Inkai Operation
South Kazakhstan Oblast,
Republic of Kazakhstan

National Instrument 43-101

Technical Report
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Prepared for Cameco Corporation by:

Charles J. Foldenauer, P.Eng.
Alain G. Mainville, P.Geo.
# Table of Contents

## 1 SUMMARY
1.1 Operation Overview ........................................................................................................................................ 1
1.2 Location and Site Description .................................................................................................................... 1
1.3 Exploration and Development ..................................................................................................................... 2
1.4 JV Inkai Funding ........................................................................................................................................... 3
1.5 Geology and Mineralization ......................................................................................................................... 3
1.6 Mineral Resources and Mineral Reserves .................................................................................................... 4
1.7 Current Exploration ....................................................................................................................................... 7
1.8 Mining ........................................................................................................................................................... 7
1.9 Processing .................................................................................................................................................... 9
1.10 Environmental Assessment and Licensing .................................................................................................. 9
1.11 Production Plan and Mine Life .................................................................................................................. 10
1.12 Economic Analysis .................................................................................................................................... 11
1.12.1 Payback .................................................................................................................................................. 13
1.13 Project Risks ................................................................................................................................................ 13
1.14 Conclusions and Recommendations ......................................................................................................... 13
1.14.1 Blocks 1 and 2 ....................................................................................................................................... 13
1.14.2 Block 3 .................................................................................................................................................. 14

## 2 INTRODUCTION
2.1 Introduction and Purpose ............................................................................................................................. 15
2.2 Report Basis ................................................................................................................................................ 16

## 3 RELIANCE ON OTHER EXPERTS ........................................................................................................... 17

## 4 PROPERTY DESCRIPTION AND LOCATION
4.1 Location ........................................................................................................................................................ 18
4.1.1 Exploration and Mining Licences ............................................................................................................. 20
4.1.2 2007 Memorandum of Understanding ................................................................................................. 20
4.1.3 The Subsoil Law ....................................................................................................................................... 21
4.1.4 Strategic Deposits .................................................................................................................................. 22
4.1.5 Assignment and Transfer of Subsoil Use Rights ....................................................................................... 23
4.1.6 Draft Subsoil Law .................................................................................................................................... 23
4.1.7 Work Programs ....................................................................................................................................... 25
4.2 Mine and Infrastructure ............................................................................................................................... 25
4.3 Tax and Royalties ......................................................................................................................................... 25
4.4 Known Environmental Liabilities .............................................................................................................. 26
4.5 Permitting ................................................................................................................................................... 28
4.6 Procurement Requirements ........................................................................................................................ 28
4.7 Local Content Requirements ..................................................................................................................... 28

## 5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY
5.1 Access ........................................................................................................................................................ 30
5.2 Climate ....................................................................................................................................................... 30
5.3 Physioography .......................................................................................................................................... 31
5.4 Local Resources ......................................................................................................................................... 31
5.5 Infrastructure .............................................................................................................................................. 31

## 6 HISTORY
6.1 Ownership .................................................................................................................................................. 37
6.2 Exploration and Development History ...................................................................................................... 37
6.3 Historical Mineral Resource and Mineral Reserve Estimates ........................................... 38
6.4 Historical Production - Test Mining .................................................................................. 39

7 GEOLOGICAL SETTING ........................................................................................................ 41
7.1 Regional Geology ............................................................................................................... 41
7.1.1 Aquifers within the Chu-Sarysu basin ............................................................................ 42
7.2 Local Geology .................................................................................................................... 43
7.3 Local Hydrogeology ......................................................................................................... 47
7.3.1 Hydraulic Connectivity ................................................................................................. 51
7.3.2 Piezometric Measurements .......................................................................................... 52
7.3.3 Groundwater Chemistry ............................................................................................... 52

8 DEPOSIT TYPES .................................................................................................................. 54
8.1 Roll-Front Deposits ............................................................................................................ 54
8.2 Oxidation State .................................................................................................................. 55

9 MINERALIZATION ................................................................................................................ 57
9.1 Host rocks .......................................................................................................................... 57
9.2 Oxidation and Mineralization ............................................................................................ 59
9.3 Geometry .......................................................................................................................... 60
9.4 Mineralogy .......................................................................................................................... 62

10 EXPLORATION .................................................................................................................... 64
10.1 Uranium Exploration ....................................................................................................... 64
10.1.1 Groundwater Flow and Plume Migration Modeling Study (Geolink, 2003) ............... 66
10.1.2 Natural Attenuation Study on Block 1 (Volkovgeology, 2005) .................................. 66

11 DRILLING ............................................................................................................................. 68

12 SAMPLING METHOD AND APPROACH .......................................................................... 70
12.1 Sample Density and Sampling Methods ......................................................................... 70
12.2 Core Recovery .................................................................................................................. 70
12.3 Sample Quality and Representativeness ......................................................................... 70
12.4 Sample Composites with Values and Estimated True Widths ..................................... 70

13 SAMPLE PREPARATION, ANALYSES AND SECURITY ..................................................... 72
13.1 Sample Preparation ......................................................................................................... 72
13.2 Assaying .......................................................................................................................... 72
13.3 Geophysical Logging ...................................................................................................... 72
13.3.1 Radiometric Probing ................................................................................................. 73
13.3.2 Caliper Logging ........................................................................................................ 74
13.3.3 Hole Deviations ......................................................................................................... 74
13.3.4 Resistivity and Self-Polarization ................................................................................ 74
13.4 Density Determinations .................................................................................................. 75
13.5 Quality Assurance/Quality Control (QA/QC) ................................................................. 75
13.6 Sample Security ................................................................................................................ 75
13.7 Adequacy of Sample Preparation, Assaying, QA/QC, and Security ............................ 75

14 DATA VERIFICATION .......................................................................................................... 76
14.1 Blocks 1 and 2 Data Verification .................................................................................... 76
14.1.1 Radioactivity, Radium and Uranium Grades .............................................................. 77
14.2 Recent data ....................................................................................................................... 78

15 ADJACENT PROPERTIES .................................................................................................. 79
15.1 South Inkai Mine ............................................................................................................. 79
15.1 General.......................................................................................................................... 79
15.1.1 General.................................................................................................................. 79
15.1.2 Geology .................................................................................................................. 79
15.1.3 Mines ...................................................................................................................... 79

16 MINERAL PROCESSING AND METALLURGICAL TESTING ................................................. 80
16.1 Metallurgical Testwork ................................................................................................ 80
16.1.1 Laboratory Testwork ............................................................................................ 80
16.1.2 Hydrogeological Studies ....................................................................................... 82
16.1.3 Field Tests .............................................................................................................. 83
16.2 Commercial Production ............................................................................................... 89
16.2.1 Leaching ............................................................................................................... 92
16.2.2 Ion Exchange Resin Loading ................................................................................ 92
16.2.3 Resin Elution (Stripping) ..................................................................................... 92
16.2.4 Denitrification ..................................................................................................... 93
16.2.5 Precipitation ....................................................................................................... 93
16.2.6 Yellowcake Product Thickening and Dewatering ............................................... 93
16.2.7 Filter Press Operation ......................................................................................... 93
16.2.8 Drying ................................................................................................................ 94
16.2.9 Packaging ........................................................................................................... 94

17 MINERAL RESOURCE AND MINERAL RESERVE ESTIMATES ........................................ 95
17.1 Definitions .................................................................................................................. 95
17.2 Mineral Resources and Mineral Reserves ................................................................. 96
17.2.1 Key Assumptions ................................................................................................. 96
17.2.2 Key Parameters .................................................................................................... 96
17.2.3 Key Methods ....................................................................................................... 97
17.2.4 Resource Classification ....................................................................................... 98
17.2.5 Cut-off ................................................................................................................ 99
17.2.6 Mineral Resource and Mineral Reserve Estimates ............................................ 101
17.3 Discussion on Factors Potentially Affecting Materiality of Resources and Reserves ......................................................................................................................... 102

18 ADDITIONAL REQUIREMENTS FOR TECHNICAL REPORTS ON DEVELOPMENT
PROPERTIES AND PRODUCTION PROPERTIES ......................................................... 104
18.1 Mining .......................................................................................................................... 104
18.1.1 Mining Method ..................................................................................................... 104
18.1.2 Production Objectives ......................................................................................... 106
18.1.3 Well Field Design and Development ................................................................ 106
18.1.4 Well field Development ..................................................................................... 107
18.2 Recoverability ............................................................................................................ 108
18.3 Production Plan and Mine Life .................................................................................... 108
18.4 Uranium Markets ....................................................................................................... 109
18.5 Uranium Sales Contract and Price ........................................................................... 111
18.6 Contracts .................................................................................................................. 112
18.7 Environmental Considerations .................................................................................... 112
18.7.1 Legislation .......................................................................................................... 112
18.7.2 Permitting .......................................................................................................... 113
18.7.3 Environmental Impact Assessment .................................................................... 114
18.7.4 Restoration ......................................................................................................... 115
18.8 Taxes and Royalties .................................................................................................... 116
18.9 Capital and Operating Cost Estimates ...................................................................... 116
18.9.1 Economic Analysis ............................................................................................. 118
18.9.2 Payback ............................................................................................................. 120
19 OTHER RELEVANT DATA AND INFORMATION .............................................................121
19.1 JV Inkai Funding ........................................................................................................121
19.2 Operation Risks ........................................................................................................121
  19.2.1 Sulphuric Acid Availability ........................................................................121
  19.2.2 Resource Use Contract .............................................................................122
  19.2.3 Extension of Block 3 Licence .....................................................................123
  19.2.4 Kazakh Laws and Regulations ..................................................................123

20 INTERPRETATION AND CONCLUSIONS ........................................................................125

21 RECOMMENDATIONS ........................................................................................................126

22 REFERENCES ........................................................................................................................127

23 DATE AND SIGNATURE PAGE .........................................................................................128

TABLES
Table 1-1: Summary of Mineral Resources – December 31, 2009 .................................................5
Table 1-2: Summary of Mineral Reserves – December 31, 2009 .....................................................6
Table 6-1: Historical Drilling ........................................................................................................38
Table 6-2: Historical Kazakh Reserves for Block 1 as of November 1993 ........................................38
Table 6-3: Historical Kazakh Reserves for Block 2 as of February 1996 ..........................................39
Table 6-4: Reconciliation of Classifications of Mineral Reserves and Resources .......................39
Table 7-1: Hydraulic Conductivity .............................................................................................50
Table 9-1: Mineralized Zones in Blocks 1 and 2 ...........................................................................57
Table 11-1: Delineation Drilling at Inkai .....................................................................................68
Table 16-1: Chemical Composition of the Test Samples, % .............................................................81
Table 16-2: Composition of the Test Samples, % .......................................................................81
Table 16-3: Chemical Composition of Pregnant Solution ..............................................................82
Table 16-4: Results of Well Fields Testwork through the end of October 2007 .........................86
Table 16-5: Past Inkai Uranium Production ...............................................................................89
Table 17-1: Additional Estimation Parameters .............................................................................97
Table 17-2: Kazakh Reserves for Block 2 as of January 1, 2007 ..................................................98
Table 17-3: Summary of Mineral Resources – December 31, 2009 ..............................................101
Table 17-4: Summary of Mineral Reserves – December 31, 2009 ..............................................102
Table 18-1: Projected Uranium Sales Prices ...............................................................................112
Table 18-2: Estimated JV Inkai Taxes and Royalties ................................................................116
Table 18-3: Summary of Estimated Capital Costs .......................................................................117
Table 18-4: Summary of Estimated Operating Costs ................................................................118
Table 18-5: Economic Analysis .................................................................................................119

FIGURES
Figure 1-1: Production Plan (100% basis) ..................................................................................11
Figure 1-2: NPV sensitivity estimates .........................................................................................12
Figure 4-1: Location Map ..........................................................................................................19
Figure 5-1: General Location Map .............................................................................................33
Figure 5-2: Blocks 1 and 2 – Infrastructure General Arrangement ............................................34
Figure 5-3: Location Map of Block 1 Main Processing Plant .......................................................35
Figure 5-4: Location Map of Block 2 Satellite 1 Plant ................................................................36
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-1</td>
<td>Schematic Cross-section of the Chu-Sarysu Basin – Looking West</td>
<td>42</td>
</tr>
<tr>
<td>7-2</td>
<td>Schematic Stratigraphic Cross-section, Inkai Operation</td>
<td>46</td>
</tr>
<tr>
<td>9-1</td>
<td>Inkai Uranium Roll Fronts</td>
<td>58</td>
</tr>
<tr>
<td>9-2</td>
<td>Roll-Front Morphology of Mineralization</td>
<td>61</td>
</tr>
<tr>
<td>9-3</td>
<td>Typical characteristics of a roll-front deposit</td>
<td>63</td>
</tr>
<tr>
<td>11-1</td>
<td>Drill Hole Collar Location Map</td>
<td>69</td>
</tr>
<tr>
<td>16-1</td>
<td>Test Block 2 Well Field Layout</td>
<td>85</td>
</tr>
<tr>
<td>16-2</td>
<td>Injection and Production Well Schematics for Test Block 2</td>
<td>86</td>
</tr>
<tr>
<td>16-3</td>
<td>Graph of Historical Recovery from Test Block 2</td>
<td>87</td>
</tr>
<tr>
<td>16-4</td>
<td>Graph of Head Grade from Test Block 2</td>
<td>87</td>
</tr>
<tr>
<td>16-5</td>
<td>Graph of Flow from Test Block 2</td>
<td>88</td>
</tr>
<tr>
<td>16-6</td>
<td>Flowsheet Based on Annual Production of 5.2 million Pounds U_3O_8</td>
<td>91</td>
</tr>
<tr>
<td>17-1</td>
<td>Blocks 1 and 2 - Kazakh Mineral Resources Map</td>
<td>100</td>
</tr>
<tr>
<td>18-1</td>
<td>Production Plan (100% basis)</td>
<td>109</td>
</tr>
<tr>
<td>18-2</td>
<td>Uranium Price History</td>
<td>111</td>
</tr>
<tr>
<td>18-3</td>
<td>NPV sensitivity estimates</td>
<td>120</td>
</tr>
</tbody>
</table>
**UNITS OF MEASURE AND ABBREVIATIONS**

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<td>Annum (year)</td>
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<td>%</td>
<td>Percent</td>
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<td>Degrees</td>
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<td>Degrees Celsius</td>
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<td>Reduction Potential</td>
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<td>g</td>
<td>Grams</td>
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<tr>
<td>g/cm³</td>
<td>Grams per cubic centimetre</td>
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<td>g/m³</td>
<td>Grams per cubic metre</td>
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<td>g/L</td>
<td>Grams per Litre</td>
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<td>h</td>
<td>Hour(s)</td>
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<td>ha</td>
<td>Hectares (10,000 square metres)</td>
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<td>HP</td>
<td>Horsepower</td>
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<td>Hwy</td>
<td>Highway</td>
</tr>
<tr>
<td>IRR</td>
<td>Internal rate of return</td>
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<tr>
<td>ISR</td>
<td>In-Situ Recovery</td>
</tr>
<tr>
<td>K</td>
<td>Thousand</td>
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<td>kg</td>
<td>Kilograms</td>
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<tr>
<td>km</td>
<td>Kilometres</td>
</tr>
<tr>
<td>km/h</td>
<td>Kilometres per hour</td>
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<tr>
<td>km²</td>
<td>Square kilometres</td>
</tr>
<tr>
<td>kV</td>
<td>Kilovolts</td>
</tr>
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<td>kW</td>
<td>Kilowatts</td>
</tr>
<tr>
<td>L</td>
<td>Litre</td>
</tr>
<tr>
<td>L/sec</td>
<td>Litres per second</td>
</tr>
<tr>
<td>M</td>
<td>Million</td>
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<tr>
<td>Mt</td>
<td>Million tonnes</td>
</tr>
<tr>
<td>m</td>
<td>Metres</td>
</tr>
<tr>
<td>m²/d</td>
<td>Square metres per day</td>
</tr>
<tr>
<td>m²/t/d</td>
<td>Square metres per tonne per day (thickening)</td>
</tr>
<tr>
<td>m³</td>
<td>Cubic metres</td>
</tr>
<tr>
<td>m³/h</td>
<td>Cubic metres per hour</td>
</tr>
<tr>
<td>m%U</td>
<td>Metres times per cent uranium</td>
</tr>
<tr>
<td>m%U³O₈</td>
<td>Metres times per cent uranium oxide</td>
</tr>
<tr>
<td>masl</td>
<td>Metres above sea level (elevation)</td>
</tr>
<tr>
<td>m/d</td>
<td>Metres per Day</td>
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<td>mm</td>
<td>Millimetres</td>
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<tr>
<td>mm/y</td>
<td>Millimetres per year</td>
</tr>
<tr>
<td>MPa</td>
<td>Megapascal</td>
</tr>
<tr>
<td>Mt/a</td>
<td>Million dry tonnes per year</td>
</tr>
<tr>
<td>mV</td>
<td>Millivolts</td>
</tr>
<tr>
<td>MW</td>
<td>Megawatts</td>
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<tr>
<td>m/y</td>
<td>metres per year</td>
</tr>
<tr>
<td>N</td>
<td>Newton</td>
</tr>
<tr>
<td>NPV</td>
<td>Net present value</td>
</tr>
<tr>
<td>Pa</td>
<td>Pascal (Newtons per square metre)</td>
</tr>
<tr>
<td>ppm</td>
<td>Parts per million</td>
</tr>
<tr>
<td>p₈₀</td>
<td>80% passing (particle size nomenclature)</td>
</tr>
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<td>st</td>
<td>Short tons</td>
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1 SUMMARY

Cameco Corporation (Cameco) has concluded that Inkai is now a material property for Cameco under Canadian securities laws. Cameco is therefore required to file a technical report on Inkai prepared in accordance with National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) with Canadian securities regulators.

To discharge this legal obligation, this technical report has been prepared for Cameco by internal Qualified Persons (QP) in support of the disclosure of scientific and technical information relating to Inkai that is material to Cameco contained in Cameco’s Annual Information Form for 2009, Cameco’s Management Discussion and Analysis filed with securities regulators on February 25, 2010, and a Cameco press release dated February 24, 2010.

All monetary references in this technical report are expressed in United States dollars.

1.1 Operation Overview

The Inkai operation is an in situ recovery (ISR) mine in the Central Asian Republic of Kazakhstan. Inkai comprises three contiguous licence blocks: two production areas (Blocks 1 and 2) and one exploration area (Block 3). Block 1 is an area about 16.6 square kilometres. Block 2 is an area about 230 square kilometres. Block 3 is an area about 240 square kilometres.

Inkai is owned and operated by Joint Venture Inkai Limited Liability Partnership (JV Inkai), an entity which is owned by Cameco (60%) and National Atomic Company KazAtomProm JSC (KazAtomProm) (40%). The Republic of Kazakhstan owns KazAtomProm. JV Inkai’s mineral reserves and resources are located at Blocks 1 and 2. Block 3 is currently being drilled in order to estimate its mineral resources. Potential future profits from Block 3 production will be shared on a 50-50 basis, instead of based upon ownership interests in JV Inkai.

1.2 Location and Site Description

Inkai is located in the Suzak District of South-Kazakh Oblast, Kazakhstan, near the small town of Taikonur. It is approximately 370 km north of the city of Shymkent and approximately 125 km east of the city of Kyzl-Orda. Inkai is accessible by road.

The main processing plant is located on Block 1 and a satellite plant is located on Block 2. The main processing plant has an ion exchange capacity of 2.6 million
pounds of U3O8 per year and a product recovery drying and packaging capacity of 5.2 million pounds per year.

The satellite plant has an ion exchange capacity of 2.6 million pounds of U3O8 per year. The satellite plant produces uranium loaded ion exchange resin which is taken to the main processing plant at Block 1 for processing.

Additionally, at Block 1 there is an administrative office, shops, garage, laboratory, emergency response building, low-level radioactive waste and domestic landfills, food services facilities, and engineering and construction offices. At Block 2, there is an office, small shops, laboratory and a food services facility. At site, there is also a camp for 400 employees with catering and leisure facilities.

1.3 Exploration and Development

Exploration on Inkai began in the 1980s and continued into the 1990s until the breakup of the former Soviet Union. A pilot test using the ISR mining method in the northeast area of Block 1 started in December 1988. The test lasted for 495 days and recovered approximately 85% of the uranium in the test area (92,900 pounds U3O8). The test was a technical success, achieving a high uranium recovery rate from the test area in a relatively short time frame.

