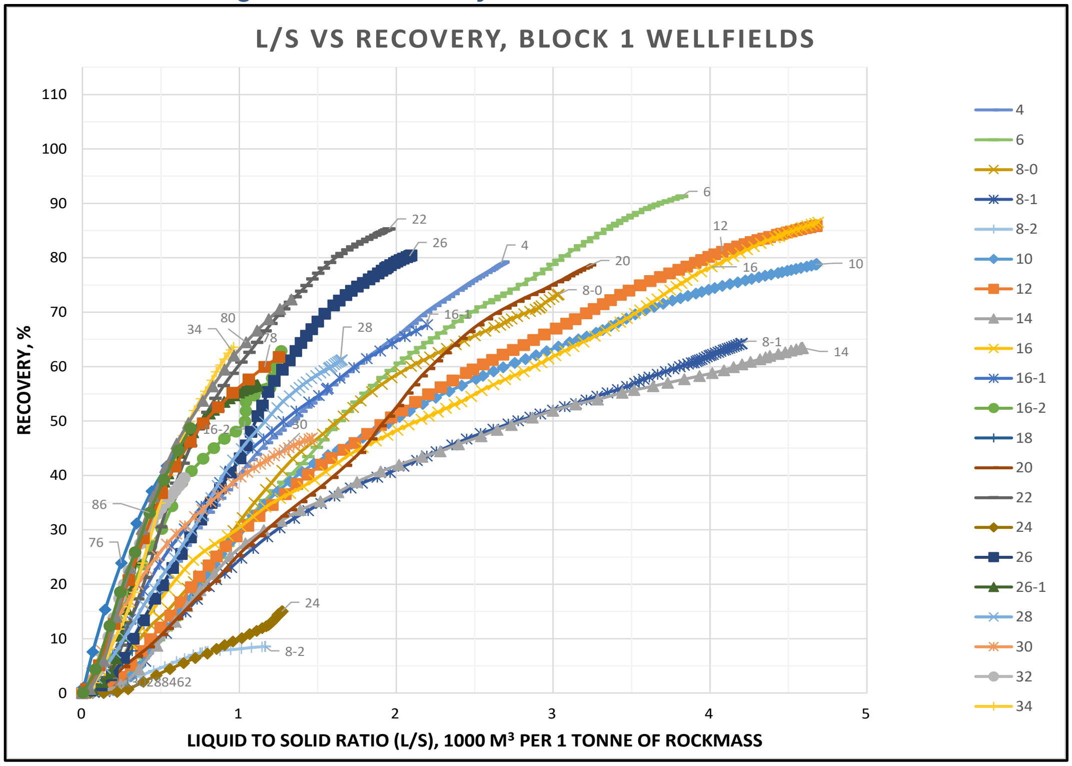
There are a number of approaches to ISR mining and, as with any mining technique, there is a substantial degree of customization applied, depending on the local conditions. Factors affecting the design of the pattern are numerous, including:

- permeability of the host sands
- depth of the host sands
- cost of drilling
- thickness of the mineralized unit
- surface topography
- target wellfield uranium recovery

Where there are no historical operations to use as a baseline, extensive hydrological modeling may be required. This is not the case with Inkai, as there has been significant experience since at least 1988 with the original test mine on Block 1 and commercial production starting in 2009.

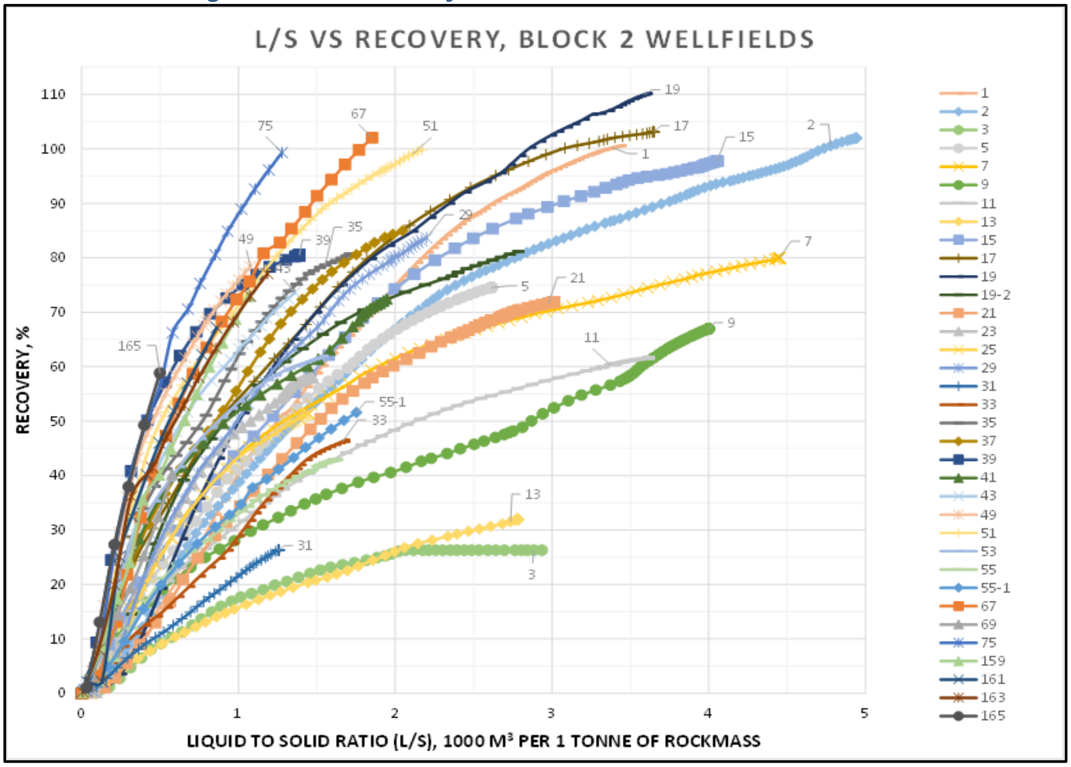
There is ongoing wellfield development to support the current production plan.

Figure 16-2: Recovery Curves for Block 1 wellfields



(Source: Cameco, 2016)

Figure 16-3: Recovery Curves for Block 2 MA wellfields



(Source: Cameco, 2016)

16.1.4 Wellfield production

Currently, all wellfields utilize hexagonal or line-drive patterns. For 2017, the average flowrate for Block 1 was about 950 m^3/h at an average U_3O_8 composite head grade of approximately 84 mg/L. This material is captured on IX resins at the MPP.

At Block 2 MA, during 2017, the average flowrate was about 1,862 m^3/h at an average U_3O_8 composite head grade of 82 mg/L. This material is captured on IX resins at Sat1.

At Block 3 MA, during 2017, the average flowrate was about 237 m^3/h at an average U_3O_8 composite head grade of 49 mg/L. This material is captured on IX resins at Sat2.

Additional wellfields are being developed, in various stages, to provide additional production as required to meet production targets in 2018 and beyond.

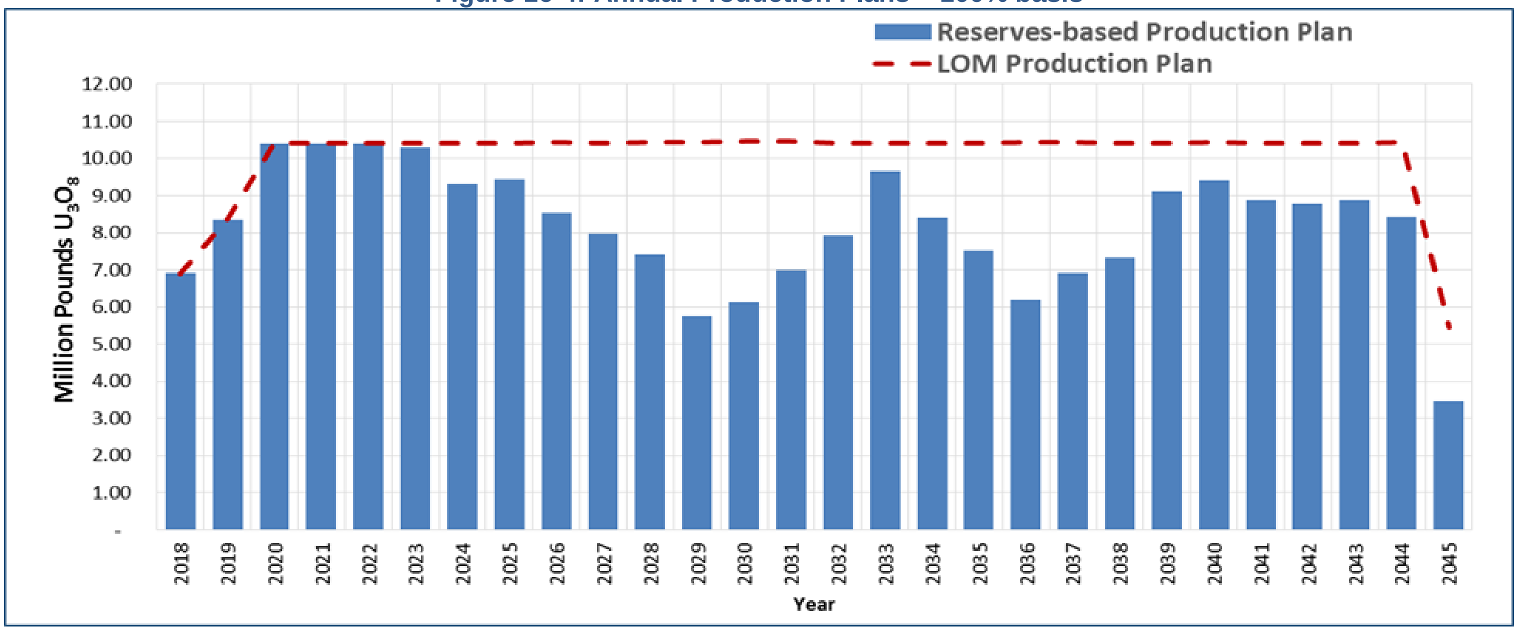
The LOM Plan details the Ramp-up, with production increasing to 10.4 M Lbs U_3O_8 per year; variations of plus or minus 20% from the levels in the LOM Plan are allowed. The LOM Plan is partially based on inferred mineral resources. Therefore annual production levels will be dependent on results of further delineation drilling and market conditions. There is no certainty that the LOM Plan production will be realized. With continued delineation drilling, it is reasonable to expect that the majority of inferred mineral resources could be upgraded to indicated mineral resources.

