COMPETENT PERSONS' REPORT ON THE MINERAL ASSETS OF JOINT STOCK COMPANY NATIONAL ATOMIC COMPANY KAZATOMPROM, REPUBLIC OF KAZAKHSTAN

Prepared For

Joint Stock Company National Atomic Company "Kazatomprom"

Report Prepared by

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UK31126

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1 INTRODUCTION

1.1 Background

SRK Consulting (UK) Limited ("**SRK**") has been appointed by Joint Stock Company National Atomic Company Kazatomprom ("**Kazatomprom**", "**KAP**", or the "**Company**") to prepare A Competent Persons' Report ("**CPR**"), pursuant to the requirements (defined in Section 1.2.1 below) on its uranium mineral and mining exploration assets (the "**Mineral Assets**") located in the in the Republic of Kazakhstan ("**Kazakhstan**"). The "**Group**" refers to the Company and its consolidated subsidiaries, i.e., companies that the Group controls by having (i) the power to direct their relevant activities that significantly affect their returns, (ii) exposure, or rights, to variable returns from its involvement with these entities, and (iii) the ability to use its power over these entities to affect the amount of the Group's returns. The existence and effect of substantive rights, including substantive potential voting rights, are considered when assessing whether the Group has power over another entity. The Group, with its associates and joint ventures ("**JVs**"), are collectively referred to as the "**Holding**".

Kazatomprom is a joint stock company incorporated under the laws of Kazakhstan on 21 February 1997 which operates as Kazakhstan's national operator for the export and import of uranium and its compounds, nuclear power plant fuel, special equipment and technologies, as well as rare metals. Following an Initial Public Offering ("**IPO**") and subsequent share sales approximately 25% of the Company's outstanding share capital is listed on the London Stock Exchange ("**LSE**") a market operated by the London Stock Exchange Group plc and the Astana International exchange (the "**AIX**") and trades under the ticker KAP.

The Company by measure of attributable production is the largest producer of natural uranium globally as well the second lowest cost producer as reported by Ux Consulting Company ("**UxC**"). For the 12-month period ended 31 December 2021 the Company together with its subsidiaries (the "**Group**") represented approximately 24% (2020: 22.5%) of total global uranium primary production and approximately 40% of global in-situ leach recovery ("**ISR**") uranium production.

The Group operates through a complex structure of subsidiaries, Joint Venture and Associate companies comprising three key segments: the "**Uranium Segment**"; the "**UMP Segment**"; and the "**Other Segment**". The Uranium Segment includes uranium mining and processing operations from the Group's mines, the Group's purchases of uranium from the Group's joint ventures and associates engaged in uranium production, and external sales and marketing of uranium products, in each case other than production and sales of UO_2 powder and fuel pellets.

The Company's status as a national company in Kazakhstan allows the Group to benefit from certain privileges, including, among other things, obtaining subsoil use agreements through direct negotiation with the Government of Kazakhstan ("**GoK**") rather than through a tender process which would otherwise be required. This effectively grants the Group priority access to such opportunities, including exploration, development and production of all-natural uranium in Kazakhstan.

For the 12-month period through to 31 December 2021, a review of the Group's consolidated operational and financial highlights as reported in the Group's public domain filings indicates as follows:

- Total Uranium production of 21,819tU_3O_8 (2020: 19,477 tU_3O_8);
- Total attributable uranium production of 11,858tU_3O_8 (2020: 10,736tU_3O_8);
- Total consolidated uranium sales of 16,526tU_3O_8 (2020: 16,432tU_3O_8) and average realized price of 33.11/lbU_3O_8 (2020: 29.54/lbU_3O_8);
- Attributable unit cash cost metrics comprising C1 of US$8.80/lb$U_3O_8$ (2020: US$8.67/lb$U_3O_8$) and All In Sustaining Cash Cost ("**AISC**") of US$12.44/lb$U_3O_8$ (2020: US$11.72/lb$U_3O_8$);
- Total sales revenue of US$1.62bn (2020: US$1.42bn);
- Adjusted Earnings Before Interest and Taxation ("**EBITDA**") of US$822.2m (2020: US$788.0m);
- Consolidated Mining Segment capital expenditure of US$213.8m (2020: US$147.4m) the majority of which is represented by wellfield construction and sustaining costs;
- Mine development assets, Mineral Rights and Exploration and evaluation assets value at US$321.2m (2020: US$297.7m), US$1,281.0m (2020: US$1,314.1m) and US$56.5m (2020: US$56.8m respectively);
- Consolidated Mining Segment Asset Retirement Obligations ("**ARO**") of US$250.5m;
- Consolidated Mining Segment Life of Min Plan Environmental Liabilities of US$621.8m;
- Total Employees Costed ("**TEC**") of 16,942 (2020: 17,228); and
- On 31 December 2021 the market statistics for the ordinary listed shares of the Company reported as follows: market capitalisation of US$10.0bn; equity value of US$10.6bn and a share price of US$36.75/share.

The scope of this "**CPR** is limited to the Mineral Assets as defined herein specifically the mining and processing operations of the Uranium Segment and all key activities relating to the extraction of uranium and production of the final saleable product in the form of U_3O_8. The Mineral Assets are located in three (Shu-Sarysu; Syrdarya; and North Kazakhstan) of the six uranium geological provinces of Kazakhstan, cover a total licence area of 2,059.27km^2 and comprise 29 deposits/blocks categorised as: 23 Producing Properties ("**PPs**"); two Development Property ("**DP**") and two Advanced Exploration Properties ("**AEPs**") based on the classifications as reported in Section (1.2.2). In addition, the Company's "**Exploration Programme**" covers several less advanced Exploration Properties ("**EPs**") also located in the three regions in which the Company is active. The Mineral Assets are largely held through 14 subsidiaries, Joint Venture and Associate companies (the "**Mining Subsidiaries**" - Table 1-1) which in conjunction with the Company are directly responsible for uranium mining and downstream processing activities. Thirteen of the Mining Subsidiaries include PPs while one Mining Subsidiary only includes AEPs (Budenovskoye LLP). In addition, the Company holds 100% of two AEPs in its own name.

Table 1-1: Mineral Assets salient statistics

Mining Subsidiary	Equity Interest (%)	Geological Region	Deposits /Prdn Units (No)	Contracts (No)	Licence Area (km^2)	Discovery (year)	Prdn Start (year)	LoMp(1) Depletion (year)	Prdn (tU)
Operating Properties									

Mining Subsidiary	Equity Interest (%)	Geological Region	Deposits /Prdn Units (No)	Contracts (No)	Licence Area (km²)	Discovery (year)	Prdn Start (year)	LoMp[1] Depletion (year)	Prdn (tU)
Kazatomprom-SaUran LLP[3]	100.00	Shu-Sarysu	5[3]	5	252.90	1963	1997	2048	1,665
Ortalyk LLP	100.00	Shu-Sarysu	2	2	186.40	1964	2007	2042	2,900
RU-6 LLP	100.00	Syrdarya	2	1	59.58	1979	1997	2040	833
Appak LLP	65.00	Shu-Sarysu	1	1	133.46	1976	2008	2037	1,000
JV Inkai LLP[2]	60.00	Shu-Sarysu	3	1	139.00	1976	2001	2051	4,000
Semizbai-U LLP	51.00	Syrdarya; Northern Kazakhstan	2	2	71.20	1973	2008	2042	1,117
JV Akbastau JSC	50.00	Shu-Sarysu	3	2	2.71	1976	1997	2039	2,194
Karatau LLP	50.00	Shu-Sarysu	1	1	17.28	1979	2007	2032	3,600
JV Zarechnoye JSC	49.98	Syrdarya	1	1	38.00	1977	2007	2028	776
JV Katco LLP	49.00	Shu-Sarysu	2	1	45.73	1976	2001	2035	4,000
JV Khorassan-U LLP	50.00	Syrdarya	1	1	70.80	1972	2008	2038	2,200
JV SMCC LLP	30.00	Shu-Sarysu	2	2	116.91	1976	2004	2057	2,924
Baiken-U LLP	52.50	Shu-Sarysu	1	1	350.00	1972	2009	2033	1,500
Budenovskoye LLP	51.00	Chu-Sarysu	1	1	151.30	2017	2024	2045	6,000
Subtotal			**27**	**22**	**1,635.27**	**1963**	**1997**	**2057**	**33,008**
Advanced Exploration Properties									
Kazatomprom	100.00	Shu-Sarysu	2	2	424.00	1976	n/a	n/a	n/a
Subtotal			**2**	**2**	**424.00**	**1976**	n/a	n/a	n/a
Grand Total			**29**	**24**	**2,059.27**	**1963**	**1997**	**2057**	**33,008**

(1) LoMp: date of depletion of Ore Reserves; maximum production in the current Life of Mine plans for the Mineral Assets.

(2) For JV Inkai LLP, the Company's equity participation is determined based on a prescribed formula based on uranium production within the following bands: 0tU to 1,500tU (40.00%); 1,500tU to 2,000tU (50.00%); 2,000tU to 4,000tU (77.50%); 4,000tU (60%) for 2022 onwards.

(3) At Kazatomprom-SaUran LLP, two deposits have limited production and no further Ore Reserves and Mineral Resources are reported in the 2021 Statements.

The Mineral Resource and Ore Reserve statements (Table 1-2) for the Mineral Assets as on 31 December 2021 (the "**2021 Statements**") reported:

- Total Ore Reserves reported on an aggregate basis of 999.2Mt grading 0.063%U and containing 625.4ktU and comprising:
  - Proved Ore Reserves of 482.8Mt grading 0.061%U and containing 296.7ktU,
  - Probable Ore Reserves of 516.5Mt grading 0.064%U and containing 328.8ktU; and
- Total Mineral Aggregated Mineral Resources of 1,424.7Mt grading 0.055%U and containing 784.4ktU and comprising:
  - Measured Mineral Resources of 700.9Mt grading 0.058%U and containing 406.6ktU,
  - Indicated Mineral Resources of 710.2Mt grading 0.052%U and containing 369.1ktU,
  - Inferred Mineral Resources of 13.6Mt grading 0.063%U and containing 8.6ktU.

SRK's audited Mineral Resource statements are reported inclusive of those Mineral Resources converted to Ore Reserves. The audited Ore Reserve is therefore a subset of the Mineral Resource and should not therefore be considered as additional to this.

Table 1-2: Aggregated Mineral Resources and Ore Reserves as on 31 December 2021 for the Mineral Assets[1]

Mining Subsidiary	Deposits (No)	Ore Reserves (Mt)	Ore Reserves (%U)	Ore Reserves (ktU)	Mineral Resources (Mt)	Mineral Resources (%U)	Mineral Resources (ktU)
Operating Properties							
Kazatomprom-SaUran LLP	5	52.0	0.044	23.1	59.6	0.042	25.3
Ortalyk LLP	2	37.2	0.100	37.2	88.5	0.042	37.2
RU-6 LLP	2	17.7	0.076	13.5	17.7	0.076	13.5
Appak LLP	1	46.0	0.035	16.3	46.0	0.035	16.3
JV Inkai LLP	3	252.0	0.052	131.3	294.8	0.051	151.8
Semizbai-U LLP	2	52.3	0.046	24.2	52.3	0.046	24.2
JV Akbastau JSC	3	43.2	0.088	37.9	43.2	0.088	37.9
Karatau LLP	1	49.1	0.079	38.7	49.1	0.079	38.7
JV Zarechnoye JSC	1	8.8	0.059	5.2	9.8	0.059	5.8
JV Katco LLP	2	47.5	0.110	52.4	51.6	0.106	54.9
JV Khorassan-U LLP	1	34.3	0.107	36.6	34.3	0.107	36.6
JV SMCC LLP	2	190.9	0.041	77.9	195.9	0.041	80.0
Baiken-U LLP	1	15.3	0.112	17.0	15.3	0.112	17.0
Budenovskoye LLP	1	153.0	0.075	114.2	160.6	0.075	120.1
Subtotal	**27**	**999.2**	**0.063**	**625.4**	**1,118.5**	**0.059**	**659.2**
Advanced Exploration Properties							
Kazatomprom	2	n/a	n/a	n/a	306.1	0.041	125.1
Subtotal	**2**	n/a	n/a	n/a	**306.1**	**0.041**	**125.1**
Grand Total	**29**	**999.2**	**0.063**	**625.4**	**1,424.7**	**0.055**	**784.4**

(1) Ore Reserves and Mineral Resources have been assessed assuming the commodity price profiles as reported in Section 3 of this CPR. For Ore Reserves the long-term uranium price ("**LTUP**") is reported in the Consensus Market Forecast as US$49/lb$U_3O_8$ to which a 30% premium has been added to derive the assumed Uranium Price of US$64/ lb$U_3O_8$.

This CPR presents the following key technical information as at the Effective Date (defined below):

- Mineral Resources and Ore Reserve statements for the Mineral Assets reported as at 31 December 2021 (the "**2021 Statements**") and reported in accordance with the Producing Properties, the Development Properties and the Advanced Exploration Properties (defined in Section 1.2.2 below) are reported in accordance with the terms and definitions of the JORC Code (2012) also defined in Section 1.2.2 below
- The Life-of-Mine plans ("**LoMp**") for the Mineral Assets reflecting production scenarios (the "**LoMp Scenarios**") including depletion of Ore Reserves including assumed production, sales, sales revenue, operating and capital expenditure commencing 1 January 2021;
- The Asset Retirement Obligations and the LoMp "**Environmental and Social Liabilities**" for the Mineral Assets inclusive of all mine closure related expenditures commencing 1 January 2021 for the Mineral Assets;
- The "**Exploration Programme**" for the Mineral Assets specifically relating to the Advanced Exploration Properties and the Exploration Properties; and
- Financial Modelling of the Mineral Assets undertaken to support the technical and economic viability of the Ore Reserves and the LoMp Scenarios as reported herein.

For the avoidance of doubt, this CPR is limited to the Mineral Assets and specifically exclude all assets and liabilities relating to the Group's activities external to the Mineral Assets as defined herein. Notwithstanding the aforementioned, this CPR does include the results of the Financial Modelling of the Mineral Assets which relies on certain inputs including TEPs as provided by the Company and as appropriate, modified and adjusted by SRK. Certain units of measurements and technical terms defined in the JORC Code (defined in 1.2.2 below) are defined in the glossaries, abbreviations and units included at the end of this CPR.

1.2 Requirement, Report Standard and Reliance

This CPR has been requested to being issued in accordance with the Company's public reporting requirements relating to its listing on the main market of the LSE and reflects an update to the original Competent Persons' Report published in support of the 2018 IPO process.

1.2.1 Requirement

The CPR has been prepared in compliance with the following requirements which together comprise the "Requirements" relating to publication of Competent Persons' Reports on the LSE:

- The "**Prospectus Regulation Rules**" and the "**Listing Rules**" published by the FCA from time to time and under Part VI of the Financial Services and Markets Act 2000 of the United Kingdom (the "**FSMA**");
- The UK version of Regulation EU (2017/1129) as amended by The Prospectus (Amendment etc.) (EU Exit) Regulations 2019, which is part of UK law by virtue of the European Union (Withdrawal) Act 2018 (the "**UK Prospectus Regulation**"); and
- The *"ESMA update of the CESR recommendations: The consistent implementation of Commission Regulation (EC) No 809/2004 implementing the Prospectus Directive"*, published on 20 March 2013: specifically paragraphs 131 to 133, section 1b – mineral companies, Appendix I – Acceptable Internationally Recognised Mining Standards, and Appendix II – Mining Competent Persons' Report – recommended content, hereinafter and collectively referred to as the "**CESR Recommendations**" and published on 20 March 2013.

Given the common technical discipline aspects pertaining to the Mineral Assets this CPR is structured on a largely discipline basis where common themes are assessed and reported collectively to avoid excessive repetition. With respect of paragraphs 132(a)-(e) of the CESR

Recommendations SRK notes that all relevant details are included in the various discipline Sections comprising: Section 5 Uranium Deposits: Geological Occurrence, Mining And Processing; Section 6 Geology; Section 7 Mineral Resources And Ore Reserves; Section 8 Exploration Potential; Section 9 In-Situ Uranium Extraction And Recovery; Section 10 Environmental And Social Liabilities; Section 11 Life Of Mine Plans; Section 12 Risks And Opportunities; and Section 13 Conclusions.

In respect of compliance with "Appendix II" of the CESR Recommendations, specifically the recommended content of the Competent Persons' Reports SRK respectfully highlights the following:

- **Scope of the CPR:** The primary focus of the CPR is with respect to the provision of independently audited and current: Mineral Resources and Ore Reserves; Life-of-Mine plans; Environmental and Social Liabilities; Exploration Programmes; and Financial Modelling of the Mineral Assets as reported herein; and
- **Compliance Cross Reference** for similar groupings noted for paragraphs 132(a)-(e) above, the following items are referenced in Section 5 through Section 11 unless otherwise noted:
  - Item (i) Legal and Geological Overview of the Mineral Assets including (1) and (2),
  - Item (ii) Geological Overview,
  - Item (iii) Mineral Resources and Ore Reserves including (1) (2), (3), (4 and 5), (6), (7), (8a), (8b), 8 (c and d),
  - Item (iv) Valuation of Ore Reserves/Mineral Assets. This CPR does not include a Valuation of Ore Reserves, and for the avoidance of doubt, does not include a valuation of the Mineral Assets. Notwithstanding this statement, the CPR provides sufficient information as reported in Section 3 Commodity Prices And Macro-Economics; Section 11 Life Of Mine Plans to derive a valuation of the Ore Reserves as reported herein,
  - Item (v) Environmental, Social and Facilities: (1), (2), (3),
  - Item (vi) Historic Production/Expenditures,
  - Item (vii) Infrastructure,
  - Item (viii) Maps,
  - Item (ix) Special Factors.

1.2.2 Reporting Standards

Mineral Resource and Ore Reserves

The reporting standard adopted for the reporting of the Mineral Resource and Ore Reserve statements included in the CPR is the ***"The 2012 Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves as published by the Joint Ore Reserves Committee of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia"*** (the "**JORC Code**"). The JORC Code is a reporting code which has been aligned with the Committee for Mineral Reserves International Reporting Standards ("**CRIRSCO**") reporting template. Accordingly, SRK considers the JORC Code to be an internationally recognised reporting standard that is adopted worldwide for market-related reporting and financial investments.

Development Status

The Mineral Assets as reported are classified into various groupings reflecting the development stage at the Effective Date of this CPR. The development stage groupings are defined as follows:

- **Producing Property ("PP"):** a mineral asset for which Ore Reserves are declared and mining and processing operations have been commissioned and are in full scale production.

- **Development Property ("DP"):** a mineral asset for which Ore Reserves have been declared and are essentially supported by a minimum of a pre-feasibility study which on a multi-disciplinary basis demonstrates that the consideration is technically feasible and economically viable, but which are not yet in full scale production;
- **Advanced Exploration Property ("AEP"):** a mineral asset for which only Mineral Resources have been declared; and
- **Exploration Property ("EP"):** a mineral asset for which no Mineral Resources have been declared.

Technical Study Standards

The standard of technical study assumed by SRK to be required to support the reporting on an Ore Reserve statement is a comprehensive study of the viability of a mineral project that has advanced to a stage where the mining method, in the case of underground mining, or the pit configuration, in the case of an open pit, has been established and an effective method of mineral processing has been determined, and includes a financial analysis based on reasonable assumptions of technical, engineering, legal, operating, economic, social, and environmental factors and the evaluation of other relevant factors which are sufficient for a qualified person, acting reasonably, to determine if all or part of the Mineral Resource may be classified as an Ore Reserve. For the avoidance of doubt this would commonly ensure that the technical feasibility and economic viability of the mineral project has been demonstrated on a multi-disciplinary basis to a Pre-Feasibility Study ("**PFS**") level at least. SRK notes that such studies are not normally dependent on Inferred Mineral Resources to demonstrate economic viability and generally include appropriate contingencies (± 20% to 25%) with respect to capital expenditures to account for the lower amount of site-specific engineering designs completed compared to that normally included in a Feasibility Study. Furthermore, it is also general industry practice to acknowledge that such studies in reflecting a lower degree of accuracy are accompanied by higher accuracy/sensitivity ranges (±20%). A key deliverable of a PFS would be for it to include a recommendation of a single and sufficiently positive technical and economic outcome such that advancement to Feasibility-Study level is warranted.

Environmental and Social Standards

Environmental and Social Standards as considered in this CPR has been, where practically possible, assessed with due consideration for various national and international legislation and regulations as well as consideration for international standards and guidance. In respect of the latter standards and guidance SRK has considered the Group's stated objective for adherence to the International Financial Corporation's Performance Standards ("**IFC PS"**) and relevant World Bank Group's Environmental Health and Safety Guidelines.

Accordingly, the principal focus of the Environmental and Social review in respect of the Mineral Assets comprised a review of the Environmental Management Practices and Environmental Liabilities (Bio-Physical and Social) at the Mineral Assets with specific focus on the primary regulatory documentation and compliance with the conditions of approval, including emissions and discharges in respect of both local and international standards. It is however important to note that this review did not constitute a detailed Environmental Audit does not extend to provide a detailed opinion and development of any Equator Principles Action Plan capable of bringing the technical studies into compliance with the Equator Principles, nor indicate when compliance is not possible as typically required for a Project Finance facility: for all Category A and, as appropriate, Category B Projects.

Responsible sourcing regulations are an increasing focal point for stakeholders in the international mining and metals sector and in addition to national legislation, there are also a number of regulations and guidance that specifically cover the responsible souring of specific commodities. For example, the "**Dodd-Frank**" legislation in the United States (Section 1502) and the "**EU Conflict Free Minerals**" regulations require due diligence within the supply chain in order to ensure that mining and production of gold does not fund conflict. One of the most widely recognised is the **"OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas**". The guidance was operationalised by the World Gold Council for the mining sector, the London Bullion Market Association for the refining sector and the Responsible Jewellery Council for this sector.

In addition to the above a number of other key mining and metals sector ESG standards and governance frameworks apply as noted below:

- **Overarching:** United Nations ("**UN**") Initiatives (UN Global Compact; UN Sustainable Development Goals; UN Guiding Principles on Business and Human Rights); International Standards (14000 environment, 45000 health and safety, 50000 energy, 31000 risk) and ISO Guidelines (26000 social responsibility);
- **Disclosure:** non-financial/sustainability reporting initiatives (Global Reporting Initiative: "**GRI**"; Sustainability Accounting Standards Board: "**SASB**"); climate specific disclosure (Taskforce on Climate-related Financial Disclosures: "**TCFD**"; Carbon Disclosure Project: "**CPD**"); other disclosure initiatives (Extractive Industry Transparency Initiative: "**EITI**"; Disclosure of specific TSF information on the Global Tailings Portal);
- Responsible Mining/Sourcing: International Council for Mining and Metals ("**ICMM**") Principles;
- Issue Specific: Global Industry Standard on Tailings Management ("**GISTM**"); and
- Regional Initiatives: European Green Deal; European Union Taxonomy Regulation; EU Sustainable Finance Disclosure Regulation ("**SFDR**").

With respect to "**Mine Closure**" related liabilities key international standards include those which are focused on a combination of technological and engineering solutions which reflect Good International Industry Practice ("**GIIP**") and "**Best Available Technology**" to where practicable achieve "**Ground Zero**" or "**Walk Away**" remediation status. Guiding standards which reinforce these objectives include: the International Council on Mining and Minerals ("**ICMM**") Planning for Integrated Mine Closure: Toolkit (2008); World Bank in Mining and Development, It's Not Over When It's Over: Mine Closure Around the World (2002); European Commission's Reference Document on "*Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities*" published in 2009; "*IFC EHS Guidelines on Construction and Decommissioning*" published in 2007; and "*Mining for Closure: Policies and Guidelines for Sustainable Mining Practice and Closure of Mines*" published by United Nations Environment Programme ("**UNEP**"), United Nations Development Programme ("**UNDP**"), Organization for Security and Co-operation in Europe ("**OSCE**") and the North Atlantic Treaty Organization ("**NATO**") in 2005.

Mineral Asset Valuation

Whilst this CPR does not include a Valuation of the Ore Reserves, the Financial Modelling information as included herein is incorporated in accordance with the general disclosure principles and process as defined by the "*Australasian Code for Public Reporting of Technical Assessments and Valuations of Mineral Assets (2015 Edition)*", hereinafter the "**Valmin Code (2015)**".

Cash Cost Reporting

The determination of cash costs in the metals and mining sector varies both within and between commodity focus companies. Furthermore, it would appear that with respect to reporting standards, that defined by the World Gold Council ("**WGC**") and published (2018) ("**WGC 2018**") in its guidance noted on "*all-in sustaining costs*" and "*all-in costs*" metrics would appear to be the most comprehensive. This was an advance from the cash cost reporting methodology introduced in 1996 which focused solely on the mining and processing costs incurred. In contrast WGC 2018 focuses on costs incurred in the complete mining life cycle from exploration to closure. This evolved to the standardisation of cost structures to include various forms of cash costs reported on a per unit of saleable production basis as reflected in the following industry standard definitions:

- **Adjusted Operating Costs ("AOC")** comprising on-site mining costs, on-site general and administrative costs, royalties and production taxes, community costs related to current operations, refining and transport costs, non-cash remuneration (site-based), stockpile and product inventory write down, operational waste stripping costs and by-product credits;
- **All In Sustaining Costs ("AISC")** comprising corporate general & administration costs (including share-based remuneration), reclamation and remediation accretion and amortisation (operating sites), exploration and study costs (sustaining), capital exploration (sustaining), capitalised stripping & underground mine development (sustaining), sustaining capital expenditure and sustaining leases; and
- **All-in Costs ("AIC")** comprising growth and development costs not related to current operations, community costs not related to current operations, permitting costs not related to current operations, reclamation and remediation costs not related to current operations, exploration and study costs (non-sustaining), capital exploration (non-sustaining), capitalised stripping & underground mine development (non-sustaining), non-sustaining capital expenditure and non-sustaining leases.

In respect of the above items it is important to note that the following expenditures are typically not included in the WGC guidance: corporate income tax; working capital (except for adjustments to inventory on a sales basis); all financing charges (including capitalised interest); costs related to business combinations, asset acquisitions and asset disposals; items needed to normalise earnings, for example impairments on non-current assets, one-time material severance charges or legal costs or settlements or legal costs or settlements related to significant lawsuits.

In addition to the above there are also various other international standards considered comprising:

- Cash costs which includes costs of goods sold ("**COGS**": including labour, energy, consumables) + royalties (net of by-product credits);
- Total cash costs inclusive of cash costs, sustaining capital, exploration expenses and offsite costs; and
- Total costs which includes total cash costs, depreciation and interests, taxes and non-sustaining capital expenditure.

In the wider mining and metals space, an alternative consideration is that reflected in the C1, C2 and C3 cash cost system which partially mirrors the AOC, AISC, and AIC respectively with the exception of C3 which typically includes corporate income taxes and working capital movement.

With respect to the uranium sector, comparative assessment of the approach adopted by mining companies yield varying interpretations with no explicit reporting of adherence to any specific standard. Accordingly, and in conjunction with the Company, SRK has determined historical cash costs which is largely based on the WGC guidance inclusive of certain modifications (exclusion of Mineral Extraction Tax to establish the variant C1 (exc MET); and exclusion of the contributions to the environmental closure fund and ultimate closure costs from the "**All In Sustaining Costs**") as advised by the Company. To this end the following definitions have been adopted:

- C1 cash costs ("**C1**") comprising all direct cash expenditures required to secure the sales volumes and sales revenues as determined and include, mining, processing, general and administration, Mineral Extraction Tax, Reimbursable Services, Distribution, Toll Refining and Retrenchment costs; and
- All in sustaining Costs ("**AISC**") comprising the C1 cash costs as well as the production well construction costs and sustaining costs.

For clarification these costs specifically to do not include any significant non-cash items and as such being presented on a cash basis and cannot be directly compared with any historical cash costs or AISC as derived either by the Company or other competitors operating in the uranium sector. Furthermore, SRK notes that both historical and forecast unit cash costs as reported herein are expressed per tonne of U_3O_8 sold with the primary variance between both produced and sold being largely attributable to movement in Work-in-Progress ("**WIP**") as determined by the change in closing balances between the reporting periods. For certain Mining Subsidiaries the variance between that which is produced and that which is sold in respect of tonnes of U in the final product is not significant and accordingly reporting on either an as produced or as sold basis is not considered significant, specifically when considering forecast data. This aside, SRK notes that certain of the Mining Subsidiaries have due to various market conditions, not sold all that was produced historically, thereby resulting in increased product stockpiles. This is specifically the case for Kazatomprom-SaUran LLP, and in this specific instance the unit of cash cost reporting adopted is on an as produced U_3O_8 basis.

1.2.3 Reliance

This CPR is address to and may be relied on by the Directors of the Company and its nominated "Advisors", specifically in compliance with the Requirements, the Reporting Standard and specifically in compliance with the Requirements, the Reporting Standard and as appropriate Rule 5.3.2R(2)(f) of the Prospectus Regulation Rules. Accordingly, SRK has confirmed in writing (the "Consent letter"), dated on the Publication Date which confirms:

- Reliance as regards the CPR for any benefit of the Company and its Advisors;
- Consent to the inclusion of the CPR, and to the inclusion of any extracts from the CPR in the Prospectus;
- Confirmation that all information contained in the Prospectus which is extracted from the CPR or based upon information contained in the CPR has been reviewed by SRK and that such information as presented is accurate, balanced, complete and not inconsistent with the CPR in accordance with Rule 5.3.2R(2)(f) of the Prospectus Regulation Rules; and
- Responsibility for the CPR and declares that it has taken all reasonable care to ensure that the information contained in the CPR is, to the best of its knowledge, in accordance with the facts and makes no omission likely to affect its import.

SRK has no obligation or undertaking to advise any person of any development in relation to Mineral Assets which comes to its attention after the date of this CPR or to review, revise or update the CPR or opinion in respect of any such development occurring after the date of this

CPR.

1.3 Effective Date, Base Technical Information Date and Publication Date

The effective date of the CPR is 30 June 2021 (the "**Effective Date**"). The 2021 Statements the LoMps, the TEPs, the Environmental and Social Liabilities, the Exploration Programme and Financial Modelling of the Mineral Asset reflect SRK's review and as necessary adjustment and modification of the Company's:

- Mineral Resource and Ore Reserves statements as noted in the 2021 Statements and reported by SRK in accordance with the terms and definitions of the JORC Code (2012);
- Life of Mine plan scenarios (the "**LoMp Scenarios**") with projected production from 1 January 2022;
- Detailed schedules of activities and expenditures relating to the derivation and support of the forecast TEPs as included in the LoMp Scenarios for the Producing Properties and the Development Properties including, production, sales, sales revenue, operating expenditure and capital expenditure;
- Financial Models for the Mineral Assets incorporating annual forecasts of the TEPs and resulting post-tax pre-finance cashflows;
- Environmental and Social Liabilities comprising both Asset Retirement Obligations and Mine Closure Costs as on 31 December 2021, whereby the later comprises liabilities for all historical, current and planned infrastructure relating to the Mineral Assets and inclusive retrenchment;
- Supporting details for the Company's Exploration Programme including schedules of activities and expenditures to support the planned forecasts as reported herein; and
- Financial Modelling of the Mineral Assets to assess the technical and economic viability of the Ore Reserves.

The 2021 Statements reflect SRK's review and modification of the Company's 31 December 2021 estimates reported in accordance with the State Commission of Kazakhstan on Mineral Reserves (the "**GKZ System**") to derive audited Mineral Resource and Ore Reserve statements for the Mineral Assets and reported in accordance with the terms and definitions of the JORC Code. The 2021 ARO Statements reflect SRK's review and where appropriate modification of the Company's initial estimates as at 31 December 2021.

The Base Technical Information Date is defined as 1 January 2022 which is co-incident with the reporting date for the 2021 Statements. The Publication Date of the CPR is 30 June 2021 and is coincident with the Effective Date.

As advised by the Company, as at the Publication Date of the CPR no material change has occurred as of the Base Technical Information Date which would warrant further updating of the Mineral Resource and Ore Reserve statements as presented herein.

1.4 Verification, Validation and Reliance

This CPR is dependent upon technical, financial and legal input from the Company. SRK has conducted a review and assessment of all material technical issues likely to influence the 2021 Statements; the LoMp and accompanying TEPs; the Environmental and Social Liabilities; the Exploration Programme; and the Financial Modelling of the Mineral Assets. The review comprised:

- Reliance on historical mandates completed in 2017, 2018, 2019 and 2020 including authoring of Mineral Resource and Ore Reserve statements, Asset Retirement Obligations and Competent Persons Reports.

- A review of the quantitative and qualitative analysis undertaken by the Group, the Mining Subsidiaries and third parties including technical assessments and related documentation submitted by the Operating Subsidiaries to various state regulatory authorities in Kazakhstan, inter alia:
  - The 2021 estimates reported in accordance with the with the GKZ System,
  - Technico Economicheskiye Obosnovaniye ("**TEO**"): Scoping/Pre-Feasibility multidisciplinary documents,
  - Proyekt Razvitiya Mestorozhdeniy and sometimes referred to as the "**Project**",
  - Otsenka Vozdejstviya na Okruzhayushchuyu Sredu ("**OVOS**"): equivalent of an Environmental and Social Impact Assessment ("**ESIA**"),

  Technical data included within, derived from and as necessary amended by the Group including:
  - The LoMps as reflected in the technical studies inclusive of mine designs, production and equipment schedules, mine cost modelling and financial modelling outputs as they relate to the Company's various LoMp,
  - The annual short term budget and 5 year capital forecasts for each of the Mining Subsidiaries,

  and in addition, other supporting technical, environmental and social, mineral tenure, mining contracts and other documents relating to the Mineral Assets, specifically where these were updated subsequent to publication of the 2021 CPR. As informed by the Company SRK understands that following 1 January 2022 there have been no substantive revisions to any of the above technical documentation which SRK reviewed as part of its current or historical mandates;
- Review of historical physical operating statistics, related revenues and expenditures from 2018 through 31 December 2021;
- Enquiry of technical, financial and legal representatives of the Company during head office discussions held at various times from 02 December 2021 through 30 June 2022;
- Historical site visits completed between 2017 and 2022 with the most recent site visits completed to selected Mineral Assets during Q3 2022;
- Review of the detailed determinations made by the Company and reflected in the **"ARO Workbooks"** as provided to SRK, specifically the:
  - supporting technical and economic inputs as initially prepared by the Company for each of the Development Properties as reported herein,
  - the incremental physical activities as reported for 2021,
  - the logic and calculation flows historically established for the 2018 CPR process and relied upon for the derivation of the 2021 ARO Statements.
  - enquiry of technical and financial representatives of the Company following receipt of the ARO Workbooks;
- Identification and where necessary modification of the TEPs reflected in the LoMps and the Company's own financial models to reflect the outcomes of the due diligence process, collectively referred to as the "**SRK Adjustments**";
- Reliance on the Company for: macro-economic parameters including consumer price inflation and exchange rates of local currencies reported against the United States Dollar ("**US$**"); and input-commodity price forecasts for key consumables, notably acid and other

mining and processing related consumables; and

- An assessment of historical and consensus market forecast commodity price assumptions in order to benchmark the Company's assumptions as relied on for reporting of Mineral Resources and Ore Reserves and as incorporated into the financial models for the Operating Properties;
- Reliance on UXc for the annual real terms (1 January 2022) commodity price forecasts as reported in Section 3 of this CPR and utilised to assess the economic viability of the Ore Reserves as reported in the 2021 Statements; and
- Development of stand-alone and group level financial models (the "**Financial Models**") for the operating mines which incorporate multi-scenario analysis to assess and evaluate the economic impact of the LoMp Scenarios;

SRK confirms that it has performed all necessary validation and verification procedures deemed necessary and/or appropriate to place a suitable level of reliance on such technical information. SRK considers that with respect to all material technical-economic matters, it has undertaken all necessary investigations to ensure compliance with the Requirements including the Reporting Standards (specifically the JORC Code and the Valmin Code).

In consideration of all legal aspects relating to the Mineral Assets, SRK has placed reliance on the representations by the Company that the following are correct as at the Effective Date of the CPR and remain correct until the date of the Public Document:

- That save as disclosed in the CPR, the Directors of the Company are not aware of any legal proceedings that may have an influence on the rights to explore for minerals in respect of the Mineral Assets;
- That the Group is the legal owner of all relevant mineral and surface rights pertaining to the Mineral Assets; and
- That save as expressly mentioned in the CPR, no significant legal issue exists which would affect the likely viability of the Mineral Assets and/or the estimation and classification of the Mineral Resources and Ore Reserves, the LoMps, the Environmental and Social Liabilities, the Exploration Programme and the Financial Modelling of the Mineral Assets.

The Mineral Resource and Ore Reserve statements as included in the 2021 Statements are reported with a date of depletion of 31 December 2021. For the avoidance of doubt, the 2021 Statements are the "current statements" and any historical statements as reported herein are done so solely for comparative purposes to provide context with respect to any significant changes and to support the reconciliation process between reporting periods.

The Company has confirmed in writing to SRK that, to its knowledge, the information provided by the Company (when provided) was complete and not incorrect or misleading in any material respect. SRK has no reason to believe that any material facts have been withheld and the Company has confirmed to SRK that it believes it has provided all material information.

1.5 Limitations, Responsibility Statement, Reliance on Information, Declarations and Copyright

1.5.1 Limitations

Save as set out in Section 1.2.3 above and for the responsibility arising under Rule 5.3.2R(2)(f) of the Prospectus Regulation Rules to any person and to the extent there provided, to the fullest extent permitted by law SRK does not assume any responsibility and will not accept any liability to any other person for any loss suffered by any such other person as a result of, arising out of, or in connection with this CPR or statements contained therein, required by and given solely for the purpose of complying with Rule 5.3.2R(2)(f) of the Prospectus Regulation Rules, consenting to its inclusion in the Prospectus.

SRK notes that this CPR has been prepared in accordance with the Requirements as defined herein. For the avoidance of doubt SRK notes that the contents of this CPR including the technical opinion as expressed herein must be read in association with the Limitations, Reliance on Information, Declarations and Consent as reported herein.

The achievability of the projections as reported in this CPR, are neither warranted nor guaranteed by SRK, specifically the: TEPs including assumed production, sales volumes, sales revenue, operating and capital expenditure relating to depletion of the Ore Reserves from 1 January 2022; the Environmental and Social Liabilities; the Exploration Programme; and the Financial Modelling of the Mineral Assets. The projections as presented and discussed herein have been proposed by the Company's management and adjusted where appropriate by SRK to reflect its opinion but cannot be assured. Notably, for example, they are necessarily based on economic and market assumptions, many of which are beyond the control of the Company.

Future cashflows and profits derived from any projections reflected by the TEPs in the LoMps, the Environmental and Social Liabilities or the Exploration Programme are inherently uncertain and actual results may be significantly more or less favourable.

Unless otherwise expressly stated all the opinions and conclusions expressed in this report are those of SRK. It should also be noted that this report reflects SRK's review of information generated, and/or technical work completed, by others. As a result of this, the projections presented here may not directly reflect that previously presented by the Company or in public announcements made by the Company as they also incorporate judgements made by SRK not necessarily incorporated into the Company's assessments.

This CPR specifically excludes all aspects of legal issues, marketing, commercial and financing matters, insurance, land titles and usage agreements, and any other agreements and/or contracts that the Company may have entered into.

1.5.2 Responsibility Statement

For the purpose of, and in compliance with, the Requirements, SRK accepts responsibility for the information provided in the CPR. SRK declares that the information contained in the CPR is, to the best of the knowledge of SRK, in accordance with the facts and makes no omission likely to affect its import. SRK has given and has not withdrawn its written consent to the publication of the CPR.

SRK accepts responsibility for the 2021 Statements, the LoMp Scenarios and associated TEPs, the 2021 Environmental and Social Liabilities, the Financial Modelling of the Mineral Asset as reported herein. Where applicable, SRK confirms that:

- the 2021 Statements are reported in accordance with the terms and definitions of the JORC Code (2012);
- the various technical studies supporting the LoMps have been completed in accordance with the Technical Study standards as defined in Section 1.2.2 of this CPR;
- that the Environmental and Social Liabilities are derived and reported in accordance with Good International Industry Practice ("**GIIP**");
- the "**Financial Modelling**" for the Mineral Assets of the Company as reported herein are reported in accordance with the Valmin Code (2015); and
- the scope of the CPR is limited to the Mineral Assets of the Company as reported herein and specifically excludes all other assets of the Group.

1.5.3 Reliance on Information

SRK believes that its opinion must be considered as a whole and that selecting portions of the analysis or factors considered by it, without considering all factors and analyses together, could create a misleading view of the process underlying the opinions presented in this CPR. The preparation of a CPR is a complex process and does not lend itself to partial analysis or summary.

SRK's opinions given in this document with respect to the 2021 Statements, the LoMps and accompanying TEPs, the Environmental and Social Liabilities, the Exploration Programme and the Financial Modelling are effective at 30 June 2021 and are based on information provided by the Company throughout the course of SRK's investigations, which in turn reflects various technical-economic conditions prevailing at the date of this report and the Company's expectations regarding the gold market, gold prices and exchange rates as at the date of this report. These and the underlying TEPs, comprising projections of production, sales, sales revenue, operating and capital expenditures can change significantly over relatively short periods of time. Should these change materially, the 2021 Statements, the LoMp Scenarios and accompanying TEPs, the Environmental and Social Liabilities, the Exploration Programme and the Financial Modelling of the Mineral Assets could be materially different in these changed circumstances.

Whilst SRK has exercised all due care in reviewing the supplied information, SRK does not accept responsibility for finding any errors or omissions contained therein and disclaims liability for any consequences of such errors or omissions.

This CPR includes technical information, which requires subsequent calculations to derive subtotals, totals and weighted averages. Such calculations may involve a degree of rounding and consequently introduce an error. Where such errors occur, SRK does not consider them to be material.

1.5.4 Declarations

SRK will receive a fee for the preparation of this CPR in accordance with normal professional consulting practice. This fee is not contingent on the outcome of any transaction and SRK will receive no other benefit for the preparation of this report. SRK does not have any pecuniary or other interests that could reasonably be regarded as capable of affecting its ability to provide an unbiased opinion in relation to 2021 Statements, the principal findings regarding the LoMp Scenarios, the accompanying Financial Models, the Environmental and Social Liabilities and the Financial Modelling of the Mineral Assets as reported herein.

Neither SRK, the Competent Persons (as identified under Section 1.7, below) who are responsible for authoring this CPR, nor any Directors of SRK have at the date of this report, nor have had within the previous two years, any shareholding in the Company, the Mineral Assets or the Advisors of the Company, or any other economic or beneficial interest (present or contingent) in any of the assets being reported on. SRK is not a group, holding or associated company of the Company. None of SRK's partners or officers are officers or proposed officers of any group, holding or associated company of the Company. Further, no Competent Person involved in the preparation of this CPR is an officer, employee or proposed officer of the Company or any group, holding or associated company of the Company. Consequently, SRK, the Competent Persons and the Directors of SRK consider themselves to be independent of the Company, its directors, senior management and Advisors.

In this CPR, SRK provides assurances to the Board of Directors of the Company, that the Mineral Resources and Ore Reserves and ARO estimates are reasonable, given the information currently available and that the Mineral Resources and Ore Reserves are reported in compliance with the terms and definitions of the JORC Code.

1.5.5 Consent

SRK has given and has not withdrawn its written consent to the publication of this CPR and has authorised the contents of its report and context in which they are respectively included and has authorised the contents of its report for the purposes of compliance with Rule 5.3.2R(2)(f) of the Prospectus Regulation Rules.

1.5.6 Copyright

Except where SRK has agreed otherwise (including pursuant to an agreement between SRK and the Company dated 02 November 2021 or any subsequent agreement (each, the "**KAP Agreement**")):

- neither the whole nor any part of this CPR nor any reference thereto may be included by any party other than the Company, any of its direct and indirect subsidiaries, the Company's shareholder JSC Sovereign Wealth Fund Samruk-Kazyna or a competent state authority in Kazakhstan or any other relevant jurisdiction, as may be applicable (together, the "**Recipients**"), in any other document without the prior written consent of SRK save that in the case that the CPR is not included in full in any other document, the Recipient shall present a draft of any document produced by it that may incorporate a part of this CPR to SRK for review so that SRK may ensure that this is presented in a manner which accurately and reasonably reflects any results or conclusions contained in this CPR; and
- copyright of all text and other matters in this document, including the manner of presentation, is the exclusive property of SRK. It is an offence to publish this document or any part of the document under a different cover, or to reproduce and/or use, without written consent (whether granted by virtue of a KAP Agreement or otherwise), any technical procedure and/or technique contained in this document. The intellectual property reflected in the contents resides with SRK and shall not be used for any activity that does not involve SRK, without the written consent of SRK.

Neither the whole nor any part of this CPR nor any reference thereto may be included in any other document without the prior written consent of SRK regarding the form and context in which it appears.

1.6 Indemnities Provided by the Company

The Company has provided the following indemnities to SRK:

- The Company has agreed that, to the extent permitted by law, it will indemnify SRK and its employees and officers in respect of any liability suffered or incurred as a result of or in connection with the preparation of this CPR albeit that this indemnity will not apply in respect of any material negligence, wilful misconduct or breach of law. The Company has also agreed to indemnify SRK and its employees and officers for time incurred and any costs in relation to any inquiry or proceeding initiated by any person except to the extent SRK or its employees and officers have been materially negligent or acted with wilful misconduct or in breach of law in which case SRK shall bear such costs; and
- In order to assist SRK in the preparation of this CPR the Company may be required to receive and process information or documents containing personal information in relation to SRK's project personnel. The Company has agreed to comply strictly with the provisions of the Data Protection Act 1998 of the United Kingdom ("**DPA 1998**") and all regulations and statutory instruments arising from the DPA 1998, and the Company will indemnify and keep indemnified SRK in respect of all and any claims and costs caused by breaches of the DPA

1998.

1.7 Statement of Qualification

SRK is an associate company of the international group holding company SRK Consulting (Global) Limited (the "**SRK Group**"). The SRK Group comprises some 1,400 professional staff offering expertise in a wide range of resource and engineering disciplines with 45 offices located in 20 countries.

The SRK Group's independence is ensured by the fact that it holds no equity in any project. This permits the SRK Group to provide its clients with conflict-free and objective recommendations on crucial judgment issues. The SRK Group has a demonstrated track record in undertaking independent assessments of resources and reserves, project evaluations and audits, Mineral Resource and Ore Reserve audits and independent feasibility studies on behalf of exploration and mining companies and financial institutions worldwide. The SRK Group has also worked with a large number of major international mining companies and their projects, providing mining industry consultancy service inputs.

This CPR has been prepared by a team of consultants sourced from the SRK Group's office in the United Kingdom of Great Britain and Northern Ireland ("**UK**") over a four-month period. These consultants are specialists in the fields of geology, resource and reserve estimation and reporting, ISR Uranium operations, hydrogeology and hydrology, infrastructure, environmental management and life of mine planning.

The individuals listed in Table 1-3 have provided the material input to the 2018 CPR and this CPR, have extensive experience in the mining industry and are members in good standing of appropriate professional institutions.

Table 1-3: SRK Project Team

Responsible Discipline	Consultant	Designation	Registration, Membership, Qualification	Years' Experience
Mineral Resources	Dr Mike Armitage	Corporate	C.Eng, C. Geol, FGS, MIMMM	39
Mineral Resources	Liubov Egorova	Principal	MAusIMM, BSc	18
Ore Reserves and Financial Modelling	Dr Iestyn Humphreys	Corporate	FIMMM, AIME, PhD	32
Geochemistry	Dr Rob Bowell	Corporate	Eur. Geol, C. Chem MRSC, C.Geol., FGS, FIMMM, PhD	26
Hydrogeology	Dr Vladimir Ugorets	Principal	NGWA, MSHA, PhD	35
Environment	Jane Joughin	Corporate	PNS, IAIA, MSc	44

The Competent Person who has overall responsibility for the Mineral Resources as reported herein is Dr Mike Armitage, C.Eng, C. Geol, FGS, MIMM, PhD. He is a Chartered Geologist and a Fellow of the Geological Society which is a Recognised Professional Organisation ("**RPO**") included in a list promulgated by the Australian Securities Exchange ("**ASX**") from time to time. He is an associate corporate consultant of SRK and has over 39 years' experience in the mining and metals industry and also has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the JORC Code. Dr Armitage has been responsible for the reporting of Mineral Resources and Ore Reserves on various properties internationally during the past 30 years.

The Competent Person who has responsibility for the Ore Reserves as reported herein is Dr Iestyn Humphreys, FMIMM, AIME, PhD who is a Corporate Consultant, and Practice Leader with SRK. He is a Fellow of the IMMM which is a RPO included in a list promulgated by the ASX from time to time. Iestyn Humphreys has 32 years' experience in the mining and metals industry and also has been involved in the preparation of Competent Persons' Reports comprising technical evaluations of various mineral assets internationally during the past five years which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the JORC Code.

1.8 Report Format

The Mineral Assets comprise uranium deposits which with respect to geology, extraction and processing are considered to be largely similar in all material respects. As such this CPR is structured on a discipline basis where all Mineral Assets are presented in aggregate within key discipline areas, notably: Section 2 Company Overview And Mineral Asset; Section 3 Commodity Prices And Macro Economics; Section **Error! Reference source not found. Error! Reference source not found.**; Section 5 Uranium Deposits: Geological Occurrence, Mining And Processing; Section 6 Geology; Section 7 Mineral Resources And Ore Reserves; Section 8 Exploration Potential;; Section 9 In-Situ Uranium Extraction And Recovery; Section 10 Environmental And Social ; Section 11 Life Of Mine Plans; Section 12 Risks And Opportunities and Section 13 Conclusions.

2 COMPANY OVERVIEW AND MINERAL ASSETS

2.1 Introduction

The following section includes discussion and comment on the Group and the Mineral Assets as defined herein. Commentary regarding the Group includes corporate structure; historical development; financial performance; human resources; environmental and social governance; and occupational health and safety. The financial and technical historical statistics as presented herein are largely derived from public domain reporting (Annual Reports; Operating and Financial Review; Financial Statements and Consolidated Financial Statements; and Trading Updates) and as such reflect the detail and format as provided by the Company. Certain information is only reported on a Group or primary segment consolidated basis and as such there is no detailed sub-division readily reported on a subsidiary, joint operation, joint venture or associate company basis. It is also important to note that these details are historical in nature and are provided where available through to 31 March 2022.

Furthermore, it should also be noted that this CPR is primarily focused on the Mineral Assets. Accordingly aggregated and segmented reporting sourced from public domain may not necessarily align with the details as reflected in the discipline focused technical sections of this CPR as certain data therein is sourced from historical unaudited management accounts and production records. Commentary regarding the Mineral Assets includes: location, access and infrastructure; historical operating statistics; and Mineral Resource and Ore Reserve statements.

2.2 Group Overview

Kazatomprom is the world's largest producer of natural uranium, with priority access to one of the world's largest uranium resource bases. According to UxC, LLC ("**UxC**") data, the Company's 2021 attributable uranium production represented approximately 24% of global primary uranium supply with total uranium production in Kazakhstan representing approximately 45% of global primary uranium supply in 2021. As the National Atomic Company of the Republic of Kazakhstan, Kazatomprom holds national operator status for the export and import of uranium and its compounds, nuclear power plant fuel, special equipment and technologies, and rare metals, which provides the Company with certain privileges, including the ability to obtain subsoil use licenses through direct negotiation with the authoritative body of the Government. This effectively grants priority access to high-quality, in-situ recovery ("**ISR**") - conducive deposits of natural uranium, which are abundant in Kazakhstan. In 2021, approximately 32,100tU representing 55.0% of the world's annual production was mined using ISR with approximately 75% of this sourced from the Group's holdings in ISR operations located in Kazakhstan.

Kazatomprom is a joint stock company incorporated under the laws of Kazakhstan on 21 February 1997 which operates as Kazakhstan's national operator for the export and import of uranium and its compounds, nuclear power plant fuel, special equipment and technologies, as well as rare metals. Following an IPO and subsequent share sales approximately 25% of the Company's outstanding share capital is listed on the LSE a market operated by the London Stock Exchange Group plc and the AIX and trades under the ticker KAP. The ordinary shares (LSE) and global depositary receipts (AIX) are deemed to be equal and the remaining 75% of shares (194,517,456) are held by Samruk-Kazyna JSC ("**Samruk-Kaznya**").

As of 31 December 2021, the number of shares in issue on the LSE is reported as 259,356,608 and as of 26 June 2022 reflected the following market statistics: share price of US$24.82/share; market capitalisation of US$6.6bn; and Enterprise Value of US$6.9bn.

The Group's Mineral Resource and Ore Reserve statements for the Mineral Assets as on 31 December 2021 and comprising the 2021 Statements reported:

- Total Ore Reserves reported on an aggregate basis of 999.2Mt grading 0.063%U and containing 625.4ktU and comprising:
  - Proved Ore Reserves of 482.8Mt grading 0.061%U and containing 296.7ktU,
  - Probable Ore Reserves of 516.5Mt grading 0.064%U and containing 328.8ktU; and
- Total Mineral Aggregated Mineral Resources of 1,424.7Mt grading 0.055%U and containing 784.4ktU and comprising:
  - Measured Mineral Resources of 700.9Mt grading 0.058%U and containing 406.6ktU,
  - Indicated Mineral Resources of 710.2Mt grading 0.052%U and containing 369.1ktU,
  - Inferred Mineral Resources of 13.6Mt grading 0.063%U and containing 8.6ktU.

2.2.1 Corporate Structure

Kazatomprom's core business is the mining and marketing of natural uranium products. The Group is also present in other stages of the "front-end" nuclear fuel cycle, including uranium dioxide (UO_2) ceramic powder production, and the production of fuel pellets for fuel assemblies used in nuclear power stations. The Group also has access to uranium enrichment services through its agreements with TVEL Fuel Company of Rosatom.

In addition to its uranium operations, the Group includes one subsidiary that is engaged in the processing of selected rare metals, primarily tantalum, niobium and beryllium. The Group also includes subsidiaries that are primarily engaged in providing supporting services to the uranium segment, such as drilling, transportation, IT and security services.

During 2021, the Group operated through three principal business segments:

- **Uranium Segment:** includes uranium mining and processing operations from the Group's mines, the Group's purchases of uranium from the Group's JVs and associates engaged in uranium production, and external sales and marketing of uranium products. The Uranium segment includes the Group's share in net results of its JVs and associates engaged in uranium production, as well as results of the Company as the head office of the Group. This segment does not include production and sales of UO_2 powder and fuel pellets;
- **Ulba Metallurgical Plant JSC ("UMP Segment"):** includes production and sales of products containing beryllium, tantalum and niobium, hydrofluoric acid and by-products. This segment is also engaged in the processing of uranium raw materials under tolling arrangements, and the production of UO_2 powder, fuel pellets and production of fuel assemblies and their components; and
- **Other Segment:** includes revenue and expenses of the Group's subsidiaries that are primarily engaged in providing supporting services to the Uranium segment, such as drilling, transportation, R&D, IT and security services.

In addition to the operations of the Company and its consolidated subsidiaries, the Group has a number of joint operations, joint ventures and associates.

- "**Subsidiaries**" are entities that the Group controls because the Group (i) has power to direct the relevant activities of the investees that significantly affect their returns, (ii) has exposure, or rights, to variable returns from its involvement with the investees, and (iii) has the ability to use its power over the investees to affect the amount of the investor's returns. The existence and effect of substantive rights, including substantive potential voting rights, are considered when assessing whether the Group has power over another entity;
- **"Joint Operations"** ("**JOs**") are entities in respect of which the Group has joint control and

has rights to their assets and revenues and has obligations relating to their expenses, as well as financial obligations in proportion to the Group's interests. The Group's JOs, being JV Akbastau JSC and Karatau LLP, are consolidated as JOs from 1 January 2018. The Group's interests in JOs are accounted for on a proportional consolidation basis;

- **"Joint Ventures"** ("**JVs**") are entities that are under the joint control of the Group acting collectively with other parties, and decisions over the relevant activities of such entity require unanimous consent of all parties sharing control. The Group's interests in JVs are accounted for using the equity method of accounting;
- **"Associates"** are entities over which the Group has, directly or indirectly, significant influence, but not sole or joint control, which is typical for a shareholding of between 20% and 50% of the voting rights. The Group's investments in associates are accounted for using the equity method of accounting; and
- **"Equity Investments"** are entities in which the Group has less than 20% of the voting rights. Equity investments are recognised at fair value as "**Other Investments**" in the Company's consolidated IFRS financial statements.

The Company's principal equity partners in the Mining Subsidiaries comprise:

- Energy Asia Holdings Ltd ("**Energy Asia**") (in which the Company holds a 50% equity interest) which holds:
  - a 40% equity interest in JV Khorasan-U LLP,
  - a 95% equity interest in Baiken-U LLP;
- Cameco Corporation which holds:
  - a 40% equity interest in JV Inkai LLP;
- China National Nuclear Energy Group ("**CNEG**") which holds:
  - a 49% equity interest in ME Ortalyk LLP;
- Chinese National Nuclear Power Group which holds:
  - a 49% equity interest in Semizbai-U LLP;
- Kansai Electric Power Co ("**Kansai**") which holds a 10% equity interest in Appak LLP;
- Karabaltinsky Mining Plant JSC ("**Karabaltinsky**") which holds a 0.04% equity interest in JV Zarechnoye JSC;
- Limited Liability Partnership Stepnogorsk Mining and Chemical Combine ("**Stepnogorsk**") holds a 49% equity interest in JV Budenovskoye LLP;
- Orano S.A. ("**Orano**") which holds a 51% equity interest in JV Katco LLP;
- Rosatom State Nuclear Energy Corporation ("**Rosatom**") which holds
  - a 50% equity interest in Karatau LLP held through Uranium One Netherlands B.V.,
  - a 50% equity interest in JV Akbastau JSC held through Uranium One Netherlands B.V.,
  - a 49.98 equity interest in JV Zarechnoye JSC held through Uranium One Holland B.V.,
  - a 30% equity interest in JV Khorasan-U LLP held through Uranium One Utrecht B.V.,
  - a 70% equity interest in JV Southern Mining and Chemical Company LLP held through Uranium One Rotterdam B.V., and
- Sumitomo Corporation ("**Sumitomo**") which holds a 25% equity interest in Appak LLP.

Notwithstanding the above definitions, the combined mining operations are collectively defined as Mining Subsidiaries. Table 2-1 lists the Group's subsidiaries, JVs, JOs and associates from 2018 through to the current position as of 31 December 2021. In all cases, the share percentage shown is equal to the Group's voting rights, with the exception of Ulba Metallurgical Plant JSC and Volkovgeologia JSC, where the Group has 100% voting rights in each entity.