In April 1999, JV Inkai received from the government of Kazakhstan a mining licence for Block 1 and an exploration licence for Blocks 2 & 3. The associated subsoil use contract (Resource Use Contract), covering both licences, was signed by the Republic of Kazakhstan and JV Inkai in July, 2000.

Test mining commenced in April 2002 at Block 2 and an expansion of the test mine was completed in 2006.

In 2008, JV Inkai received initial approval for a mining licence for Block 2 to replace its exploration licence. Final approval was received in 2009 when Amendment No.2 to the Resource Use Contract was signed by JV Inkai and the Ministry of Energy and Mineral Resources of Kazakhstan (MEMR). (Until March 12, 2010, the MEMR was the ministry designated as the "Competent Authority" under the Subsoil Law (as defined in Section 4.1.3 below). The current Competent Authority is the Ministry of Industry and New Technologies). The Block 1 mining licence expires in 2024 and the Block 2 mining licence expires in 2030.

In September 2005, JV Inkai decided to proceed with an ISR commercial processing facility (now known as the main processing plant) to be located at Block 1, and thereafter construction commenced.
During the fourth quarter of 2008, commissioning of the front half of the main processing plant was completed and the processing of solutions from Block 1 commenced.

In 2009, JV Inkai finished construction and commissioned the main processing plant. In February 2010, regulatory acceptance was received for the commissioning of the main processing plant. In 2009, JV Inkai finished construction and began commissioning a satellite plant to process solution recovered from Block 2.

In 2009, JV Inkai produced 1.87 million pounds U₃O₈.

In 2010, JV Inkai is planning $35.2 million of capital expenditures.

In February 2010, JV Inkai filed an application with the MEMR declaring that it had made a potential commercial discovery at Block 3 and requesting an extension of the licence term.

1.4 JV Inkai Funding

A Cameco subsidiary has agreed to provide up to $370 million of loan funding to JV Inkai. Further funding may be required. As of December 31, 2009, the amount outstanding on the loan was $337 million, including accrued interest. Of the cash available for distribution each year, 80% is used to repay the loan until it is repaid in full.

Cameco has agreed to provide all funds required by JV Inkai in connection with work on Block 3 until completion of a feasibility study.

1.5 Geology and Mineralization

South-central Kazakhstan geology is comprised of a large relatively flat basin of Cretaceous to Neogene age continental clastic sedimentary rocks. The Cretaceous-Cainozoic 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 Greater Karatau Mountains on the southwest and the Chuskoa uplift 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-Cenozoic sediments host several stacked and relatively continuous, sinuous "roll-fronts", or oxidation-reduction (redox) fronts hosted in the more porous and permeable sand and silt units. Several uranium deposits
and active uranium ISR 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 Inkuduk and Mynkuduk Formations which comprise feldspathic sandstones or sub-arkoses, typically containing 50% to 60% quartz and 10% to 15% feldspar. Clay content is in the range of 5% to 10%. The redox boundary can be readily recognised in core by a distinct colour change from grey on the reduced side to yellowish stains on the oxidized side, stemming from the oxidation of pyrite to limonite. In cross-section, the redox boundary is often “C” shaped forming the classic roll-front.

The sands have high horizontal permeability.

Hydrogeological parameters of the deposit play a key role in ISR mining. Studies and mining indicate Inkai has favourable hydrogeological conditions for ISR mining.

Seven mineralized zones have been identified on Blocks 1 and 2 of the Inkai operation, including three zones in the Mynkuduk horizon and four zones in the Inkuduk horizon. The bulk of the uranium mineralization in Block 1 is contained in the Mynkuduk horizon, of Turonian age, that unconformably overlays Permian argillites. This horizon is at a depth of about 500 m and consists of fine to medium sands with occasional layers of clay or silt. Above the Mynkuduk horizon, the lower part of the Inkuduk horizon is also locally mineralized. Mineralization in Block 2 is contained primarily in the Middle and Lower Inkuduk horizons between 350 m to 420 m below surface.

Mineralization comprises sooty pitchblende (85%) and coffinite (15%). The pitchblende occurs as micron-sized globules and spherical aggregates while the coffinite occurs as small 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.

1.6 Mineral Resources and Mineral Reserves

The estimated mineral resources and reserves at Inkai are located in Block 1 and Block 2. The resource models follow the Kazakhstan “State Committee of Mineral Reserves (GKZ)” guide. They were created by Volkovgeology Joint Stock Company (Volkovgeology), using the Grade Thickness (GT) estimation method on 2-dimensional blocks in plan. Volkovgeology is a subsidiary of KazAtomProm.
and is responsible for prospecting, exploration and development of uranium deposits in Kazakhstan.

Throughout this technical report, references to Kazakh resources and/or reserve estimates generally include the non-compliant combination of NI 43-101 mineral resources and mineral reserves.

In 2003, Cameco performed a validation of the Kazakh uranium reserves estimate for Block 1 and confirmed the estimated pounds of uranium to within 2.5% of the Kazakh estimate. The same Kazakh estimate was validated by an independent consulting firm in 2005. In 2007, Cameco and an independent consulting firm verified the Block 2 Kazakh indicated reserves estimate and obtained results in agreement with the Kazakh estimate.

The Block 1 mineral resources and reserves are based on 944 surface drillholes. The Block 2 mineral resources and reserves estimates are based upon 1,052 drillholes. No mineral resources or reserves have been estimated for Block 3.

A summary of the estimated mineral resources for Inkai with an effective date of December 31, 2009 is shown in Table 1-1. Alain G. Mainville, P.Geo. of Cameco, is the QP within the meaning of NI 43-101 for the purpose of the mineral resource and mineral reserve estimates.

### Table 1-1: Summary of Mineral Resources – December 31, 2009

<table>
<thead>
<tr>
<th>Category</th>
<th>Area</th>
<th>Tonnes (x 1000)</th>
<th>Grade % U₃O₈</th>
<th>Contained Million pounds U₃O₈</th>
<th>Cameco’s Share Million pounds U₃O₈</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicated</td>
<td>Block 1</td>
<td>13,291</td>
<td>0.07</td>
<td>21.9</td>
<td>13.1</td>
</tr>
<tr>
<td>Inferred</td>
<td>Block 1</td>
<td>11,926</td>
<td>0.06</td>
<td>16.2</td>
<td>9.7</td>
</tr>
<tr>
<td>Inferred</td>
<td>Block 2</td>
<td>242,770</td>
<td>0.05</td>
<td>238.9</td>
<td>143.3</td>
</tr>
<tr>
<td>Total Inferred</td>
<td></td>
<td>254,696</td>
<td>0.05</td>
<td>255.1</td>
<td>153.0</td>
</tr>
</tbody>
</table>

Notes:  
1. Cameco reports mineral reserves and mineral resources separately. Reported mineral resources do not include amounts identified as mineral reserves.  
2. Cameco's share is 60% of total mineral resources.  
3. Inferred mineral resources have a great amount of uncertainty as to their existence and as to whether they can be mined economically. It cannot be assumed that all or any part of the inferred mineral resources will ever be upgraded to a higher category.  
4. Mineral resources have been estimated at a minimum GT (grade-thickness) of 0.130 m% U₃O₈.  
5. The geological model employed for Inkai involves geological interpretations on section and plan derived from surface drillhole information.
(6) Mineral resources were estimated on the assumption of using the in-situ recovery extraction method.

(7) Mineral resources were estimated with the GT (grade-thickness) method using 2-dimensional block models.

(8) No known environmental, permitting, legal, title, taxation, socio-economic, political, marketing or other issues are expected to materially affect the above estimate of mineral resources, other than a possible permitting issue. This possible permitting issue is discussed below Table 1-2 and in Section 17.3.

(9) Mineral resources that are not mineral reserves do not have demonstrated economic viability.

(10) Totals may not add up due to rounding.

A summary of the estimated mineral reserves for Inkai with an effective date of December 31, 2009 is shown in Table 1-2.

Table 1-2: Summary of Mineral Reserves – December 31, 2009

<table>
<thead>
<tr>
<th>Category / Area</th>
<th>Tonnes (x 1000)</th>
<th>Grade % U₃O₈</th>
<th>Contained Million pounds U₃O₈</th>
<th>Cameco’s Share Million pounds U₃O₈</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proven Block 1</td>
<td>6,043</td>
<td>0.08</td>
<td>11.1</td>
<td>6.7</td>
</tr>
<tr>
<td>Probable Block 1</td>
<td>35,257</td>
<td>0.08</td>
<td>59.6</td>
<td>35.8</td>
</tr>
<tr>
<td>Probable Block 2</td>
<td>48,177</td>
<td>0.06</td>
<td>64.0</td>
<td>38.4</td>
</tr>
<tr>
<td>Total Probable</td>
<td>83,434</td>
<td>0.07</td>
<td>123.6</td>
<td>74.2</td>
</tr>
<tr>
<td>Total Reserves</td>
<td>89,477</td>
<td>0.07</td>
<td>134.7</td>
<td>80.9</td>
</tr>
</tbody>
</table>

Notes:

1. Pounds U₃O₈ are those contained in mineral reserves and are not adjusted for the estimated metallurgical recovery of 80 %.
2. Cameco’s share is 60 % of total mineral reserves.
3. Inkai mineral reserves have been estimated at a GT (grade-thickness) cut-off of 0.130 m%U₃O₈.
4. The Inkai geological model involves geological interpretations on section and plan derived from surface drillhole information.
5. Mineral reserves have been estimated with no allowance for dilution, as dilution is not applicable to mining a deposit using the ISR extraction method.
6. Mineral reserves were estimated based on the use of the ISR extraction method. The production rate is planned for 5.2 million pounds U₃O₈ per year based on 80 % recovery.
7. Mineral reserves were estimated with the GT (grade-thickness) method using 2-dimensional block models.
8. An average price of $54 per pound U₃O₈ was used to estimate the mineral reserves.
9. No known environmental, permitting, legal, title, taxation, socio-economic, political, marketing, or other issues are expected to materially affect the above estimate of mineral reserves other than a possible permitting issue. This possible permitting issue is discussed below this table and in Section 17.3.
10. Totals may not add up due to rounding.

The mineral reserve estimates of Inkai assume annual production of 5.2 million pounds of U₃O₈. JV Inkai has regulatory approval to produce 2.6 million pounds,
and intends to increase production to 5.2 million pounds per year. Cameco expects JV Inkai will receive all permits and approvals required for this level of production and will seek regulatory approvals for an increase in production to 3.9 million pounds per year in 2010 and thereafter for a further increase to 5.2 million pounds per year in 2011. The approval process for the initial production increase to 3.9 million pounds per year is under way and has the support of KazAtomProm. Once the initial approval is received, the subsequent application for an increase to 5.2 million pounds per year will be commenced. If JV Inkai does not receive approval to increase production, half of Inkai’s mineral reserves will be re-categorized as mineral resources.

The annual production rate is based on 80% recovery. Operational performance so far and plant design indicate that a higher percentage of recovery may be sustainable.

Mineral resources in the indicated and inferred mineral resource categories have not been included in the current mine plan. Mineral resources have no demonstrated economic viability.

1.7 Current Exploration

The exploration work conducted on the northern flank (Block 3) of the Inkai deposit resulted in the identification by JV Inkai of an extensive zone of mineralization hosted by several horizons in the lower and middle parts of the Upper Cretaceous stratigraphic level and traced along approximately 25 km from Block 2 in the southwest through to the Mynkuduk deposit in the northeast. The mineralization thus identified is a potential commercial discovery that requires further assessment of its commercial viability.

The licence for Block 3 expires in July 2010. JV Inkai has filed an application with the Competent Authority declaring that it has made a potential commercial discovery at Block 3. In accordance with Kazakh regulatory procedures, JV Inkai has also applied for an extension of the licence term. See Section 19.2.3 for more information.

JV Inkai spent $7.0 million on exploration at Block 3 in 2009 and plans to spend $31.3 million at Block 3 in 2010.

1.8 Mining

Mining at Inkai is based on the 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 lixivant, which goes to settling ponds and then to the main processing plant (which has a capacity to produce 5.2 million pounds annually) for production of uranium as yellowcake.

- Well field development practices using an optimal pattern design to distribute barren lixivant (a solution of sulphuric acid and water) to the well field injectors and to then collect lixivant, which carries the dissolved uranium back to the main processing plant or satellite plant, as the case may be. The satellite plant produces uranium loaded ion exchange resin which is taken to the main processing plant for processing;

- Preparation of a production sequence which will deliver the uranium-bearing lixivant to meet production requirements considering the rate of uranium recovery, lixivant uranium head grades, and well field flow rates;

- Determination of the cut-off grades 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 grade applies to individual producer wells and dictates the lower limit of operation once a well has entered production;

- The above factors are used to estimate the number of operating well fields, well field patterns and well field houses over the production life; and

- Determination of the unit cost of each of the mining components required to realize the production schedule, including drilling, well field installation, and well field operation.

At Inkai there will be ongoing well field development in both Blocks 1 and 2 to support the current production plan. In order to maintain the planned annual production of 5.2 million pounds from the current mineral reserves of these two Blocks, two additional satellite processing plants are required. The economic analysis includes the estimated construction capital of $100 million for these two plants. The current plan is for the engineering design and construction of one plant at Block 1 to commence in 2011 and the second plant in the next decade.
1.9 Processing

Inkai utilizes a conventional well established ISR technology. As the 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 sulphuric acid;
- Uranium recovery from solution with ion exchange resin;
- Precipitation of uranium with hydrogen peroxide;
- Product thickening, dewatering, and drying; and
- Packaging of final product U₃O₈ (yellowcake).

Inkai is designed to produce a dry uranium product that meets the quality specifications of uranium refining and conversion facilities.

1.10 Environmental Assessment and Licensing

In recent years, Kazakhstan has amended its environmental protection laws and adopted environmental regulations that require industrial companies, such as JV Inkai, to initiate programs to reduce, control or eliminate various types of pollution. The regulations are enforced primarily through the imposition of payment obligations on an entity based on the entity’s levels of emissions, discharges and waste storage. JV Inkai is liable to pay an annual fee (payable on a quarterly basis) for specified levels of emissions, discharges and waste storage. Exceeding these specified levels for emissions, discharges and waste storage may result in additional fees being required to be paid to the Kazakh State.

Furthermore, JV Inkai is required to obtain certain permits and licences to operate Inkai, as it is a nuclear facility. The primary regulatory authorities that issue permits/licences/approvals are: the Ministry of Industry and New Technologies of the Republic of Kazakhstan (replacing MEMR and the Ministry of Industry and Trade of the Republic of Kazakhstan as of March 12, 2010) and the Environmental Protection Ministry of the Republic of Kazakhstan.

With regard to the foregoing environmental protection requirements, JV Inkai has applied for, and received, several permits for environmental emissions. The primary emissions permit is valid until December 2010, while other permits for drilling activities are valid until December 2012. JV Inkai also holds several water use permits which are valid through August 2011 and December 2011.

JV Inkai holds the following additional material licences with regard to its mining activities:
“Licence for performance of works connected with stages of life cycle of objects
of use of atomic energy”, issued on January 18, 2010, by the Committee of
Atomic Energy of the MEMR;

“Licence for operation of mining production and mineral raw material processing”,
issued on December 23, 2009, by the Committee of State Energy Supervision of
the MEMR;

“Licence for transportation of radioactive substances within the territory of the
Republic of Kazakhstan”, issued on November 18, 2008, by the Committee of
Atomic Energy of the MEMR; and

“Licence for dealing with radioactive substances” issued on August 29, 2008, by
the Committee of Atomic Energy of the MEMR.

These licences are currently in force and are of indefinite term.

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 its environmental permits requires: (i) submission of an
annual report on emission levels to Kazakhstan’s environmental authorities; (ii)
compliance with the provisions of each permit; and (iii) payment of any
environmental payment obligations, exclusive of payments for violations.

1.11 Production Plan and Mine Life

JV Inkai’s production plan is based on current mineral reserves that are expected
to produce 107.9 million pounds U₃O₈ recovered by the mill. Based on maximum
annual production of 5.2 million pounds U₃O₈, there are more than enough
mineral reserves to produce the expected 107.9 million pounds through the
current term of each of JV Inkai’s licences (2024 for Block 1 and 2030 for Block
2). The projected mine life is 21 years.

The Inkai production plan over its mine life is presented on Figure 1-1.
1.12 Economic Analysis

This economic analysis is undertaken from the perspective of JV Inkai and is based on JV Inkai’s share (100%) of Inkai’s mineral reserves. The economic analysis assumes that 80% of the mineral reserves are recoverable as saleable yellowcake.

The financial projections set forth herein do not contain any estimates relating to the potential mining and milling of mineral resources, as only mineral reserves have demonstrated economic viability. Accordingly, expenditures required to bring any of the mineral resources into production or to identify additional mineral reserves and mineral resources, have not been included.

Based on information provided by JV Inkai, remaining capital costs, as of January 1, 2010, for JV Inkai are estimated to be $359.2 million, which includes $208.6 million for well field development. It is assumed that well field development costs will gradually decline over the last five years of production. Of the remaining $150.6 million, $133.6 million is for construction and $17 million is for sustaining capital. Of the $133.6 million for construction capital, $100 million is for the construction of two additional satellite processing plants.

Average operating costs over the mine life, excluding taxes and royalties are estimated to be $17.55 per pound U₃O₈. This includes mining costs, processing costs, site administration, and corporate overhead (includes marketing and transportation costs).
Mineral Extraction Tax (MET) estimates have been provided by JV Inkai. The MET rate is assumed to be 22% over the life of the mine.

Estimated corporate income taxes have been calculated as 20% of income after depreciating the capital investment over the life of the Inkai operation. The corporate tax rate is assumed to be 20% for the life of the mine as there is uncertainty if the 15% rate contemplated by the new Tax Code will take effect in 2014. See Section 4.3 for more information.

The analysis assumes no excess profits tax is payable. JV Inkai’s current view is that under the new Tax Code, which took effect January 1, 2009, it will not be liable to pay any excess profits tax.

The analysis results in an estimated after tax NPV (at a 12% discount rate) of $1.03 billion to JV Inkai as at January 1, 2010.

Figure 1-2 shows estimates of the sensitivity of the after tax NPV to changes in revenue, operating costs and capital costs over a range of -10% to +10% from the base case shown as 0%. Changes to either the uranium price or the grade of solution presented to the mill will have an equivalent impact on the revenue stream. Consequently, the sensitivity to revenue illustrates the sensitivity of the NPV to each of these variables. Capital already invested has been treated as a sunk cost and is not accounted for in arriving at the NPV estimate.

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

**Figure 1-2: NPV sensitivity estimates**
1.12.1 Payback

Payback for JV Inkai, including all 2009 and prior costs, would be achieved during 2012 on an undiscounted, after tax basis.

1.13 Project Risks

There are a number of project risks relating to Inkai. These include availability of sulphuric acid required for ISR mining, the need for regulatory approvals to achieve planned production and retain Block 3, compliance with requirements of the Resource Use Contract and Kazakh laws and regulations, the need for ongoing support, agreement and cooperation from KazAtomProm and the Kazakh government, and political risk. Cameco believes that while operating in Kazakhstan today is challenging, it is manageable.

1.14 Conclusions and Recommendations

1.14.1 Blocks 1 and 2

Blocks 1 and 2 have the potential to support a significant increase in production by JV Inkai to an annual rate of 5.2 million pounds. Based on a mine life of approximately 21 years, Inkai would produce an estimated 107.9 million pounds of U₃O₈.

The economic analysis shows a projected after tax NPV, as of January 1, 2010, using a 12% discount rate, to JV Inkai of $1.03 billion for Blocks 1 and 2 mineral reserves. The sensitivity analysis demonstrates that Inkai can withstand financially negative events, such as increasing costs, or decreased prices and ore grades, and still continue to deliver strong cash flows.

Remaining capital costs, as of January 1, 2010, for Inkai are estimated to be $359.2 million, which includes $208.6 million for well field development.

JV Inkai still requires regulatory approvals to produce at the increased annual production rate of 3.9 million pounds for 2010 and 5.2 million pounds for 2011 and remaining life of mine, which approvals Cameco expects JV Inkai to receive. These approvals would be documented by an amendment to the Resource Use Contract.