The reserves-based production profile and economic analysis supporting the reported mineral reserves do not include the inferred resources and their associated extraction costs and revenues. The production plan is based on mineral reserves from which production of an estimated 229.2 M Lbs U_3O_8 is forecast. The projected mine life extends until mid-2045. *Table 16-1* shows the reserves-based production schedule summary for Inkai from 2018 to 2045. *Figure 16-4* presents the LOM Plan and reserves-based production plan for the same period.

Table 16-1: Reserves-based Production Schedule

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
JV Inkai (M Lbs U_3O_8)	6.9	8.4	10.4	10.4	10.4	10.3	9.3	9.4	8.5	8.0	7.4	5.8	6.1	7.0	7.9
Year	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**		**Total**
JV Inkai (M Lbs U_3O_8)	9.7	8.4	7.5	6.2	6.9	7.3	9.1	9.4	8.9	8.8	8.9	8.4	3.5		229.2

Figure 16-4: Annual Production Plans – 100% basis



17 Recovery methods

17.1 Processing facilities

There are three surface processing facilities at Inkai: MPP, Sat1 and Sat2. The processing equipment in the MPP circuit includes IX units (adsorption and elution columns), along with yellowcake precipitation, thickening, drying and packaging process units. The processing equipment at both Sat1 and Sat2 consists of adsorption and elution equipment. This is illustrated in the block flowsheet in *Figure 17-1: Flowsheet Based on Annual Production of 5.2 M Lbs U3O8*. The MPP generates a dried yellowcake product from pregnant solutions. Periodically, when there is a shortage in drying capacity, eluate from the process circuit is shipped to a toll mill for processing.

Loaded IX resin is produced at the MPP from Block 1 pregnant solution. This loaded resin can be eluted and processed into yellowcake at the MPP or transported and eluted at Sat1. The resulting eluate is transported from Sat1 to the MPP and converted into yellowcake.

Loaded IX resin is produced at Sat1 from Block 2 MA pregnant solution. This loaded resin can be eluated at Sat1 and the eluate is then transported to the MPP. Alternatively, the loaded resin can be transported to the MPP for elution. The resulting eluate can be converted to yellowcake at MPP or, if required, the eluate can be transported to a toll mill and converted into yellowcake.

Loaded IX resin is produced at Sat2 from Block 3 MA pregnant solution. This loaded resin is eluted at Sat2 and the eluate is transported to MPP. The eluate is either converted to yellowcake at MPP or, if required, the eluate can be transported to a toll mill and converted into yellowcake.

The following capacity estimates are based on periods when higher head grades have been attained during production in the specific block. The existing MPP, Sat1 and Sat2 circuit capacities were estimated using Inkai daily process summaries. The MPP has an IX capacity of 2.7 M Lbs U_3O_8 per year and a product drying and packaging capacity of 8.1 M Lbs U_3O_8 per year. Sat1 has a nameplate IX capacity of 6.3 M Lbs U_3O_8 per year as eluate. The current IX capacity of Sat2 has been estimated to be 0.9 M Lbs U_3O_8 per year as eluate based on the forecasted Block 3 MA solution head grade.

A more detailed description of the process is provided in the remainder of this section.

17.1.1 Ion exchange resin adsorption (loading)

Wellfield acid solution, containing the leached uranium (pregnant solution), is pumped from the selected wellfield(s) via pipelines to a settling pond and then to the IX circuits for adsorption of the contained uranium. The use of IX for recovery of uranium from leach solutions is based on the existence of uranyl sulphate complexes. The uranyl sulphate anions are selectively adsorbed onto solid synthetic IX resin beads with fixed ionic sites. The resin bed is retained in IX vessels where resin is contacted with pregnant solution.

Once the resin in an IX column is fully loaded with uranium, the column is isolated from the continuous IX circuit and the resin is retained for elution or transferred with push water to an elution vessel. In the case of the MPP, the pregnant solution can be directed to one of the adsorption column trains. Each train is capable of performing resin adsorption and then operated in the desired mode of elution. In the case of Sat1, the pregnant solution reports to either an adsorption column train or a semi-batch adsorption column. In the case of Sat2, pregnant solution reports to a semi-batch adsorption column.

17.1.2 Resin elution (stripping)

In the elution process, uranium that has been adsorbed onto the IX resin during the adsorption cycle (loaded resin) is desorbed from the resin using ammonium nitrate. The eluate produced from this step is stored in pregnant eluate tanks.

At the MPP and Sat1, loaded resin can either be retained in the vessel for elution or hydraulically conveyed to a vessel specifically designed for elution within the circuit. Loaded resin can also be transferred between the two plants for elution based on available elution capacity. At Sat2, loaded resin is hydraulically transferred from the adsorption vessel to an elution vessel for elution.

17.1.3 Denitrification

After the uranium has been stripped from the resin in the elution process, the adsorption sites on the resin are initially left in a nitrate form. The adsorption sites on the resin must be denitrified and converted to a sulphate form for re-use in the IX circuit. Denitrification is accomplished by contacting the resin with a solution of sulphuric acid and process water in a denitrification vessel. Each plant has a denitrification vessel to complete this step.

17.1.4 Precipitation

Eluate from Sat1 and Sat2 is transported to and stored with the MPP eluate before the eluate is directed to the precipitation circuit. Hydrogen peroxide is added to the precipitation tanks to induce precipitation. The pH of this stream is adjusted in the precipitation tank by the addition of anhydrous ammonia.

The precipitation tanks are operated in a cascade configuration to allow the required retention time for the precipitation reaction to proceed to completion. The final yellowcake slurry is discharged from the last tank in the series and pumped into a thickener.

17.1.5 Yellowcake product thickening

The precipitated slurry from the precipitation circuit flows into a thickener. The contained yellowcake slurry is thickened and is pumped to filter presses.

17.1.6 Filter press operation

The yellowcake slurry from the yellowcake thickener underflow reports to the filter presses. The slurry is first washed and then dewatered in the filter presses.

17.1.7 Drying

The dewatered yellowcake from the filter press is then pumped into rotary vacuum dryers where the yellowcake product is produced.

The vacuum dryers are totally enclosed during the drying cycle to assure zero emissions. The off-gases and steam generated during the drying cycle are filtered and condensed to collect entrained particulates and moisture within the process system.

17.1.8 Packaging

Once the dryer contents have cooled, a measured amount of dried yellowcake is transferred through a rotary valve to a drum. The drums are collected into lots before being shipped.

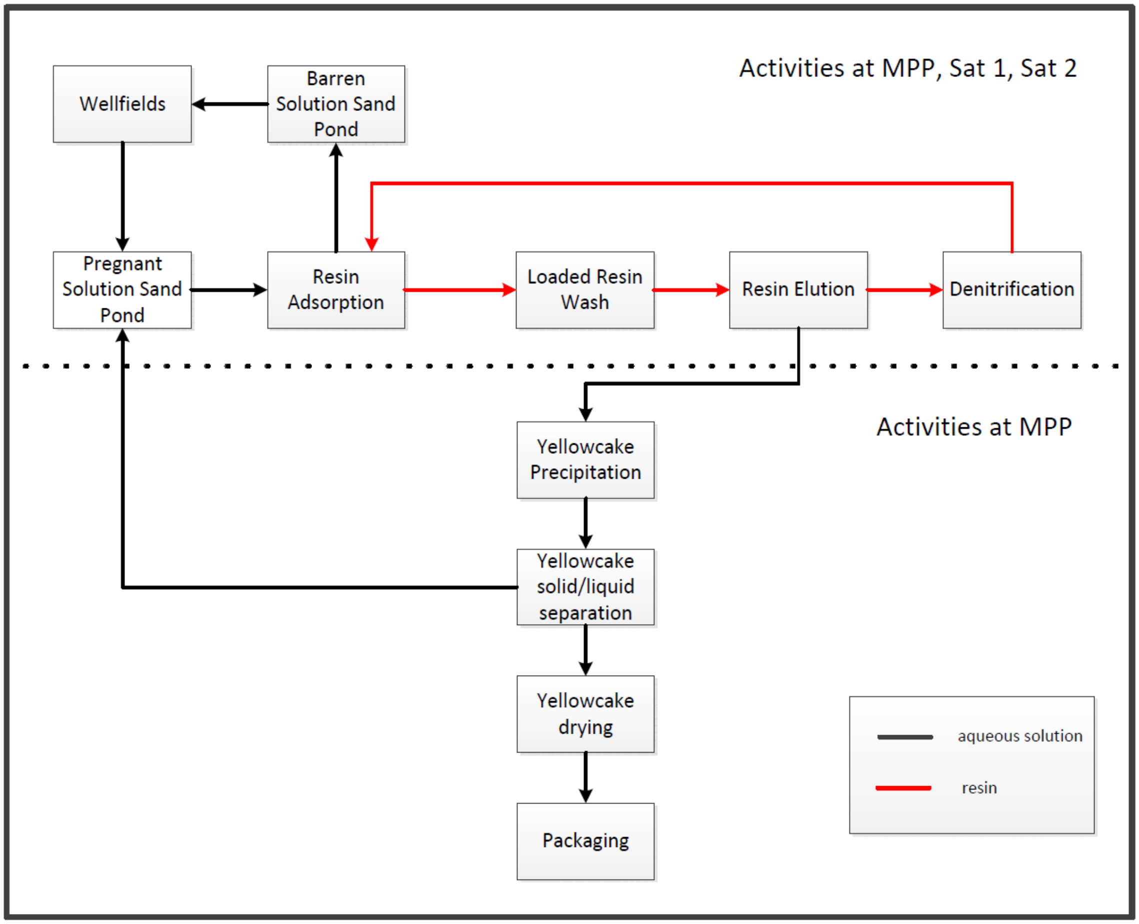
17.1.9 Toll Milling

Consistent with earlier production years, if required, eluate can be shipped to a toll mill and converted into yellowcake.

17.1.10 Overall uranium recovery

The uranium extraction efficiency (recoverability) of ISR operation is determined by uranium loss in underground leaching and in surface production facilities. In 2017, the uranium recovery from wellfield pregnant solutions at the MPP and Sat1 surface production facilities was 98%. An overall uranium recovery, or metallurgical recovery, of 85% is targeted. It is expected that the metallurgical recovery will remain at this level for the current LOM Plan.