Table 2-1: Group Equity Holding Interest: historical and current

Entities	Units	2018	2019	2020	2021
Uranium Mining and Processing					
Subsidiaries					
Kazatomprom-SaUran LLP	(%)	100.00	100.00	100.00	100.00
RU-6 LLP	(%)	100.00	100.00	100.00	100.00
Appak LLP	(%)	65.00	65.00	65.00	65.00
JV Inkai LLP	(%)	60.00	60.00	60.00	60.00
Baiken-U LLP[(1)]	(%)	52.50	52.50	52.50	52.50
Ortalyk LLP[(2)]	(%)	100.00	100.00	100.00	51.00
JV Khorassan-U LLP	(%)	50.00	50.00	50.00	50.00
Joint Ventures					
JV Budenovskoye LLP	(%)	51.00	51.00	51.00	51.00
Semizbai-U LLP	(%)	51.00	51.00	51.00	51.00
Joint Operations					
JV Akbastau JSC	(%)	50.00	50.00	50.00	50.00
Karatau LLP	(%)	50.00	50.00	50.00	50.00
Energy Asia (BVI) Limited[(1)]		40.05	50.00	50.00	50.00
Associates					
JV Katco LLP	(%)	49.00	49.00	49.00	49.00
JV SMCC LLP	(%)	30.00	30.00	30.00	30.00
JV Zarechnoye JSC	(%)	49.98	49.98	49.98	49.98
Kyzylkum LLP[(1)]	(%)	50.00	50.00	50.00	50.00
Zhanakorgan-Transit LLP[(3)]	(%)	60.00	60.00	60.00	60.00
Nuclear Fuel Cycle and Metallurgy Subsidiaries					
Subsidiaries					
Ulba Metallurgical Plant JSC	(%)	90.18	90.18	90.18	94.33
ULBA-CHINA Co Ltd[(3)]	(%)	100.00	100.00	100.00	100.00
Mashzavod LLP[(3)]	(%)	100.00	100.00	100.00	100.00
Ulba-FA LLP[(3)]	(%)	51.00	51.00	51.00	51.00
Nuclear Fuel Cycle					
International Uranium Enrichment Centre JSC[(4)]	(%)	10.00	10.00	10.00	10.00
JV "UKR TVS Closed Joint Stock Company	(%)	33.33	33.33	33.33	-
Uranium Enrichment Centre JSC	(%)	50.00	50.00	-	-
Ural Electrochemical Integrated Plant JSC	(%)	25.00	25.00	-	-
Ancillary Operations					
Subsidiaries					
High Technology Institute LLP	(%)	100.00	100.00	100.00	100.00
KazakAtom TH AG or THK	(%)	100.00	100.00	100.00	100.00
KAP Technology LLP	(%)	100.00	100.00	100.00	100.00
Trading and Transportation Company	(%)	99.99	99.99	99.99	99.99
Volkovgeologia JSC	(%)	90.00	90.00	90.00	96.62
Rusburmash-Kazakhstan" LLP[(3)]	(%)	49.00	49.00	49.00	49.00
Qorġan-Security LLP[(5)]	(%)	100.00	100.00	100.00	100.00
Joint Ventures					
SKZ-U LLP	(%)	49.00	49.00	49.00	49.00
Uranenergo LLP	(%)	79.45	79.52	79.17	79.17
Shieli – Energoservice LLP	(%)	99.75	99.17	-	-
Taukent – Energoservice LLP	(%)	99.75	99.95	-	-
Uranenergo-PUL LLP	(%)	100.00	100.00	-	-
Associates					
SSAP LLP	(%)	9.89	9.89	9.89	-

(1) The Company holds 50% (direct ownership) in Energy Asia (BVI) Limited. Energy Asia (BVI) Limited holds 40% (direct ownership) in Kyzylkum LLP and 95% (direct ownership) in Baiken-U LLP.

(2) Under the terms of several agreements between Kazatomprom and China General Nuclear Power Corporation ("**CGNPC**"), the parties agreed to construct a fuel assembly plant ("**Ulba-FA**") at the Ulba Metallurgical Plant. CGNPC provided a guarantee that Ulba-FA's production will be purchased by CGNPC in exchange for Kazatomprom agreeing to sell a 49% interest in the Company's wholly owned subsidiary, Ortalyk LLP, to a subsidiary of CGNPC (the "**Transaction**"). In April 2021, a Sale and Purchase agreement was signed, and the parties agreed to the valuation determined by one of the four major international advisory and professional services firms, whereby a 49% share of the operation was assessed a value of approximately US$435m. On 22 July 2021, the sale of the interest in Ortalyk LLP was completed following receipt of all government approvals, satisfaction of all contracts pre-conditions are fulfilled by the end of 2021. Re-registration of the entity has been completed and CGNM UK Limited (a CGNPC subsidiary) is now a participant in Ortalyk LLP. Kazatomprom retains a 51% interest and CGNM UK Limited holds a 49% interest, with each partner purchasing a proportionate share of uranium production from the operation according to its interest. The consideration received was US$435m (equivalent to KZT185.9bn).

(3 These companies are 3rd level entities for the Company indirectly through the interests in subsidiaries, JVs and associates presented above these companies in the table. The corresponding interests belongs to the 2nd tier entities, not the Company.

(4) As at the reporting date, the Group classifies JSC Uranium Enrichment Center (TsOU) with 1 share as other investment.

(5) On July 23, 2021, the procedure of re-registration of Korgan-KAP LLP into Qorġan-Security LLP was carried out.

(6) On April 30, 2021, the liquidation procedure of Kazatomprom-Damu LLP was completed.

(7) In accordance with the privatisation plan of non-core assets as presented in the IPO prospectus of the Company, Group intends to sell its entire stake in JSC JV UKR TVS Closed Joint-Stock Company by the end of 2022.

(8) In accordance with the privatisation plan of non-core assets as presented in the Company's IPO Prospectus, Kazatomprom and United Chemical Technologies Trading House LLP entered into an Agreement on 30 December 2021, for the sale of the Company's 40% share in "Caustic" JSC. On 31 January 2022, partial payment was made for 30% of the Company's total interest in Caustic JSC, therefore United Chemical Technologies Trading House LLP's interest in Caustic JSC increased by 12% (30% of the Company's 40% share). The remaining portion of the Company's shares were transferred to trust management of United Chemical Technologies Trading House LLP until full payment for the Company's remaining interest is completed, expected not later than 2023.

(9) In accordance with the privatisation plan of non-core assets of the Company, Group intends to sell its entire stake in SSAP LLP by the end of 2022. On July 8, 2020, the procedure of re-registration of JV SKZ Kazatomprom LLP into SSAP LLP (Stepnogorsk Sulfuric Acid Plant) was carried out.

Following the IPO and subsequent share sales approximately 25% of the Company's outstanding share capital is listed on the LSE a market operated by the London Stock Exchange Group plc and the AIX and trades under the ticker KAP. As of 31 December 2021, the number of shares in issue on the LSE is reported as 259,356,608 and as of 26 June 2022 reflected the following market statistics: share price of US$24.82/share; market capitalisation of US$6.6bn; and Enterprise Value of US$6.9bn (Figure 2-1). Table 2-2 presents the historical market statistics for the Company and comparable statistics for Cameco Corporation ("**Cameco**").

Figure 2-1: Historical Market Statistics for the Company to 26/06/2022

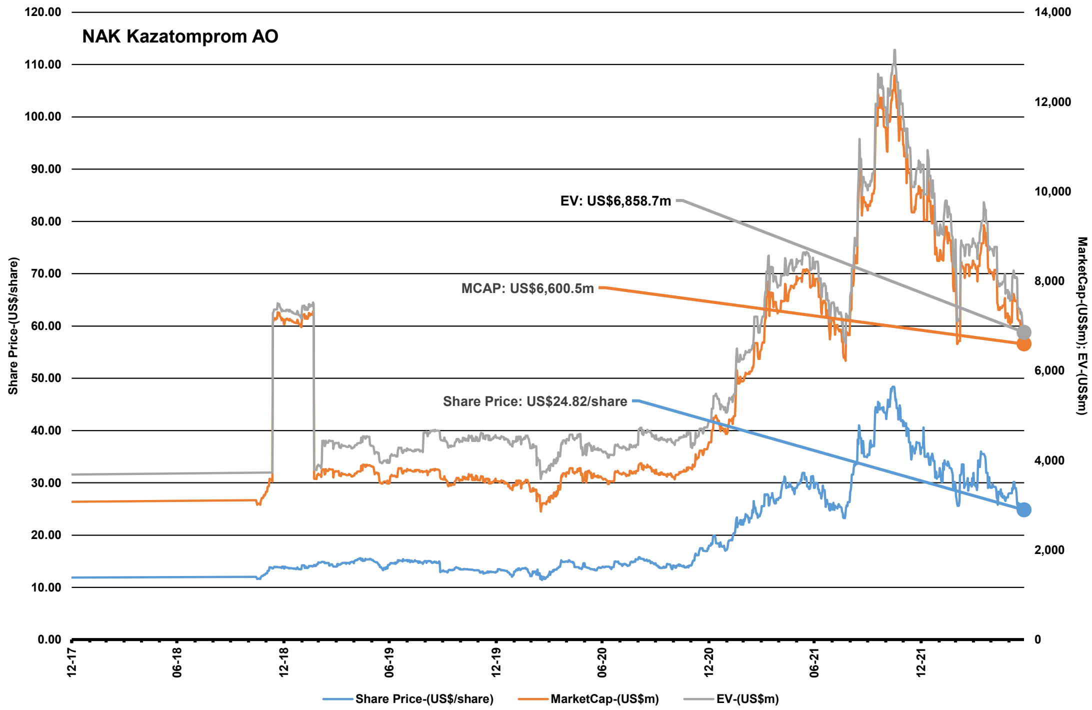


Table 2-2: Historical Market Statistics

Statistic	Units	2018	2019	2020	2021	2022
Company						
Average Share Price	(US$/sh)	13.09	14.21	14.10	30.13	30.70
MCAP	(US$m)	4,858.9	4,163.3	3,636.7	7,985.3	8,263.2
MCAP: EoP	(US$m)	7,041.8	3,534.8	4,401.9	10,026.9	6,600.5
EV	(US$m)	7,211.9	4,763.4	4,368.6	8,465.5	8,775.2
EV: EoP	(US$m)	7,336.7	4,503.9	4,885.2	10,597.4	6,858.7
Ore Reserves	(MlbU_3O_8)	811.9	794.5	761.0	730.9	912.1
	(ktU)	312.3	305.6	292.7	281.1	350.8
Mineral Resources	(MlbU_3O_8)	1,179.0	1,239.3	1,202.3	1,245.8	1,288.6
	(ktU)	453.5	476.7	462.4	479.2	495.7
Sales	(MlbU_3O_8)	43.3	41.7	42.7	43.0	6.7
EV/2P-CM1	(US$/lb$U_3O_8$)	8.88	6.00	5.74	11.58	9.62
EV/3R-CM1	(US$/lb$U_3O_8$)	6.12	3.84	3.63	6.80	6.81
Average Price	(US$/lb$U_3O_8$)	24.47	25.92	29.38	35.32	50.18
EV/2P-CM2	(%)	36.29	23.13	19.54	32.80	19.17
EV/3R-CM2	(%)	24.99	14.83	12.37	19.24	13.57
Cameco						
Average Share Price	(US$/sh)	10.57	10.34	9.94	19.30	24.38
MCAP	(US$m)	4,183.1	4,094.1	3,934.4	7,671.7	9,707.0
MCAP: EoP	(US$m)	4,492.8	3,517.3	5,301.8	8,687.5	8,894.0
EV	(US$m)	4,900.4	4,489.4	4,095.3	7,766.3	9,404.3
EV: EoP	(US$m)	4,928.9	3,777.8	5,622.8	8,404.3	8,519.7
Ore Reserves	(MlbU_3O_8)	467.1	461.2	454.5	464.3	464.3
Mineral Resources	(MlbU_3O_8)	680.5	598.7	681.5	601.3	601.3
Sales	(MlbU_3O_8)	35.1	31.5	30.7	24.3	24.0
EV/2P	(US$/lb$U_3O_8$)	10.5	9.7	9.0	16.7	20.3
EV/3R	(US$/lb$U_3O_8$)	7.2	7.5	6.0	12.9	15.6
Average Price	(US$/lb$U_3O_8$)	24.47	25.92	29.38	35.32	50.18
EV/2P-CM2	(%)	42.87	37.56	30.67	47.36	40.36
EV/3R-CM2	(%)	29.42	28.93	20.45	36.57	31.17

2.2.2 Historical Development

Kazakhstan has been a key supplier of nuclear fuel raw materials for more than 60 years. The original facilities, which are now owned by UMP, commenced operations in 1949, and have been involved in manufacturing of uranium products since 1954. In 1996, JV Katco LLP and JV Inkai LLP, (which were subsequently transferred to the Company), were launched as joint ventures with Orano SA ("**Orano**") and Cameco, respectively. The Company was formed in

1997 by order of the President of Kazakhstan as the National Operator of Kazakhstan's nuclear fuel industry. Since its incorporation, the Company has not engaged in the mining of uranium, or production of any uranium products, for the military purposes of any country. The principal milestones reflecting the historical development of the Company to date comprise:

- **1997:** the Company is established, and the Group believes it ranked 13th in the global uranium production industry in terms of uranium extraction volume. The Company acquires its interest in JV Inkai LLP, the joint venture between the Group and Cameco;
- **2000:** the Group became the sixth largest uranium producer globally in terms of uranium extraction volume, according to the NEA, the IAEA and the Red Book, and launched tantalum and non-military grade beryllium production;
- **2002:** the Group expands its uranium export geography by adding United States and European destinations, and enters the Chinese and South Korean markets;
- **2003:** the Group believes it became the second largest beryllium producer globally (with 29% of global output) and fourth largest tantalum producer, both in terms of extraction volume;
- **2007:** the Company's credit rating are assigned for the first time;
- **2010:** the Group becomes number one uranium producer globally, according to according to the NEA and IAEA, the Red Book;
- **2012:** the Group commissions a sulfuric acid plant with an annual capacity of 500 thousand tonnes;
- **2013:** the Group gains access to uranium enrichment facilities of UEIP and the IUEC with an annual capacity of 2.5m and 60 thousand separative work units, respectively, through equity participation;
- **2015:** the Group enters into a strategic agreement with CGNPC on commercial terms for the design and construction of a fuel assembly plant and the joint development of uranium deposits in Kazakhstan. The Group's subsidiary UMP becomes the operator of the low-grade uranium bank created under the auspices of the International Atomic Energy Agency ("**IAEA**");
- **2016:** the Group's asset restructuring program is adopted;
- **2017:** the Group's Switzerland-based trading house, THK, launches its operations;
- **2018:** Samruk-Kazyna, the sole shareholder of Kazatomprom, lists 14.92% of the ordinary shares and global depositary receipts ("**GDRs**") of Kazatomprom on the Astana International Financial Centre exchange and the London Stock Exchange. The Board of Directors adopts a new Development Strategy for 2018–2028, geared towards market-centric production focusing on five key considerations: (i) refocus on core business, (ii) optimise mining, processing and sales volumes based on market conditions, (iii) create value through enhanced sales and marketing capabilities and channels, (iv) implement best-practice business processes and (vi) develop industry leader corporate culture.
- **2019:** the Group announced plans to extend the 20% production decrease (against subsoil use agreement volumes) into 2021 (previously 2018–2020). In addition, the Company announced a project to introduce an automated control system at the Corporate centre and separate subsidiaries and affiliates based on the SAP ERP intelligent platform wins the annual SAP Value Award for SAP clients in CIS. The International Atomic Energy Agency Low Enriched Uranium Bank ("**IAEU Fuel Bank**"), located at Kazatomprom's Ulba Metallurgical Plant, receives its second and final shipment of low-enriched uranium (in the

form of uranium hexafluoride (UF6)) from Kazatomprom (the first shipment was from Orano in October). This international project, which adheres to all international LEU storage safety standards, enters the operational stage.

2020 Milestones

In 2020, operations at Moinkum #1 (South) and Uvanas deposits of Kazatomprom-SaUran LLP were completed. Also, in 2020, JV Budenovskoye LLP obtained mining contract for sites 6 and 7 of the Budenovskoye mine site, uranium mining there has not started in 2020.

In addition, in December 2020, a plant for the production of fuel assemblies in Kazakhstan was completed and began commissioning. By the end of 2021, Ulba-FA LLP is expected to complete the qualification processes for the plant and begin producing fuel assemblies for use in nuclear power reactors in the People's Republic of China ("**PRC**") under a contract with China General Nuclear Power Corporation-Uranium Resources.

In addition, during 2020:

- the Company continued supply of the new product, uranium hexafluoride (UF6), to Brazil-based Indústrias Nucleares do Brasil ("**INB**");
- the Company completed a deal to sell 50% minus one share in the Uranium Enrichment Centre to its partner in this joint venture, TVEL JSC. The Group reserves one share in the Centre, which entitles the Company to access uranium enrichment services as previously agreed with TVEL. Actual cash consideration of €90m (KZT43.9bn) was received;
- Samruk-Kazyna JSC completed a secondary offer of additional shares and global depositary receipts ("**GDRs**") on the LSE and AIX. This resulted in an increased 25% free float percentage of the Company's shares;
- the Company made the first delivery of Kazakh natural uranium to Argentina under an agreement with Dioxitek; and
- the Company attracted two new US-based customers Ulba-FA LLP signed a long-term contract for the fuel assembly supply with CGN-Uranium Resources Co., Ltd Commissioning of the fuel assembly plant Ulba- FA LLP was completed.

2021 Milestones

In 2021, JV Budenovskoye LLP obtained an amendment for the right to commence commercial production under JV Budenovskoye's Subsoil Use Agreement for the sites 6 and 7. The 25-year plan (2021 – 2045) provides for the future development of Budenovskoye Blocks 6 and 7 after the completion of its ongoing pilot production program, with a commercial ramp-up of up to 2,500tU beginning no earlier than 2024, and the potential for maximum annual production capacity of up to 6,000tU no earlier than 2026. Also, in 2021, Kazatomprom obtained the Subsoil Use Agreement for the right to commence commercial production from the Zhalpak deposit, which was transferred to Ortalyk LLP. The 21-year plan (2022 – 2042) provides for development of the Zhalpak mine according to the Ortalyk LLP mine plan, with a maximum annual production capacity of up to 900tU no earlier than 2030. Pilot production at both Budenovskoye Blocks 6 and 7 and at Zhalpak mine had not started in 2021.

In September 2021, the certification of the Ulba-FA LLP plant for the production of fuel assemblies (FA) was completed. In October 2021, the "Ulba-FA" LLP plant was recognized as a certified supplier of the Chinese company China General Nuclear Power Corporation-Uranium Resources Co. ("**CGNPC-UR**") for the supply of fuel assemblies of AFA 3G design to nuclear power plants in the People's Republic of China. Ulba-FA LLP has begun working to ensure the production and supply of fuel assemblies according to orders placed under a long-term contract with CGNPC-URC, which entered into force in May 2021.

In total, the number of the Group's subsidiaries, JVs, JOs, associates and other equity investments decreased from 39 as on 31 December 2020, to 35 as on 31 December 2021.

2.2.3 Corporate Strategy, vision and mission

Kazatomprom's Mission is to develop its uranium deposits and their value chain components in order to create long-term value for all of its stakeholders, in accordance with the principles of Sustainable Development. The Vision of the Company is to become the partner of choice for the global nuclear fuel industry. The Company's 2018-2028 Development Strategy is to achieve continued growth and strengthen its position as the leading company in the uranium industry by focusing on:

- Uranium mining as the core business;
- Optimising production, processing and sales volumes based on market conditions;
- Creating value by enhancing the marketing function and expanding sales channels;
- Implementing best-practice business processes;
- Developing a corporate ethics culture that is commensurate with industry leader status.

The Company strives to be the first choice in the provision of uranium and related front-end services, focusing on reliability, technical excellence, outstanding Health, Safety and Environmental ("**HSE**") performance, and fair business practice with customers.

The Group's Mission key highlights:

- **Sustainability:** the Group is committed to the best HSE practices, and the management team is focused on continual improvement;
- **Uranium deposits and their value chain components:** the focus of the Group's commercial activities will remain where it has the most significant competitive advantage: uranium mining; and
- **Ensure long term value growth:** the Group focuses on high-margin, cash generating operations with relatively modest requirements for further expansion capital in its uranium segment. In maintaining a conservative debt policy, the Group seeks to return substantial cash flows to its shareholders, whilst preserving a conservative financial position structure and comfortable leverage to better position itself to act on market and investment opportunities.

The results of strategic implementation goals in 2021 comprised:

- **Core business programme:** disposal of a number of non-core assets as part of the 2021-2025 Comprehensive Privatisation Plan of the Republic of Kazakhstan:
  - KazPV project companies – (Kazakhstan Solar Silicon LLP, Astana Solar LLP, MK KazSilicon LLP) sold through auction bidding on the web portal of the state property register
  - Caustic JSC – December 30, 2021, Company signed sale and purchase agreement to sell 40% of shares by direct sale to one of the shareholders of Caustic JSC in accordance with the estimated market value and pursuant to the terms of the agreement, the sale procedure comprises 3 stages;
  - Liquidation of Kazatomprom-Damu LLP;
- **Production and sales optimisation programme:** production expectations remain in line with the market-oriented strategy and production in 2021 was again reduced by 20% compared to the planned production levels under subsoil use contracts;

- **Sales and marketing value chain programme:** continued operation of the Company's sole trading entity THK; signing of additional contracts to supply uranium products to 2 Chinese companies; and signing of a framework agreement on investing in a Kazakhstan physical uranium fund, where the Company acts as a key supplier. The initial capital contributions to this fund are scheduled for March 2022
- **Best-practice business programme:** IT security processes were enhanced at headquarters and subsidiaries; an automatic monitoring system for radiation hazards at Kazatomprom-SaUran LLP has been developed; a draft pricing methodology was elaborated for uranium products (UF6, EUP, fuel pellets, fuel assemblies, etc.) in order to increase the market share through sale of those and thus to generate revenue and net profit growth; methodology for natural uranium concentrate pricing was updated to enhance the export potential of the Kazakhstan by increasing the company's competitive performance in the global uranium market; a system for monitoring and analysis of the centrifugal pump units' technical condition at JV Khorasan-U LLP (vibration, pressure, temperature sensors) has been developed; BI-analytical tool for determining ore bodies contour was developed and implemented at JV Khorasan-U LLP, Baiken-U LLP, Semizbay-U LLP; BI-analytical tools based on Apache Superset open source solution for mining subsidiaries and affiliates were developed to digitize production data for the process drilling phase; and
- **Corporate culture leadership programme:** confirmed the TÜV International Certification (Germany) for compliance with international requirements and standards on health care, occupational safety and environmental management; dissemination of safety management data through the eKAP information system on 2021; securing "A" corporate governance ratings; development of a 2022-2025 roadmap to promote Company culture.

In addition to the above the Company has also implemented a range of business transformation strategies included a number of the items noted above. Items planned for 2022 comprised:

- Completion of the development of a system for monitoring and analysis of the centrifugal pump units technical condition at JV Inkai LLP (vibration, pressure, temperature sensors);
- upgrading the refining capacity at Kazatomprom-SaUran LLP;
- completion the development of a methodology for determining drilling performance-related KPIs, including a prototype model for setting the interdependence between the probability of repair works and well parameters;
- complete monitoring of the ore body contour definition tool at JV Khorasan-U LLP, Baiken-U LLP and Semizbay-U LLP providing recommendations for further development (including possible financial project benefits);
- introduction of target IT business processes at KAP Technology LLP; and
- completing actions to approve the new pricing methodology for uranium products (UF6, enriched uranium product ("**EUP**"), fuel pellets, fuel assemblies (FAs), etc.) by the authorised agency in Kazakhstan

Furthermore, the Company has also implemented range of SAP (system, applications and products) tools across the wider business including:

- **GRC Access Control:** A key tool to ensure compliance with internal company procedures for data protection, identification of access risks and correct assignment of authority to company staff. Business unit heads became SAP modules owners;
- **SAP Project and Portfolio Management (SAP PPM):** Ensures automation of project management processes and makes project portfolio management much easier. In addition,

the Company worked to migrate data to the S/4HANA platform, including integration between SAS IPS and SAP PPM, SAP PPM and SAP ERP via the BW migration to the new SAP BW/4HANA version. BW is also the data transfer intermediary from SAP ERP to the Data Warehouse;

- **SAP MDG system:** SAP MDG on the S/4HANA platform was launched in May 2021. As part of the Project, the system was configured to automatically generate short and full name of the Goods, Works and Services (hereinafter referred to as "**GWS**") directory using the GWS classifier, maintenance of Plan of Accounts and Primary Cost Types directories, integration with public databases, approval processes for master data requests involving business units of companies, quite simplified system interface and much more. All of this has significantly improved the quality of master data, which has a major impact on procurement, production, logistics and other Company business processes;
- **Robotisation of business processes through RPAs:** Transformation team together with the interested Company's structural units developed and implemented RPA robots aimed at automation of routine operations performed by employees both of the headquarters and of the Company's subsidiaries and affiliates. Kazatomprom introduced nine solutions covering treasury, accounting, marketing, industrial safety and other processes. The main areas of robotisation are data transfer between information systems, including SAP ERP, collection and processing of information from external and internal portals, building operational reporting, reconciliation and validation of information. In 2021, we developed and implemented an internal regulatory document governing the robotisation of business processes through RPAs; and
- **Geological modelling based on machine learning:** As part of Kazatomprom Transformation Programme, a project for implementation of a tool for determining the orebodies contour based on machine learning technologies is in the pipeline. The purpose of this project is to model the contour of orebodies represented by a plan using machine learning and geostatistics algorithms and, as a result, to automate the geological modelling process in terms of the task being studied. As part of this project, the Company internally developed the "Contour" tool, which allows geologists to run various modelling scenarios using accumulated historical data. Together with the staff of subsidiaries and affiliates, the tool is implemented and tested within the selected perimeter.

2.2.4 Financial Performance

Table 2-3 presents the historical Group financial statistics for annual periods from 2015 through 2021 and for Q1 2022. The statistics presented are sourced from the public domain reports and comprise: uranium sales; sales revenue; operating expenditures; taxation; profit; capital expenditure; cashflow; debt; and assets.

The Group's consolidated uranium revenue has increased significantly since 2015 through a combination of increased production and uranium prices with total uranium revenue for the period ended 31 December 2021 reporting KZT625bn. All key financial metrics including Operating profit, Adjusted EBITDA and attributable EBITDA have similarly significantly increased over the reporting period and for the 12-month period ended 31 December 2021 reported, KZT288.0bn, KZT350.3bn and KZT276.5bn.

The extraction of uranium using the ISR mining method requires the import of certain key operating materials and components. These items are either imported into Kazakhstan directly by the Group, or they are imported by local suppliers from whom the Group procures such materials. Due to global pandemic-related shipping constraints and export restrictions imposed by some countries, the Group has encountered delays and/or limited access to some key materials & equipment, such as certain types of pipes and pumps, specialised equipment and drilling rigs. In some cases, shipping and availability constraints have resulted in a higher cost to acquire the necessary operating materials, including inflationary pressure as a result of commodity price changes, driving a slight increase in production costs and a negative impact on profitability. In other cases, there has been a near complete loss of access to certain materials. Pandemic-related supply chain challenges have continued to result in limited access to certain key operating materials and equipment, which had a material impact on the Company's wellfield development and production schedules in 2021, adding additional risk to production in 2022 and resulting in a lower and wider ranges for the expected production volume.

Adjusted EBITDA reflected an increase of 8% compared to 2020 due to a higher operating profit, as well as an increase in the EBITDA of JVs and associates. Attributable EBITDA reflected a decrease of 6% compared to 2020 mainly due to the sale of 49% share in Ortalyk LLP.

Total Group capital expenditure has increased over the past three years and for the 12-month period ended 31 December 2021 reported KZT104.7bn with KZT97.4bn contributed from activities directly associated with the mining operations and comprising: well construction (75%); sustaining capital (13.8%); expansion capital (4.65); and liquidation fund contributions (6.5%).

Total Group assets for the 12-month period ended 31 December 2021 closed at a value of KZT1,951.5bn with the primary contributions being: property plant and equipment 8.8%); mine development assets (7.1%); mineral rights (28.3%); exploration and evaluation assets (1.2%); and other assets (54.5%).

Table 2-3: Historical Group Financial Statistics

Statistics	Units	2015	2016	2017	2018	2019	2020	2021	2022[1]
Uranium Sales									
Sales Volume	(tU)	11,846	10,966	10,111	16,647	16,044	16,432	16,526	2,596
	(MlbU$_3$O$_8$)	30.8	28.5	26.3	43.3	41.7	42.7	43.0	6.7
Uranium Spot Price	(US$/lbU$_3O_8$)	36.87	26.58	21.98	24.47	25.92	29.38	35.32	50.18
Uranium Realised Price	(US$/lbU$_3O_8$)	41.17	30.04	23.85	24.46	26.60	29.54	33.11	39.36
Exchange Rate	(KZT:US$)	222.9	341.8	326.1	344.9	382.9	413.4	426.0	457.0
Sales Revenue									
Uranium	(KZTm)	282,638	292,687	207,788	368,325	438,518	529,196	625,048	129,815
Operating Expenditure									
Direct Costs (COGS)	(KZTm)	(294,404)	(308,468)	(209,934)	(313,817)	(307,498)	(319,624)	(402,967)	(74,030)
Distribution Costs	(KZTm)	(4,116)	(6,314)	(4,316)	(10,530)	(10,827)	(14,352)	(15,706)	(3,467)
G&A	(KZTm)	(25,655)	(30,877)	(30,194)	(34,805)	(32,024)	(29,582)	(34,105)	(7,229)
By-Product Credits	(KZTm)	21,363	25,108	26,095	26,788	29,260	34,071	41,896	9,124
Other Revenue	(KZTm)	93,765	101,106	43,163	41,519	34,491	24,190	24,067	6,338
Other income	(KZTm)	1,352	775	114,907	1,242	19,719	7,370	7,525	2,758
Other expenses	(KZTm)	(7,535)	(6,160)	(6,278)	(5,849)	(6,797)	(7,605)	(15,394)	(10,385)
Subtotal	**(KZTm)**	**(215,230)**	**(224,830)**	**(66,557)**	**(295,452)**	**(273,676)**	**(305,532)**	**(394,684)**	**(76,891)**
Financial Items	**(KZTm)**	**(17,863)**	**61,686**	**12,779**	**379,508**	**82,413**	**61,480**	**51,280**	**31,003**
Profit before Tax	**(KZTm)**	**49,545**	**129,543**	**154,010**	**452,381**	**247,255**	**285,144**	**281,644**	**83,927**
Taxation									
Corporate Income Tax	(KZTm)	(13,044)	(17,988)	(17,287)	(28,797)	(33,506)	(63,776)	(61,618)	(21,819)
Effective CIT	(%)	26.3	13.9	11.2	6.4	13.6	22.4	21.9	26.0
Profit									
Operating Profit	**(KZTm)**	**103,362**	**110,433**	**67,112**	**122,815**	**194,771**	**267,833**	**288,044**	**71,247**
Profit for Period	(KZTm)	**36,501**	**111,555**	**139,154**	**424,688**	**213,749**	**221,368**	**220,026**	**62,108**
Total Comprehensive Income	**(KZTm)**	**53,690**	**110,778**	**139,461**	**418,000**	**215,322**	**221,410**	**220,294**	**62,968**
Adjusted EBITDA[1]	**(KZTm)**	**126,919**	**151,271**	**96,700**	**141,700**	**248,719**	**325,734**	**350,294**	**n/a**
Attributable EBITDA[2]	**(KZTm)**	**n/a**	**n/a**	**128,200**	**140,300**	**217,266**	**295,465**	**276,510**	**n/a**
Capital Expenditure									
Mining	**(KZTm)**	**-**	**-**	**85,062**	**82,235**	**69,342**	**76,907**	**97,412**	**n/a**
Well Construction	(KZTm)	-	-	55,918	57,396	49,994	48,229	73,222	n/a
Sustaining	(KZTm)	-	-	25,535	13,419	10,026	10,453	13,427	n/a
Expansion	(KZTm)	-	-	-	4,622	6,954	2,264	4,438	n/a
Liquidation Fund	(KZTm)	-	-	3,609	6,798	2,368	15,961	6,325	n/a
UMP	**(KZTm)**	**-**	**-**	**2,507**	**3,173**	**3,281**	**4,146**	**3,631**	**n/a**
Other	**(KZTm)**	**-**	**-**	**7,688**	**4,024**	**3,396**	**4,146**	**3,631**	**n/a**
Total	**(KZTm)**	**-**	**-**	**95,257**	**89,432**	**76,019**	**85,199**	**104,674**	**n/a**
Cashflow									
From operating activities	(KZTm)	49,135	66,876	23,355	58,327	159,529	161,593	118,729	100,533
From/(used) investing activities	(KZTm)	9,126	12,655	215,575	(40,279)	(28,271)	48,759	(71,241)	(34,400)
From/(used) financing activities	(KZTm)	(54,092)	(56,196)	74,881	(139,272)	(159,103)	(201,415)	(1,843)	(27,862)
Net Inc. in cash and cash equiv.	(KZTm)	4,169	23,335	164,049	128,819	98,560	113,347	161,190	213,398
Debt									
Total debt	(KZTm)	172,421	127,765	121,702	200,169	161,358	98,572	89,308	n/a
Cash Balance	(KZTm)	55,869	75,052	248,408	129,024	98,561	113,347	204,410	n/a
Net Debt	(KZTm)	116,552	52,713	(126,706)	71,145	62,797	(14,775)	(115,102)	n/a

Statistics	Units	2015	2016	2017	2018	2019	2020	2021	2022[1]
Assets									
Property, plant and equipment	(KZTbn)	130.4	117.3	122.2	176.4	179.5	172.7	171.5	n/a
Mine development assets	(KZTbn)	38.6	41.7	43.5	121.1	140.7	128.3	138.7	n/a
Mineral rights	(KZTbn)	2.1	2.3	2.0	452.4	603.0	577.5	553.0	n/a
Explor. and Evaluation assets	(KZTbn)	8.5	3.5	5.6	23.6	22.9	22.9	24.4	n/a
Other Assets	(KZTbn)	613.7	655.3	764.7	708.6	728.0	787.8	1,064	n/a
Total	**(KZTbn)**	**793.3**	**820.0**	**938.0**	**1,482.1**	**1,674.1**	**1,689.3**	**1,951.5**	**n/a**

(1) Adjusted EBITDA is calculated by excluding from EBITDA items not related to the main business and having a one-time effect.

(2) Attributable EBITDA is calculated as Adjusted EBITDA less the share of the results in the net profit in JVs and associates, plus the share of Adjusted EBITDA of JVs and associates engaged in the uranium segment (except JV Budenovskoye LLP's EBITDA due to minor effect it has during each reporting period), less non-controlling share of adjusted EBITDA of Appak LLP, JV Inkai LLP, Baiken-U LLP, Ortalyk LLP and JV Khorasan-U LLP, less any changes in the unrealized gain in the Group.

Table 2-4 presents a summary of the historical reporting financial statistics for the individual segments including the Uranium Segment, UMP, Other, eliminations and the total Group position for the 12-month periods ending 31 December 2017 through 2021. In summary the Group's performance in respect of revenue, expenditures and financial metrics is dominated by the Uranium Segment which for the 12-month period ended 2021 reported: external revenues of KZT616.8bn (89.3% of the Group) and gross profit of KZT271.7bn (94.3% of the Group)

Table 2-4: Historical Segmented Reporting Financial Statistics

Statistic	Units	2017	2018	2019	2020	2021
Uranium Segment						
External Revenue	(KZTm)	205,187	366,040	435,438	525,532	616,860
Revenue from other Segments	(KZTm)	416	739	1,722	2,404	4,846
Cost of Sales	(KZTm)	(151,318)	(258,202)	(258,276)	(274,968)	(350,052)
Gross Profit	**(KZTm)**	**54,285**	**108,577**	**178,884**	**252,968**	**271,654**
Adjustments	(KZTm)	(116,084)	(342,245)	(16,429)	46,126	65,109
Share of Results of Ass. JV	(KZTm)	40,395	36,155	26,203	43,982	52,341
Income Tax	(KZTm)	(16,726)	(26,274)	(31,602)	(60,029)	(58,759)
Profit/(loss)	**(KZTm)**	146,700	**440,941**	**200,712**	**222,889**	**212,963**
Depreciation & Amortisation	(KZTm)	(11,783)	(34,968)	(56,299)	(56,141)	(63,348)
Capital Expenditure	**(KZTm)**	**24,262**	**53,768**	**38,148**	**33,462**	**45,096**
Capital Expenditure (Mining)	**(KZTm)**	**85,062**	**82,235**	**69,342**	**76,907**	**97,412**
Well Construction	(KZTm)	55,918	57,396	49,994	48,229	73,222
Sustaining	(KZTm)	25,535	13,419	10,026	10,453	13,427
Expansion	(KZTm)	-	4,622	6,954	2,264	4,438
Liquidation Fund	(KZTm)	3,609	6,798	2,368	15,961	6,325
UMP						
External Revenue	(KZTm)	32,793	39,181	37,998	42,625	55,323
Revenue from other Segments	(KZTm)	4,691	3,796	4,231	3,712	4,908
Cost of Sales	(KZTm)	(28,946)	(28,554)	(26,663)	(30,066)	(42,534)
Gross Profit	**(KZTm)**	**8,538**	**14,423**	**15,566**	**16,271**	**17,697**
Adjustments	(KZTm)	8,627	13,555	10,844	15,047	15,150
Share of Results of Ass. JV	(KZTm)	(150)	(204)	(503)	(1,745)	(1,932)
Income Tax	(KZTm)	(1,363)	(2,069)	(1,722)	(3,315)	(2,606)
Profit/(loss)	**(KZTm)**	**1,424**	**3,141**	**6,947**	**6,284**	**7,085**
Depreciation & Amortisation	(KZTm)	(1,368)	(1,475)	(1,552)	(1,924)	(1,666)
Capital Expenditure	**(KZTm)**	**2,507**	**3,173**	**3,281**	**4,146**	**3,631**
Other						
External Revenue	(KZTm)	39,066	31,411	28,833	19,300	18,828
Revenue from other Segments	(KZTm)	41,232	47,768	56,790	53,209	54,083
Cost of Sales	(KZTm)	(75,293)	(77,012)	(81,500)	(69,868)	(65,175)
Gross Profit	**(KZTm)**	**5,005**	**2,167**	**4,123**	**2,641**	**7,736**
Adjustments	(KZTm)	10,686	26,530	(12,968)	10,886	2,593
Share of Results of Ass. JV	(KZTm)	3,869	(7,448)	7,711	(2,151)	1,174
Income Tax	(KZTm)	292	(454)	(182)	(432)	(253)
Profit/(loss)	**(KZTm)**	**(9,842)**	**(16,461)**	**9,562**	**(5,662)**	**4,222**
Depreciation & Amortisation	(KZTm)	(4,711)	(4,613)	(4,300)	(4,434)	(4,718)
Capital Expenditure	**(KZTm)**	**7,688**	**4,024**	**3,396**	**4,146**	**3,631**
Eliminations						
External Revenue	(KZTm)	-	-	-	-	-
Revenue from other Segments	(KZTm)	(46,339)	(52,303)	(62,743)	(59,325)	(63,837)
Cost of Sales	(KZTm)	45,623	49,951	58,941	55,278	54,794
Gross Profit	**(KZTm)**	**(716)**	**(2,352)**	**(3,802)**	**(4,047)**	**(9,043)**
Adjustments	(KZTm)	333	401	(330)	(1,904)	(4,799)
Share of Results of Ass. JV	(KZTm)	-	-	-	-	-
Income Tax	(KZTm)	510	-	-	-	-
Profit/(loss)	**(KZTm)**	**(1,559)**	**(2,753)**	**(3,472)**	**(2,143)**	**(4,244)**
Depreciation & Amortisation	(KZTm)	3,416	251	324	257	728
Capital Expenditure	**(KZTm)**	-	-	-	-	-
Group						
External Revenue	(KZTm)	277,046	436,632	502,269	587,457	691,011
Revenue from other Segments	(KZTm)	-	-	-	-	-
Cost of Sales	(KZTm)	(209,934)	(313,817)	(307,498)	(319,624)	(402,967)
Gross Profit	**(KZTm)**	**67,112**	**122,815**	**194,771**	**267,833**	**288,044**
Adjustments	(KZTm)	(96,438)	(301,759)	(18,883)	70,155	78,053
Share of Results of Ass. JV	(KZTm)	44,114	28,503	33,411	40,086	51,583
Income Tax	(KZTm)	(17,287)	(28,797)	(33,506)	(63,776)	(61,618)
Profit/(loss)	**(KZTm)**	**136,723**	**424,868**	**213,749**	**221,368**	**220,026**
Depreciation & Amortisation	(KZTm)	(14,446)	(40,805)	(61,827)	(62,242)	(69,004)
Capital Expenditure	**(KZTm)**	**34,457**	**60,965**	**44,825**	**41,754**	**52,358**

Product Marketing and Sales

The sale of natural uranium and uranium products is the Company's primary source of revenue and profit. Market prices for uranium have a significant impact on the Company's financial results and like any commodity, the balance of supply and demand determines the market price for uranium products. The sales prices realised by any primary uranium producer are highly dependent upon the specific types of contracts they deliver into and the structure of their sales portfolio (including terms, price formulae used in each contract, proportion of spot and term contracts).

As part of the Company's strategic goal to create value by expanding sales channels, its marketing and sales departments are constantly working to grow the Company's customer base, with ongoing negotiations in Europe, North and South America and the Middle East. In 2021, the Company sold its uranium products, directly and through its Swiss marketing subsidiary Trade House KazakAtom AG ("**THK**"), to 21 customers in 8 countries, including three new customers (2020: 20 customers in 10 countries). Kazatomprom delivers U_3O_8 and finished uranium products to various destinations based upon customer requirements:

- **Converters:** The Group transports U_3O_8 to licensed conversion facilities owned by companies such as ConverDyn (United States of America – "**United States**"), Cameco (Canada) and Comurhex S.A. (the French Republic – "**France**"), first by rail from the Company's operations in Kazakhstan, generally to the port of St. Petersburg in the Russian Federation ("**Russia**"), then by sea to various ports in the United States, Canada and Europe. The material then moves by rail or road to the processing facilities and is transferred to the customer's accounts. In some cases, the Group enters into swap (exchange) agreements at the conversion facility to reduce risks and transportation costs. This can include the exchange of U_3O_8 with partners of the Group at the conversion facility;
- **People's Republic of China ("China"):** When transporting material to China, the Company delivers its cargo to the Alashankou railway station near the Kazakhstan-China border;
- **Russia:** When shipping to the Russian Federation - recipients include Angarsk Electrolysis and Chemical Combine JSC ("**AECC**"), Siberian Chemical Combine JSC ("**SCC**") and Chepetsk Mechanical Plant JSC (Rosatom) - the Group delivers its cargo by rail from its operations to one of several Russian railway stations, depending on the final destination of the products;
- **India:** The Company generally delivers U_3O_8 to destinations in India by rail to the port in St. Petersburg, Russia, then by sea to the port of Mumbai, the Republic of India ("**India**"); and
- **Others:** The transportation methods and routes to other countries may differ depending on the terms of delivery agreed with customers.

The Company purchases U_3O_8 from its subsidiaries, JOs, JVs and associates, principally at spot price with market-based discounts, which may vary by operation. Purchased volumes generally correspond to the Company's interest in the respective selling entities. The Group's Uranium segment revenue is primarily composed of two streams:

- the sale of U_3O_8 purchased from operations (JVs and associates), third parties; and
- the sale of U_3O_8 produced by the Company and by its consolidated subsidiaries and JOs.

Table 2-5 presents the historical Group production, sales and revenue statistics from 2015 through Q1 2022 where supporting details are available (n.a. – not available) in the Company's public domain reporting data. Production volumes (100%) over the period have, with the exception of 2019 largely remained range bound between 21ktU and 25ktU with production for the period ended 31 December 2021 reporting approximately 22ktU (2020: 20ktU).

Production on both a 100% and attributable basis was higher for 2021 compared to the same period in 2020. The pandemic-related safety measures that were implemented in 2020 impacted production volumes throughout the second half of that year and production in 2020 should therefore be considered unusually low. The pandemic-related supply chain challenges have continued to result in limited access to certain key operating materials and equipment (production reagents, certain types of pipes and pumps, specialized equipment, drilling rigs), which had a material impact on the Company's wellfield development and production schedules in 2021, resulting in a decrease of the guidance by approximately 1,000tU on 100% basis and by almost 540tU on attributable basis (original 2021 guidance of 22,500tU to 22,800tU on 100% basis, 12,100tU to 12,400tU on attributable basis).

Uranium sales at the Group level in 2021 were in line with 2020. Due to the timing of customer requirements and differences in the timing of deliveries, a larger proportion of both Group and Company sales occurred in the fourth quarter, resulting in higher sales in the final quarter of 2021 compared to the same period in 2020. The Company's sales volume was modestly lower in 2021 compared to 2020 due to additional sales by consolidated subsidiaries to JV partners.

Consolidated Group inventory of finished U_3O_8 products in 2021 amounted to 8,824t as on 31 December 2021, which was 17% higher than on 31 December 2020. At the Company level, inventory of finished U_3O_8 products was 7,724t, an increase of 14% compared to 2020. The increase in inventory was mainly related to a higher 2021 U_3O_8 production volume on both a 100% and attributable basis, while sales level remained approximately on the same level as in 2020. Consistent with the Company's value strategy, the Company's inventory levels vary based on the timing of customer requirements and the resulting differences in the timing of deliveries and mining and sales volumes, in alignment with changing market conditions. Expressed as a percentage of production the inventories of finished goods reported for the group has largely remained range bound from 36% to 43% with the attributable equivalent declining from approximately 75% in 2015 through to 65% in 2021.

Realised average prices for the same period reported for the Group were US$33.11/lb$U_3O_8$ (2020: US$29.54/lb$U_3O_8$) reflecting an increase of 16%. The contribution of uranium sales related revenue has since 2015 generally increased from approximately 70% to 90% with rare earth by-products and other sales (services and other products) contributing the remaining proportions. Geographic distribution of external sales has for Europe (2021: 29%) remained relatively constant with sales to the Americas (2021: 23%) increasing and those to Asia and others declining over the period (2021: 48%).

The Company's current overall contract portfolio price is closely correlated to current uranium spot prices. However, the increase in average realized prices in 2021 was lower than the increase in the spot market price for uranium due to the significant spot price volatility in the uranium market in 2021 (low of US$27.35/lb$U_3O_8$ and high of US$50.38/lb$U_3O_8$); during the fourth quarter, many deliveries were based on contract price mechanisms that established a contract price for the delivery, set earlier in the year when the market price was lower and prior to the sharp increase in the market price in September 2021.

Sales of fuel pellets decreased by 28% to 43.5tUO_2 and dioxide from scraps by 10% to 50.6tUO_2 in 2021, lower than in 2020 as per customer demand. The significant increase in sales of ceramic powder in 2021 was due to higher demand from customers. Sales volume of beryllium products increased by 11% in 2021 compared to 2020, due to an increase in the number of orders from customers. Sales price increased by 7% in 2021 mainly related to the weakening of KZT against US$ and the product mix changing to highly refined products and higher price in the non-ferrous metal market. Sales volumes and prices for tantalum products were higher in 2021 compared 2020, due to higher consumer demand for tantalum ingots and chips. Sales of niobium products in 2021 decreased by 49% compared to 2020 due to a decrease in the quantity of orders for niobium hydroxide, although 2021 orders were for more highly refined products of higher value, resulting in a higher selling price in 2021.

Table 2-5: Historical Group Production, Sales and Revenue Statistics

Statistics	Units	2015	2016	2017	2018	2019	2020	2021	2022
Uranium Production and Sales									
Production Volume (100%)	(tU)	23,607	24,586	23,321	21,705	22,808	19,477	21,819	4,954
Production Volume (Attrib.)	(tU)	12,851	13,187	12,093	11,476	13,291	10,736	11,858	2,685
Sales Volume (Group)	(tU)	11,846	10,966	10,111	16,647	16,044	16,432	16,526	2,596
Sales Volume (attributable)	(tU)	10,896	10,086	9,300	15,287	14,148	14,126	13,586	2,355
Inv. of Finished Goods (Group)	(tU)	9,654	9,907	9,085	7,892	9,906	7,537	8,824	n.a.
Inv. of Finished Goods (Attrib.)	(tU)	9,563	9,813	8,999	7,353	8,571	6,761	7,724	n.a.
Inter Group Transactions	**(tU)**	**11,789**	**10,894**	**8,759**	**11,921**	**14,060**	**11,262**	**12,121**	**n.a.**
Purchased from JVs and Assoc.	(tU)	5,338	6,668	6,877	3,020	3,050	2,676	2,910	n.a.
Purchased from JOPs and Sub.	(tU)	6451	4,226	1,882	8,901	11,010	8,586	9,211	n.a.
Production Volume (100%)	(MlbU$_3$O$_8$)	61.4	63.9	60.6	56.4	59.3	50.6	56.7	12.9
Production Volume (Attrib.)	(MlbU$_3$O$_8$)	33.4	34.3	31.4	29.8	34.6	27.9	30.8	7.0
Sales Volume (Group)	(MlbU$_3$O$_8$)	30.8	28.5	26.3	43.3	41.7	42.7	43.0	6.7
Sales Volume (Attrib.)	(MlbU$_3$O$_8$)	28.3	26.2	24.2	39.7	36.8	36.7	35.3	6.1
Inv. of Finished Goods (Group)	(MlbU$_3$O$_8$)	25.1	25.8	23.6	20.5	25.8	19.6	22.9	n.a.
% of Production	(%)	40.9	40.3	39.0	36.4	43.4	38.7	40.4	n.a.
Inv. of Finished Goods (Attrib.)	(MlbU$_3$O$_8$)	24.9	25.5	23.4	19.1	22.3	17.6	20.1	n.a.
% of Production	(%)	74.4	74.4	74.4	64.1	64.5	63.0	65.1	n.a.
Uranium Pricing & Exch. Rates									
Group Average Realised	(US$/lbU$_3O_8$)	41.17	30.04	23.85	24.46	26.60	29.54	33.11	39.36
Attributable Average Realised	(US$/lbU$_3O_8$)	41.69	30.42	24.15	24.37	26.89	29.63	32.33	37.74
Average Exchange Rate	(KZTS$)	223	342	326	345	383	413	426	457
Closing Exchange Rate	(KZTS$)	341	334	332	384	381	421	432	458
Sales Revenue									
Uranium Products	(KZTm)	282,638	292,687	207,788	368,325	438,518	529,196	625,048	129,815
Beryllium Products	(KZTm)	9,312	13,359	13,224	17,364	19,717	21,866	26,119	5,916
Tantalum Products	(KZTm)	12,051	11,749	12,871	9,424	9,543	12,205	15,777	3,208
Purch. goods and other products	(KZTm)	10,886	10,461	11,655	14,333	10,470	5,321	5,860	2,959
Sales of other services	(KZTm)	56,868	65,714	8,018	8,342	8,048	6,911	6,459	1,509
Drilling services	(KZTm)	12,841	10,532	9,950	6,803	6,602	5,972	4,357	849
Sales of mat. and other goods	(KZTm)	6,034	8,782	8,516	8,465	5,912	3,030	3,713	-
Transportation services	(KZTm)	5,092	5,148	3,895	2,887	2,818	2,798	3,413	1,021
Research and development	(KZTm)	135	443	748	398	193	153	265	-
Sales of photovoltaic cells	(KZTm)	1,909	26	381	291	448	5	-	-
Total	**(KZTm)**	**397,766**	**418,901**	**277,046**	**436,632**	**502,269**	**587,457**	**691,011**	**145,277**
Uranium	(%)	71.1	69.9	75.0	84.4	87.3	90.1	90.5	89.4
By-products	(KZTm)	21,363	25,108	26,095	26,788	29,260	34,071	41,896	9,124
Other Revenue	(KZTm)	93,765	101,106	43,163	41,519	34,491	24,190	24,067	6,338
Consolidated Sales Distribution									
Americas	(%)	20.0	12.0	4.0	15.6	17.1	24.2	32.0	n.a.
Asia + Others	(%)	61.0	72.0	78.0	52.6	52.5	43.0	41.0	n.a.
Europe	(%)	19.0	16.0	18.0	31.8	30.4	32.8	27.0	n.a.
External Sales Distribution									
Americas	(%)	n.a.	n.a.	n.a.	10.0	10.0	16.0	23.0	n.a.
Asia	(%)	n.a.	n.a.	n.a.	56.0	59.0	49.0	48.0	n.a.
Europe	(%)	n.a.	n.a.	n.a.	34.0	31.0	35.0	29.0	n.a.
Uranium Segment Sales									
China	(%)	44.0	47.0	60.0	34.0	40.0	49.0	48.0	n.a.
Europe	(%)	19.0	16.0	18.0	9.0	18.0	-	-	-
India	(%)	-	11.0	8.0	23.0	9.0	-	-	-
Russia	(%)	-	-	-	-	8.0	-	-	-
South Korea	(%)	3.0	6.0	4.0	-	-	-	-	-
USA	(%)	20.0	12.0	4.0	5.0	6.0	16.0	23.0	n.a.
Canada	(%)	-	-	-	7.0	8.0	-	-	-
Other	(%)	14.0	8.0	6.0	22.0	11.0	35.0	29.0	n.a.
Total	**(%)**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	n.a.
UMP Segment									
UO2 powder and Fuel Pellets									
Fuel Pellets	(t)	n.a.	24.0	75.2	84.3	86.1	60.3	43.5	n.a.
Ceramic Powder	(t)	n.a.	n.a.	10.2	10.2	n.a.	0.8	10.7	n.a.
Dioxide from scraps	(t)	28.0	28.0	8.3	15.3	56.2	56.4	50.6	n.a.
Rare Metal Products									
Beryllium Products	(t)	1,740	1,766	1,662	1,600	1,636	1,375	1,529	n.a.
	(KZT/kg)	n.a.	n.a.	8,267	10,447	12,049	15,902	17,074	n.a.
Tantalum Products	(t)	145	123	135	138	120	144	165	n.a.
	(KZT/kg)	n.a.	n.a.	95,369	104,076	79,693	84,918	95,351	n.a.
Niobium Products	(t)	122	52	24	23	9.41	17	21	n.a.
	(KZT/kg)	-	-	19,906	24,088	26148	16,846	20,655	n.a.

Table 2-6 indicates how the Group's U_3O_8 annual average sales price may respond to changes in spot prices (shown in the left column), for a given year (shown across the top row). At present, the table clearly indicates that the Group's U_3O_8 average sales prices are closely correlated with the uranium spot market price. This sensitivity analysis should be used only as a reference, and actual uranium market spot prices may result in different U_3O_8 annual average sales prices than those shown in the table. The table is based upon several key assumptions, including estimates of future business opportunities, which may change and are subject to risks and uncertainties outside the Group's control.

The values reported are rounded to the nearest dollar and the sensitivity analysis above is based on the following key assumptions:

- annual inflation at 2.0% in the United States;
- analysis completed as of 31 December 2021 and prepared for 2022 through 2026 on the basis of minimum average Group annual sales during the specified period of approximately 18.0 thousand tonnes of uranium in the form of U_3O_8, of which the volumes contracted as of 31 December 2021 will be sold per existing contract terms (i.e. contracts with hybrid pricing mechanisms with a fixed price component (calculated in accordance with an agreed price formula) and/or combination of separate spot, mid-term and long-term prices); Kazatomprom's marketing strategy does not target a specific proportion of fixed and market related contracts in its portfolio in order to remain flexible and react appropriately to market signals.
- a difference between sales prices and spot prices is expected for 2022, since numerous sales commitments for 2022 are based on pricing that was locked-in before September 2021, when the spot price started to increase significantly; and
- for the purpose of the table, uncommitted volumes of U_3O_8 are assumed to be sold under short-term contracts negotiated directly with the customers and based on spot prices.

Table 2-6: Uranium Sales Price Sensitivity

Spot Pricing Assumption	Units	Average Realised price				
		2022	2023	2024	2025	2026
20	(US\$/lbU_3O_8)	27.00	22.00	22.00	22.00	21.00
30	(US\$/lbU_3O_8)	33.00	31.00	31.00	31.00	31.00
40	(US\$/lbU_3O_8)	38.00	40.00	40.00	40.00	40.00
50	(US\$/lbU_3O_8)	44.00	48.00	48.00	48.00	50.00
60	(US\$/lbU_3O_8)	50.00	57.00	57.00	57.00	59.00
70	(US\$/lbU_3O_8)	56.00	65.00	66.00	65.00	68.00

Cost of Sales and Operating Expenditure

Table 2-7 provides details relating to the Group's cost of sales and other related operating expenditures from 2015 through Q1 2022. In 2021 the cost of sales totalled KZT402,967m which reports a 26% increase on that reported in 2020 (KZT319,624m).

Cost of sales of purchased uranium is equal to the purchase price from JVs and associates, which in most cases is the prevailing spot price with certain applicable discounts. The share of results of JVs and associates represents a significant part of the Group's profits and should be considered in the assessment of the Group's financial results. In 2021, U_3O_8 was purchased at a weighted average discount of 4.09% on the prevailing spot price. When uranium produced by the Company, consolidated subsidiaries and JOs, is sold, the cost of sales is predominantly represented by the cost of production. For those sales, the full margin for uranium products including uranium for export is captured in the consolidated results of the Group.

The cost of materials and supplies was KZT241,695m in 2021, an increase of 44% compared to 2020 due to a significant increase in the proportion of sales of uranium purchased from JVs and associates, as well as from third parties. When such uranium is sold, the cost of sales is predominantly represented by the cost of purchased uranium (accounted in materials and supplies) at the prevailing spot price with certain applicable discounts. The purchase price of materials and supplies, including U_3O_8 also increased as a result of the increase in uranium spot prices and the weakening of the KZT against the US$, and increased inflationary pressure.

Depreciation and amortisation totalled KZT66,429m in 2021, an increase of 11% compared to 2020, mainly due to an increase in the costs of repayment of the wellfield development depreciation ("**PGR**"). Wages and salaries totalled KZT33,294m in 2021, an increase of 4% compared to 2020, mainly due to an increase in the payroll of main production personnel.

The taxes other than income tax totalled KZT25,474m, which is comprised mostly of Mineral Extraction Tax ("**MET**"), increased by 7% compared to 2020 due to an increase in uranium production volumes in 2021. The cost of processing and other services was KZT17,404m in 2021, a decrease of 12% compared to 2020, mainly due to a significant increase in the proportion of sales of uranium purchased from JVs and associates as well as from third parties. When such uranium is sold, the cost of sales is predominantly represented by the cost of purchased uranium. The other categories of costs totalled KZT18,671m in 2021, an increase of 12% compared to 2020 due to an increase in maintenance and repair and other overheads.

Selling expenses totalled KZT15,706 million in 2021, an increase of 9% compared to 2020. The increase was mainly due to changes in the delivery destination points for uranium products, an increase in transportation tariffs and the weakening of the KZT against the US$, as a significant portion of shipping, transportation and storing expenses are denominated in foreign currency. The average cost of shipping products to the destinations indicated in the map below ranges from US$0.5/kg$U_3O_8$ to US$3.5/kg$U_3O_8$. Where practical, the Group enters swap agreements in order to minimise delivery times (the physical transportation of materials takes, on average, 100 days, while deliveries under swap agreements can take up to 25 days), reduce transportation costs, and lower risks related to the transportation of uranium products.

Table 2-7: Historical Group Operating Expenditure Statistics

Statistics	Units	2015	2016	2017	2018	2019	2020	2021	2022
Cost of Goods Sold	**(KZTm)**	**294,404**	**308,468**	**209,934**	**313,817**	**307,498**	**319,624**	**402,967**	**74,030**
Materials and supplies	(KZTm)	210,918	229,467	143,771	202,817	147,331	167,546	241,695	40,532
Depreciation and amortisation	(KZTm)	16,779	15,113	13,623	39,866	60,044	60,002	66,429	13,080
Wages and salaries	(KZTm)	29,512	30,620	22,830	24,024	29,632	31,874	33,294	9,199
Taxes other than income tax	(KZTm)	12,469	9,511	10,552	22,033	27,021	23,775	25,474	5,506
Processing and other services	(KZTm)	17,290	15,845	5,052	10,354	18,566	19,738	17,404	2,261
Maintenance and repair	(KZTm)	1,805	2,358	3,344	3,490	4,132	4,751	4,918	820
Transportation expenses	(KZTm)	1,850	2,558	2,894	3,021	6,795	2,913	4,982	444
Utilities	(KZTm)	1,808	1,541	1,515	1,581	1,607	1,669	1,703	490
Other	(KZTm)	1,973	1,455	6,353	6,631	12,370	7,356	7,068	1,698
Other Revenue	**(KZTm)**	**(115,128)**	**(126,214)**	**(69,258)**	**(68,307)**	**(63,751)**	**(58,261)**	**(65,963)**	**(15,462)**
By Products	(KZTm)	(21,363)	(25,108)	(26,095)	(26,788)	(29,260)	(34,071)	(41,896)	(9,124)
Other Revenue	(KZTm)	(93,765)	(101,106)	(43,163)	(41,519)	(34,491)	(24,190)	(24,067)	(6,338)
Distribution Costs	**(KZTm)**	**4,116**	**6,314**	**4,316**	**10,530**	**10,827**	**14,352**	**15,706**	**3,467**
Shipping, trans. and storing	(KZTm)	2,248	4,301	2,868	7,275	6,790	10,351	11,110	2,452
Wages and salaries	(KZTm)	715	624	484	950	1,035	1,139	1,456	321
Materials	(KZTm)	76	235	169	106	255	212	306	68
Rent	(KZTm)	161	132	85	221	70	113	105	23
Depreciation and amortisation	(KZTm)	-	-	65	67	70	66	65	14
Others	(KZTm)	916	1,022	645	1,911	2,607	2,471	2,664	588
General and Administrative	**(KZTm)**	**25,655**	**30,877**	**30,194**	**34,805**	**32,024**	**29,582**	**34,105**	**7,229**
Wages and salaries	(KZTm)	15,089	16,718	16,556	17,809	18,478	17,709	18,303	3,880
Consulting and info. services	(KZTm)	2,370	4,147	3,150	4,488	3,816	4,467	4,697	996
Rent	(KZTm)	934	1,083	1,086	1,166	315	75	352	75
Depreciation and amortisation	(KZTm)	924	827	696	808	1,611	1,744	2,493	528
Other	(KZTm)	6,338	8,102	8,706	10,534	10,534	5,587	8,260	1,751

Uranium extraction at the Mining Assets requires consumption of substantial amounts of sulphuric acid Table 2-8 provides a historical analysis of the Group's historical weighted average cost of sulphuric acid from 2017 through 2021 inclusive. For the 12-month period ended 31 December 2021 the weighted average cost recorded was KZT22,740/t which represented 13% of the Group's production costs.