It is recommended that JV Inkai increase production, once the necessary regulatory approvals have been secured. Based on the robust economics for the Inkai operation, JV Inkai plans to proceed with the development required to increase annual production to 5.2 million pounds from Blocks 1 and 2 as described in this technical report. This is supported by the economic analysis,
showing a strong after tax NPV that is resilient to changes in capital cost and operating cost, and to a lesser extent revenue.

It is recommended that JV Inkai continue to examine the feasibility of increasing production to 10.4 million pounds as contemplated by the May 2007 Memorandum of Understanding between Cameco and KazAtomProm.

1.14.2 Block 3

Cameco is of the opinion that Block 3 has the potential to support a commercial discovery.

To facilitate the planned exploration JV Inkai applied to the Competent Authority for an extension of its Block 3 licence for five years, the period required for an appraisal of a potential commercial discovery under the Subsoil Law. JV Inkai’s rights to Block 3 expire on July 13, 2010 if the extension is not granted.

JV Inkai plans to include a diamond drilling program within Block 3 with the goal of supporting the declaration of a commercial discovery. JV Inkai plans to spend $31.3 million on Block 3 in 2010. In anticipation of receiving the licence extension, JV Inkai commenced its 2010 Block 3 exploration program.

The authors of this technical report concur with, and recommend that JV Inkai proceed with, the foregoing plans.
2 INTRODUCTION

2.1 Introduction and Purpose

Cameco has concluded that Inkai is now a material property for Cameco under Canadian securities laws. Cameco is therefore required to file a technical report on Inkai prepared in accordance with NI 43-101 with Canadian securities regulators.

To discharge this legal obligation, this technical report has been prepared for Cameco in support of the disclosure of scientific and technical information relating to Inkai that is material to Cameco, contained in Cameco’s Annual Information Form for 2009, Cameco’s Management Discussion and Analysis filed with securities regulators on February 25, 2010 and a Cameco press release dated February 24, 2010.

The report has an effective date of December 31, 2009 and has been prepared in compliance with NI 43-101 by the following individuals.

- Charles J. Foldenauer, P. Eng., Deputy General Director, Operations, JV Inkai.

The individuals noted above are QPs within the meaning of NI 43-101 responsible for the content of this technical report. They are also considered “internal” qualified persons, not “independent” of Cameco within the meaning of NI 43-101. Both QPs have visited Inkai. The date and duration of each QP’s most recent inspection of Inkai are included in their respective Certificate of Qualified Persons filed with this technical report under Cameco’s profile on SEDAR.

Alain G. Mainville has visited the Inkai site on three occasions, the latest being on November 20-23, 2009. The scope of his last personal visit to the Inkai site included meetings with JV Inkai and Volkovgeology personnel and field inspections of drilling, sampling, core logging, sample preparation and assaying, geological and geophysical modelling. Mr. Mainville has been involved with Inkai since 2002.

Charles J. Foldenauer is the Deputy General Director, Operations and his work location is at the mine itself. Mr. Foldenauer has been employed by JV Inkai in the position since January 2009. He is usually present at the Inkai site every second month for a period of a month. His most recent personal inspection of the Inkai Operation started on March 13, 2010 for a planned duration of one month.
2.2 Report Basis

This technical report has been prepared with available internal Cameco and JV Inkai data and information and 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 22.

All monetary references in this technical report are expressed in United States dollars.
3 RELIANCE ON OTHER EXPERTS

In the context of Form 43-101F1, Item 5, the authors have relied, and believe they have a reasonable basis to rely, upon the following individuals who have contributed the legal, social, environmental, marketing and taxation information stated in this technical report, as noted below:

Larry Korchinski, LLB, Director, Legal Services, Securities Compliance, Cameco Corporation, Sections 4.1.1. (a description of exploration and mining licenses), 4.1.3 (a description of the Subsoil Law), 4.1.4 (a description of strategic deposits), 4.1.5 (a description of assignment and transfer of Subsoil Use Rights), 4.1.6 (a description of the Draft Subsoil Law) and 6.1 (a description of ownership).

Glen Hein, P.Eng., Director, Safety, Health, Environment and Quality, JV Inkai, Sections 4.4 (a description of known environmental liabilities) and 18.6 (a description of environmental considerations).

Nathan Flaman, Senior Analyst, Cameco Corporation. Sections 18.4 (a description of uranium sales contract and price) 18.3 (a description of markets) and 18.7 (a description of taxes).
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 26’ north latitude and 67º 29’ east longitude.

JV Inkai received a licence for mineral resource use and a licence for geological exploration in the Republic of Kazakhstan. Licence Series AY 1370D, dated April 20, 1999, is for extraction of uranium in the area defined as Block 1 near the town of Taikonur. Licence Series AY 1371D, dated April 20, 1999, is for exploration and further mining in the areas designated as Blocks 2 and 3, also near the town of Taikonur (Figure 4-1).

The associated subsoil use contract (Resource Use Contract), covering both licences, was signed by the government and JV Inkai in July 2000.
Figure 4-1: Location Map
4.1.1 Exploration and Mining Licences

Licence Series AY 1370D is a mining concession and allows for the mining of uranium in a 16.58km$^2$ area designated as Block 1 in the Suzak District of the Republic of Kazakhstan. Mining is to be conducted in the Inkuduk and Mynkuduk zones, which are at depths ranging from 300 to 520 m from the surface.

The April 20, 1999 Licence AY 1370D includes an Attachment 2 which provides a list of geographical coordinates of 14 points delimiting the licence area. These coordinates in degrees, minutes and seconds have been correlated with a list of coordinates that are in the same system of coordinates as the one used by Volkovgeology. These coordinates have been used to plot the limits of the licence area.

Licence Series AY 1371D is a geological concession and allows for the exploration and further mining of uranium in a 470km$^2$ area designated as Blocks 2 (about 230 km$^2$) and 3 (about 240 km$^2$) in the Suzak District of the Republic of Kazakhstan.

Test mining operations commenced in April 2002 at Block 2 and an expansion of the test mine was completed in 2006. In 2008, JV Inkai received an initial approval for the mining licence for Block 2 to replace its exploration licence. On October 19, 2009, JV Inkai and the Competent Authority (then MEMR) signed Amendment No.2 to the Resource Use Contract whereby mining at Block 2 was approved through the combination of Blocks 1 and 2 for mining and reporting purposes. This combination does not merge the two licences. The mining licence for Block 2 expires in 2030. The mining licence for Block 1 expires in 2024.

The licence for Block 3 expires July 13 2010. JV Inkai has filed an application with the Competent Authority declaring that it has made a commercial discovery at Block 3 and is seeking an extension of its Block 3 licence. See Section 19.2.3 for more information.

4.1.2 2007 Memorandum of Understanding

Cameco and KazAtomProm signed a non-binding Memorandum of Understanding (MOU) in May 2007 to double future annual production capacity from Inkai to 10.4 million pounds on a timeframe yet to be confirmed. While the existing JV Inkai ownership would not change, Cameco’s share of the additional capacity under the MOU would be 50%. If the 10.4 million pounds production target is achieved, Cameco’s share of the annual production would rise to 5.7 million pounds. The production increase was approved by Cameco and KazAtomProm at a JV Inkai owners meeting in July 2008. A binding agreement to finalise the terms of the MOU and various government approvals are required.
to implement this production increase. The MOU also contemplates studying the feasibility of constructing a uranium conversion facility as well as considering other collaboration in uranium conversion. Cameco is currently in discussions with KazAtomProm regarding these initiatives.

4.1.3 The Subsoil Law

The principal legislation governing subsoil exploration and mining activity in Kazakhstan is the Law on the Subsoil and Subsoil Use, dated January 27, 1996, as amended (the Subsoil Law). This 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 Kazakh State property, while resources brought to the surface belong to the subsoil user, unless otherwise provided by contract.

In order to develop mineral resources, the appropriate State agency (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 may be terminated by the State if the counter-party does not satisfy its contractual obligations, which generally include compliance with long-term and annual work program commitments, payment of taxes to the State and the satisfaction of mining, environmental, safety and health requirements. Currently, the Ministry of Industry and New Technologies is the Competent Authority.

Until amendments to the 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 twenty-five 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 Government of Kazakhstan 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 subsoil 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 subsoil use contract. An entity which obtained a subsoil use right after August 1999 holds its rights on the basis of a subsoil use contract alone.
The subsoil use rights held by JV Inkai came into effect upon the issuance of its two licences (1999), the conclusion of its Resource Use Contract (July 2000), and approval of the Resource Use Contract by applicable State entities.

In accordance with the August 1999 amendments to the Subsoil Law, Cameco believes the licences held by JV Inkai are governed by the version of the Subsoil Law in effect at the time of their issuance in April, 1999.

Subsoil rights become effective upon conclusion of a contract with the Competent Authority. Pursuant the Subsoil Law, a subsoil user is accorded, *inter alia*, the exclusive right to conduct mining operations, to erect production and social facilities, to freely dispose of its share of production and to conduct negotiations for extension of the contract. Under clause 6.1 of the Resource Use Contract, the State has a priority right to acquire up to one percent (1%) of JV Inkai’s estimated annual production of uranium from the Blocks.

While the Subsoil Law contains guarantees providing that changes to legislation (except legislation involving national defence or security, ecological safety and public health) which worsen the position of the subsoil user are not applicable, the government has gradually weakened this stabilization guarantee, particularly in relation to new projects, and the national security exception is applied broadly to encompass security over strategic national resources.

**4.1.4 Strategic Deposits**

On August 19, 2009, a Governmental Resolution “On Determination of the List of Subsoil (Deposit) Areas having Strategic Importance” came into force whereby 231 blocks, including all three of JV Inkai’s Blocks, were prescribed as strategic deposits.

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 significant adverse change to the economic interests of Kazakhstan, which create a threat to national security, the Competent Authority is entitled to require an amendment to the contract for the purpose of restoring the economic interests of Kazakhstan. The Subsoil Law prescribes strict deadlines for the parties to negotiate and execute any such required amendments.

The Subsoil Law also allows the Competent Authority, with the consent of the State, to unilaterally refuse to perform its obligations under a contract if it determines that the subsoil use operations conducted thereunder will result in a material adverse 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 refusal. Under this
provision, the Competent Authority also has the right to unilaterally terminate a contract without having to comply with the civil law provisions requiring a party to apply to a court or arbitration panel for termination.

The stated basis for exercise by the Competent Authority of any of the aforesaid powers is a "significant change in the economic interests of the State", but so far no clear definition of "significant change" and "economic interests" have been developed under Kazakhstan law.

4.1.5 Assignment and Transfer of Subsoil Use Rights

Amendments to the 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 permits the Republic of Kazakhstan to purchase any such subsoil use rights or equity interests being offered for transfer on terms no less favourable than those offered by other purchasers. The Competent Authority has the right to terminate a subsoil contract if a transaction takes place in breach of this law. According to the Subsoil Law requirements, these provisions apply both to Kazakhstan and overseas entities, including publicly traded companies.

Also, Article 14 of the Subsoil Law requires 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 designated Competent Authority, MEMR customarily interpreted this requirement very widely, to include any alienation of rights, including, for example, in bankruptcy or by merger or amalgamation.

4.1.6 Draft Subsoil Law

Currently, the Parliament of the Republic of Kazakhstan is considering a draft Subsoil Law (the Draft Subsoil Law). While this Section describes the principal changes proposed to be introduced based on the latest publicly available draft of the Draft Subsoil Law, it is possible that the enacted version of the Draft Subsoil Law will differ from this draft or that no new legislation will be enacted.

The Draft Subsoil Law, if enacted in its currently proposed form, will introduce significant changes in terms of the regulation of the activities of subsoil users.

The current Subsoil Law contains a stabilization clause, Article 71, which provides that amendments and changes in legislation that worsen the position of the subsoil user shall not apply to subsoil use contracts concluded prior to the introduction of such amendments and changes. The guarantees expressly do not
extend to amendments and changes to legislation in the sphere of defence, national security, environmental protection and health. The Draft Subsoil Law retains the stabilization clause, however, it expands the list of exceptions to the guarantee of stability by adding taxation and customs regulation. Amendment No. 2 to the Resource Use Contract eliminated its tax stabilization provision.

The dispute resolution procedure set forth in the Draft Subsoil Law does not permit exclusive submission of a dispute for resolution by international arbitration. Instead it provides that if the disputes related to the performance, amendment or termination of a subsoil use contract cannot be resolved by means of negotiations, the parties may submit the dispute for resolution to a court in accordance with the laws of Kazakhstan. JV Inkai’s Resource Use Contract provides for international arbitration. The Draft Subsoil Law does not address which of these conflicting provisions will prevail.

The Draft Subsoil Law does not change the existing provisions regarding the State’s pre-emptive right as discussed in Section 4.1.5; however, it provides for certain exemptions which include: (i) the transfer of shares or other securities which are traded on an organized securities market and are issued by a subsoil user legal entity if such legal entity’s core activities relate to subsoil use in the Republic of Kazakhstan; and (ii) the transfer, in full or in part, of the subsoil use right between legal entities in which not less than 99% in the participatory interest (shareholding) is owned by one entity. An initial placement of shares in a subsoil user would still be subject to obtaining a waiver of the State's pre-emptive rights.

The Draft Subsoil Law also establishes a procedure (previously unspecified), to be followed when seeking a waiver of the Kazakhstan Government’s pre-emptive right as well as a non-exhaustive list of documents required for submission to the Competent Authority in this regard.

The current Subsoil Law provides for a judicial procedure for setting aside termination or renewal of a subsoil use contract in applicable circumstances. Under the Draft Subsoil Law, the Competent Authority has the power to renew a subsoil use contract that was earlier terminated by the Competent Authority without the need for recourse to the courts, provided an application for renewal is made within 6 months of the termination and the Competent Authority believes that the decision to terminate the contract was made on the basis of inaccurate or unreliable information or the failure to perform or duly perform contractual obligations due to force-majeure circumstances.

The Draft Subsoil Law does not contemplate the concept of combined subsoil use contracts for both production and exploration. Since the Resource Use Contract is a combined contract for exploration and production of uranium, there
may be a risk that the State may require JV Inkai to negotiate a new production contract to replace its existing combined exploration and production contract.

4.1.7 Work Programs

In addition to following its obligations under its licences and 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 mining operations over the life of the mine (Work Program), as well as the annual work programs which it must submit to the Competent Authority for approval each year. Such annual work programs cover, \textit{inter alia}, the introduction of new technologies or processes and define the levels of production volumes anticipated by the subsoil user in each coming year.

Any changes in the Work Program or in annual work programs require application to the Competent Authority, generally supported by a technical study and corporate approvals of the subsoil user approving the requested changes.

4.2 Mine and Infrastructure

All current mineral reserves and mineral resources for Blocks 1 and 2 are contained within Licences AY 1370D and AY 1371D.

A discussion of the buildings and infrastructure at Inkai is included in Section 5.5.

4.3 Tax and Royalties

The Resource Use Contract lists the taxes, duties, fees, royalties and other governmental charges that are payable by JV Inkai.

However, on January 1, 2009 a new Tax Code of the Republic of Kazakhstan (Tax Code) took effect. Pursuant to the Tax Code, a number of changes have been introduced to the taxation regime of subsoil users.

The most significant changes to the tax regime previously applicable to the Resource Use Contract now introduced by the Tax Code are:

- The abolition of the stabilization of tax regimes provided by subsoil use contracts. Prior to the October 2009 amendment, the Resource Use Contract contained a tax stabilization provision. At the request of the MEMR, in October 2009, JV Inkai signed an amendment to the Resource Use Contract to adopt the Tax Code, which included elimination of the Resource Use Contract’s tax stabilization provision. Cameco does not expect that the Tax Code will have a material impact on JV Inkai at this time; however, elimination of the tax stabilization provision could be material in the future.
The rate of the corporate income tax on aggregate income was set at 20% during the period January 1, 2009 to January 1, 2010; 17.5% during the period January 1, 2010 to January 1, 2011; and 15% commencing January 1, 2014. However, these rates have been suspended until 2014, with government setting the corporate income tax rate at 20%. In 2007, JV Inkai became subject to income tax. Under the Resource Use Contract the corporate income tax rate was 30%.

The Tax Code has replaced the previous royalty regime with a new tax – the Tax on Production of Useful Minerals, a mineral extraction tax previously defined as MET. MET must be paid on minerals and certain other substances extracted. Under the prior law, JV Inkai would pay royalties, calculated on a graduated scale, based on the sales price of production in each year.

Under the Resource Use Contract, a one-time payment of a commercial discovery bonus is payable when confirmation is received of Kazakh-defined recoverable reserves located in a particular licensed area. Under the Tax Code the rate for future commercial discoveries is increased to 0.1% of the value of Kazakh-defined recoverable reserves. Previously, the bonus was calculated as 0.05% of the value of Kazakh-defined recoverable reserves. JV Inkai paid a bonus of $14 million in 2008 in relation to reserves at Block 2.

The Tax Code changes the calculation of excess profits tax from that contained in the Resource Use Contract. However, JV Inkai is currently of the view that it will not be liable to pay any excess profits tax for the foreseeable future.

### 4.4 Known Environmental Liabilities

JV Inkai’s mining activities must comply with the environmental requirements of Kazakhstan legislation 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 dated January 9, 2007 (and effective from February 3, 2007), which replaced the three principal prior laws on environmental protection.

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 the mining process.
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 environmental impact assessment (EIA or OVOS).

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 or criminal penalties, 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 or revoke the permits. JV Inkai has applied for and received a permit for environmental emissions valid until December, 2010 and emission permit(s) for drilling activities valid until December 2012.

Pursuant to the Water Code, of July 9, 2003, 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 rights permits effective until August, 2011 and December 2011. 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, quality of nearby surface water, groundwater quality, levels of contaminants in soil and the creation of solid waste. It must also submit annual reports on pollution levels to the Kazakhstan 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.

Inkai is subject to decommissioning liabilities which are largely defined by the terms of 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. The account has been fully funded by JV Inkai in this amount.

Recently the Parliament of Kazakhstan ratified the country’s accession to the United Nations Framework Convention on Climate Changes (Kyoto Protocol). The Kyoto Protocol’s objective is to limit or capture emissions of greenhouse gases such as carbon dioxide and methane. It is expected that Kazakhstan may enact new environmental health and safety requirements as well as other legislation to ensure compliance with the Kyoto Protocol. Based upon its current operations, JV Inkai believes the cost of compliance would not be material.

4.5 Permitting

Please see Section 1.10 on Environmental Assessment and Licensing and Section 18.7.2 on Permitting.

4.6 Procurement Requirements

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

In particular, subsoil users are required not later than 30 calendar days from the date of approval of an annual work program, to approve an annual procurement program for the following year. JV Inkai has approved annual procurement programs for 2009 and 2010.

4.7 Local Content Requirements

Since 2002, Kazakhstan has implemented a policy aimed at replacing imports, and fostering greater involvement, support and stimulation of local producers (Local Content Policy).
Under the Local Content Policy, subsoil users are obliged to purchase local goods, works and services (GWS) in such percentages as may be specified in their subsoil use contracts. The Resource Use Contract obligates JV Inkai to use GWS unless specifically approved to the contrary by the applicable regulatory authorities. As a result, at least 40% of the costs of equipment and material must be for equipment and materials purchased of Kazakh origin and 90% of the contract work must be of Kazakh origin.
ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Access

The Inkai operation is located near the small town of Taikonur, approximately 370 km north of the city of Shymkent and approximately 125 km east of the city of Kyzl-Orda in the south-central region of Kazakhstan. Taikonur can be reached from Almaty by flying to one of the regional cities of Shymkent or Kyzl-Orda and then driving on paved and gravel roads (Figure 5-1).

The road to Taikonur is currently the primary access road for transportation of people, supplies and uranium product for Inkai. The road is constructed of gravel and crosses the Karatau Mountains.

Major airline service is available to Almaty from Europe, Russia and other regional countries. From Almaty, commercial airline services are available to the cities of 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 road for 120 km to the town of Shieli and then for 160km on gravel roads to Taikonur. The total trip time through Shymkent from Almaty is about ten hours.

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

5.2 Climate

The Inkai operation lies in the Betpak Dala Desert, which is characterised by an arid climate with minimal precipitation and relatively high evaporation. 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 -8.9°C. July is the warmest month, when temperatures climb to an average of +27.7°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/y 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 and almost uninterrupted winds. The prevailing direction of the wind is north-east 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; and
- 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 elevations.