Figure 17-1: Flowsheet Based on Annual Production of 5.2 M Lbs U_3O_8



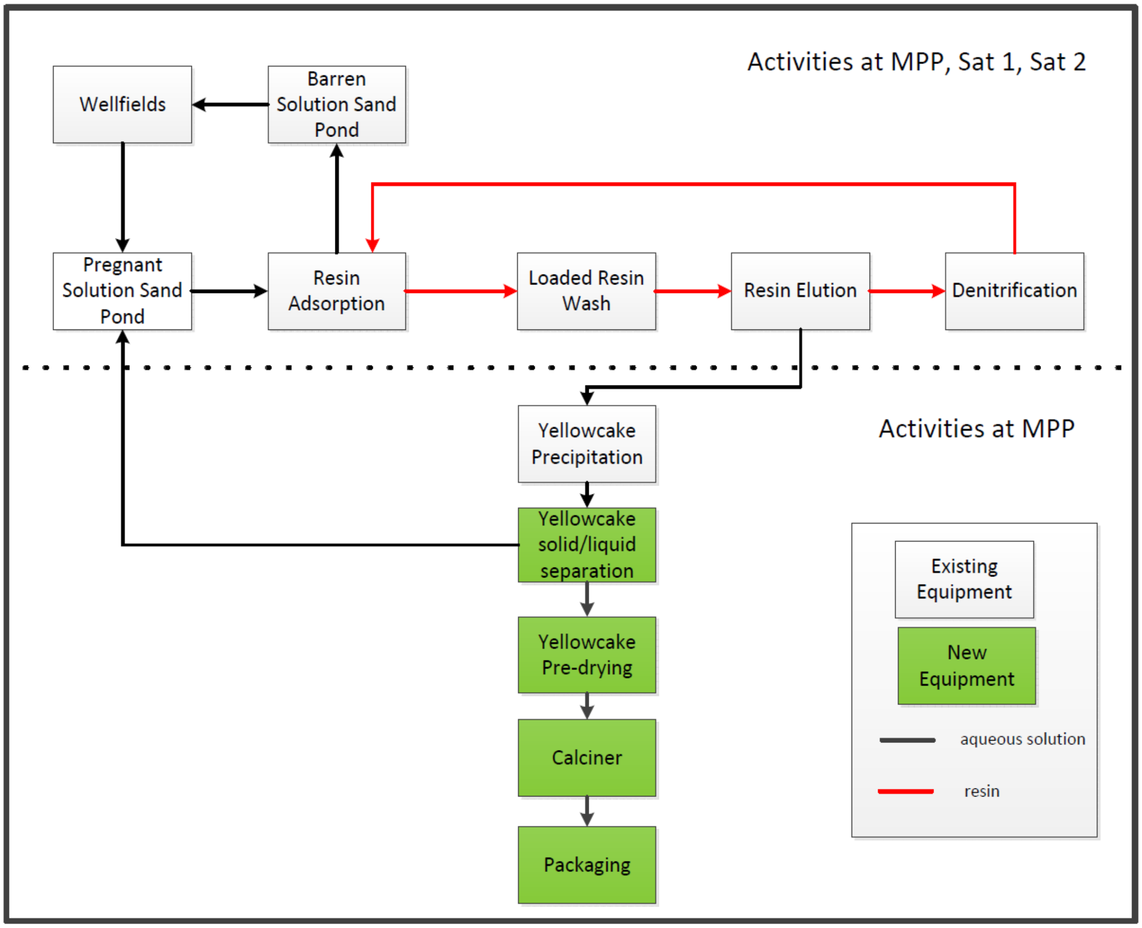
(Source: Cameco, 2017)

17.1.11 Expansion project

Engineering work for a process expansion of the Inkai circuit to 10.4 M Lbs U_3O_8 per year is in progress. The expansion project includes an upgrade to the yellowcake filtration and packaging units, the addition of a pre-dryer and calciner, and some additional equipment to Sat2. The proposed expansion flowsheet is presented in Figure 17-2.

Process inputs for the Inkai circuits include water, sulphuric acid, ammonium nitrate, hydrogen peroxide, ammonia, and electrical power. The current process input capacity is sufficient to support production at 5.2 M Lbs U_3O_8 per year. The requirements for expanding the process input capacity to a production level of 10.4 M Lbs U_3O_8 per year are considered in the expansion project.

Figure 17-2: Proposed Flowsheet Based on Annual Production of 10.4 M Lbs U_3O_8



(Source: Cameco, 2017)

18 Project infrastructure

Inkai is a developed producing property with surface rights, site facilities and infrastructure. Expansion plans are in progress to accommodate future expansion in mining operations and production. A site plan of the existing infrastructure general arrangement is shown in *Figure 18-1.*

JV Inkai facilities in Taikonur

- residence camp for employees, with catering and leisure facilities
- perimeter security fence

As part of the Ramp-up, the following upgrades are planned:

- expansion of the camp in a phased approach with construction of two residential blocks for 165 people each and addition of a dining room for 150 people
- construction of a 24 km asphalt paved road connecting the camp to the three processing facilities

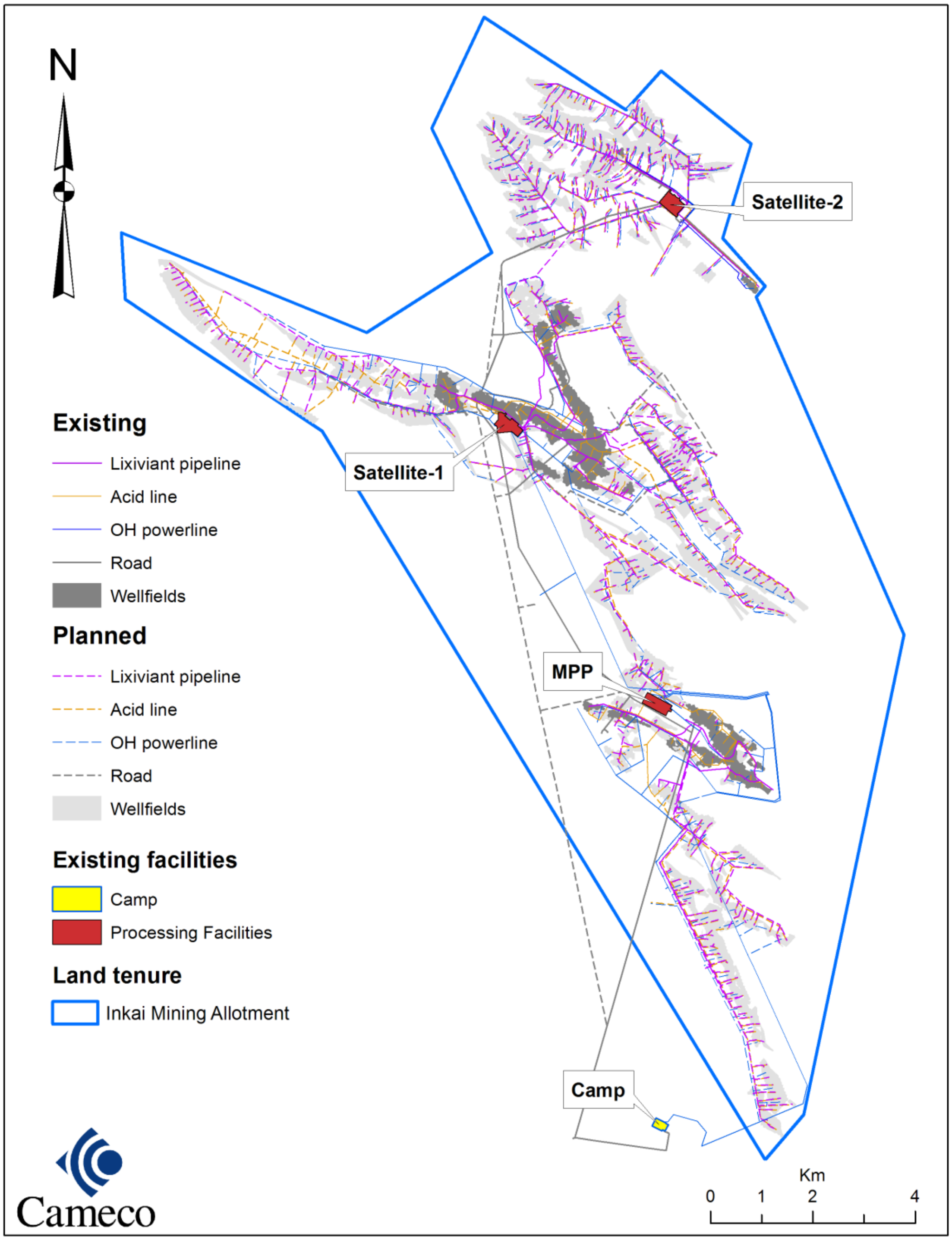
Facilities in the MA Area

- the MPP, Sat1 and Sat2
- security gates
- administrative, engineering and construction offices, laboratory, shops and garages
- holding ponds and reagent storage tanks
- waste disposal enclosures for low-level radioactive waste and domestic waste
- emergency response building (staffed at all times by fire services personnel)
- food services facilities
- roads and power lines
- wellfield pipelines and header houses

As part of the Ramp-up, the following upgrades are planned:

- expansion of the processing facilities to add processing capacity
- addition of calcining capability at the MPP
- addition of new pumping stations and sand ponds
- expansion of the office buildings and the laboratory

Figure 18-1: Infrastructure General Arrangement



(Source: JV Inkai, 2017)

19 Market studies and contracts

19.1 Markets

Overview

Nuclear plants around the world use uranium to generate electricity. The following is an overview of the uranium market.

Uranium demand

The demand for U_3O_8 is directly linked to the level of electricity generated by nuclear power plants. World uranium consumption has increased from approximately 75 M Lbs U_3O_8 in 1980 to about 160 M Lbs in 2016.

Uranium supply

There are two sources of uranium supply: *primary production* is production from mines that are currently in commercial operation; and *secondary supply* includes other sources such as excess inventories, uranium made available from defence stockpiles and the decommissioning of nuclear weapons, re-enriched depleted uranium tails, and used reactor fuel that has been reprocessed.

Mine production

While the uranium production industry is international in scope, there are only a small number of companies operating in relatively few countries. In 2016, world mine production was estimated at 163 M Lbs U_3O_8:

- almost 80% of estimated world production was sourced from four countries: Kazakhstan (39%), Canada (22%), Australia (10%) and Niger (7%)
- over 60% of estimated world mine production was attributable to four producers. Cameco marketed about 17% (27 M Lbs) of estimated world production

Uranium markets

Uranium is not traded in meaningful quantities on a commodity exchange. Utilities buy the majority of their uranium products under long-term contracts with suppliers and meet the rest of their needs on the spot market.