Table 2-8: Group historical weighted average cost of sulphuric acid

Statistics	Units	2017	2018	2019	2020	2021
Sulphuric Acid	(KZT/t)	21,529	21,557	21,304	22,303	22,740
Proportion of production costs	(%)	16.0	16.0	15.0	13.0	13.0

Table 2-9 presents the historical attributable cash costs and capital expenditures reported for the Uranium Segment from 2015 through 2021 inclusive and reported on an attributable basis for C1, sustaining capital expenditure and total capital expenditures related to the Mining Subsidiaries.

Compared to 2020, C1 Cash cost (attributable) increased by 1% mainly due to an increase in the payroll of production personnel, whereas AISC (attributable C1 + sustaining capital) increased by 8% in US$ equivalent in 2021 due to an increase in capital expenditures of Mining Subsidiaries. The Company partially shifted wellfield development activities from 2020 to 2021 due to the four-month suspension of wellfield development activity, resulting from the COVID-19 pandemic in 2020, and the shift in schedule resulted in a higher level of capital expenditures in 2021. The results were considerably better than expected and below the guidance ranges provided for 2021 (updated guidance of US$9.50/lb$U_3O_8$ to US$10.50/lb$U_3O_8$ for attributable C1 cash cost, US$13.50/lb$U_3O_8$ to US$14.50/lb$U_3O_8$ for AISC) primarily due to the weakening of the KZT against the US$ in 2021.

Capital expenditures of mining companies (100% basis) comprised KZT91,087m, an increase of 49% compared to 2020, primarily due to a shift in wellfield development activities as described above, as well as higher purchase prices for materials, supplies, equipment and cost of drilling. Capital expenditures in 2020 were lower as a result of measures taken to prevent the spread of the COVID-19 pandemic.

Table 2-9: Uranium Segment historical attributable cash costs and capital expenditure[(1)]

Statistics	Units	2015	2016	2017	2018	2019	2020	2021
Cash Costs Categories								
Materials and supplies	(KZTm)	27,530	28,621	27,342	28,514	32,325	24,243	24,329
MET	(KZTm)	21,470	22,027	22,693	30,765	23,521	19,793	23,168
Processing and other services	(KZTm)	30,397	30,173	29,925	14,535	17,523	18,123	18,830
Wages and salaries	(KZTm)	13,923	14,475	13,828	14,420	16,815	17,111	18,932
General and administrative	(KZTm)	16,047	15,360	12,868	8,148	8,014	7,323	9,157
Selling Expenses	(KZTm)	1,543	2,333	2,034	4,292	3,361	2,668	2,839
Others	(KZTm)	9,550	12,245	10,947	24,088	19,224	13,033	13,188
Total	**(KZTm)**	**120,461**	**125,233**	**119,637**	**124,763**	**120,783**	**102,294**	**110,443**
Cash Cost Contribution								
Materials and supplies	(%)	22.9	22.9	22.9	22.9	26.8	23.7	22.0
MET	(%)	17.8	17.6	19.0	24.7	19.5	19.3	21.0
Processing and other services	(%)	25.2	24.1	25.0	11.7	14.5	17.7	17.0
Wages and salaries	(%)	11.6	11.6	11.6	11.6	13.9	16.7	17.1
General and administrative	(%)	13.3	12.3	10.8	6.5	6.6	7.2	8.3
Selling Expenses	(%)	1.3	1.9	1.7	3.4	2.8	2.6	2.6
Others	(%)	7.9	9.8	9.2	19.3	15.9	12.7	11.9
Total	**(%)**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Cash Costs (Sales basis)								
C1 (Attributable)	(US$/lb$U_3O_8$)	17.45	12.22	12.02	11.56	9.28	8.67	8.80
Capital Cost (Attributable)	(US$/lb$U_3O_8$)	4.74	3.45	4.07	3.52	2.66	3.05	3.83
All in Sustaining Cost (Attrib.)	(US$/lb$U_3O_8$)	22.19	15.67	16.09	15.08	11.94	11.72	12.63
Capital Exp. (Mining 100%)	(KZTm)	63,476	70,466	81,500	75,400	66,973	60,947	91,087

(1) Excludes liquidation funds and closure costs and includes expansion investments, however, includes total expansion investments (JV Inkai LLP, Karatau LLP, JV Katco LLP) in amount of KZT4.4bn in 2021 and KZT2.2bn in 2020.

Capital Expenditure

Most capital expenditures of the Group are incurred by subsidiaries, JO's, JVs and associates engaged in the mining of natural uranium. Such expenditures are comprised of the following key components:

- well construction costs;
- expansion costs, which typically include expansion of processing facilities, extension of services and transport routes to new wellfield areas, implementation of new systems and processes;
- sustaining capital, largely reflecting recurring, infrastructure, maintenance and equipment replacement related costs, which are assumed to cease three years prior to the end of production at the asset; and
- liquidation fund contributions and mine closure costs (not included in the calculation of AISC).

Table 2-10 provides the capital expenditures for the Group's subsidiaries, JOs, JVs and associates engaged in uranium mining for the periods indicated. Capital expenditure amounts shown were derived from stand-alone management information of certain entities within the Group on an unconsolidated basis, and they are therefore not comparable with or reconciled to the amounts of additions to property, plant and equipment as presented in the Financial Statements for the Group as these items represents unaudited, unconsolidated financial information on an accounting basis that is not in compliance with IFRS.

In order to achieve the planned levels of production, the Group's mining companies assess the required level of wellfield and mining preparation based on the availability of reserves. These costs relate to the capitalised costs of maintaining the sites, with the main component being wellfield construction.

Table 2-10: Historical capital expenditure[1]

Capital Item	Units	2017	2018[1]	2019[1]	2020[2]	2021[2]
Well Construction	(KZTm)	55,918	57,396	49,994	48,229	73,222
Sustaining[1]	(KZTm)	25,535	13,419	10,026	10,453	13,427
Subtotal	**(KZTm)**	**81,453**	**70,815**	**60,020**	**58,682**	**86,649**
Expansion	(KZTm)	-	4,622	6,954	2,264	4,438
Subtotal	**(KZTm)**	**81,453**	**75,437**	**66,974**	**60,946**	**91,087**
Liquidation Fund	(KZTm)	3,609	6,798	2,368	15,961	6,325
Total	**(KZTm)**	**85,062**	**82,235**	**69,342**	**76,907**	**97,412**

(1) Excludes total expansion investments of KZT4.6bn in 2018 and KZT7.0bn in 2019.

(2) Excludes liquidation funds and closure costs and includes expansion investments, however, includes total expansion investments (JV Inkai LLP, Karatau LLP, JV Katco LLP) in amount of KZT4.4bn in 2021 and KZT2.2bn in 2020.

Wellfield construction and sustaining costs for the 13 mining entities in 2018 amounted to KZT70.8bn, which is 13% lower than in 2017. The change was mainly due to the decrease of sustaining capital expenses related a cost optimization program. A 3% rise in the cost of well construction is related to higher piping costs, higher pump prices combined with KZT depreciation.

Wellfield construction and sustaining costs for the 13 mining entities in 2019 amounted to KZT60,020m, which is 15% lower than in 2018. The results were considerably below the guidance ranges provided for 2019 (80KZTbn to 90KZTbn). The change in the sustaining costs were mainly due to the timing of different projects related to future expansion at each of the mining assets, and constant cost optimization efforts. A 13% decrease in the cost of well construction was related to a change of the construction schedule for technological blocks (postponement to 2020).

Wellfield construction and sustaining costs for the 14 mining entities in 2020 amounted to KZT 58,682m, which is 2% lower than in 2019. The results were considerably below the guidance ranges provided for 2020 (KZT65bn to KZT75bn), due to a decrease in well construction as a result of production reductions associated with a decline in field development activities amid the COVID-19 pandemic. The decrease was offset by the change in Kazakhstan's tax legislation, whereby the cost of sulphuric acid used in the ISR wellfield acidification process is now capitalised within well construction, rather than being expensed directly to the production cost.

Wellfield construction and sustaining costs for the 14 mining entities in 2021 comprised KZT86,649m, which is 48% higher than in 2020 due to an increase in well construction in 2021 as a result of production reductions associated with a decline in field development activities amid the COVID-19 pandemic in 2020. The results were below the guidance range provided for 2021 (KZT90bn to KZT100bn) due to the pandemic-related supply chain challenges. The pandemic-related safety measures that were implemented in 2020 impacted production volumes throughout the second half of that year – production in 2020 should therefore be considered unusually low.

Taxation

Total tax accrued increased by 22% in 2021 compared to 2020, mainly due to an increase in corporate income tax. The increase was due to a higher tax base resulting from higher uranium spot prices and the weakening of the KZT against the US$. The sale of the Uranium Enrichment Centre" JSC in the first half of 2020 had a once off effect on the tax base of corporate income tax. The increase in MET and other taxes is mainly due to an increase in uranium production volumes in 2021. Following the announcement by the President of the Republic of Kazakhstan in January 2022 that the country's current tax regime and MET would be subject to revision, government authorities are considering options to increase MET rates for solid minerals, including uranium. Although no decisions or changes in legislation have been made to date, the government has publicly stated that it is considering an increase in the MET rates on uranium from 2023.

Kazakhstan's MET is currently determined by applying a 29% tax charge to the taxable base related to mining production costs (see Table 2-11 footnotes). Taxable expenditures are made up of all direct expenditures associated with mining operations, including wellfield development depreciation charges and any other depreciation charges attributable to direct mining activities, but specifically exclude processing and general and administrative expenses. The MET is calculated separately for each subsoil use license. The resulting MET paid is therefore dependent upon the cost of mining operations.

Table 2-11 presents the historical taxation incurred from 2017 through 2021 with details for corporate income tax, MET and other taxes. For the 12-month period ended 31 December 2021 the taxes accrued by the Group were: corporate income tax (KZT85,344m); MET (KZT23,659m); and other taxes and payment to budget (KZT62,572m).

Table 2-11: Historical taxation

Statistics	Units	2017	2018	2019	2020	2021
Corporate Income Tax[(1)]	(KZTm)	14,675	31,412	43,948	65,492	85,344
Mineral Extraction Tax[(2)]	(KZTm)	13,280	17,720	22,916	20,110	23,659
Other taxes and payments to budget[(3)]	(KZTm)	44,079	49,684	60,335	55,490	62,572
Total	**(KZTm)**	**72,034**	**98,816**	**127,199**	**141,092**	**171,575**

(1) Applicable rate: 20%; calculation: taxable income (based on tax reporting accounts) multiplied by corporate income tax rate.

(2) Applicable rate: 18.5% for uranium cost in pregnant solution; calculation: the tax charge is a cost of mining and is based on a deemed 20% profit margin on certain expenditures, and a MET rate of 18.5%. The tax charge of 29% is determined by the following formula: (1 + 20%) × 18.5% ÷ (1 – (1 + 20%) × 18.5%).

(3) Includes property tax, land tax, transport tax, social tax, other payments to budget, VAT and PIT (on PIT Company acts as a tax agent).

Guidance

The Company's reported historical (2019 through 2021) and current (2022) guidance for certain key metrics in addition for actual performance for the equivalent reporting period are provided in Table 2-12. Note that for 2022 the actual statistics available are only for Q1 2022 and do not include cash cost reporting statistics. With the exception of 2019 actual production volumes have generally not met the original guidance, although sales reported on either a Group or Company basis have generally exceeded guidance. Cash costs for either C1 or AISC have generally been lower than guidance and capital expenditure has also consistently not met guidance targets. In certain instances, the original guidance was updated during H2 of each reporting period and where this was completed, the actual results tended to be more closely aligned.

The Company's production expectations for 2022 remain consistent with its market-centric strategy and the intention to flex down planned production volumes by 20% for 2018 through 2023 (versus planned production levels under Subsoil Use Agreements). Production volume in 2022 is expected to be between 21,000tU and 22,000 tU on a 100% basis, which is similar to 2021 at the top end of the range. However, pandemic-related supply chain challenges have continued to result in limited access to certain key operating materials and equipment (production reagents, certain types of pipes and pumps, specialized equipment, drilling rigs), which had a material impact on the Company's wellfield development and production schedules in 2021, adding additional risk to production in 2022 and resulting in a wider range for the expected production volume. On an attributable basis, 2022 production volume is expected to be between 10,900tU to 11,500tU, which is lower than 2021 primarily due to the sale of a 49% share of ME Ortalyk LLP to CGN Mining UK Limited in mid-2021, as well as the above-mentioned supply chain risks.

Sales volume guidance for 2022 is also aligned with the Company's market-centric strategy. The Group expects to sell between 16,300tU and 16,800tU, which includes Company sales of between 13,400tU and 13,900tU, in line with sales volumes in 2021.

Revenue, C1 cash cost (attributable basis) and All-in Sustaining cash cost (attributable C1 + capital cost) may vary from the guidance provided if the KZT to USS exchange rate fluctuates significantly during 2022. Ranges for C1 cash cost (attributable basis) and AISC have been increased to reflect the uncertainty in the current geopolitical situation and widening offsetting effects of current KZT devaluation and potential inflationary impacts. The Company expects that current guidance will be updated if the recent fluctuations and geopolitical uncertainties persist throughout 2022.

Wellfield development, procurement and supply chain issues, including inflationary pressure on production materials and reagents, are expected to continue throughout 2022, impacting the Company's financial metrics and giving rise to an expectation that C1 cash cost and AISC will be higher in 2022 than in 2021. In addition, the Company's costs could be impacted by potential changes to the tax code in Kazakhstan and by possible local social funding requests, although these risks cannot be quantified or estimated at the time of reporting.

Total capital expenditures on 100% basis guidance for 2022 increased significantly in comparison to 2021 results to cover the shift in wellfield development activities and increase in purchase prices for materials, supplies, equipment and cost of drilling. The Company continues to target an ongoing inventory level of approximately six to seven months of annual attributable production. However, inventory could fall below this level in 2022 due to supply chain challenges and production losses.

Table 2-12: Historical Group Guidance Statistics

Guidance Statistic	Units	2019			2020			2021			2022		
		Low	High	Actual	Low	High	Actual	Low	High	Actual	Low	High	Actual
Production Volume (100%)[1, 2]	(tU)	22,750	22,800	22,808	22,750	22,800	19,477	22,500	22,800	21,819	21,000	22,000	4,954
Production Volume (Attrib.)[3]	(tU)	13,000	13,500	13,291	12,800	13,300	10,736	12,550	12,800	11,858	10,900	11,500	2,685
Group Sales Vol. (Cons.)[4]	(tU)	13,500	14,500	16,044	15,500	16,500	16,432	15,500	16,000	16,526	16,300	16,800	2,596
KAP Sales Volume[5]	(tU)	15,000	16,000	14,148	13,500	14,500	14,126	13,500	14,000	13,586	13,400	13,900	2,355
Revenue (Consolidated)[6]	(KZTbn)	485.0	505.0	502.3	490.0	510.0	587.5	620.0	640.0	691.0	930.0	950.0	145.3
Revenue from Group U_3O_8 sales	(KZTbn)	392.0	408.0	438.5	400.0	440.0	529.2	540.0	560.0	625.0	790.0	810.0	129.8
C1 Cash Cost (attributable)[6]	(US$/lb)	11.00	12.00	9.28	10.00	11.00	8.67	9.00	10.00	8.80	9.50	11.00	n.a.
AISC (attributable)	(US$/lb)	15.00	16.00	11.94	13.50	14.50	11.72	12.00	13.00	12.63	16.00	17.50	n.a.
Total Capital Exp. (100%)	(KZTbn)	85.0	95.0	67.0	80.0	90.0	60.9	90.0	100.0	91.1	160.0	170.0	n.a.

(1) Production volume (100% basis): Amounts represent the entirety of production of an entity in which the Company has an interest; it disregards that some portion of production may be attributable to the Group's JV partners or other third-party shareholders.

(2) The duration and full impact of the COVID-19 pandemic is not yet known. Annual production volumes could therefore vary from our expectations.

(3) Production volume (attributable basis): Amounts represent the portion of production of an entity in which the Company has an interest, corresponding only to the size of such interest; it excludes the portion attributable to the JV partners or other third-party shareholders, except for JV Inkai LLP, where the annual share of production is determined as per Implementation Agreement as disclosed in IPO Prospectus. Actual drummed production volumes remain subject to converter adjustments and adjustments for in-process material.

(4) Group sales volume: includes Kazatomprom's sales and those of its consolidated subsidiaries (according to the definition of the Group provided on page one of this document).

(5) KAP sales volume: includes only the total external sales of KAP HQ and THK. Intercompany transactions between KAP HQ and THK are not included.

(6) Revenue expectations are based on uranium prices taken at a single point in time from third-party sources. The prices used do not reflect any internal estimate from Kazatomprom, and 2022 revenue could be materially impacted by how actual uranium prices and exchange rates vary from the third-party estimates.

(7) Total capital expenditures (100% basis): includes only capital expenditures of the mining entities, excluding expansion investments.

2.2.5 Human Resources

The Company's HR management activities are regulated by Kazatomprom HR Policy 2018-2028. This document is designed to motivate employees, achieve high labour efficiency with due regard to their interests and capabilities, and stimulate the active engagement of personnel in the Company's life. Key tasks in human resources management at Kazatomprom:

- Recruiting staff on a competitive basis and reducing staff turnover;
- Ensuring equal working conditions and promoting the professional, career and personal growth of employees;
- Providing training and professional development opportunities;
- Accumulating and retaining in-house knowledge;

- Improving employees’ remuneration and motivation system;
- Providing social support to employees, including measures to preserve their physical and mental health, as well as improving their quality of life;
- Developing the corporate culture and increasing the employee engagement level; and
- Maintaining an effective dialogue with employees.

Staff recruiting, maintaining a corporate culture and relationships with employees are also based on a combination of: remuneration policies; rules for the selection and recruitment of personnel; collective bargaining agreements; code of ethics and compliance; and principles of the corporate social responsibility policy.

In addition, the Company in its public reporting documentation provides extensive details pertaining to Human Resources management with specific focus on reporting key indicators and achievements pertaining to social responsibility comprising and reporting requirements as mandated under the Global Reporting Initiative Standards specifically (GR103-2; GR 103-3; GRI 401-1, 102-7; GRI 102-8; GRI 405-1; GRI 406-1; GRI 405-1; GRI 401-1; GRI 103-2, 413-1; GRI 103-1, 103-2; GRI 103-3; GRI 404-2; GRI 401-2; GRI 403-6; GRI 102-41; GRI 103-1, 103-2; GRI 408-1; GRI 412-3; GRI 409-1, 411-1; GRI 403-6):

- management approach;
- talent retention;
- staff development and training;
- staff welfare;
- trade unions and human rights; and
- corporate culture and internal communications.

Table 2-13 presents the historical Group human resources statistics for annual periods from 2015 through 2021 inclusive. The total headcount of the Company’s personnel (including joint ventures and associates) amounted to 20,643 people with Total Employees Costed (“**TEC**”) reporting 21,031. Key observations in respect of these historical statistics indicate that:

- the total headcount of the Group's personnel dropped by 1.8% year on year as a result of various divestment, as well as measures to optimise and modernise processes;
- the majority of the Group’s employees are employed on long-term contracts (>91%), while around 9% are employed on fixed-term contracts;
- the average age of employees was 40 years with employees under 30 accounting for 13.6%;
- as an equal opportunity employer, the Company provides employment for people with disabilities. In 2021, the Group employed 153 persons with disabilities, an increase of 2 persons compared to 2020. The share of employees with disabilities in 2021 was 0.7% of the average employees;
- due to the nature of production operations in the mining industry, the share of females in the total number employed by the Group in the reporting period remained at the level of the previous year and at the end of 2021 was 18%, while the share of males was 82%.
- 3,316 people were hired by the Group in 2021, of which 67% work in South Kazakhstan (including Shymkent). In 2021, the Group's staff turnover was 13% and compared to 2020, this indicator slightly increased by 3%. During this period 51% of employees who left the Group were men aged 30 years to 50 years. Its largest share was in the southern region (including Shymkent) and amounted to 66%.

- the average monthly salary of the Company's production personnel increased by 12.7% and amounted to KZT314,653.
- training is based on the principle of self-learning, according to which 70% of training takes place at work, 20% of skills are acquired by employees through the mentoring and coaching programmes, and 10% through training courses and other training programmes. In 2021, the Company invested KZT1.476m in employee training and development. In 2021, the average annual number of training hours was 37,244 hours. As of the end of 2021, 376 people were trained in industry-specific specialties, of which 201 were employees of the Company, its subsidiaries and affiliates and 175 individuals were not employed by the Company. In 2021, Company spent KZT282m on training of specialists in universities and colleges;
- the Company does not restrict the employees' rights to found or join public organisations that represent their interests. The Group's staff can engage in any political, educational, charitable or social activity, as long as this engagement does not affect the performance of official duties and does not harm society. Nuclear Industry Workers Trade Union ensures that the Company has a reliable partnership in complying with labour legislation and actively participates in protecting the interests of employees. As of the end of 2021, 10,700 employees of the Group's enterprises are members of the Trade Union. The Collective Bargaining Agreement is key to protecting labour rights, economic and social guarantees of employees, as well as regulating labour relations and effective dialogue between the Company and employees. The Collective Bargaining Agreement is developed for a three-year period and is subject to regular renewal and the share of employees covered by the collective bargaining agreements is 94%; and
- the company's programmes and initiatives dedicated to corporate culture development, improvement of social and labour conditions, safety improvement, material remuneration, motivation and involvement of employees are implemented in accordance with the developed plans and supported by all employees of the Company. The annual positive performance appraisals are confirmed by regular surveys on the level of social stability and according to survey results, the social stability level reached 73% at the Group in 2021.

Table 2-13: Historical Group Human Resources Statistics

Indicator	Units	2015	2016	2017	2018	2019	2020	2021
TEC	**(No)**	**26,764**	**26,792**	**25,568**	**20,956**	**21,138**	**21,788**	**21,031**
Headcount	**(No)**	**26,764**	**26,218**	**25,020**	**20,507**	**20,592**	**21,019**	**20,643**
Male	(No)	21,144	20,906	20,304	16,642	16,753	17,228	16,942
Female	(No)	5,620	5,312	4,716	3,865	3,839	3,791	3,701
Status								
Long term contract	(No)	25,544	25,023	23,879	19,572	19,794	19,821	19,122
Fixed-term contract	(No)	1,220	1,195	1,141	935	798	1,198	1,521
Full time employment	(No)	25,363	24,846	24,997	20,488	20,577	21,011	20,627
Part-time employment	(No)	1,401	973	23	19	15	8	16
Under civil-law contracts	(No)	-	973	548	449	546	769	388
Employees	**(No)**	**26,764**	**26,218**	**25,020**	**20,507**	**20,592**	**21,019**	**20,643**
Managers	(No)	155	152	145	119	108	119	117
Production	(No)	26,609	26,066	24,875	20,388	20,484	20,900	20,526
Collective Agreement	(%)	97	96	97	98	98	98	94
Turnover	(%)	13	8	13	14	10	10	13
Training	(KZTm)	974	1,313	1,513	1,713	1,447	1,650	1,476
Education Indicator	**(%)**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.01**	**100.00**
Higher	(%)	42.19	42.19	42.19	42.19	42.19	42.93	43.81
Secondary vocational	(%)	32.13	32.13	32.13	32.13	32.13	32.66	33.49
Basic vocational	(%)	3.91	3.91	3.91	3.91	3.91	3.19	3.26
Secondary	(%)	21.70	21.70	21.70	21.70	21.70	21.17	19.42
Basic	(%)	0.07	0.07	0.07	0.07	0.07	0.06	0.02
Age Demography and Other	**(No)**	**26,764**	**26,218**	**25,020**	**20,507**	**20,592**	**21,019**	**20,643**
<30	(No)	6,156	5,569	4,328	3,547	3,632	3,201	2,799
30 to 50	(No)	13,917	14,042	14,086	11,545	11,707	12,260	12,034
> 50	(No)	6,691	6,607	6,607	5,415	5,253	5,558	5,810
Average age	(years)	39	39	40	40	41	41	40
Employees with Disabilities	(No)	190	190	181	149	150	151	153
Employees Dismissed	(No)	5298	4,155	3,331	2,984	2,899	2,857	3,734
Employees Hired	(No)	3,037	3,040	2,901	2,378	3,027	2,466	3,316
Payroll related expenditures								
Social Stability Index	(%)	72	81	83	80	80	79	73
Socio-Economic Development	(KZTm)	5,376	5,793	0	1,337	1,400	1,537	1,609
Average Monthly Salary (TEC)	(KZT/TEC/m)	141,097	152,446	132,794	173,855	198,884	201,096	214,169

Indicator	Units	2015	2016	2017	2018	2019	2020	2021
Average Monthly Salary (Production)	(KZT/TEC/m)	193,854	215,889	234,029	244,543	263,997	279,202	314,653
Minimum Salary	(KZT/TEC/m)	22,364	22,859	25,572	28,284	42,500	42,500	42,500
Payroll fund	(KZTm)	56,972	59,600	61,829	63,413	64,884	65,707	71,484
Trade union support costs	(KZTm)	n.a.	n.a.	464.2	498.1	572.2	575.5	684.9
Nationality								
Kazaks	(%)	n.a.	n.a.	n.a.	67.0	69.0	70.0	68.0
Russians	(%)	n.a.	n.a.	n.a.	26.0	25.0	25.0	26.0
Other	(%)	n.a.	n.a.	n.a.	7.0	6.0	5.0	6.0

2.2.6 Environmental and Social Governance

Sustainable development practices have been prioritized and reported on by the Company for over a decade. For many years, the Company's Integrated Annual Reports ("**IAR**") have summarized the key aspects of its sustainability, corporate social responsibility, health and safety, and corporate governance results, highlighting an increasingly proactive and transparent approach to what now falls under the pillars of ESG. In 2019 the Company began reporting results in alignment with the United Nations' sustainable development goals, improving disclosure for investors interested in ESG factors.

As the world's largest uranium mining company and a nuclear industry leader, Kazatomprom recognizes the impact of its businesses on both local and global social development and works to address some of the key global challenges related to the environment, climate change, clean energy generation, and the social conditions in the regions where it operates. Sustainable development is a fundamental component of the Group's Development Strategy and by extension, ESG-related targets and objectives are therefore integral to the Company's plans, including:

- reducing the environmental impact of subsidiaries, associates and joint ventures;
- environmental protection, including effective water and land resources management, ecosystem and biodiversity conservation, and the reduction of emissions;
- ensuring resources are extracted in a way and at a rate that minimizes subsoil impact;
- increased oversight of energy and resource management;
- growth of socio-economic prosperity in the regions where the Company operates; and
- facilitation of access to affordable, reliable, sustainable and modern energy sources, and enhancement of energy security.

With an increasing focus on "green" priorities, Kazatomprom's ongoing improvement of its sustainable development practices is a dominant factor ensuring the long-term stability and competitiveness of the Company, as well as its ability to create incremental benefits for all stakeholders, resulting in a positive contribution to the development of the country, society in general, and the uranium industry. Throughout 2021, the Company continued taking steps to bolster its ongoing transition to a risk-based approach in sustainability management to meet the demands of transparent ESG reporting, which involves:

- identifying and assessing risks that have a direct impact on the Group's long-term financial performance and implementing measures for effective management of those risks;
- enhancing sustainability risk management practices and developing a risk culture to identify new opportunities to improve performance and gain significant competitive advantages;
- adapting intra-company reporting processes to provide reliable and accurate ESG-related metrics for future disclosure, allowing for improved assessment and evaluation by external parties;
- advancing the Company's ESG reporting and sustainability processes to meet accepted global standards, allowing recognized third-party providers to apply a corporate ESG rating to Kazatomprom.

In 2021, Samruk-Kazyna JSC, Kazatomprom's majority shareholder, engaged an independent consultant to conduct corporate governance diagnostics in order to assign a corporate governance rating to the Company. According to the results of diagnostics, the Company demonstrated high level of corporate governance and was assigned the Corporate Governance Rating "A" (in 2020 "BBB").

Environmental protection at the Company's operations is governed and implemented through a range of key policies, management structures, monitoring and reporting functions which are reflected in the Company's public reporting in accordance with the Global Reporting Initiative Standards (specifically GRI 102-11; GRI 413-1; GRI 307-1; GRI 103-2; GRI 303-1; GRI 303-3; GRI 102-48; GRI 303-2; GRI 303-4; GRI 306-1, 306-2, 103-1, 103-2; GRI 306-3; GRI 103-1; GRI 304-1, 304-4, 304-2; and comprise the following key areas:

- environmental protection management including: ESAP Roadmap implementation; monitoring and control, certification; environmental protection training; investment in environmental protection; environmental assessment of supplies;
- emissions;
- water resources including consumption, withdrawal and discharge; and
- waste management including solid low radioactive waste management ("**SLRWM**"), biodiversity.

Table 2-14 provides a summary of the key historical Group environmental and social governance statistics as reported from 2015 through 2021. During 2021 the Company indicated that:

- all production facilities of the Group have the environmental management systems and energy management systems in place that are ISO 14001 and ISO 50001 certified;
- an independent audit certified that the Group complies with the requirements of international standards ISO 14001:2015 (environmental management systems) and ISO 45001:2018 (occupational health and safety management) when organizing export deliveries of natural uranium compounds;
- the Group's total cost of environmental protection measures amounted to KZT964.6m and the Company paid KZT187,6m in emission taxes. The fines and economic sanctions for non-compliance with the requirements of environmental laws at the enterprises of the Group reached KZT12.4 million in general
- overall, emissions at the Group's enterprises reduced by 3.3% in 2021, from 1,908t in 2020 to 1,845t in 2021. The reduction in emissions is associated with environmental protection measures implemented by subsidiaries and affiliates under the current emissions permits;
- the Group's companies actively use solar energy to generate electricity, thereby reducing air emissions resulting from the consumption of traditional fuels such as fuel oil and coal. The reduction in CO2 emissions amounted to about 3% of the total emissions. The annual electricity output generated by the Group's solar photovoltaic plants is 3.34MWh. The generated electricity is used for own needs, allowing annual savings of KZT90m;
- total water withdrawal reduced by 3.2% in 2021: from 10.5Mm^3 in 2020 to 101Mm^3 of water in 2021. In the reporting period, the water withdrawal structure did not change. Groundwater accounts for 84% of the total amount of withdrawn water. 0.06% of water is taken from surface sources, and we are witnessing a constant reduction in water intake from surface sources. Water withdrawal from municipal and other water supply systems increased by 40%, from 1.1Mm^3 to 1.6Mm^3. The increase in water consumption was associated with an

increase in uranium mining in 2021. The Company endeavours to reduce the volume of water it uses in production and to this end, some of enterprises use closed water cycles. In 2021, the volume of recycled and reused water amounted to 50 '000m^3, down by 0.6% against 2020;

- wastewater discharged by the Company reached 4.8Mm^3, down by 7.9% compared to 2020.
- as of the end of the 2021, the total amount of accumulated waste made 1,017t, down by 10% compared to 2020. Industrial waste account for 87.9% of the total waste volume and in 2021, the total volume of industrial waste decreased by 10.3%; and
- the total area of land owned, leased and managed by the Group is 51,924ha and there are no nature reserves or other specially protected natural sites on the territory of Kazatomprom's uranium deposits or near their borders.

Table 2-14: Historical Group Environmental and Social Governance Statistics

Indicator	Units	2015	2016	2017	2018	2019	2020	2021
Carbon Footprint								
Scope 1 (Direct)	(tCO_2eq)	3,676,263	3,767,000	3,929,000	132,480	107,600	92,590	106,910
Scope 2 (Indirect)	(tCO_2eq)	n.a.	n.a.	n.a.	n.a.	842,122	819,883	842,554
Total	**(tCO_2eq)**	**3,676,263**	**3,767,000**	**3,929,000**	**132,480**	**949,722**	**912,473**	**949,464**
Uranium Mining and Processing	**(tCO_2eq)**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**570,823**	**533,466**	**555,478**
Electricity Consumption	(tCO_2eq)	n.a.	n.a.	n.a.	n.a.	569,878	532920	554960
Thermal Energy Consumption	(tCO_2eq)	n.a.	n.a.	n.a.	n.a.	945	546	518
Nuclear Fuel Cycle and Metallurgy	**(tCO_2eq)**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**223,648**	**231,574**	**234,798**
Electricity Consumption	(tCO_2eq)	n.a.	n.a.	n.a.	n.a.	128,717	135,196	130,871
Thermal Energy Consumption	(tCO_2eq)	n.a.	n.a.	n.a.	n.a.	94,931	96,378	103,927
Ancillary Services	**(tCO_2eq)**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**47,651**	**54,844**	**52,278**
Electricity Consumption	(tCO_2eq)	n.a.	n.a.	n.a.	n.a.	45,838	52,929	50,902
Thermal Energy Consumption	(tCO_2eq)	n.a.	n.a.	n.a.	n.a.	1,813	1,915	1,376
All Segments	**(tCO_2eq)**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**842,122**	**819,884**	**842,554**
Electricity Consumption	(tCO_2eq)	n.a.	n.a.	n.a.	n.a.	744,433	721,045	736,733
Thermal Energy Consumption	(tCO_2eq)	n.a.	n.a.	n.a.	n.a.	97,689	98,839	105,821
Air Emissions								
NOx	(t)	n.a.	n.a.	n.a.	n.a.	118	96	123
SOx	(t)	n.a.	n.a.	n.a.	n.a.	64	73	849
Solid emissions	(t)	n.a.	n.a.	n.a.	n.a.	54	54	111
CO	(t)	n.a.	n.a.	n.a.	n.a.	175	190	181
Volatile organic comp. emissions.	(t)	n.a.	n.a.	n.a.	n.a.	827	815	56
Hazard Substances (Class 1)	(t)	n.a.	n.a.	n.a.	n.a.	10	1	12
Total	**(t)**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**1,248**	**1,229**	**1,332**
Specific air emissions	(kg/t)	n.a.	n.a.	n.a.	n.a.	18.0	17.5	31.0
Water Withdrawal								
Surface waster	('000m^3)	1,190,243	1,249,917	1,200,372	951.1	866	781	7
Ground water	('000m^3)	12,304	14,659	14,806	9,955	8,992	8,540	8,531
Municipal water and other WSS	('000m^3)	2,548	1,521	1,330	1,312	837	1,131	1,583
Total	**('000m^3)**	**1,205,094**	**1,266,097**	**1,216,508**	**12,218**	**10,694**	**10,452**	**10,121**
Recycled and Reused	('000m^3)	29,560	19,774	20,447	19,840	50,443	50,683	50,384
Water Discharge								
Total	('000m^3)	1,144,961	1,206,489	1,159,205	5,250	5,675	5,239	4,823
Waste								
Industrial waste	(kt)	515.6	443.6	797.1	1,253.5	936.4	996.2	893.3
Household waste	(kt)	3.7	3.0	2.7	2.5	3.1	1.8	1.6
Solid radioactive waste	(kt)	2.5	2.9	11.5	3.9	4.1	3.3	2.6
Liquid radioactive waste	(kt)	147.2	111.1	125.5	106.1	120.5	128.1	119.2
Total	**(kt)**	**669.0**	**560.6**	**936.8**	**1,366.0**	**1,064.1**	**1,129.4**	**1,016.7**
Solid Low Radioactive Waste								
Sand and sludge (sand trap)	(%)	n.a.	n.a.	n.a.	n.a.	65.0	68.0	75.3
Ion-exchange resin	(%)	n.a.	n.a.	n.a.	n.a.	19.0	19.0	1.9
Metal waste	(%)	n.a.	n.a.	n.a.	n.a.	7.0	7.0	2.6
Overalls, PPE, cloth/filters	(%)	n.a.	n.a.	n.a.	n.a.	7.0	4.0	6.2
Plastic waste	(%)	n.a.	n.a.	n.a.	n.a.	2.0	2.0	1.2
Other	(%)	n.a.	n.a.	n.a.	n.a.	-	-	12.8
Total	**(%)**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**100.0**	**100.0**	**100.0**
Energy Intensity								
Processing Consumption	('000GJ)	n.a.	n.a.	2,003	1,854	6,948	4,252	4,590
Production	(tonnes)	n.a.	n.a.	23,391	21,699	22,761	19,587	21,834
Specific Energy Intensity	('000GJ/t)	n.a.	n.a.	0.09	0.09	0.31	0.22	0.21
Electricity Production (PV plants)	(MW)	n.a.	n.a.	n.a.	n.a.	4.32	3.53	3.34
Photovoltaic stations	(KZTm)	n.a.	n.a.	n.a.	n.a.	n.a.	97,761	90,950
Solar collectors	(KZTm)	n.a.	n.a.	n.a.	n.a.	n.a.	32,030	29,902
Heat pump installation	(KZTm)	n.a.	n.a.	n.a.	n.a.	n.a.	28,343	20,888
Energy Consumption								
Thermal Energy	('000GJ)	11,180	11,435	11,775	11,551	11,659	921	994
Electricity	('000GJ)	6,020	6,042	5,936	5,766	5,341	2,916	3,138
Total	**('000GJ)**	**17,200**	**17,477**	**17,711**	**17,317**	**17,000**	**3,837**	**4,132**
Primary Energy Sources								
Coal	('000GJ)	17.9	18.2	2.6	2.5	12.3	17.9	17.6
Fuel (gasoline, fuel oil, diesel)	('000GJ)	82,368	76,017	75,615	77,604	1,595	1,318	1,431
Non-Renewable	**('000GJ)**	**82,386**	**76,035**	**75,618**	**77,607**	**1,607**	**1,336**	**1,449**
Renewable	**('000GJ)**	**4**	**15**	**15**	**44**	**20**	**21**	**19**
Total	**('000GJ)**	**82,390**	**76,050**	**75,632**	**77,651**	**1,627**	**1,357**	**1,468**
Summary								
Gross Energy Cons. (heating and electricity)	('000GJ)	17,200	17,477	17,711	17,317	17,000	3,837	4,132
Total water withdrawal	('000m^3)	1,205,094	1,266,097	1,216,508	12,218	10,694	10,452	10,121
Gross GHG emissions	(tCO_2eq)	3,676,263	3,767,000	3,929,000	132,480	107,600	92,590	106,910
Waste production	(t/tU)	n.a.	n.a.	n.a.	n.a.	n.a.	4.4	5.2

Indicator	Units	2015	2016	2017	2018	2019	2020	2021
Environmental Expenditures	(KZTm)	1,144	1,159	2,011	2,138	1,880	2,170	965
ISO 14001 Certification	(%)	n.a.	n.a.	n.a.	n.a.	n.a.	100	100
Environmental Investment								
Process Improvement	(KZTm)	601.5	217.8	1,057.6	1,124.6	1,124.6	1,137.3	100.4
Efficiency Improvement	(KZTm)	27.3	25.8	48.0	51.0	51.0	64.3	87.5
R&D	(KZTm)	66.4	170.6	116.7	124.1	112.9	273.7	127.1
Emission taxes	(KZTm)	129.8	208.9	178.7	190.0	190.0	198.8	187.6
Fines	(KZTm)	19.8	-	14.4	15.3	17.6	11.5	12.4
Other	(KZTm)	338.7	535.8	595.6	633.3	384.2	484.7	449.6
Total	**(KZTm)**	**1,143.6**	**1,158.9**	**2,011.0**	**2,138.3**	**1,880.3**	**2,170.3**	**964.6**
Social support costs								
Health care	(KZTbn)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.88
Food	(KZTbn)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	3.43
Investment in external social programme								
Healthcare support	(KZTm)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	479.7
Sports support	(KZTm)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	109.3
Vulnerable groups support	(KZTm)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	136.5
Veterans and pensioners support	(KZTm)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	14.1
Regional social infrastructure development	(KZTm)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.0
Education support	(KZTm)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	110.3
Total	**(KZTm)**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**850.9**
Provisions								
Compensation for Occupational Diseases	(KZTm)	519	466	347	337	313	231	196
Environmental Protection	(KZTm)	2316	2,733	2,556	3,090	3,516	3,157	1,357
Site Restoration	(KZTm)	14421	14,188	19,939	29,607	36,505	23,841	31,431
Other	(KZTm)	28	31	35	38	40	43	77
Total	**(KZTm)**	**17,284**	**17,418**	**22,877**	**33,072**	**40,374**	**27,272**	**33,061**
Economic Contribution								
Direct Economic Value Generated								
Income	(KZTbn)	474.1	514.4	801.6	846.0	621.1	667.1	761.5
Distributed Economic Value								
Operating Expenses	(KZTbn)	266.4	287.9	293.8	292.8	273.4	288.1	373.6
Salary	(KZTbn)	44.6	47.3	41.8	42.8	49.2	50.7	53.1
Interest and Dividend Expenses	(KZTbn)	8.7	11.0	12.7	12.7	12.0	7.7	6.7
Taxes, except income tax	(KZTbn)	13.2	10.4	23.6	23.6	27.8	24.7	26.1
Income Tax Expenses	(KZTbn)	13.0	18.0	28.8	28.8	33.5	63.8	61.6
Other Expenses	(KZTbn)	91.7	28.2	20.0	20.0	8.5	9.7	15.9
Social Expenditures	(KZTbn)	1.4	-	0.7	0.7	1.1	1.0	4.5
Total	**(KZTbn)**	**439.0**	**402.8**	**421.3**	**421.3**	**405.4**	**445.8**	**541.5**
Retained Economic Value	**(KZTbn)**	**35.1**	**111.6**	**380.3**	**424.7**	**215.7**	**221.4**	**220.0**
Regional Economic Contribution								
Taxes and obligatory payments	(KZTbn)	n.a.	n.a.	n.a.	n.a.	102.4	116.5	153
Dividends paid	(KZTbn)	n.a.	n.a.	n.a.	n.a.	80.0	99.0	150.1
Average monthly salary	(KZT/m)	n.a.	n.a.	n.a.	n.a.	320,828	331,380	270,894
Average group monthly salary/Kazakhstan	(ratio)	n.a.	n.a.	n.a.	n.a.	1.7	1.6	1.5
Group social expenses	(KZTm)	n.a.	n.a.	n.a.	n.a.	3,044	3,494	3,451
Share of social expenses in revenue	(%)	n.a.	n.a.	n.a.	n.a.	0.6	0.6	0.5

Following global priorities, sharing a national position and striving to contribute to the implementation of the provisions of the Paris Agreement, the Company considers the action against climate change as one of its priorities. To this end, the Company is developing a Strategy for decarbonisation and achieving carbon neutrality until 2025, 2030 and 2060, which will include a Program and Action Plan to reduce GHG emissions in the context of each subsidiary and affiliate of the Company for the period up to 2025, 2030 and 2060. Low-carbon initiatives of the Company comprise:

- transition to low-carbon energy sources (gas);
- energy production from renewable sources – solar collectors, heat pump units, wind turbines are installed at the Group's production sites; and
- regular monitoring and control of greenhouse gas emissions (Scope 1)

Monitoring and recording of greenhouse gas emissions is carried out by the Industrial Safety Department, which reports directly to the Chairman of the Management Board of Kazatomprom. The Company also monitors the state of technological facilities and environmental objects, as well as introduces the best available technologies, resource and energy saving technologies. The Company discloses data on greenhouse gas emissions, which is in line with the recommendations of the Task Force on Climate-related Financial Disclosures (“**TCFD**”). The Company is working to deepen the disclosure of climate-related risks and opportunities under the TCFD methodology in future reporting periods.

Greenhouse gas emissions from operations of subsidiaries and affiliates are mainly related to auxiliary processes associated with the main production. The main sources of greenhouse gases are:

- boiler installations for heating industrial and residential premises;

- vehicles for transportation of goods and personnel;
- compressor units for supplying compressed air to technological processes;
- diesel generator sets to provide emergency power supply; and
- other sources.

The coefficients used for GHG emission calculations comply with the Guidelines for the calculation of greenhouse gas emissions from thermal power plants and boiler houses and the Guidelines for the calculation of greenhouse gas emissions into the atmosphere from motor transport enterprises issued by the Ministry of Environment and Water Resources of the Republic of Kazakhstan.

- the greenhouse gas emissions from the Company's operations amounted to 107tCO2e in 2021. The increase in GHG emissions was associated with an increase in fuel consumption by vehicles, an increase in drilling and the resumption of other works due to the ease of quarantine measures;
- the amount of fuel and energy resources saved as a result of energy saving and energy efficiency measures in 2021 amounted to 170,000GJ. The Company increased its energy consumption by 8% compared to 2020, due to increased production, extraction, and processing of raw materials
- the consumption of fuel and energy resources ("**FER**") at the Group's enterprises increased by 9.4% compared to 2020. This was due to an increase in production, extraction and processing of raw materials. At the same time, specific energy intensity decreased by 1.9% in 2021.

Actions are planned for 2022 to assess products' carbon footprint with the development of decarbonisation and carbon neutrality programme for the Company's enterprises. The solution to the issue of developing renewable energy sources and reducing greenhouse gas emissions for Kazatomprom enterprises is the further development of energy saving and energy efficiency, the main directions of which are:

- rational distribution and use of electricity, lighting, heating, hot water supply and ventilation systems;
- measures to modernize electrical equipment, replacing them with energy-saving ones; and
- implement the process of ensuring the proper technical condition and rational operation of power equipment and power plants, ensuring the proper technical condition of power equipment and power plants.

As renewable energy sources a number of the Company's enterprises are gradually installing solar collectors for hot water supply and heat pumping units for heating and hot water supply. These measures will reduce the cost of diesel fuel and consequently reduce greenhouse gas emissions. In 2022, activities are planned to design and install a 100kW wind turbine generator at the Yuzhny Inkai mine, JV SMCC LLP; work is underway to re-equip the boiler plants of the shift camp of Karatau LLP with the conversion of water heating boilers from diesel fuel to liquefied gas with commissioning in Q2 2022.

The principal plans related to environmental protection outlined for 2002 and the medium term comprise:

- establishing key performance indicators for the heads of subsidiaries and affiliates focused on the implementation of the ESAP Roadmap bullets;
- continuing training employees of subsidiaries and affiliates responsible for environmental protection, in particular: production and consumption waste management, biodiversity

assessment at uranium mining deposits, environmental monitoring at enterprises;

- conducting research to explore the impact of Kazatomprom's operations on the environment and the local population (Environmental and Social Research Programme, ESRP) and the Zero Waste Programme of Kazatomprom, seeking to develop measures to reduce and minimise production and consumption waste generated at the enterprises of the uranium mining industry;
- providing quantitative assessment of the carbon footprint of products, following the development of the Carbon Neutrality Programme;
- continuing the efforts of the internal group on planning the closure of production facilities and the decommissioning of the enterprises;
- complete the development of the environmental performance rating of the Company;
- implementing the corporate standard Methodological Guidelines on Liquidation Cost Estimate Calculation and Procedures for Regular Analysis of Current Liquidation Costs (measurement of asset retirement obligations (ARO))l
- implementing the standard Methodological Guidelines for Monitoring of the Impact on Ground and Underground Water in ISR Mining of Uranium;
- implementing the standard Guidelines for Assessment of Biodiversity at Uranium Deposits, Production Facilities and Adjacent Territories;
- conducting a second surveillance audit of the environmental management system (EMS), the health and safety management system (OHS&OHS) for compliance with the requirements of ISO 14001:2015 and ISO 45001:2018;
- implement the criteria developed for compiling the environmental rating of Kazatomprom enterprises;
- updating the standards on radiation safety: ST NAC 12.1-2010 Procedures for the Admission of Staff of Kazatomprom enterprises for Performing Radiation-hazardous Works and ST NAC 19-2016 Procedures for Organising and Conducting a Radiation Survey of the Production Area Using the Gamma Ray Surveying;
- continuing efforts to create a database of the environmental monitoring system and the environment of uranium mining enterprises of Kazatomprom; and
- updating the corporate standard Methodological Guidelines for Management of Radioactive Waste Prior to their Disposal.

2.2.7 Occupational Health and Safety

Kazatomprom's commitment to safety and wellbeing is demonstrated by its membership of the International Social Security Association's Vision Zero initiative to reduce workplace injuries and promote comfortable and safe working conditions guided by the Vision Zero program's "*Seven Golden rules*". These rules apply to all employees of the Company's enterprises and their contractors, the main goal of which is to achieve the goal of zero injuries:

- take leadership – demonstrate commitment;
- identify hazards – control risks;
- define targets – develop programs;
- ensure a safe and healthy system – be well-organized;
- ensure safety and health in machines, equipment and workplaces;
- improve qualifications – develop competence; and

- invest in people – motivate by participation.

The Company conducts its production activities in compliance with both Kazakh and international requirements for labour protection and industrial safety, implementing comprehensive measures to prevent incidents and accidents. Health and safety management systems that meet international standards (ISO 45001) have been implemented and annually confirmed by external audit, and the Company carries out systematic work to improve the safety culture among employees and managers at all levels. The measures undertaken in 2021 to enhance the focus on safety awareness helped to prevent major industrial accidents (including uncontrolled explosions, emissions of dangerous substances or destruction of buildings) at the Holding's enterprises. In 2021, the Holding spent more than KZT8.29bn (in 2020: KZT7.63bn) within its occupational health and safety programs. Table 2-15 presents the historical group occupational health and safety statistics for 2015 through 2021 inclusive.

Notwithstanding the continuing actions taken to improve workplace health and safety, a number of serious accidents occurred in 2021. The accidents included: one case resulting from of the impact of moving mechanisms, one case of chemical burns, three cases of falling from a height, one case of falling on a slippery surface and two road accidents. Both fatalities occurred as a result of one road accident.

Table 2-15: Historical Group Occupational Health and Safety Statistics

Indicator	Units	2015	2016	2017	2018	2019	2020	2021
Occupational Safety (GRI 403-9)								
Industrial Accidents(1)	(No)	-	-	-	-	-	-	-
LTIFR(2)	(Nopmmhr)	0.34	0.34	0.15	0.31	0.24	0.25	0.55
Unsafe Cond., unsafe actions, near-miss rep.	(No)	-	-	-	6,200	35,546	35,529	44,271
Number of Accidents(3)	(No)	9	9	7	12	8	8	9
Traffic accidents	(No)	5	9	7	9	-	1	2
Chemical burns	(No)	-	-	-	-	-	3	1
Fall from height	(No)	-	-	-	-	-	2	2
Fall on slippery surface	(No)	-	-	-	-	-	1	2
Moving objects	(No)	-	-	-	-	-	1	1
Thermal burns	(No)	-	-	-	-	-	-	1
High impact occupational injuries	(No)	-	-	-	-	2	2	2
Fatalities	(No)	-	-	-	1	1	1	2
Hours worked	(mmhrs)	26.5	26.5	46.7	38.7	33.5	31.8	32.9
OHS Expenditures	(KZTbn)	5.10	7.30	7.08	7.38	7.23	7.63	8.29
Disease Prevention	(KZTm)	449.5	643.2	623.8	650.2	637.0	991.9	1,100.0
Investment	(KZTm)	**685.6**	**779.0**	**800.5**	**822.0**	**852.0**	**894.0**	**916.8**
Medical equipment	(KZTm)	-	-	-	-	-	195.5	62.4
Financing medical care	(KZTm)	685.6	779.0	800.5	822.0	852.0	698.5	854.4
Radiation Safety Indicators								
Average exposure	(m3vpa)	1.38	0.81	n/a	1.55	1.51	1.45	1.44
Natural background	(m3vpa)	1.00-3.00	1.00-3.00	n/a	0.30-1.20	0.40-1.00	0.85	0.75-1.36
Maximum effective dose of group-A employees	(m3vpa)	6.93	9.60	5.50	4.97	4.94	4.94	6.19
Basic limit	(m3vpa)	50.00	50.00	n/a	50.00	50.00	50.00	50.00
	(%)	13.86	19.2	n/a	9.94	9.88	9.88	12.38

(1) Defined as uncontrolled explosions, emissions of dangerous substances, or destruction of buildings.

(2) Lost-Time Injury Frequency Rate ("**LTIFR**") per million hours.

(3) Defined as impact on the employee of a harmful and (or) dangerous production factor in performance of his work (job) duties or tasks of the employer, which resulted in an industrial accident, sudden deterioration of health, or poisoning of the employee that led to temporary or persistent disability, or death.

As part of the continuing work to improve the system for ensuring industrial safety and implementing the 2018 through 2028 development strategy, the Company completed the following in 2021:

- analysis of the frequency and nature of detected hazardous conditions, hazardous actions, potentially hazardous situations, and Near Misses to determine the adequacy of the corrective measures taken;
- improvement of the survey methods used to gauge the level of conscious observance of industrial safety requirements by employees and managers at all levels;
- the company was certified by TUV International Certification (Germany) for compliance with international standards ISO 45001 (HSE management systems) and ISO 14001 (environmental management systems);
- implementation of the Environmental and Social Action Plan (ESAP) continued, aimed at

improving environmental and social stability in the regions where the Company operates;

- the practice of stopping unsafe work by workers (STOP cards) was introduced across all operations;
- quarterly reports on health and safety were updated, including sections for contractor safety; and
- comprehensive measures were taken to combat COVID-19 at the Company's enterprises.

Related activities under the 2018-2028 Development Strategy are continuing into 2022 comprise:

- automation of production industrial safety reporting processes;
- development and implementation of a methodology for continuous identification of hazards and risks in the workplace – 5 safety steps;
- continued implementation of the ESAP roadmap; and
- improvement of approaches to health and safety of workers.

Covid-19 Pandemic

Following the outbreak of the COVID-19 pandemic in Kazakhstan in 2020, the Company has been taking all necessary measures to prevent the spread of coronavirus infection among employees of the Group, prioritizing the workers' wellbeing. As of 31 December 2021, the Company registered 1,957 cases of coronavirus infection: 1,941 people recovered and 7 people had active infections. In 2021, the Company sadly registered four deaths from COVID-19: two cases at Ulba Metallurgical Plant JSC, one case at JV Katco LLP, and one case at JV Inkai LLP.

Kazatomprom continuously monitors the situation related to COVID-19, ensuring the relevance and effectiveness of all existing protocols. During the pandemic, all activities, plans, and working hours of the Group are promptly corrected and updated in accordance with the Resolutions of the Chief State Sanitary Doctor of the Republic of Kazakhstan. In addition, within the framework of the work of the HSE Committee of Samruk-Kazyna JSC, an exchange of experience was carried out among portfolio companies on the prevention of COVID-19, vaccination and interaction with the Ministry of Health of the Republic of Kazakhstan. In 2021, the Company continued all preventive measures introduced by the Group in 2020.

As part of necessary measures to prevent and reduce the staff morbidity risk, Kazatomprom implemented a number of measures to ensure continued operations. In particular, Kazatomprom has reduced the number of employees involved in production to a minimum since April 2020 to mitigate the risk of exposure to the infection among its workers at mines and the local population living in the regions where the Company operates. The Company also developed and implemented plans for five protection lines with due regard to the pandemic risks and the Epidemiological Situation Matrix which comprised:

- timely transfer to remote working;
- preventative measures to reduce the risk of infection;
- establishment of an anti-crisis centre;
- health system support; and
- implementation of a vaccination campaign.

Since the outbreak of the pandemic, RU-6 LLP has purchased and donated an oxygen device to the Central District Hospital. Ulba Metallurgical Plant JSC has sent food packages to its retired employees. Kyzylkum LLP and Khorasan-U LLP refilled 500 oxygen tanks for

Zhanakorgan District Hospital. JV Katco LLP purchased six ventilators for hospitals in Turkistan and Shymkent. JV Katco LLP, a Kazakh-French joint venture, allocated KZT50m to the Birgemiz Public Foundation, and six ventilators were purchased for hospitals in Turkistan and Shymkent (three per city) for a total of KZT100m. As part of the fight against COVID-19, the subsidiaries and affiliates invested KZT916.8m in medical equipment and medical care in 2021.

The measures taken by the Company have to date been successful in maintaining continuity of operations and production capacity. However, as a result of the introduction of a state of emergency in the Republic of Kazakhstan in 2020, exploration activities at production facilities were suspended for a four-month period, which led to a shift in the schedule for commissioning of new wellfields. The resulting impact was a decrease in not only the production volume in 2020, but in production volumes for 2021 as well (compared to expected volumes). In addition to the delays in the commissioning of new wellfields, the COVID-19 pandemic impacted the entire production supply chain, resulting in shortages of certain materials and equipment, including pipe products, which also impacted production. Supply chain challenges have continued, and as a result the Group has announced a wider range for its production volume Guidance for 2022. While Kazatomprom will make every effort to meet its uranium production plan, final production volumes for 2022 may still fall short of the target level.

Vaccination status is monitored daily as of 14 March 2022, over 94.3% (18,139) of employees have received a first vaccine dose, over 93.9% (18,061) now being fully vaccinated with two doses and over 40% (7,230) of all vaccinated personnel revaccinated with booster vaccine.

2.3 Mineral Assets

The Group Mineral Assets are located in three (Shu-Sarysu with 1,469.69km^2; Syrdarya with 545.58km^2; and North Kazakhstan with 44.00km^2) of the six uranium geological provinces of Kazakhstan, cover a total licence area of 2,059.27km^2 and comprise 29 deposits/blocks categorised as: 23 Producing Properties ("**PPs**"); two Development Property ("**DP**") and two Advanced Exploration Properties ("**AEPs**") and two properties classified as Ceased Production ("**CP**") based on the classifications as reported in Section (1.2.2). In addition, the Company's "**Exploration Programme**" covers several less advanced Exploration Properties ("**EPs**") also located in the three regions in which the Company is active. The Mineral Assets are largely held through subsidiaries (7), Joint Venture (2), Joint Operations (2) and Associate (3) companies (the 14 "**Mining Subsidiaries**" - Table 2-16) which in conjunction with the Company are directly responsible for uranium mining and downstream processing activities. Two of these Mining Subsidiaries are wholly owned, and the remaining 12 Mining Subsidiaries comprise entities which are partly owned by the Company. Historical development of the Mineral Assets dates from initial discovery in 1963 with the most recent discovery being in 1982. Initial production commenced at Kazatomprom-SaUran LLP and RU-6 LLP in 1997.