5.4 Local Resources

Currently, Taikonur has a population of about 450 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 mineral property with sufficient surface rights to meet future mining operation needs for the current mineral reserves as well as site facilities and infrastructure. A site plan of the existing infrastructure general arrangement is shown in Figure 5-2. Site facilities include a camp for 400 employees with catering and leisure facilities. The camp area has a perimeter fence for security and adequate yard space for recreation activities. There is no garage or administrative facilities in Taikonur. At the Block 1 mine site there is an administrative office, shops, garage, main processing plant, holding ponds, waste
disposal enclosures for low-level radioactive waste and domestic waste, laboratory and emergency response building (manned 24/7 by fire services personnel) engineering and construction offices (*Figure 5-3*). In Block 2 there is a satellite processing plant, holding ponds, an office, small shops, and a food services facility (*Figure 5-4*).

The electrical supply for Inkai is from the Kazakh power grid. Inkai is connected to the grid via a 35kV power line which is a branch of the circuit that supplies the Stepnoye mine east of Inkai.

Telephone communications utilize a satellite internet system.

Inkai has access to sufficient water from ground water wells for all planned industrial activities. Potable water for use at the camp is supplied from shallow wells on site. Sewage disposal at the camp is in a standard septic tank and leach field system. 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.

A fire protection system has been installed that includes a water storage tank and pumps.
Figure 5-1: General Location Map
Figure 5-2: Blocks 1 and 2 – Infrastructure General Arrangement
Figure 5-3: Location Map of Block 1 Main Processing Plant
Figure 5-4: Location Map of Block 2 Satellite 1 Plant
6 HISTORY

6.1 Ownership

There were several changes in ownership of participating interests in JV Inkai in the late 1990’s. The current participants and their participating interests are Cameco, with a 60% direct participating interest, and KazAtomProm, with a 40% direct participating interest.

JV Inkai was first registered by the Kazakhstan Ministry of Justice on March 21, 1996, under registration number 1032-1900-TOO (YO) as a Kazakh-German-Canadian joint venture, established by and among Cameco, Uranerzbergbau-GmbH and National Joint Stock Company Atomic Power Engineering and Industry “KATEP” (KATEP). The participating interest of each founder was 33 1/3%.

In 1997 KazAtomProm was established. Consequent upon Presidential Decrees of July 14 and July 22, 1997, and a subsequent agreement between KATEP and KazAtomProm of March 5, 1998, all of KATEP’s participating interest in JV Inkai was transferred to KazAtomProm.

On August 11, 1998, pursuant to an Acquisition Agreement between Uranerzbergbau-GmbH, Cameco and Cameco Resources (US) Inc., Cameco acquired all of the participatory interest of Uranerzbergbau-GmbH in JV Inkai. As the result of such acquisition, Cameco became the owner of a 66 2/3% participatory interest in JV Inkai.

On November 20, 1998, Cameco agreed to transfer a 6 2/3% participatory interest in JV Inkai to KazAtomProm, which resulted in Cameco holding, in total, a 60% participating interest in JV Inkai.

Thereafter, JV Inkai was re-registered by the Kazakhstan Ministry of Justice on December 7, 1998, under registration number 9783-1958-TOO (I/U) (business identification number 960340001136).

6.2 Exploration and Development History

The Inkai deposit was discovered in 1976-78 by crew GPC-27 of 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 new large 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 it was increased to 200 by 50 m. In contrast, Block 3 was characterized by significantly lower densities of drilling, ranging from 800 m by 50 m to 1600 m - 3200 m by 100 m - 800 m. All historic exploration and delineation drilling, 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 is presented in Section 11, on Figure 11-1.

**Table 6-1: Historical Drilling**

<table>
<thead>
<tr>
<th>Block</th>
<th>Area (km²)</th>
<th>Number of holes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17</td>
<td>1368</td>
</tr>
<tr>
<td>2</td>
<td>230</td>
<td>2294</td>
</tr>
<tr>
<td>3</td>
<td>240</td>
<td>510</td>
</tr>
</tbody>
</table>

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.

### 6.3 Historical Mineral Resource and Mineral Reserve Estimates

The Kazakh-approved estimates of uranium reserves for Block 1 as at November 1993 and for Block 2 as at February 1996, are given in Tables 6-2 and 6-3. These estimates were included as attachments to Licences AY 1370D and AY 1371D obtained by JV Inkai in April 1999. Cameco does not consider them as current mineral resources or mineral reserves as defined in Sections 1.2 and 1.3 of NI 43-101. They are not classified in accordance with the categories set out in NI 43-101.

**Table 6-2: Historical Kazakh Reserves for Block 1 as of November 1993**

<table>
<thead>
<tr>
<th>Area</th>
<th>Kazakh Categories</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>C1</td>
</tr>
<tr>
<td>Tonnage (kt)</td>
<td>7,463</td>
<td>48,548</td>
</tr>
<tr>
<td>Grade (%U₃O₈)</td>
<td>0.084</td>
<td>0.077</td>
</tr>
<tr>
<td>Uranium (million pounds U₃O₈)</td>
<td>13.74</td>
<td>81.44</td>
</tr>
</tbody>
</table>
Table 6-3: Historical Kazakh Reserves for Block 2 as of February 1996

<table>
<thead>
<tr>
<th>Area</th>
<th>Kazakh Categories</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>C1</td>
</tr>
<tr>
<td>Block 2</td>
<td>Tonnage (kt)</td>
<td>7,433</td>
</tr>
<tr>
<td></td>
<td>Grade (%U₃O₈)</td>
<td>0.069</td>
</tr>
<tr>
<td></td>
<td>Uranium (million pounds U₃O₈)</td>
<td>11.30</td>
</tr>
</tbody>
</table>

Note: A mistake was later identified in the Block 2 listed reserve inventory, since no reserves under category C1 were approved and no transfer from C2 was made.

In Kazakhstan and other countries of the Commonwealth of Independent States (CIS), mineral resources and reserves are classified according to the 1981 “System of Classification of Reserves and Resources of Mineral Deposits”. This classification system uses seven categories in three groups based on the level of exploration performed. Table 6-4 presents Cameco’s reconciliation of the Kazakh classification system to the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) standard definitions.

Table 6-4: Reconciliation of Classifications of Mineral Reserves and Resources

<table>
<thead>
<tr>
<th>CIS Classification</th>
<th>CIS Categories</th>
<th>Comparable CIM Resources</th>
<th>Comparable CIM Reserves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explored Reserves</td>
<td>A and B</td>
<td>Measured</td>
<td>Proven / Probable</td>
</tr>
<tr>
<td>Explored Reserves</td>
<td>C</td>
<td>Indicated</td>
<td>Probable</td>
</tr>
<tr>
<td>Evaluated Reserves</td>
<td>C1</td>
<td>Inferred</td>
<td>-</td>
</tr>
<tr>
<td>Prognosticated Resources</td>
<td>P1, P2 and P3</td>
<td>Potential</td>
<td>-</td>
</tr>
</tbody>
</table>

The QP responsible for this Section has verified the historical resources and reserves for Block 1 and considers them reliable but not relevant, given that uranium extraction from Block 1 has occurred since January 1998. The historical resources and reserves for Block 2 as presented in this Section are not reliable and not relevant since they have been updated in 2007. More recent estimates for Blocks 1 and 2 are presented in Section 17, where they are classified in accordance with NI 43-101.

6.4 Historical Production - Test Mining

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 U₃O₈ of the estimated uranium in situ. This test
was a technical success in achieving a high uranium recovery rate from the test area in relatively short time frame.
7 GEOLOGICAL SETTING

7.1 Regional Geology

The geology of south-central Kazakhstan is comprised of a large relatively flat basin of Cretaceous to Neogene age continental clastic sedimentary rocks. The Cretaceous to Cenozoic 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 Greater Karatau Mountains on the southwest and the Chuskoa uplift 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. These sediments host several stacked and relatively continuous, sinuous “roll-fronts”, or oxidation-reduction (redox) fronts hosted in the more porous and permeable sand and silt units (Figure 7-1).

Economic uranium mineralization within the Chu-Sarysu basin has been studied extensively for 20 years, during the period between 1971 and 1991. Fifteen uranium deposits have been 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 ore region. They include the Zhalpak, Mynkuduk, Akdala, Inkai and Budyonovskoe deposits that form the Zhalpak-Budyonovskoe ore belt.

These deposits are all hosted within Cretaceous and Palaeogene sediments associated with large fluvial systems. Soviet geologists established the spatial relation for uranium ore between the boundaries of the yellow oxidized sand sediments of aquifers and unoxidized grey sand sediments in Uzbekistan in 1956, named “bed oxidation zones” by Soviet geologists. These are characterised by:

- Hydrodynamic conditions of infiltration artesian basins;
- Arid climate conditions of the ore deposition epoch; and
- Favourable lithologic-geochemical type of host rocks (grey-coloured, easily permeable sediments).
7.1.1 Aquifers within the Chu-Sarysu basin

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 and are not suitable for drinking. These upper aquifers are hydraulically isolated from the lower hydrogeological sub-stage aquifers by the regional, about 100 to 150 m thick, clay aquitard of the Lower and Upper Eocene.

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 (KAPE, 2006). 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 the proximity to Inkai. Groundwater from the Zhalpak aquifer is used for industrial and partial drinking water supply in the vicinity of the deposit site (production well 2021, south from the town of Taikonur).

- **Inkuduk aquifer**: contains brackish and slightly brackish water and is not suitable for drinking.

- **Mynkuduk aquifer**: contains brackish and slightly brackish water and is not suitable for drinking.

The groundwater movement in the Chu-Sarysu Basin is directed towards the north-westerly discharge areas. The annual natural flow rate averages 1 to 4 meters, depending on the various permeabilities of the different sand horizons.

The lower aquifers have a common recharge area (Karatau Mountains) and discharge into topographic depressions of the region-saline lands of Ashikol, Askazansor, and Lake Arys. Regional groundwater flows to the 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 Geology

The stratigraphic sequence at Inkai ranges from Cretaceous though Quaternary sediments. A schematic stratigraphic cross-section of Inkai is presented in Figure 7-2.

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 Turtkuduk and of the Taukent area (Kanzhugan and Moynkum).
The underlying Upper Cretaceous strata are divided into three horizons, listed from youngest to oldest (1) the Zhalpak horizon; (2) the Inkuduk horizon; and (3) the Mynkuduk horizon.

**Zhalpak horizon**

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

**Inkuduk horizon**

The Inkuduk horizon is Coniac-Santonian in age, and 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, the upper horizon – floodplain channel formations. The thickness of the Inkuduk horizon is up to 120 m.

The general plan of the Coniacian-Santonian time river network (Inkuduk horizon) 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.

**The Mynkuduk Horizon**

The Mynkuduk horizon is Turonian in age 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 8-10) elementary rhythms with a thickness up to several meters can be identified, each of them begins with coarse poorly sorted rocks – gravel, inequigranular sands with gravel and pebble and ends with small clastic rocks, sometimes interbeds (up to 10 to 20 cm) of dense sands on carbonaceous cement. In some areas in the basal part of the horizon there develop mottled sandy clays and siltstones of floodplain facies.

The dominating color of the rocks is greyish-green, light-grey of 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 Mynkuduk the unconformity is at a depth of about 250 m, deepening to 350 to 400 m at the Mynkuduk – Inkai boundary, to 500 to 600 m at the south end of Inkai, and to more than 700 m at Budyenovskoye.
Figure 7-2: Schematic Stratigraphic Cross-section, Inkai Operation
7.3 Local Hydrogeology

The unconsolidated Upper Cretaceous sediments provide an excellent groundwater-storing reservoir, some 250 to 300 meters thick. This reservoir is regionally confined by the underlying Palaeozoic rocks and the overlying thick Palaeogene marine clays. 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 total dissolved solids (TDS). At Inkai, from youngest to oldest bottom to top 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; and
- 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 meters above sea level. The general water table is at a depth of 8 to 10 meters at Inkai. A full breakdown of water geochemistry is not available for Mynkuduk; however, the water quality is expected to be similar to that at Inkai. The water table is typically at a depth of around 80 meters at Mynkuduk.

The Inkai deposit includes the lower hydrogeological sub-stage (Paleocene and Upper Cretaceous) particularly within Block 2. The hydrogeological conditions for the Quaternary-Upper Eocene sediments are not described here because aquifers of the upper sub-stage, with rare exception, are not hydraulically connected to the Inkai deposit.

Available hydrogeology information is summarized for the entire Inkai deposit without specification for different blocks. When specified, most of local data concern Block 1 and, to a lesser extent, Block 2. In the following Section, the hydrogeological concepts, unless stated differently, are explained for the Operation, and where possible, specifically for Block 2. Indeed, the aquifer hydraulic conductivities and transmissivities are the most variable hydrogeological properties, so for Block 2, they must be understood on a more local scale.
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-horizontal.

**Uvanas aquifer**

The Uvanas aquifer pinches out in the north of the site and increases in thickness up to 70 to 80 m in the south and south east, beyond the site boundary. At Inkai, the aquifer occurs at the depths of 170 to 280 m and has a thickness from 20 m to 30 m. Water bearing sediments are fine to medium grain sands.

Based on 15 single borehole pumping tests (Volkovgeology, 1991), the calculated transmissivity of the Uvanas aquifer at the site varies from 47 m²/d to 168 m²/d with horizontal hydraulic conductivities between 2.4 and 8.6 m/d. Cameco did not have access to all test borehole locations from Volkovgeology (1991); however, it is probable that the majority of the tests were conducted outside Block 2. Borehole yields were 1.56 to 11.06 L/sec.

**Zhalpak aquifer**

The Zhalpak aquifer is logged at the depths of 220 to 270 m in the north of the mine and at the depths of 280 to 355 m in the south. 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 1 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). 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.

Within Block 2, the hydraulic properties of the Zhalpak aquifer were characterized by ten pumping tests. From their interpretation (Volkovgeology, 1991), the estimated transmissivity varies from 226 m²/day to 575 m²/d with an average value of 413 m²/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**

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 (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 separate the Inkuduk aquifer from the upper and lower horizons. This aquifer hosts a portion of the ore zone of the mine. In Block 2, 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. Horizontal hydraulic conductivities obtained from different parts of test interpretation graphs were between 6.3 m/d and 22.8 m/d with 80% of values at the range 10 m/d to 18 m/d.

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 2.44 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 in average as 472 m²/d, 613 m²/day and 336 m²/d for the lower, the middle, and the upper horizons, respectively.

**Mynkuduk aquifer**

The top of the Mynkuduk aquifer is encountered at depths of 360 to 370 m with a thickness increasing from northeast to south-west from 30 to 40 m to 70 to 90 m. The average thickness of the aquifer at Block 2 is 47.7 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 north-east of Block 2 and the entire site, the clay content is slightly increasing in all sub layers and especially in upper sub-horizon of the Mynkuduk aquifer. The Mynkuduk aquifer hosts a portion of the ore zone. In Block 2, the lower boundary of uranium mineralization is found for
different locations at depths of 380 to 430 m; however, this aquifer contains minor mineralization (compared to the Inkuduk aquifer on Block 2).

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 1.53 to 16.66 L/sec with borehole specific yields between 0.21 to 2.62 L/sec/m.

Horizontal hydraulic conductivities at the deposit area vary from 7.1 m/d to 13 m/d with the average value of 10.9 m/d. Site transmissivities vary between 394 and 694 m²/d with the average value of 564 m²/d. Block 2 was characterized by 20 borehole tests prior to 1991.

Resulting horizontal hydraulic conductivities are generally higher for Block 2, than that for Block 1 with values varying between 7.4 m/d 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 m²/day to 755 m²/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**

<table>
<thead>
<tr>
<th>Aquifer/Aquitard</th>
<th>Hydraulic Conductivity (m/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Horizontal Kh</td>
</tr>
<tr>
<td>Uvanas</td>
<td>4.0</td>
</tr>
<tr>
<td>Upper Zhalpak aquitard</td>
<td>10-5</td>
</tr>
<tr>
<td>Zhalpak</td>
<td>14.6</td>
</tr>
<tr>
<td>Upper Inkuduk</td>
<td>3.0</td>
</tr>
<tr>
<td>Middle Inkuduk</td>
<td>10.5</td>
</tr>
<tr>
<td>Lower Inkuduk</td>
<td>14.4</td>
</tr>
<tr>
<td>Upper Mynkuduk</td>
<td>10.7</td>
</tr>
<tr>
<td>Lower Mynkuduk</td>
<td>10.3</td>
</tr>
</tbody>
</table>

Calibrated values of horizontal hydraulic conductivity are generally higher than vertical hydraulic conductivity values by about one order 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.

7.3.1 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 modeling 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 thin (1 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.
7.3.2 Piezometric Measurements

The majority of water level measurements were taken in Block 1 and most of those concerned the Mynkuduk aquifer (Volkovgeology, 1991; 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 m/y.

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 0.33 m/y and 1.15 m/y was observed the majority of exploration boreholes, with a site average of 0.5 to 0.7 m/y. 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-Chuiski 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 (0.11 to 0.3 m/y–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.

7.3.3 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 1.76 g/L). Uranium concentrations are $1.0 \times 10^{-7}$ to $2.1 \times 10^{-6}$ g/L; radium concentrations $1 \times 10^{-12}$ to $6 \times 10^{-12}$ 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 and it increasing from north to south with deepening of the layer. The groundwaters from both aquifers are of a SO₄-Cl-Na type. Uranium mineralization in Block 2 occurs in the middle and upper parts of the Inkuduk aquifer. In Block 1, uranium mineralization generally associates with Mynkuduk aquifer.
8 DEPOSIT TYPES

8.1 Roll-Front Deposits

The Inkai uranium deposit is a roll-front type deposit. Roll-front deposits are a common example of stratiform deposits that form within permeable sandstones in localised reduced environments. Microcrystalline uraninite, coffinite and pyrite are deposited during diagenesis by ground water in a crescent-shaped lens that cut across bedding and form at the interface between oxidized and reduced ground. Sandstone host rocks are medium to coarse grained; highly permeable at time of mineralization, subsequently restricted by cementation and alteration.

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 ore, source rocks for ore-related fluids are commonly in overlying or underlying mud-flat facies sediments.

Sediment-hosted vanadium deposits may be intimately associated with uranium. Sediment-hosted copper deposits may be in similar host rocks and may contain uranium.

Oxidized iron minerals occur in rock up-dip, with reduced iron minerals in rock down-dip from redox interface. Common ore controls include:

- Permeability;
- Sulphur species;
- Bedding sequences with low dips;
- Proximity of felsic plutons or felsic tuffaceous sediments; and
- Pathfinder elements include V, Mo, Se, locally Cu, and Ag.

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 ore region, and situated within the two basins that are separated by the Karatau Range uplift.

Soviet geologists established the spatial relation for uranium ore 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 (BOZ) deposits by Soviet geologists, and characterised by:

- Hydrodynamic conditions of infiltration artesian basins;
• Arid climate conditions of the ore deposition epoch; and

• Favourable lithologic-geochemical type of host rocks (grey-coloured, easily permeable sediments).

8.2 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 ore minerals are replaced by 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 colors 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; and

• **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 unoxidized. 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 meters, or rarely for a few hundred meters (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 MINERALIZATION

9.1 Host rocks

The Inkai deposit has developed along a regional system of superimposed mineralization redox fronts in the porous and permeable sand units of the Chu-Sarysu Basin. The overall strike length of the redox front at Inkai is 60 km. To the northeast, the mineralization is semi-continuous with the Mynkuduk deposit, with both being located at the distal edge of a large north-westerly facing oxidation cell in the Basin. The overall stratigraphic horizon of interest in the basin, located between 290 m and 520 m below surface, is approximately 200 to 250 m thick.

As presented in Figure 9-1, the mineralization is hosted by three horizons: the Middle Inkuduk horizon; the Lower Inkuduk horizon; and the Mynkuduk horizon.

The mineralized zone within the Middle Inkuduk horizon averages 300 m wide, 7 m thick, and is located between 320 m to 350 m below surface. The mineralized zone within the Lower Inkuduk horizon averages 350 m wide, 6.5 m thick, and is located between 350 m to 420 m below surface. The mineralized zone within the Mynkuduk horizon averages 280 m wide, 6.6 m thick, and is located between 430 m and 490 m below surface.

Seven mineralized zones have been identified on Blocks 1 and 2 of Inkai, including three zones in the Mynkuduk horizon labelled 1, 2 and 3, and four zones in the Inkuduk horizon labelled 10, 11, 12 and 13. Their distribution is listed in Table 9-1.