Details on Cameco's customers and uranium supply commitments can be found in Cameco's most recent annual Management's Discussion & Analysis.

Uranium spot and long-term prices

The industry average spot price (TradeTech and UxC) on December 31, 2017 was $23.75 (US) per pound of U_3O_8, up 17% from $20.25 (US) per pound of U_3O_8 at the end of 2016.

The industry average long-term price (TradeTech and UxC) on December 31, 2017 was $31.00 (US) per pound of U_3O_8, up 3% from $30.00 (US) per pound of U_3O_8 on December 31, 2016.

19.2 Uranium sales contracts

100% of JV Inkai's annual production is sold to Cameco and Kazatomprom. Annual uranium sales contracts between JV Inkai and a Cameco subsidiary to purchase Cameco's share of JV Inkai's production are concluded each year, as well as similar contracts between JV Inkai and Kazatomprom to purchase Kazatomprom's share of JV Inkai's production. JV Inkai currently has no other forward-sales commitments for its uranium production.

In accordance with the Kazakhstan government's resolution on uranium concentrate pricing regulations (effective February 3, 2011), product is currently purchased from JV Inkai at a price equal to the uranium spot price, less a 5% discount (maximum allowable).

19.3 Material contracts

The Resource Use Contract is the only contract material to Cameco required for the development and mining of Inkai. Please see *Section 4.4 Resource Use Contract* for a description of this contract.

19.4 Uranium price assumptions for economic analysis

A spot price projection of $28.00 (US) per pound U_3O_8 in 2018 increasing to $57.00 (US) per pound U_3O_8 in 2023 onwards has been incorporated into the realized price projection for the purpose of the economic analysis. The current price projection is generally consistent with various independent forecasts of supply and demand fundamentals. To the extent the independent forecasts did not extend their price projections to cover the entire expected mine life, the projections have been extrapolated forward to the end of the anticipated mine life.

Table 19-2 outlines the projected JV Inkai average realized prices, taking into account Kazakhstan's transfer pricing law and the independent annual spot prices projections. The price projections are stated in constant 2017 dollars (US).

The QPs for *Sections 14 Mineral resource estimates* and *15 Mineral reserve estimates* have reviewed the studies of the independent price projections and confirm that the results of these studies support the assumptions used for the portions of the technical report such qualified persons are responsible for.

Table 19-1: Expected average realized uranium prices by year

Price assumptions	2018	2019	2020	2021	2022	2023-2045
Independent Spot Price Projection $US/lb	28.00	34.00	43.00	52.00	55.00	57.00
Transfer Price Discount $US/lb	1.40	1.70	2.15	2.60	2.75	2.85
JV inkai average price $US/lb	26.60	32.30	40.85	49.40	52.25	54.15
JV inkai average price $Cdn/lb	33.25	40.38	51.06	61.75	65.31	67.69
Exchange rate $1.00 US = $Cdn	1.25	1.25	1.25	1.25	1.25	1.25

20 Environmental studies, permitting and social or community impact

20.1 Environmental considerations

20.1.1 Legislation

In Kazakhstan, government agencies are responsible for the administration of, among other things, uranium production, transportation and storage. The primary regulatory authorities that issue permits/licences/approvals are the Ministry of Investments and Development (Industrial Development and Industrial Safety Committee) and the Ministry of Energy (Committee of Environmental Regulation and Control).

At a regional level, both ministries provide enforcement through local representative authorities. In particular, the Ministry of Energy's local representative authorities administer approvals of environmental protection programs, costs for environmental protection and enhancement, and approval for waste management programs. Local executive authorities supervise and control development and implementation of environmental protection and subsoil use programs, and are responsible for granting approval for the construction of facilities.

The Ecological Code is the principal legislation dealing with the protection of the environment. Although it does not specifically refer to uranium, there are general provisions regulating production waste which apply to uranium. More specific provisions are provided in other applicable Kazakhstan regulations and state standards.

The environmental management system at JV Inkai is designed to ensure compliance with regulatory requirements, preventing pollution in accordance with ISR operation best practice, and continual improvement of performance. The environmental management system and the occupational health and safety management systems have been certified to ISO 14001 and OHSAS 18001 since 2006 (re-certification in 2009, 2012, and 2015).

The principal legislation governing subsoil exploration and mining activity in Kazakhstan is the Subsoil Law. In general, the Subsoil Law identifies the subsoil and mineral resources in the underground state as property of the Republic of Kazakhstan, and resources brought to the surface as property of the subsoil user, unless otherwise provided by contract or this law. See *Section 4.5 Subsoil Law* for more information on the Subsoil Law and *Section 4.6 New Subsoil Code* for information on the New Subsoil Code.

20.1.2 Permitting

JV Inkai is required to hold certain permits and licences to operate the mine, as it is a nuclear facility. With regard to environmental protection requirements, JV Inkai has applied for and received:

- a permit for environmental emissions and discharges for the operation valid until December 31, 2022
- water use permits with various expiry dates

JV Inkai currently holds the following additional material licences relating to its mining activities:

- "Licence for radioactive substances handling" valid until January 23, 2020
- "Licence for operation of mining production and mineral raw material processing" with an indefinite term
- "Licence for transportation of radioactive substances within the territory of the Republic of Kazakhstan" valid until January 23, 2020
- "Licence for radioactive waste handling" valid until January 23, 2020.

In accordance with applicable legislation regulating permits and licences, JV Inkai is required to submit annual reports to relevant state authorities. In particular, renewal of environmental permits requires the submission of an annual report on pollution levels to Kazakhstan's environmental authorities, compliance with the permits' provisions and the payment of any environmental payment obligations not in the nature of payments in respect of violations.

Under the Resource Use Contract, JV Inkai has the rights to explore for and to extract uranium from the subsoil and JV Inkai owns uranium extracted from the subsoil. The Resource Use Contract between JV Inkai and the Republic of Kazakhstan was signed in 2000 and most recently amended in November 2017. For more information, see *Sections 4.2 Exploration and mining licences*, *4.3 Surface tenure*, *4.4 Resource Use Contract* and *4.5.5 Work programs and project documentation.*

As is typical with any mineral extraction site, construction, operation, and reclamation are subject to an ongoing process during which permits, licences, and approvals are requested, monitored and reported on, expire, and are amended or renewed. Provision for these ongoing processes has been included in the cost estimates in this technical report.

20.1.3 Environmental impact assessment

Under the Ecological Code, an environmental impact assessment (EIA) is a mandatory requirement for various types of activities which may have direct or indirect impact on the environment and human health. The Ecological Code does not allow development or implementation of particular business projects (affecting the environment) without an EIA. The Ecological Code requires that an EIA must be conducted at various stages of a project.

Specifically, an EIA must be carried out:

- prior to implementing any type of industrial or construction project
- in respect of feasibility studies for construction, upgrades and reconstruction of buildings, facilities or other industrial infrastructure
- in connection with designs and project documentation for construction of buildings, facilities and infrastructure
- in connection with the certification of facilities, technologies and materials
- in respect of documentation relating to emissions permits and the treatment of wastes

Every EIA must be reviewed and approved by a state environmental expert evaluation, which is conducted by the Ministry of Environmental Protection or its territorial departments. Obtaining approvals based on EIAs constitutes *prima facie* proof that the scope and details of subsoil use operations have been approved by environmental, governmental and other authorities.

Prior to commencing subsoil operations under the Resource Use Contract and obtaining emission and water use permits, JV Inkai had to conduct approved EIAs. The issuance of emission and water use permits by the relevant authorities confirms that JV Inkai conducted approved EIAs as required.

Kazakhstan environmental legislation requires that a state environmental expert examination precede the making of any legal, organizational or economic decisions regarding an operation that may potentially impact public health or the environment. One of the documents the subsoil user must provide in connection with the state environmental expert examination is an environmental impact statement.

The baseline conditions and potential environmental impacts of the commercial mining facility based on Republic of Kazakhstan and western U.S. standards were assessed. The baseline fieldwork was performed in 2001 – 2002. The anticipated environment is common to any uranium acid ISR operation and is described in detail in the EIA and western environmental assessment reports published since 2002. The EIA reports describe the biological, hydro-geological, hydrologic and other physical environmental baseline prior to the introduction of exploration and production operations, and assess the potential impacts to environmental media and the human environment from the proposed operations. The environmental studies completed to date have not identified any potential impacts to human health or the environment that could not be mitigated through permit conditions or reclamation bond commitments.

The project of maximum permissible discharges was amended and submitted for the state environmental expert's review. The expected timeline for obtaining the required approval is in the first quarter of 2018.

Groundwater flow and plume migration modelling study (Geolink, 2003)

The study presents a critical analysis of hydrogeological data and simulation of contaminant transport. The modelling study predicted groundwater flow and transport within the test area of Block 1. The model was calibrated with recent and historical piezometric measurements. The model results showed no risk to local and regional groundwater users from ISR mining of Block 1.

Natural attenuation study on Block 1 (Volkovgeology, 2005)

The objective of this Volkovgeology (2005) study was to assess natural attenuation of ISR solutions within Block 1, based on the pilot-scale uranium in-situ leaching conducted between 1988 and 1990. To assess and monitor the natural attenuation, four deep boreholes were drilled to depths up to 519 m into Permian rocks to intersect the mineralized zones within the Mynkuduk aquifer.

Core samples were studied in the field and in the laboratory. Water samples were collected and analyzed. The observed contamination plume was localized within an area of 110 x 80 m and with a thickness of 32 m. Laboratory investigations showed attenuation of contaminants (e.g., approximately neutral pH) in the upper part of ISR profile and partial attenuation in the lower part of the profile. In analogy with other uranium ISR sites in the region, the study concluded that the majority of contamination caused by ISR test at Block 1 will be attenuated in 39 years.

20.1.4 Decommissioning and restoration

Under the Resource Use Contract, JV Inkai must submit a documented plan for decommissioning the property to the government six months before completion of mining activities. A preliminary decommissioning plan has been established for the purposes of estimating total decommissioning costs. The decommissioning plan considers the issues and costs under a “decommission now” scenario. The plan is updated every five years, or as significant changes take place at the operation which would affect the decommissioning estimates. The preliminary decommissioning plan was initially completed in January 2006. The estimated decommissioning cost revised in 2016 was $10 M (US) on a 100% basis. The plan is in the process of being revised.

Surface reclamation following the completion of mining will include the removal of all buildings, re-contouring of all disturbed areas of the mine site, and removal of any contaminated material based on a detail post-mining gamma radiation survey. Material exceeding baseline conditions will be removed and replaced with clean material. Contaminated material will be removed to an approved waste facility for permanent disposal.