Table 2-16: Mineral Assets development stage, equity interest and tenure key dates and area

Mining Subsidiary/Deposit	Uranium Province	Stage	Equity Interest	Tenure key dates and area						
				Expiry		Discovery	Op. Start	LoMp Depletion[1]		Area
				(year)	(years)	(year)	(year)	(date)	(years)	(km^2)
Production										
Kazatomprom-SaUran LLP[3]			**100.00**							
Uvanas	Shu-Sarysu	CP		2022	1.0	1963	1997	n/a	n/a	84.48
Eastern Mynkuduk	Shu-Sarysu	PP		2022	1.0	1973	1997	2028	8.0	28.97
Kanzhugan	Shu-Sarysu	PP		2022	1.0	1972	1997	2048	28.0	60.83
South Moinkum (Southern part)	Shu-Sarysu	CP		2019	2.0	1976	2001	n/a	n/a	17.40
Central Moinkum	Shu-Sarysu	PP		2039	18.0	1974	2014	2040	20.0	61.22
Total					**18.0**	**1963**	**1997**	**2048**	**27.0**	**252.90**
Ortalyk LLP			**100.00**							
Zhalpak	Shu-Sarysu	DP		2042	1.0	1964	2018	2042	21.0	145.80
Central Mynkuduk	Shu-Sarysu	PP		2033	12.0	1976	2007	2033	12.0	40.60
Total					**12.0**	**1964**	**2007**	**2042**	**21.0**	**186.40**
RU-6 LLP[2]			**100.00**							
Northern Karamurun	Syrdarya	PP		2022	2.0	1979	1997	2040	19.0	59.58

Mining Subsidiary/Deposit	Uranium Province	Stage	Equity Interest	Tenure key dates and area						
				Expiry		Discovery	Op. Start	LoMp Depletion[1]		Area
				(year)	(years)	(year)	(year)	(date)	(years)	(km^2)
Southern Karamurun	Syrdarya	PP								
Total					**2.0**	**1979**	**1997**	**2040**	**19.0**	**59.58**
Appak LLP			**65.00**							
Western Mynkuduk	Shu-Sarysu	PP		2035	**14.0**	**1976**	**2008**	**2037**	**16.0**	**133.46**
JV Inkai LLP[2]			**60.00**							
Blocks 1, Inkai (a)	Shu-Sarysu	PP		2045	24.0	1976	2008	2051	30.0	
Blocks 1, Inkai (b)	Shu-Sarysu	PP		2045	24.0	1976	2008	2046	25.0	139.00
Blocks 1, Inkai (c)	Shu-Sarysu	PP		2045	24.0	1976	2015	2051	30.0	
Total					**24.0**	**1976**	**2008**	**2051**	**30.0**	**139.00**
Semizbai-U LLP			**51.00**							
Semizbai	Northern Kazakhstan	PP		2031	10.0	1973	2009	2042	21.0	27.20
Irkol	Syrdarya	PP		2030	9.0	1976	2008	2040	19.0	44.00
Total					**10.0**	**1973**	**2008**	**2042**	**21.0**	**71.20**
JV Akbastau JSC			**50.00**							
Block 1 Budenovskoye	Shu-Sarysu	PP		2037	16.0	1976	2009	2037	16.0	1.586
Block 3 Budenovskoye	Shu-Sarysu	PP		2038	17.0	1976	2009	2039	18.0	1.123
Block 4 Budenovskoye	Shu-Sarysu	PP			17.0	1976	2009	2039	18.0	
Total					**17.0**	**1976**	**2009**	**2039**	**18.0**	**2.71**
Karatau LLP			**50.00**							
Block 2, Budenovskoye	Shu-Sarysu	PP		2040	**19.0**	**1979**	**2007**	**2032**	**11.0**	**17.28**
JV Zarechnoye JSC			**49.98**							
Zarechnoye	Syrdarya	PP		2025	**5.0**	**1977**	**2007**	**2028**	**7.0**	**38.00**
JV Katco LLP			**49.00**							
Southern Moinkum (Northern part)	Shu-Sarysu	PP		2039	18.0	1976	2001	2028	7.0	15.92
Tortkuduk	Shu-Sarysu	PP		2039	18.0	1976	2007	2035	14.0	29.81
Total					**18.0**	**1976**	**2001**	**2035**	**14.0**	**45.73**
JV Khorassan-U LLP			**50.00**							
Block Kharassan 1, North Kharassan	Syrdarya	PP		2058	**37.0**	**1972**	**2008**	**2038**	**17.0**	**70.80**
JV SMCC LLP			**30.00**							
Akdala	Shu-Sarysu	PP		2026	5.0	1982	2004	2025	4.0	37.54
Block 4, Inkai	Shu-Sarysu	PP		2029	8.0	1976	2007	2057	36.0	79.37
Total					**8.0**	**1976**	**2004**	**2057**	**36.0**	**116.91**
Baiken-U LLP			**52.50**							
Block Kharassan 2, North Kharassan	Syrdarya	PP		2055	34.0	1972	2009	2033	12.0	350.00
Budenovskoye LLP			**51.00**							
Block 6 & 7 Budenovskoye	Shu-Sarysu	DP		2045	**4.5**	**1976**	**2024**	**2045**	**24.0**	**151.30**
Exploration										
Kazatomprom			**100.00**							
Block 2 Inkai	Shu-Sarysu	AEP		2022	3.0	1976	2008	n/a	n/a	183.2
Block 3 Inkai	Shu-Sarysu	AEP		2022	3.0	1976	2015	n/a	n/a	240.8
Total						**1976**	**2008**			**424.00**
Grand Total										**2,059.27**

(1) LoMp: date of depletion of Ore Reserves in the current Life of Mine plans for the Mineral Assets.

(2) For JV Inkai LLP, the Company's equity participation is determined based on a prescribed formula based on uranium production within the following bands: 0tU to 1,500tU (40.00%); 1,500tU to 2,000tU (50.00%); 2,000tU to 4,000tU (60.00%).

(3) At Kazatomprom-SaUran LLP, two deposits have limited production and no further Ore Reserves and Mineral Resources are reported in the 2021 Statements.

The Company either directly or through other subsidiaries also holds contracts with the GoK to undertake exploration at several assets including:

- Togusken and East Uvanas which are all located in the Shu-Sarysu Basin and have been explored since 2013 and 2017 respectively; and
- Akkum which is located in the Syrdarya Basin where exploration started in 2017.

2.3.1 Location, Access and Infrastructure

The Company's Mineral Assets are located in four (Figure 2-2) of the principal administrative provinces of Kazakhstan: Kyzylorda Province (Shieli and Zhanakorgan districts); Turkestan Province (Sozak district); and North-Kazakhstan Province (Ualikhanovsky district); and Amkola Province (Enbekshilder district). Uranium deposits in Kazakhstan are grouped into six uranium provinces (Figure 2-3). Table 2-17 presents the historical distribution of Uranium reported in accordance with the GKZ system.

With the exception of the Semizbai deposit located in Northern Kazakhstan, which straddles the North-Kazakhstan Province and the Amkola Province, the Company's deposits are located in the south of Kazakhstan within the Shu-Sarysu (23) and Syrdarya (6) uranium provinces. In administrative terms these southern provinces belong to the Turkestan Province and Kyzlorda Province and the deposits themselves are confined to the northern or southern limb of the

Karatau Rise (Figure 2-4). Table 2-18 presents details relating to the proximity of the Mineral Assets to population centres grouped by administrative provinces and geographic areas.

The Mineral Assets are generally accessible via a well-developed railway and tarred road network with the last sections of access normally comprise as dirt roads (Figure 2-5; Figure 2-6). The transportation of goods to and from the ISR operations is mostly undertaken by Trade and Transport Company LLP, a subsidiary of the Company. This company assists with both rail and road transport and also maintains 500km of private roads used for transportation.

On-site infrastructure is extensive and well maintained with the majority having become operational after 2005 with modern installations. Certain of the older installations were commissioned 30 to 40 years ago and appear weathered, notably: Uvanas and Eastern Mynkuduk (dating to1978), Kanzhugan (1982) and North Karamurun and South Karamurun (dating to 1981). Key installations at the Group's operations comprise:

- External power supply connected to the national grid via 110kV and 220kV transmission lines and local substations;
- Wellfields standard infrastructure at all operations comprise: power distribution lines; pregnant leach solution ("**PLS**") pipelines; portable cabins; access roads; mobile drill rigs; and drill slimes settling ponds;
- Wellfields supporting infrastructure comprising acid tanks; PLS setting ponds; and drill slimes storage facilities; and
- Processing and Refining plants comprising fencing and security; process plant and product storage; acid storage tanks; hydrogen peroxide tanks; potable and technical water supply; settling ponds (PLS, barren solution, process slimes, sewage, effluent); office and staff facilities; and other ancillary infrastructure.

Figure 2-2: Kazakhstan Country Map and location of the Mineral Assets mining and processing operations

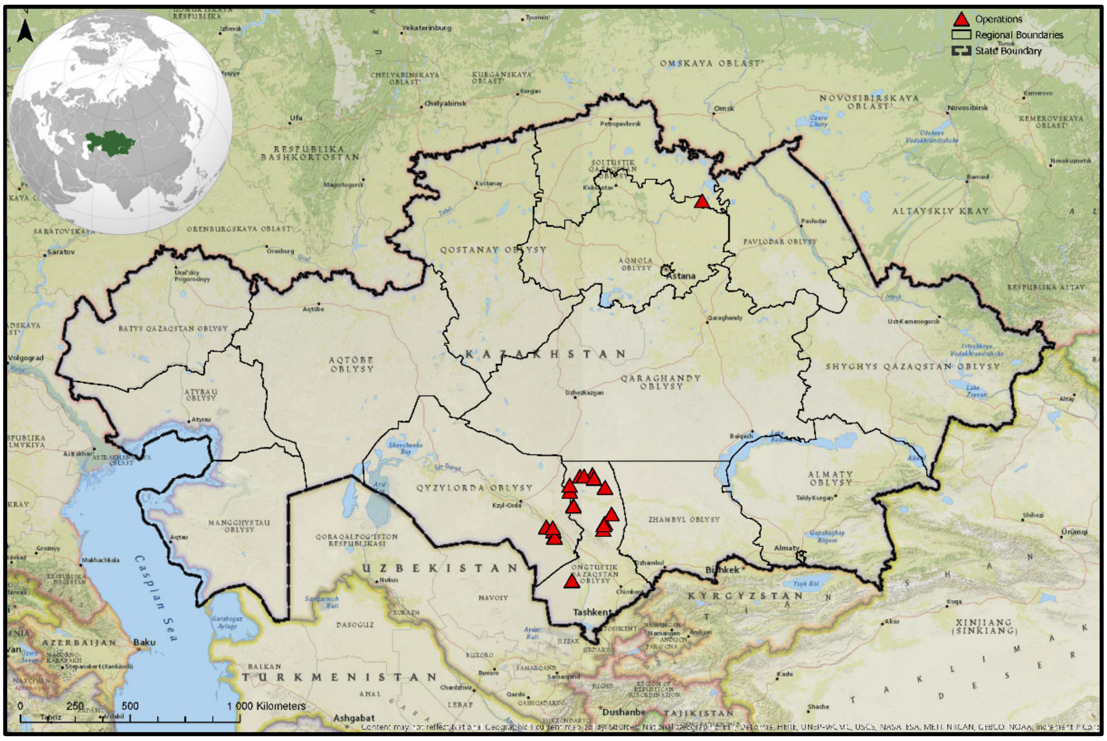


Table 2-17: Distribution of Uranium reported assuming GKZ system

Uranium Province	Units	2018	2019	2020	2021
Caspian	(%)	1.9	1.9	1.8	3.1
North Kazakhstan	(%)	17.3	17.3	17.3	13.1
Shu-Sarysu	(%)	60.1	60.1	60.2	66.8
Pribalkhashskaya	(%)	0.8	0.8	0.8	0.7
Syrdarya	(%)	15.2	15.2	15.2	10.2
Eli	(%)	4.7	4.7	4.7	6.1
Total	**(%)**	**100.0**	**100.0**	**100.0**	**100.0**

Figure 2-3: Kazakhstan Uranium Provinces indicating distribution of GKZ System 'reserve' uranium content distribution

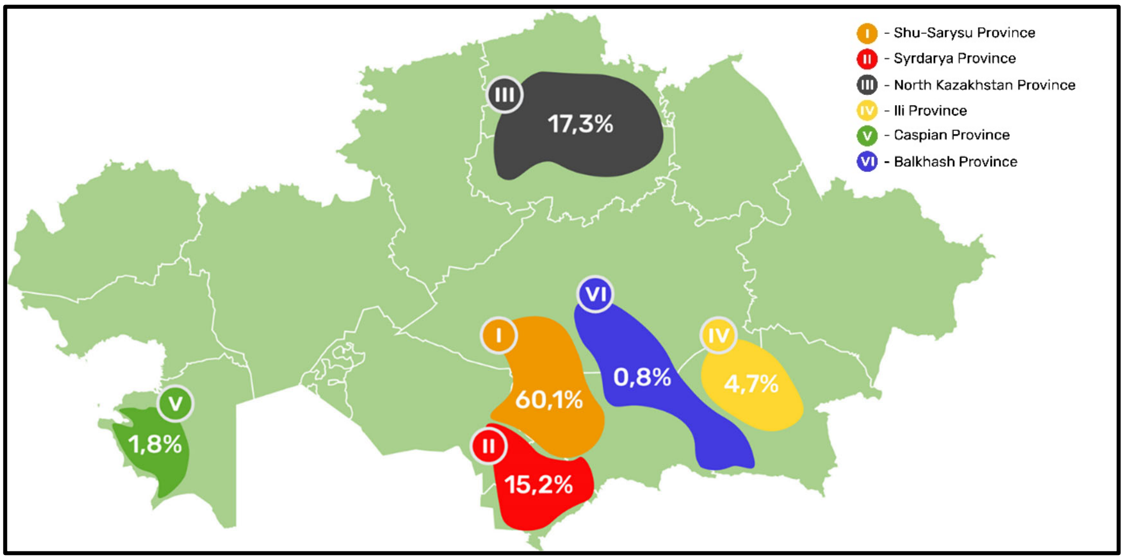


Table 2-18: Geographic and administrative location of the Mineral Assets

Province and district	Geographic area	Mining Subsidiary	Deposit name	Nearest settlements (distance from mine)
Kyzylorda Province (Shieli and Zhanakorgan districts)	Syrdarya depression	Semizbai-U LLP	Irkol	Kyzylkaiyn (9km), Ortakshyl (9.5km) and Zhanaturmys (13km)
		RU-6 LLP	Northern Karamurun Southern Karamurun	22nd intersection (1.5km), Avangard (2.6km from North Karamurun deposit), Gigant (3.8km) and Aktam (8.5km)
		JV Khorassan LLP	Block Kharassan 1, North Kharassan	Baykenzhe (7km)
		Baiken-U LLP	Block Kharassan 2, North Kharassan	Baykenzhe (10km) and Belibay (13km)
South Kazakhstan Province (Sozak district)	Syrdarya depression	JV Zarechnoye JSC	Zarechnoye	Koksaray (62km)
	Shu-Sarysu basin (south of Shu River)	JV Akbastau LLP	Block 1, Block 3 and Block 4 Budenovskoye	Aksumbe (40km) Karatau (60km)
		Karatau LLP	Block 2 Budenovskoye	Aksumbe (45km)
		Budenovskoye LLP	Block 6, Block 7 Budenovskoye	Aksumbe (45km)
		JV Katco LLP	Tortkuduk	Tasty (20km)
			Southern Moinkum (Northern part)	Taukent (50km), Tasty (50km)
		Kazatomprom-SaUran LLP	Kanzhugan	Taukent (20km)
			South Moinkum (Southern Part)	Taukent (40km)
			Central Moinkum	Taukent (50km), Tasty (50km)
	Shu-Sarysu basin (north of Shu River)	JV Inkai LLP	Block Inkai (a), (b) and (c)	Taikonur (6km)
		JV SMCC LLP	Block 4, Inkai	Taikonur (12km)
			Akdala	Kyzemshek (35km)
		ME Ortalyk LLP(1)	Central Mynkuduk	Taikonur (70km)
		Appak LLP	Western Mynkuduk	Taikonur (60km)
		Kazatomprom-SaUran LLP	Uvanas	Kyzemshek (2km), Zhuantobe (60km) and Tasty (80km)
			Eastern Mynkuduk	Kyzemshek (60km)
			Zhalpak (exploration and trial mining site)*	Kyzemshek (85km), Tasty and Zhuantobe (120km)
North-Kazakhstan Province (Ualikhanovsky district) Amkola Province (Enbekshilder district)	Semizbai depression	Semizbai-U LLP	Semizbai	Kairat and Zhas-karait villages (50km), Bestobe (60km) Stepnogorsk city (150km)

Figure 2-4: Regional location of Mineral Assets in the Shu-Sarysu Province and the Syrdarya Province

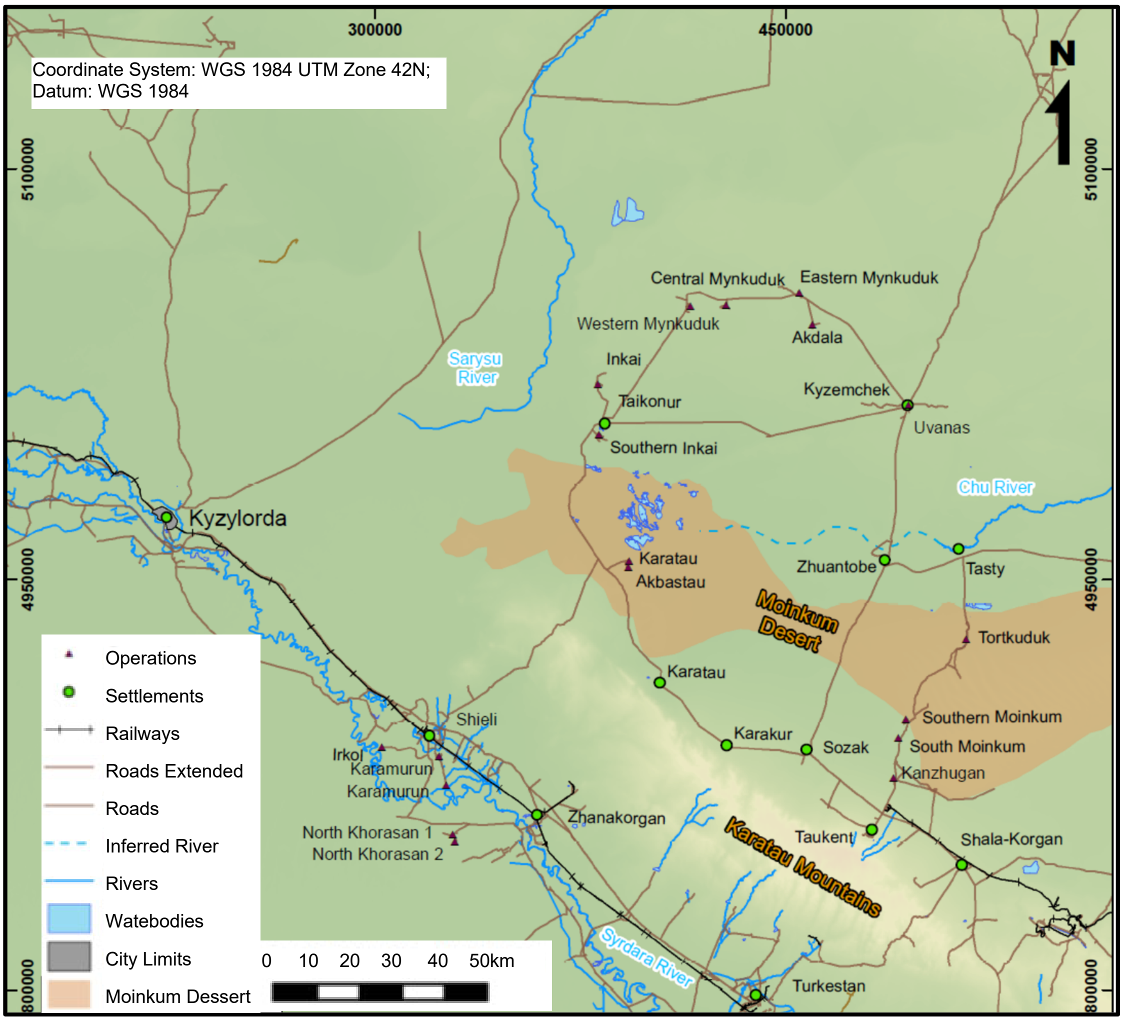


Figure 2-5: Regional location map for Shu-Sarysu and Syrdarya uranium provinces, indicating the main deposits and basic infrastructure (Legend shown in Figure 2-6)

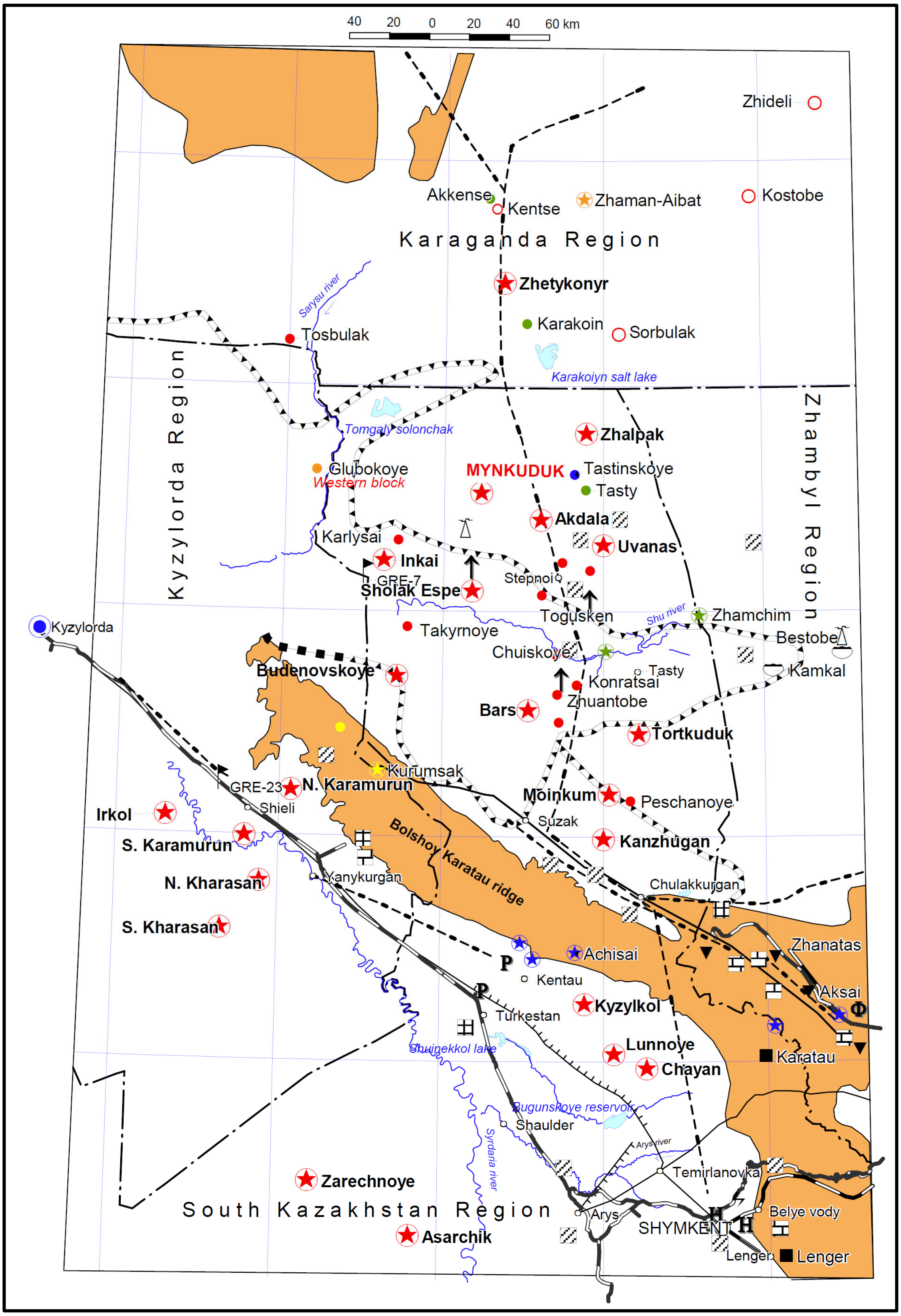
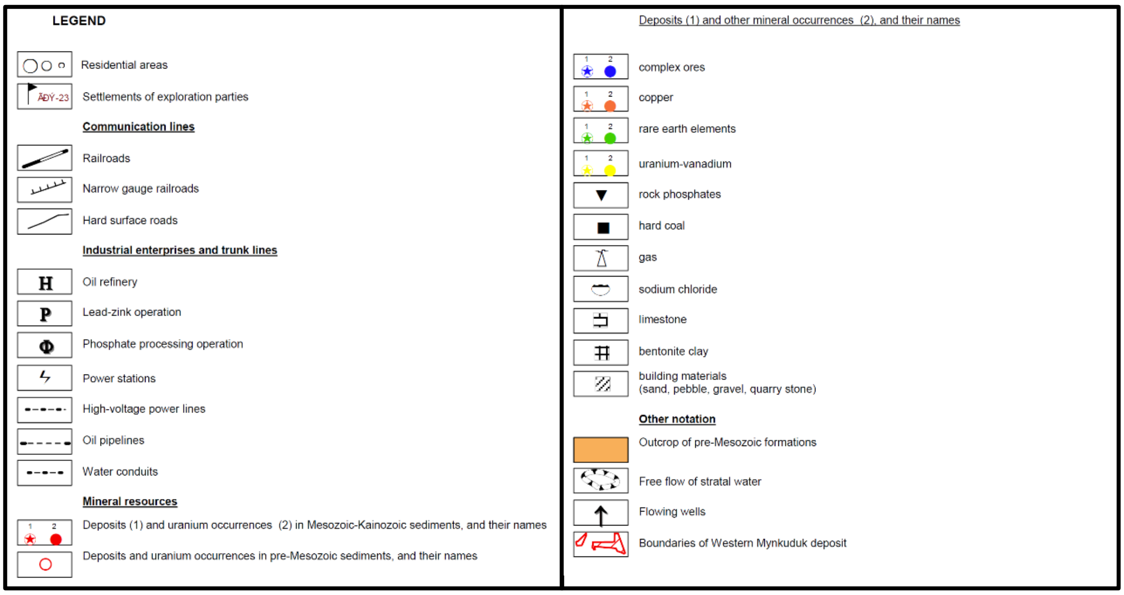


Figure 2-6: Location map for Shu-Sarysu and Syrdarya uranium provinces, indicating the main deposits and basic infrastructure (Legend)



2.3.2 Historical Operating Statistics

SRK has collated the historical production and economic statistics for the Mining Subsidiaries reported on both an aggregated and attributable basis for the 12-month period ended 31 December for 2015 through 2021 inclusive. During this period the equity interest held by the Company in the Mining Subsidiaries has changed with adjustments occurring both at the close and within reporting periods. Furthermore, for JV Inkai LLP the equity attributable proportion varies in accordance with a pre-defined formulae as reported in Table 2-16 with its application providing differing estimates depending on the reporting period increment applied. The foregoing can also be further complicated in applying differing equity determinations for production, sales and their related cash costs. In the statistics presented below, SRK has applied the equity attributable percentages based on that defined for sales and applied this to all reporting statistics. This in combination with consideration of unaudited management accounts to reflect the appropriate level of detail can also give rise to variances between that determined herein and that reported in the public domain for the Uranium Segment or in the Group consolidated/attributable reporting. The Company's approach for reporting attributable Mineral Resources and Ore Reserves only considers the equity interest applicable at the close of each reporting period and may therefore be different to that assumed for historical operating statistics. Table 2-19 provides the historical (2015 through 2021) equity participation in the Mining Subsidiaries as relied upon for production. Where these are different for specific historical reporting statistics for the Mining Subsidiaries the relevant sales/revenue/expenditures and Ore Reserves/Mineral Resources are also provided.

Table 2-19: Historical (2015 through 2021) equity participation in the Mining Subsidiaries

Mining Subsidiary	Units	2015	2016	2017	2018	2019	2020	2021
Production								
JV SMCC LLP	(%)	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Semizbai-U LLP	(%)	51.00	51.00	51.00	51.00	51.00	51.00	51.00
Appak LLP	(%)	65.00	65.00	65.00	65.00	65.00	65.00	65.00
JV Inkai LLP	(%)	47.32	47.57	43.15	51.21	55.66	40.60	53.42
JV Khorassan-U LLP	(%)	33.98	33.98	33.98	33.98	50.00	50.00	50.00
Baiken-U LLP	(%)	5.00	5.00	5.00	5.00	52.50	52.50	52.50
JV Zarechnoye JSC	(%)	49.98	49.98	49.98	49.98	49.98	49.98	49.98
JV Katco LLP	(%)	49.00	49.00	49.00	49.00	49.00	49.00	49.00
Karatau LLP	(%)	50.00	50.00	50.00	50.00	50.00	50.00	50.00
JV Akbastau JSC	(%)	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Kazatomprom-SaUran LLP	(%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Ortalyk LLP	(%)	100.00	100.00	100.00	100.00	100.00	100.00	51.00

Mining Subsidiary	Units	2015	2016	2017	2018	2019	2020	2021
RU-6 LLP	(%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Sales/Revenue/Expenditures								
JV Inkai LLP	(%)	43.80	43.78	43.19	51.20	55.68	40.61	40.61
JV Khorassan-U LLP	(%)	33.98	33.98	33.98	33.98	50.00	50.00	50.00
Baiken-U LLP	(%)	5.00	5.00	5.00	5.00	52.50	52.50	52.50
Ortalyk LLP	(%)	100.00	100.00	100.00	100.00	100.00	100.00	81.51
Ore Reserves/Mineral Resources								
JV Inkai LLP	(%)	60.00	60.00	60.00	60.00	60.00	60.00	60.00
JV Khorassan-U LLP	(%)	33.98	33.98	33.98	50.00	50.00	50.00	50.00
Baiken-U LLP	(%)	5.00	5.00	5.00	52.50	52.50	52.50	52.50
Ortalyk LLP	(%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table 2-20 and Table 2-21 presents consolidated (100%) and equity attributable historical operating statistics for the Mining Subsidiaries from 2015 through 2021. For the reporting period ended 31 December 2021 the salient consolidated (100%) operating statistics indicated as follows:

- Production and final product sales of 21,819tU (2020: 19,477tU) and 54.5MlbU$_3$O$_8$ (2020: 52.2MlbU$_3$O$_8$) respectively;
- Realised sales price of US$34.64/lbU$_3O_8$ (2020: US$27.76/lbU$_3O_8$);
- Total capital expenditure of KZT(97,412m); and
- Unit cash costs of US$8.22/lbU$_3O_8$ (2020: US$8.00lbU$_3O_8$) and US$11.60/lbU$_3$O$_8$ (2020: US$10.83lbU$_3O_8$) for C1 and AISC respectively.

Table 2-20: Mining Subsidiary historical operating statistics (100%)

Mining Subsidiary	Units	2015	2016	2017	2018	2019	2020	2021
Physicals								
Production	(tU)	23,607	24,586	23,321	21,705	22,808	19,477	21,819
Sales	(MlbU)	49.7	51.9	51.1	48.7	49.9	44.3	46.3
Final Product Sales	(MlbU$_3$O$_8$)	58.6	61.2	60.2	57.5	58.8	52.2	54.5
Macro Economics								
Exchange Rate	(KZT:US$)	222	342	326	345	383	413	426
Commodity Price								
Benchmark	(US$/lbU$_3O_8$)	39.32	25.72	21.31	22.92	24.78	28.61	35.92
Discount	(%)	2.68	2.56	2.51	3.08	2.99	3.00	3.56
Realised	(US$/lbU$_3O_8$)	38.27	25.06	20.78	22.21	24.03	27.76	34.64
Financial								
Sales Revenue	**(KZTm)**	**499,660**	**524,572**	**408,047**	**440,279**	**541,178**	**599,243**	**804,985**
Cash Costs (Sales)	**(KZTm)**	**120,461**	**125,233**	**119,637**	**124,763**	**120,783**	**102,294**	**110,443**
Capex	**(KZTm)**	**66,368**	**74,322**	**85,062**	**82,235**	**69,342**	**76,907**	**97,412**
Well Construction	(KZTm)	47,014	50,778	55,918	57,396	49,994	48,229	73,222
Sustaining & Expansion	(KZTm)	16,430	21,052	25,535	18,041	16,980	12,717	17,865
Liquidation	(KZTm)	2,923	2,492	3,609	6,798	2,368	15,961	6,325
Unit Costs								
C1 (Sales - 100%)	(US$/lbU$_3O_8$)	15.41	10.05	10.37	10.08	8.59	8.00	8.22
AISC (Sales - 100%)	(US$/lbU$_3O_8$)	20.29	13.42	14.51	13.65	11.25	10.83	11.60

Table 2-21: Mining Subsidiary historical operating statistics (attributable)

Mining Subsidiary	Units	2015	2016	2017	2018	2019	2020	2021
Physicals								
Production	(tU)	12,851	13,187	12,093	11,476	13,291	10,736	11,858
Sales	(MlbU)	26.3	25.4	25.9	26.5	28.8	24.3	25.0
Final Product Sales	(MlbU$_3$O$_8$)	31.1	30.0	30.5	31.3	34.0	28.7	29.4
Macro Economics								
Exchange Rate	(KZT:US$)	222	342	326	345	383	413	426
Commodity Price								
Benchmark	(US$/lbU$_3O_8$)	39.61	26.57	21.53	21.28	24.35	28.33	35.63
Discount	(%)	1.82	1.92	1.92	3.00	2.98	2.96	3.85
Realised	(US$/lbU$_3O_8$)	38.89	26.06	21.12	20.64	23.62	27.49	34.26
Financial								
Sales Revenue	**(KZTm)**	**268,398**	**267,055**	**210,227**	**222,753**	**307,347**	**325,873**	**429,827**
Cash Costs (Sales)	**(KZTm)**	**120,461**	**125,233**	**119,637**	**124,763**	**117,785**	**102,809**	**110,443**
Capex	**(KZTm)**	**34,818**	**37,317**	**42,553**	**47,864**	**39,735**	**44,209**	**55,438**
Well Construction	(KZTm)	25,377	27,079	29,109	30,610	28,701	28,712	42,510
Sustaining & Expansion	(KZTm)	7,310	8,815	11,393	11,941	9,470	7,359	9,180
Liquidation	(KZTm)	2,131	1,422	2,051	5,314	1,563	8,138	3,748
Unit Costs								
C1 (Sales - 100%)	(US$/lbU$_3O_8$)	17.45	12.22	12.02	11.56	9.05	8.67	8.80
AISC (Sales - 100%)	(US$/lbU$_3O_8$)	22.19	15.67	16.09	15.07	9.05	11.72	12.44

The supporting tables below provide the historical (2015 through 2021) operating statistics for the individual Mining Subsidiaries with totals reported on a consolidated (100%) and attributable basis:

- **Table 2-22:** historical production statistics including 2021 percentage contribution;
- **Table 2-23:** historical sales statistics including 2021 percentage contribution;
- **Table 2-24:** historical unit sales price statistics: Note that the individual Mining Subsidiaries

are subject to various sales price discounts as reflected in the underlying agreements between the Company and its operating partners. These price discounts have remained relatively constant save for the wholly owned Mining Subsidiaries;

- **Table 2-25:** historical cash cost (C1 and AISC) statistics; and
- **Table 2-26:** historical capital expenditures including well construction, sustaining and expansion and liquidation fund contributions. In this instance SRK notes that the supporting details for the AISC reporting indicates variances between that included in the public domain reporting. These variances are only noted for JV Khorassan-U LLP and JV Akbastau LLP and with variances included in the cash cost reporting detail reporting KZT6.2bn and KZT1.9bn less respectively than that included in the public domain reporting.

Table 2-22: Mining Subsidiary historical production statistics

Mining Subsidiary	Units	2015	2016	2017	2018	2019	2020	2021	2021 (%)
JV SMCC LLP	(tU)	3,049	3,058	2,937	2,418	2,401	2,260	2,321	10.6
Semizbai-U LLP	(tU)	1,221	1,242	1,128	960	960	753	962	4.4
Appak LLP	(tU)	880	1,004	901	801	800	633	805	3.7
JV Inkai LLP	(tU)	2,418	2,413	2,202	2,662	3,209	2,693	3,449	15.8
JV Khorassan-U LLP	(tU)	1,095	1,354	1,564	1,665	1,599	1,455	1,579	7.2
Baiken-U LLP	(tU)	1,503	1,838	1,762	1,631	1,560	1,181	1,230	5.6
JV Zarechnoye JSC	(tU)	800	817	802	756	778	648	655	3.0
JV Katco LLP	(tU)	4,007	4,003	3,519	3,212	3,252	2,833	2,840	13.0
Karatau LLP	(tU)	2,064	2,108	2,359	2,088	2,600	2,460	2,561	11.7
JV Akbastau JSC	(tU)	1,630	1,778	1,941	1,556	1,550	1,363	1,545	7.1
Kazatomprom-SaUran LLP	(tU)	2,214	2,003	1,590	1,470	1,541	1,230	1,493	6.8
Ortalyk LLP	(tU)	1,770	1,953	1,898	1,712	1,694	1,308	1,579	7.2
RU-6 LLP	(tU)	956	1,015	718	774	864	660	800	3.7
Total	**(tU)**	**23,607**	**24,586**	**23,321**	**21,705**	**22,808**	**19,477**	**21,819**	**100.0**
Production (Attributable)	**(tU)**	**12,851**	**13,187**	**12,093**	**11,476**	**13,291**	**10,736**	**11,858**	**54.3**

Table 2-23: Mining Subsidiary historical sales statistics

Mining Subsidiary	Units	2015	2016	2017	2018	2019	2020	2021	2021 (%)
JV SMCC LLP	(MlbU_3O_8)	7.90	8.80	7.53	6.29	6.25	6.24	6.03	11.1
Semizbai-U LLP	(MlbU_3O_8)	3.12	3.17	2.94	2.50	2.50	2.14	2.50	4.6
Appak LLP	(MlbU_3O_8)	2.18	2.50	2.51	2.11	2.08	1.83	2.05	3.8
JV Inkai LLP	(MlbU_3O_8)	5.31	6.38	5.93	6.50	8.11	6.89	8.77	16.1
JV Khorassan-U LLP	(MlbU_3O_8)	2.88	3.72	3.96	3.77	4.55	3.92	4.09	7.5
Baiken-U LLP	(MlbU_3O_8)	3.63	5.40	4.89	4.28	4.24	3.08	3.14	5.8
JV Zarechnoye JSC	(MlbU_3O_8)	2.21	2.21	2.21	1.98	2.00	1.76	1.69	3.1
JV Katco LLP	(MlbU_3O_8)	10.86	10.55	9.31	8.47	8.40	7.38	7.39	13.5
Karatau LLP	(MlbU_3O_8)	5.30	5.30	6.18	5.43	6.66	6.66	6.68	12.2
JV Akbastau JSC	(MlbU_3O_8)	4.13	4.75	5.06	4.12	4.01	4.02	2.95	5.4
Kazatomprom-SaUran LLP	(MlbU_3O_8)	4.67	3.78	2.97	5.32	3.72	2.19	3.08	5.6
Ortalyk LLP	(MlbU_3O_8)	3.64	3.09	4.86	4.45	4.40	4.40	4.11	7.5
RU-6 LLP	(MlbU_3O_8)	2.75	1.62	1.86	2.25	1.89	1.72	2.08	3.8
Total	**(MlbU_3O_8)**	**58.57**	**61.24**	**60.22**	**57.47**	**58.81**	**52.23**	**54.54**	**100.0**
Production (Attributable)	**(MlbU_3O_8)**	**31.05**	**29.98**	**30.53**	**31.29**	**33.98**	**28.67**	**29.45**	**54.0**

Table 2-24: Mining Subsidiary historical uranium price statistics

Mining Subsidiary	Units	2015	2016	2017	2018	2019	2020	2021
Benchmark Price								
JV SMCC LLP	(US$/lb$U_3O_8$)	38.66	23.64	21.38	25.55	24.77	30.24	36.32
Semizbai-U LLP	(US$/lb$U_3O_8$)	36.99	23.00	22.14	24.79	25.22	30.04	39.17
Appak LLP	(US$/lb$U_3O_8$)	42.98	27.50	21.43	27.32	25.09	30.60	37.16
JV Inkai LLP	(US$/lb$U_3O_8$)	41.41	23.53	20.38	25.89	24.86	28.63	37.11
JV Khorassan-U LLP	(US$/lb$U_3O_8$)	41.40	24.13	22.36	24.46	24.54	20.14	36.43
Baiken-U LLP	(US$/lb$U_3O_8$)	38.57	28.30	20.74	23.24	24.56	30.33	38.09
JV Zarechnoye JSC	(US$/lb$U_3O_8$)	36.50	24.09	20.80	24.92	24.77	28.52	33.79
JV Katco LLP	(US$/lb$U_3O_8$)	37.99	24.53	21.89	24.84	24.65	31.31	37.52
Karatau LLP	(US$/lb$U_3O_8$)	38.01	24.53	20.10	25.70	25.77	29.25	32.45
JV Akbastau JSC	(US$/lb$U_3O_8$)	40.33	25.63	19.86	23.70	30.65	28.71	35.46
Kazatomprom-SaUran LLP	(US$/lb$U_3O_8$)	39.57	33.73	22.60	10.12	19.55	28.56	33.49
Ortalyk LLP	(US$/lb$U_3O_8$)	40.94	30.39	22.59	23.86	22.99	26.82	35.50
RU-6 LLP	(US$/lb$U_3O_8$)	41.78	29.86	22.14	8.78	23.61	25.59	32.67
Total	**(US$/lb$U_3O_8$)**	**39.32**	**25.72**	**21.31**	**22.92**	**24.78**	**28.61**	**35.92**
Attributable	**(US$/lb$U_3O_8$)**	**39.61**	**26.57**	**21.53**	**21.28**	**24.35**	**28.33**	**35.63**
Realised Price								
JV SMCC LLP	(US$/lb$U_3O_8$)	37.69	23.05	20.85	24.91	24.15	29.48	35.41
Semizbai-U LLP	(US$/lb$U_3O_8$)	36.25	22.54	21.70	24.29	24.72	29.44	38.39
Appak LLP	(US$/lb$U_3O_8$)	40.83	26.13	20.36	25.95	23.84	29.07	35.30
JV Inkai LLP	(US$/lb$U_3O_8$)	39.34	22.36	19.36	24.60	23.62	27.19	35.25
JV Khorassan-U LLP	(US$/lb$U_3O_8$)	40.36	23.53	21.80	23.85	23.93	19.63	35.52
Baiken-U LLP	(US$/lb$U_3O_8$)	36.64	26.89	19.71	22.08	23.33	28.82	36.18
JV Zarechnoye JSC	(US$/lb$U_3O_8$)	35.59	23.48	20.28	24.29	24.15	27.81	32.95
JV Katco LLP	(US$/lb$U_3O_8$)	37.23	24.04	21.45	24.35	24.16	30.68	36.77
Karatau LLP	(US$/lb$U_3O_8$)	37.06	23.92	19.60	25.06	25.13	28.52	31.64
JV Akbastau JSC	(US$/lb$U_3O_8$)	39.32	24.99	19.36	23.10	29.89	27.99	34.57
Kazatomprom-SaUran LLP	(US$/lb$U_3O_8$)	39.57	33.73	22.60	10.12	19.55	28.56	31.48
Ortalyk LLP	(US$/lb$U_3O_8$)	40.94	30.39	22.59	22.66	21.84	25.48	33.73
RU-6 LLP	(US$/lb$U_3O_8$)	41.78	29.86	22.14	8.78	23.61	25.59	30.71
Total	**(US$/lb$U_3O_8$)**	**38.38**	**25.06**	**20.78**	**22.21**	**24.03**	**27.76**	**34.64**
Attributable	**(US$/lb$U_3O_8$)**	**38.89**	**26.06**	**21.12**	**20.64**	**23.62**	**27.49**	**34.26**
Discount								

Mining Subsidiary	Units	2015	2016	2017	2018	2019	2020	2021
JV SMCC LLP	(%)	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Semizbai-U LLP	(%)	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Appak LLP	(%)	5.00	5.00	5.00	5.00	5.00	5.00	5.00
JV Inkai LLP	(%)	5.00	5.00	5.00	5.00	5.00	5.00	5.00
JV Khorassan-U LLP	(%)	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Baiken-U LLP	(%)	5.00	5.00	5.00	5.00	5.00	5.00	5.00
JV Zarechnoye JSC	(%)	2.50	2.50	2.50	2.50	2.50	2.50	2.50
JV Katco LLP	(%)	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Karatau LLP	(%)	2.50	2.50	2.50	2.50	2.50	2.50	2.50
JV Akbastau JSC	(%)	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Kazatomprom-SaUran LLP	(%)	-	-	-	-	-	-	6.00
Ortalyk LLP	(%)	-	-	-	5.00	5.00	5.00	5.00
RU-6 LLP	(%)	-	-	-	-	-	-	6.00
Total	**(%)**	**2.39**	**2.56**	**2.51**	**3.08**	**2.99**	**3.00**	**3.56**
Attributable	**(%)**	**1.82**	**1.92**	**1.92**	**3.00**	**2.98**	**2.96**	**3.85**

Table 2-25: Mining Subsidiary historical cash cost statistics (2015 through 2021)

Mining Subsidiary	Units	2015	2016	2017	2018	2019	2020	2021
C1 Cash Cost (Sales)								
JV SMCC LLP	(US\$/lbU_3O_8)	12.97	7.73	8.02	8.82	7.68	6.71	7.00
Semizbai-U LLP	(US\$/lbU_3O_8)	19.96	13.32	14.16	14.53	14.18	13.32	14.52
Appak LLP	(US\$/lbU_3O_8)	21.77	12.80	12.77	13.38	10.90	13.37	11.86
JV Inkai LLP	(US\$/lbU_3O_8)	12.22	6.93	7.74	7.70	6.36	6.86	6.23
JV Khorassan-U LLP	(US\$/lbU_3O_8)	16.71	9.86	10.78	9.12	8.93	7.97	7.75
Baiken-U LLP	(US\$/lbU_3O_8)	13.27	7.82	9.34	8.25	9.43	9.15	9.42
JV Zarechnoye JSC	(US\$/lbU_3O_8)	18.34	12.42	13.93	13.24	12.15	11.36	12.36
JV Katco LLP	(US\$/lbU_3O_8)	8.95	6.46	7.55	7.75	7.21	7.30	8.96
Karatau LLP	(US\$/lbU_3O_8)	11.68	7.11	6.54	4.36	4.50	3.85	3.55
JV Akbastau JSC	(US\$/lbU_3O_8)	13.01	5.58	5.69	5.77	5.33	4.98	4.84
Kazatomprom-SaUran LLP	(US\$/lbU_3O_8)	28.25	24.03	30.92	19.25	16.20	17.89	12.85
Ortalyk LLP	(US\$/lbU_3O_8)	24.62	20.24	12.25	11.77	10.42	7.74	9.85
RU-6 LLP	(US\$/lbU_3O_8)	19.80	23.11	18.33	20.18	12.98	13.73	6.90
Total	**(US\$/lbU_3O_8)**	**15.41**	**10.05**	**10.37**	**10.08**	**8.40**	**8.00**	**8.22**
Attributable	**(US\$/lbU_3O_8)**	**17.45**	**12.22**	**12.02**	**11.56**	**9.05**	**8.67**	**8.80**
AISC (Sales)								
JV SMCC LLP	(US\$/lbU_3O_8)	17.48	10.08	10.76	11.65	9.90	8.41	9.25
Semizbai-U LLP	(US\$/lbU_3O_8)	24.52	16.64	17.12	19.15	18.11	17.36	19.01
Appak LLP	(US\$/lbU_3O_8)	26.95	15.78	15.52	15.10	12.88	18.00	20.20
JV Inkai LLP	(US\$/lbU_3O_8)	19.42	11.76	14.64	12.62	9.51	9.15	7.95
JV Khorassan-U LLP	(US\$/lbU_3O_8)	21.12	13.72	16.08	14.19	10.40	10.75	9.63
Baiken-U LLP	(US\$/lbU_3O_8)	18.36	11.72	14.15	12.00	12.75	13.11	11.87
JV Zarechnoye JSC	(US\$/lbU_3O_8)	26.17	16.93	19.37	19.32	17.54	16.03	18.16
JV Katco LLP	(US\$/lbU_3O_8)	14.73	10.15	11.87	11.76	10.48	11.01	14.46
Karatau LLP	(US\$/lbU_3O_8)	14.96	9.08	9.97	5.99	6.36	4.98	5.40
JV Akbastau JSC	(US\$/lbU_3O_8)	16.04	7.37	9.08	8.03	7.02	6.55	8.77
Kazatomprom-SaUran LLP	(US\$/lbU_3O_8)	33.17	27.87	38.16	23.75	19.23	24.68	18.16
Ortalyk LLP	(US\$/lbU_3O_8)	28.41	23.59	14.31	13.54	11.78	10.11	12.76
RU-6 LLP	(US\$/lbU_3O_8)	25.26	29.80	23.26	24.23	17.14	17.36	16.28
Total	**(US\$/lbU_3O_8)**	**20.29**	**13.42**	**14.51**	**13.65**	**8.40**	**10.83**	**11.60**
Attributable	**(US\$/lbU_3O_8)**	**22.19**	**15.67**	**16.09**	**15.07**	**9.05**	**11.72**	**12.44**

Table 2-26: Mineral Assets historical capital expenditure (2015 through 2021)

Mining Subsidiary	Units	2015	2016	2017	2018	2019	2020	2021
Well Construction								
JV SMCC LLP	(KZTm)	3,999	3,967	3,962	5,813	4,456	3,772	3,927
Semizbai-U LLP	(KZTm)	2,475	2,609	2,364	2,996	2,810	3,108	4,231
Appak LLP	(KZTm)	2,200	2,375	2,046	999	1,076	2,666	6,769
JV Inkai LLP	(KZTm)	4,221	4,009	5,258	8,707	8,517	4,306	4,815
JV Khorassan-U LLP	(KZTm)	2,824	4,217	6,582	4,983	2,138	3,698	7,645
Baiken-U LLP	(KZTm)	2,613	4,303	4,389	4,674	4,392	4,634	2,679
JV Zarechnoye JSC	(KZTm)	3,553	2,885	3,386	3,971	3,858	3,129	3,878
JV Katco LLP	(KZTm)	10,708	10,538	10,252	9,275	8,499	8,237	14,391
Karatau LLP	(KZTm)	3,108	3,098	4,369	2,376	4,203	1,713	4,667
JV Akbastau JSC	(KZTm)	2,687	2,641	3,103	2,031	2,249	2,382	6,247
Kazatomprom-SaUran LLP	(KZTm)	3,455	3,943	5,197	6,778	3,488	5,231	6,094
Ortalyk LLP	(KZTm)	2,364	2,944	2,555	2,321	2,091	3,451	4,487
RU-6 LLP	(KZTm)	2,806	3,250	2,453	2,472	2,217	1,902	3,392
Subtotal	**(KZTm)**	**47,014**	**50,778**	**55,918**	**57,396**	**49,994**	**48,229**	**73,222**
Sustaining & Expansion								
JV SMCC LLP	(KZTm)	3,920	3,103	2,761	339	845	627	1,879
Semizbai-U LLP	(KZTm)	690	2,674	470	980	946	468	561
Appak LLP	(KZTm)	313	166	209	257	507	833	495
JV Inkai LLP	(KZTm)	4,276	6,529	8,077	2,324	2,634	2,203	3,925
JV Khorassan-U LLP	(KZTm)	-	680	254	1,611	422	805	1,781
Baiken-U LLP	(KZTm)	1,378	2,674	3,051	861	998	400	590
JV Zarechnoye JSC	(KZTm)	291	517	535	182	275	263	291
JV Katco LLP	(KZTm)	3,248	2,779	2,866	2,447	2,491	3,067	5,037
Karatau LLP	(KZTm)	742	459	2,558	685	5,683	890	579
JV Akbastau JSC	(KZTm)	86	262	2,486	1,191	351	713	611
Kazatomprom-SaUran LLP	(KZTm)	430	603	1,185	1,478	830	925	865
Ortalyk LLP	(KZTm)	528	439	543	5,010	194	851	594
RU-6 LLP	(KZTm)	528	166	541	676	804	672	657
Subtotal	**(KZTm)**	**16,430**	**21,052**	**25,535**	**18,041**	**16,980**	**12,717**	**17,865**
Capital Expenditure								
JV SMCC LLP	(KZTm)	7,919	7,070	6,723	6,152	5,301	4,399	5,806
Semizbai-U LLP	(KZTm)	3,166	5,283	2,834	3,976	3,756	3,576	4,792
Appak LLP	(KZTm)	2,513	2,541	2,255	1,256	1,583	3,499	7,264
JV Inkai LLP	(KZTm)	8,497	10,538	13,335	11,031	11,151	6,509	8,740
JV Khorassan-U LLP	(KZTm)	2,824	4,898	6,836	6,594	2,560	4,503	9,426
Baiken-U LLP	(KZTm)	3,991	6,976	7,440	5,535	5,390	5,034	3,269
JV Zarechnoye JSC	(KZTm)	3,844	3,402	3,921	4,153	4,133	3,392	4,169
JV Katco LLP	(KZTm)	13,956	13,316	13,118	11,722	10,990	11,304	19,428
Karatau LLP	(KZTm)	3,851	3,557	6,927	3,061	9,886	2,603	5,246

Mining Subsidiary	Units	2015	2016	2017	2018	2019	2020	2021
JV Akbastau JSC	(KZTm)	2,773	2,903	5,589	3,222	2,600	3,095	6,858
Kazatomprom-SaUran LLP	(KZTm)	3,885	4,546	6,382	8,256	4,318	6,156	6,959
Ortalyk LLP	(KZTm)	2,892	3,382	3,098	7,331	2,285	4,302	5,081
RU-6 LLP	(KZTm)	3,334	3,416	2,994	3,148	3,021	2,574	4,049
Subtotal	**(KZTm)**	**63,444**	**71,830**	**81,453**	**75,437**	**66,974**	**60,946**	**91,087**
Liquidation Fund								
JV SMCC LLP	(KZTm)	138	88	858	535	224	251	374
Semizbai-U LLP	(KZTm)	106	134	137	115	123	211	177
Appak LLP	(KZTm)	99	114	87	68	48	142	1,331
JV Inkai LLP	(KZTm)	-	-	-	31	(1)	23	6
JV Khorassan-U LLP	(KZTm)	67	272	182	142	119	202	171
Baiken-U LLP	(KZTm)	123	225	233	146	150	250	167
JV Zarechnoye JSC	(KZTm)	10	10	11	10	9	17	1,281
JV Katco LLP	(KZTm)	693	761	768	1,368	632	13,903	1,467
Karatau LLP	(KZTm)	91	95	99	80	96	171	112
JV Akbastau JSC	(KZTm)	90	137	144	79	132	152	218
Kazatomprom-SaUran LLP	(KZTm)	1,212	410	639	2,991	444	238	542
Ortalyk LLP	(KZTm)	141	109	169	171	139	175	219
RU-6 LLP	(KZTm)	156	136	282	1,062	253	226	260
Subtotal	**(KZTm)**	**2,923**	**2,492**	**3,609**	**6,798**	**2,368**	**15,961**	**6,325**
Summary								
Well Construction	(KZTm)	47,014	50,778	55,918	57,396	49,994	48,229	73,222
Sustaining	(KZTm)	16,430	21,052	25,535	13,419	10,026	10,453	13,427
Subtotal	**(KZTm)**	**-**	**-**	**81,453**	**70,815**	**60,020**	**58,682**	**86,649**
Expansion	(KZTm)	-	-	-	4,622	6,954	2,264	4,438
Subtotal	**(KZTm)**	**-**	**-**	**81,453**	**75,437**	**66,974**	**60,946**	**91,087**
Liquidation Fund	(KZTm)	2,923	2,492	3,609	6,798	2,368	15,961	6,325
Total	**(KZTm)**	**2,923**	**2,492**	**85,062**	**82,235**	**69,342**	**76,907**	**97,412**

2.3.3 Mineral Resources and Ore Reserves

As at the Effective Date of the CPR, the Company reported:

- Aggregated Ore Reserves (Table 2-27) of 999.2Mt grading 0.063%U and containing 625.4ktU and total Mineral Resources of Mineral Resources of 1,424.7Mt grading 0.055%U and containing 784.4ktU and comprising:
  - Proved Ore Reserves (Table 2-28) of 482.8Mt grading 0.061%U and containing 296.7ktU,
  - Probable Ore Reserves (Table 2-28) of 516.5Mt grading 0.064%U and containing 328.8ktU,
  - Measured Mineral Resources (Table 2-29) of 700.9Mt grading 0.058%U and containing 406.6ktU,
  - Indicated Mineral Resources (Table 2-29) of 710.2Mt grading 0.052%U and containing 369.1ktU,
  - Inferred Mineral Resources (Table 2-30) of 13.6Mt grading 0.063%U and containing 8.6ktU; and
- Attributable Ore Reserves of 549.0Mt grading 0.064%U and containing 350.8ktU and attributable Mineral Resources of 947.5Mt grading 0.052%U and containing 495.7ktU (Table 2-27).

Table 2-27: Aggregated Mineral Resources and Ore Reserves as of 31 December 2021 for the Mineral Assets

Mining Subsidiary	Deposits	Ore Reserves			Mineral Resources		
	(No)	(Mt)	(%U)	(ktU)	(Mt)	(%U)	(ktU)
Operating Properties							
Kazatomprom-SaUran LLP	5	52.0	0.044	23.1	59.6	0.042	25.3
ME Ortalyk LLP	2	37.2	0.100	37.2	88.5	0.042	37.2
RU-6 LLP	2	17.7	0.076	13.5	17.7	0.076	13.5
Appak LLP	1	46.0	0.035	16.3	46.0	0.035	16.3
JV Inkai LLP	3	252.0	0.052	131.3	294.8	0.051	151.8
Semizbai-U LLP	2	52.3	0.046	24.2	52.3	0.046	24.2
JV Akbastau JSC	3	43.2	0.088	37.9	43.2	0.088	37.9
Karatau LLP	1	49.1	0.079	38.7	49.1	0.079	38.7
JV Zarechnoye JSC	1	8.8	0.059	5.2	9.8	0.059	5.8
JV Katco LLP	2	47.5	0.110	52.4	51.6	0.106	54.9
JV Khorassan-U LLP	1	34.3	0.107	36.6	34.3	0.107	36.6
JV SMCC LLP	2	190.9	0.041	77.9	195.9	0.041	80.0
Baiken-U LLP	1	15.3	0.112	17.0	15.3	0.112	17.0
Budenovskoye LLP	1	153.0	0.075	114.2	160.6	0.075	120.1
Subtotal	**27**	**999.2**	**0.063**	**625.4**	**1,118.5**	**0.059**	**659.2**
Advanced Exploration Properties							
Kazatomprom	2	n/a	n/a	n/a	306.1	0.041	125.1
Subtotal	**2**	n/a	n/a	n/a	**306.1**	**0.041**	**125.1**
Grand Total	**29**	**999.2**	**0.063**	**625.4**	**1,424.7**	**0.055**	**784.4**

Mining Subsidiary	Deposits	Ore Reserves			Mineral Resources		
	(No)	(Mt)	(%U)	(ktU)	(Mt)	(%U)	(ktU)
Attributable		**549.0**	**0.064**	**350.8**	**947.5**	**0.052**	**495.7**

Table 2-28: Aggregated and Attributable Ore Reserves as of 31 December 2021 for the Mineral Assets

Mining Subsidiary	Proved Ore Reserves			Probable Ore Reserves		
	(Mt)	(%U)	(ktU)	(Mt)	(%U)	(ktU)
Kazatomprom-SaUran LLP	5.0	0.037	1.9	47.0	0.045	21.2
Ortalyk LLP	26.7	0.100	26.7	10.5	0.100	10.5
RU-6 LLP	11.2	0.076	8.5	6.5	0.076	5.0
Appak LLP	6.5	0.032	2.1	39.5	0.036	14.2
JV Inkai LLP	202.0	0.053	106.2	50.0	0.050	25.2
Semizbai-U LLP	31.9	0.048	15.4	20.4	0.043	8.8
JV Akbastau JSC	28.6	0.086	24.5	14.7	0.091	13.4
Karatau LLP	22.8	0.097	22.1	26.3	0.063	16.6
JV Zarechnoye JSC	4.3	0.052	2.2	4.5	0.065	2.9
JV Katco LLP	24.1	0.110	26.4	23.4	0.111	26.0
JV Khorassan-U LLP	9.1	0.106	9.6	25.2	0.107	27.0
JV SMCC LLP	102.7	0.041	41.9	88.1	0.041	36.0
Baiken-U LLP	8.1	0.114	9.2	7.2	0.109	7.9
Budenovskoye LLP	-	-	-	153.0	0.075	114.2
Total	**482.8**	**0.061**	**296.7**	**516.5**	**0.064**	**328.8**
Attributable	**263.7**	**0.064**	**169.5**	**285.2**	**0.064**	**181.3**

Table 2-29: Aggregated and Attributable Measured and Indicated Mineral Resources as of 31 December 2021 for the Mineral Assets

Mining Subsidiary	Measured Mineral Resources			Indicated Mineral Resources		
	(Mt)	(%U)	(ktU)	(Mt)	(%U)	(ktU)
Kazatomprom-SaUran LLP	8.5	0.034	2.9	51.1	0.044	22.4
Ortalyk LLP	57.6	0.046	26.7	30.9	0.034	10.5
RU-6 LLP	11.2	0.076	8.5	6.5	0.076	5.0
Appak LLP	6.5	0.032	2.1	39.5	0.036	14.2
JV Inkai LLP	236.2	0.052	122.6	58.6	0.050	29.2
Semizbai-U LLP	31.9	0.048	15.4	20.4	0.043	8.8
JV Akbastau JSC	28.6	0.086	24.5	14.7	0.091	13.4
Karatau LLP	22.8	0.097	22.1	26.3	0.063	16.6
JV Zarechnoye JSC	4.3	0.052	2.2	4.5	0.065	2.9
JV Katco LLP	26.8	0.105	28.1	24.8	0.108	26.8
JV Khorassan-U LLP	9.1	0.106	9.6	25.2	0.107	27.0
JV SMCC LLP	102.7	0.041	41.9	88.1	0.041	36.0
Baiken-U LLP	8.1	0.114	9.2	7.2	0.109	7.9
Budenovskoye LLP	66.5	0.076	50.4	86.5	0.074	63.8
Kazatomprom	80.3	0.050	40.4	225.9	0.038	84.7
Total	**700.9**	**0.058**	**406.6**	**710.2**	**0.052**	**369.1**
Attributable	**434.2**	**0.057**	**247.4**	**507.4**	**0.048**	**244.4**

Table 2-30: Aggregated and Attributable Inferred and Total Mineral Resources as of 31 December 2021 for the Mineral Assets

Mining Subsidiary	Inferred Mineral Resources			Total Mineral Resources		
	(Mt)	(%U)	(ktU)	(Mt)	(%U)	(ktU)
Kazatomprom-SaUran LLP	-	-	-	59.6	0.042	25.3
Ortalyk LLP	-	-	-	88.5	0.042	37.2
RU-6 LLP	-	-	-	17.7	0.076	13.5
Appak LLP	-	-	-	46.0	0.035	16.3
JV Inkai LLP	-	-	-	294.8	0.051	151.8
Semizbai-U LLP	-	-	-	52.3	0.046	24.2
JV Akbastau JSC	-	-	-	43.2	0.088	37.9
Karatau LLP	-	-	-	49.1	0.079	38.7
JV Zarechnoye JSC	1.0	0.064	0.6	9.8	0.059	5.8
JV Katco LLP	-	-	-	51.6	0.106	54.9
JV Khorassan-U LLP	-	-	-	34.3	0.107	36.6
JV SMCC LLP	5.0	0.043	2.2	195.9	0.041	80.0
Baiken-U LLP	-	-	-	15.3	0.112	17.0
Budenovskoye LLP	7.6	0.077	5.8	160.6	0.075	120.1
Kazatomprom	-	-	-	306.1	0.041	125.1
Total	**13.6**	**0.063**	**8.6**	**1,424.7**	**0.055**	**784.4**
Attributable	**5.9**	**0.067**	**3.9**	**947.5**	**0.052**	**495.7**

Table 2-31: Aggregated and Attributable Ore Reserves (historical and current) and Total Mineral Resources as for the Mineral Assets

Reporting Period	Ore Reserves			Mineral Resources		
	(Mt)	(%U)	(ktU)	(Mt)	(%U)	(ktU)
Consolidated						
31/12/2021	999.2	0.063	625.4	1,424.7	0.055	784.4
31/12/2020	788.8	0.061	479.0	1,377.4	0.055	751.9
31/12/2019	822.2	0.061	498.4	1,332.4	0.054	716.2
31/12/2018	859.1	0.061	520.6	1,373.7	0.054	740.0
30/06/2021	859.1	0.061	520.6	1,373.7	0.054	740.0
Attributable						
31/12/2021	549.0	0.064	350.8	947.5	0.052	495.7
31/12/2020	478.2	0.059	281.1	927.4	0.052	479.2
31/12/2019	499.2	0.059	292.7	907.0	0.051	462.4
31/12/2018	521.6	0.059	305.6	932.7	0.051	476.7
30/06/2021	521.6	0.059	305.6	932.7	0.051	476.7

2.3.4 Exploration Programme

The Company has established an exploration programme focus on a number of prospects located in the three key geological regions of Kazakhstan: namely Shu–Sarysu, Syrdarya and North–Kazakhstan. The Company projects expenditure of approximately KZT35.2bn (US$82.9m; Table 2-32) over a 7-year period with approximately 50% of expenditures focused on the Shu-Sarysu region and approximately 30% in the Syrdarya region.