Table 9-1: Mineralized Zones in Blocks 1 and 2

<table>
<thead>
<tr>
<th>Zones</th>
<th>Horizon</th>
<th>Blocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mynkuduk Lower</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Mynkuduk Upper</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Mynkuduk Lower</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Inkuduk Lower</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>11</td>
<td>Inkuduk Middle</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>Inkuduk Middle</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>(north extension of 11)</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Inkuduk Lower</td>
<td>2</td>
</tr>
</tbody>
</table>

Mineralization in Block 3 has been identified in the Middle and Lower Inkuduk horizons and in the Lower Mynkuduk horizon.
The bulk of the uranium mineralization in Block 1 is contained in the Mynkuduk horizon, at a depth of about 490 m, unconformably overlaying Permian argillite. The mineralized levels are generally at the lower part of the horizon, close to the Permian-Upper Cretaceous unconformity but may also be found at a higher level, above the oxidized part of the Mynkuduk roll. The bulk of the mineralization in Block 2 is contained in the Lower and Middle Inkuduk horizons at a depth of about 400 m.

Due to the south-westerly sloping basin structure, the mineralization lies at greater depths in the western part of the deposit where it is considered to be part of the Inkai deposit.

There are no known structures that offset mineralization. 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 sedimentology of the Cretaceous formations being the primary control to mineralization.

### 9.2 Oxidation and Mineralization

Different lithologic and geochemical types have been studied for the content of their organic carbon, total iron, and iron contents. No significant correlation has been established between uranium content, lithologic types or specific classes of sands.

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. Carbonaceous plant detritus remains unoxidized. Some associated pyrites, and sometimes carbonates, are observed. Four geochemical types of ore can be identified at the deposit:

- Diagenetically reduced grey sands and clays containing carbonaceous fossils;
- Green-grey sands and clays, reduced both diagenetically and epigenetically by “gley” soil (anaerobic organic) processes;
- Non-reduced initially mottled sediments; and
- Stratified rocks oxidized epigenetically (yellow spectre).

The initial colours are typical of channel facies of flood-plain formations.
The greatest variation is based on the geochemistry of rocks. Diagenetically reduced grey sands and gravel of channel facies are more favourable for uranium ore 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 ores of the Mynkuduk horizon. In the upper horizons such control is weakly expressed.

From brief observations of core, the redox boundary can be readily recognized by a distinct colour change from gray on the reduced side to yellowish stains on the oxidized side, stemming from the oxidation of pyrite to limonite. In cross-section, the redox boundary is often “C” shaped forming the classical roll-front.

9.3 Geometry

The mineralized fronts trend northwest and comprise prominent, long, east-west limbs with highly sutured, short, north-south limbs. It is the long-limb segments of the deposit that contain most of the reserves. The short-limb segments contain less than 10% of the total reserves. The Inkuduk mineralization shows broadly similar uranium distribution features.

In the Inkuduk II 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 Inkuduk I and Mynkuduk horizons, mineralization lags somewhat behind along a complex system of superimposed suturing oxidation tongues. This results in a variety of roll morphologies, represented in Figure 9-2 and are classified in five major groups shown below:

- 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 ore) (B and D);
- Adjacent type, where two or more tongues develop in the same level enclosing ore in between (C);
- Combined cascade-adjacent type (G); and
- Tabular (F).
Figure 9-2: Roll-Front Morphology of Mineralization
9.4 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, selenium and vanadium 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 the potential contaminants in the rollfronts is represented in Figure 9-3.

Poor and rich ores are distinguished not by the composition of uranium minerals but by nature of their distribution; poor ores are more dispersed than rich ores.

Authigenic mineralization is composed of pyrite, siderite, calcite, native selenium, chlorite, sphalerite, pyrolusite and apatite.

Trace elements

Quantitative methods of analysis in ore 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 ore. It is located only along the margins of grey sands, where it is fixed in the sub-zone of radium enrichment of up to 2 m thick. The average selenium bodies are 1 to 2 m thick and grades 0.01 to 0.03%. They typically do not coincide with the contours of uranium ores.

Molybdenum occurs as a uranium trace element. Molybdenum content in mineralized uranium rocks is 2 to 5 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 9-3: Typical characteristics of a roll-front deposit

Typical "Roll - Front" Uranium 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.
10 EXPLORATION

10.1 Uranium Exploration

The methodology of delineation program and all related geological, geophysical, analytical work follows the recommendation of the State Reserve Commission (SRC) guidelines for exploration and delineation of uranium deposits. 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 category and the category of reserves to be defined;
- a regular pattern is necessitated by the polygonal plan method of reserve calculation;
- requirements for geological logging of the core;
- requirements for geophysical downhole logging;
- requirements for the content and standards of analytical work; and
- reserve calculation 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 etc.

There are two editions of the guidelines. The first one came into effect in 1986, was developed by the Soviet State Reserve Commission, and was to be applied for all types of uranium deposits. The second Guideline was developed by the State Reserve Commission of Kazakhstan specifically for the roll-front (sandstone) uranium deposits in Kazakhstan, was published and came into effect in December 2008. The key differences between the two guidelines are:

- orientation of the later guideline specifically for sandstone uranium deposits of Kazakhstan;
relaxation on the required density of drilling for C2 (800x50-100 m versus 800x50 meter spacing); and

the flexible ratio between the C2 and C1 categories of reserves (C1 category sufficient to sustain first few years of a production centre versus C1:C2 ratio = 30:70) is used to estimate the mineral reserves and resources at Blocks 1 and 2.

The guidelines are thus significantly more detailed and prescriptive set of documents in comparison to NI-43-101 and CIM Definition Standards.

No exploration activity has been conducted by JV Inkai at Blocks 1 and 2. Instead, historical data in relied upon to estimate Inkai’s mineral resources and reserves.

As of the end of February 2010, the following activities have been carried out under the Licence Series AY 1371 (Blocks 2 and 3) of Inkai deposit:

$133.7 million has been invested into the exploration and the development of mineral processing infrastructure during the pilot test mining period.

the mineral reserves have been estimated and put on the Kazakh State balance sheet of mineral reserves.

Exploration work continued at the northern flank (Block 3) of the Inkai deposit; the results of this work are as follows:

- 726 exploration drillholes have been drilled between 2006 and end of February 2010; more than 6000 samples have been analyzed. It is the opinion of Cameco that the minimum requirements set out in the current work program have been fulfilled. See Section 4.1.7 for more information;
- Mineralization zones have been delineated and a significant increase in their extent (while compared with the predecessors’ results) has been established in the more densely drilled south-western part of Block 3;
- The additional drilling has allowed for tracing the presence of mineralization throughout the whole Block 3 with a greater degree of certainty;
- The density of exploration drilling performed in the south-western part of Block 3 will allow for the estimation of mineral resources in the inferred category later in 2010, once assay results are available;
The exploration program’s purpose of supporting a commercial discovery application was achieved. The licence for Block 3 expires on July 13, 2010.

General exploration oversight is performed by the Geological Department of JV Inkai, including strategic directions of the drilling program and management of contractors.

Geological oversight is performed under contract by Expedition 7 (GRE-7) of Volkovgeology based in Taikonur. It includes day-to-day directing and coordinating of drilling activities, control of the drilling quality, core recovery, surveying work, as well as geological logging, sampling and ongoing day-to-day data processing.

Drilling is performed by a number of contractors, supervised by GRE-7. They are: Volkovgeology, Joint Drilling, 2K and YuKSU. The number of drilling rigs actively drilling on Block 3 varied in the last eighteen months from two to over twenty belonging to up to four different contractors. In early March 2010, there were three contractors with fifteen drilling rigs working on Block 3.

10.1.1 Groundwater Flow and Plume Migration Modeling Study (Geolink, 2003)

The study presents a critical analysis of hydrogeological data and simulation of contaminant transport. The modeling study predicted groundwater flow and transport within the test area of Block 1. The model was calibrated with recent (KAPE, 2002) and historic piezometric measurements. The model results showed no risk to local and regional groundwater users from ISR mining of Block 1.

10.1.2 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 ore 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 Block 1 will be attenuated in 39 years.
11 DRILLING

JV Inkai’s Block 1, 2 and 3 uranium exploration surveys were conducted by drilling vertical holes. Delineation of the deposits and their geological structural features were carried out by drilling on grid at prescribed density at 3.2 to 1.6 km line spacing and 200 to 50 m (3.2-1.6 km x 200-50 m) hole spacing. Increasing level of geological knowledge and confidence is obtained by further drilling at grids of 800-400 × 200-50 m and 200-100 × 50-25 m grid.

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. A relatively large number of core holes are drilled, although the host rocks are relatively unconsolidated. At the Inkai deposit, approximately 30% of all exploration holes are cored through the entire mineralized interval and 70% core recovery is recommended. Radiometric probing, hole deviation, geophysical and hole diameter surveys are done by site crews and experienced contractors.

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

The approximate total number of holes drilled at Inkai per concession block is listed in Table 11-1. The locations of the drillholes are shown in Figure 11-1. No new delineation drilling was carried out on Blocks 1 and 2 by JV Inkai; rather, the historic data was reviewed and validated.

As of the end of February, 2010, 1236 holes have been drilled in Block 3, including 510 prior to 2006, and the 45 in 2006, and 681 in the 2008-2010 period drilled by JV Inkai.

Table 11-1. Delineation Drilling at Inkai

<table>
<thead>
<tr>
<th>Block</th>
<th>Type</th>
<th>Number of holes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Historical</td>
<td>1368</td>
</tr>
<tr>
<td>2</td>
<td>Historical</td>
<td>2294</td>
</tr>
<tr>
<td>3</td>
<td>Historical</td>
<td>510</td>
</tr>
<tr>
<td></td>
<td>JV Inkai</td>
<td>726</td>
</tr>
</tbody>
</table>
Figure 11-1: Drill Hole Collar Location Map
12 SAMPLING METHOD AND APPROACH

12.1 Sample Density and Sampling Methods

Sampling of the mineralization is based on drilling grids that progressively tighten with increasing levels of geological knowledge and confidence. The line spacing with drill hole spacing decrease as follows: 3.2 to 1.6 km x 200-50 m, 800-400 m x 200-50 m and 200-100 m x 50-25 m.

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 0.2m to 1.2m. Sample intervals also are differentiated by barren or low permeability material. The average core sample length is 0.4m. The sampling is conducted sectionally from the half of core divided along its axis and cleared from the clay envelope.

The split core is also tested for grainsize analysis and carbonate content following the same procedure.

12.2 Core Recovery

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%.

12.3 Sample Quality and Representativeness

Detailed sampling procedures guide the sampling interval within the mineralization. Since gamma probing of the drill holes are used for resource estimation, assays from core sampling are only used for correlation purposes.

The QP responsible for this Section has witnessed core handling, logging and sampling at Inkai and considers that the methodologies are very satisfactory and the results representative and reliable.

12.4 Sample Composites with Values and Estimated True Widths

Composites of the mineralized horizons use gamma probe surveys that are converted to grade equivalent %U₃O₈. The composite lengths represent the true widths of the mineralization as the surface drill holes are vertical and the mineralization is generally flat lying. The following true widths and their respective grades are from Block 2 and are considered representative of the Inkai deposit. The true widths vary in thickness from a maximum of 20.05m to a minimum of 0.30 m with an average thickness of 6.25 m. The composite grades
vary from a maximum of 1.676% U$_3$O$_8$, to a minimum of 0.014% U$_3$O$_8$ with an average grade of 0.063% U$_3$O$_8$. 
13 SAMPLE PREPARATION, ANALYSES AND SECURITY

Drill core is logged and representative core samples are selected for the following surveys: determination of the content of uranium, radium and associated elements; determination of bulk density, ore humidity and acid-base balance of monolith rocks; determination of ore and host rock physical composition, rock grading and carbonate content; and ore geotechnical tests for uranium leachability.

When core samples are being analyzed for geochemistry, they are primarily analyzed for grain size and assayed for uranium, radium, thorium, potassium, and carbon dioxide. On selected fence lines, a more extensive study of geochemistry is undertaken.

Sample preparation and assaying is done by Volkovgeology.

13.1 Sample Preparation

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 - 1.2 m and a minimum of 0.2 m (the average core sample length is 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 sub-divided by one or three times quartering until the final representative weight of samples and duplicates is reached (0.2 kg).

13.2 Assaying

The laboratory tests for uranium and radium were performed by the Central Analytical Laboratory (CAL) of Volkovgeology. The laboratory is certified and licensed by the Kazakh Government. The uranium content was determined by using the X-ray spectrum. The radium content was determined by the complex gamma-X-ray spectrum.

13.3 Geophysical Logging

Downhole geophysical logging is performed by JV Inkai geophysical crews. JV Inkai owns three geophysical downhole logging trucks fully equipped for conducting the following types of logging used in exploration/delineation program:

- Gamma logging;
- Electric logging (resistivity and spontaneous potential methods);
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 a subsidiary of KazAtomProm 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. Volkovgeology converts gamma logs into uranium grades in order for them to use the results in their day-to-day coordination of the drilling program.

A copy of the database is given to the Volkovgeology data processing centre in Almaty (TsOME) for a 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. TsOME performs this work under a separate contract with Inkai JV.

13.3.1 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 30x70mm in size and are shielded by lead filters 0.9-1.1mm 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 cm 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% GT (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 logging instruction manual. During the interpretation, adjustments are made for absorption of gamma radiation by mud and for moisture within the ore. The first adjustment is made based on the value of the nominal diameter for the drilled ore intervals because the adjustment by an actual well diameter, established by calliper logging, differs from it by less than 2%. A 15% adjustment for ore 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 (PFNL) 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.

13.3.2 Caliper Logging

Calliper logging is performed over the entire length of a drillhole but is only conducted on 10% of the drillholes. Callipers 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 drillhole could be used.

13.3.3 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 20m 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 2-3m 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.

13.3.4 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.
13.4 Density Determinations

Density determinations are typically made on 100 - 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/m³.

13.5 Quality Assurance/Quality Control (QA/QC)

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 confirms the accuracy specified by the instructions and no significant systematic deviations were found.

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

13.6 Sample Security

With respect to historic Kazakh exploration on Blocks 1, 2 and 3, 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 Kazakh government, Cameco believes that the security measures taken to store and ship samples were of the highest quality. In addition, JV Inkai’s current security measures meet this same high quality standard.

13.7 Adequacy of Sample Preparation, Assaying, QA/QC, and Security

The QP responsible for this Section is satisfied with all aspects of probing, sample preparation, assaying, and QA/QC. The QP believes that the security measures taken to handle, store and ship samples are very acceptable.
14 DATA VERIFICATION

14.1 Blocks 1 and 2 Data Verification

The data relevant to Block 1 of the Inkai deposit as well as some of the data relevant to Block 2 of the same deposit have been used to produce the “Report of the Expedition No 7 on the First Stage of the Detailed Prospecting of the Inkai Uranium Deposit for the Period 1979-1991” (also known as RDP-7) issued by Volkovgeology in 1991.

This report consists of 3 volumes in Russian and is held by KazAtomProm.

- Volume I: Geology of the Orebody, comprising 11 books and 2 binders of plan views and sections;
- Volume II: Estimate of the Reserves, comprising 11 books and 11 binders of plan views and sections; and
- Volume III: Results of a leach test on Property 1, comprising 3 books and 1 binder of drawings.

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

- Listing of radioactivities for all anomalous zones (with their conversion into radium concentration for 159 drill holes);
- Geophysical graphs (radioactivity, resistivity, self potential);
- Assay results (radium and uranium) from individual drill hole log and from binders No. 186 and 187; and
- Listings of filtration coefficients in the anomalous zones.

Graphic documents 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 validated 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 2 to 10 of Volume II of the RDP-7;
Radioactive listings (and calculated radium concentrations) for 159 drill holes only;

Drill hole collars coordinates and deviations; and

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 historic Kazakh mineral resource and reserve estimate.

Part of the assay results has also been computerized by Cameco to validate the uranium grade calculations by Volkovgeology.

All the 1,294 drill holes shown on the Volkovgeology cross-sections were studied and coded.

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

14.1.1 Radioactivity, Radium and Uranium Grades

Each drill hole 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.

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 rather complex and was performed by means of AtomGeo, a proprietary program developed by Volkovgeology. This program takes into account the characteristics of the drill hole (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 on drillhole 1593. 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 dependant 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 excellent. The data validation work done by Cameco showed that the grade and grade thicknesses used by Volkovgeology are considered quite reliable.

14.2 Recent data

Over the last years, the exchange of digital drillhole information between the site and Cameco is very good. All of the drillhole information in use at Inkai site is available.

The current database has been thoroughly validated a number of times by geologists with JV Inkai, Volkovgeology, the State Reserves Commission and Cameco geologists (including the QP responsible for this section) and is considered relevant and reliable. This is supported by the results of the leach tests on Block 2, by recent well production drilling results, and by exploration drilling in Block 3.
15 ADJACENT PROPERTIES

15.1 South Inkai Mine

15.1.1 General

South Inkai is an operating ISR mine, whose land position is contiguous with, and south of, Inkai. It is owned 100% by the Betpak-Dala JV, which is in turn owned by Uranium One Inc. (70% interest) and KazAtomProm (30% interest). Information in Sections 15.1.2 and 15.1.3 is based upon information from Uranium One Inc.’s website.

The authors of this technical report have not verified this information on South Inkai. The information is not necessarily indicative of the mineralization contained at Inkai which is the subject of this technical report.

15.1.2 Geology

The South Inkai deposit is located at the southern end of the Inkai deposit, which extends over a strike length of 55 km and a width of 17 km. The South Inkai deposit covers a 17 km length of the trend. There are eight mineralized beds identified to date; three are in the Mynkuduk horizon and five are in the overlying Inkuduk horizon.

Two resource areas have been delineated in the Mynkuduk horizon and mineralization is found at depths of 450 to 510 m below surface. The mineralization in the Mynkuduk horizon is in the form of pitchblende and coffinite occurring interstitially in the sandstones and to a lesser extent, the clay layers. The main roll fronts can reach a thickness of 20 metres, but more commonly they average 7 m to 10 m at their thickest and 1 m to 2 m on the limbs. The grade ranges from 0.080% U₃O₈, averaging 0.048% U₃O₈, for the deposit.

Mineralization has also been found in the Inkuduk horizon at depths of 425 to 450 metres below surface but to date insufficient drilling has been completed to establish resources. The grades are similar to that in the Mynkuduk horizon.

15.1.3 Mines

The South Inkai mine is an operating ISR mine which produces a wet yellowcake uranium product. Commercial production commenced on January 1, 2009, following a 15-month pilot plant program conducted during the period from October 2007 to December 2008. A plant with production capacity of 5.2 million pounds U₃O₈ per year was substantially complete in December 2008.
16 MINERAL PROCESSING AND METALLURGICAL TESTING

Uranium in situ recovery has a long and successful history in Kazakhstan. The first field test work started in 1970’s. By the end of the 1990’s all main process parameters for the Inkai deposit had been determined. It was decided that uranium would be leached with sulphuric acid without the addition of an oxidant. The pregnant solution is pumped to the treatment plant where uranium is recovered via ion exchange (IX), followed by precipitation with hydrogen peroxide. If necessary a solvent extraction purification stage can be added. Numerous process and equipment options are available for uranium extraction and purification from ISL solutions. The optimum design is often unique for each ISL operation. The key features of Inkai are described below.

16.1 Metallurgical Testwork

Process parameters for uranium extraction were determined by studying the physical and chemical characteristics of the ore including its permeability, mineralogy, chemical composition of solids and ground water.

16.1.1 Laboratory Testwork

The detailed metallurgical laboratory testwork for Block 2 was performed in 1989. The tests were conducted by VNIIHT (Moscow) and Volkovgeology. The results of these studies are summarized in the report “Feasibility Study Block 2” (Volkovgeology, 2007).

During the exploration drilling, eleven composite samples were derived from core materials of individual samples from the Test Block 2 area. Eight of them were taken from different areas of the Inkuduk horizon and three from the Mynkuduk horizon. Each composite sample with a total mass of 25-72 kg was derived from 10 to 50 individual core subsamples from the Block 2 area. Tables 16-1 and 16-2 represent average chemical and mineralogical analyses of the samples.