No active restoration of post-mining groundwater is done in Kazakhstan. Natural attenuation of ion constituents as a passive form of groundwater restoration is determined to be sufficient.

The decommissioning regulations have been changed by the New Subsoil Code. The general provisions related to decommissioning have been modified and special provisions on decommissioning of uranium fields have been introduced. During the drafting and approval process for the New Subsoil Code, it was anticipated that the new decommissioning procedure would have retroactive effect and JV Inkai would be required to comply with it. However, now that the final version of the New Subsoil Code has been published, the special provisions relating to decommissioning of uranium fields do not have retroactive effect and it is unclear whether the general provisions related to decommissioning have retroactive effect.

20.1.5 Known environmental liabilities

JV Inkai’s mining activities must comply with the environmental requirements of Kazakhstan laws and regulations. In addition, in the Resource Use Contract, JV Inkai has committed to conduct its operations in accordance with good international mining practices.

The environmental protection legislation in Kazakhstan has evolved rapidly, especially in recent years. As the subsoil use sector has evolved, there is presently a trend towards greater regulation, heightened enforcement and increased liability for non-compliance with respect to environmental issues. The most significant development was the adoption of the Ecological Code in 2007, which replaced the three principal prior laws on environmental protection. Amendments were made to the code in 2011 that include more stringent environmental protection regulations, particularly relating to the control of greenhouse gas emissions, obtaining environmental permits, state monitoring requirements and other similar matters.

Both under the prior and the existing legislative regime, a subsoil user, such as JV Inkai, is obliged to comply with environmental requirements during all stages of a subsoil use operation. Kazakhstan environmental legislation requires that a state environmental expert examination precede the making of any legal, organisational or economic decisions with respect to an operation that could impact the environment and public health. One of the documents that the subsoil user must provide in connection with the state environmental expert examination is an EIA.

The Ecological Code requires that the subsoil user obtain environmental permits to conduct its operations. A permit certifies the holder's right to discharge emissions into the environment, provided that it introduces the "best available technologies" and complies with specific technical guidelines for emissions as set forth by the environmental legislation. Government authorities and the courts enforce compliance with these permits and violations may result in civil, administrative and/or criminal liability, the curtailment or cessation of operations, orders to pay compensation, orders to remedy the effects of violations and orders to take preventative steps against possible future violations. In certain situations, the issuing authority may modify, renew, suspend or revoke the permits. JV Inkai has applied for and received a permit for environmental emissions and discharges for the operation that is valid until December 31, 2022.

Pursuant to the Water Code, JV Inkai is qualified as a primary water user, and is entitled to extract water directly from water sources for its own use. JV Inkai has obtained special water use permits, which have various expiry dates. Water usage under the permits is limited to the purposes defined in the permits.

As an industrial company, JV Inkai is also required to undertake programs to reduce, control or eliminate various types of pollution and to protect natural resources. The Resource Use Contract specifically requires the implementation of environmental controls based on an industrial environmental control program developed by JV Inkai and which is to be approved by the environmental protection authorities. JV Inkai must also actively monitor specific air emission levels, ambient air quality, nearby surface water quality, groundwater quality, levels of contaminants in soil and the creation of solid waste. It must also submit annual reports on pollution levels to Kazakhstan's environmental, tax and statistics authorities. The authorities conduct tests to validate JV Inkai's results.

If JV Inkai's emissions were to exceed the specified levels, this would trigger additional payment obligations. Moreover, in the course of, or as a result of, an environmental investigation, regulatory authorities in Kazakhstan have the power to issue an order reducing or halting production at a facility that has violated environmental standards.

The Ecological Code and the Resource Use Contract set out requirements with respect to environmental insurance. Legal entities carrying out environmentally hazardous activities are required to obtain insurance to cover these activities, in addition to the civil liability insurance which must be held by owners of facilities, the activities of which may cause harm to third parties. JV Inkai currently maintains both the required environmental insurance and the civil liability insurance.

JV Inkai is subject to decommissioning obligations which are largely defined by the Resource Use Contract. JV Inkai has established a separate bank account and has made the required contributions to the account as security for decommissioning Inkai. Contributions are set as a fraction of gross revenue and are capped at $500,000 (US). The account has been fully funded by JV Inkai in this amount. The estimated decommissioning cost in 2016 was $10 M (US) on a 100% basis and is in the process of being revised.

The Parliament of Kazakhstan ratified the country's accession to the United Nations Framework Convention on Climate Changes (Kyoto Protocol) in 2009. The Kyoto Protocol's objective is to limit or capture emissions of greenhouse gases such as carbon dioxide and methane. Within the framework of the Kyoto Protocol, Kazakhstan has enacted a number of legislative instruments aiming to reduce emissions of greenhouse gases. In particular, the emission regulations and trading provisions were introduced into the Environmental Code and took effect January 1, 2018.

Currently, all operators of installations (units) cannot use any unit which produces emissions higher than 20,000 tons of equivalent to Carbon dioxide per year in the regulated spheres of activities such as oil and gas, electric power, mining, metallurgy, and the chemical industry. If the unit's emission is between 10,000 to 20,000 tons equivalent to Carbon dioxide per year then its operator is subject to the regime of administration. JV Inkai has not exceeded these limits.

20.2 Social and community factors

JV Inkai operates in the Suzak district of the South Kazakhstan region. The territory of the district is about 41,000 km^2 and its population is over 50,000. The town of Taikonur, with a population of about 680, is in this district and the Inkai deposit is located nearby. A major part of Kazakhstan's uranium deposits are in the district. The district also has deposits of gold, silver, coal and other minerals. Meat and dairy products production is a leading agriculture industry in the district.

In accordance with JV Inkai's corporate responsibility strategy and to comply with its obligations under the Resource Use Contract, JV Inkai finances projects and provides goods and services to support the district's social infrastructure.

Under the Resource Use Contract, JV Inkai is required to finance the training and development of Kazakhstan personnel. The Resource Use Contract imposes local content requirements on JV Inkai with respect to employees, goods, works and services. See *Section 4.5.7 Local content requirements* for more information.

21 Capital and operating costs

The cost estimates in this section are on a 100% basis with a currency exchange rate assumption of 265 Kazakhstan Tenge to $1.00 Cdn. All cost projections are stated in constant 2017 Canadian dollars and assume the throughput from the production schedule outlined in *Table 16-1*. The cost projections do not contain any estimates involving the potential mining and processing of inferred mineral resources.

21.1 Capital cost estimates

Capital costs for Inkai are estimated to be $1.064 billion over the remaining life of the current mineral reserves. The remaining capital costs, as of January 1, 2018, includes $811 M for wellfield development, $149 M for construction and expansion, and $104 M for sustaining capital.

It is assumed that wellfield development costs will trend with the production schedule.

Capital for construction and expansion is heavily weighted to 2018 to 2020 due to the capital required for the Ramp-up, as well as upgrades planned for existing facilities.

Table 21-1 Capital Cost Forecast by Year – 100% basis shows the annual capital cost estimate for Inkai from 2018 to 2045.

21.2 Operating cost estimates

Estimated operating expenditures, excluding taxes and royalties, for ISR mining, surface processing, site administration and corporate overhead for Inkai from 2018 to 2045 are presented in *Table 21-2*.

Mining costs consist of annual expenditures incurred at Inkai to extract the uranium from the ore zone and pump the pregnant solution to the surface for further processing.

Surface processing costs are expenditures incurred to turn the pregnant solution from the wellfields into the product. This includes IX (adsorption and elution), precipitation, thickening, drying, and packaging circuits.

Site administration costs consist of general maintenance, health, safety and environment, camp and catering costs, along with charges for additional functions performed at the mine site office, such as geology and supply chain management.

Corporate overhead costs consist of the marketing and transportation of the finished product, along with additional charges due to the administration functions at the Shymkent office, such as the finance and legal departments.

Operating costs for Inkai are estimated to be $9.55 per pound of U_3O_8 over the remaining life of the current mineral reserves. The operating cost projections have incorporated the production sequence and pattern design of the wellfields along with past production experience to determine the estimated annual expenditures. The operating costs have decreased from the 2017 technical report as a result of further optimization in the consumption of sulphuric acid and other reagents, as well as certain economies of scale in operating costs projected as production volumes increase over time.

Table 21-1: Capital Cost Forecast by Year – 100% basis

Capital Costs ($Cdn M)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total wellfield development	$43.8	$47.2	$50.5	$34.8	$39.1	$30.4	$29.5	$30.9	$27.0	$27.4	$25.8	$18.7	$21.2
Construction and expansion capital	9.8	27.1	20.3	6.1	5.7	3.3	3.6	3.0	11.9	3.5	3.7	3.6	4.2
Sustaining capital	5.8	6.8	4.5	4.1	5.0	3.9	3.9	4.1	4.1	3.5	3.3	2.9	2.5
Total Capital Costs	$59.4	$81.1	$75.3	$45.0	$49.9	$37.6	$36.9	$37.9	$43.0	$34.5	$32.7	$25.2	$28.0

Capital Costs ($Cdn M)	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	Total
Total wellfield development	$21.9	$23.4	$30.9	$27.4	$24.1	$20.7	$24.7	$24.1	$32.1	$31.8	$29.6	$28.6	$29.0	$28.3	$7.8	$810.5
Construction and expansion capital	2.7	3.6	2.8	3.7	2.7	2.6	3.5	2.7	3.7	2.7	2.7	2.6	2.6	2.5	2.2	149.3
Sustaining capital	3.1	3.3	4.0	3.7	3.1	2.6	3.0	3.0	3.8	3.9	3.7	3.6	3.7	3.5	1.4	103.7
Total Capital Costs	$27.6	$30.3	$37.7	$34.8	$29.9	$26.0	$31.2	$29.9	$39.5	$38.4	$36.0	$34.9	$35.2	$34.3	$11.5	$1,063.5