Table 2-32: Regional Exploration Programme

Region	Units	Total	2022	2023	2024	2025	2026	2027	2028
Exploration Programme									
Shu-Sarysu	(KZTm)	16,713.6	5,801.6	5,076.8	2,911.1	1,455.6	1,215.3	253.1	-
Syrdarya	(KZTm)	10,656.1	2,025.1	1,985.9	2,151.7	1,493.5	1,493.5	1,253.1	253.1
North - Kazakhstan	(KZTm)	7,847.4	1,898.6	1,898.6	1,898.6	1,898.6	253.1	-	-
Total	**(KZTm)**	**35,217.2**	**9,725.4**	**8,961.3**	**6,961.4**	**4,847.7**	**2,962.0**	**1,506.2**	**253.1**
Exploration Programme									
Shu-Sarysu	(US$m)	39.3	13.7	11.9	6.8	3.4	2.9	0.6	-
Syrdarya	(US$m)	25.1	4.8	4.7	5.1	3.5	3.5	2.9	0.6
North - Kazakhstan	(US$m)	18.5	4.5	4.5	4.5	4.5	0.6	-	-
Total	**(US$m)**	**82.9**	**22.9**	**21.1**	**16.4**	**11.4**	**7.0**	**3.5**	**0.6**

(1) All US$ estimates have been converted to US$ incorporating from a base date of 30 June 2018 to 31 December 2021 KZ CPI factor of 1.27 and converted to US$ assuming a closing exchange rate of KZT425 to one US$.

2.3.5 Environmental and Social Liabilities

As of 31 December 2021, the Asset Retirement Obligation for the Mining Subsidiaries (Table 2-33) report:

- Aggregated ARO of KZT106,451.2m (US$250.5m); and
- Attributable ARO of KZT71,951.27m (US$169.3m).

As of 31 December 2021, the closing balances of the liquidation funds for the Mining Subsidiaries (excluding the Advanced Exploration Properties) reported KZT46.0bn (US$108.2m). The Environmental Liabilities as reported herein are inclusive of a 10% contingency, however it is clear that further work is required in order to develop the closure cost estimate to a minimum of PFS level and to specifically address the accompanying risks as highlighted in Section 12 of this CPR.

As of 31 December 2021, the Life-of-Mine Plan Environmental and Social Liabilities for the Mining Subsidiaries (Table 2-34) report:

- Aggregated LoMp Liabilities of KZT264,273.3m (US$621.8m); and
- Attributable LoMp Liabilities of KZT165,298.3m (US$388.9m).

Table 2-33: ARO Environmental and Social Liabilities(1),(2)

Mining Subsidiary	ARO (KZTm)	ARO (US$m)	Liquidation Fund (KZTm)	Liquidation Fund (US$m)	Excess/(Shortfall) (KZTm)	Excess/(Shortfall) (US$m)
Operating Properties						
Kazatomprom-SaUran LLP	13,697.9	32.2	6,412.9	15.1	(7,285.0)	(17.1)
Ortalyk LLP	5,224.9	12.3	1,636.8	3.9	(3,588.1)	(8.4)
RU-6 LLP	19,211.4	45.2	2,433.0	5.7	(16,778.4)	(39.5)
Appak LLP	4,228.6	9.9	2,364.2	5.6	(1,864.4)	(4.4)
JV Inkai LLP	8,741.0	20.6	257.1	0.6	(8,483.9)	(20.0)
Semizbai-U LLP	6,141.1	14.4	1,533.0	3.6	(4,608.1)	(10.8)
JV Akbastau JSC	3,915.2	9.2	1,430.8	3.4	(2,484.5)	(5.8)
Karatau LLP	4,126.4	9.7	1,201.3	2.8	(2,925.1)	(6.9)
JV Zarechnoye JSC	2,234.3	5.3	1,407.9	3.3	(826.3)	(1.9)
JV Katco LLP	24,285.6	57.1	21,097.1	49.6	(3,188.5)	(7.5)
JV Khorassan-U LLP	2,865.5	6.7	1,205.0	2.8	(1,660.5)	(3.9)
JV SMCC LLP	8,721.6	20.5	3,304.8	7.8	(5,416.8)	(12.7)
Baiken-U LLP	3,057.7	7.2	1,653.5	3.9	(1,404.2)	(3.3)
Budenovskoye LLP	-	-	107.7	0.3	107.7	0.3
Subtotal	**106,451.2**	**250.5**	**46,045.2**	**108.3**	**(60,406.0)**	**(142.1)**
Advanced Exploration Properties						
Kazatomprom	-	-	-			
Total	**106,451.2**	**250.5**	**46,045.2**	**108.3**	**(60,406.0)**	**(142.1)**
Attributable	**71,951.3**	**169.3**	**27,829.8**	**65.5**	**(44,121.5)**	**(103.8)**

(1) All US$ estimates have been converted to US$ assuming an exchange rate assumption of KZT425 to one US$.

(2) ARO estimates have been updated incorporating updated assumptions for physicals and unit rates.

Table 2-34: LoMp Environmental and Social Liabilities[1]

Mining Subsidiary	LoMp		Liquidation Fund		Excess/(Shortfall)	
	(KZTm)	(US$m)	(KZTm)	(US$m)	(KZTm)	(US$m)
Operating Properties						
Kazatomprom-SaUran LLP	25,189.5	59.3	6,412.9	15.1	(18,776.6)	(44.2)
Ortalyk LLP	16,577.1	39.0	1,636.8	3.9	(14,940.2)	(35.2)
RU-6 LLP	26,632.9	62.7	2,433.0	5.7	(24,199.9)	(56.9)
Appak LLP	8,697.6	20.5	2,364.2	5.6	(6,333.5)	(14.9)
JV Inkai LLP	31,139.7	73.3	257.1	0.6	(30,882.6)	(72.7)
Semizbai-U LLP	14,521.9	34.2	1,533.0	3.6	(12,988.9)	(30.6)
JV Akbastau JSC	15,414.0	36.3	1,430.8	3.4	(13,983.3)	(32.9)
Karatau LLP	9,301.8	21.9	1,201.3	2.8	(8,100.5)	(19.1)
JV Zarechnoye JSC	4,345.1	10.2	1,407.9	3.3	(2,937.2)	(6.9)
JV Katco LLP	25,531.5	60.1	21,097.1	49.6	(4,434.4)	(10.4)
JV Khorassan-U LLP	8,013.2	18.9	1,205.0	2.8	(6,808.2)	(16.0)
JV SMCC LLP	29,663.7	69.8	3,304.8	7.8	(26,358.9)	(62.0)
Baiken-U LLP	6,308.7	14.8	1,653.5	3.9	(4,655.3)	(11.0)
Budenovskoye LLP	42,936.5	101.0	107.7	0.3	(42,828.8)	(100.8)
Subtotal	**264,273.3**	**621.8**	**46,045.2**	**108.3**	**(218,228.1)**	**(513.5)**
Advanced Exploration Properties						
Kazatomprom	-	-	-	-	-	-
Total	**264,273.3**	**621.8**	**46,045.2**	**108.3**	**(218,228.1)**	**(513.5)**
Attributable	**165,298.3**	**388.9**	**27,829.8**	**65.5**	**(137,468.5)**	**(323.5)**

(1) All US$ estimates have been converted to US$ assuming an exchange rate assumption of KZT425 to one US$.

3 COMMODITY PRICES AND MACRO ECONOMICS

3.1 Introduction

The following section includes discussion and comment on the commodity prices and macro-economic assumptions as relied on for the purpose of reporting the Mineral Resources and Ore Reserve statements reported herein in accordance with the terms and definitions of the JORC Code. Specifically, the forecast commodity prices, and macro-economic assumptions as provided by the Company have been compared with historical and forecasts data derived from various public domain sources and as such data sourced from public domain sources have neither been validated nor verified by SRK.

The uranium market summary analysis as reported herein is derived from various public domain sources including, inter alia, www.world-nuclear.org; Consensus Economics, Ux-C; Cameco; Trade-Tech; and SP Global which are acknowledged accordingly.

3.2 Commodity Prices and Macro-Economic Summary

The forecast commodity prices, and macro-economic assumptions as reported herein are compiled from that assumed by the Company comprising the mid-point mid Q4 2021 forecast from "**Ux Consulting Company**" ("**UxC**") and consensus market forecasts where available.

In contrast to the detailed analysis undertaken by UxC, the consensus marker forecasts ("**CMF**") are not directly supported by detailed analysis undertaken by recognised commodity market specialists which typically short, medium- and long-term demand-supply-price analysis to support their determinations. Accordingly, all such forecasts should be considered on a relative comparative basis. Where possible historical data has been collated and reported through to 30 May 2022 and the latest CMF is also sourced from consensus data obtained in May 2022. All historical real terms data has been based dated to reflect 30 April 2022.

With respect to historical macro-economic data, exchange rates are collated to 31 May 2022 and consumer price inflation ("**CPI**") to 30 April 2022, these being typically available on a monthly or quarterly basis. No detailed analysis has however been undertaken in respect of demand-supply-analysis of sulphuric acid and to this extent assumed prices are largely based on historical actuals as reported by the Company.

Table 3-1 and Table 3-2 present the assumed uranium price forecasts for the periods 2021 through 2038. All real terms forecasts are presented on 1 January 2021 money terms and include the Company's forecasts derived from the UxC mid-point forecasts and compared with reference data sourced from CMF and S&P Global Polls. In summary the Company forecast assumes a spot uranium price increasing from US\$42.33/lbU_3O_8 in 2022 through to US\$45.89/lbU_3O_8 by 2026 which can be directly comparted with an assumed **"Long Term Price"** ("**LTP**") of US\$49.15/lbU_3O_8.

Table 3-3 presents forecast of both CPI as sourced from various polling data and in addition projects forecast exchange rates in nominal terms assuming the principle of purchase price parity ("**PPP**").

Table 3-1: Commodity Pricing Assumptions (1 January 2022 real terms): 2022 through 2030

Price Assumption	Units	2022	2023	2024	2025	2026	2027	2028	2029	2030
UxC										
High	(US\$/lbU_3O_8)	45.46	46.25	49.12	52.17	55.70	56.88	60.98	64.14	67.78
Mid	(US\$/lbU_3O_8)	42.33	42.43	44.02	44.70	45.89	46.32	49.26	51.15	53.67
Low	(US\$/lbU_3O_8)	39.23	39.73	40.13	39.74	40.12	40.76	43.58	45.62	46.40
CMF										
High	(US\$/lbU_3O_8)	67.69	56.65	56.41	57.96	59.38	60.00	60.00	60.00	60.00
Median	(US\$/lbU_3O_8)	53.18	51.93	47.97	45.28	46.17	49.15	49.15	49.15	49.15
Low	(US\$/lbU_3O_8)	42.24	40.13	41.03	41.44	36.78	33.00	33.00	33.00	33.00
LoMp Assumptions										
Base Case	(US\$/lbU_3O_8)	42.33	42.43	44.02	44.70	45.89	46.32	49.26	51.15	53.67
	(US\$/lbU)	49.92	50.04	51.91	52.71	54.12	54.62	58.09	60.32	63.29

Price Assumption	Units	2022	2023	2024	2025	2026	2027	2028	2029	2030
	(US$/kgU)	110.05	110.31	114.44	116.21	119.30	120.42	128.07	132.98	139.53
Exchange Rate	(KZT to 1 US$)	425	425	425	425	425	425	425	425	425
	(KZT/lbU)	21,215	21,265	22,062	22,403	22,999	23,215	24,688	25,635	26,898
	(KZT/kgU)	46,771	46,882	48,638	49,390	50,705	51,180	54,428	56,516	59,301

Table 3-2: Commodity Pricing Assumptions (1 January 2022 real terms): 2031 through 2039

Price Assumption	Units	2031	2032	2033	2034	2035	2036	2037	2038	2039
UxC										
High	(US$/lb U_3O_8)	70.80	70.56	70.48	70.50	71.91	73.35	73.35	73.35	73.35
Mid	(US$/lb U_3O_8)	56.61	57.80	59.06	58.85	60.03	61.23	61.23	61.23	61.23
Low	(US$/lb U_3O_8)	46.74	46.46	47.14	46.88	47.82	48.77	48.77	48.77	48.77
CMF										
High	(US$/lb U_3O_8)	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00
Median	(US$/lb U_3O_8)	49.15	49.15	49.15	49.15	49.15	49.15	49.15	49.15	49.15
Low	(US$/lb U_3O_8)	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00
LoMp Assumptions										
	(US$/lb U_3O_8)	56.61	57.80	59.06	58.85	60.03	61.23	61.23	61.23	61.23
Base Case	(US$/lbU)	66.76	68.16	69.65	69.40	70.79	72.20	72.20	72.20	72.20
	(US$/kg)	147.17	150.27	153.54	153.00	156.06	159.18	159.18	159.18	159.18
	(KZT to 1 US$)	425	425	425	425	425	425	425	425	425
Exchange Rate	(KZT/lbU)	28,372	28,968	29,600	29,494	30,084	30,686	30,686	30,686	30,686
	(KZT/kgU)	62,549	63,864	65,256	65,024	66,325	67,652	67,652	67,652	67,652

Table 3-3: Macro-Economic Forecast Assumptions (2022 through 2026)

Statistic	Units	2022	2023	2024	2025	2026
CPI: Average						
Kazakhstan	(%)	8.53	7.13	4.78	4.27	4.00
United States	(%)	7.68	2.86	2.26	2.00	1.97
Russia	(%)	24.00	12.00	6.00	4.00	4.00
Euro Area	(%)	3.92	3.76	2.04	1.81	1.82
United Kingdom	(%)	7.60	3.50	1.85	2.00	2.00
Exchange Rate						
Kazakhstan	(KZT:US$)	430	448	459	469	478
Russia	(RUB:US$)	85	92	96	98	99
Euro Area	(€:US$)	1.29	1.28	1.27	1.27	1.27
United Kingdom	(GBP:US$)	1.37	1.38	1.38	1.38	1.38

3.3 Uranium Market

The following section provides a summary analysis of the global uranium market, historical price analysis and forecast prices as relied on by the Company's latest independent experts UxC and also from recent polls completed in May 2022.

3.3.1 Demand

Nuclear power currently contributes approximately 10% of the world's electricity production. It is expected to play an increasingly important role in future electricity and energy supply for several reasons, including:

- The near-zero carbon dioxide and other pollutant emissions associated with nuclear power generation;
- The on-demand reliable and secure nature of nuclear power, attractive to developing countries, those lacking indigenous energy resources, and to developed countries intent on introducing high shares of renewables, while maintaining grid stability;
- The ability to produce near zero-carbon heat, in addition to electricity, that could help to decarbonize many hard-to-abate sectors of the economy.

About 442 reactors with combined capacity of over 394GWe, require some 79,500 tonnes of uranium oxide concentrate containing about 67,500tU from mines (or the equivalent from stockpiles or secondary sources) each year. This includes initial cores for new reactors coming online. The capacity is growing slowly, and at the same time the reactors are being run more productively, with higher capacity factors, and reactor power levels. However, these factors increasing fuel demand are offset by a trend for increased efficiencies, so demand is dampened: over the 20 years from 1970 there was a 25% reduction in uranium demand per kWh output in Europe due to such improvements, which continue today. Each GWe of increased new capacity will require about 150tUpa of extra mine production routinely, and about 300tU to 450tU for the first fuel load.

Fuel burn-up is measured in units such as MW days per tonne U (MWd/tU). Increases in burn-up reduce the number of fresh fuel assemblies which need to be loaded. Higher burn-up therefore result in potential cost savings for the utility at both ends of the fuel cycle. However, increases in burn-up sometimes (but not always) require increased enrichment levels in the fuel assemblies, which increases the uranium and/or the enrichment needed for each assembly, thus increasing the cost of each assembly. During 1980-2010 burn-up levels increased, compared with original designs, to around 40,000MWd/tU for most Light Water Reactors ("**LWRs**"), with reductions in specific uranium consumption. Some utilities have continued to increase burn-ups further, and levels of 45GWd/tU to 50GWd/tU are now common. However, increasing burn-up above 40GWd/tU only reduces specific uranium consumption slightly, while very slightly increasing specific enrichment requirements. For example, an increase from 40GWd/tU to 50GWd/tU reduces uranium requirements by 4% to 5% and increases enrichment requirements by about 2% to 3%. Generally, utilities have pursued higher enrichment and burn-ups, and when uranium prices were high, they specified low tails assays from enrichment, to get more fuel from it, so that significantly less natural uranium feed was required. As more enrichment energy was then needed there is a clear trade-off between energy input to enrichment and uranium input.

Because of the cost structure of nuclear power generation, with high capital and low fuel costs, the demand for uranium fuel is much more predictable than with probably any other mineral commodity. Once reactors are built, it is very cost-effective to keep them running at high capacity and for utilities to make any adjustments to load trends by cutting back on fossil fuel use. Demand forecasts for uranium thus depend largely on installed and operable capacity, regardless of economic fluctuations. However, this picture is complicated by policies which give preferential grid access to subsidised wind and solar PV sources.

The 2021 edition of The Nuclear Fuel Report continues a positive trend in nuclear generating capacity projections that began in the previous (2019) edition. This has reversed a negative trend that had spanned the preceding three reports (2013, 2015 and 2017). Despite a slight reduction in nuclear generating capacity projections that can be seen in the near to midterm in the Reference and Upper scenarios, all three cases show considerable growth from 2035 onwards due to vast nuclear construction programmes in East and South Asia, extended operational lifetimes of existing reactors and anticipated expansion of the pool of nuclear countries due to more newcomer countries expected to operate their first reactors before 2040.

Three scenarios for world nuclear generating capacity up to 2040 have been prepared, referred to as the Reference, Upper and Lower Scenarios. As of mid-2021, world operable nuclear capacity was around 394GWe (from 442units), and about 60GWe (57 units) was under construction. In the Reference Scenario, nuclear capacity is expected to rise to 439GWe by 2030 and to 615GWe by 2040. In the Upper Scenario, the equivalent figures are 521GWe in 2030 and 839GWe in 2040. The Lower Scenario shows a slight increase that becomes more pronounced after 2030 due to the commissioning of new reactors in China, India and several newcomer countries, compensating for reactor closures in the USA and Western Europe. World reactor requirements for uranium in 2021 are estimated at about 62,500tU. In the Reference Scenario, these are expected to rise to 79,400tU in 2030 and 112,300tU in 2040. In the Upper Scenario, uranium requirements are expected to be about 99,000tU in 2030, and 156,500tU in 2040. In the Lower Scenario, the requirements are expected to rise to nearly 70,000tU in 2030 and 79,400tU in 2040. World uranium production dropped considerably from 63,207tU in 2016 to 47,731tU in 2020. The currently depressed uranium market has caused not only a sharp decrease in uranium exploration activities (by 77% from US$2.12bn in 2014 to nearly U$483m in 2018, according to the 2020 edition of the OECD Nuclear Energy Agency and International

Atomic Energy Agency's Uranium Resources, Production and Demand) but also the curtailment of uranium production at existing mines, with more than 20,500 tonnes of annual production being idled.

Three scenarios for uranium production to 2040 have been developed by evaluating current and future mine production capabilities. In the Reference case, global primary uranium production is expected to be around 70,100tU in 2030 before declining to 50,600tU in 2040. In the Upper case, the equivalent figures are 76,100tU and 53,200 tU, respectively. The partial return of idled mines to production is expected to commence in 2023 and in 2024 in the Upper and the Reference Scenarios, respectively, and in 2025 in the Lower case. Secondary supplies of uranium are projected to have a gradually diminishing role in the world market, decreasing from the current level in supplying 14% to 18% of uranium reactor requirements to 5% to 8% in 2040 (depending on the scenario). However, in the near term, one of the major components of secondary supply, commercial inventories, will continue to play an indispensable part in bridging the gap between supply and demand. Beyond mining, the report found that:

- In the conversion sector, near-term reactor requirements in UF6 will be largely covered by commercial inventories. By 2023, global conversion production is expected to meet requirements due to the ramp-up and restart of existing facilities. Nevertheless, in the long-run more conversion capacity will be needed;
- In the enrichment sector, excess capacity is currently used for underfeeding and tails re-enrichment, bringing in approximately 6,000tU to 8,000tU in support of the undersupplied uranium market. This will largely be reduced over time, as enrichment requirements rise due to nuclear generating capacity growth.
- In the fuel fabrication sector, competition may become more intense from both the commercial and technological perspective, due to increased interest in developments of advanced fuels (e.g., for non-light water reactors). Nuclear fuel demand increasing in Asia and decreasing in the West may cause fuel vendors to move from a regional to a more global market approach.

The report concludes that rapid uranium demand growth in a number of countries, above all in China, will result in the need for additional mined uranium within the period covered by the scenarios. In 2020 uranium supply was nearly 30% less than reactor fleet requirements for that year. Irrespective of the uranium supply scenario, the capacity of all presently-known mining projects will have to at least double by the end of the forecast period. There is no doubt that sufficient uranium resources exist to meet future needs; however, the producers are waiting for the market to rebalance in order to start reinvesting in new capacity and bringing idled and shutdown projects back to production. Additional conversion capacity is also likely to be needed, while enrichment and fuel fabrication capacities appear to be sufficient to cope with demand.

3.3.2 Supply

Uranium production over the period from 1945 to 2021 can be divided into four distinct phases:

- **A military era, from 1945 to the mid-1960s:** The generation of electricity from nuclear fuel was incidental to the nuclear arms race. Production rose rapidly in the 1950s to satisfy the requirement for highly enriched uranium and plutonium. Uranium demand fell sharply in the 1960s and, in response, production halved by the mid-1960s;
- **Mid-1960s to mid-1980s:** A period of rapidly expanding civil nuclear power saw uranium production pick up as reactor orders expanded. Many new mines were brought into production, often underwritten by long-term contracts agreed with electricity utilities in North

America, Japan and Western Europe. Western production peaked in 1980 and stayed above annual reactor requirements until 1985;

- **Mid-1980s to about 2002:** By 1985, the nuclear construction programme had been cut back severely. Many utilities had signed uranium contracts in anticipation of building more plants. Honouring these created a significant overhang. As mines were being run down, many cut production or closed. Utilities satisfied requirements by drawing down their significant inventories, without recourse to new production. The supply overhang was extended due to the arrival on the Western market of uranium from the former Soviet Union starting in 1993; and
- **Early 2000s to present:** There was a strong market reaction to the perception that new primary production would be needed to facilitate an anticipated renaissance in nuclear growth. This took place in the context of a uranium mining sector that had faced unfavourable economic conditions for many years and needed to offset declining and finite secondary supplies. This reaction started in 2003 with a strong upward movement in world uranium prices that continued into 2007 (the spot market price increased by a factor of 13 between early 2003 and mid-2007), but went into a downward correction, accentuated by the Fukushima accident in 2011. Since the accident, uranium prices have fallen to one of the lowest inflation-adjusted levels ever experienced

Production from world uranium mines has in recent years supplied 90% of the requirements of power utilities and primary production from mines is supplemented by secondary supplies, formerly most from ex-military material but now the products of recycling and stockpiles built up in times of reduced demand.

In 2021 mines supplied some 56,961 tonnes of uranium oxide concentrate (U_3O_8) containing 48,303tU, representing 77% of the utilities' annual requirements. The balance is made up from secondary sources including stockpiled uranium held by utilities, and in the last few years of low prices those civil stockpiles have been built up again following their depletion over 1990-2005. At the end of 2020 they were estimated at almost 40,000tU in Europe and the USA, about 130,000tU in China, and about 60,000tU in the rest of Asia. Note that at the prices which utilities are likely to be paying for current delivery, only one-third of the cost of the fuel loaded into a nuclear reactor is the actual ex-mine (or other) supply. The balance is mostly the cost of enrichment and fuel fabrication, with a small element for uranium conversion. With the main growth in uranium demand being in Russia and China, it is noteworthy that the vertically integrated sovereign nuclear industries in these countries (and potentially India) have sought equity in uranium mines abroad, bypassing the market to some extent. Strategic investment in uranium production, even if it is not lowest cost, has become the priority while world prices have been generally low. Russia's ARMZ bought Canada-based Uranium One in 2013, and China holds equity in mines in Niger, Namibia, Kazakhstan, Uzbekistan and Canada

As well as existing and likely new mines, nuclear fuel supply may be from secondary sources including:

- Recycled uranium and plutonium from used fuel, as mixed oxide ("**MOX**") fuel;
- Re-enriched depleted uranium tails;
- Ex-military weapons-grade uranium, blended down;
- Civil stockpiles; and
- Ex-military weapons-grade plutonium, as MOX fuel.

Commercial reprocessing plants are operating in France and Russia with a combined capacity of about 2,000 tonnes of heavy metal ("**tHM**") per year. World reprocessing capacity would increase by 800tHM with the restart of the Japanese plant at Rokkasho-Mura. Further capacity is under construction in Russia and China, and there are a number of other plants with small reprocessing capacities worldwide. Military uranium for weapons was enriched to much higher levels than that for the civil fuel cycle. Weapons-grade material is about 97% U-235, and this can be diluted about 25:1 with depleted uranium (or 30:1 with enriched depleted uranium) to reduce it to about 4%, suitable for use in a power reactor. From 1999 to 2013 the dilution of 30 tonnes per year of such material displaced about 9,720 tonnes U_3O_8 per year of mine production.

The global uranium market since 2011 (Table 3-4) indicates an expansionary (cumulative 18%) phase through to 2016 followed by a noticeable contraction (cumulative negative 23%) through to 2021 with mine production of 125.6MlbU_3O_8 for the 12-month period ended 31 December 2021. Over the same period mine production expressed as a percentage of demand increased from 87.0% to 96.0% which by 2021 has reduced to 77.0% with other sources (stocks) meeting demand of 163.1MlbU_3O_8 in 2021.

In 1990, 55% of global production was sourced from underground mines, however this shrunk dramatically to 33% by 1999 and marginally increased from 2000 following development of the new Canadian mining operations. In situ leach ("**ISL**", also called in situ recovery, "**ISR**") mining has been steadily increasing its share of the total, mainly due to Kazakhstan. In 2021 ISR production at 55% accounted for over half of global mine production compared with 38% from conventional underground and open-pit methods and 7% produced as a by-product. Conventional mines have a mill where the ore is crushed, ground and then leached with sulfuric acid to dissolve the uranium oxides. At the mill of a conventional mine, or the treatment plant of an ISL operation, the uranium then separated by ion exchange before being dried and packed, usually as U_3O_8. Some mills and ISL operations (especially in the USA) use carbonate leaching instead of sulfuric acid, depending on the orebody. Where uranium is recovered as a by-product, e.g., of copper or phosphate, the treatment process is likely to be more complex

Geographical distribution (Table 3-5) of mine production indicates that approximately 76% of world mine production is sourced from four countries: Kazakhstan (45%); Canada (10%); Australia (9%); and Namibia (12%).

With respect to sustainability of supply, the total measure of combined Mineral Resources (exclusive) and Ore Reserves (Table 3-6) indicates a total of 6.1MtU (16.0BlbU_3O_8) representing in excess of 143 active projects/operations globally with approximately 50% of these located in the Commonwealth of Australia ("**Australia**"), Kazakhstan and "**Canada**" representing approximately 125 years of future production assuming peak (2010 through 2021) production levels.

During the 1990s the uranium production industry was consolidated by takeovers, mergers and closures, but this has diversified again with Kazakhstan's multinational ownership structure. Over half of uranium mine production is from state-owned mining companies, some of which prioritise secure supply over market considerations. The top four uranium companies ranked by uranium production (Table 3-7) contribute approximately 50% of global mine production in 2021 with the top 10 contributing approximately 83% of global mine production. The top 10 uranium mining operations ranked by uranium production (Table 3-8) contributed 84% of global mine production in 2021 with the top five contributing approximately 54% of global mine production.

Table 3-4: Global Uranium Market: Historical Supply-Demand Analysis

Statistics	Units	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Supply												
Mine Production	(tU)	53,494	58,490	59,331	56,042	60,342	63,206	60,462	54,155	54,742	47,731	48,303
	(tU_3O_8)	63,083	68,974	69,966	66,087	71,158	74,536	71,300	63,862	64,554	56,287	56,961

Statistics	Units	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
	($MlbU_3O_8$)	139.1	152.1	154.2	145.7	156.9	164.3	157.2	140.8	142.3	124.1	125.6
Demand												
	(tU)	61,487	62,223	65,199	65,932	61,573	65,840	65,013	67,694	67,583	64,501	62,731
	(ktU_3O_8)	72,509	73,377	76,886	77,750	72,610	77,641	76,666	79,828	79,697	76,063	73,976
	($MlbU_3O_8$)	159.9	161.8	169.5	171.4	160.1	171.2	169.0	176.0	175.7	167.7	163.1
% of Demand	(%)	87.0	94.0	91.0	85.0	98.0	96.0	93.0	80.0	81.0	74.0	77.0
Other Sources	($MlbU_3O_8$)	20.8	9.7	15.3	25.7	3.2	6.8	11.8	35.2	33.4	43.6	37.5
Prices												
U_3O_8 Spot (Average)	(US$/lb$U_3O_8$)	57	49	39	33	37	27	22	24	26	29	35
U_3O_8 Spot (Close)	(USc/lb)	53	44	35	36	34	20	24	29	25	30	42
U_3O_8 Spot (Min)	(USc/lb)	49	41	34	28	34	18	19	21	24	24	28
U_3O_8 Spot (Max)	(USc/lb)	73	53	44	44	40	35	27	29	29	34	46

Table 3-5: Global Uranium Market: geographical distribution of historical uranium production

Mine Production	Units	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Kazakhstan	(tU)	19,451	21,317	22,451	23,127	23,607	24,689	23,321	21,705	22,808	19,477	21,819
Canada	(tU)	9,145	8,999	9,331	9,134	13,325	14,039	13,116	7,001	6,938	3,885	4,693
Australia	(tU)	5,983	6,991	6,350	5,001	5,654	6,315	5,882	6,517	6,613	6,203	4,192
Namibia	(tU)	3,258	4,495	4,323	3,255	2,993	3,654	4,224	5,525	5,476	5,413	5,753
Uzbekistan	(tU)	2,500	2,400	2,400	2,400	2,385	3,325	3,400	3,450	3,500	3,500	3,500
Niger	(tU)	4,351	4,667	4,518	4,057	4,116	3,479	3,449	2,911	2,983	2,991	2,248
Russia	(tU)	2,993	2,875	3,135	2,989	3,017	3,005	2,969	2,903	2,911	2,846	2,634
China	(tU)	885	1,500	1,500	1,500	1,616	1,616	1,692	1,885	1,885	1,885	1,885
Ukraine	(tU)	890	960	922	926	1,200	808	707	790	800	744	455
USA	(tU)	1,537	1,596	1,792	1,919	1,256	1,125	940	582	58	6	8
India	(tU)	400	385	385	385	385	385	421	423	308	400	615
South Africa	(tU)	582	465	531	573	393	490	308	346	346	250	385
Iran	(tU)	-	-	-	-	38	-	40	71	71	71	71
Pakistan	(tU)	310	45	45	45	45	45	45	45	45	45	45
Czech Republic	(tU)	229	228	215	193	155	138	-	-	-	-	-
Romania	(tU)	77	90	77	77	77	50	-	-	-	-	-
Brazil	(tU)	-	326	192	55	40	44	-	-	-	15	-
France	(tU)	6	3	5	3	2	-	-	-	-	-	-
Germany	(tU)	51	50	27	33	-	-	-	-	-	-	-
Malawi	(tU)	846	1,101	1,132	369	-	-	-	-	-	-	-
Total	**(tU)**	**53,494**	**58,493**	**59,331**	**56,041**	**60,304**	**63,207**	**60,514**	**54,154**	**54,742**	**47,731**	**48,303**
	(tU_3O_8)	**63,083**	**68,978**	**69,966**	**66,086**	**71,113**	**74,537**	**71,361**	**63,861**	**64,554**	**56,287**	**56,961**
	($MlbU_3O_8$)	**139.1**	**152.1**	**154.2**	**145.7**	**156.8**	**164.3**	**157.3**	**140.8**	**142.3**	**124.1**	**125.6**

Table 3-6: Global Uranium Market: global Mineral Resource (“recoverable”) distribution by country

Rank	Country	Active Projects (No)	2P&3R (ktU)	2P&3R ($MlbU_3O_8$)	2P&3R (%)	Cumulative ($MlbU_3O_8$)	Cumulative (%)
1	Australia	31	1,693	4,401	27.5	4,401	27.5
2	Kazakhstan	18	907	2,357	14.7	6,758	42.3
3	Canada	24	565	1,469	9.2	8,227	51.5
4	Russia	5	486	1,264	7.9	9,490	59.4
5	Namibia	3	448	1,165	7.3	10,656	66.7
6	South Africa	6	321	834	5.2	11,490	71.9
7	Brazil	10	277	720	4.5	12,210	76.4
8	Niger	1	276	719	4.5	12,928	80.9
9	China	4	249	647	4.0	13,575	84.9
10	Mongolia	39	144	373	2.3	13,948	87.3
11	Other	n/a	783	2,035	12.7	15,983	100.0
Total		**141**	**6,148**	**15,983**	**100.0**	**15,983**	**100.0**

Table 3-7: Global Uranium Market: top 14 producing companies

Rank	Company	Production ($MlbU_3O_8$)	Production (tU_3O_8)	Production (tU)	Contribution (%)
1	Kazatomprom	30.8	13,984	11,858	23.1
2	Orano	11.8	5,355	4,541	8.8
3	Cameco	7.9	3,563	3,021	5.9
4	Uranium One	11.7	5,323	4,514	8.8
5	CNNC	9.1	4,127	3,500	6.8
6	CGN	11.4	5,185	4,397	8.6
7	Navoi Mining	10.7	4,849	4,112	8.0
8	BHP	9.3	4,200	3,562	6.9
9	ARMZ	6.9	3,107	2,635	5.1
10	Energy Asia	2.1	954	809	1.6
11	General Atomics/Quasar	5.8	2,643	2,241	4.4
12	Sopamin	2.3	1,061	900	1.8
13	Rio Tinto	5.0	2,267	1,922	3.7
14	VostGok	1.2	537	455	0.9
15	Other	7.4	3,369	2,857	5.6
Total		**133.4**	**60,524**	**51,324**	**100.0**

Table 3-8: Global Uranium Market: top 10 mining operations

Mine	Country	Main owner	Type	Production (tU)	Production ($MlbU_3O_8$)	World Production (%)
Cigar Lake	Canada	Cameco/Orano	underground	4,693	12.2	9.7
Husab	Namibia	Swakop Uranium (CGN)	open pit	3,449	9.0	7.1
Olympic Dam	Australia	BHP Billiton	by-product/underground	3,309	8.6	6.9
Moinkum & Tortkuduk	Kazakhstan	Orano/Kazatomprom	ISL	2,561	6.7	5.3
Inkai, sites 1-3	Kazakhstan	Kazatomprom/Cameco	ISL	2,444	6.4	5.1
Budenovskoye 2	Kazakhstan	Uranium One/Kazatomprom	ISL	2,241	5.8	4.6
Rössing	Namibia	Rio Tinto	open pit	1,996	5.2	4.1
SOMAIR	Niger	Orano	open pit	1,922	5.0	4.0
Central Mynkuduk	Kazakhstan	Kazatomprom	ISL	1,579	4.1	3.3
South Inkai (Block 4)	Kazakhstan	Uranium One/Kazatomprom	ISL	1,579	4.1	3.3

Mine	Country	Main owner	Type	Production (tU)	(MlbU$_3$O$_8$)	World Production (%)
Top 10				**25,773**	**67.0**	**53.4**
Other				22,530	58.6	46.6
Total				**48,303**	**125.6**	**100.0**

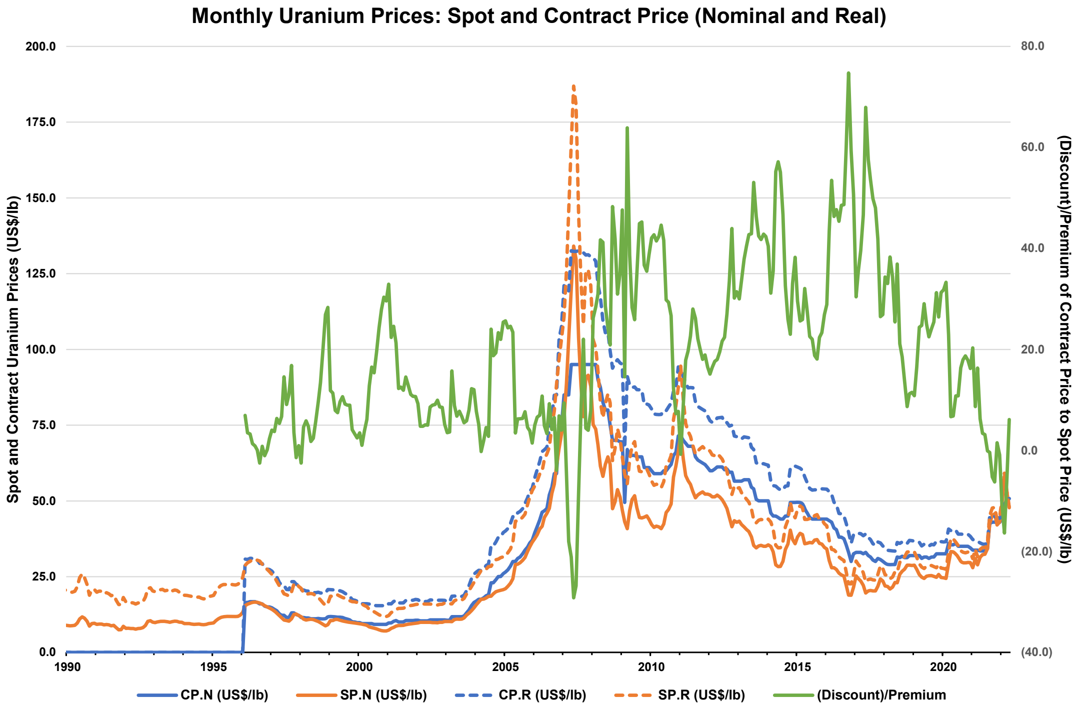
3.3.3 Uranium Price Analysis

All mineral commodity markets tend to be cyclical (i.e., prices rise and fall substantially over the years) but these fluctuations tend to be superimposed on a long-term trend decline in real prices, as technological progress reduces production cost at mines. In the uranium market, however, high prices in the late 1970s gave way to depressed prices in the whole of the period of the 1980s and 1990s, with spot prices below the cost of production for all but the lowest cost mines. Spot prices recovered from 2003 to 2009 but have been weak since then.

The quoted spot prices through to about 2007 applied only to day-to-day marginal trading and represented a small portion of supply, though since 2008 the proportion has approximately doubled, to about one-quarter in the last decade. Most trade is via 3 to 15-year term contracts with producers selling directly to utilities at a higher price than the spot market, reflecting the security of supply. The specified price in these contracts is, however, often related to the spot price at the time of delivery. During mid 2020 (Figure 3-1) the spot price was US$34/lbU$_3O_8$, and the long-term price quoted by UxC was US$32/lbU$_3O_8$.

In 2000, primary market participants – utilities and producers – accounted for 95% of the spot market. That share decreased to two-thirds by 2005 and one-third by 2011 and it has remained at 30-40% since. The rest comes from the financial community, namely traders and financiers who have moved in on the market, binging greater liquidity and efficiency. The reasons for fluctuation in mineral prices relate to demand and perceptions of scarcity. The price cannot indefinitely stay below the cost of production, nor will it remain at very high levels for longer than it takes for new producers to enter the market and anxiety about supply to subside.

Figure 3-1: Spot and long-term nominal uranium prices (2000 through 2021) (Source: Cameco, UxC, TradeTech)



The annual historical spot uranium price reported since 2000 indicates a period of significant increases in nominal terms from 2000 (US$8.38/lbU$_3O_8$) through 2007 (US$98.19/lbU$_3$O$_8$)

which has essentially been in decline through 2020 (US$29.38/lb$U_3O_8$) with 2021 and 2022 indicating a reversal to increased prices of US$35.32/lb$U_3O_8$ and US$50.79/lb$U_3O_8$ respectively. Analysis of the price ranges for the 12-month period ended 31 December 2021 indicates that the spot uranium price has ranged from a low of US$27.98/lb$U_3O_8$ to US$45.75/lb$U_3O_8$ with an average of US$35.32/lb$U_3O_8$ and a three-year moving daily average of US$28.77/lb$U_3O_8$. Analysis of the price ranges for the 5-month period ended 30 May 2022 indicates that the spot uranium price has ranged from a low of US$43.08/lb$U_3O_8$ to US$58.20/lb$U_3O_8$ with an average of US$50.79/lb$U_3O_8$ and a three-year moving daily average of US$35.35/lb$U_3O_8$.

Figure 3-2 presents the historical and forecast gold price trends from 1970 through to 2031 for: nominal and real daily closing prices; three year daily moving average; historical nominal and real LTP assumptions; and forecast CMF in nominal and real terms where the real base date is noted as 1 May 2022. Table 3-10 presents the analysis of the CMF analysis from 2022 through 2030 and in addition the LTP assumptions in real terms (1 January 2021). The CMF LTP for uranium derived from the May 2022 analyst pole indicates a median of US$49/lb$U_3O_8$ based on 4 analysts with a range of US$33/lb$U_3O_8$ to US$60/lb$U_3O_8$. Over the short term the CMF indicates a median price of US$53.18/lb$U_3O_8$ in 2022 to US$46.17/lb$U_3O_8$ in 2026, thereafter increasing to the LTP.

Table 3-9: Historical uranium price statistics for annual periods commencing 2000 through 2022 inclusive[(1),(2)]

Year	Min (US$/lb)	Max (US$/lb)	Average (US$/lb)	3YDMAV (US$/lb)	Nominal Close (US$/lb)	Real Close (US$/lb)	LTP Real (US$/lb)
2000	7.10	9.60	8.38	10.34	7.10	11.80	11.80
2001	7.10	9.60	8.62	9.44	9.60	15.71	15.71
2002	9.60	10.20	9.84	9.26	10.20	16.30	16.30
2003	10.10	14.50	11.25	9.52	14.50	22.75	22.75
2004	14.50	20.70	18.12	11.96	20.70	31.45	31.45
2005	20.70	36.25	27.39	16.65	36.25	53.26	53.26
2006	36.25	72.00	47.55	26.08	72.00	103.15	103.15
2007	72.00	136.00	98.19	47.81	90.00	123.88	123.88
2008	44.00	90.00	63.68	59.20	53.00	72.89	72.89
2009	40.00	54.00	46.47	63.97	44.50	59.58	59.58
2010	40.50	62.50	46.30	63.66	62.50	82.44	82.44
2011	49.00	73.00	57.10	53.39	52.50	67.26	67.26
2012	40.75	52.50	48.88	49.69	43.75	55.09	55.09
2013	34.00	44.00	38.60	47.72	34.50	42.80	42.80
2014	28.00	44.00	33.45	44.51	35.50	43.71	43.71
2015	34.25	39.50	36.87	39.45	34.25	41.86	41.86
2016	18.00	34.85	26.58	33.88	20.25	24.25	24.25
2017	19.25	26.50	21.98	29.72	23.75	27.85	27.85
2018	20.50	29.15	24.47	27.47	28.60	32.91	32.91
2019	24.00	28.90	25.92	24.74	25.15	28.29	28.29
2020	24.10	33.50	29.38	25.44	29.90	33.19	33.19
2021	27.98	45.75	35.32	28.77	42.05	43.60	43.60
2022	**43.08**	**58.20**	**50.79**	**35.35**	**53.00**	**53.00**	**41.67**

(1) Real terms defined as 1 May 2022 money terms. Historical Long-Term Price derived from median of Consensus Market Forecasts.

Figure 3-2: Historical Uranium Spot Market Prices (nominal and real 1 May 2021), daily, three year average daily

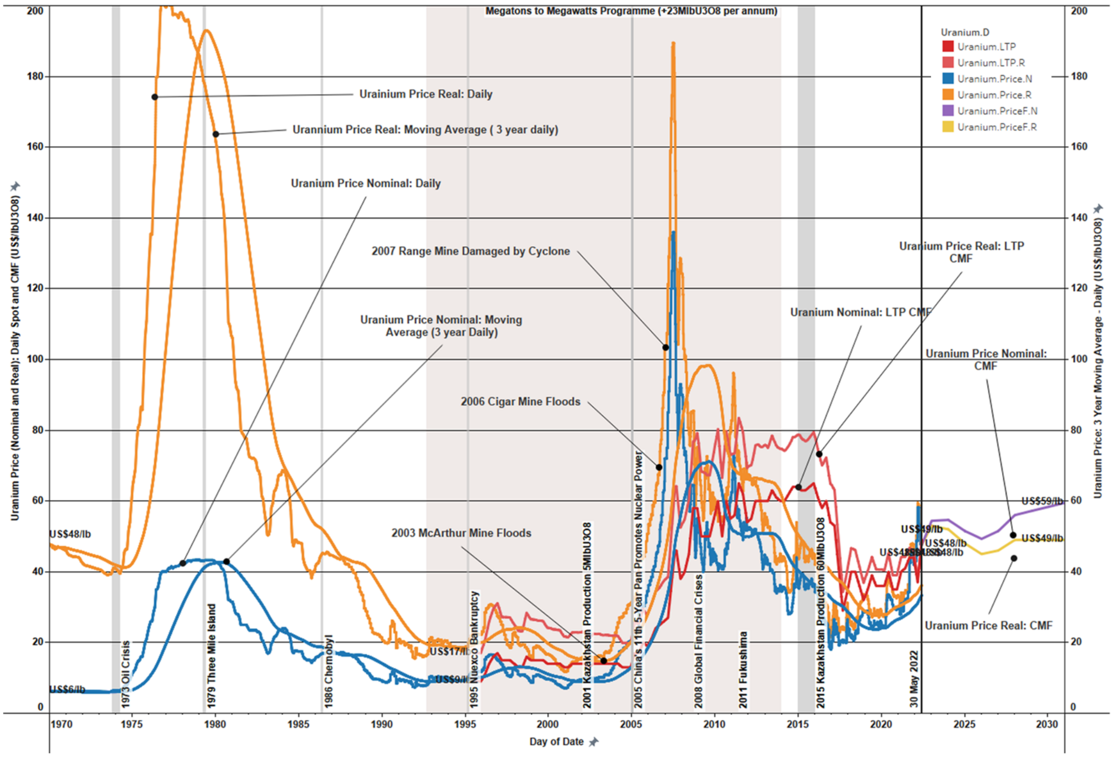


Table 3-10: Uranium Consensus Market Forecast analysis (1 January 2021 money terms): 2021 through 2028 and LTP

Statistics	Units	2022	2023	2024	2025	2026	2027	2028	2029	2030	LTP
High	(US$/lb)	67.69	56.65	56.41	57.96	59.38	60.00	60.00	60.00	60.00	60.00
Median	(US$/lb)	53.18	51.93	47.97	45.28	46.17	49.15	49.15	49.15	49.15	49.15
Average	(US$/lb)	54.54	50.57	48.59	48.29	46.96	47.03	47.03	47.03	47.03	47.03
Low	(US$/lb)	42.24	40.13	41.03	41.44	36.78	33.00	33.00	33.00	33.00	33.00
STDEV	(US$/lb)	8.72	6.87	6.03	6.26	8.68	11.34	11.34	11.34	11.34	11.34
Analysts	(No)	8	7	7	7	6	5	4	4	4	5

The Company has mandated a commodity market specialist, UxC, to provide an overview and analysis of the uranium market including annual schedules of the benchmark spot market price for U_3O_8, which is reproduced and expressly relied upon herein for the purpose of supporting the economic viability of the Ore Reserves and to ensure that the Mineral Resources are appropriately assessed with regards to economic potential. The spot price assumptions have inter alia been relied upon for reporting the 2022 Statements for the Mineral Assets and the 2022 TEPs as reported herein.

The pricing forecasts (spot price forecast) as developed by UxC is developed from UxC's U-PRICE™ econometric model to account for key factors influencing the uranium market, which include UxC Requirements Model ("**URM**") Base Case Demand, Market Outlook & Perception, Primary Production (Base Case), Secondary Supplies, Separative Work Units ("**SWU**" – Enrichment Services) Market Developments and Exchange Rates. During periods of oversupply, the spot price has a history of trending lower as available inventories are offered at a discount to the market. Likewise, in periods of projected undersupply, the spot price has a history of strengthening to incentivise bringing more primary production online to meet higher demand levels.

The real terms (1 January 2020) US$ price is forecast (Table 3-11; Table 3-12) to increase from U$32.88/lb$U_3O_8$ in 2020 to US$40.90/lb$U_3O_8$ in 2025. For the 2026 through 2035 period, the spot price is forecast to increase to US$56.27/lb$U_3O_8$ reflecting an overall increase in the constant U.S. dollar midpoint by 33% and remain at this level thereafter. The general approach adopted by commodity market specialists is to establish demand-supply-price (nominal) relationships and based on demand and supply forecasts determine pricing assumptions accordingly. The key outcomes from the market outlook assessment provided by UxC are:

- An assumed consumer price inflation rate of 2.00% per annum for the United States dollar (US$); and
- In real (1 January 2020) terms mid-point prices of US$32.88/lb$U_3O_8$, US$33.59/lbU_3O_8 and US$52.09/lb$U_3O_8$ for 2020, 2021 and 2030 respectively.

Table 3-11 and Table 3-12 presents the annual pricing assumptions on 1 January 2022 real terms where the assumed unit conversions comprise: 2,204.62262 lbs in one metric tonne; and U to U_3O_8 mass conversion of 1.17925. Comparison of the UxC forecast (mid-point) with the real terms noted by the Consensus Market Forecast ("**CMF**") as sourced from public domain sources indicate:

- In the short term (through 2027) median prices which are essentially higher than the UxC mid-point which margin reduces by 2027;
- In the longer term (from 2028 onwards) median prices which are increasingly lower than the UxC mid-point which increases to approximately US$5.00/lb$U_3O_8$ by 2030; and
- Over the entire period a High-Low spread which essentially increases from approximately US$6.23/lb$U_3O_8$ to US$25.00/lb$U_3O_8$.

Table 3-11: Commodity Pricing Assumptions (1 January 2021 real terms): 2021 through 2029

Price Assumption	Units	2022	2023	2024	2025	2026	2027	2028	2029	2030
UxC										
High	(US$/lb$U_3O_8$)	45.46	46.25	49.12	52.17	55.70	56.88	60.98	64.14	67.78
Mid	(US$/lb$U_3O_8$)	42.33	42.43	44.02	44.70	45.89	46.32	49.26	51.15	53.67
Low	(US$/lb$U_3O_8$)	39.23	39.73	40.13	39.74	40.12	40.76	43.58	45.62	46.40
CMF										
High	(US$/lb$U_3O_8$)	67.69	56.65	56.41	57.96	59.38	60.00	60.00	60.00	60.00
Median	(US$/lb$U_3O_8$)	53.18	51.93	47.97	45.28	46.17	49.15	49.15	49.15	49.15
Low	(US$/lb$U_3O_8$)	42.24	40.13	41.03	41.44	36.78	33.00	33.00	33.00	33.00
LoMp Assumptions										
Base Case	(US$/lb$U_3O_8$)	42.33	42.43	44.02	44.70	45.89	46.32	49.26	51.15	53.67
	(US$/lbU)	49.92	50.04	51.91	52.71	54.12	54.62	58.09	60.32	63.29
	(US$/kgU)	110.05	110.31	114.44	116.21	119.30	120.42	128.07	132.98	139.53
Exchange Rate	(KZT to 1 US$)	425	425	425	425	425	425	425	425	425
	(KZT/lbU)	21,215	21,265	22,062	22,403	22,999	23,215	24,688	25,635	26,898
	(KZT/kgU)	46,771	46,882	48,638	49,390	50,705	51,180	54,428	56,516	59,301

Table 3-12: Commodity Pricing Assumptions (1 January 2021 real terms): 2030 through 2038

Price Assumption	Units	2031	2032	2033	2034	2035	2036	2037	2038	2039
UxC										
High	(US$/lb$U_3O_8$)	70.80	70.56	70.48	70.50	71.91	73.35	73.35	73.35	73.35
Mid	(US$/lb$U_3O_8$)	56.61	57.80	59.06	58.85	60.03	61.23	61.23	61.23	61.23
Low	(US$/lb$U_3O_8$)	46.74	46.46	47.14	46.88	47.82	48.77	48.77	48.77	48.77
CMF										
High	(US$/lb$U_3O_8$)	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00
Median	(US$/lb$U_3O_8$)	49.15	49.15	49.15	49.15	49.15	49.15	49.15	49.15	49.15
Low	(US$/lb$U_3O_8$)	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00
LoMp Assumptions										
Base Case	(US$/lb$U_3O_8$)	56.61	57.80	59.06	58.85	60.03	61.23	61.23	61.23	61.23
	(US$/lbU)	66.76	68.16	69.65	69.40	70.79	72.20	72.20	72.20	72.20
	(US$/kg)	147.17	150.27	153.54	153.00	156.06	159.18	159.18	159.18	159.18
Exchange Rate	(KZT to 1 US$)	425	425	425	425	425	425	425	425	425
	(KZT/lbU)	28,372	28,968	29,600	29,494	30,084	30,686	30,686	30,686	30,686
	(KZT/kgU)	62,549	63,864	65,256	65,024	66,325	67,652	67,652	67,652	67,652

3.4 Macro-Economics

Historical data for the exchange rate between the Kazakhstan tenge ("**KZT**") and the US$ and consumer price inflation ("**CPI**") is provided in Table 3-13, Figure 3-3 and Figure 3-4.

For the 12-month period ended 31 December 2021 the historical exchange rate of the KZT against the US$ has ranged from a low of 415KZT to a high of 440KZT with an average of 426KZT and a year-end close of 435KZT. For the 5-month period ended 30 May 2022 the historical the historical exchange rate of the KZT against the US$ has ranged from a low of

416KZT to a high of 523KZT with an average of 452KZT and a period close of 425KZT

For the 12-month period to 31 December 2021, SRK notes that the CPI:

- For Kazakhstan has ranged between a minimum of 6.97% to a maximum of 9.40% with an average of 8.35% and a closing value of 8.91%; and
- For the United States has ranged between a minimum of 0.74% to a maximum of 4.84% with an average of 2.52% and a closing value of 4.84%.

For the 4-month period to 30 April 2022, SRK notes that the CPI:

- For Kazakhstan has ranged between a minimum of 8.97% to a maximum of 13.30% with an average of 10.98% and a closing value of 13.30%; and
- For the United States has ranged between a minimum of 4.85% to a maximum of 6.53% with an average of 5.77% and a closing value of 6.53%.

Table 3-13: Historical Macro-Economics

Year	Annual Average				End of Period			
	(KZT)	(RUB)	(Euro)	(GBP)	(KZT)	(RUB)	(Euro)	(GBP)
2000	142	28.14	0.92	1.52	146	28.53	0.94	1.50
2001	147	29.20	0.90	1.44	151	30.47	0.89	1.45
2002	153	31.38	0.95	1.50	156	31.93	1.05	1.61
2003	149	30.67	1.13	1.64	143	29.24	1.26	1.79
2004	136	28.80	1.24	1.83	130	27.71	1.36	1.92
2005	133	28.29	1.24	1.82	134	28.74	1.18	1.72
2006	126	27.17	1.26	1.84	127	26.32	1.32	1.96
2007	123	25.56	1.37	2.00	121	24.57	1.46	1.98
2008	120	24.88	1.47	1.85	121	30.53	1.40	1.46
2009	148	31.71	1.39	1.57	148	30.31	1.43	1.62
2010	147	30.37	1.33	1.55	147	30.57	1.34	1.56
2011	147	29.40	1.39	1.60	148	32.19	1.29	1.55
2012	149	31.05	1.29	1.59	150	30.55	1.32	1.63
2013	152	31.86	1.33	1.56	154	32.89	1.37	1.66
2014	179	38.58	1.33	1.65	183	58.05	1.21	1.56
2015	223	61.16	1.11	1.53	341	72.95	1.09	1.47
2016	342	66.94	1.11	1.36	334	61.26	1.05	1.23
2017	326	58.29	1.13	1.29	333	57.66	1.20	1.35
2018	345	62.79	1.18	1.33	384	69.68	1.15	1.28
2019	383	64.67	1.12	1.28	383	61.92	1.12	1.33
2020	414	72.19	1.14	1.28	421	73.79	1.22	1.37
2021	426	73.57	1.18	1.38	435	74.56	1.14	1.35
2022	**452**	**80.18**	**1.10**	**1.31**	**425**	**60.25**	**1.07**	**1.26**

(1) Historical data through to 30 April 2022 for Consumer Price Inflation and to 30 May 2022 for Exchange Rates.