Based on the chemical content, the ores are of the silicate type with comparatively homogeneous content of rock-forming components. The uranium mineralization is developed in all lithologic members; however, the fine-grained and medium-grained members (27% - 60% of the rock mass) predominate. The uranium mineralization is represented by pitchblende and coffinite in the proportions of 75% and 25% (for ores of Mynkuduk horizon) and 84% and 16% (for ores of Inkuduk horizon).
Table 16-1: Chemical Composition of the Test Samples, %

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Mynkuduk</th>
<th>Inkuduk</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO₂</td>
<td>86.4</td>
<td>86.5</td>
</tr>
<tr>
<td>TiO₂</td>
<td>0.17</td>
<td>0.18</td>
</tr>
<tr>
<td>Al₂O₃</td>
<td>6.25</td>
<td>6.7</td>
</tr>
<tr>
<td>Fe₂O₃</td>
<td>0.36</td>
<td>1.05</td>
</tr>
<tr>
<td>FeO</td>
<td>0.62</td>
<td>0.6</td>
</tr>
<tr>
<td>CaO</td>
<td>0.9</td>
<td>0.42</td>
</tr>
<tr>
<td>MgO</td>
<td>0.36</td>
<td>0.34</td>
</tr>
<tr>
<td>(Na+K)₂O</td>
<td>3.12</td>
<td>3.02</td>
</tr>
<tr>
<td>MnO</td>
<td>0.03</td>
<td>0.01</td>
</tr>
<tr>
<td>S₉</td>
<td>0.1</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>P₂O₅</td>
<td>0.07</td>
<td>0.03</td>
</tr>
<tr>
<td>U₃O₈</td>
<td>0.1</td>
<td>0.05</td>
</tr>
<tr>
<td>H₂O</td>
<td>0.36</td>
<td>0.17</td>
</tr>
<tr>
<td>C₉</td>
<td>0.12</td>
<td>0.19</td>
</tr>
</tbody>
</table>

Table 16-2: Composition of the Test Samples, %

<table>
<thead>
<tr>
<th>Minerals</th>
<th>Mynkuduk horizon</th>
<th>Inkuduk horizon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartz</td>
<td>57</td>
<td>55</td>
</tr>
<tr>
<td>Siliceous broken rock</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Clastic rocks (mainly feldspar)</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Clay minerals (mainly kaolinite)</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Carbonates</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Sulphides</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Limonite</td>
<td>0.6</td>
<td>0.7</td>
</tr>
<tr>
<td>Uranium minerals</td>
<td>0.07</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Ore-hosting rocks of Block 2 are characterized by a relatively low content of harmful impurities which may affect the acid leaching process: carbonates, organic carbon content – 0.07% - 0.084% and P₂O₅ – 0.08%. A cut-off grade of calcium carbonate of 2% ensures that ore with high acid consumption will not be processed.

Common column filtration tests were used to determine major process parameters:

- Uranium recovery from ore to solution is 80% - 99.8%;
- Concentration of sulphuric acid in leach solutions is 2.6 g/L - 40 g/L;
- Specific consumption of acid per ton of ore is 2.2 kg/t - 18.8 kg/t;
- Ratio liquid: solids is 0.4 - 5.5; and
- No oxidizing reagents are required.

Pregnant solutions obtained from the leaching tests were analyzed to identify the concentration of elements that can reduce permeability of the leaching zone (via precipitation of secondary minerals). *Table 16-3* shows the composition of typical pregnant solution.

| Table 16-3: Chemical Composition of Pregnant Solution |
|------------------------------------------|------------|--------|-------|
| Concentration, g/L                     | Ca         | Mg     | Al    | Fe (total) |
| Pregnant solution                      | 0.56       | 0.45   | 0.5   | 0.66       |

Simultaneously with sulphuric acid leach tests, a selected sample was studied using a bicarbonate leaching system. The leach solution containing 5 g/L NH₄HCO₃ and 2 g/L NH₄S₂O₈ (as an oxidant) was used in a column test. A high recovery of uranium of 93% - 95% was achieved at the end of the test. However, an economic analysis of this option showed that an acid system would be more efficient.

Based on the laboratory testwork, it was concluded that acid leaching would be used for further field pilot test work.

**16.1.2 Hydrogeological Studies**

Additional details are presented in Section 7.3. Hydrogeological parameters of the ore deposit play a key role in any ISR mining operation. A significant number of special hydrogeological surveys were carried out in the 70's – 80's at Inkai to assess the uranium deposits to be mined by in situ recovery. As a result of those surveys, all the aquifers within the Inkai deposit have been explored reliably and in detail. Reliable values of the main hydrogeological parameters were determined for all the water bearing hydrogeological levels, as well as the permeability of confining poorly permeable layers. Groundwater quality parameters have also been studied in the main aquifers within a large area of the ore field.
On the basis of these studies, there are a number of positive factors for the mining of uranium deposits in the Inkuduk and Mynkuduk horizons by in-situ leaching:

- Abundance of water within the horizon – the specific yield varies from 0.8 to 17 L/sec;
- Good permeability of ore hosting rocks; horizontal hydraulic conductivity at various levels of the deposit are 6.1 m/d - 16 m/d;
- Rock transmissivity is high and varies from 330 m2/d to 755 m2/d; and
- Low total dissolved solids, up to 3.0 g/L, with favorable chemistry, and high groundwater temperatures of 27 °C - 29.5°C.

In respect of the hydrogeology, one of the challenges of ISR mining at Inkai is that the ore hosting horizon is not hydraulically insulated. Persistent water-confining layers are not present either at the top or the base of the Inkuduk horizon, to separate it from the above and below aquifers. Layers of clay, silt and clayey sand are lens-shaped, with thicknesses from 0.5 to 2.5 meters. Significant field testing took place to confirm the possibility of using the ISR method in these unique conditions.

### 16.1.3 Field Tests

The first field test was performed for Block 1. The test commenced in 1988 and included three production and six injection wells on a three row well pattern. Eight monitoring wells were also installed. The pilot production was successful and within a relatively short time a high uranium recovery was achieved.

Construction of the facilities for the second pilot mine in Block 2 commenced in 1995, whilst the pilot test was started in 2002. Three field tests were conducted in Block 2 of the Inkai deposit for the purpose of testing various wells patterns, acid consumption and other production parameters. The Test Block 2 site is located in the northeast section of Block 2, approximately 15 km north of the town of Taikonur.

Uranium mineralization at test Block 2 is confined to the Inkuduk aquifer of sands and gravels with higher (relative to other deposit sites) horizontal hydraulic conductivity: \( k = 30 \text{ m/d and more.} \)

Presently, test Block 2 operates with Well fields 1, 2, 3 and 7 and those layouts are shown in Figure 16-1. Injection and production well schematics are shown in Figure 16-2. The borehole screens were set up at a depth of approximately
340 m. Leaching solutions are being injected into the developed horizon through a system of injection wells screened over 5 m to 15 m (thickness of a producing stratum).

In situ leaching at Well field 1 (WF1) started in April 2002 with a row scheme of development wells. In this scheme, a row of production wells is located between two rows of injection wells. The spacing between the rows of injection and production wells is about 60 m to 70 m, whilst the spacing between wells in a row is 20 m to 30 m. In August 2003, Test Block 2 was expanded to Well field 2 (WF2) with eight production wells. The well field was designed in a hexagonal pattern, where a production well is located in the middle of a hexagon with six injection wells in included angles of a hexagon. The spacing between injection wells was 40 m to 45 m. The same hexagonal scheme with a similar well spacing is used at Well Field 3 that started to operate with 12 production boreholes in March 2006.

There are multiple pattern geometries possible for ISR mining. Typical examples are a five-spot pattern (a producer in the center surrounded by four injectors at the corners of a square), a seven-spot pattern (a producer in the center surrounded by six injectors in a hexagonal pattern), or line drives (a line of producers next to a line of injectors). The test patterns employed at Inkai used a hybrid of the five-spot (WF1), while a seven-spot was employed at WF2 and Well field 3.
Figure 16-1: Test Block 2 Well Field Layout
Table 16-4 summarizes the results of uranium extraction from Well fields 1, 2 and 3 for Test Block 2 through the end of October 2007.

Table 16-4: Results of Well Fields Testwork through the end of October 2007

<table>
<thead>
<tr>
<th>Well Field</th>
<th>Production (Pounds $U_3O_8$)</th>
<th>Indicated Recovery (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>681,700</td>
<td>104.7</td>
</tr>
<tr>
<td>2</td>
<td>1,211,200</td>
<td>80.0</td>
</tr>
<tr>
<td>3</td>
<td>747,700</td>
<td>61.1</td>
</tr>
</tbody>
</table>

A series of graphs showing the historical recovery, head grade and flow from the three well fields of Test Block 2 are presented in Figures 16-3, 16-4 and 16-5.
Figure 16-3: Graph of Historical Recovery from Test Block 2

Figure 16-4: Graph of Head Grade from Test Block 2
As can be seen from Figures 16-3 and 16-4, there is no appreciable difference apparent in the head-grade or recovery behaviour between the line well pattern used in WF1 as compared to the hexagonal patterns used in WF2 and 3. However, there is difference in the number of wells required to cover a given area, and well field development represents a significant proportion of the capital costs of operation. Therefore, the seven-spot hexagonal pattern with sides of 40 m was adopted as standard for future production development.

As can be seen from Figure 16-3, the recovery curves are reasonably consistent, following a roughly exponential curve, with production starting after a month or so of acid application.

The following key parameters of the uranium recovery were determined during the wells field tests:

- The initial concentration of sulphuric acid in uranium in-situ recovery is generally 15 g/L – 25 g/L; therefore no additional oxidant is necessary;

- The residual acid concentration in production solution is 1 g/L - 3 g/L, pH<2; and

- The typical concentration of uranium in production solutions is 80 mg/L-300 mg/L.

The uranium rich solution (lixiviate) is pumped to the processing facilities for uranium extraction.
Extensive metallurgical testwork has been performed on the processing uranium leach solutions from the test well fields. There was also significant experience of processing similar solutions from other ISR operations in Kazakhstan. The pilot production plant at Inkai has operated since 2002.

### 16.2 Commercial Production

In 2005, JV Inkai started construction of commercial facility, now called the main processing plant at Block 1. In 2008, the front half of the main processing plant was commissioned and the processing of solutions from Block 1 was started. The full plant was commissioned in 2009 and State acceptance of the commissioning was received in February 2010.

In 2009, JV Inkai finished construction and began commissioning a satellite plant to process solution recovered from Block 2.

The present Inkai facility consists of a main processing plant with an ion exchange IX capacity of 2.6 million pounds U3O8 per year, a product recovery drying and packaging capacity of 5.2 million pounds U3O8 per year, and a satellite plant with an IX capacity of 2.6 million pounds U3O8 per year. The satellite plant produces uranium loaded ion exchange resin which is taken to the main processing plant for processing.

Table 16-5 shows the historical production from Inkai.

#### Table 16-5: Past Inkai Uranium Production

<table>
<thead>
<tr>
<th>Period</th>
<th>Status</th>
<th>Production (million pounds U3O8)</th>
<th>Cameco’s Share (million pounds U3O8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988 - 1990</td>
<td>Block 1</td>
<td>0.093</td>
<td>-</td>
</tr>
<tr>
<td>2002 - 2006</td>
<td>Block 2</td>
<td>2.041</td>
<td>1.224</td>
</tr>
<tr>
<td>2007</td>
<td>Block 2</td>
<td>0.600</td>
<td>0.360</td>
</tr>
<tr>
<td>2008</td>
<td>Block 2</td>
<td>0.500</td>
<td>0.300</td>
</tr>
<tr>
<td>2009</td>
<td>Blocks 1 &amp; 2</td>
<td>1.870</td>
<td>1.100</td>
</tr>
</tbody>
</table>

The key result of the testwork and operational experience is a very efficient process of uranium recovery from uranium leach solutions.
The general flowsheet of Inkai process facility is shown in Figure 16-6. The process flowsheet is divided into major unit processing areas within the uranium recovery facility as follows:

- **Main Processing Plant or Satellite Plant IX**: The ion exchange unit is employed to extract soluble uranium from the well field lixiviant. It is the first step in the uranium recovery process and operates as a continuous process;

- **Elution Section**: This unit strips uranium from saturated IX resin and, in sequence regenerates the ion form and loading capabilities of the resin. A relatively concentrated aqueous uranium solution (eluate) is produced and

- **Precipitation, Thickening, Drying, Filtration and Packaging Section**: The purified uranium solution is chemically treated to create an insoluble uranium compound which is chemically precipitated, thickened, filtered and dried producing the final uranium product as yellowcake, which is packaged into drums for shipment.

Inkai is designed to produce a dry uranium product that meets the quality specifications of uranium refining and conversion facilities.

The processing circuits are supported by utilities (water, compressed and instrument air) and reagent supply systems.

For control and monitoring of the processing circuits, two separate control systems are provided in the main processing plant and satellite plant. Each system is designed and instrumented to accommodate the steady state or batch flow characteristic of particular process flow streams or unit operations. The control systems employ state-of-the-art hardware and software programs with proven as well as demonstrated process logic. The design of the instrumentation and controls are based on modern practices with proven techniques.
Figure 16-6: Flowsheet Based on Annual Production of 5.2 million Pounds U₃O₈
16.2.1 Leaching

Solution of 10 g/L - 20 g/L sulphuric acid is injected into ore horizon through injection wells and uranium rich solution is recovered through production wells. The use of ion exchange for recovery of uranium from leach solutions is based on the existence of uranyl sulphate complexes. The uranyl sulphate anions are selectively but reversibly adsorbed onto solid synthetic ion exchange resin beads with fixed ionic sites.

16.2.2 Ion Exchange Resin Loading

Well field acid solution, containing the solubilised uranium, is pumped from the selected well field(s) via a settling pond to the ion exchange IX circuits for adsorption of the contained uranium.

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 transferred with push water to an empty elution vessel. After the IX column has been emptied, a batch of regenerated barren resin from an elution vessel which has completed the elution cycle is transferred back into the empty IX column. At this time, the column is put back into service as the tail vessel in the set of three to restart the uranium loading cycle.

Six trains of three IX columns are necessary to treat the uranium loaded well field solution.

As the barren solution is recycled to the well field for leaching, it is refortified with sulphuric acid before injection. The effluent (barren) solution from each train should contain 4 mg/L U₃O₈ for an overall recovery efficiency of 96%. Each vessel will collect about 2,600 lb U₃O₈ per loading cycle.

16.2.3 Resin Elution (Stripping)

Uranium that is adsorbed onto the IX resin during the loading cycle is removed from the resin using ammonium nitrate and sulphuric acid solutions during the elution or stripping process.

During the elution process, the loaded resin is contacted with ammonium nitrate solution in four batch stages. The elution section yields a pregnant eluant, which is stored in pregnant eluant tanks.
16.2.4 Denitrification

After the uranium has been stripped from the resin in the elution process, the resin is left in a nitrate form. The resin must be denitrified and converted to a sulphate form for re-use in the IX circuit. Two tanks are used for denitrification.

Each batch of 28.6 m$^3$ of resin is treated with 2.3 bed volumes of circulating denitrification solution. The denitrification solution is a strong sulphuric acid solution comprising recycled barren solution, 93% sulphuric acid and process water.

16.2.5 Precipitation

Pregnant eluant tanks are sampled for uranium content as the feed to the precipitation circuit. Hydrogen peroxide is added to the precipitation tanks at a rate indicated by the uranium content. The pH of this stream is adjusted in the precipitation tank by the addition of anhydrous ammonia.

Five agitated precipitation tanks in a cascade are provided to obtain the required retention time for the precipitation reaction to proceed to completion. The final precipitation stream is discharged from the last tank and is pumped into a thickener at a target pH of 2.0.

16.2.6 Yellowcake Product Thickening and Dewatering

The precipitated slurry from the five stage precipitation circuit flows into a thickener. The contained yellowcake slurry is thickened and is pumped to one of two filter presses for additional washing and then dewatering.

16.2.7 Filter Press Operation

The yellowcake slurry contained in the yellowcake thickener underflow is the feed to the filter press. The slurry density in the thickener will build up continuously, while the withdrawal of slurry from the underflow will be a batch process. The filter press operation usually commences when the thickener yellowcake sludge inventory is greater than the capacity of one filter press.

Two automatic filter presses are provided. Only one filter press may operate at any one time. After thickening, the thickener underflow slurry at about 35% solids is pumped using an automatic cycle to one of two filter presses for further washing to remove undesired dissolved salts and to dewater the uranium solids to approximately 60% solids.
16.2.8 Drying

The dewatered yellowcake from the filter press is then pumped into one of three rotary vacuum dryers where the finished 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 will be filtered and condensed to collect entrained particulates within the process system.

16.2.9 Packaging

There are three identical packaging systems, each handling the discharge from a dedicated dryer. The system is operated on a batch basis. When the yellowcake is dried, it is discharged from the drying chamber through a bottom valve, metered by the rotary valve, and weighed into a package drum.

Approximately 16 to 20 drums are required to hold the yellowcake contents of each dryer batch. Each batch is tracked as a lot.
17 MINERAL RESOURCE AND MINERAL RESERVE ESTIMATES

The estimated mineral resources and reserves at Inkai are located in Block 1 and Block 2. No mineral resources or reserves have been estimated for Block 3. The resource models were created in accordance with the Kazakhstan GKZ guidelines. They were prepared by Volkovgeology using the Grade-Thickness estimation method on 2-dimensional blocks in plan. Throughout this technical report, references to Kazakh resource and/or reserve estimates generally include the non-compliant combination of NI 43-101 mineral resources and mineral reserves.

In 2003, Cameco performed a validation of the Kazakh uranium reserves estimate for Block 1, which confirmed the estimated pounds of uranium to within 2.5% of the Kazakh estimate. The same Kazakh estimate was validated by an independent consulting firm in 2005. In 2007, Cameco and an independent consulting firm verified a portion of the Block 2 Kazakh uranium reserves estimate and obtained results in agreement with the Kazakh estimate. The Block 1 mineral resources and mineral reserves are based on 944 surface drillholes. The Block 2 mineral resources and mineral reserves estimates are based upon 1,052 drillholes.

Methodologies, assumptions and parameters used for the current Inkai mineral resources and mineral reserves are described in this Section.

17.1 Definitions

Stated mineral reserves and resources are derived from estimated quantities of mineralized material recoverable by in situ recovery methods. Only mineral reserves have demonstrated economic viability during the term of the mining licences. The Inkai mineral reserves and mineral resources do not include allowances for dilution and mining recovery.

The Inkai mineral reserve and mineral resource estimates have been reviewed under the supervision of Alain G. Mainville, Professional Geoscientist and QP, Director, Mineral Resources Management at Cameco.

There are numerous uncertainties inherent in estimating mineral reserves and mineral resources. The accuracy of any mineral reserve and mineral resource estimation is the function of the quality of available data and of engineering and geological interpretation and judgment. Results from drilling, testing and production, as well as a material changes in the uranium price, subsequent to the date of the estimate may justify revision of such estimates.
The classification of mineral reserves and mineral resources and the subcategories of each conform to the definitions adopted by CIM Council on December 11, 2005, 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, which are not mineral reserves, do not have demonstrated economic viability.

17.2 Mineral Resources and Mineral Reserves

17.2.1 Key Assumptions

The key assumptions used in the mineral resource and mineral reserve estimates for Inkai are:

- Blocks 1 and 2 mineral resources have been estimated and classified on the basis of sampling density, interpretation of geological continuity and grade continuity;

- Dilution and mining loss are factors which are not relevant to the uranium extraction method of in situ recovery. The recovery obtained from the in situ leaching process is included in the metallurgical recovery;

- In situ recovery rates are assumed to vary between 13,000 to 16,000 pounds of U3O8 per day with a mill production rate of 5.2 million pounds of U3O8 per year based on 80% recovery;

- An average uranium price of $54 per pound U3O8 was used to estimate the mineral reserves; and

- No known environmental, permitting, legal, title, taxation, socio-economic, political, marketing or other issues are expected to materially affect the mineral resource and mineral reserve estimates, other than the possible permitting issue discussed in Section 17.3.

17.2.2 Key Parameters

The key parameters used in the mineral resource and mineral reserve estimates for Inkai are:

- Grades (% U3O8) were obtained from downhole gamma radiometric probing of drillholes, checked against assay results and prompt-fission neutron probing results in order to account for disequilibrium; and
An average density of 1.70 t/m³ was used, based on historical and current sample measurements.

Additional parameters are listed in Table 17-1.