Table 21-2: Operating Cost Forecast by Year – 100% basis

Operating Costs ($Cdn M)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Site administration	$26.6	$29.3	$34.7	$23.2	$22.9	$22.8	$21.9	$22.4	$21.6	$21.0	$20.4	$18.8	$19.1
Mining costs	9.0	18.4	20.2	30.1	31.0	32.4	28.8	28.8	27.7	27.1	27.5	24.0	24.2
Processing costs	11.1	12.5	14.8	13.2	13.2	13.2	12.7	12.6	12.1	11.8	11.5	10.6	10.8
Corporate overhead	20.4	17.3	20.1	19.4	19.6	19.5	18.6	18.5	17.7	17.3	16.8	15.5	15.8
Total Operating Costs	$67.0	$77.5	$89.8	$86.0	$86.6	$87.8	$82.0	$82.3	$79.1	$77.2	$76.2	$69.0	$70.0
Total Operating Costs ($Cdn/lb)	$9.72	$9.28	$8.63	$8.27	$8.33	$8.53	$8.81	$8.71	$9.28	$9.67	$10.27	$11.94	$11.40

Operating Costs ($Cdn M)	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	Total
Site administration	$19.8	$20.5	$22.0	$20.8	$19.9	$18.6	$19.3	$19.5	$21.0	$21.1	$20.6	$20.3	$20.6	$20.4	$16.3	$605.7
Mining costs	26.1	25.7	27.4	27.9	25.6	26.3	26.8	27.3	29.8	31.4	30.3	29.7	30.3	32.2	24.8	750.7
Processing costs	11.3	11.8	12.7	12.1	11.7	10.9	11.2	11.5	12.2	12.3	12.1	12.1	12.2	11.9	9.8	335.9
Corporate overhead	16.5	17.3	18.6	17.7	17.1	16.0	16.6	16.9	18.2	18.5	18.0	18.0	18.2	17.8	14.4	496.3
Total Operating Costs	$73.8	$75.3	$80.7	$78.5	$74.3	$71.8	$73.9	$75.2	$81.3	$83.3	$81.2	$80.0	$81.3	$82.3	$65.3	$2,188.5
Total Operating Costs ($Cdn/lb)	$10.56	$9.52	$8.36	$9.36	$9.88	$11.61	$10.68	$10.28	$8.92	$8.85	$9.14	$9.13	$9.14	$9.78	$18.80	$9.55

22 Economic analysis

22.1 Economic analysis

The following economic analysis as shown in Table 22-1 Economic Analysis by Year – 100% basis for JV Inkai is based upon the current production plan which contemplates mining and processing Inkai's mineral reserves to mid-2045. The financial projections do not contain any estimates involving the potential mining and processing of inferred mineral resources. Only mineral reserves have demonstrated economic viability.

The economic analysis is undertaken from the perspective of JV Inkai and is based on JV Inkai's share (100%) of Inkai mineral reserves. The economic analysis assumes that 85% of these reserves are recoverable as saleable yellowcake. The net cash flow incorporates the projected sales revenue from the estimated saleable yellowcake, less the related operating and capital cost, mineral extraction tax, and corporate income tax.

The economic analysis results in an after tax NPV (at a discount rate of 12%), for the net cash flows from January 1, 2018 to mid-2045, of $2.2 billion for JV Inkai mineral reserves. Using the total capital invested, along with the operating and capital cost estimates for the remainder of the mineral reserves, the after tax IRR is estimated to be 27.1%.

22.2 Sensitivities

The graph in *Figure 22-1* illustrates the operation's sensitivity to changes in capital cost, operating cost, and revenue. The graph illustrates the variability around the base case after tax net present value of $2.2 billion, using sensitivities of plus and minus 25% on each of the variables.

Figure 22-1: Sensitivity Analysis – 100% basis

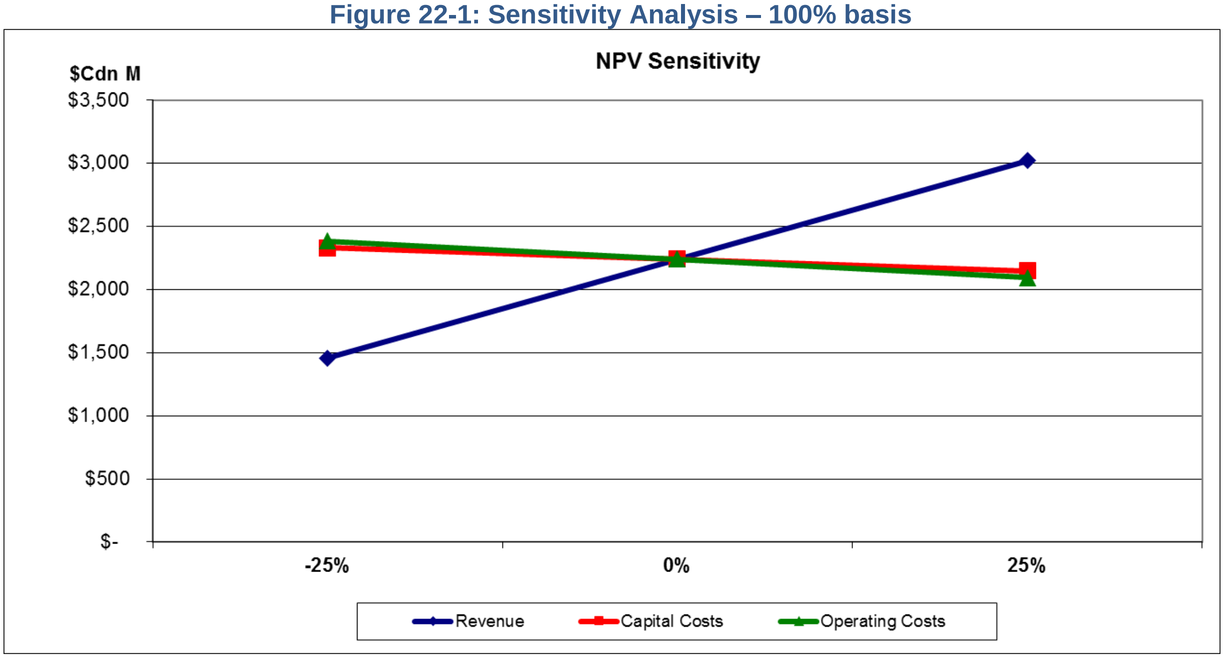


Table 22-1: Economic Analysis by Year – 100% basis

Economic Analysis ($Cdn M)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Production volume (000's lbs U3O8)	6,896	8,351	10,406	10,399	10,399	10,293	9,305	9,445	8,526	7,979	7,417	5,776	6,134
Sales Revenue	$229.3	$337.2	$531.4	$642.1	$679.2	$696.7	$629.8	$639.3	$577.1	$540.1	$502.0	$391.0	$415.2
Operating Costs	67.0	77.5	89.8	86.0	86.6	87.8	82.0	82.3	79.1	77.2	76.2	69.0	70.0
Capital Costs	59.4	81.1	75.3	45.0	49.9	37.6	36.9	37.9	43.0	34.5	32.7	25.2	28.0
Mineral Extraction Tax	14.2	18.3	20.5	19.2	19.6	19.0	16.1	16.4	14.4	14.0	13.3	9.8	10.4
Corporate Income Tax	23.7	39.7	74.9	96.9	103.8	107.9	97.6	99.3	89.0	82.2	75.5	57.1	61.2
Net cash flow	$65.1	$120.6	$271.0	$395.1	$419.3	$444.5	$397.2	$403.4	$351.5	$332.2	$304.5	$230.0	$245.7

Economic Analysis ($Cdn M)	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	Total
Production volume (000's lbs U3O8)	6,986	7,908	9,650	8,389	7,522	6,186	6,917	7,321	9,115	9,412	8,876	8,762	8,892	8,421	3,475	229,159
Sales Revenue	$472.9	$535.3	$653.2	$567.8	$509.1	$418.7	$468.2	$495.5	$617.0	$637.1	$600.8	$593.1	$601.8	$570.0	$235.2	$14,786.1
Operating Costs	73.8	75.3	80.7	78.5	74.3	71.8	73.9	75.2	81.3	83.3	81.2	80.0	81.3	82.3	65.3	2,188.5
Capital Costs	27.6	30.3	37.7	34.8	29.9	26.0	31.2	29.9	39.5	38.4	36.0	34.9	35.2	34.3	11.5	1,063.5
Mineral Extraction Tax	11.5	12.5	15.3	12.7	10.7	9.4	10.4	10.7	13.4	14.2	13.1	13.0	13.1	13.0	5.5	383.5
Corporate Income Tax	71.3	82.5	102.8	88.6	79.0	62.6	71.3	76.3	97.4	100.6	94.5	93.0	96.0	90.2	30.8	2,245.5
Net cash flow	$288.7	$334.7	$416.7	$353.2	$315.2	$248.9	$281.5	$303.5	$385.4	$400.6	$376.1	$372.1	$376.2	$350.2	$122.1	$8,905.1

The analysis shows relatively low sensitivity to changes in its operating or capital cost projections. The relative sensitivity to revenue, directly impacted by changes in the uranium price realized, is significantly higher due to the price estimates being used, which are a reflection of the current U_3O_8 market environment.

The sensitivity analysis further demonstrates that JV Inkai can withstand financially negative events, such as increasing costs or decreased prices, and continue to deliver strong cash flows.

22.3 Payback

Payback for JV Inkai, including all actual costs was achieved in 2015, on an undiscounted, after tax basis. All future capital expenditures are forecasted to be covered by operating cash flow.

22.4 Mine life

The production plan presented in this technical report is based on Inkai mineral reserves from which production of an estimated 229.2 M Lbs U_3O_8 is forecast. The projected mine life extends until mid-2045.

The LOM Plan details the Ramp-up, with production increasing to 10.4 M Lbs U_3O_8 per year; variations of plus or minus 20% from the levels in the LOM Plan are allowed. The LOM Plan is partially based on inferred mineral resources. Therefore annual production levels will be dependent on results of further delineation drilling and market conditions. There is no certainty that the LOM Plan production will be realized. With continued delineation drilling, it is reasonable to expect that the majority of inferred mineral resources could be upgraded to indicated mineral resources. The reserves-based production profile and economic analysis supporting the reported mineral reserves do not include the inferred resources and their associated extraction costs and revenues.

22.5 Taxes and royalties

JV Inkai is required to pay the mineral extraction tax (MET) of 18.5% on production of uranium. The MET is calculated as 18.5% of the direct costs related to the production of the uranium bearing solution. There are no other royalties payable by JV Inkai.

The rate of corporate income tax on aggregate income is 20%.

23 Adjacent properties

South Inkai is an operating ISR uranium mine that began operating in 2009. South Inkai's land position is contiguous with, and south of, Inkai. It is owned 100% by the Southern Mining and Chemical Company (SMCC) joint venture and operated by SMCC, in turn owned by Uranium One Inc. (70% interest) and Kazatomprom (30% interest). The mineralization hosted in the Middle and Lower Inkuduk and in the Mynkuduk horizons extends from Inkai's MA Area onto the South Inkai property. The source of this information, not verified by the QP responsible for this section, is from Uranium One's "Operating and Financial Review – Quarter Ended June 30, 2016" and their technical report on South Inkai published in 2014. This information is not necessarily indicative of the mineralization in the MA Area that is the subject of this technical report.