Figure 3-3: Historical Exchange Rates against the US$ (daily close) to 31 May 2022

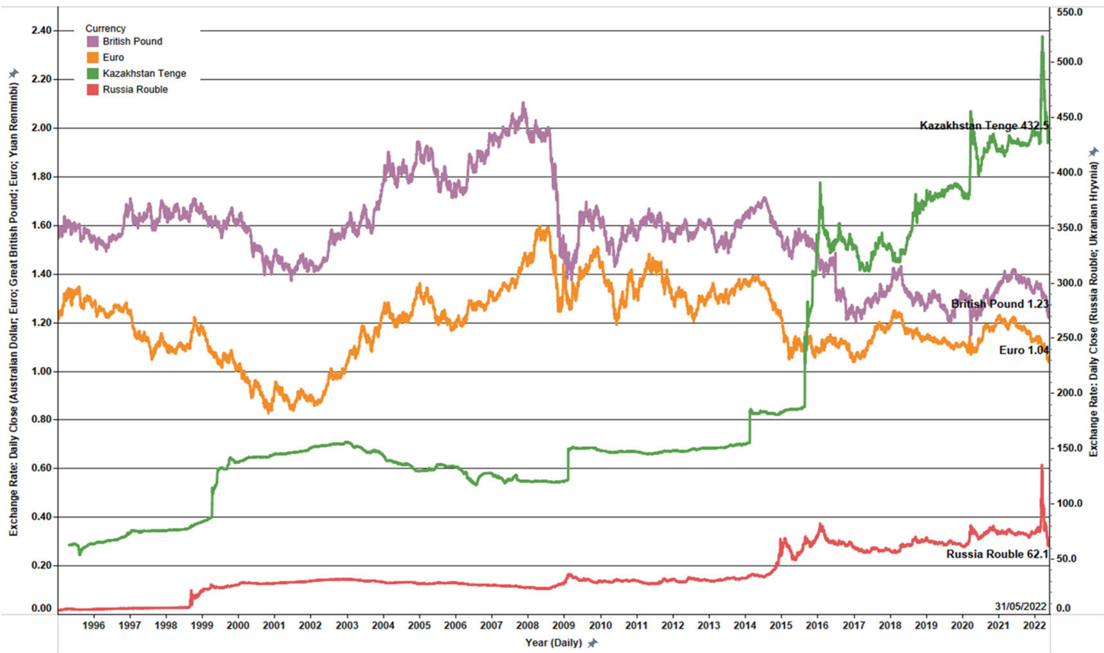
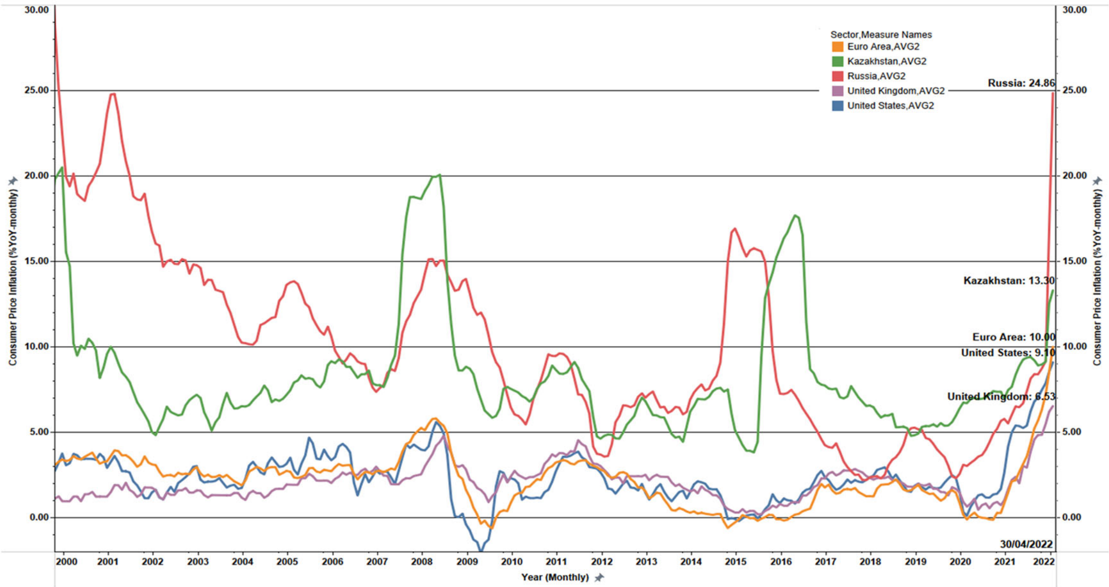


Figure 3-4: Historical Consumer Price Index and Inflation for Kazakhstan to 30 April 2022



4 LEGISLATIVE ENVIRONMENT AND MINING TITLE STATUS

4.1 Introduction

SRK has not reviewed the rights of the Company to mine from a legal perspective. Consequently, SRK has relied on advice by the Company to the effect that the Company will be entitled to mine all material reported here, and that all necessary statutory mining authorisations and permits are in place. SRK's review has rather been restricted to confirming that the stated Mineral Resources and Ore Reserves in this document are within the licences and also on reviewing the technical commitments attached to these licences. Notwithstanding this, this section of the report includes a summary of the mining law in Kazakhstan as it impacts on the Company's assets.

4.2 Legislation

Kazakhstan has recently revised its mining legislation with the aim of boosting mineral exploration and improving control over environmental protection. The new code (the "**Subsoil Code**") was implemented on 27 June 2018.

The Subsoil Code has for the first time introduced a rule under which licences for exploration of solid subsoil resources can be granted to the first applicant (provided no one else has applied for the same deposit), while retaining the pre-existing procedure under which subsoil use rights are granted on the basis of a tender (albeit that it should be noted that the Company has preferential rights to uranium licences within Kazakhstan). The Subsoil Code has also significantly simplified the application process for the obtainment of subsoil use rights. Under the Subsoil Code, subsoil use agreements and licences may be granted to local or foreign legal entities or individuals. Transfers of subsoil use rights are only permitted after consent of the Competent Authority has been obtained. The transfer of a subsoil use right (a share in the subsoil use right) is prohibited (i) under the contract for the exploration of solid minerals in the first year of its operation; (ii) under the contract for geological study of subsurface resources; and (iii) under the contract for uranium mining.

Notwithstanding the above, in general, the content of subsoil use agreements under the Subsoil Code is practically the same as that under previous Subsoil Law and in respect of the subsoil use agreements concluded before the Subsoil Code entered into force, the latter outlines the general rules:

- Subsoil use permits, licences and subsoil use agreements concluded before the Subsoil Code entered into force, as well as the legal acts of executive state bodies of Kazakhstan connected to them, shall remain in effect;
- Subsoil use agreements concluded before the Subsoil Code entered into force, can be amended by agreement between the parties (i.e., the subsoil user and the Competent Authority), or in cases prescribed in the contracts or in the laws; and
- Amendments and supplements to the laws of Kazakhstan, which worsen the results of the entrepreneurial activity of a subsoil user under its subsoil use agreements, do not apply to the contracts concluded before the introduction of such amendments.

The Subsoil Code also sets forth a limited list of grounds based on which the contract may be amended by way of executing a supplementary (amendment) agreement. Such amendments relate to the information on the subsoil user, extension of exploration and/or production periods, transfer of the rights under the contract, or changes in the contract area. In case of changing (extending) the subsoil use agreement's term, the subsoil user shall enter into a new contract according to the terms and conditions of the model contract, if the original contract was entered into prior to the Subsoil Code enactment and does not conform to the model contract.

In addition to changes in the mining law, Kazakhstan continues to implement new legislation relating to climate change and transitioning to a green economy. The Law on Supporting the Use of Renewable Sources of Energy (No 165-4 2009), which aimed to facilitate the reduction in greenhouse gas emission and increase the share in renewable energy relative to fossil fuels, has recently been supplemented by the introduction of the Law on Transition to a Green Economy (in force 1 July 2016). This law provides for amendments and additions to existing laws of Kazakhstan aimed to improve efficient use of resources and waste treatment/recycling. In particular, the law introduces a more precise regulation of removal and storage of waste, and changes to regulation of water resources in terms of quality management, consumption and wastewater disposal. While neither of these laws aim to penalise mining or the fossil fuel industry specifically, they illustrate a growing trend in more stringent environmental requirements across sectors and the potential introduction of costly emission controls in the future.

The Constitution of Kazakhstan vests ownership of mineral resources in the state. The Constitution states that land may be privately owned, but subsurface natural resources are state property. The main legislative act governing extractive activities (including mining) is the Law on Subsoil and Subsoil Use (first enacted in 1996; last amendment: May 2018), (the "**Subsoil Law**"). This legislation was recently replaced by the new code on subsoil and use of subsoil (the "**Subsoil Code**": Section **Error! Reference source not found.**) adopted on 27 December 2017 and becoming effective in June 2018.

The "**Competent Authority**" regulating solid minerals mining currently is the Ministry of Energy. Among other responsibilities and rights, this Competent Authority grants the right for subsoil usage and awards the contracts. The award of contract can be granted either through tender or direct negotiations without holding a tender.

When transferring subsoil use rights to third parties, such as in cases of alienation based on civil law transactions, it is necessary to fulfil certain legal requirements. In particular, the investor must obtain a prior consent from the Competent Authority for such transaction as specified by law. In addition, a prospective investor must keep in mind that the state may exercise its right of pre-emption. A prospective investor should plan in advance the terms of the transaction, since the process of obtaining consent and refusal of the state of pre-emption is durable.

Contracts for geological exploration are valid for 6 years and may be extended in the event of a commercial discovery for a period as required for additional surveys. The contracts for exploitation (Mining Contract) may be granted for up to 45 years and are considered on a case-by-case basis.

Subsoil use rights may be held by Kazakhstani and foreign individuals and legal entities. The rights and obligations of co-holders of the subsoil use right and the procedure for running common business are defined in the contract and in the joint operations agreement. The contracts require mandatory equity participation of a national company and that the relevant share of such local company in the charter capital should be at least 50%.

The subsoil use rights can be granted for the following activities:

- State geological studies of the subsoil resources;
- Geological exploration;
- Production (mining);
- Geological exploration and production combined; and
- Construction and/or operation of underground facilities not associated with mining.

Subsoil use contracts may be terminated by the Competent Authority if a subsoil user is not compliant with contractual obligations, including, but not limited to, regular payment of royalties and taxes to the government and full compliance to the mining, environmental, safety and health requirements.

The Subsoil Law guarantees protection of subsoil user's rights. Any amendments and additions to the legislation that might have adverse effects on commercial activities do not apply to the contracts concluded prior to such amendment and or additions. The governmental guarantees are not applicable in certain areas, including environmental safety, healthcare, defence, national security, taxation and customs control.

4.2.1 Exploration

In order to start exploration activities, a subsoil user is required to obtain subsoil user rights on the basis of signing the exploration contract.

The Competent Authority issues a geological allotment, which is an integral part of the contract and which defines both graphically and by description the subsoil area where a subsoil user has the right to perform exploration works.

An Exploration Work Programme is a mandatory part of the contract and requires prior approval from the authorised state agency for subsoil studies and use. This must include a financial summary, reflecting costs of exploration activities and other relevant expenditures and should be prepared for a period of up to 6 years.

An exploration project is subject to the following mandatory expert examinations:

- State environmental examination and approval;
- State industrial safety approval; and
- State sanitary approval.

In the event of a commercial discovery during the exploration stage, a subsoil user is obliged to notify the Competent Authority. Further, the Competent Authority shall issue a permit for transferring the project to a more advanced stage – the Project for Appraisal Works stage.

The Project for Appraisal Works document (which may comprise a pilot production project or a test production project) identifies the mining and geological conditions of the deposit, technological parameters and the economic feasibility of the deposit development. It must contain a financial section reflecting financial provisions for mineral resources and reserves estimation study for the entire appraisal period.

Similarly, the Project for Appraisal Works document is a subject to the following mandatory expert examinations:

- State environmental examination and approval;
- State industrial safety approval; and
- State sanitary approval.

A subsoil user that has discovered and appraised a deposit under an exploration contract shall have a pre-emptive right over any other interested parties to be granted a subsoil use right for production by means of direct negotiations without going through a tender procedure.

4.2.2 Mining

Prior to signing and registering a Mining Contract, the winner of a tender or a contractual party who is to enter into contractual negotiations with the state shall ensure the preparation of project documentation as prescribed in the legislation.

The project documentation for a mining contract comprises the following key documents:

- A work programme;
- A Commercial Deposit Development Project; and
- A Feasibility Study (“**FS**” or TEO).

A Commercial Deposit Development Project must address the mining and production time schedule; technical aspects and solutions ensuring constant productivity rates of the mine; measures ensuring compliance with the requirements of rational and integrated use of subsoil resources, work safety, protection of the environment; reclamation of disturbed soils, as well as information on the financing of the planned activities with a breakdown by years.

A draft contract, together with a work programme, shall be, prior to its signing, subject to agreement with the authorised agency for subsoil studies and use. The project documentation must be agreed and approved by the local authorities. Relevant approvals include the following:

- State environmental examination and approval;
- State industrial safety approval;
- State sanitary approval; and
- Approval for the rational and integrated use of subsoil resources.

The draft Feasibility Study document (when ready) must also undergo a mandatory economic expert examination.

A Mining Contract is finally signed between the subsoil user and Competent Authorities when all the above procedures are complete, and all required approvals are obtained.

4.2.3 Environmental Regulations

Environmental legislation in Kazakhstan is primarily based on the Constitution as a supreme law and new Environmental Code (replaced 2007 Environmental Code). New Environmental Code was adopted on 2 January 2021 and came into effect on 1 July 2021. It defines the legal, economic and social aspects of environmental protection and aims to prevent the adverse impacts of business activities on the environment, preserve ecological balance, contribute to the Paris Agreement and other international commitments and implement sustainable environmental management. It is an unfinished regulation in the sense that subsidiary legislation that expands on some of the requirements remains incomplete.

The Environmental Code includes a number of generic requirements applicable to mining projects, but these can be superseded by specific requirements within the asset’s environmental permits or other legal agreements. Non-compliance could lead to suspension of operations.

Environmental impact assessment (“**EIA**”) approval is a prerequisite to financing and implementing most mining projects. The EIA process is referred to as an “**OVOS**” process in Kazakhstan. The EIA procedure was profoundly revised under the new Environmental Code and is explained in Articles 64 – 84. It must be initiated at the commencement of a technical project in the form of a screening and scoping processes, followed by an impact assessment if warranted on completion of these initial two stages. Completion of an EIA is mandatory for most mining projects in Kazakhstan and the implementation time frame has increased significantly (up to three years) compared with prior legislation.

Stakeholder engagement is one of the main components of the EIA process in Kazakhstan and according to new legislation, public participation in all stages of an EIA is key and can therefore influence the project decisions and related outcomes.

Environmental approval must be obtained before a project can proceed. According to the

Article 87 of new Environmental Code, state ecological expertise ("**SEE**") is an obligatory measure of environmental protection prior to making a business decision on the development of any project of I, II and III categories of hazard (includes most of mining operations). SEE approval takes the form of a record of decision referred to as a "*positive conclusion of the SEE"*. Implementation of projects without a positive conclusion of the SEE is prohibited (Article 90 of new Environmental Code). Positive SEE conclusions issued before 1 July 2021 remain effective during the period specified in the conclusion.

Environmental permits in Kazakhstan are compulsory for the operations of I and II categories of hazard. They are issued in a form of environmental impact permit or complex environmental permit.

According to Article 418 of new Environmental Code, all category I operations commissioned before 1 July 2021 and category II operations must have environmental impact permits, which issued by regulatory authority and its local (regional) executive body, respectively. Nonetheless, environmental permits obtained by the category I and II operations before 1 July 2021 will remain valid in the period as shown on these permits. Should the category I operation opt for changing its operational process it must initiate environmental assessment process and apply for complex environmental permit.

Starting from 1 January 2025, all category I enterprises commissioned after 1 July 2021 must obtain complex environmental permit and include Best Available Technologies ("**BAT**") in their operation (Article 111 of new Environmental Code). BAT is introduced to minimize environmental footprint of operation. A subordinate organisation of the regulatory authority will develop a guide on the BAT by 1 July 2023 to support this technological transition. In the meantime, these operations will develop their project designs and operate on the basis of the developments of the European Integrated Pollution Prevention and Control Bureau in the field of BAT.

The industrial environmental monitoring programme establishes a mandatory list of parameters to be monitored (including air, soil, groundwater and other), duration and frequency of the measurements, and instrumental or computational methods used. The environmental action plan provides the costs incurred by the operation for implementation of required environmental protection measures and pollution payments.

The emissions permitting system in Kazakhstan is a "pay-to-pollute" system wherein the developer pays for the 'right' to make emissions to the environment in accordance with the permit. Emission permits contain emission limits that must be adhered to. There are also maximum permissible concentrations (sanitary norms) that apply on the boundary of sanitary protection zones around hazardous facilities. Regulatory authorities impose high penalties for non-compliance with permit limits or sanitary norms. Emissions fees are paid quarterly and for standard emissions are paid based on fixed rates according to the tax legislation. For releases in excess of the permit limits or sanitary norms lead to the penalties according to the administrative violations legislation and for environmental damage.

Environmental reports must be regularly submitted to regulating authorities as specified in the permit. If the required documentation is not submitted this may lead to fines.

The new Environmental Code also provides for regulation of the use of radioactive materials, nuclear energy and radiation safety alongside specific laws on these subjects. In addition, it covers environmental damage, economic evaluation of damage and damage payments. Furthermore, the Environmental Code regulates greenhouse gas emissions and provides for the Kazakhstan Emissions Trading System ("**KAZ ETS**"). Details of KAZ ETS have been issued in a series of executive decrees. The KAZ ETS was launched in 2013, was temporarily suspended in 2016 and became operational again in January 2018. The Company's operations are not major producers of greenhouse gases. The annual Scope 1 greenhouse gas emissions from the operations are below the threshold (of 20,000 tonnes of carbon dioxide equivalent) for greenhouse gas reporting and participation in the KAZ ETS.

According to Article 109 (Environmental basis for performing subsoil (extractive) operations) of the Subsoil Law, a subsoil user must obtain all required approvals of project documentation from relevant authorities, including obtaining required environmental permits.

A subsoil user must submit all project documentation as noted earlier. The project documentation must include an Environmental Impact Assessment of the proposed activities, an Environmental Emissions Permit and must also address environmental protection/mitigation measures to reduce, avoid or control potential adverse effects on environment.

Environmental regulations as defined in the new Subsoil Code are described in Articles 6 (Environmental safety of subsoil use) and 52 (Environmental safety of subsoil operations) of the Subsoil Code, subsoil use shall be carried out in environmentally safe manner with appropriate measures taken to prevent pollution of the subsoil and minimize adverse impact on the environment. Subsoil operations including forecasting, planning and design of industrial and other facilities shall comply with environmental legislation of Kazakhstan Republic. Environmental state/condition of subsoil is ensured by regulating of maximum permissible emissions, limiting or prohibiting of subsoil operations or it's particular types. Based on requirements of the Subsoil Code, subsoil use is prohibited without positive conclusion of the state environmental expertise or without approval of the authorized body responsible for environmental protection.

4.2.4 Mine closure

According to the Article 111 (Liquidation and Conservation of Subsoil Use Objects) of the Subsoil Law, after termination of the subsoil use operations (or termination of a Mining Contract) or the depletion of mineral resources, a subsoil user, in line with the project documentation and working programme shall immediately proceed to works, associated with remediation/liquidation or conservation of the mine complex.

The liquidation or conservation works are carried out on the basis of liquidation or conservation plan (mine closure and remediation plan) that meets the following criteria:

- That it has been developed by a licensed design company;
- That it was developed according to the rules of liquidation and conservation of subsoil use objects;
- That the closure plan has been approved by a subsoil user; and that
- The closure plan has been agreed with, and approved by, the relevant authorities controlling environmental protection, study and use of subsoil resources, industrial safety, sanitary-epidemiological service, and land resources management.

The liquidation is financed by the liquidation fund which is accumulated by the subsoil user on a special deposit account in any bank in Kazakhstan, to eliminate the negative impacts as a result of subsoil use operations (mine operations). In the event of there being insufficient funds accumulated for remediation and clean-up, the subsoil user must cover the remaining costs and be fully responsible for mine closure and remediation.

Mine closure regulations as defined in the new Subsoil Code are described in Article 54 (General provisions on liquidation of subsoil use consequences) of the Subsoil Code. After termination of the subsoil use operations (or termination of mining contract) or the depletion of

Ore Reserves, a subsoil user shall carry out remediation/liquidation of consequences of the subsoil use operations on subsoil plot provided.

4.2.5 Land Code and Land Use Regulations

The “**Land Code**” (Law No 442 II ZPK, 2003, amended 29 June 2018) enables land to be given designated uses. The Code requires owners/users of land, whether state or privately owned, not to harm public health or the environment, not to pollute the land or cause deterioration in soil fertility, to conserve topsoil and to rehabilitate disturbed land. The Land Code allows for state appropriation of land for “public needs” (which may include mineral exploration/exploitation). It also includes the legal procedure for changing land use.

According to Article 68.5 of the Subsoil Law, a signed subsoil resources use contract is the basis for registration of the land plot. The land plot is registered with a regional executive body except for cases of forced expropriation of land plots (land use right) for the state needs in compliance with land legislation of Kazakhstan, specifically the Land Use Code.

Article 84.1 of Land Use Code states that land can be forcibly expropriated for state needs in exceptional cases when it is impossible to meet these needs in any other way. The law does however provide compensation mechanisms for such cases.

If the land is owned by third parties the subsoil user has to make provisions to obtain rights to use land plot. The termination of the subsoil use right shall constitute an unconditional ground for terminating the land use right to the land plot allocated for the purposes of subsoil use.

Land use regulations as defined in the Subsoil Code are described in Article 167.2 of the Subsoil Code.

4.2.6 Water Use Code

The “**Water Use Code**” (Law No 481, 2003, amended 29 June 2018) describes the general procedure for water protection activities, including payments for water use and protection of waters from pollution and depletion. As with the Environment Code, the Water Use Code stipulates a permit must be obtained for water abstraction, industrial (and mining) water use and the discharge of effluents (referred to as “special water uses”). The responsible authority is the Committee of Water Resources of the Ministry of Agriculture.

4.2.7 Atomic Industry and Radiation Safety Requirements

The primary legislation on nuclear safety and security is outlined below.

- Law of the Republic of Kazakhstan of 12 January 2016 No 442-V “On the Use of Atomic Energy”: The “**Atomic Energy Law**” defines the legal basis and principles of regulating public relations in the use of atomic energy in order to protect the life and health of people, their property and environment. It includes specific provisions on licensing (Article 9),construction of nuclear facilities and repositories (Article 12), nuclear security (Article 13),state accounting for nuclear material and sources of ionising radiation (Article 14), export and import (Article 15), transport (Article 6), handling of radioactive waste and spent fuel (Article 17), decommissioning of facilities (Article 22), emergency preparedness and response (Article 23), safety and security reviews (Article 24) and compensation (Article 27). Additionally, the Atomic Energy Law defines the types of expertise of nuclear, radiation and nuclear physical safety required for various types of facilities. Natural uranium mining and processing facilities are subject to licensing according to the Atomic Energy Law;
- Law of the Republic of Kazakhstan No 219-I of April 23, 1998 “On Radiation Safety of the Population”: The “**Radiation Safety Law**” regulates the field of radiation safety of people to

protect them from harmful effects of ionizing radiation; and

- Law of the Republic of Kazakhstan dated May 16, 2014 No 202-V "On Permits and Notifications" (as amended on June 15, 2017) (the "**Permits and Notifications Law**"): In addition to the environmental permit/s, licences are required to operate or provide service to a nuclear\radiation hazardous facility. Depending on the operation these may include:
  - licence for works related to the life cycle of nuclear facilities,
  - licence for activities related to radioactive waste management,
  - licence for activities related to the special training of personnel responsible for ensuring nuclear and radiation safety,
  - licence for the provision of services in the field of the use of atomic energy,
  - licence for handling radioactive substances, devices and installations containing radioactive substances,
  - licence for transportation, including transit, of nuclear materials, radioactive substances, radioisotope sources of ionizing radiation, radioactive waste within the territory of Kazakhstan,
  - licence for physical protection of nuclear installations and nuclear materials,
  - licence for handling nuclear materials.

  Several subordinate documents have been developed to support implementation of the Atomic Energy Law, the Radiation Safety Law and the Permits and Notifications Law. Regulatory functions for safety, security and safeguards are assigned to the Committee of Atomic and Energy Supervision and Control, which reports to the Ministry of Energy. The Committee is responsible for licensing of nuclear related activities, development of norms and rules related to radiation safety, emergency planning and supervision of compliance to the norms and rules.

4.2.8 Labour Protection and Occupational Health and Safety

Labour protection and health and safety in Kazakhstan are regulated by:

- "**Constitution**": The Constitution of the Republic of Kazakhstan (adopted at the republican referendum on August 30, 1995) (with amendments and additions as of March 10, 2017);
- "**Labour Code**": The Labour Code of the Republic of Kazakhstan of November 23, 2015 No. 414-V (as amended and supplemented as of June 13, 2017); and
- "Law on Civil Protection": Law of the Republic of Kazakhstan of April 11, 2014 No. 188-V "On Civil Protection" (as amended and supplemented as of June 13, 2017).

The Constitution and the Labour Code guarantee basic workers' rights, including the occupational safety and health, the right to organise and the right to strike. The Labour Code regulates employment and related matters, including dismissal, and safety in the workplace.

The Constitution and the Labour Code prohibit discrimination based on gender, race, decent, nationality, religion, political opinion, public associations, social class or financial status, and physical shortcomings. The Constitution and Labour Code also prohibit forced and child labour. The mining age for work is 16 years in most work settings and 18 years for hazardous work (Articles 31 and 26 of the Labour Code, respectively).

The Ministry of Labour and Social Protection is responsible for the enforcement of the Labour Code.

The Labour Code makes written employment contracts mandatory and promotes use of collective bargaining agreements. The Code requires an employer to give a month's notice prior to termination in case of dismissal due to liquidation or downsizing of personnel, unless a longer notification period is stipulated in the employment contract or collective bargaining agreement. Compensation must be paid for dismissal due to liquidation or restructuring and should be one average month salary. It can be more if there is a provision in the employment contract or collective bargaining agreement. An employer is obligated to report to the labour authority at least one month before contemplated collective dismissal. There are restrictions on retrenchment of staffing positions of pregnant women, single parents with young children and people who are close to retirement age. When the employment contract is terminated, amounts due to the employee from the employer must be made no later than three working days after its termination.

The Labour Code provides for labour and employment claims to be asserted collectively or individually and resolved through a conciliation commission, mediation commission, labour arbitration or court hearing.

The Law on Civil Protection regulates fire safety and industrial safety, as well as defines the main tasks, organizational principles for the construction and operation of the civil defence of the Republic of Kazakhstan

4.2.9 Energy Saving Law

Under the Law No 541-IV "*On Energy Saving and Raising Energy Efficiency*", which came into effect in 2012, enterprises required to demonstrate improvements in energy saving and energy efficiency. The Company's ISR mines have ISO 5001 energy management systems to facilitate ongoing improvement.

4.3 Status of the Company's Agreements

The table below summarises status and details of the Company's Mining Contracts. Each Mining Contract has a validity term which can be changed (i.e., exploration/mining terms). In case changes are required to a Mining Contract then an additional agreement is signed between the Company and the Competent Authority (i.e., changes to a mining term, mining lease area or production requirements).

Table 4-1: Status of the Company's mining contracts details

Mining Subsidiary/Deposit	Stage	Equity Interest	Contract Details (No)	Award (date)	Recent Amendment (date)	Expiry (year)	Area (km^2)	Production Requirement (tU)
Kazatomprom-SaUran LLP		**100.00**						
Uvanas	OP		73	27/11/1996	01/11/2013	2022	84.48	Depleted
Eastern Mynkuduk	OP		74	27/11/1996	02/11/2017	2022	28.97	1,000
Kanzhugan	OP		75	27/11/1996	01/11/2013	2022	60.83	550
South Moinkum (Southern part)	OP		543	26/09/2000	01/11/2013	2019	17.40	Depleted
Central Moinkum	OP		3609-TPI	31/05/2010	24/03/2016	2039	61.22	550
Total							**252.90**	
Ortalyk LLP		**100.00**						
Zhalpak	OP		3610-TPI	31/05/2010	19/10/2017	2022	145.80	Exploration Stage
Central Mynkuduk	OP		1796	08/07/2005	19/10/2017	2033	40.60	2,000
Total							**186.40**	
RU-6 LLP		**100.00**						
Northern Karamurun	OP		76	27/11/1996	01/11/2013	2022	59.58	1,000
Southern Karamurun	OP							
Total							**59.58**	
Appak LLP		**65.00**						
Western Mynkuduk	OP		1797	08/07/2005	29/12/2016	2035	133.46	1,000
JV Inkai LLP		**60.00**						
Blocks 1, Inkai (a)	OP		507	13/07/2000	30/11/2017	2045	139.00	4,000
Blocks 1, Inkai (b)	OP					2045		
Blocks 1, Inkai (c)	OP					2045		
Total							**139.00**	
Semizbai-U LLP		**51.00**						
Semizbai	OP		2060	02/06/2006	28/05/2015	2031	27.20	500
Irkol	OP		1801	08/07/2005	28/05/2015	2030	44.00	700
Total							**71.20**	
JV Akbastau JSC		**50.00**						
Block 1 Budenovskoye	OP		2488	20/11/2007	30/04/2015	2037	1.59	731
Block 3 Budenovskoye	OP		2487	20/11/2007	20/03/2015	2038	1.12	1,200
Block 4 Budenovskoye	OP						-	
Total							**2.71**	
Karatau LLP		**50.00**						
Block 2, Budenovskoye	OP		1798	08/07/2005	09/06/2017	2040	17.28	3,200
JV Zarechnoye JSC		**49.98**						
Zarechnoye	OP		996	23/09/2002	29/12/2016	2025	38.00	1,000
JV Katco LLP		**49.00**						

Mining Subsidiary/Deposit	Stage	Equity Interest	Contract Details (No)	Award (date)	Recent Amendment (date)	Expiry (year)	Area (km^2)	Production Requirement (tU)
Southern Moinkum (Northern part)	OP		414	03/03/2000	17/05/2011	2039	15.92	2,000
Tortkuduk	OP					2039	29.81	2,000
Total							**45.73**	
JV Khorassan-U LLP		**50.00**						
Block Kharassan 1, North Kharassan	OP		1799	08/07/2005	17/10/2014	2058	70.80	3,000
JV SMCC LLP		**30.00**						
Akdala	OP		647	28/03/2001	29/12/2016	2026	37.54	1,000
Block 4, Inkai	OP		1800	08/07/2005	29/12/2016	2029	79.37	2,000
Total							**116.91**	
Baiken-U LLP		**52.50**						
Block Kharassan 2, North Kharassan	OP		1964	01/03/2006	04/03/2015	2055	350.00	2,000
Kazatomprom		**100.00**						
Block 2 Inkai	AEP		4614-TPI-ME	25/06/2018	n/a	2022	183.20	Exploration Stage
Block 3 Inkai	AEP		4615-TPI-ME	25/06/2018	n/a	2022	240.80	Exploration Stage
Total							**424.00**	
Budenovskoye LLP		**51.00**						
Block 6& 7 Budenovskoye	AEP		4198-TPI-ME	14/10/2015	12/06/2017	2022	151.30	Development
Total							**151.30**	
Grand Total							**2,059.27**	
Regional								
Chu-Sarysu							1,469.69	
Syrdarya							562.38	
Northern Kazakhstan							27.20	
Total							**2,059.27**	

(1) As of the date of this CPR, the Company was the registered subsoil user with respect to the deposit developed by Kazatomprom-SaUran LLP and RU-6 LLP; the Company intends to transfer the rights under the relevant subsoil use contracts to Kazatomprom-SaUran LLP and RU-6 LLP by the end of 2019.

5 URANIUM DEPOSITS: GEOLOGICAL OCCURRENCE, MINING AND PROCESSING

5.1 Introduction

The following section includes common background elements pertinent to the context of the Mineral Assets and is generally sourced from various public domain sources and SRK's industry experience with specific focus on: Uranium Deposits; Kazakhstan Uranium Production; and Mining and Processing Operations at the Company's Deposits.

5.2 Uranium Deposits: geology, resources, mining and processing

Geology and Mineralisation

Uranium is a relatively common element in the crust of the Earth with a stated average of 2.8ppm which economic concentrations of which are not uncommon. Typical natural uranium concentrations range from very high-grade ore noted in certain deposits located in Canada (20%U) to very low-grade ore in certain deposits in Namibia. During the past decade global uranium resources have increased by at least 25% primarily as a direct result of increased mineral exploration.

Table 5-1: Typical natural uranium concentration

Grade category	Concentration (ppm)	(%)
Very High-Grade Ore (Canada)	200,000	20.0
High-Grade Ore	20,000	2.0
Low-Grade Ore	1000	0.1
Very Low-Grade Ore (Namibia)	100	0.0
Granite	3-5	0.0003-0.0005
Sedimentary Rock	2-3	0.0002-0.0003
Earth's Continental Crust (average)	2.8	0.00028
Seawater	0.003	0.0000003

Uranium naturally occurs in a number of differing geological environments and are typically grouped into 15 major types (Table 5-2) based on a standardised geological classification as define by the International Atomic Energy Agency ("**IAEA**") in 2013 and adopted for reporting in the industry benchmark "**Red Book**" since 2014 (latest available 2020). The deposit types have fundamental characteristics and recognition criteria, and in that respect, while mainly named by host rock, the types are essentially empirical models, based on observable characteristics.

The majority of economic deposits are either unconformity-related (30%) or sandstone deposits (30%) and over two-thirds of the world's production of uranium from mines is from Kazakhstan, Canada and Australia. Most deposits in Kazakhstan are sandstone hosted while most Canadian deposits are unconformity-related, and most Australian deposits are either unconformity-related or iron oxide breccia complexes.

The major primary ore mineral is uraninite (basically UO_2) or pitchblende ($U_2O_5.UO_3$, better known as U_3O_8), though a range of other uranium minerals are found in particular deposits. These include carnotite (uranium potassium vanadate), the davidite-brannerite-absite type uranium titanates, and the euxenite-fergusonite-samarskite group (niobates of uranium and rare earths). Most uranium mines exploit only uranium, some uranium is also recovered as a by-product of copper (Olympic Dam), gold (Witwatersrand) or phosphate deposits (Morocco and Florida).

Table 5-2: Uranium Deposit Types

Deposit Type	Host Rock	Deposit examples and occurrence
Intrusive	Alaskite, granite, pegmatite and monzonites	Rössing and Husab (Republic of Namibia: "**Namibia**"), Kvanefjeld (Greenland), Bancroft area (Canada), and Palabora (Republic of South Africa: "**South Africa**"))
Granite-related	Veins in granite, deposits in adjacent metasediments and disseminated mineralisation in granite	Jachymov deposit (Czech Republic), various ore bodies in Europe, Canada and Commonwealth of Australia ("**Australia**")
Polymetallic iron-oxide breccia complex	Hematite-rich granite breccia complex	Olympic Dam (Australia)

Deposit Type	Host Rock	Deposit examples and occurrence
Volcanic-related	Occur in and near volcanic calderas, in acid to intermediate volcanic rocks, and are related to faults and shear zones	Peoples' Republic of China ("**China**") (Xiangshan), Kazakhstan, Mongolia (Dornod and Gurvanbulag), Russian Federation ("**Russia**") (Streltovska caldera, the major occurrence), Republic of Peru and Mexico.
Metasomite	Disseminated uranium in structurally deformed rocks that were affected by sodium and/or potassium metasomatism	Elkon district (Russia), the Lagoa Real-Caetite district (Federative Republic of Brazil), Novokonstantinovskoye and those near Zheltye Vody (Ukraine), Valhalla and Skal (Australia), Michelin (Canada) and Lianshanguan (China).
Metamorphite	Occur in metasediments and/or metavolcanics unrelated to granite.	Forstau (Republic of Austria), Shinkolobwe deposit (Democratic Republic of Congo), Rozna (Czech Republic), Jaduguda (Republic of India), Kokshetau District (Kazakhstan) and Port Radium (Canada).
Proteozoic unconformity	Faulted and brecciated metasedimentary rocks below major Proterozoic unconformities	(1) Canada: Athabasca Basin (Cigar Lake and McArthur River), Saskatchewan (Key Lake, Cluff Lake, Rabbit Lake, McClean Lake, McArthur River and Cigar Lake deposits) and Thelon Basin, Northwest Territories; (2) Australia: Alligator Rivers region (Ranger, Jabiluka, Koongarra and Nabarlek), Northern Territories and Rudall River area (Kintyre), Western Australia.
Collapse breccia pipe	Permeable sandstone breccias in circular, vertical collapse structures filled with coarse fragments and a fine matrix of the penetrated sediments	Grand Canyon (United States of America: the "**United States**"), notably in the Arizona Strip
Sandstone	Sandstone with interbedded impermeable shale/mudstone often occurring immediately above and below the mineralised sandstone.	Mineral Assets, Basal channel deposits - Dalur and Khiagda (Russia), and Beverley and Honeymoon (South Australia). Tabular deposits - Akouta, Arlit, and Imouraren (Republic of Niger), Hamr-Stráž pod Ralskem (Czech Republic) and those of the Colorado Plateau (United States)
Paleo-quartz-pebble conglomerate	Archaean-early Paleoproterozoic quartz-pebble conglomerates that unconformably overlie granitic and metamorphic basement.	Witwatersrand in South Africa, Elliot Lake in Canada
Surficial	Tertiary to recent near surface sediments (e.g. calcretes) and soils from uranium-rich basement	YeelirrieLake Way, Centipede, Thatcher Soak, and Lake Maitland deposits in Western Australia; Langer Heinrich and Trekkopje in Namibia
Lignite-coal	Lignite or coal mixed with mineral detritus (silt, clay), and in immediately adjacent carbonaceous mud and silt/sandstone beds.	North and South Dakota (United States), Mulga Rock (Western Australia), Springbok Flats (South Africa), Nizhneylyiskoye (Kazakhstan), and Freital (Federal Republic of Germany)
Carbonate	Limestone or dolomite, often related to karsts, fractures, faults and folds	Strata-bound Tummalapalle (India), Mailuu-Suu (Kyrgyz Republic) and Bentou-Sanbaqi (China)
Phosphate	Uranium in fine-grained apatite	USA (Florida and Idaho), Kingdom of Morocco, Hashemite Kingdom of Jordan and other Middle Eastern countries
Black shale	Synsedimentary disseminated uranium adsorbed onto organic material and clays	Alum shale in Kingdom of Sweden, the Rudnoye and Zapadno-Kokpatasskaya deposits in Uzbekistan, the Chatanooga shale in the United States, deposits in the Guangxi Autonomous Region, China, and the Gera-Ronneburg deposit, Germany.

Sandstone uranium deposits occur in medium- to coarse-grained sandstones deposited in a continental fluvial or marginal marine sedimentary environment. Impermeable shale/mudstone units are interbedded in the sedimentary sequence and often occur immediately above and below the mineralised sandstone. Uranium is precipitated under reducing conditions caused by a variety of reducing agents within the sandstone including carbonaceous material (detrital plant debris, amorphous humate, marine algae), sulphides (pyrite, H_2S), hydrocarbons, and interbedded basic volcanic ash with abundant ferro-magnesian minerals (e.g., chlorite). There are five main sub-types of sandstone deposits, often mixed:

- **Basal channel deposits:** wide channels filled with permeable sediments. Examples are Dalur and Khiagda (Russian Federation), and Beverley and Honeymoon (Australia);
- **Tabular deposits:** irregular, elongate lenticular bodies parallel to the depositional trend, deposits commonly occur in paleochannels incised into underlying basement rocks. Examples are Akouta, Arlit, and Imouraren (Niger), Hamr-Stráž pod Ralskem (Czech Republic) and those of the Colorado Plateau (United States);
- **Roll-front deposits:** arcuate bodies of mineralisation that crosscut sandstone bedding, often in paleochannels. Examples are Budenovskoye, Tortkuduk, Moynkum, Inkai and Mynkuduk (Kazakhstan) and Crow Butte and Smith Ranch (United States);
- **Tectonic/lithologic deposits:** occur in sandstones adjacent to a permeable fault zone. Examples are in the Lodève District (France) and the Franceville Basin (Gabon); and
- **Mafic dykes or sills in Proterozoic sandstones:** examples at Matoush (Canada) and Westmoreland (Australia).

Sandstone deposits constitute about 28% of world uranium "reasonably assured resources" ("**RAR**": broadly correlated to Measured and Indicated Mineral Resources) as defined by the International Atomic Energy Agency ("**IAEA**") and 40% of "estimated assured resources" ("**EAR**": broadly correlated to Inferred Mineral Resources category), and are of major economic importance in Kazakhstan, Uzbekistan, USA and Niger. Orebodies of this type are commonly low to medium grade (0.050%U to 0.350%U) and individual orebodies are small to medium in size (ranging up to a maximum of 50,000tU).

Roll-front sub-types of form where uranium-bearing oxidised groundwaters moving through sandstone aquifers react with reducing materials and are precipitated. The locations of ore zones and the sizes of mineral deposits depend, among other factors, on the abundance and reactive nature of the reductant. The nature and abundance of organic material in the ore-bearing sedimentary sequence is generally considered to be of critical importance in the formation of sandstone hosted uranium deposits. In sandstones rich in organic material (containing debris of fossil plants or layers of authigenic, or in-situ generated, organic material) the organic matter either reduces uranium directly with bacteria as a catalyst or through the production of biogenic hydrogen sulphide. In sandstones relatively poor in organic material, it has been proposed that the reduction is caused either by hydrogen sulphide, (biogenic as well as non-biogenic) produced from the interaction of oxidised groundwater with pyrite in the sandstone aquifer (thiosulphate produced initially by oxidation of pyrite breaks down to form reduced sulphur), or from the introduction of reduced fluids/gases (hydrogen sulphide, hydrocarbons or both) along favourable structures.

Roll-front sub-types are mined by in situ leach ("**ISL**") methods and some deposits situated in Kazakhstan are larger than this. The main primary U minerals are uraninite and coffinite. The USA has large resources in sandstone deposits in the Western Cordillera region, and most of its uranium production has been from these deposits, recently by in ISL. The Powder River Basin in Wyoming, the Colorado Plateau and the Gulf Coast Plain in south Texas are major sandstone uranium provinces. Other large sandstone deposits occur in Niger, Gabon (Franceville Basin), and in the eastern part of Africa, in the Karoo Formation (Malawi, Tanzania, Zambia, South Africa). Sandstone hosted uranium deposits also account for approximately 30% of annual global production, largely through ISR mining. Most of this production has come from deposits in the western United States, Niger and Kazakhstan.

The deposits in Kazakhstan were formed by the lateral movement of groundwater bearing oxidised uranium minerals through the aquifer, with precipitation of the minerals occurring when the oxygen content decreased, along extensive oxidation-reduction interfaces. The uranium minerals are usually uraninite (oxide) or coffinite (silicate) and they typically occur as coatings on individual sand grains.

Uranium Resources

The global distribution of "identified resources" comprising RAR and EAR recoverable (after losses in mining and processing) at an assumed cost of production of less than US$50/lb$U_3O_8$ are estimated at 6.14MtU (Table 5-4) which indicates largely static position from 2017 through 2018. The global distribution (Figure 5-1; Figure 5-2) of identified resources among 16 countries that are either major uranium producers or have significant plans for growth of nuclear generating capacity illustrates the widespread distribution of these resources. Together, these 16 countries are endowed with 95% of the identified global resource base in this cost category (the remaining 5% are distributed among another 21 countries). The widespread distribution of uranium resources is an important geographic aspect of nuclear energy in light of security of energy supply.

The overall increase in the <US$40/kgU category of "identified resources" is largely the result of increased low-cost RAR in Kazakhstan and a minor increase in Canada overcoming declines in China, Spain and Uzbekistan. The increase in higher cost (<US$130/kgU and <US$ 260/kgU) is principally the result of the new and reassessed mining and processing

recoverability information in Australia, as well as increases in Botswana, Jordan, Kazakhstan, Mongolia, Namibia, Russia, Turkey and Zambia that overcome declines in Canada, China, Iran and Mauritania. Amid these changes is a notable increase of resources in all cost categories of RAR and EAR in Kazakhstan, owing to exploration activities and local currency changes, as well as an overall decline of RAR and EAR in all cost categories in China, owing to re-evaluation of existing deposits. Table 5-4 presents a summary of the top 10 mining operations by annual production.

Table 5-3: Global Historical 'Resource Category' distribution by cost of production

'Resource' Category	Cost of Production (US$/kgU)	(US$/lbU3O8)	2017 (ktU)	2019 (ktU)
Identified Recoverable Resources (RAR+EAR)	260	100	7,988	8,070
	130	50	6,142	6,147
	80	30	2,080	2,008
	40	15	1,058	1,080
Reasonably Assured Resources ("**RAR**"): recoverable	260	100	4,815	4,724
	130	50	3,865	3,792
	80	30	1,280	1,244
	40	15	713	745
Estimated Assured Resources (EAR - *'Inferred Resources'*): recoverable	260	100	3,173	3,346
	130	50	2,277	2,356
	80	30	800	764
	40	15	344	336

Figure 5-1: Global distribution of "identified resources": <US$130kg/U as of 1 January 2019 (Uranium 2020)

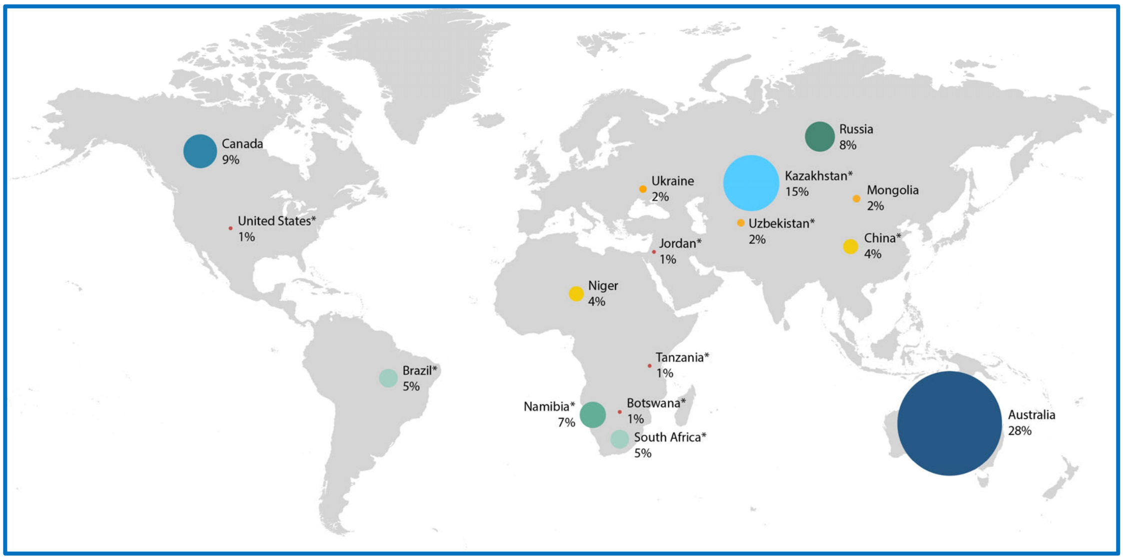


Figure 5-2: Global distribution of "identified recoverable resources" by cash cost of production (Uranium 2020)

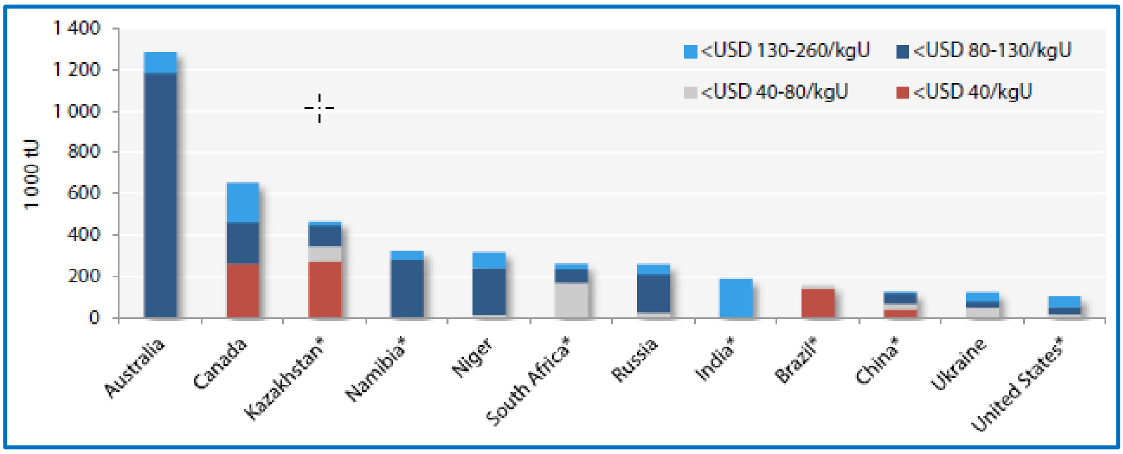


Table 5-4: Global Uranium Market: top 10 mining operations

Mine	Country	Main owner	Type	Production (tU)	Production ($MlbU_3O_8$)	World Production (%)
Cigar Lake	Canada	Cameco/Orano	underground	4,693	22.8	9.7
Husab	Namibia	Swakop Uranium (CGN)	open pit	3,449	16.8	7.1
Olympic Dam	Australia	BHP Billiton	by-product/underground	3,309	16.1	6.9
Moinkum & Tortkuduk	Kazakhstan	Orano/Kazatomprom	ISL	2,561	12.4	5.3
Inkai, sites 1-3	Kazakhstan	Kazatomprom/Cameco	ISL	2,444	11.9	5.1
Budenovskoye 2	Kazakhstan	Uranium One/Kazatomprom	ISL	2,241	10.9	4.6
Rössing	Namibia	Rio Tinto	open pit	1,996	9.7	4.1
SOMAIR	Niger	Orano	open pit	1,922	9.3	4.0
Central Mynkuduk	Kazakhstan	Kazatomprom	ISL	1,579	7.7	3.3
South Inkai (Block 4)	Kazakhstan	Uranium One/Kazatomprom	ISL	1,579	7.7	3.3
Top 10				**25,773**	**125.3**	**53.4**
Other				22,530	109.5	46.6
Total				**48,303**	**234.8**	**100.0**

Mining Methods: conventional open-pit and underground

Mining methods as applied at the open-pit and underground operations are not dissimilar to other mined commodities. Where orebodies lie close to the surface, they are usually accessed by open cut mining, involving a large pit and the removal of much overburden (overlying rock) as well as a lot of waste rock. Where orebodies are deeper, underground mining is usually employed, involving construction of access shafts and tunnels but with less waste rock removed and less environmental impact. In either case, grade control is usually achieved by measuring radioactivity as a surrogate for uranium concentration.

At Ranger in north Australia, Rössing in Namibia, and most of Canada's Northern Saskatchewan mines through to McClean Lake, the orebodies have been accessed by open cut mining. Other mines such as Olympic Dam in Australia, McArthur River, Rabbit Lake and Cigar Lake in Northern Saskatchewan, and Akouta in Niger are underground, up to 600m deep. At McClean Lake and Ranger, mining will be completed underground

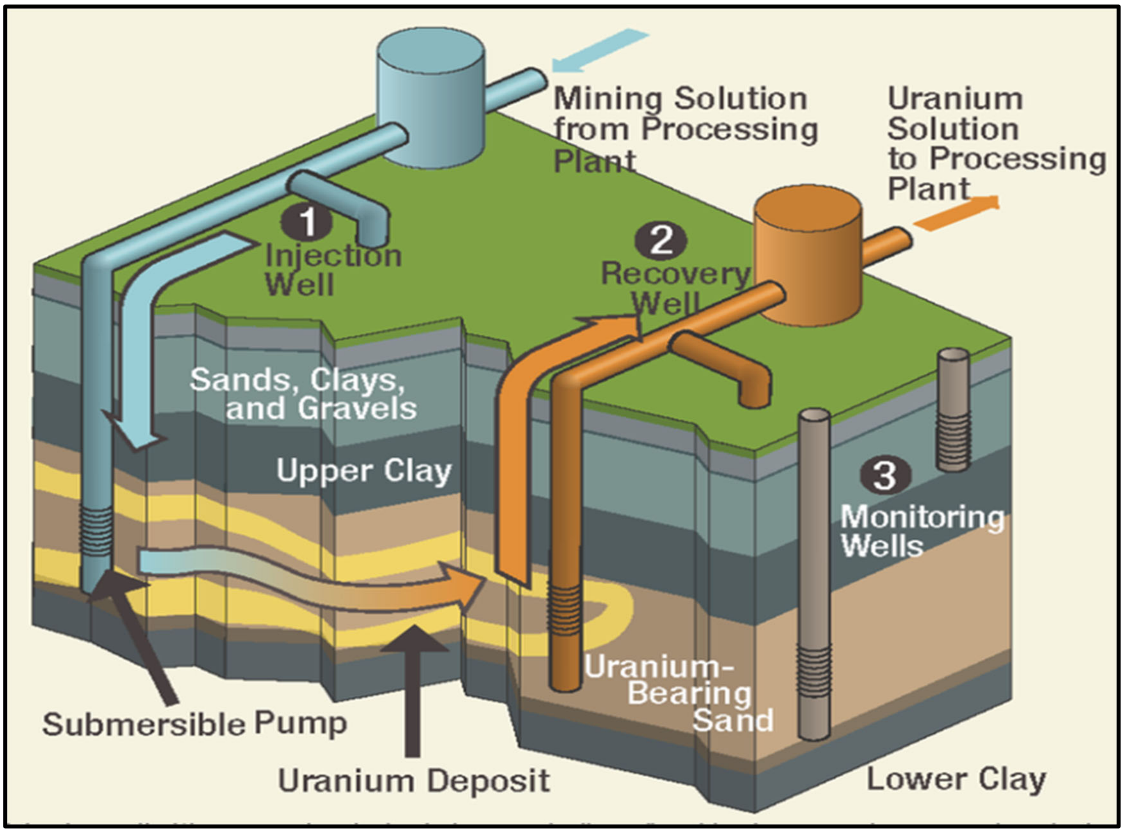
Mining Methods: In Situ Recovery

Some orebodies are located in aquifers of porous unconsolidated material (such as gravel or sand) and may be accessed simply by dissolving the uranium and pumping it out – this is in situ leach ("**ISL**") mining (also known in North America as in situ recovery – "**ISR**"). It can be applied where the host rocks are permeable to the liquids used and the orebody's aquifer is confined vertically and ideally horizontally such that the solutions do not contaminate groundwater. Techniques for ISR have now evolved to the point where it is a controllable, safe, and environmentally benign method of mining which operates under strict operational and regulatory controls.

ISR uranium mining was first tried on an experimental basis in Wyoming, United States, during the early 1960s and the first commercial mine began operating in 1974. Today virtually all uranium production in Kazakhstan and Uzbekistan, and most in the United States comes from ISR mining.

Weakly acidified groundwater (or alkaline groundwater where the ground contains a lot of limestone such as in the United States) with a lot of oxygen in it is circulated through an enclosed underground aquifer which holds the uranium ore in loose sands. The leaching solution dissolves the uranium before being pumped to the surface treatment plant where the uranium is recovered as a precipitate. The majority of uranium production un the United States and Kazakhstan uranium production is by this method. In Australian ISR mines the oxidant used is hydrogen peroxide and the complexing agent sulfuric acid to give a uranyl sulphate. Kazakhstan ISR mines generally do not employ an oxidant but use much higher acid concentrations in the circulating solutions. ISR mines in the United States use an alkali leach to give a uranyl carbonate due to the presence of significant quantities of acid-consuming minerals such as gypsum and limestone in the host aquifers. Any more than a few percent carbonate minerals means that alkali leach must be used in preference to the more efficient acid leach, though the cost is often double. In either the acid or alkali leaching method the fortified groundwater is pumped into the aquifer via a series of injection wells where it slowly migrates through the aquifer leaching the uranium bearing host sand on its way to strategically placed extraction wells where submersible pumps pump the liquid to the surface for processing. For very small orebodies which are amenable to ISR mining, a central process plant may be distant from them so a satellite plant will be set up. This does no more than provide a facility to load the ion exchange ("**IX**") resin/polymer so that it can be trucked to the central plant in a bulk trailer for stripping. Hence very small deposits can become viable, since apart from the wellfield, little capital expenditure is required at the mine and remote IX site. Figure 5-3 below presents a schematic picture of a typical ISR operation.

Figure 5-3: Schematic Diagram of ISR Wellfield



Uranium Processing

The pregnant liquor solution ("**PLS**") is generally recovered in some form of ion exchange ("**IX**") or solvent extraction ("**SX**") system. The uranium is then stripped from this and precipitated and the final chemical precipitate is filtered and dried.

5.3 Kazakhstan Uranium Production

Mining Production

Based on 2019 estimates of global uranium resources, Kazakhstan hosts approximately 12% and in 2021 produced approximately 21,800tU (Table 5-5). In 2009 Kazakhstan became the world's leading uranium producer with almost 28% of global production which by 2021 has reached in excess of 45%. Accordingly, Kazakhstan has been an important source of uranium production for more than 50 years and current capacity is estimated at approximately 25,000tU and in August 2020, the Company announced that it expected to produce approximately 21,000tU to 22,000tU for 2022. Of its 17 mining operations, five are wholly owned by

Kazatomprom and 12 are managed through joint ventures with foreign equity holders. For the period ended 2021, Kazatomprom reported production of 11,858tU of attributable production representing 23% of global production and placing it ahead of its main competitors of Orano, Cameco and Uranium One.

Uranium exploration commenced in 1948 and economic mineralisation was found is several parts of the country and this supported various mines exploiting hard rock deposits. Some 60 uranium deposits are known, in six uranium provinces. Total recoverable 'indicated' resources reported at cash cost of production less than to US$130/kgU were 956ktU in 2018. In 1970 tests on ISR mining commenced and were successful, which led to further exploration being focused on two sedimentary basins with ISR potential. By 2000 twice as much uranium had been mined in hard rock deposits than sedimentary ISR, however almost all production is now presently from ISR.

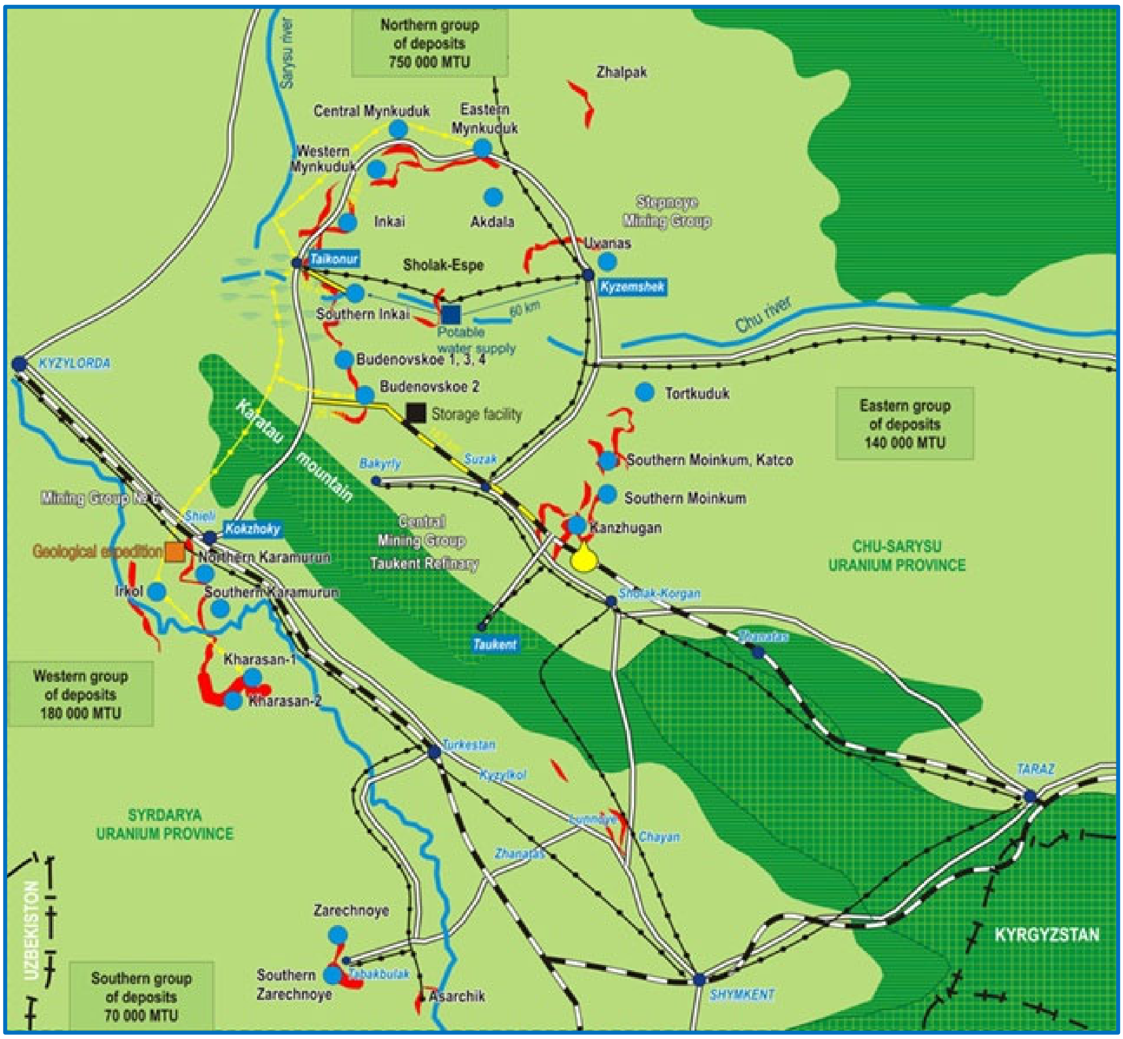
Since 2012 total mined uranium production in Kazakhstan has largely remained range bound between 21,000tU and 25,000tU with the exception of 2020 when production reduced to 19,477 and for 2021 reported a total of 21,819tU.