**Table 17-1: Additional Estimation Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum grade to define the mineralized intervals</td>
<td>0.012% U₃O₈</td>
</tr>
<tr>
<td>Minimum cumulative GT per hole to define the limits of mineralization</td>
<td>0.047 m%U₃O₈</td>
</tr>
<tr>
<td>Minimum GT for an estimated block</td>
<td>0.130% U₃O₈</td>
</tr>
<tr>
<td>Maximum thickness of internal waste</td>
<td></td>
</tr>
<tr>
<td>per hole</td>
<td>1 m</td>
</tr>
<tr>
<td>per C1 category block</td>
<td>6 m</td>
</tr>
<tr>
<td>per C2 category block</td>
<td>No limit</td>
</tr>
<tr>
<td>Minimum percent of above cutoff holes per estimated block</td>
<td>75%</td>
</tr>
<tr>
<td>Minimum size of estimated block</td>
<td>40,000 m²</td>
</tr>
<tr>
<td>Maximum size of estimated block</td>
<td>300,000 m²</td>
</tr>
<tr>
<td>Content of silt-clay of size &lt; 0.05 mm in mineralized intervals</td>
<td>&lt; 30%</td>
</tr>
<tr>
<td>Minimum permeability</td>
<td>1.0 m per day</td>
</tr>
</tbody>
</table>

### 17.2.3 Key Methods

The key methods used in the mineral resource and reserve estimates for Inkai are:

- Mineral reserves were estimated based on the use of the in situ recovery extraction method and yellowcake production at Inkai;
- The geological interpretation of the ore body outlines was done on section and plan views derived from surface drill hole information;
- Mineral resources and mineral reserves were estimated with the GT method using 2-dimensional block models;
- The estimated blocks are delimited within the same water-bearing horizons, taking into account local confining layers; and
- Mineral reserves are defined as the economically mineable part of the indicated and measured resources. Only mineral reserves have demonstrated economic viability. Reported mineral resources do not include those amounts identified as mineral reserves.

The mineral resource estimate for Block 1 was created by Volkovgeology in 1992. It was approved in 1993 by the Kazakh State Reserves Commission and
later validated by Cameco and independent consultants. This model was the basis for a number of feasibility studies. The historical Kazakh reserves for Block 1 are listed in Section 6.3. Following the results of the leach test on Block 2 by JV Inkai and the confirmation of technical parameters, the mineral resource estimate for Block 2 was updated in 2007 by JV Inkai geologists and Volkovgeology. *Table 17-2* presents the Kazakh reserves for Block 2 as of January 1, 2007, not categorized in accordance with NI 43-101. They were approved by the Kazakh State Reserves Commission and validated by Cameco and an external consulting firm.

**Table 17-2: Kazakh Reserves for Block 2 as of January 1, 2007**

<table>
<thead>
<tr>
<th>Area</th>
<th>CIS Categories</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Block 2</td>
<td>Tonnage (kt)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Grade (% U₃O₈)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Uranium (Million pounds U₃O₈)</td>
<td>-</td>
</tr>
</tbody>
</table>

**17.2.4 Resource Classification**

Historic drilling pattern densities over Blocks 1 and 2 were sufficient to satisfy the Kazakh State Reserve Commission requirements in defining reserves in the C2, C1 and B categories within Block 1 and C2 and C1 categories within Block 2.

Cameco’s reconciliation of the Kazakh classification system to the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) standard definitions was previously presented in *Table 6-4* of Section 6.3. In short, Cameco considers that Kazakhstan’s reserves categories B, C1 and C2 correspond respectively to NI 43-101 mineral resource categories of measured, indicated and inferred. This is supported by the Protocol of Intentions between the Committee for Mineral Reserves International Reporting Standards (CRIRSCO) and the Russian State Commission on Mineral Reserves signed in October 2008. The Protocol states the following:

- In the CRIRSCO system a measured or indicated resource is converted to a proved or probable reserve respectively, therefore on the condition that all modifying factors have been taken into consideration and that the technical and economic criteria (price and cost assumptions for example) used are current, then category A, B, and C1 as approved by State Expert review could in general be converted directly to CRIRSCO
proved or probable reserves by the application of factors representing dilution and mining losses; and

- In the CRIRSCO system an indicated resource is converted to a probable reserve, therefore on the condition that all modifying factors have been taken into consideration and that the technical and economic criteria (price and cost assumptions for example) used are current, category C2 as approved by State Expert Review could in many cases be converted directly to CRIRSCO probable reserves by the application of factors representing dilution and mining losses.

It is recognized that material in the C2 category is often presented as overlapping the indicated and inferred categories. Cameco at this point has selected to reconcile all of the C2 category material with inferred mineral resources given the lower confidence on the interpretation observed so far with the C2 density of drilling at Inkai. A planview of the Kazakh mineral resources estimate by category C1 and C2 is presented in Figure 17-1.

Cameco has reclassified the Kazakh reserves to be compliant with NI 43-101 mineral resources and mineral reserves.

17.2.5 Cut-off

The results of the leach tests conducted on Block 2 determined parameters used in the conversion of mineral resources to mineral reserves. The minimum GT (grade-thickness) for individual reserve blocks was determined by the Kazakh State Reserves Commission to be 0.130 m%U₃O₈. Cameco is also reporting mineral reserves for Inkai at a GT cut-off of 0.130 m%U₃O₈.
Figure 17-1: Blocks 1 and 2 - Kazakh Mineral Resources Map
17.2.6 Mineral Resource and Mineral Reserve Estimates

A summary of the estimated mineral resources for Inkai with an effective date of December 31, 2009 is shown in Table 17-3.

Alain G. Mainville, P.Geo., of Cameco, is the QP within the NI 43-101 for the purpose of the mineral resource and mineral reserve estimates.

Table 17-3: Summary of Mineral Resources – December 31, 2009

<table>
<thead>
<tr>
<th>Category</th>
<th>Area</th>
<th>Tonnes (x 1000)</th>
<th>Grade % U₃O₈</th>
<th>Contained Pounds U₃O₈ (millions)</th>
<th>Cameco’s Share Pounds U₃O₈ (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicated</td>
<td>Block 1</td>
<td>13,291</td>
<td>0.07</td>
<td>21.9</td>
<td>13.1</td>
</tr>
<tr>
<td>Inferred</td>
<td>Block 1</td>
<td>11,926</td>
<td>0.06</td>
<td>16.2</td>
<td>9.7</td>
</tr>
<tr>
<td>Inferred</td>
<td>Block 2</td>
<td>242,770</td>
<td>0.05</td>
<td>238.9</td>
<td>143.3</td>
</tr>
<tr>
<td>Total Inferred</td>
<td></td>
<td>254,696</td>
<td>0.05</td>
<td>255.1</td>
<td>153.0</td>
</tr>
</tbody>
</table>

Notes:
(1) Cameco reports mineral reserves and mineral resources separately. Reported mineral resources do not include amounts identified as mineral reserves.
(2) Cameco’s share is 60 % of total mineral resources.
(3) Inferred mineral resources have a great amount of uncertainty as to their existence and as to whether they can be mined economically. It cannot be assumed that all or any part of the inferred mineral resources will ever be upgraded to a higher category.
(4) Mineral resources have been estimated at a minimum grade thickness of 0.3 m%U₃O₈
(5) The geological model employed for Inkai involves geological interpretations on section and plan derived from surface drillhole information.
(6) Mineral resources were estimated on the assumption of using the in-situ recovery extraction method.
(7) Mineral resources were estimated with the grade-thickness method using 2-dimensional block models.
(8) No known environmental, permitting, legal, title, taxation, socio-economic, political, marketing or other issues are expected to materially affect the above estimate of mineral resources, other than the possible permitting issue discussed in Section 17.3.
(9) Mineral resources that are not mineral reserves do not have demonstrated economic viability.
(10) Totals may not add up due to rounding.

A summary of the estimated mineral reserves for Inkai with an effective date of December 31, 2009 is shown in Table 17-4.
Table 17-4: Summary of Mineral Reserves – December 31, 2009

<table>
<thead>
<tr>
<th>Category</th>
<th>Area</th>
<th>Tonnes (x 1000)</th>
<th>Grade % U₃O₈</th>
<th>Contained Pounds U₃O₈ (millions)</th>
<th>Cameco’s Share Pounds U₃O₈ (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proven</td>
<td>Block 1</td>
<td>6,043</td>
<td>0.08</td>
<td>11.1</td>
<td>6.7</td>
</tr>
<tr>
<td>Probable</td>
<td>Block 1</td>
<td>35,257</td>
<td>0.08</td>
<td>59.6</td>
<td>35.8</td>
</tr>
<tr>
<td>Probable</td>
<td>Block 2</td>
<td>48,177</td>
<td>0.06</td>
<td>64.0</td>
<td>38.4</td>
</tr>
<tr>
<td>Total</td>
<td>Total Probable</td>
<td>83,434</td>
<td>0.07</td>
<td>123.6</td>
<td>74.2</td>
</tr>
<tr>
<td>Total</td>
<td>Total Reserves</td>
<td>89,477</td>
<td>0.07</td>
<td>134.7</td>
<td>80.9</td>
</tr>
</tbody>
</table>

Notes:  
(1) Pounds U₃O₈ are those contained in mineral reserves and are not adjusted for the estimated metallurgical recovery of 80%.
(2) Cameco’s share is 60% of total mineral reserves.
(3) Inkai mineral reserves have been estimated at a GT (grade-thickness) cut-off of 0.13 m%U₃O₈.
(4) The geological model employed for Inkai involves geological interpretations on section and plan derived from surface drillhole information.
(5) Mineral reserves have been estimated with no allowance for dilution as this is not applicable for ISR mining.
(6) Mineral reserves were estimated based on the use of the in-situ recovery extraction method. The production rate is planned for 5.2 million pounds U₃O₈ per year based on 80% recovery.
(7) Mineral reserves were estimated with the GT (grade-thickness) method using 2-dimensional block models.
(8) An average price of $54 per pound U₃O₈ was used to estimate the mineral reserves.
(9) No known environmental, permitting, legal, title, taxation, socio-economic, political, marketing, or other issues are expected to materially affect the above estimate of mineral reserves, other than the possible permitting issue discussed in Section 17.3.
(10) Totals may not add up due to rounding.

Mineral resources in the indicated and inferred mineral resource categories have not been included in the current mine plans. Mineral resources have no demonstrated economic viability.

### 17.3 Discussion on Factors Potentially Affecting Materiality of Resources and Reserves

The QP responsible for Inkai’s mineral resources and mineral reserves estimate is satisfied with the high quality of data and considers them valid for use in the estimate of mineral resources and mineral reserves. This is supported by the results of the leach test done on Block 2 and production results over the last 2 years.
The annual production rate is based on 80% recovery. Operational performance so far and plant design indicate that a higher percentage of recovery may be sustainable.

As in the case for most mining projects the extent to which the estimate of mineral resources and mineral reserves may be affected by environmental, permitting, legal, title, taxation, socio-economic, political, marketing or other issues could vary from major gains to major losses of mineral resources and mineral reserves. Other than the risk of not obtaining approvals to increase annual production described in the following paragraph, the QP is not aware of any pending issues that could materially affect the Inkai mineral resource and mineral reserve estimates.

The mineral reserve estimates of Inkai assume annual production of 5.2 million pounds of U₃O₈. JV Inkai has regulatory approval to produce 2.6 million pounds, and intends to increase production to 5.2 million pounds per year in 2011. Cameco expects JV Inkai will receive all permits and approvals required for this level of production and will seek regulatory approvals for an increase in production to 3.9 million pounds per year in 2010 and thereafter for a further increase to 5.2 million pounds per year in 2011. The approval process for the initial production increase to 3.9 million pounds per year is under way and has the support of KazAtomProm. Once the initial approval is received, the subsequent application for an increase to 5.2 million pounds per year will be made. If JV Inkai does not receive approval to increase production, half of Inkai’s mineral reserves will be re-categorized as mineral resources.

The extent to which the estimate of mineral resources and mineral reserves may be materially affected by mining, metallurgical, infrastructure and other relevant factors could also vary from major gains to major losses of resources and reserves. The QP is not aware of any scientific or technical issues that, at this time, could materially affect the Inkai mineral resource and reserve estimates. Unexpected geological or hydrogeological conditions or adverse in situ recovery conditions could negatively affect the mineral resource and mineral reserve estimates. Given the term of the licences, once plant capacity or approved maximum production rate is reached, any shortfall in annual production could likely not be regained. The operation risks are discussed further in Section 19.2.
18 ADDITIONAL REQUIREMENTS FOR TECHNICAL REPORTS ON DEVELOPMENT PROPERTIES AND PRODUCTION PROPERTIES

18.1 Mining

ISR mining at Inkai is comprised of the following components to produce a uranium-bearing lixivant, which goes to settling ponds and then to the main processing plant (which has a capacity to produce 5.2 million pounds annually) for production of uranium as yellowcake.

• Well field development practices using an optimal pattern design to distribute barren lixivant (a solution of sulphuric acid and water) to the well field injectors and to then collect lixivant, which carries the dissolved uranium back to the main processing plant or satellite plant, as the case may be. The satellite plant produces uranium loaded ion exchange resin which is taken to the main processing plant for processing;

• Preparation of a production sequence which will deliver the uranium-bearing lixivant to meet production requirements considering the rate of uranium recovery, lixivant uranium head grades, and well field flow rates;

• Determination of the cut-off grades 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 grade applies to individual producer wells and dictates the lower limit of operation once a well has entered production;

• The above factors are used to estimate the number of operating well fields, well field patterns and well field houses over the production life; and

• Determination of the unit cost of each of the mining components required to realize the production schedule, including drilling, well field installation, and well field operation.

18.1.1 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, dilute 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, like 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 well field due to the formation of low permeable chemical precipitates that block flow;
- Addition of oxidants is not necessary (if iron is present); and
- 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 which increases chemical costs which make the process uneconomical;
- The risk of pore plugging (blocking the formation with gas or chemical precipitate);
- Increased concentrations of dissolved solids; and
- Use of corrosion resistant equipment increasing the up-front capital cost.
Leaching at Inkai will be done near a pH between 1.5 and 2.5. The use of ion exchange for recovery of uranium from leach solutions is based on the existence of uranyl sulphate complexes. The uranyl sulphate anions are selectively but reversibly adsorbed onto solid synthetic ion exchange resin beads with fixed ionic sites.

18.1.2 Production Objectives

The annual production specification is 5.2 million pounds U$_3$O$_8$, derived from a combined flow of 2,840 m$^3$/h (12,500 gal/min). By calculation, this implies an average head grade of 100ppm-U delivered to the IX columns. Therefore, the rate of installation of new patterns, coupled with appropriate well field 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 indicated that patterns yield approximately 10.2 m$^3$/h (45 gal/min). Assuming the average, approximately 278 patterns will need to be operating at any one time to provide flow to the Block 1 and Block 2 IX circuits.

18.1.3 Well Field Design and Development

Within 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 the 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), post-processing costs, and administrative overhead. Any pattern that cannot demonstrate an economic benefit should not be installed unless there is some compelling reason to do otherwise.

For long-range planning purposes, scheduling assumes that the average flow from historical test blocks will apply to 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 mineralized unit;
- Surface topography; and
- Desired 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.

As part of the Kazakh mining regulations, JV Inkai was required to install and operate a test mine for the Block 2 area. The first of these tests was Well field 1, which served as the basis for demonstrating that at least 80% of the Kazakh estimated reserve could be recovered. Test Block 2, Area 1 was producing in May of 2002, and reached 75% recovery by April 2006. At the end of February 2010, production from Well field 1 continues to the present March 2010 with a cumulative recovery of over 99%.

Testing was continued during the construction phase of the initial main processing plant and satellites through the test facility, which was upgraded to accept up to 35m³/h (1,200gal/min). Subsequent tests were directed at pattern geometry and were useful in identifying potential problems in the new plants. Well fields 2, 3 and 7 remain in production as well. As of the end of February 2010, the recovery of Well field 2 amounted to 87%; Well field 3, 75%; and Well field 7, 55%. Well field 7 was included into Test Block 2 plant throughput after completion of ISR test works and after the preparation of the geological report submitted to the Kazakhstan State Reserves Committee.

With the completion and subsequent testing of the leached Area 1, Volkovgeology prepared and submitted reserves estimate to the Kazakh State Reserves Committee for review and approval. Approval was granted on December 12, 2007.

18.1.4 Well field Development

Currently at Block 1, Well fields 4, 6, 8-0, 8-1, 10, 12, 14, 16, and 18 are in operation. All utilize hexagonal patterns. The present combined flowrate for
Block 1 is 850 m³/hour at a composite average headgrade of 206 mg/l U₃O₈. This material is captured on IX resins in the Main Processing Plant.

Currently at Test Block 2 Wellfields 1, 2 and 3 and 7 are in operation. The average flowrate is 300 m³/hr at an average composite headgrade of 59 mg/l U₃O₈. This material is captured on IX resins at the Test Block 2 Test Plant. The resins are eluted at the Test Plant and pregnant eluant is transported to the Main Processing Plant for final processing.

The satellite plant at Block 2 is located southeast of Test Block 2. This is the first phase of commercial mining with no production in 2008, and negligible production in 2009. The production is captured on IX resin at the satellite and the resin is periodically transported by speciality trailers to the Main Processing Plant for final processing. The barren resin is returned to the Satellite plant for further loading and re-use.

Additional well fields are in various stages of development in Block 1 and in Block 2 to provide additional production as required to meet production targets in 2010 and beyond.

18.2 Recoverability

The uranium extraction efficiency (recoverability) of ISR operation is determined by uranium loss in underground leaching and in surface production facilities. The last one is very small and easy to control. The only way to directly determine the underground loss is to drill the leached area after recovery is finished, which is not practical. All indirect methods are based on the resource estimate which excludes the cut-off grade material.

Actual field results from Inkai indicated that uranium recovery of at least 80% is achievable. That is in agreement with Kazakh mining regulations.

18.3 Production Plan and Mine Life

JV Inkai’s production plan is based on current mineral reserves that are expected to produce 107.9 million pounds U₃O₈ recovered by the mill. Based on maximum annual production of 5.2 million pounds U₃O₈, there are more than enough mineral reserves to produce the expected 107.9 million pounds through the current term of each of JV Inkai’s licences (2024 for Block 1 and 2030 for Block 2). The projected mine life is 21 years. The Inkai production plan over its mine life is presented on Figure 18-1.
18.4 Uranium Markets

The Inkai operation will produce a uranium concentrate nominally in the form of U3O8, or yellowcake. Nuclear plants around the world use uranium to generate electricity. The following is an overview of the uranium market.

**Uranium Demand**

The demand for U3O8 is directly linked to the level of electricity generated by nuclear power plants. World uranium consumption has increased from approximately 75 million pounds U3O8 in 1980 to about 169 million pounds in 2009.

**Uranium Supply**

Uranium supply sources include primary mine production and secondary sources such as excess inventories, uranium made available from the decommissioning of nuclear weapons, re-enriched depleted uranium tails, and used reactor fuel that has been reprocessed.

**Mine Production**

The uranium production industry is international in scope with a small number of companies operating in relatively few countries. In 2009, primary production was estimated at 130 million pounds U3O8, representing about 77% of world uranium consumption.
An estimated 88% of the world production of 130 million pounds U₃O₈ was provided by ten producers. In 2009, over 90% of estimated world production was sourced from eight countries:

**Major Uranium Producers**

<table>
<thead>
<tr>
<th>By Company</th>
<th>%</th>
<th>By Country</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Areva</td>
<td>17%</td>
<td>Kazakhstan</td>
<td>26%</td>
</tr>
<tr>
<td>Cameco</td>
<td>16%</td>
<td>Canada</td>
<td>20%</td>
</tr>
<tr>
<td>Rio Tinto</td>
<td>16%</td>
<td>Australia</td>
<td>16%</td>
</tr>
<tr>
<td>Kazatomprom</td>
<td>13%</td>
<td>Namibia</td>
<td>9%</td>
</tr>
<tr>
<td>ARMZ</td>
<td>9%</td>
<td>Russia</td>
<td>7%</td>
</tr>
<tr>
<td>BHP</td>
<td>6%</td>
<td>Niger</td>
<td>6%</td>
</tr>
<tr>
<td>Navoi</td>
<td>5%</td>
<td>Uzbekistan</td>
<td>5%</td>
</tr>
<tr>
<td>Uranium One</td>
<td>3%</td>
<td>United States</td>
<td>3%</td>
</tr>
<tr>
<td>Paladin</td>
<td>2%</td>
<td>Other</td>
<td>8%</td>
</tr>
<tr>
<td>General Atomics</td>
<td>1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>12%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Cameco estimate

**Uranium Markets and Prices**

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.