As part of the Restructuring, JV Inkai is in the process of returning portions of Blocks 2 and 3 to the Government of Kazakhstan that are not part of the MA Area.

24 Other relevant data and information

24.1 Implementation Agreement

The restructuring of JV Inkai, as contemplated by the Implementation Agreement, closed on December 11, 2017, with an effective date of January 1, 2018, and consists of the following:

- JV Inkai has the right to produce 10.4 M Lbs U_3O_8 per year (Cameco's share 4.2 M Lbs), an increase from the prior licensed production of 5.2 M Lbs (Cameco's share 3.0 M Lbs)
- JV Inkai has the right to produce from the MA Area until 2045 (previously, the licence terms were to 2024 for Block 1 and to 2030 for Blocks 2 and 3)
- Cameco's ownership interest in JV Inkai is 40% and Kazatomprom's ownership interest in JV Inkai is 60%. However, during the Ramp-up, Cameco's share of annual production remains at 57.5% on the first 5.2 M Lbs U_3O_8. As annual production increases above 5.2 M Lbs U_3O_8, Cameco will be entitled to 22.5% of any incremental production, to the maximum annual share of 4.2 M Lbs U_3O_8. Once the Ramp-up is complete, Cameco's share of all production will be 40%, matching its ownership interest.
- a governance framework that provides protection for Cameco as a minority owner of JV Inkai
- the boundaries of the MA Area match the agreed production profile for Inkai to 2045
- the loan made by a Cameco subsidiary to JV Inkai to fund exploration and evaluation of Block 3 is being paid on a priority basis

Cameco and Kazatomprom have also completed and reviewed a feasibility study for the purpose of evaluating the design, construction and operation of a uranium refinery in Kazakhstan. Given current market conditions, the parties have agreed that the project is not economically attractive at this time. Kazatomprom also has an option under the Implementation Agreement, expiring in 2021, to license Cameco's proprietary uranium conversion technology for purposes of constructing and operating a UF_6 conversion facility in Kazakhstan.

24.2 Cameco funding of Block 3 appraisal program

A Cameco subsidiary advanced funds for JV Inkai's exploration and evaluation work on Block 3 and, as at September 30, 2017, the remaining principal and interest outstanding amounted to $124 M (US). As part of the Implementation Agreement, JV Inkai is to repay the Cameco subsidiary from the sale of its production in priority to the payment of dividends until the loan is fully repaid.

24.3 Currency control regulations

In 2009, specific amendments to existing currency regulations were adopted. These amendments are aimed at preventing possible threats to the economic security and stability of Kazakhstan's financial system. The Government of Kazakhstan has the power to establish a special currency regime that can:

- require foreign currency holders to deposit a certain portion of their foreign currency interest free with a resident Kazakhstan bank or the National Bank of Kazakhstan
- require the permission of the National Bank of Kazakhstan for currency transactions
- require the sale of foreign currency received by residents
- restrict overseas transfers of foreign currency

While the special currency regime has not been imposed, it has the potential to prevent Kazakhstan companies, like JV Inkai, from being able to pay dividends to their shareholders abroad or repatriating any or all of its profits in foreign currency. It can also impose additional administrative procedures, and Kazakhstan companies could be required to hold a portion of their foreign currency in local banks.

Following 2009, Kazakhstan currency control legislation was liberalized. Changes, although insignificant, were made with respect to simplification of administration of currency operation and liberalization of the regulatory regime applicable to currency payments by individuals.

In 2015, the National Bank of the Republic of Kazakhstan amended the rules on currency operations in the Republic of Kazakhstan (Rules). The Rules inter alia regulate foreign exchange operations, the regime of foreign investments into Kazakhstan, and cross border and domestic currency payments. Kazakhstan legal entities (with some exceptions) may purchase foreign currency on Kazakhstan's market in the amount exceeding $100,000 (US) or its equivalent only when such currency is required for fulfillment of a currency contract (e.g. a cross-border sale and purchase agreement) or other documents which confirm the purpose of the purchase. A Kazakhstan bank may sell currency to Kazakhstan legal entities only when an underlying contract is presented to the bank. The previous version of the Rules did not restrict the purchase of foreign currency by Kazakhstan legal entities. Non-resident legal entities, when purchasing or selling the foreign currency through Kazakhstan banks for Tenge, must provide the purpose of such purchase or sale.

A new law, Law on Currency Regulation and Currency Control, has been proposed and could be adopted by the beginning of 2019. The proposed law envisages substantial changes to Kazakhstan currency control. In particular, the contemplated changes relate to:

- amendments to the definition of Kazakhstan residents
- the sale and purchase of currency by residents in the Kazakhstan market
- requirements applicable to export/import operations with customer clearance in the territory of Kazakhstan

The Resource Use Contract grants JV Inkai a measure of protection from currency control regulations, granting it the right to freely transfer funds, in state and other currencies, inside and outside Kazakhstan.

24.4 Regulatory risks

24.4.1 Kazakhstan laws and regulations

Most civil relations in the Republic of Kazakhstan are governed principally by the Civil Code of the Republic of Kazakhstan. The Civil Code broadly recognizes, inter alia, the rights of foreign companies and citizens to enter into transactions and to own property in Kazakhstan. These rights are established in the Constitution of the Republic of Kazakhstan and may be limited only by those restrictions set forth in the legislation of Kazakhstan.

In addition to the Civil Code, there are a number of statutes which are material to JV Inkai's operations. They include, principally, Subsoil Law, the Law on Limited Liability Partnerships, the Tax Code, the Ecological Code, the Entrepreneurial Code, Law on State Property, the Law on Transfer Pricing, and the Law on Currency Regulation.

Although the Republic of Kazakhstan has well-developed legislation, many provisions are sufficiently vague as to give government officials discretion in their application, interpretation and enforcement. Consequently, laws are subject to changing and different interpretations. This means that even JV Inkai's best efforts to comply with applicable law may not always result in recognized compliance and that non-compliance may have consequences disproportionate to the violation. The uncertainties in Kazakhstan laws, as well as in their interpretation and application, represent a significant risk for JV Inkai's current operations and plans to increase production.

In addition, the regulation of business in Kazakhstan continues to be influenced by historical notions of strong governmental control and regulation. This legacy, coupled with state institutions and a judicial system in which many foreign investors still lack confidence, present a challenging environment in which to do business. To maintain and increase Inkai production, ongoing support, agreement and co-operation from Kazatomprom and the Kazakhstan government is required.

The recent worldwide trend of resource nationalism has also been embraced by Kazakhstan in recent years, as previous benefits accorded foreign investors have been whittled away in the subsoil use sector, changes have been negotiated by the government into existing resource use contracts, and new laws granting preferences to the state,

state enterprises and domestic concerns have been adopted.

Under Kazakhstan law, the state has the right to nationalize private property by enacting a law on nationalization. As of the date of this technical report, Kazakhstan has not exercised such right but the risk of nationalization of Cameco interest in JV Inkai exists.

JV Inkai's operations may be affected in varying degrees by government regulations restricting production, price controls, export controls, currency controls, taxes and royalties, expropriation of property, environmental, mining and safety legislation, and annual fees to maintain mineral properties in good standing. There is no assurance that the laws in Kazakhstan protecting foreign investments will not be amended or abolished, or that these existing laws will be enforced or interpreted to provide adequate protection against any or all of the risks described above. There is also no assurance that the Resource Use Contract can be enforced or will provide adequate protection against any or all of the risks described above.

Cameco believes that the regulatory risks related to its JV Inkai investment in Kazakhstan are manageable.

24.4.2 Compliance with legal requirements

Under the Resource Use Contract, JV Inkai has the rights to explore for and to extract uranium from the subsoil in the MA Area and it owns the uranium extracted from this subsoil. Its ability to conduct these activities, however, depends upon compliance with its obligations under the Resource Use Contract and laws of the Republic of Kazakhstan, as well as ongoing support, agreement and co-operation from the government of Kazakhstan.

The Subsoil Law lists the violations which entitle the Competent Authority to unilateral termination of a resource use contract. For more details please refer to *Section 4.4 Resource Use Contract*. If JV Inkai or its participants commit any of these violations, there is a risk of JV Inkai losing its subsoil use rights due to unilateral termination by the Competent Authority.

The Subsoil Law provides the state with the right to demand amendments to the resource use contract if activities of a subsoil user, exploring or developing a strategic deposit, entail such changes in the economic interests of the state that pose a threat to national security. This in turn might entail a risk of diminishment of JV Inkai's rights. The right to demand amendments might be applied broadly by the state leading to a risk of (i) curtailment of JV Inkai's rights or (ii) termination of the Resource Use Contract. For more details please refer to *Section 4.5.4 Contract termination*.

In the Resource Use Contract, JV Inkai committed to conducting its operations according to good international mining practices. It complies with the environmental requirements of Kazakhstan legislation and regulations, and, as an industrial company, it must also reduce, control or eliminate various kinds of pollution and protect natural resources. Regulatory authorities have the power to issue an order reducing or halting production at a facility that violated environmental standards.

JV Inkai is required to hold, and it does hold, a number of licences and permits (including but not limited to ecological permits) and therefore, must comply with their requirements. Failure to obtain and to comply with the requirements of licences and permits could result in the activities JV Inkai performs under a licence or permit being limited. For example, without an ecological permit, JV Inkai will be unable to conduct subsoil operations.

Generally, other breaches of law and/or contractual obligations may also lead to limitation of the right to use JV Inkai's property.

24.5 Caution about forward-looking information

This technical report includes statements and information about expectations for the future that are not historical facts. When JV Inkai's plans and the future performance of Inkai, or other things that have not yet taken place, are discussed, these statements are considered to be forward-looking information or forward-looking statements under Canadian and US securities laws. They are referred to in this technical report as forward-looking information.

Key things to understand about the forward-looking information in this technical report:

- It typically includes words and phrases about the future, such as *believe, estimate, anticipate, expect, plan, forecast, project, scheduled, strategy and proposed* or variations (including negative variations) of such words and phrases or may be identified by statements to the effect that certain actions, events or results, *may, could, should, would, will be or shall be taken, occur or be achieved*.

- It is based on a number of material assumptions, including those listed below, which may prove to be incorrect.