All except one of the operating and planned ISL mine groups are in the 40,000km^2 Chu-Sarysu province in the central south of the country and controlled by the state corporation Kazatomprom. Mines in the Stepnoye area have been operating since 1978, some in the Tsentralnoye area since 1982 – both in the Chu-Sarysu basin/uranium district, which has more than half the country's known resources. It is separated by the Karatau Mountains from the Syrdarya basin/uranium district to the south, where mines in the Western (No.6) area have operated since 1985. The ISL mines and projects in the two central southern provinces are in four groups (the Northern Stepnoye Group; the Central-Eastern (Tsentralnoye) Group; the Western (No. 6) Group; and the Southern Group), as set out below in Figure 5-4.

Table 5-5: Kazakhstan annual uranium production

Province/Group	Mine	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Chu-Sarysu, Eastern	Tortkuduk & Southern Moinkum-northern part (JV Katco LLP)	3,661	3,558	4,322	4,007	4,003	3,519	3,339	3,252	2,833	2,840
	Southern Moinkum-southern part & Kanzhugan (KAP-SaUran LLP)	1,075	1,129	1,174	873	781	616	609	1,541	1,230	1,493
Chu-Sarysu, Northern	Uvanas & Eastern Mynkuduk (Kazatomprom-SaUran LLP)	1,234	1,192	1,154	1,341	1,222	974	866	-	-	-
	Central Mynkuduk (PE Ortalyk)	1,622	1,800	1,790	1,770	1,953	1,898	1,600	1,694	1,308	1,579
	Western Mynkuduk (Appak LLP)	1,003	998	870	880	1,004	901	839	800	633	805
	Inkai 1, 2, 3 (JV Inkai LLP)	1,701	2,047	1,922	2,418	2,413	2,202	2,643	3,209	2,693	3,449
	Inkai 4 (JV SMCC LLP)	1,870	2,030	2,002	2,007	2,058	2,037	1,617	1,601	2,260	2,321
	Akdala (JV SMCC LLP)	1,095	1,020	1,007	1,042	1,000	900	835	800		
	Budenovskoye 1, 3 & 4 (JV Akbastau LLP)	1,203	1,499	1,594	1,630	1,778	1,941	1,561	1,550	1,363	1,545
	Budenovskoye 2 (Karatau LLP)	2,135	2,115	2,084	2,064	2,108	2,359	2,081	2,600	2,460	2,561
Syrdarya, Western	North and South Karamurun (RU-6 LLP)	1,000	1,000	941	956	1,015	718	819	864	660	800
	Irkol (Semizbai-U LLP)	750	750	700	781	700	678	560	960	753	962
	Kharassan 1 (JV Khorassan LLP)	583	752	858	1,095	1,354	1,564	1,554	1,599	1,455	1,579
	Kharasan 2 (Baiken-U LLP)	603	888	1,135	1,503	1,838	1,762	1,666	1,560	1,181	1,230
Syrdarya, Southern	Zarechnoye (JV Zarechnoye JSC)	942	931	876	800	817	802	781	778	648	655
Northern, Amkola Region	Irkol (Semizbai-U LLP)	470	411	400	440	542	450	377	-	-	-
	RU-1 (Vostok, Zvezdnoye)	370	331	298	-	-	-	-	-	-	-
Total		**21,317**	**22,451**	**23,127**	**23,607**	**24,586**	**23,321**	**21,747**	**22,808**	**19,477**	**21,819**

Figure 5-4: Kazakhstan Uranium Mining Operations (2007 map)



Acid Production

ISR uranium production in Kazakhstan requires large quantities of sulfuric acid, about 1.5Mtpa (according to Argus Media), due to relatively high levels of carbonate in the orebodies. A fire at a sulphuric acid production plant in 2007 led to shortages, and due to the delayed start-up of a new plant, rationing continued until mid-2008. Extra supplies were sought from Uzbekistan and Russia, but uranium production well into 2009 was affected. Uranium One revised its 2008 production downwards by 1,080tU, which it said was "primarily due to the acid shortage" for its South Inkai and Kharasan 1 projects (70% and 30% owned respectively) which were just starting up. In August 2009 Cameco reported that production at Inkai would remain constrained through 2009 due to acid shortage. The key developments noted with respect to acid production and supply in Kazakhstan are:

- At Balkhash a 1.2Mtpa Canadian acid plant feeding from the Kazakhmys Corporation copper smelter started production at the end of June 2008, financed by an EBRD loan to abate sulphur dioxide emissions from copper smelting;
- Another Kazakhmys metallurgical acid plant is at Zhezkazgan, with unknown capacity and old plant may not be operational;
- A 180ktpa Italian-built acid plant at the Stepnogorsk Mining and Chemical Combine costing US$74m was commissioned in 2015 to serve ISR mining;

- A 360ktpa acid plant at Stepnogorsk started in 2008 but has apparently been shut down for environmental reasons;
- Another new acid plant of 500ktpa capacity, was commissioned in December 2011 at Zhanakorgan, next to the Kharasan mines in the Western (#6) mining group or Kyzlorda region, to serve those mines from 2011, reaching design capacity in 2012. In 2013 it produced 356kt of acid and 16.9MWh of power. At full capacity it burns 170ktpa of solid sulphur derived from oil and gas production by Tengizhevroil in western Kazakhstan. It is a US$216m project, and supplies all the Western region mines: Kharasan, Irkol and Karamurun. Construction of the plant was being carried out by SKZ-U LLP joint venture, in which Baiken-U LLP (40%) and Kyzylkum LLP (60%) are the stakeholders. Uranium One declared a 19% "joint control interest" in SKZ-U from 2009;
- KazZinc has a 320ktpa metallurgical acid plant operating since 2004 at Ust-Kamenogorsk Metallurgical Complex, taking gas from a zinc roaster and lead smelter, and another of unknown capacity operating there since 2011, taking gas from an IsaSmelt lead furnace. Both are primarily to abate sulphur dioxide emissions from smelting;
- A further acid plant of 180ktpa capacity is planned in connection with the Pavlodar Oil Refinery in northeast Kazakhstan, using 60ktpa of sulphur from the refinery; and
- In 2009 Kazatomprom with other mining companies and two acid producers, KazZinc JSC and Kazakhmys, set up a coordinating council to regulate acid supplies and infrastructure. Cameco reported that acid supply was adequate through 2010.

5.4 Mining and Processing Operations at the Company's Deposits

Kazakhstan is recognised as a world leader in ISR mining with initial tests having commenced in 1970. The uranium at the Company's Mineral Assets typically occurs in sandstone aquifers as coating s on the sand grains at depths ranging between 100m and 700m although some orebodies extend to 800m.

As commented above, uranium deposits suitable for ISR occur in permeable sandstones which are over and underlain by impermeable strata, and which are below the water table. They may either be flat, or "*roll front*" C-shaped deposits in cross section, within a permeable sedimentary layer. Uranium ISR uses the native groundwater in the orebody which is fortified with a complexing agent and in most cases an oxidant. It is then pumped through the underground orebody to recover the minerals in it by leaching. Once the pregnant solution is returned to the surface, the uranium is recovered in much the same way as at other uranium operations.

Uranium is largely insoluble in the native groundwater which is not potable due to naturally high concentrations of radionuclides and dissolved solids. Using a grid of injection and extraction wells with submersible pumps used to deliver pregnant solution to the processing plant, a mining solution containing an oxidant (sulphuric acid) is circulated through the orebody to dissolve the uranium. The uranium-bearing solution (generally containing less than 0.1% uranium) is then pumped to a surface processing facility where the uranium is removed using ion exchange resin/polymer.

After recovery of the uranium, the barren solution is re-fortified with oxidant or acid before being returned to the wellfield via the injection wells. However, a small flow (about 0.5%) is bled off to maintain a pressure gradient in the wellfield. This wastewater contains various dissolved ions such as chloride, sulphate, sodium, radium, arsenic and iron from the orebody and is reinjected into approved disposal wells in a depleted portion of the orebody. This bleed of process solution ensures that there is a steady flow into the wellfield from the surrounding aquifer and serves to restrict the flow of mining solutions away from the mining area.

The uranium is stripped from the resin/polymer, precipitated with hydrogen peroxide and then dried to form the final product, U_3O_8. This process is repeated to remove as much uranium as is economically feasible. The Company's operations typically use between 35kg and 155kg of sulphuric acid per kgU, although a small number of operations fall outside this range.

This is a closed loop recirculation system since the water from the production well is reintroduced in the injection wells. Slightly less water is injected than is pumped to the surface to ensure that fluids are confined to the ore zones intended for extraction. Monitor wells are installed above, below and around the target zones to check that mining fluids do not move outside a permitted mining area. The wells are cased to ensure that solutions only flow to and from the ore zone and do not affect any overlying aquifers.

ISR uranium production in Kazakhstan requires large quantities of sulphuric acid, due to relatively high levels of carbonate in the orebodies. The supply of sulphuric acid was a serious constraint on production between 2007 and 2010. In 2009 the Company with other mining companies and two acid producers, KazZinc JSC and Kazakhmys, set up a coordinating council to regulate acid supplies and infrastructure. Since then, acid supply has been sufficient and new acid plant capacity has been established.

The following summarises the steps for uranium leaching:

- **Leaching:** The first step is to feed the leaching solution (1% to 2% sulphuric acid solution) through the injection wells (blue-coloured pipelines) into the ore-bearing horizon and through a number of chemical reactions, uranium migrates into the solution;
- **Pumping:** A PLS with uranium content of 20mg/l to 175mg/l (historical range between 2015 and H1 2018) is then pumped to the surface through production wells where Uranium-bearing pregnant solution moves through the production wells (red-coloured pipelines) using submersible pumps; and
- **Precipitation:** The PLS is transferred to the collector unit, where its volume is measured, and the solution is pumped to sand ponds for precipitation and subsequently transported to the pregnant solution processing area.

5.4.1 Hydrogeology and Geochemistry

The following section includes discussion and comment on the hydrogeology and geochemistry of the deposits presently mined by the Company, these being key to the in-situ process and therefore the assessment of both technical feasibility and economic viability of the deposits.

Hydrogeology

All of the deposits mined by the Company are hosted by permeable sand sediments within deep confined aquifers. The high hydraulic conductivity (and transmissivity) of the ore bearing sands and large available drawdowns allows successful recirculation of lixiviant within orebodies between the injection and recovery wells.

From a hydrogeological viewpoint the deposits can be broadly grouped as follows:

- **Budenovskoye, Inkai, Mynkyduk, Akdala and Zhalpak** are located within an Upper Cretaceous water-bearing complex of the Shu-Sarysu Basin and the horizons containing the mineralisation are located within three major aquifers: Zhalpaksky (Campanian and Maastrichtian), Inkuduksky (Upper Turonian and Santonian), and Mynkuduksky (Lower Turonian);
- **Uvanas, Tortkuduk, Moinkum and Kanzhugan** are also located within the Shu-Sarysu Basin but are associated with a Paleogene (Mid and Lower Eocene) water-bearing complex and hosted within three different major aquifers – Ikansky, Uyuksky, and Kanzhugansky;

- **Irkol, Karamurun, Kharassan and Zarechnoye** are located within an Upper Cretaceous water-bearing complex of the Syrdarya Basin and the horizons containing the mineralisation are located within two major aquifers: Zhalpaksky (Campanian/Maastrichtian) and Inkuduksky (Upper Turonian/Santonian) (albeit that these aquifers are subdivided into five aquifer sub-horizons); and
- **Semizbai** in Northern Kazakhstan is located within the sand sediments of an Upper Jurassic/Lower Cretaceous complex.

The Upper Cretaceous water-bearing complex within both the Shu-Sarysu Basin and the Syrdarya Basin comprises a thick bedded stratum containing several hydraulically connected aquifers. The extent of connection between aquifers varies from place to place depending on the presence, continuity, extent and thickness of local aquitards. The upper aquiclude of 100m to 150m thickness reliably separates the Upper Cretaceous ore hosting rocks and the Middle Eocene aquifers located above the ore zone. Cenomanian argillaceous siltstones up to 30m thickness form a lower aquitard although a saturated sand interlayer has been observed in some areas within this unit in some exploration boreholes.

The Mid and Lower Eocene water-bearing complex contains three aquifers, Ikansky, Uyuksky, and Kanzhugansky. The Uyuksky aquifer, which is situated between the other two, is hydraulically disconnected with the Ikansky aquifer which is above but has hydraulic connection with the Kanzhugansky aquifer below. The upper aquitard of this water-bearing complex comprises Upper Eocene marine clays developed regionally while the rocks underlying the Kanzhugansky aquifer are mostly confined groundwater horizons which are hydraulically disconnected with Kanzhugansky aquifer but have hydraulic connection with fractured bedrock aquifers within the Palaeozoic basement.

The hydrogeological conditions of the uranium deposits have been adequately studied through field investigations and based on the results from numerous ISR pilot tests, pumping tests (both with multiple monitoring wells and from single wells), water level measurements, groundwater sampling, and full-scale mining of uranium since 1997.

- **Favourable Factors affecting ISR Efficiency:** ISR mining with sulphuric acid is ideally suited to the deposits mined by the Company due to their hydrogeological characteristics. These characteristics include:
  - The amenability of the uranium minerals to leaching solutions and their solubility in sulphuric acid. Uraninite, uranophane and coffinite are the most common minerals in the Cretaceous deposits along with variable amount of uranyl phosphate minerals. In the Tertiary deposits uranium-bearing clays, carnotite, tyauamunite and uranyl phosphate minerals are more common. The individual grains are exposed or free with only a minor portion occurring as inclusions in other minerals (typically within illite, kaolinite and calcite). The grain size of the minerals varies but most are less than 1mm in diameter making dissolution likely within the context of ISR passive leaching,
  - The good quality of the background groundwater which has typically low Total Dissolved Solids ("**TDS**") of (less than 2g/l) with some exceptions such as Zhalpaksky (up to 7.5g/l) and Kanzhugansky (5g/l) and Mynkuduksky (up to 6.2g/l),
  - The moderate to high permeability (hydraulic conductivity 1.1m/d to 40.9m/d), and transmissivity (7m^2/d to 3,900m^2/d) of the host rocks and abundance of groundwater (specific capacity is 0.1l/s to 18l/s),
  - The moderate to high well injectability with average observed injection well rates between varying from 0.8m^3/hr to 4.8m^3/hr,
  - The moderate to high ability to pump PLS with achieved averaged extraction well rates

varying from 3.4m^3/hr to 14.7m^3/hr,

- The high groundwater pressure within the aquifer sub-horizons (up 43m above ground surface) enabling the implementation of various methods of solution extraction (natural flow and natural flow enhanced by pumping), especially at the beginning of the mining;
- The confined conditions with diffusivity values varying from 1.7x10^{4}m^2/d to 2.9x10^{7}m^2/d,
- The high groundwater temperature of the Upper Cretaceous (to 45ºC) and Paleogene (up to 30ºC) water-bearing complexes that host the uranium mineralization,
- The homogeneity of stratum, i.e. equal interrelation of permeability and transmissivity of ore and barren interlayer for majority of deposits,
- The low natural groundwater velocity (from 4m/y to 144m/y; from 4m/y to 18m/y for the majority of deposits), allowing acid solutions to remain localised in the stratum within the deposit and limiting the amount and extent of spillage along the groundwater flow path beyond its boundary,
- The absence of hydraulic connection between the Upper Cretaceous deposits (Zhalpak, Akdala, Mynkuduk, Inkai, Budenovskoye, Irkol, Karamurun, Kharassan, and Zarechnoye) and the overlying Eocene and Pliocene – Quaternary water-bearing complexes which removes the potential for contamination by leach solutions,
- The absence of hydraulic connection between the Eocene deposits (Uvanas, Tortkuduk, Moinkum, and Kanzhugan deposits) and the above ore Pliocene – Quaternary water-bearing complexes which removes the potential for contamination by leach solutions,
- The presence of a regional aquitard below the deposits, specifically: Palaeozoic siltstone and low permeability sandstone for the Upper Cretaceous ore hosting aquifers; and a 10m to 18m thick regional aquitard below the Kanzhugansky ore hosting aquifer; and

- **Complicating Factors affecting ISR Efficiency:** Notwithstanding the above, there are also several natural factors that complicate ISR process. These factors include:
  - The significant depth of the deposits and necessity to drill/install deep injection/extraction wells, most notably at Budenovskoye and the deposits within the Syrdarya Basin generally,
  - The presence of carbonate minerals in the uranium bearing sandstones (which can contain up to 6% calcite) and so results in increased acid consumption, notably, for example, at Zarechnoye. In general, the Tertiary deposits contain less calcite than the Cretaceous deposits,
  - The relatively high clay content of the Tertiary deposits and potential for preg-robbing and the need therefore to use higher acid concentrations,
  - The potential for higher organic carbon layers within the Tertiary sandstone that hosts the eastern group of operations which further increases the potential for preg-robbing and so requiring even higher acid concentrations,
  - The absence of aquitards immediately above and below the orebodies and, in some cases, the presence of aquifers above the orebody with high hydraulic pressures, notably Zarechnoye,
  - The presence of ore bodies in several aquifers and presence of so called “hanging ores”, partly separated between each other by aquitards,
  - The presence of artesian high-pressure conditions with static levels above or slightly below ground surface requiring maintenance of the pressure in the injection well at levels of 6Mpa or more and significantly complicating maintenance and repairing of the injection wells,
  - The presence of two above-ore water-bearing complexes (Pliocene-Quaternary and

Middle Eocene), requiring their hydro isolation during installation of the technological wells (all deposits within the Upper Cretaceous water-bearing complex),

- The absence of the regionally consistent aquiclude separating the Upper Cretaceous water-bearing complex from the Paleocene complex (the thickness of the separating clays and siltstone varies up to 8m in some deposits) and possible impact to Paleocene freshwater aquifers used for the irrigation of agricultural lands (some deposits),
- The presence of sands - "windows" facies replacement in some mineralised zones of impermeable rocks (aquitard) allowing hydraulic connection between production sub-horizons and upper overlying – or lower underlying sub-horizons. Such conditions can favour leakage of pregnant solutions into these sub-horizons,
- The presence of sub-horizons above or below ore horizons with transmissivity higher than the production horizon. This complicates ISR operation in some of the deposits; and
- The presence of highly permeable coarse sand-gravel sediments immediately below the orebody (Eastern Mynkuduk) which allows PLS to move by a gravity to below the orebody where it is diluted by groundwater.

These factors complicate the ISR mining process and increase costs but do not prevent uranium recovery. Notably the Company is aware of all of these issues and plans its operations accordingly.

Geochemistry

A further key element impacting ISR performance is the overall geochemical environment as defined by three key aspects:

- **pH and total dissolved solids concentrations:** The pH and TDS of the groundwater are the two fundamental physiochemical properties of the groundwater from an ISR perspective. Figure 5-5 presents a graph of pH against TDS for the different geological basins.

  The pH ranges from pH7 to pH8 within the Syrdarya Basin, and a similar range is shown for the Semizbai deposit in Northern Kazakhstan. For the Shu-Sarysu Basin the pH range is slightly larger, extending from pH7 up to pH8.8. The pH range reflects circum-neutral conditions and is likely due to the groundwater being in dynamic equilibrium with carbonate minerals phases within the aquifers.

  The TDS range of groundwater in the Syrdarya Basin is typically less than 1,000mg/l, although there are several higher TDS concentrations reported for the Zarechnoye deposit (up to over 10,000mg/l in the P" unit). TDS concentrations of the Shu-Sarysu Basin have a larger range up to 6,000mg/l, reflecting a generally higher salinity within this basin. Lower salinities are associated with Tortkuduk and Uvanas deposits. Whilst the higher TDS concentrations are typically reported for the Western Mynkuduk and Moinkum aquifers;

- **pH and alkalinity:** The groundwaters all contain moderate alkalinity concentrations, as shown in Figure 5-6 (a graph of pH against bicarbonate (HCO_3^-) concentration), with bicarbonate concentrations ranging from around 100mg/l to 280mg/l. The bicarbonate concentrations of the Shu-Sarysu Basin (ranging from 100mg/l to 200mg/l) is generally lower than that of the Syrdarya Basin (ranging from around 150mg/l to 280mg/l).

  The natural waters resident within the aquifers therefore contains moderate concentrations of alkalinity to buffer acidity; this bicarbonate alkalinity contributes to acid consumption during operations, and also acts to attenuate acidity migrating within the aquifer, either for PLS losses during operations or as natural attenuation during the post-closure period; nad

- **Major ion composition:** The major ion composition of the groundwaters are typically presented within Piper plots that allow visual presentation of the proportional concentration of major ions within the water samples. The Piper plots provide information of the hydrochemical facies, indicating the major ion contributions and the minerals/materials that have been contacted and the geochemical interactions of the groundwaters.

The Piper plot shown in Figure 5-7 presents the major ion data for the groundwaters by regional basin. The Piper plots show that with respect to cations, the majority of the groundwaters are sodium dominated, typically with around 60% to 70% sodium cation charge contribution, although some of the Syrdarya Depression groundwaters contain greater than 80% to 90% sodium by charge.

The different basins show greater differences with respect to anion contribution, where the Shu-Sarysu Basin waters are chloride dominated, whilst the Syrdarya Basin and Semizbai/Northern Kazakhstan groundwaters have similar contributions from chloride, alkalinity and sulphate. Overall, the waters of the Shu-Sarysu Basin would be classed as sodium-chloride type waters, whilst the Syrdarya Basin and Semizbai/Northern Kazakhstan would be classed as sodium-bicarbonate-chloride-sulphate type.

Figure 5-5: pH against TDS, by basin

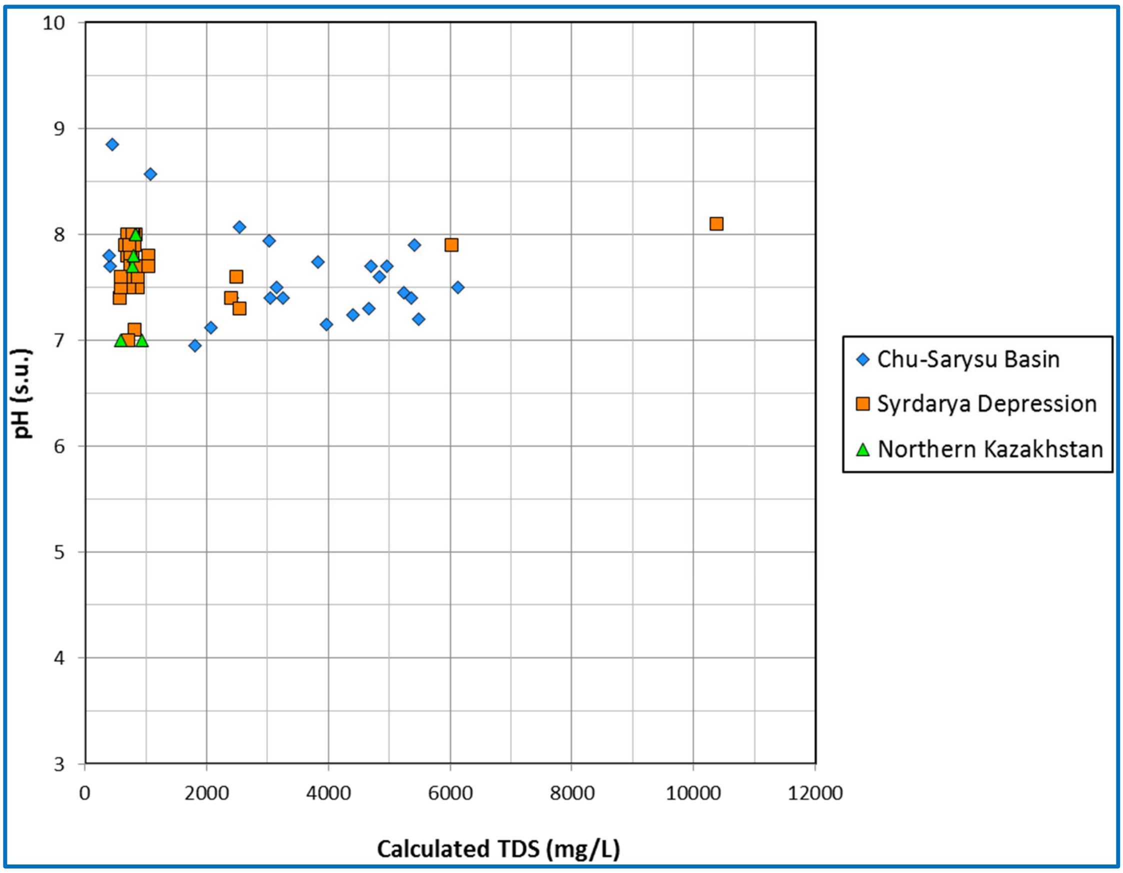


Figure 5-6: pH against bicarbonate (HCO_3^-) concentration, by basin

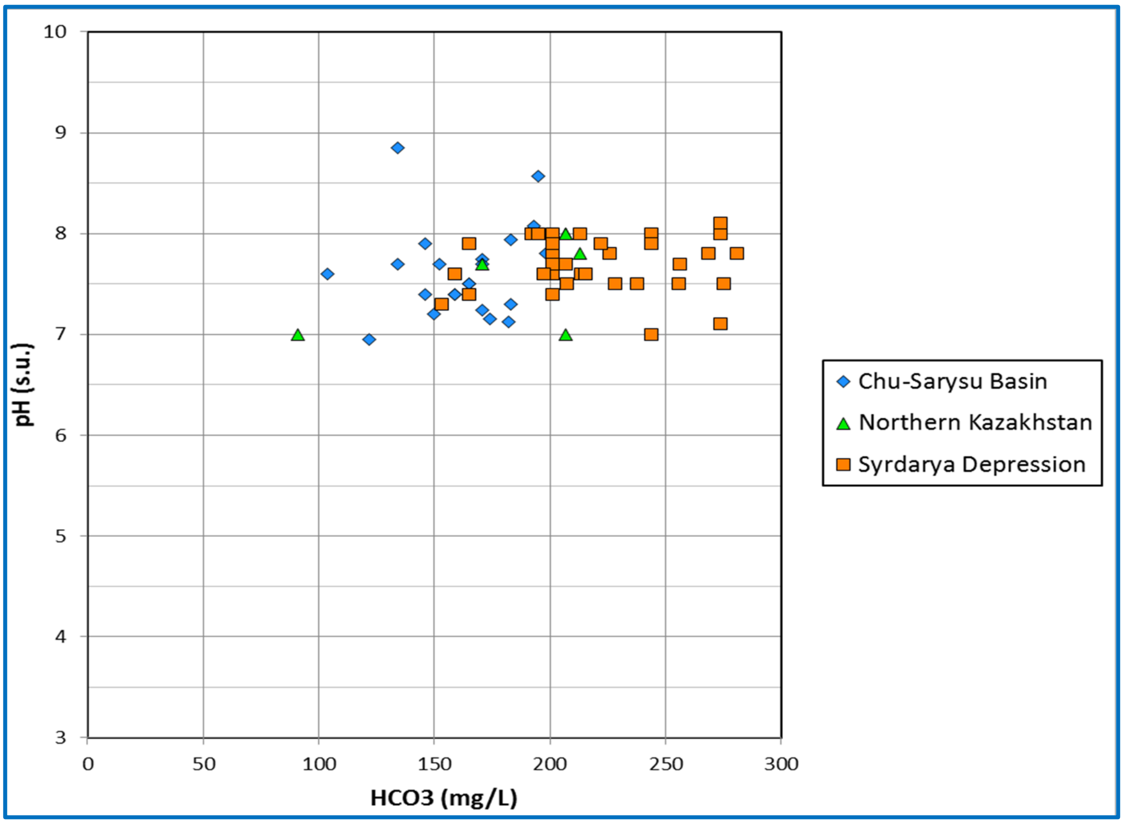


Figure 5-7: Piper plot of major ions, by regional basin

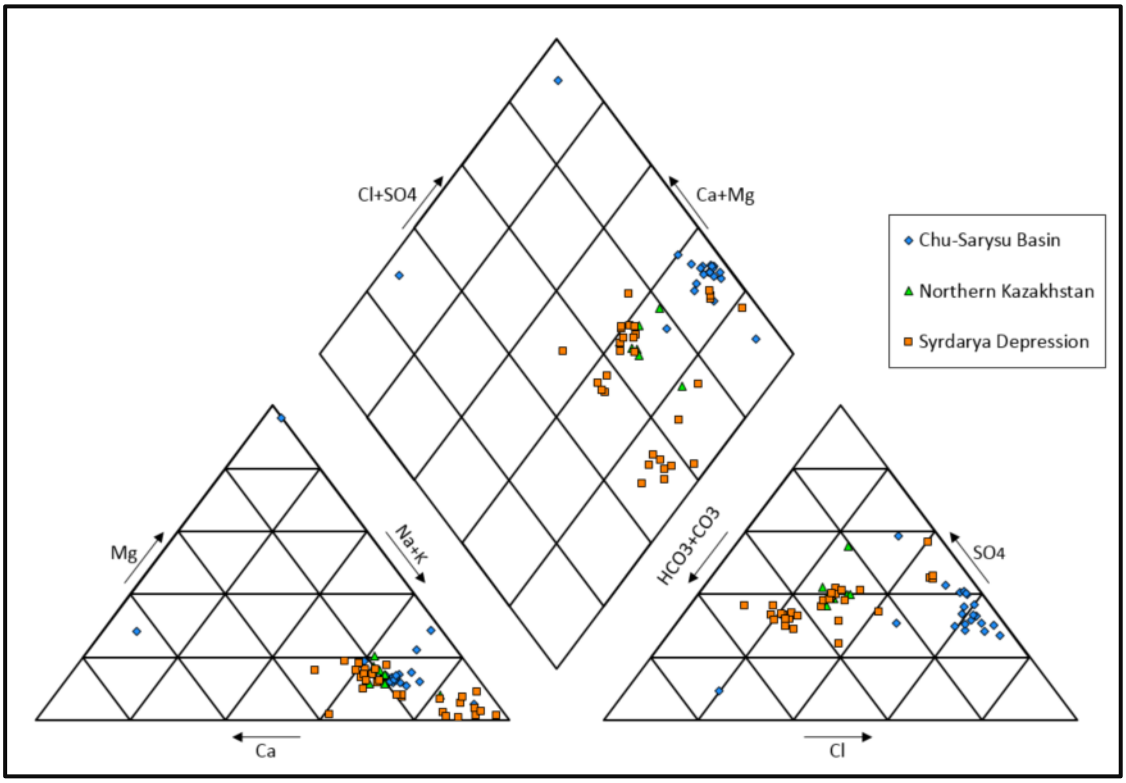


Table 5-6 presents a summary of the hydrogeological characteristics of the mineral deposits and Table 5-7, Table 5-8, Table 5-9 summarise the hydrogeological data collected during the exploration of each deposit.

Table 5-6: Summary of Hydrogeological Characteristics

Uranium Deposit		Orebody Water-Bearing Horizons			
		Water-Bearing Complex	Aquifers		Orebody Horizons
Shu-Sarysu Basin	Block 1 Budenovskoye	Upper Cretaceous	Inkuduksky	Upper Turonian / Santonian	2
	Block 2 Budenovskoye		Inkuduksky	Upper Turonian / Santonian	2
	Block 3 Budenovskoye		Inkuduksky	Upper Turonian / Santonian	2
	Block 4 Budenovskoye		Mynkuduksky	Lower Turonian	1
	Block 1, Inkai		Inkuduksky and Mynkuduksky	Turonian / Santonian	2
	Block 2, Inkai		Inkuduksky and Mynkuduksky	Turonian / Santonian	2
	Block 3, Inkai		Inkuduksky and Mynkuduksky	Turonian / Santonian	3
	Block 4, Inkai		Inkuduksky and Mynkuduksky	Turonian / Santonian	2
	Western Mynkuduk		Inkuduksky and Mynkuduksky	Turonian / Santonian	2
	Central Mynkuduk		Mynkuduksky	Lower Turonian	1
	Eastern Mynkuduk		Mynkuduksky	Lower Turonian	2
	Akdala		Zhalpaksky, Mynkuduksky, Intymaksky (Eocene orebody 7)	Campanian, Low Turonian, Eocene	3
	Zhalpak		Zhalpaksky	Campanian / Maastrichtian	1
	Uvanas	Paleogene	Uvanassky (Kanzhugansky)	Middle Eocene	2
	Tortkuduk		Ikansky and Uyuksky	Middle / Lower Eocene	2
	SouthTortkuduk				
	Southern Moinkum (Northern Part)		Ikansky, Uyuksky, and Kanzhugansky	Middle / Lower Eocene	3
	Central Moinkum				2
	South Moinkum (Southern Part)				
	Kanzhugan		Uyuksky and Kanzhugansky	Lower Eocene	2
Syrdarya Basin	Irkol	Upper Cretaceous	Irkolsky (Inkuduksky)	Upper Turonian / Coniacian	2
	Northern Karamurun		Zhalpaksky	Campanian / Maastrichtian	2
	Southern Karamurun		Zhalpaksky	Campanian / Maastrichtian	2
	Block Kharassan 1, North Kharassan		Kharassansky (Zhalpaksky)	Upper Santonian / Campanian / Maastrichtian	3
	Block Kharassan 2, North Kharassan		Kharassansky (Zhalpaksky)	Upper Santonian / Campanian / Maastrichtian	3
	Zarechnoye		Inkuduksky	Upper Turonian / Santonian	5
Northern Kazakhstan – Semizbai		Upper Jurassic /Lower Cretaceous	Upper and Lower Semizbaisky		2

Table 5-7: Summary of Hydrogeological Exploration Data

Uranium Deposit		Exploration Data							
		Depth to Top of Aquifer		Transmissivity		Hydraulic Conductivity		Diffusivity	
		From (mbgl)	To (mbgl)	Min (m^2/d)	Max (m^2/d)	Min (m/d)	Max (m/d)	Min (m^2/d)	Max (m^2/d)
Shu-Sarysu Basin	Block 1 Budenovskoye	510	780	178	1,257	1.3	8.8	1.80E+06	1.10E+07
	Block 2 Budenovskoye	550	600	520	551	5.5	5.8	3.50E+05	2.30E+06
	Block 3 Budenovskoye	620	720	178	1,257	1.5	8.7	1.10E+05	1.10E+07
	Block 4 Budenovskoye	540	645	196	657	6.0	11.7	4.10E+06	7.00E+06
	Block 1, Inkai	250	380	623	3,899	9.2	16.1	6.30E+05	2.90E+07
	Block 2, Inkai	300	320	447	1,662	6.1	21.8	ND	ND
	Block 3, Inkai	240	320	48	1,886	2.8	15.5	2.50E+05	1.60E+06
	Block 4, Inkai	300	440	71	832	6.0	16	7.50E+05	1.40E+07
	Western Mynkuduk	210	220	46	1,542	1.6	40.9	1.60E+06	5.20E+06
	Central Mynkuduk	80	360	147	876	2.2	18.2	2.80E+07	4.60E+06
	Eastern Mynkuduk	180	260	90	860	3.7	20.2	ND	ND
	Akdala	63	121	116	286	3.9	7.9	1.00E+06	2.80E+07
	Zhalpak	112	118	193		3.4	14.3	4.20E+06	
	Uvanas	85	115	70	104	6.0	10.5	ND	ND
	Tortkuduk	350	420	8	276	1.1	7.4	1.70E+04	1.20E+07
	SouthTortkuduk								
	Southern Moinkum (Northern Part)	270	480	73	275	1.3	12	ND	ND
	Central Moinkum	355	460	73	275	2.2	12	5.00E+04	4.90E+05
	South Moinkum (Southern Part)								
	Kanzhugan	170	300	120	430	3.4	12.2	1.00E+06	2.40E+06
Syrdarya Basin	Irkol	350	500	541	1,317	6.1	14	7.00E+05	6.80E+06
	Northern Karamurun	379	635	335	359	8.9	11	4.60E+05	4.40E+06
	Southern Karamurun								
	Block Kharassan 1, North Kharassan	540	753	253	267	2.6	7.2	4.40E+05	6.60E+06
	Block Kharassan 2, North Kharassan	545	685	250	350	4.0	8	1.00E+06	9.50E+06
	Zarechnoye	290	560	270	542	7.3	20.1	3.00E+05	6.00E+06
Northern Kazakhstan – Semizbai		6	82	7	570	101.3.2	17.2	ND	ND

Table 5-8: Summary of Hydrogeological Exploration Data (continued)

Uranium Deposit		Exploration Data						
		Depth to Groundwater		Hydraulic Head		Specific Capacity		Ground Water velocity
		From (mbgl)	To (mbgl)	From (m)	To (m)	Min (l/s/m)	Max (l/s/m)	(m/year)
Shu-Sarysu Basin	Block 1 Budenovskoye	(26.00)	(43.00)	480	450	0.25	0.73	
	Block 2 Budenovskoye	(26.00)	(43.00)	480	580	0.25	0.73	
	Block 3 Budenovskoye	(26.00)	(43.00)	480	450	0.25	0.73	
	Block 4 Budenovskoye	(18.00)	(33.00)	480	580	0.17	0.73	
	Block 1, Inkai	2.00	30.00	250	330	0.69	2.34	4.0
	Block 2, Inkai	18.00	20.00	280	300	0.70	1.75	4.0
	Block 3, Inkai	64.00	(14.00)	180	380	0.36	0.86	
	Block 4, Inkai	(24.00)	(30.00)	325	500	0.08	0.45	
	Western Mynkuduk	50.00	15.00	90	295	0.20	6.20	
	Central Mynkuduk	70.00	64.00	125	310	0.80	1.46	
	Eastern Mynkuduk	75.00	-	100	190	0.32	6.12	7.5
	Akdala	65.00	7.00	9	100	0.38	1.40	
	Zhalpak	55.00	58.00	55	58	0.28	1.20	

Uranium Deposit		Exploration Data						
		Depth to Groundwater		Hydraulic Head		Specific Capacity		Ground Water velocity
		From (mbgl)	To (mbgl)	From (m)	To (m)	Min (l/s/m)	Max (l/s/m)	(m/year)
	Uvanas	55.00	16.00	31	53	0.30	0.70	4.4
	Tortkuduk	36.00	99.00	280	330	0.05	0.50	17.6
	SouthTortkuduk							
	Southern Moinkum (Northern Part)	near ground surface		270	480	0.01	0.59	44-144
	Central Moinkum	10.00	54.00	330	470	0.12	0.71	39-40
	South Moinkum (Southern Part)							
	Kanzhugan	117.00	(32.00)	50	250	1.40	6.00	24.1-34.4
Syrdarya Basin	Irkol	15.00	1.00	340	490	0.40	1.30	
	Northern Karamurun	7.00	(1.50)	374	632	0.50	0.64	24.1-40.0
	Southern Karamurun							
	Block Kharassan 1, North Kharassan	4.00	(2.00)	580	630	0.29	0.52	
	Block Kharassan 2, North Kharassan	4.00	(3.00)	545	685	0.70	1.80	
	Zarechnoye	(10.00)	(15.00)	300	615	0.10	3.30	4.0-12.0
Northern Kazakhstan – Semizbai		16.00	12.40	4	137	0.30	18.10	

Table 5-9: Summary of Hydrogeological Exploration Data (continued)

Uranium Deposit		Exploration Data		
		Total Dissolved Solids		Temperature
		Min (g/l)	Max (g/l)	(°C)
Shu-Sarysu Basin	Block 1 Budenovskoye	1.8	3.9	
	Block 2 Budenovskoye	1.8	2.0	
	Block 3 Budenovskoye	1.8	3.9	35
	Block 4 Budenovskoye	1.7	4.0	
	Block 1, Inkai	1.9	3.6	27.0 to 29.5
	Block 2, Inkai	1.0	3.9	
	Block 3, Inkai	1.2	2.1	27.0 to 29.5
	Block 4, Inkai	3.3	5.4	
	Western Mynkuduk	1.8	6.2	
	Central Mynkuduk	3.2	6.0	
	Eastern Mynkuduk	5.0	6.0	15.0
	Akdala	4.3	5.6	
	Zhalpak	7.3	7.5	
	Uvanas	2.8	5.1	17.0
	Tortkuduk	0.5	0.7	25.0 to 28.0
	SouthTortkuduk			
	Southern Moinkum (Northern Part)	0.4	0.7	21.0 to 30.0
	Central Moinkum	0.3	1.0	22.0 to 29.0
	South Moinkum (Southern Part)			
	Kanzhugan	0.5	1.0	16.0 to 20.0
Syrdarya Basin	Irkol	0.6	0.9	
	Northern Karamurun	0.7	0.9	38.0 to 45.0
	Southern Karamurun			
	Block Kharassan 1, North Kharassan	0.6	0.8	15.0 to 36.0
	Block Kharassan 2, North Kharassan	0.6	0.9	43.0 to 45.0
	Zarechnoye	0.4	0.6	30.0 to 39.0
Northern Kazakhstan – Semizbai		1.0	4.7	

5.4.2 Wellfield design and construction

The design of ISR wellfields varies greatly depending on the local conditions such as permeability, sand thickness, deposit type, ore grade and distribution. Whatever the type of pattern used, there is a mixture of injection wells, to introduce the leach solution to the orebody, and extraction wells with submersible pumps used to deliver pregnant solution to the processing plant. Wells are typical of normal water bores. Where large sheet-like deposits exist, such as in Kazakhstan, rows of injection wells interleafed with rows of extraction wells can be used cost effectively (Figure 5-8).

This pattern has a relatively low installation cost and is simple to install, however, the time taken to recover the uranium under leach can be extended due to the large distances between the well types (typically 50m to 60m). Typically, in channels narrower than 60m closer spaced patterns were originally employed to recover the uranium at a faster rate (per unit area) than the alternating line patterns and the most common type of pattern employed originally at the Mineral Assets was the hexagonal configuration (Figure 5-8). Over time however the predominant hexagonal configurations were replaced by row cells as these are deemed to be more efficient. The majority of the deposits are currently mined by row configuration wellfields, however some of them continue ISR recovery using the hexagonal configuration. Distances between wells are dictated by narrow and long orebody configurations and determined by geological models and previous site ISR experience. The distances between the wells generally varies as follows:

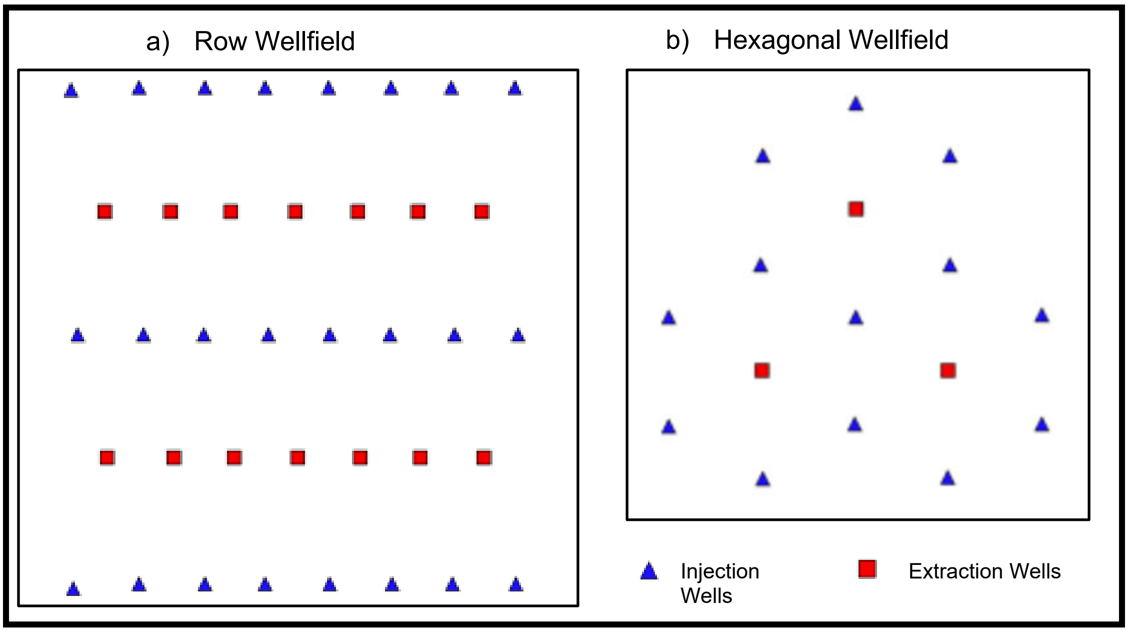
- **Row configuration:** between rows of the wells (40m to 50m), between pumping wells (30m to 35m) and between injection wells (20m to 25m); and
- **Hexagonal configuration:** between extraction and injection wells (radius of hexagon) from 35m to 45m with the majority at 40m.

The tighter patterns are generally used effectively in narrower paleochannel type deposits where flexibility in the installation is needed. The installed costs of these wellfields are generally higher, so to ensure maximum recovery of the uranium. The following secondary measures are also implemented: flow reversals – converting injection wells to extraction wells where required; and infill wells – to increase recovery from higher grade portions of the wellfield.

Whichever pattern type is used, the wellfields (usually a production unit that feeds to a single header house) are progressively established over the orebody as uranium is depleted. A series of monitor wells are situated around each mineralised zone to detect any movement of mining fluids outside the mining area. The wells are cased to ensure that liquors only flow to and from the ore zone and do not affect any overlying aquifers. The production life of an individual ISR well pattern is typically one to three years, and a significant portion of the uranium is recovered during the first six months of the operation.

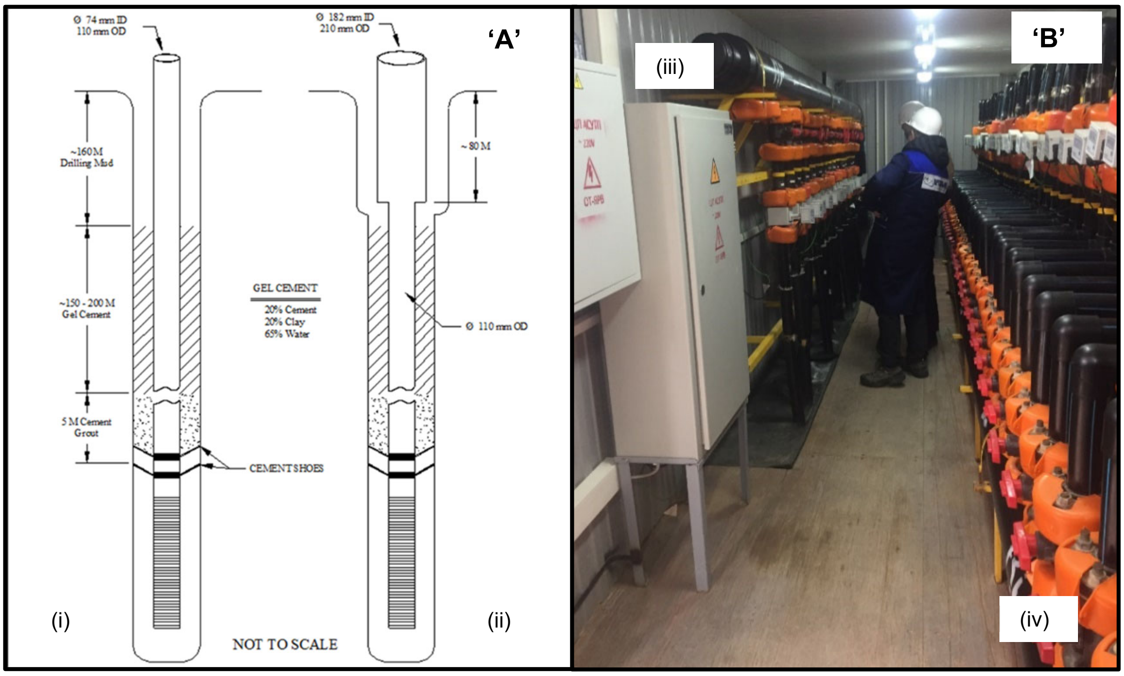
The progressive flow through the aquifer also traps clay and silt in the permeable sediments. These can be dislodged to some extent by using higher pressure injection or by reversing the flow between injection and production wells, however, the flow capacity of injection wells is generally always on a downward trend thought the life of the well.

Figure 5-8: Typical Wellfield Layouts as implement at the Mineral Assets



The typical construction of an ISR well is shown in Figure 5-9. The wells are controlled within each leach field in a control point, often housed in a trailer or trailer house (Figure 5-9). The depths of the wells varies from about 200m (Akdala) to 720m (Block 3 Budenovskoye). The screen interval usually does not exceed 10m to 12m. If the orebody thickness exceeds 12m in the central part of a roll, or the wings of a roll are mined, the two wells with separate screens are used.

Figure 5-9: 'A' Construction of ISR Wells: i) Injection and Monitoring Wells; ii) Pumping (Extraction) Well and 'B' typical control point for wellfield with injection and monitoring wells (iii) ad extraction wells (iv) fitted with sampling ports



5.4.3 Uranium Process Recovery and Refining

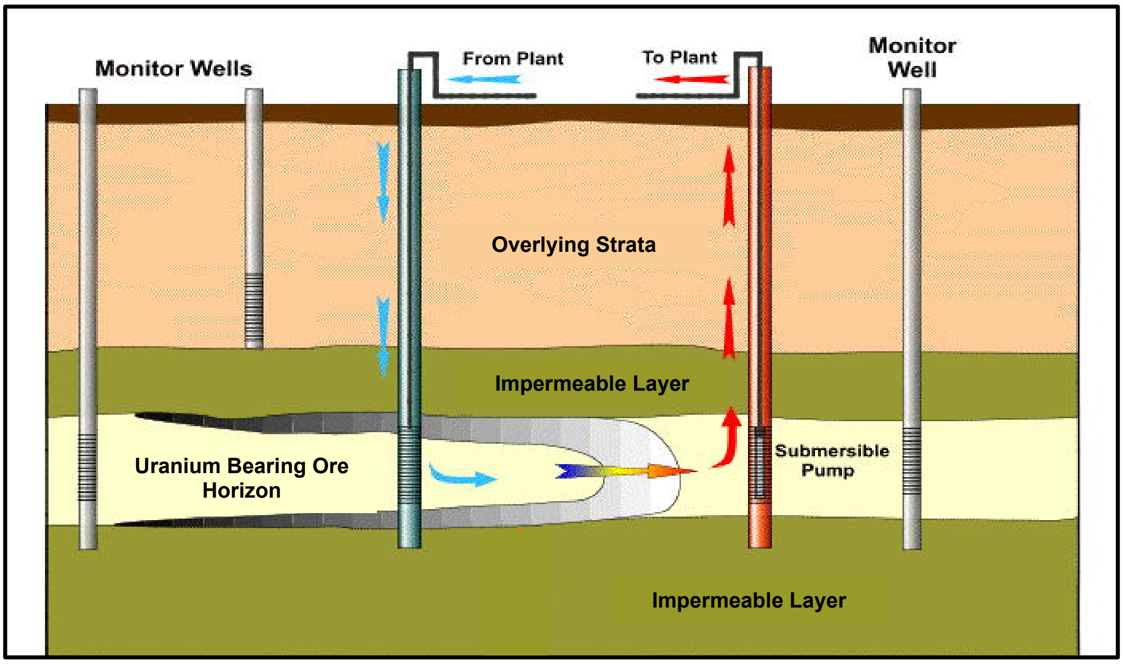
The submersible pumps (Figure 5-10) initially extract native groundwater from the host aquifer prior to the addition of uranium complexing reagents (acid or alkaline) and an oxidant (hydrogen peroxide or oxygen) before injection into the wellfield. The leach liquors pass through the ore to oxidise and dissolve the uranium minerals in situ. Depending on the type of leaching environment used the uranium will be complexed as either a uranyl sulphate, predominantly $UO_2(SO_4)_3^{4-}$, in acid leach conditions or a uranyl carbonate, predominantly $UO_2(CO_3)_3^{4-}$ in a carbonate leach system. This can then be precipitated with an alkali, e.g., as sodium or magnesium diuranate. In either case the PLS from the production wells is pumped to the treatment plant where the uranium is recovered in a resin/polymer ion exchange ("**IX**").

IX is used in the vast majority of ISR operations in Kazakhstan. In terms of operating and capital costs IX is the preferred processing option. In situations where the groundwater has a high concentration of ions that may compete with the uranyl complexes for active resin/polymer sites, such as chloride and nitrates, the use of IX becomes unattractive due to low uranium loadings on the resin/polymer.

The pregnant solution, mined by the ISR method, undergoes further processing once it reaches the surface. The PLS from the well field is pumped through trunk lines to sand trap facilities and is then forwarded to the PLS processing plant. In the processing plant, the solution is first passed through a column filled with ion-exchange resin and as the solution penetrates through the sorbent layer, sorbent uranium saturation occurs.

Once sorbent is saturated with uranium, it is passed on for desorption. Desorption is a process opposite to sorption and involves the treatment of saturated sorbent with chemical solutions and the conversion of uranium ions into a solution known as "**Rich Eluate**" or TD. In its turn, the uranium-depleted ion-exchange resin is passed over for regeneration and cleaning for subsequent use in sorption processes. The Rich Eluate received from desorption columns is then accumulated in a reservoir and forwarded for further processing either through a settlement process which results in a chemical concentrate of natural uranium (commonly known as “**Yellow Cake**” (or “**HKPU**”) because of its yellow colouring) for subsequent production of U_3O_8 on-site or to a third party refinery if the relevant mine does not have the required processing facilities.

Figure 5-10: Typical well and pump configuration



Uranium settlement, i.e., the process of solidifying a uranium solution, is performed through feeding specific chemical reagents (such as caustic sodium, ammonia solution, hydrogen peroxide and ammonium carbonate) at specific reactors where it is forwarded from reservoirs. The resulting settled pulp, essentially uraniferous crystals, is collected in a reservoir and forwarded for filtration. Filtration is aimed at removing all liquid from the settled pulp at filtration pumps, where the pulp is periodically fed from reservoirs, through cascading, cleansing and air blowing. The resulting chemical concentrate of natural uranium, or yellow cake, which contains up to 45% to 60% of uranium is forwarded to pipe calcining furnaces where the residual moisture is eliminated from Yellow Cake, resulting in the production of U_3O_8.

Once at surface the PLS is first filtered through resin beads where the resin beads attract uranium from the solution. Uranium loaded resins are then transported to the processing plants where U_3O_8 is separated from the resin beads and yellowcake is produced. The resin beads can then be returned to the ion exchange facility where they are reused. Bead beds in tanks and in U-shaped vessels are used where the latter enables increased grade through use of high-density packed resin in a smaller volume of vessel.

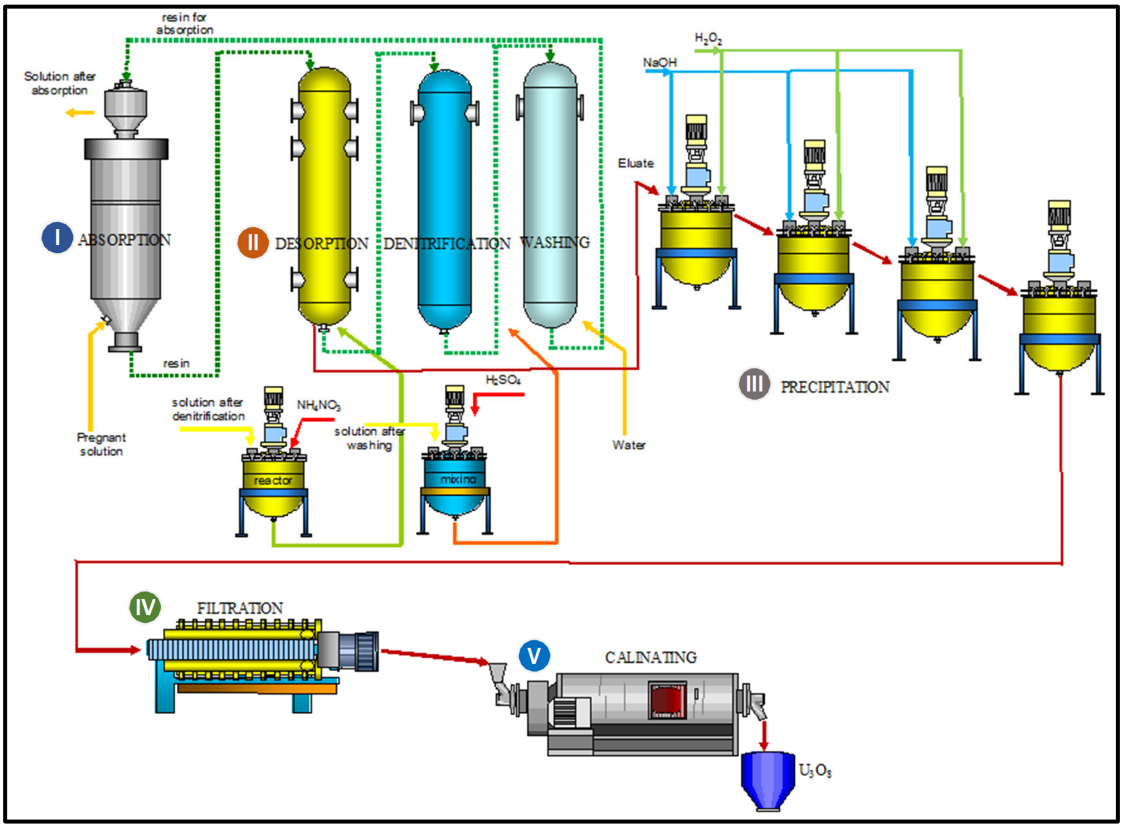
At the Mineral Assets the resins/polymers are generally stripped with a nitrate solution in a semi-continuous cycle. The pregnant solution produced by the stripping cycle is then precipitated by the addition of ammonia, hydrogen peroxide, caustic soda or caustic magnesia. Peroxide products can be dried at low temperatures to produce a product containing about 80% U_3O_8. However, ammonium or sodium diuranate products must be dried at high temperatures to convert the product to 100% U_3O_8. Some operations produce Yellowcake (typically U_3O_8); others produce a uranium bearing solution or Uranium loaded resin.

Figure 5-11 presents a schematic of the uranium recovery process flow chart. In Summary:

- The PLS is pumped into absorption columns **(I)**, where ion exchange resins (sorbents) are loaded with uranium;

- Uranium-loaded ion exchange resin is sent to desorption **(II)**. Desorption is the opposite of absorption, and the procedure includes the processing of loaded resin with chemicals to produce Rich Eluate, which is a solution with uranium content 1,000x higher than in the PLS. The resulting Rich Eluate is sent for further processing. In turn, ion exchange resin with low uranium content is ready for regeneration and flushing stage for reuse in the absorption process;
- Rich Eluate is then sent to precipitation **(III)**, i.e., transfer of dissolved uranium into the solid form. Precipitation is carried out by adding chemical reagents;
- The residue is sent to filtration **(IV)** where the main purpose is to remove the liquid phase from the residue through washing and flushing with air in filter presses. The product output, Yellowcake, typically has a moisture content of no more than 20% and uranium content ranging from 45% to 50%, which is then subsequently sent for calcination; and
- Calcination (**V**) is carried out in special furnaces designed to obtain uranium oxide (U_3O_8) from Yellowcake. The furnace is divided in three zones with different temperatures: the first zone is designed for total moisture removal; and the other two are for decontamination and U_3O_8 production. Temperature at furnace outlet ranges from approximately 800°C to 850°C and the temperature inside the furnace is maintained automatically.