**Uranium Spot Market**

The industry average spot price (TradeTech and UxC) on December 31, 2009 was $44.50 per pound U₃O₈, down 15% from $52.50 per pound U₃O₈ at the end of 2008.

**Long-Term Uranium Market**

The industry average long-term price (TradeTech and UxC) on December 31, 2009 was $61.00 per pound U₃O₈, down 13% from $70.00 per pound U₃O₈ on December 31, 2008.

The price history of uranium is shown in Figure 18-2.
18.5 Uranium Sales Contract and Price

There is a uranium sales contract between JV Inkai and a Cameco subsidiary for a portion of 2010 Inkai mine production. JV Inkai currently has no other forward-sales commitments for its uranium production.

Under Kazakhstan's transfer pricing law (effective January 1, 2009), product is currently purchased from JV Inkai at a price equal to the uranium spot price, less a 2% discount. For the purpose of this technical report, JV Inkai’s sales revenue has been calculated using this formula.

A spot price projection, as of March 3, 2010, has been incorporated into the realized price projection for the purpose of the economic analysis. The spot price projection is consistent with various independent forecasts of supply and demand fundamentals and price projections at that time. To the extent the independent forecasts did not extend their projections to cover the entire expected mine life of Inkai, the projections have been extrapolated forward to the end of the anticipated mine life.

*Table 18-1* outlines the projected uranium sales prices, taking into account Kazakhstan's transfer pricing law and the independent spot price projections. The price projections are stated in constant 2010 dollars.
Table 18-1: Projected Uranium Sales Prices

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent Spot Price Projection</td>
<td>$53.40</td>
<td>$52.11</td>
<td>$67.00</td>
<td>$65.25</td>
<td>$63.33</td>
<td>$55.00</td>
<td>$55.00</td>
<td>$55.00</td>
<td>$55.00</td>
</tr>
<tr>
<td>Transfer Price Discount</td>
<td>1.07</td>
<td>1.24</td>
<td>1.34</td>
<td>1.33</td>
<td>1.27</td>
<td>1.10</td>
<td>1.10</td>
<td>1.10</td>
<td>1.10</td>
</tr>
<tr>
<td>JV Inkai Projected Sales Price</td>
<td>$52.33</td>
<td>$60.07</td>
<td>$65.66</td>
<td>$64.93</td>
<td>$62.07</td>
<td>$53.90</td>
<td>$53.90</td>
<td>$53.90</td>
<td>$53.90</td>
</tr>
</tbody>
</table>

18.6 Contracts

Of the type of contracts listed in item 25 (f) of Form 43-101F, JV Inkai only has transportation contracts and a short term uranium sales contract (see Section 18.4 above). The transportation contracts are for the shipment of uranium product.

JV Inkai has a number of important supply contracts for reagents and fuels. One supplier provides sulphuric acid from three sources (See Section 19.2.1)

JV Inkai believes rates and charges for these contracts reflect industry norms.

18.7 Environmental Considerations

18.7.1 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 Industry and New Technologies of the Republic of Kazakhstan (replacing MEMR and the Ministry of Industry and Trade of the Republic of Kazakhstan as of March 12, 2010) and the Environmental Protection Ministry of the Republic of Kazakhstan.

At a regional level, both Ministries provide enforcement through local representative authorities. In particular, the Ministry of Environmental Protection’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 in situ recovery 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 OSHAS 18001 since 2006.

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 state property, and resources brought to the surface as property of the subsoil user, unless otherwise provided by contract. See Sections 4.1.3 to 4.1.6 for more information on the Subsoil Law, including the draft new Subsoil Law.

18.7.2 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 from the operation valid until December, 2010, permits for emissions from drilling activities valid until December, 2012, and water use permits valid through August and December, 2011.

JV Inkai currently holds the following additional material licences relating to its mining activities: (i) “Licence for performance of the works connected with stages of life cycle of objects of use of atomic energy”; (ii) “Licence for operation of mining production and mineral raw material processing”; (iii) “Licence for transportation of radioactive substances within the territory of the Republic of Kazakhstan”; and (iv) “Licence for dealing with radioactive substances”. These licences are in force and are of indefinite unlimited term.

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.
JV Inkai received a mining licence for Block 1 and an exploration licence for Blocks 2 and 3 from the government of Kazakhstan in April 1999. The Subsoil Use Agreement, or Resource Use Contract, between JV Inkai and the Kazakh government was signed in 2000.

In 2009, JV Inkai received initial approval for a mining licence for Block 2, to replace the existing exploration licence. An extension of the licence for Block 3 has been approved to July 2010.

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.

18.7.3 Environmental Impact Assessment

Under the Ecological Code, an environmental impact assessment (EIA or OVOS in Kazakhstan) 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 OVOS. The Ecological Code requires that an OVOS must be conducted at various stages of a project.

Specifically, an OVOS 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, infrastructure, etc. and in connection with the certification of facilities, technologies and materials; and
- In respect of documentation relating to emissions permits and the treatment of wastes.

Every OVOS 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 OVOSs 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 OVOSs. The issuance of emission and water use permits by the relevant authorities confirms that JV Inkai conducted approved OVOSs 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 in situ leach operation and is described in detail in the OVOS and western environmental assessment reports published since 2002. The OVOS 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 environmental that could not be mitigated through permit conditions or reclamation bond commitments. Based on the environmental findings of the OVOS studies, the State has chosen to award two mining licences and the extension of the Block 3 licence.

18.7.4 Restoration

Under Republic of Kazakhstan regulations, JV Inkai must submit a documented plan for decommissioning the mining facility 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.

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.

18.8 Taxes and Royalties

Section 4.3 contains a discussion of taxes and royalties under the new Tax Code applicable to production from Inkai.

*Table 18-2 below sets out the estimated taxes and royalties that JV Inkai will pay based upon projected Inkai production. The actual taxes and royalties paid could differ from the estimate as there is uncertainty how the new Tax Code will be interpreted and applied by the Kazakh government. The projected taxes and royalties are stated in constant 2010 dollars.*

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</tr>
</thead>
<tbody>
<tr>
<td>Mineral Extraction Tax</td>
<td>$ 9.8</td>
<td>$ 12.9</td>
<td>$ 12.9</td>
<td>$ 12.9</td>
<td>$ 12.9</td>
<td>$ 12.9</td>
<td>$ 12.9</td>
<td>$ 12.9</td>
<td>$ 12.9</td>
<td>$ 12.9</td>
</tr>
<tr>
<td>Income Tax</td>
<td>19.4</td>
<td>38.6</td>
<td>42.3</td>
<td>42.0</td>
<td>35.6</td>
<td>27.0</td>
<td>27.4</td>
<td>27.7</td>
<td>27.9</td>
<td>28.0</td>
</tr>
<tr>
<td><strong>Total Taxes &amp; Royalties</strong></td>
<td>$ 29.3</td>
<td>$ 51.5</td>
<td>$ 55.1</td>
<td>$ 54.9</td>
<td>$ 48.5</td>
<td>$ 39.9</td>
<td>$ 40.3</td>
<td>$ 40.6</td>
<td>$ 40.8</td>
<td>$ 40.8</td>
</tr>
</tbody>
</table>

MET estimates have been provided by JV Inkai. The MET rate is assumed to be 22% over the life of the mine.

Corporate income taxes have been calculated as 20% of income after depreciating the capital investment over the life of the Inkai operation. The corporate tax rate has been maintained at 20% over the life of the Inkai operation as there is uncertainty if the 15% rate contemplated by the new Tax Code will take effect in 2014. See Section 4.3 for more information.

18.9 Capital and Operating Cost Estimates

Based on information provided by JV Inkai, the remaining capital costs, as of January 1, 2010, for JV Inkai are estimated to be $359.2 million, which includes $208.6 million for well field development. It is assumed that well field development costs will gradually decline over the last five years of production. Of the remaining $150.6 million, $133.6 million is for construction and $17 million is for sustaining capital. Of the $133.6 million for construction capital, $100 million of this is for the construction of two additional satellite processing plants. The
current plan is for engineering design and construction to commence in 2011 for
one plant and in the next decade for the other plant.

Table 18-3 shows the annual capital cost estimate for Inkai from 2010 to 2030.

Table 18-3: Summary of Estimated Capital Costs

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Total Wellfield Development Capital</td>
<td>$15.6</td>
<td>$10.9</td>
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<td><strong>$12.1</strong></td>
<td><strong>$12.1</strong></td>
</tr>
</tbody>
</table>

Based on information provided by JV Inkai, the estimated operating costs, excluding taxes and royalties, average $17.55 per pound U$_3$O$_8$ over the life of the mine. These costs include mining and processing costs as well as site administration and corporate overhead.

Amongst other things, mining and processing costs include:

- Payroll
- Mining Pipes & Fittings
- Wire / Cable
- Valves
- Switch gear
- Gasoline and Diesel Fuel
- Miscellaneous Production Supplies
- General Maintenance Supplies
  - Sulphuric Acid
  - Other Reagents
  - Yellow Cake Drums

The primary components of site administration costs are:

- Taikonur office and shift camp
- Shymkent office
- Geology department
- Purchasing department
The primary components of corporate overhead costs are:

- Almaty office
- Finance department
- Legal department
- Marketing and transportation

Table 18-4 shows the annual operating cost estimate for Inkai from 2010 to 2030.

### Table 18-4: Summary of Estimated Operating Costs

<table>
<thead>
<tr>
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<td>Processing Costs</td>
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<td>Corporate Overhead</td>
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<tr>
<td><strong>Total Operating Costs</strong></td>
<td>$71.5</td>
<td>$84.2</td>
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<td>$90.8</td>
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### Total Operating Costs per lb U3O8

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<th>2010</th>
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<th>2022</th>
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<th>2027</th>
<th>2028</th>
<th>2029</th>
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<tbody>
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<td>$ 18.9</td>
<td>$ 18.9</td>
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<td>$ 18.9</td>
<td>$ 18.9</td>
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<td>$ 17.71</td>
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<td>$ 17.35</td>
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</table>

#### 18.9.1 Economic Analysis

The following economic analysis as shown in Table 18-5 for Inkai is based upon the current mine plan which contemplates mining Inkai’s mineral reserves to 2030.

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 80% of these reserves are recoverable as saleable yellowcake.

The financial projections set forth herein do not contain any estimates relating to the potential mining and milling of mineral resources, as only mineral reserves have demonstrated economic viability. Accordingly, expenditures required to bring any of the mineral resources into production or to identify additional mineral reserves and mineral resources, have not been included.
The analysis assumes no excess profits tax is payable. JV Inkai’s current view is that under the new Tax Code, which took effect January 1, 2009, it will not be liable to pay any excess profits tax.

The analysis results in an estimated after tax NPV (at a 12% discount rate) of $1.03 billion to JV Inkai, as of January 1, 2010.

Table 18-5: Economic Analysis

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<td>Sales Revenue</td>
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<td>Net cash flow (US $B)</td>
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Figure 18-3 shows estimates of the sensitivity of the after tax NPV to changes in revenue, operating costs and capital costs over a range of -10% to +10% from the base case shown as 0%. Changes to either the uranium price or the grade of solution presented to the mill will have an equivalent impact on the revenue stream. Consequently the sensitivity to revenue illustrates the sensitivity of the NPV to each of these variables. Capital already invested has been treated as a sunk cost and is not accounted for in arriving at the NPV estimate.

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

Payback for JV Inkai, including all 2009 and prior costs, would be achieved during 2012 on an undiscounted, after tax basis.
19 OTHER RELEVANT DATA AND INFORMATION

19.1 JV Inkai Funding

A Cameco subsidiary has agreed to provide loan funding, up to $370 million, to JV Inkai. Further funding may be required. As of December 31, 2009, the amount outstanding on the loan was $337 million, including accrued interest. Of the cash available for distribution each year, 80% is used to repay the loan until it is repaid in full.

Cameco has agreed to provide all funds required by JV Inkai in connection with work on Block 3 until completion of a feasibility study.

19.2 Operation Risks

19.2.1 Sulphuric Acid Availability

ISR mining at Inkai requires large quantities of sulphuric acid due to the relatively high levels of carbonate in the ore bodies.

The availability of sulphuric acid required for ISR mining was restricted due to a fire at one sulphuric acid plant in Kazakhstan in the third quarter of 2007 and delays in the start-up of a new plant. As a result, Inkai and other ISR operations in Kazakhstan were subject to reduced acid allotments. This shortage continued throughout 2008, though it was resolved by the end of that year. JV Inkai received sufficient supply during 2009 to acidify the well fields as planned. This was due, in part, to an increase in the number of supply sources from two to four. This increase in acid supply contributed to JV Inkai exceeding expected 2009 production.

Currently, supply of sulphuric acid is not a concern to JV Inkai and it is not expected to constrain production in the future. In Kazakhstan, a number of new sulphuric acid plants have commenced production and several more are planned. In addition, sulphuric acid can be sourced from Russia. Currently, JV Inkai has one supplier, who procures acid from three sources: two Kazakh and one Russian.

Nevertheless, because of the 2007-2008 shortage of sulphuric acid which delayed Inkai production, JV Inkai continues to assess its supply of sulphuric acid and whether additional steps are required to mitigate the risk of any potential supply shortage.
19.2.2 Resource Use Contract

The Resource Use Contract was signed by the Republic of Kazakhstan and JV Inkai in July, 2000. Under the Subsoil Law, JV Inkai holds its rights to Blocks 1, 2 and 3, on the basis of the licences it received for those Blocks and the Resource Use Contract. JV Inkai also has obligations under those licences and the Resource Use Contract with which it must comply in order to maintain rights to Blocks 1, 2 and 3.

In 2007, Amendment No. 1 to the Resource Use Contract was signed to extend the period for exploration at Blocks 2 and 3.

In October 2009, Amendment No. 2 to the Resource Use Contract was signed to:

- Extend the exploration period for Block 3 until July 13, 2010;
- Provide final approval for mining at Block 2;
- Combine Blocks 1 and 2 for mining and reporting purposes. This amendment does not merge the two licences nor does it change their respective terms – the licence for Block 1 expires 2024 and the licence for Block 2 expires in 2030;
- Adopt the new Tax Code that took effect January 1, 2009;
- Reflect current Kazakh legal and policy requirements for subsoil users, like JV Inkai, to procure goods, works and services under certain prescribed procedures and foster great local content. As a result, at least 40% of the cost of equipment and materials purchased must be for equipment and materials of Kazakh origin and 90% of the contract work must be of Kazakh origin; and
- Prescribe certain percentages of Kazakh employment by JV Inkai: 100% of workers must be Kazakh; at least 70% of technical and engineering staff must be Kazakh; and at least 60% of the management staff must be Kazakh. All of these percentages are measured over the life of the Resource Use Contract.

In addition to complying with its obligations under its licences and 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 mining operations over the life of the mine (the Work Program), as well as the annual work programs which it must submit to the Competent Authority for approval each year. Such annual work programs cover, inter alia, the introduction of new
technologies or processes and define the levels of production volumes anticipated by the subsoil user in each coming year.

Any changes in the Work Program or in annual work programs require application to the Competent Authority, generally supported by a technical study and corporate approvals of the subsoil user approving the requested changes.

Any increase in production from Inkai approved by a regulatory authority would be documented by an amendment to the Resource Use Contract. Regulatory approval of a potential commercial discovery at Block 3 would be documented by an amendment to the Resource Use Contract.

See Section 17.3 for a discussion of the regulatory approvals JV Inkai needs in 2010 and 2011 to increase production.

19.2.3 Extension of Block 3 Licence

On October 19, 2009, JV Inkai and the Competent Authority (then MEMR) signed Amendment No.2 to the Resource Use Contract whereby a two-year extension of its licence for Block 3 to July 13, 2010 was granted.

The exploration work conducted on Block 3 resulted in JV Inkai identifying an extensive zone of mineralization. Accordingly, in February 2010, JV Inkai filed an application with the Competent Authority declaring it has made a potential commercial discovery that requires further assessment of commercial viability.

In accordance with Kazakh regulatory procedures, JV Inkai also applied to the Competent Authority for an extension of its Block 3 licence for five years, the period required for an appraisal of a potential commercial discovery under the Subsoil Law. Without this approval, JV Inkai’s rights to Block 3 expire on July 13, 2010, without the licence extension.

19.2.4 Kazakh Laws and Regulations

Most legal relations in Kazakhstan are governed principally by the Civil Code of the Republic of Kazakhstan. The Civil Code broadly recognises, 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 materially applicable to JV Inkai’s operations. They include, principally, Subsoil Law, the Law on Limited Liability Partnerships, the Tax Code, the Ecological Code, the
Law on Competition, the Law on Transfer Pricing and the Law on Currency Regulation.

Although 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 Kazakh 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 subsoil use contracts and new laws granting preferences to the state, state enterprises and domestic concerns have been adopted.

Cameco believes that while operating in Kazakhstan today is challenging, it is manageable.
20 INTERPRETATION AND CONCLUSIONS

Inkai is an ISR mine in the Central Asian Republic of Kazakhstan. It comprises three contiguous licence blocks: two production areas (Blocks 1 and 2) and one exploration area (Block 3).

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

In 2009, Blocks 1 and 2 of Inkai produced 1.83 million pounds uranium (100% basis). JV Inkai believes that Blocks 1 and 2 have the potential to significantly increase production to an annual rate of 5.2 million pounds, as outlined in this technical report.

The current technical report supports the increased production, based on an operating mine life of approximately 21 years, producing an estimated 107.9 million pounds of U₃O₈. At the forecast uranium price over this period, it is estimated that JV Inkai will receive substantial positive net cash flows.

The economic analysis shows a projected after tax NPV, as of January 1, 2010, using a 12% discount rate, to JV Inkai of $1.03 billion for the Block 1 and 2 mineral reserves. The sensitivity analysis demonstrates that JV Inkai can withstand financially negative events, such as increasing costs, or decreased prices and ore grades, and continue to deliver strong cash flows.

JV Inkai still requires regulatory approval to produce at increased annual production levels planned for 2010 and 2011, which approvals Cameco expects JV Inkai to receive. These approvals would be documented by amendments to the Resource Use Contract.

Based on exploration to date, Cameco and JV Inkai are of the opinion that Inkai Block 3 has the potential to support a commercial discovery. Therefore JV Inkai requested the Competent Authority to approve an extension of its Block 3 licence for five years, the period required for an appraisal of a potential commercial discovery under the Subsoil Law. Without this approval, JV Inkai’s rights to Block 3 expire on July 13, 2010.
21 RECOMMENDATIONS

It is recommended that JV Inkai increase production, once the necessary regulatory approvals have been secured. Based on the robust economics for Inkai, it is JV Inkai’s plan to proceed with the increase of production from Blocks 1 and 2 Inkai to 5.2 million pounds production as described in this technical report. This is supported by the economic analysis, showing a strong after tax NPV that is resilient to changes in capital costs and operating costs, and to a lesser extent revenue.

The remaining capital costs, as of January 1, 2010, for JV Inkai are estimated to be $359.2 million.

JV Inkai plans to include a diamond drilling program within Block 3 with the goal of supporting the declaration of a commercial discovery. JV Inkai plans to spend $31.3 million on Block 3 in 2010. In anticipation of receiving extension of the Block 3 licence, JV Inkai has commenced its 2010 Block 3 exploration program.

The authors of this technical report concur with, and recommend that JV Inkai proceed with the foregoing plans.
22 REFERENCES

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


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

23  DATE AND SIGNATURE PAGE

This NI 43-101 Technical Report titled “Inkai Operation, South Kazakhstan Oblast, Republic of Kazakhstan”, dated March 31, 2010 with an effective date of December 31, 2009 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,

“signed and sealed”
Charles J. Foldenauer, P. Eng.  March 31, 2010
Joint Venture Inkai Limited
Liability Partnership
240 Dostyk Avenue
Suite 203
Dostar Business Centre
Almaty, 05 00 51
Kazakhstan
Tel 7-7272-585-777
Fax 7-7272-581-607

“signed and sealed”
Alain G. Mainville, P. Geo.  March 31, 2010
Cameco Corporation
2121 – 11th Street West
Saskatoon, SK, S7M 1J3
Canada
Tel (306) 956-6200
Fax (306) 956-6201