- Actual results and events may be significantly different from what is currently expected because of the risks associated with JV Inkai, its business, the Inkai deposit and mining in the Republic of Kazakhstan. A number of these material risks are listed below. It is recommended that the reader also review other parts of this document, including *Section 24.4 Regulatory risks*, which outlines a number of regulatory risks, Cameco's Annual Information Form for the year ended December 31, 2016 under the headings "Caution about forward-looking information" and "Risks that can affect our business", Cameco's annual Management's Discussion and Analysis for the year ended 2016 under the headings "Caution about forward-looking information" and "Uranium Operating Properties – Inkai – Managing our risks", and Cameco's December 11, 2017 and January 25, 2018 news releases under the heading "Caution about forward-looking information" which include a discussion of other material risks that could cause actual results to differ from current expectations.

Forward-looking information is designed to help the reader understand current views of the QPs and management of Cameco. It may not be appropriate for other purposes. Cameco and the QPs will not necessarily update this forward-looking information unless required to by securities laws.

Examples of forward-looking information in this technical report

- plans and expectations for Inkai

- estimates of capital, operating and decommissioning costs

- mineral resource and mineral reserve estimates

- forecasts relating to mining, development and other activities including but not limited to mine life and mine production

- results of the economic analysis, including NPV, IRR, cash flow forecasts and sensitivity analysis

Material assumptions

- there is no material delay or disruption in JV Inkai's plans due to natural phenomena, delay in acquiring critical equipment, equipment failure or other causes

- there are no labour disputes or shortages

- all necessary contractors, equipment, operating parts and supplies are obtained when they are needed

- regulatory permits and approvals are obtained when they are needed

- the Ramp-up, including the expansion and upgrade of various facilities, proceeds as anticipated

- the MPP, Sat1 and Sat2 are available, function reliably and as designed

- the mineral resource and mineral reserve estimates and the assumptions they are based on are reliable (see *Sections 14 Mineral resource estimates* and *15 Mineral reserve estimates*)

- JV Inkai's development, mining and production plans for Inkai succeed
- equipment required for mining operates reliably

Material risks

- an unexpected geological, hydrological, or mining condition delays or disrupts production
- the Ramp-up is delayed
- the necessary regulatory permits or approvals cannot be obtained or maintained
- natural phenomena, labour disputes, equipment failure, delay in obtaining the required contractors, equipment, operating parts and supplies or other reasons cause a material delay or disruption in production
- the MPP, Sat1, and Sat2 are not available or do not function as designed
- mineral resource and mineral reserve estimates are not reliable
- JV Inkai's development, mining or production plans for Inkai are delayed, change or do not succeed for any reason
- the risks described in *Section 24.4 Regulatory risks*

25 Interpretation and conclusions

Inkai is an ISR mine successfully operating in the Central Asian Republic of Kazakhstan, with a Mining Allotment covering an area of 139 km^2.

Based on the rigorous procedures and experience demonstrated by Volkovgeology, JV Inkai and Cameco personnel, Cameco's review of the reliability, quality and density of data available, the thorough geological interpretative work, and the different validation tests performed over the years, the QPs responsible for the mineral resource and mineral reserve estimates consider that the current estimates of mineral resources and reserves are relevant and reliable.

The economic analysis, undertaken from the perspective of JV Inkai, is based on JV Inkai's share (100%) of Inkai mineral reserves, and results in an after tax NPV (at a discount rate of 12%), for the net cash flows from January 1, 2018 to mid-2045, of $2.2 billion. Using the total capital invested, along with the operating and capital cost estimates for the remainder of the mineral reserves, the after tax IRR is estimated to be 27.1%.

Capital costs for Inkai are estimated to be $1.064 billion over the remaining life of the current mineral reserves. The remaining capital costs, as of January 1, 2018, includes $811 M for wellfield development, $149 M for construction and expansion, and $104 M for sustaining capital. Capital for construction and expansion is heavily weighted to 2018-2020 due to the capital required for the Ramp-up, as well as upgrades planned for existing facilities.

Operating expenditures for ISR mining, surface processing, site administration and corporate overhead are estimated to be $9.55 per pound of U_3O_8 over the remaining life of the current mineral reserves.

Cameco believes that the identified regulatory risks associated with Inkai and presented in Section 24.4 Regulatory risks are manageable.

From 2009 until end of 2017, JV Inkai produced, not including Block 3 MA test mining, 42.8 M Lbs U_3O_8 (Cameco's share of 24.8 M Lbs). Cameco believes that Inkai has the potential to sustain production levels, as outlined in this technical report. The reserves-based production plan represents an operating mine life until mid-2045, during which Inkai is forecast to produce an estimated 229.2 M Lbs U_3O_8 (Cameco's share 92.6 M Lbs).

26 Recommendations

Given that Inkai is in production and that it has sufficient mineral reserves and mineral resources to produce at the current licensed production rate, the authors of this technical report consider that it is not necessary to recommend further exploration activities.

The confidence on some characteristics of the mineralization, such as grade continuity and hydrological conditions, can be increased in areas of probable mineral reserves and inferred mineral resources. Additional delineation drilling is recommended and is already included in the LOM Plan budget.

Over the life of the operation and at higher production rates, the accumulation of specific ionic species in the holding ponds could reduce surface equipment performance. It is recommended that the concentration of ionic species be monitored.

In order to achieve the production plan and its economic benefits, the authors of this technical report concur with JV Inkai's plan for construction and expansion of the required project facilities and infrastructure.

27 References

Cameco, JV Inkai Property- Uranium Reserve and Resource Estimate, 2003

CIM, Definition Standards - For Mineral Resources and Mineral Reserves, 2014

CIM, Estimation of Mineral Resources and Mineral Reserves – Best Practice Guidelines, 2003

Council of Ministers of the USSR, Resolution N 1128 on the Approval of the Classification for the Mineral Reserves and Prognosticated Resources of the Solid Minerals, 1981

FGU GKZ and CRISCO, Guidelines on Alignment of Russian minerals reporting standards and the CRIRSCO Template, 2010.

Geolink Consulting, Groundwater Flow and Plume Migration Modeling Study at the Inkai Deposit, Block No. 1, 2003

GKZ (State Reserve Commission of the USSR), Guidelines on the Application of the Mineral Reserve Classification for the Deposits of Radioactive Minerals, 1986

International Atomic Energy Agency, Manual of acid in situ leach uranium mining technology, 2001

JV Inkai, The Elephant And Its Habitat: Regional Geology, MZ-CZ Tectonic Evolution Of Central Asia And The Origin Of Giant Uranium Deposits In The Chu-Sarysu Basin. IAEA Technical Meeting on Origin of sandstone uranium deposits: A global perspective, Vienna, 2012

KAPE, Environmental Baseline Study of the Inkai Deposit, 2002

KAPE, Environmental Baseline Study on Block 2 of the Inkai Deposit, 2006.

Kazatomprom, Development of Uranium Mining by ISL in Kazakhstan, IAEA Vienna, 2014

KAZRC, Kazakhstan Code for the Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves, 2016

KAZRC, The Guidelines On Alignment Of Minerals Reporting Standards Of The Republic Of Kazakhstan And The CRIRSCO Template, 2016

Kislyakov, Y.M. and Shetochkin, V.N., Hydrogenic Ore Formation, 2000. English translation from Russian by CERCAMS, 2009

NAEN. The NAEN Code for the Public Reporting of Exploration Results, Mineral Resources, Mineral Reserves, 2011

Power Resources Inc., Inkai ISL Uranium Project Feasibility Study Volume 1, November 2003, revised September 2004 and December 2004

SRC (State Reserve Commission of Kazakhstan), Guidelines on the Application of the Mineral Reserve Classification for the Sandstone Uranium Deposits (Amendment to the Guidelines on the Application of the Mineral Reserve Classification for the Deposits of Radioactive Minerals), 2008

SRK Consulting, Inkai In-Situ Leach Uranium Project, 2005

SRK Consulting, Resource Verification – Inkai in-situ Leach, 2007

Two Key, Interim Report on the Results of Exploration and Delineation at the Block 3 (Northern Flank) of the Inkai Deposit with Uranium Resource Estimation in the C1 and C2 Categories, 2014

Two Key, Report on the Results of Exploration and Delineation at the Block 3 of Inkai Uranium Deposit with Technical-Economic Substantiation of Permanent Conditions, 2017

Volkovgeology, Assessment of Natural Attenuation on Test Block 1 after In-Situ Leaching at the Inkai Deposit, 2005

Volkovgeology, Report of the Expedition No 7 on the First Stage of the Detailed Exploration and Delineation of the Inkai Uranium Deposit for the Period 1979-1991, with Mineral Resource Estimation as of 01.07.1991. Volumes I, II and III, 1991

Volkovgeology, Report on the Results of Exploration and Delineation Block 2 of the Inkai Uranium Deposit over a Period of 1991-2006, 2007

Volkovgeology, Technical and Economic Substantiation of Permanent Conditions for Block 2 of the Inkai Uranium Deposit, 2007

Volkovgeology, Laboratory Studies on the Technical Parameters of the Ore - Deposit Inkai, 2011

Volkovgeology, Report of Exploration of Block 3 Inkai Uranium Deposit As of 01.01.2015, Volume 1, Book 4, 2015

28 Date and signature page

This NI 43-101 Technical Report titled "Inkai Operation, South Kazakhstan Oblast, Republic of Kazakhstan", dated January 25, 2018 with an effective date of January 1, 2018 has been prepared under the supervision of the undersigned. The format and content of the report conform to Form 43-101F1 of NI 43-101 of the Canadian Securities Administrators.

_*"signed and sealed"*_____________________
Alain G. Mainville, P. Geo.
Cameco Corporation

January 25, 2018
2121 – 11th Street West
Saskatoon, SK, S7M 1J3
Canada

_*"signed"*___________________________
Darryl Clark, PhD, FAusIMM
Cameco Kazakhstan LLP

January 25, 2018
6 Sary-Arka Street
Office 920, Arman Business Center
Astana,
Kazakhstan 010000

_*"signed and sealed"*_____________________
Stuart B. Soliz, P. Geo.
Power Resources, Inc. (operating as Cameco Resources)

January 25, 2018
550 North Poplar, Suite 100
Casper, WY 82601
United States of America

_*"signed and sealed"*_____________________
Robert J. Sumner, PhD, P. Eng.
Cameco Corporation

January 25, 2018
2121 – 11th Street West
Saskatoon, SK, S7M 1J3
Canada