Figure 5-11: Uranium Recovery Flow Chart



Following unloading from the furnace and cooling, U_3O_8 is automatically placed into special containers. After packaging, samples are taken from each container, after which the containers are weighed, decontaminated, sealed and transported by an automatic loader to the finished product warehouse, where they are shipped to customers. The finished product after processing is U_3O_8 uranium concentrate in accordance with ASTM C 967 (U content of at least 65%) and ST RK 2573 (U content of at least 80%).

In addition to on-site facilities, the Company owns two of the three dedicated processing facilities in Kazakhstan. The dedicated processing facilities comprise the facility owned and operated by Ulba Metallurgical Plant JSC ("**UMP**") in which the Company has a 90.2% equity interest and 100% voting interest, a processing facility owned and operated by the Company's subsidiary Kazatomprom-SaUran LLP, and a third-party processing facility owned by Stepnogorsk Mining Chemical Combinate (plant) LLP ("**SMCCP**").

The final product at the sites are generally in the form of rich eluate (also referred to herein as "**Technical Desorbate**" or "**TD**") or Yellowcake (also referred to herein as HKPU). These products are typically further refined at either other Mining Subsidiary processing and refining facilities or third-party refineries to produce uranium concentrate (U_3O_8) in accordance with ASTM C967 with U content of at least 65% and ST RK 2573 with U content of at least 80%.

5.4.4 Supporting Infrastructure

This section describes the existing infrastructure on the ISR mines, the transportation of goods to and from the ISR mines and the waste facilities used by the mines. Most of the ISR mines are relatively young, having become operational after 2005 and have modern infrastructure.

Mine Infrastructure

A summary of infrastructure at typical ISR mine sites is provided in Table 5-10. The productive aquifers that are being mined ate the Company's operations are between 90m and 800m below surface. A solution containing sulphuric acid is circulated through these to dissolve uranium. The production wells create reduced pressure in the mined region by withdrawing slightly more water from the ground than is injected; this controls the horizontal spread of the solutions. The PLS is pumped from the production wells to a surface process plant, via settling ponds for removal of suspended particles. There are PLS settling facilities in remote well fields, as well as at the process plant sites.

At the process plant, uranium is removed from the solution in an ion exchange unit where it is attached to resin (loaded resin). The barren solution is returned to the wellfields, via a settling facility for removal of suspended particles. The acidity of the solution is adjusted through addition of sulphuric acid prior to re-injection into the orebody. The uranium is stripped from the loaded resin in an elution unit typically using ammonium nitrate to produce an eluate. It is then precipitated and filtered to form a Yellow Cake product. Several operations produce intermediate products (loaded resin, eluate or filtered products) that are directed to a plant at other operations for upgrading to produce a Yellow Cake product. Some operations (North Kharassan 2; Karatau; Inkai 4; Inkai; Western Mynkuduk; Tortkuduk; and Kanzhugan) produce upgraded U_3O_8 Yellow Cake by means of a drying or calcining process although this does not occur at the Mineral Assets as defined herein.

Table 5-10: Infrastructure at the ISR Mines

Parts of the mine	Infrastructure	Types and ancillary infrastructure
External power supply	Power transmission lines (110kV and 220kV)	
	Substation on/ next to the mine site	
Wellfields standard infrastructure at all operations	Power lines	Power lines (10kV) on various types of poles (pylons, wood and concrete poles) distribute power across the well fields
	Pipelines (mostly plastic, with some steel pipelines for transfer of concentrated acid)	<u>Trunk pipelines connecting wellfields and the process plant</u> • Pregnant solution pipelines (typically buried at 2m depth to prevent freezing) • Barren solution pipelines (also buried) • Acid pipelines (on surface)
		<u>Pipelines linked to wells</u> • For delivery of acidified barren solution to injection wells • For transport of pregnant solution from production wells
	Wells	<u>Injection wells</u> • Production wells • Monitoring wells (most monitor the productive aquifer)

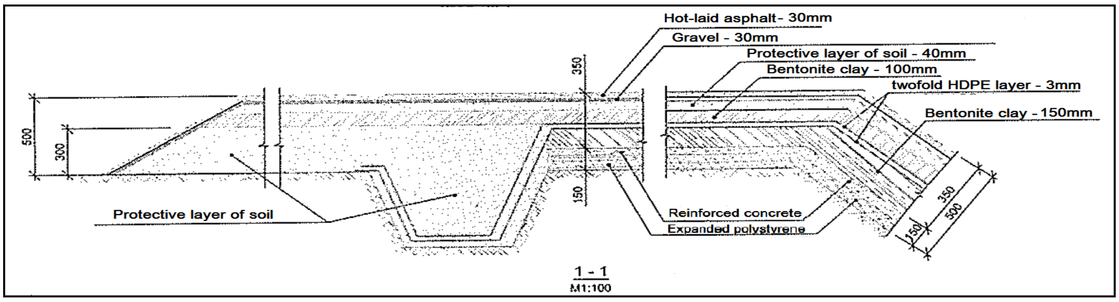
Parts of the mine	Infrastructure	Types and ancillary infrastructure
	Portable cabins (usually arranged in groups of three at intervals of between 100m and 200m in the wellfields, located at junctions between well pipelines and trunk pipelines),	Flow monitoring & control cabin • Acid addition control cabin • Power supply control cabin Generally, each cabin has two external lights • Warm workstation cabins are often integrated with the above cabins and are situated at intervals of at least 1km within the well fields.
	Access roads	Unsurfaced roads
	Drill rigs drilling new wells	Drill rigs
	Drill slimes settling ponds	Drill slimes that are not radioactive (drill slimes from the ore zone are collected separately for disposal at a LLRW waste disposal facility)
Wellfields additional infrastructure at some operations	Acid tanks	• Large tanks • Bunds with capacity exceeding the capacity of the tanks (usually about 130%) • Acid loading facility (with spill containment below truck-to-tank connections) • Portable cabin, with controls and emergency shower, eye washstands, countering agents (alkali for acid burns) and chemical cupboards.
	Pregnant solution settling ponds	Lined ponds, with fencing to prevent animal access
	Drilling slimes storage facility	Impoundment with raised embankment walls (generally rectangular with four walls), some have geomembrane applied to surfaces to prevent wind erosion (e.g. Ortalyk LLP;s Central Mynkuduk operation)
Process plant	Fencing and security	• Fences are generally restricted to the process plant area and accommodation facilities • There is mobile security both in vehicles and on horseback
	Process plant and product store	• The process plant is usually housed in one building or two adjacent buildings and associated with a neighbouring product store. The buildings are generally steel structures. • The size of the process plant depends on the product produced (loaded resin, eluate, yellow cake or U_3O_8 product). • Plant producing U_3O_8 product includes drying or calcining facilities. The stack emissions are scrubbed, and particulates removed by scrubbing are returned to the process circuit via the barren solution. The emissions include ammonia gas. The sanitary protection zone around the plant extends up 1km, there are no settlements in this zone. • Laboratory (generally located within the plant).
	Acid storage tanks	• Large tanks • Spill bunds with capacity exceeding the capacity of the tanks (usually about 130%) • Acid unloading facility (with bunds below truck to tank connections)
	Hydrogen peroxide storage tanks	• Some operations have hydrogen peroxide tanks (hydrogen peroxide is used in the precipitation step of the yellow cake production process), with spill containment exceeding the capacity of the tanks • Loading facilities
	Potable and technical water supply (Typical quantity of water used by an operation is 500,000m^3/y for an operation producing 2000tU per year as yellow cake – value provided by Inkai 4)	• Most mines abstract water for potable and technical water supply from boreholes on site • Others rely on water piped to site over a considerable distance (for example, the Uvanas mine obtains water from an abstraction point on the Shu River, which is about 60km south west of the mine). • Potable water treatment facilities • Water storage tanks include fire water tanks
	Pregnant solution settling ponds or tanks	• Lined ponds (most operations), or • Lined ponds that are sheltered by a roof (but have no walls so that radon can escape) (e.g., Akbastau and Karatau operations), or • Settling tanks, including underlying concrete spill bunds with capacity exceeding the capacity of the tanks (usually about 130%) (e.g., Ortalyk LLP's Central Mynkuduk operation and Kazatomprom-SaUran LLP's Central Moinkum operation).
	Barren solution settling ponds	Lined ponds
	Process slimes settling pond	Generally, there is one pond per operation that receives wash-down water from the process plant.
	Sewage plant and effluent pond	Often there is one pond containing treated effluent. The water is relatively clean and attracts bird life.
	Waste collection and disposal facilities	• LLRW collection facilities for waste transfer to decontamination and/or disposal facilities. • Non-radioactive general/ inert waste disposal sites (often in the well field area, use a trench-system for waste burial).
	Office and staff facilities	• Administration building/s • Change houses, with boot washing stations, shower facilities that are used by staff twice in a workday prior to meal times, hand washing facilities and radiation monitoring checkpoints • Kitchen and canteen/s • On-site clinic, with a resident doctor and a site ambulance for evacuating patients to hospital • Emergency facilities including emergency showers • Comfortable camp sites (at most operations), including recreational and sports facilities (some camps have saunas, a heated pool, gym/fitness centres, table tennis and pool tables and outside football and basketball facilities)
	Other ancillary infrastructure	• Pumping station/s • Power distribution on site • Emergency back-up generator/s • Fuel tanks with spill containment and loading facilities • Heating plant (diesel powered) • Reagent warehouses for storage of ammonia in various forms (as used in the process, includes ammonium nitrate and anhydrous ammonia), caustic soda and other chemicals used in the operations • Equipment and spare-part stores • Maintenance shops • Communications infrastructure • Parking bays

The ponds for PLS, barren solution and process slimes ponds are lined with complex liners. The structure of the complex liners varies from operation to operation and the liner designs are approved by regulatory authorities. The structure typically includes an impermeable geotextile layer sandwiched between bentonite clay, soil and gravel protective layers. The structure may also include additional cushioning geotextile layers and be underlain with concrete or asphalt and topped with asphalt. Each pond is monitored by four groundwater monitoring boreholes. An example cross section of the slime settling pond at JV SMCC's LLP Inkai 4 operation is shown below in Figure 5-12.

The sediments that accumulate in the ponds are removed approximately once every three years and are either returned to the process (in the case of slimes ponds) or transported to a low level radioactive waste ("**LLRW**") facility (transportation and waste disposal is described below).

The ponds are designed and operated with sufficient freeboard to hold an extreme storm event, based on the maximum amount of precipitation in each region. The designs have been approved by the relevant regulatory authority. Gauges are used to monitor the level of solutions in the ponds.

Figure 5-12: Cross-section of the slime settling pond at Inkai 4



Goods Transportation

The transportation of goods to and from the ISR operations is mostly undertaken by Trade and Transport Company LLP, a subsidiary of the Company. This company assists with both rail and road transport and also maintains 500km of private roads used for transportation. Licences for transportation of radioactive and hazardous substances have to be obtained from the government and require that the roads are maintained in good condition. Product is transported from the operations in metal containers and is escorted by security vehicles.

Large quantities of sulphuric acid are required for the ISR mining operations. The acid is sourced from third party mining companies that produce sulphuric acid as a by-product (by means of their sulphur dioxide emission abatement technology), such as Kazzinc and Kazakhmys, as well as acid plants operated by the Group, specifically SKZ U LLP and SKZ Kazatomprom LLP (49% and 10% ownership by the Company, respectively). The SKZ U LLP plant (capacity of 500ktpa) is located at Zhanakorgan, next to Block Kharassan 1, North Kharassan, and Block Kharassan 2 North Kharassan and supplies mines in the Syrdarya basin. The SKZ Kazatomprom LLP plant is located in the Stepnogorsk Industrial Complex (capacity of 180ktpa) and supplies acid to the Semizbai mine. Acid is transported to the ISR operations in the Shu-Sarysu basin by rail and then road, with transfer between rail tankers and road tankers occurring at the Suzak marshalling yard. The road tankers typically have capacity to carry about 35t to 45t of acid each and each operation typically receives between five and ten tanker loads of acid daily.

Other raw materials trucked to site in bulk (a number of truck loads per month) are hydrogen peroxide, ammonium nitrate and caustic soda.

Waste Management

Radioactive wastes produced by the mining operations are low level radioactive wastes ("**LLRW**"). They contain low concentrations of naturally occurring radioactive materials ("**NORM**") with alpha activity less than 100Bq/g (100kBq/kg). These are either disposed of at

LLRW facilities or are decontaminated. Wastes that are amenable to decontamination are metal wastes, particularly galvanised metal wastes that do not have pitted surfaces.

Kazmetrao Ltd is a company independent of the Company that provides LLRW metal decontamination services. The decontamination processes used by this company is a commercial secret and the fate of the decontaminated metal is unknown to the Company. Reportedly, it is less expensive for the ISR operations to send LLRW metal off to Kazmetrao than it is to dispose of the waste at its own LLRW facilities. Kazmetrao currently operates from a site next to Kyzymshek (the settlement near the Uvanas mine) and uses the Stepnoye LLRW facility for disposal of any remaining waste from the decontamination process.

The LLRW produced by the operations include contaminated paper and cardboard, waste personal protective equipment ("**PPE**"), plastic, metal waste and filters from the plant emissions abatement technology. They also include drill slimes from the drilling in the ore zone, sediments from settling ponds, contaminated soil and resin. The capacity of the LLRW facilities is limited and the costs of disposal at these facilities is high, so companies are motivated to minimise the waste volumes as much as possible. Waste volumes are reduced by re-using materials as much as possible (for example, re-use of piping) and by means of shredding and/or compaction.

The largest quantity of the waste from the operations is contaminated soil from pregnant-solution pipeline leaks. The leaks are detected with leak detection technology and addressed quickly to minimise impacts. There is a Company protocol for clean-up of contaminated soil. It is noted that the protocol requires annual gamma-radiation surveys of well fields to identify any contaminated soils that will need to be collected and disposed of at a LLRW.

The non-metal radioactive wastes produced by the mines are bagged in plastic bags and transported to LLRW facilities in metal containers. The plastic bags are used to prevent dust dispersion from the waste.

The LLRW facilities used by the operations are listed in Table 5-11. The LLRW have been located and designed so they do not impact on the environment. The cells of these facilities are lined with a bentonite clay liner and the wastes are covered with soils at a depth sufficient to prevent public exposure to significant levels of ionising radiation. For example, the cells of waste facilities are typically designed with a compacted clay liner (0.5m thick) and will be capped with a clay anti-radon screen (0.5m thick), overlain with a rocky crushed stone layer (0.5m thick) with bitumen impregnation. After that, a layer of potentially fertile soil (0.8m thickness) will be applied followed by topsoil layer (0.2m thick).

Table 5-11: Low Level Radioactive Waste Facilities Used by the ISR Operations including the Mineral Assets

Waste facility (Province and geological basin)	Location	Capacity	Operations using the facility
RU-6 (Kyzylorda Province, Syrdarya basin): Operated by RU-6 LLP	Near North Karamurun and South Karamurun mines, 90km from Shelli, in the Shieli district.	Three cells with total capacity of 110,000m^3 : (10,000m^3; 50,000m^3; and 50,000m^3). The first cell is being decommissioned and the second is being commissioned.	All of the Company's operations in the Kyzylorda Province, specifically: • Irkol (Semizbai-U LLP) • North Karamurun and South Karamurun (RU-6 LLP) • Block Kharassan 1, North Kharassan (JV Khorassan LLP) • Block Kharassan 2, North Kharassan (Baiken-U LLP)
Stepnoye (South Kazakhstan Province, Shu-Sarysu basin): Operated by Kazatomprom-SaUran LLP	Next to the Uvanas Mine and the Kyzymshek settlement	Current cell (80,000m^3) where about 50% of the capacity has been used. Permitted second cell (80,000m^3) and construction will commence in 2020. Space for third cell (100,000m^3) whilst space is available, this is not permitted yet.	Many of the Company's operations in the South Kazakhstan Province. Including operations in the Shu-Sarysu Basin: • Southern Moinkum (Northern Part) and Tortkuduk, (JV Katco LLP); • Uvanas and Eastern Mynkuduk (Kazatomprom-SaUran LLP) • Akdala and Block 4 Inkai (JV SMCC LLP) • Western Mynkuduk (Appak LLP) • Central Mynkuduk (Ortalyk LLP) • Block 1, 3 and 4 Budenovskoye (JV Akbastau JSC) and Block 2 Budenovskoye (Karatau LLP) Also including Zarechnoye (JV Zarechnoye JSC), which is in the Syrdarya basin.

Waste facility (Province and geological basin)	Location	Capacity	Operations using the facility
Kanzhugan (South Kazakhstan Province, Shu-Sarysu basin): Operated by Kazatomprom-SaUran LLP	At the Kanzhugan mine	7,200m^3	Kanzhugan, South Moinkum (Southern Part) and Central Moinkum (Kazatomprom-SaUran LLP operations south of the Shu River)
PV 1 & 2 (South Kazakhstan Province, Shu-Sarysu basin): Operated by Inkai LLP	At the Inkai mine, 8km from Taikonur	10,000m^3 and 16m^3	Block 1, Inkai (a), (b) (c) (JV Inkai LLP)
Stepnogorsk waste facility (Akmola Province): Operated by Stepnogorsk Mining-Chemical Combine LLP	25km from Stepnogorsk and 160km from Astana	Unknown	Semizbai (Semizbai-U LLP)

Each package of waste placed in the LLRW facilities has a waste passport with detail of its nature and radioactivity and its location in the facility.

Regulatory authorities favour development of a small number of large facilities shared by a number of operations, rather than each operation having its own dedicated facility.

Operations in the South Kazakhstan Province that do not have dedicated LLRW facilities transport LLRW waste to the Stepnoye facility, which is operated by Kazatomprom-SaUran LLP. Regulatory authorities discourage waste transport across provincial boundaries. Consequently, some operations transport waste over vast distances.

The LLRW facilities have been sized based on predicted wastes from the operations they serve and estimates of waste that will come from decommissioning of the mines. The Stepnoye LLRW operators say that it is difficult to get accurate predictions of waste loads that will be received from the mines. It is understood that there are no constraints, other than regulatory authority approvals, the expansion of the facilities. Reportedly, there are no obvious groundwater, environmental and land use reasons why the facilities cannot be expanded.

Wastes not classified as radioactive wastes are classified as inert, non-hazardous (green waste), potentially hazardous (amber waste) and hazardous (red waste) according to legally defined waste classification procedures. The amber waste includes batteries, fluorescent lamps, used oil and filters, medical waste and hydrocarbon contaminated soil/sand. The wastes are removed from site by licenced contractors and are recycled or disposed of at licenced facilities. All operations have waste inventories, together with the receipts, invoices and certificates provided by waste contractor for all wastes removed from site. These records are kept up to date for internal and spot checks, inspections and audits. The waste inventories are collated for the year and reported to regulatory authorities annually as part of the permit conditions.

Some operations have small, licenced sites for domestic waste disposal and most have licenced facilities for holding of non-radioactive drilling wastes, which are classified as inert or green waste. The Company has reportedly recently established a protocol for drilling waste classification that will result in most companies classifying their drilling wastes as inert. The drill slimes waste facilities have raised embankment walls, but do not have liners because the waste is non-hazardous. The drill slimes of the ore zone are measured for specific alpha-particle activity. If the activity level is above sanitary norms, then the slimes are classed as LLRW and transported to LLRW facilities. Usually less than 1% of the total volume of the drill cuttings from the ore zone are classed as LLRW.

6 GEOLOGY

6.1 Introduction

The following section includes discussion and comment on the regional and deposit specific geology relating to the Mineral Assets.

6.2 Shu-Sarysu Basin

6.2.1 Regional Geology

The Mesozoic-Cenozoic sediments of the Shu-Sarysu Basin extend over more than 1,000km from the foothills of the Tien-Shan mountains to the south and south-east, to the plains of the Aral Sea depression in the north-west. The width of the Shu-Sarysu depression is 250km (Figure 6-1).

The territory of the Shu-Sarysu Basin is a large epicaleleldian structural trough characterised by a three-level structure. In vertical section, the following stratigraphic levels are identified: the lower level (folded Caledonian basement), the middle level (intermediate semi-platform or lithified sedimentary layer) and the upper level (Mesozoic-Cenozoic platform cover).

Mesozoic-Cenozoic sediments are split into three units: Jurassic pre-platform unit; Cretaceous-Paleogene platform unit and Neogene-Quaternary platform-suborogenic unit (Figure 6-2; Figure 6-3).

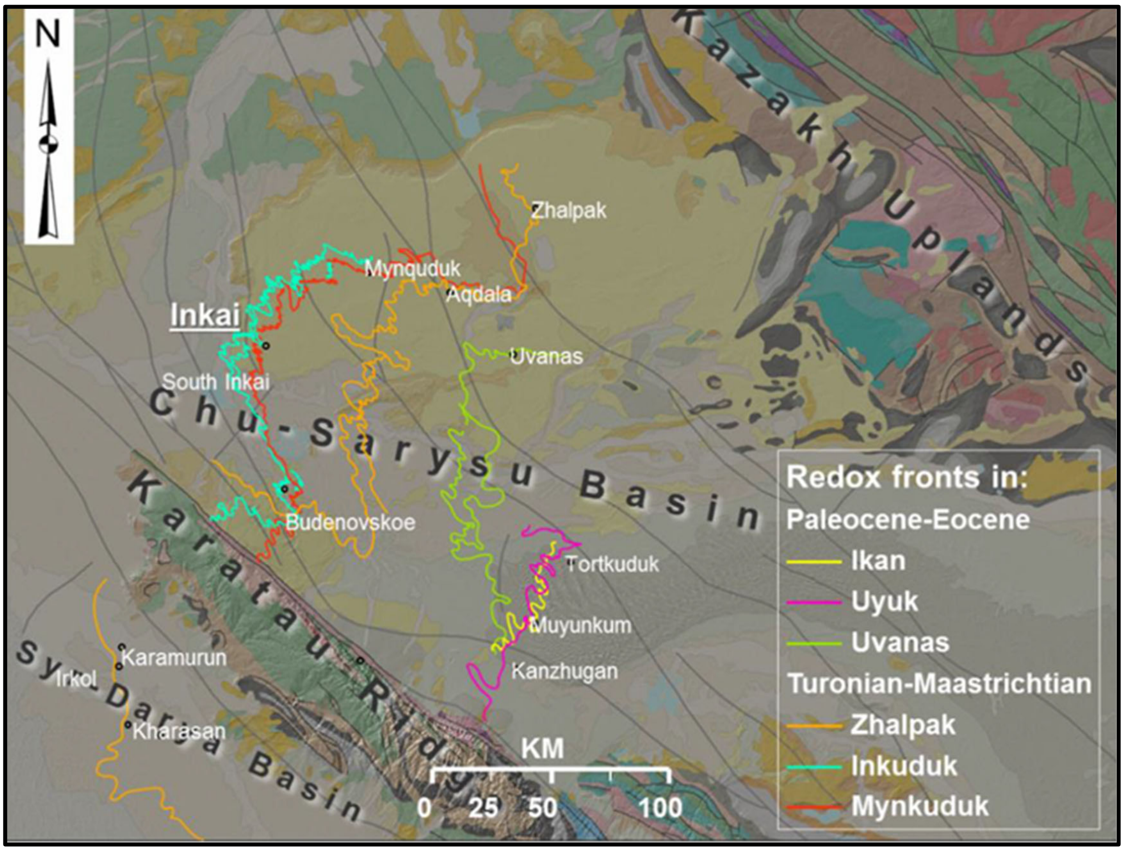
Sediments of the Jurassic pre-platform unit are found in the wall sections of the basin where they are enclosed in grabens among rocks of the intermediate structural level and have a common planation surface with these rocks, so structurally they are more related to the intermediate level. These sediments are represented by a complex unit of proluvial-lacustrine-alluvial rocks that contain coals in the lower part of the section. The total thickness of the Jurassic sediments in the Lower Sarysu trough is over 400m.

The Cretaceous-Paleogene platform unit is represented by continental terrigenous strata of the Late Cretaceous period and continental and marine terrigenous strata of the Palaeocene and Eocene period.

The Late Cretaceous sediments lie unconformably on the deeply eroded Palaeocene-Eocene surface and are represented by only continental formations.

According to the drilling data, at the section bottom, in the surface depressions of the Middle Paleozoic rocks, there are uneroded relicts of reddish dense clays with inclusions of quartz pebbles and gravels and siliceous rocks with intercalations of sand clay sandstones of various grain sizes. Usually, their thickness is not in excess of 15m. Based on their analogy with similar Kyzylkum formations, these rocks are nominally assigned to the Cenomanian Formation (K2sm).

Figure 6-1: Geological Map of Shu-Sarysu Basin and Its Surroundings(1)



(1) "Inkai Operation South Kazakhstan Oblast, Republic of Kazakhstan National Instrument 43-101 Technical Report" published on 25 January 2018.

The Cretaceous-Paleogene (ore-bearing) unit is subdivided into three independent formations: Mynkuduk (early Turonian), Inkuduk (late Turonian-Coniacian-Santonian) and Zhalpak (Campanian-Maastricht to the Early Paleocene) formations.

Each of these formations forms a large rhythm-stratigraphic cycle arranged as according to a near view plan: coarse-grained sandy and pebble-gravel-sandy sediments of typically grey colour predominate in the lower part, while the upper part is mainly occupied by relatively fine-grained often clayey (usually epigenetic) strata of predominantly red colour.

The age of the formations has been mainly determined on the basis of a spore-pollen analysis using geological-stratigraphic correlation sections of the Mynkuduk deposit.

The Mynkuduk Formation (K2t1mk) was defined in 1973 at the deposit of the same name. It is represented by a layer of grey-coloured and variegated alluvial and lacustrine-alluvial sediments accumulated in the Turonian River System which generally extends from the south-east to the north-west.

In the vertical section of the formation, there are clear changes in lithological-facial units from bottom up:

- rod-channel sands of various grain sizes with gravel and pebble;
- floodplain deposits of medium-grained sands; and
- medium and fine-grained sands with clay layers of floodplain-oxbow facies.

The thickness of the Mynkuduk Formation in the area ranges from 70m to 90m, and it is one of the main ore-bearing formations at the Mynkuduk deposit.

The Inkuduk Formation (K2t2-st) has a distinct erosion boundary and lies on the Turonian sediments. It has a coarse-grained composition and a low degree of material grading. Three sub-formations (cycles) were identified in its section, ranging from gravel-pebble sediments to fine and medium-grained sands with clay layers and lenses.

The thickness of the lower sub-formation ranges from 30m to 35m, of the middle sub-formation - from 55m to 60m and of the upper sub-formation - from 25m to 35m.

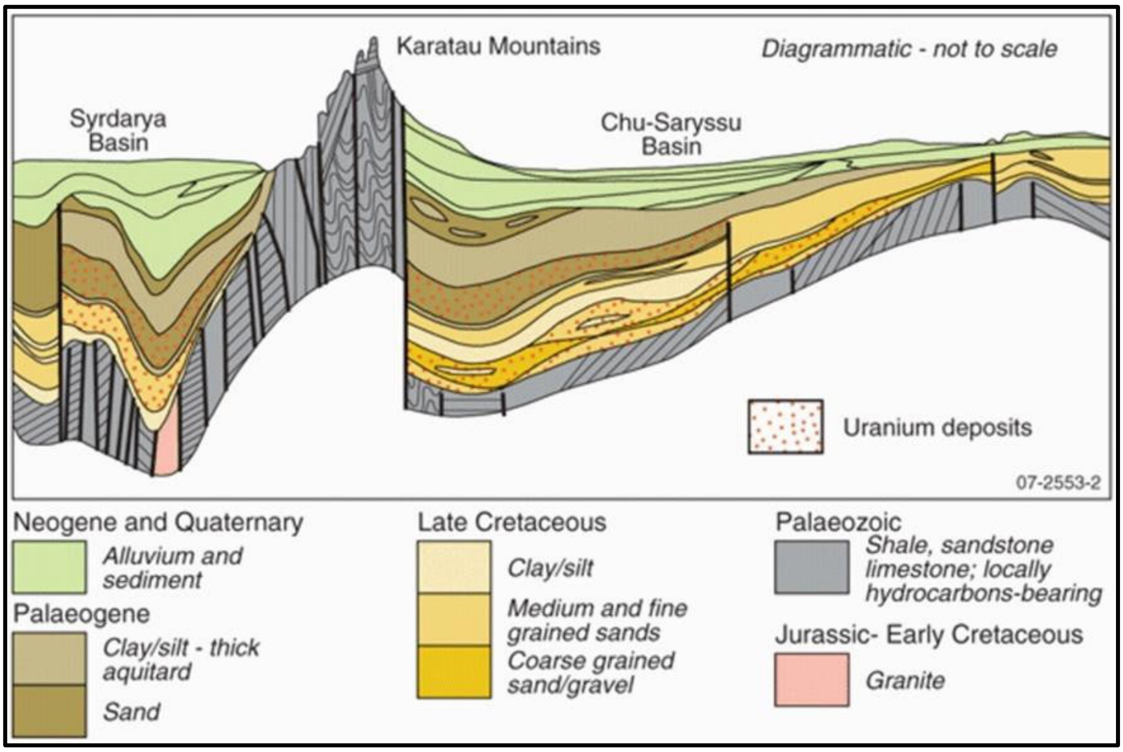
Sediments of the lower sub-formation are represented by grey and green-grey gravel-pebble varieties that naturally change in the upper part of the section into more graded sands of medium and various grain sizes.

At the base of the middle sub-formation, green-grey sands of various grain sizes with gravel and pebble also predominate, changing into medium and fine-grained sands with clay layers.

Sediments of the upper sub-formation have a more uniform lithological composition and are mainly composed of medium-grained sands with a small portion of inequigranular sands and inequigranular sands with gravel (up to 10% of the total thickness). Primary grey colours predominate in this sub-formation.

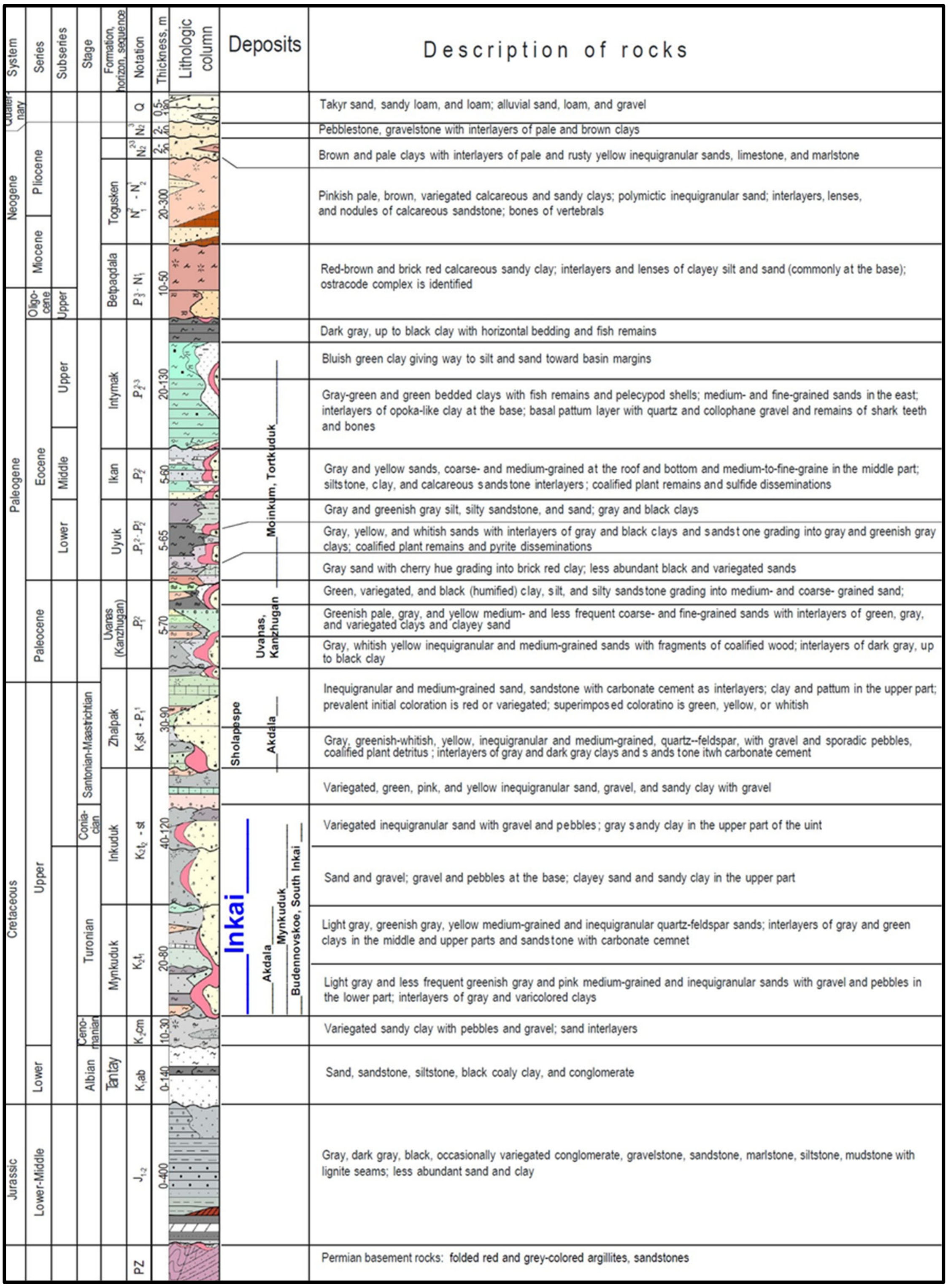
The Inkuduk Formation underwent a regional “gley” reduction processes due to which its strata are mostly represented by green permeable rocks with relict mottled colours typical for clay intercalations. A portion of grey-coloured rocks in the formation composition increases toward south-west, and the overall thickness of the formation increases to 150m in the same direction, in the axial part of the Suzak Trough. Inkuduk is an ore-bearing formation at the mine site.

Figure 6-2: Schematic Cross-section of the Shu-Sarysu Basin and Syrdarya Basin – Looking West[1]



(1) “Inkai Operation South Kazakhstan Oblast, Republic of Kazakhstan National Instrument 43-101 Technical Report” published on 25 January 2018.

Figure 6-3: Schematic Stratigraphic Column for the Shu-Sarysu Basin(1)



(1) "Inkai Operation South Kazakhstan Oblast, Republic of Kazakhstan National Instrument 43-101 Technical Report" published on 25 January 2018.

The Zhalpak Formation (K2km-P11gp) lies on the Inkuduk Formation with sporadic gaps. It is split into two sub-formations; the lower grey-coloured and the upper variegated sub-formations. There is a geochemical boundary between the variegated and grey-coloured parts of the formation which corresponds to the standing groundwater level of the Danian-Early Paleocene period.

Sediments of the variegated part of the formation are mainly represented by medium and fine-grained sands of green-yellow-brown-red hues and tints. The upper part of the formation is composed of red brown carbonatised clays that represent a regional boundary separating saline Cretaceous waters from fresh Paleogene waters. The thickness of variegated sub-formation varies between 20m and 60m.

Grey medium-grained cross-bedded feldspar-quartz sands with pebble and gravel are developed in the grey-coloured part of the formation. They often contain carbonised detritus with iron disulphides.

Paleogene

Paleogene sediments are represented by continental (Paleocene) and marine (Eocene) strata.

There are four formations within the Palaeogenic unit (from the bottom upwards): Uvanas, Uyuk, Ikan and Intymak.

The Uvanas Formation (P12uv) was discovered in 1970, where it hosts mineralisation. It is present throughout the entire area of the Inkai deposit at depths from 170m to 300m, and within the Suzak Trough at the Budenovskoye deposit it is located at depth of about 450m. The thickness of this formation increases in the same direction from a few meters to 80m.

The Uyuk Formation (P12-P21uk) is ubiquitous and is mainly represented by intermittent bedded grey and green-grey clay. Coastal-marine sandy-clay sediments were only preserved only in the southern part of the area. Thickness of the Uyuk Formation ranges from a few meters to 60m.

The Ikan Formation (P22ik) composition (grey-green clay, sometimes opoka-like) is very close to the underlying Uyuk Formation which is why it is often impossible to separate these two formations within the profile. In axial parts of the Suzak Trough, where the thickness of the Ikan Formation reaches 50m, its composition is complemented with fine-grained water-bearing sand. The Uyuk and Ikan formations are mineralised at the Kanzhugan and Moinkum deposits.

The Intymak Formation (P22-3im) is represented by deep marine green-grey to blue-green intermittent bedded or massive (less often) clay with thicknesses of 80m to 150m. This formation is the upper regional aquifuge for Eocene – Late Cretaceous aquifer system.

Late Oligocene – Quaternary unit (barren)

A late Oligocene – Quaternary unit, overlies the late Eocene formations with signs of erosion and an angular unconformity. The unit contains three subunits: a Late Oligocene – Early Miocene suborogenic subunit; a Late Oligocene – Quaternary orogenic sub-unit and a Quaternary platform sub-unit. The unit is characterised by complex formational composition and frequent non-depositional hiatus, which played a role in development of mineralisation-controlling infiltration processes in Cretaceous-Palaeogenic formations.

The suborogenic subunit is represented by Betpakdala Suite and Togusken Series sediments. The Betpakdala Suite (P33-N11bt) contains two layers: the lower one with red beds and the upper one is variegated. The lower layer overlies Palaeogenic and Cretaceous formations with signs of erosion degradation and is composed of brick-red and brown-red carbonate clays, silt, pink and brown sands. The upper layer differs from the lower layer one in heterogeneous lithological composition (clays, sands and gravel), variegated dirty-yellow, brown and pale colours, poor rounding and grading of material. The overall thickness of the suite in the Suzak Trough reaches 200m but reduces towards the north and eventually pinches out entirely.

The Togusken Series (N12 -N21tg) is represented by ubiquitous yellow, rusty-brown inequigranular quartz sands with bands of gritstone, sandstone and clay. Its thickness across the Betpak-Dala Plateau generally does not exceed 12m and it is considered to have formed under fluvial conditions with origins located in the Kazakh folded area.

The Late Pliocene – Quaternary orogenic subunit (N2+Q) is composed of pebble-gravel deposits, gritstone and conglomerates of alluvial plain of Karatau ridge and its thickness ranges from a few meters to 40m.

Quaternary unit

Quaternary sediments form shallow cover at the Betpak-Dala Plateau, infill valleys of Sarysu and Shu rivers, arid grasslands, takyr and salt basins and form sand massifs of Muyunkum, Samen-Kum, etc. Most widespread are alluvial sands, sandy loam, loam, gravel rock, aeolian sand, silt and clay. The total Quaternary thickness varies from less than a meter to 20m.

6.2.2 Deposit Geology

Cretaceous-Palaeogenic formations host all major economic uranium deposits of the Shu-Sarysu Basin.

The primary commercial mineral in the area is stratified-infiltration uranium, associated with regional zones of stratal oxidation, which is currently the main economic type. Formations of the Bolshoi Karatau Mountains folded basement were found to contain deposits and occurrences of gold, silver, copper, lead, tin, barite, phosphates, marble, etc.

6.2.3 Deposit Mineralisation

The Uvanas, Moinkum, Kanzhugan deposits, together with a number of other occurrences are associated with regional zone of stratal oxidation in permeable Palaeocene-Eocene deposits. Uranium mineralisation is formed along a geochemical barrier between epigenetic oxidised and primary grey-coloured rocks and the uranium content of the ores typically varies from 0.010%U to 0.100%U.

The Zhalpak and Akdala deposits are genetically and spatially associated with attenuation of a regional zone of stratal oxidation in Upper Cretaceous Zhalpak formation. Mineralisation is located at depths from 80m to 200m; apart from uranium, there are elevated concentrations of rhenium of up to 1.5g/t.

The Inkai deposit connects to the Mynkuduk deposit in the south-west and stretches towards the south up to the boundary with the Budenovskoye deposit. Economic uranium-bearing mineralisation was found in Mynkuduk and Inkuduk formations and is controlled by a regional NS-striking zone of stratal oxidation. Mineralisation is located at depths of 340m to 530m.

The Budenovskoye deposit is the southern extension of Inkai and stretches towards the south up to the Main Karatau Fault. Economic uranium ore bodies were identified within the Upper Cretaceous Mynkuduk and Inkuduk formations. Mineralisation is controlled by a regional zone of stratal oxidation with the base of mineralisation located at depths from 290m to 750m.

6.2.4 Deposit Summaries

Akdala

The Akdala deposit comprises seven orebodies which are divided into two levels: the lower corresponds to the Mynkuduk and Inkuduk horizons and the upper to the Zhalpak horizons. The orebodies are consistent along strike, but their width is quite variable: the thickness varying 2m to 5m at the flanks and 5m to 10m in the central part of the roll. The total strike length of the orebodies varies from 0.9km (orebody 9) to 9.6km (orebodies 1, 2, 3), and the width varies between 25m and 700m (orebody 1). The main orebody (orebody 1) has been explored using a 200m by 50m to 25m grid up to C1 category. A portion of Orebody 2 has also been drilled using a 100m by 25m grid for C1 category. The remaining portions of the deposit have been drilled using 800m by 25m or 400m by 50m grids to define C2 category. The average thickness varies from 3m to 10m, the average productive unit being 6m for C1 and 4m for C2. The average uranium grade averages 0.058%U.

Western Mynkuduk

Western Mynkuduk comprises eight orebodies which correspond to the Mynkuduk and Inkuduk horizons companion sediments. In plan-view all the orebodies are presented by twisty narrow bands of different thickness and shape. The lenses extend along strike for between 3km and 25km, have widths of 25m to 500m, and thickness of between 7m and 23m.

The largest orebodies are 13, 14 and 17, the remaining ore bodies represent 25% of the total resources of the deposit.

The main drilling grid for C1 category was 200m by 50m to 25m for C1 and 800m by 100m to 50m for C2 with some infill areas to 400m by 100m to 50m.

The average equilibrium coefficient is 0.83 and is dependent on the thickness of the mineralisation. The uranium grade of the resource varies from 0.025%U to 0.045%U, the average thickness varies from 5.7m to 7.3m and the average productivity varies from 2.9kg/m^2 for the C1 Category to 3.3kg/m^2 for the C2 category. The geological structure of West Mynkuduk deposit is presented on Figure 6-4.

Central Mynkuduk

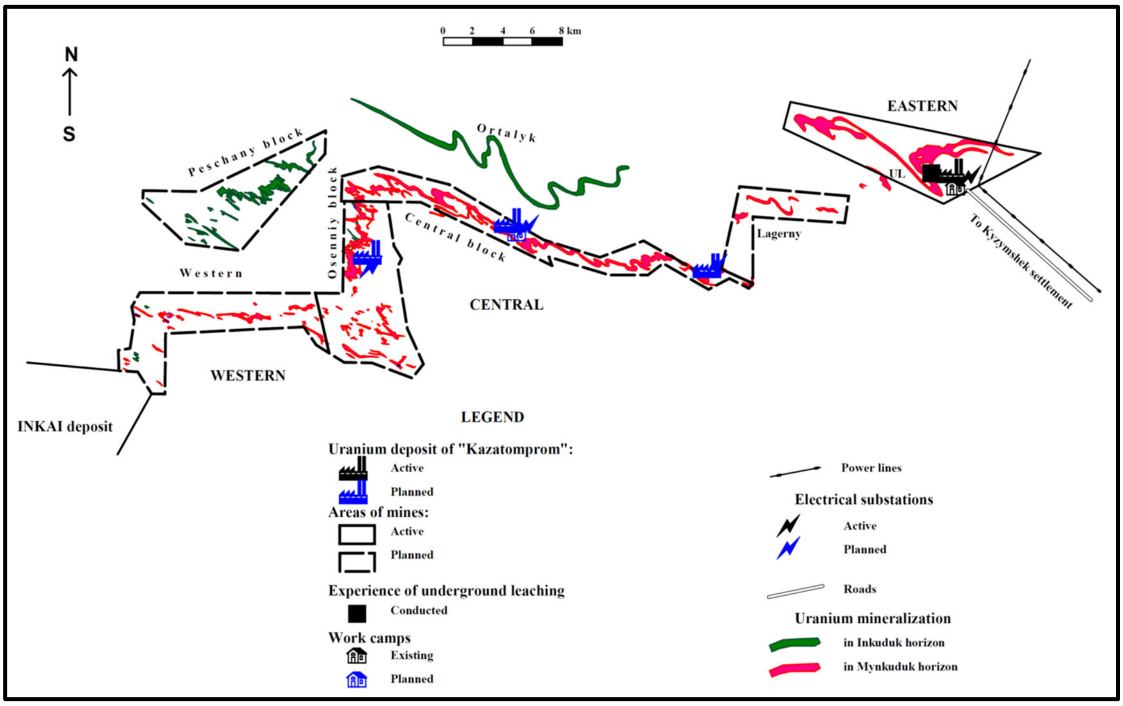
Central Mynkuduk comprises 2 main orebodies and one minor one which correspond to Mynkuduk and Inkuduk horizons of Turonian-konyak-santonian sediments. In plan-view all of the orebodies are presented by twisty narrow bands of different thickness and shape. The lenses extend along strike for between 8km and 26km, have widths between 50m and 800m, and thicknesses of between 0.9m and 27m.

The largest orebody is number 10 and the remaining 35% of the total resource is within orebody 18. The drill spacing for C1 was 200m by 50m to 25m for C1 and 800m by 100m to 50m for C2.

The average equilibrium coefficient is 0.81, while in centre part of the roll of the orebody 10 it is equal to 0.97. The uranium grade in the resource block varies from 0.038%U to 0.047%U, the average thickness varies from 5.6m to 7.6m and the average productivity varies from 5.2kg/m^2 (C1) to 2.9kg/m^2 (C2).

The geological structure of Central Mynkuduk part of Mynkuduk deposit is presented on Figure 6-4.

Figure 6-4: Mynkuduk mineralisation map



Inkai

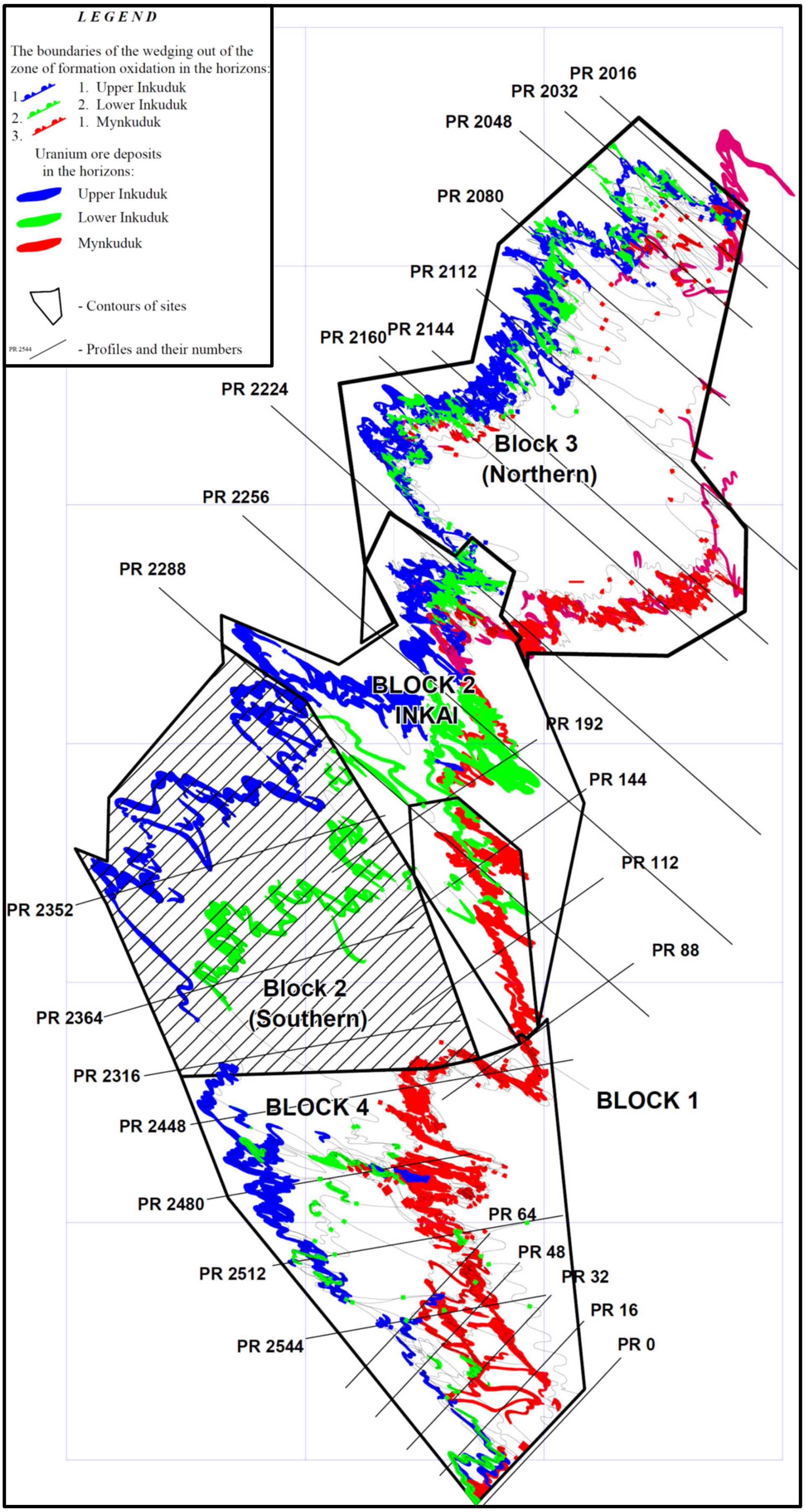
Inkai is the largest uranium deposit of a hydrogenous type in the Shu-Sarysu uranium province. The nearest uranium deposits are Budenovskoye (50km), Sholak-Espe (60km), Mynkuduk (extension of Site 3 to the north-east), Akdala (100km), Zhalpak (140km), Uvanas (160km), Kanzhugan and Moinkum (250km).

The orebodies at Inkai are spatially confined to the geological boundary of the stratal oxidation zone, and their limits in plan and in section were defined based on the gamma logging data (Figure 6-5).

Each of the discovered orebodies is located within one ore-bearing horizon and corresponds to one hypsometric level.

Orebodies consist of several morphological elements - the main rolls with distinct flexures and limbs whose proportions vary from equal values to the 10-fold prevalence of one or another morphological element. In addition, there is a wide presence of conjugated flexure-limb elements of the ore bodies (“*winged sacks*”) whose thickness ranges from 20m to 25m. During the development of ore-controlling oxidation, there appear satellite and residual bodies that are usually located in the “*rear*” of the main rolls and are separated from them by not insignificant (dozens and hundreds of meters) barren intervals.

Figure 6-5: Ore mineralisation at the Inkai deposit



In plan-view, all orebodies are shaped like winding ribbons that differ only in length and width and are spatially interconnected with the main structural-morphological types of pinch-out of the stratal oxidation zone.

In cross-sections, morphological structure of the ore bodies is represented by a diverse combination of roll elements generally in the form of irregular rolls which are usually asymmetrical, deformed and laminated, or a combination of several contiguous rolls associated with residual and satellite bodies.

Inkai 1 comprises two main ore bodies and Inkai 2 six ore bodies which correspond to Mynkuduk and Inkuduk horizons of Turonian-Konyak-Santonian sediments. In plan-view all the orebodies are presented by twisty narrow bands of different thickness and shape. Orebody 2 is considered to be the simplest in structure, ore body 10a and 1 – complex and 1,3,10, 12, 12 – very complex.

Inkai 1 and Inkai 2 were explored using 100m by 50m grid for B category, 200m by 50m – for C1 and 800m by 50m grid for C2.

Parameters of uranium mineralisation in the resource blocks vary in a wide range: uranium grade - from 0.026%U to 0.063%U, thickness - from 5m to 7.5m.

Inkai 3 lies to the north of Inkai 2 and to the southwest of the Mynkuduk deposit and extends for some 25km and varies in width from 10km to 17km. The mineralisation at Inkai 3 is mainly localised in three Upper Cretaceous sub-formations: Lower Mynkuduk (from 400m to 480m deep), Lower Inkuduk (from 320m to 390m deep) and Middle Yakutuk (from 290m to 350m deep).

Parameters of uranium mineralisation in the resource blocks vary over a wide range: uranium grade - from 0.027%U to 0.070%U, averaging 0.044%U and thickness - from 2.55m to 10.61m, averaging 6.21m.

Ore content was estimated based on the results of prospecting and exploration works. Drill spacing at Inkai 3 was 800m by 100m to 50m for C2 category and 200m by 50m for C1 category.

The geological structure of Inkai 4 is very similar to Inkai 3. The uranium grade ranges from 0.023%U to 0.123%U, with an average of 0.043%U and a thickness from 2.5m to 10.6m, with an average of 6.2m.

The orebodies are characterised by an extremely uneven distribution of size classes both in cross section and throughout the site area. Size fractions of 0.5mm to 0.25mm and 0.25mm to 0.10mm predominate in the composition of mineral sands and amount to 44% to 62%. The proportion of a clay-siltstone fraction (less than 0.05mm) varies from 10% to 25% (15% on average). Ores are of a silicate type. Minerals which are insoluble or hardly soluble in acids predominate in the composition of mineralised sands (up to 98%).

Inkai 4 is referred to Group 2 in terms of geological structure complexity. The drill spacing was 800m by 100m to 50m for C2 category and 200m by 400m to 50m for C1 category. A total of 2,367 boreholes were drilled at the site, including 1,043 core holes. The geological model for Inkai 4 was recently updated and the current Mineral Resource statements now incorporate the revised estimate.

Uvanas

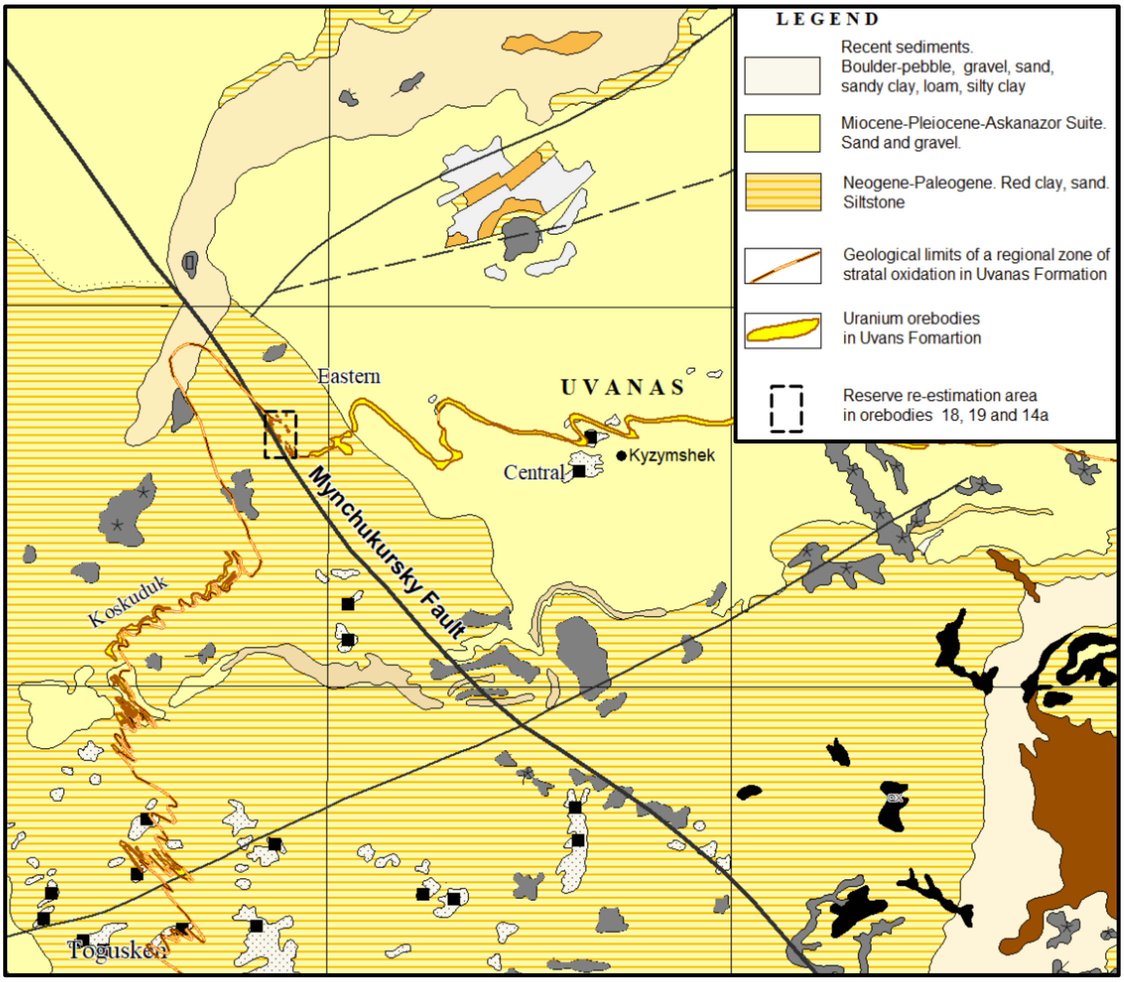
The Uvanas deposit is located in the northern part of the ore district within the Uvanas-Kanzhugan metallogenic zone (Figure 6-6).

The general position of the Uvanas formation in the Mesozoic-Cenozoic section and its structural features are characterised by a gradual increase in its thickness from east to west and from north to south. At the east site of the Uvanas deposit, the thickness of the formation varies from 4m to 8m, whilst in the West site it ranges from 26m to 30m. The maximum thickness of up to 52m was observed at the Koskuduk site (South-Western flank), and at the Togusken site the thickness further increases to 60m.

The Uvanas ore-bearing formation has a shallow dip not exceeding 6° to 7° on average. Steeper dips are only observed within the West and South-West sites (Koskuduk site and Togusken site adjoining from the south). In a zone adjoining the Mynchukursky fault from the east, the dip angle is not in excess of 1°.

In plan, mineralisation is shaped like winding ribbons that follow the geological boundary of the stratal oxidation zone.

Figure 6-6: Geological map of Uvanas deposit area



The main part of Uvanas deposit was explored between 1973 and 1975 by drilling on a 200m by 50m to 25m grid.

As of 1 January 1976, the total delineated length of a near-latitudinal ore-bearing zone was 37.1km, of which 25.4km was drilled on 200m by 50m to 25m grid. The remaining mineralised zone of 11.7km long was explored on a 800m by 50m to 25m grid. The Koskuduk site was explored on a 800m by 50m to 25m drilling grid along its entire length (11km along strike).

Continuity of uranium mineralisation was confirmed within the largest orebodies. The largest and morphologically simplest orebodies are located in the eastern part of the West site as well as at the Central and Eastern sites of the deposit. Uranium mineralisation appears to be more complex in the western part of the West site and at the Koskuduk site.

The width of orebodies in the strata of productive formation ranges from 25m to 35m to 400m. The depth of the roof of the ore-bearing permeable formation within the latitudinal ore zone increases from east to west from 82m to 126m. The deposit is characterised by a horizontal or sub-horizontal bedding of the ore-bearing formation and the absence of the clearly visible post-ore dislocations.

Throughout the entire area explored to the C1 category, competent impervious clay strata with continuous sand “windows” localised in some areas (up to 4.6% of the latitudinal zone area) are developed at the base of the Uvanas formation.

The ore-bearing formation is characterized by high water content: specific well yields vary between 0.049l/s to 0.3l/s at the East site and 0.96l/s to 1.75l/s at the Koskuduk site. Permeability coefficients range from 4m/day to 5.3m/day in the east to 11.6m/day to 13.1m/day in the west.

Water is predominantly of sulphate-chloride sodium chemistry, with salinity varying from 5g/l at the East site to 3.1g/l to 1.22g/l at the Koskuduk site.

The main uranium mineral is coffinite (up to 95% of the total uranium mineralisation). Ores are considered non-carbonate and the CO_2 content in $CaCO_3$ equivalent does not exceed 0.1% to 0.4%.

Zhalpak

Zhalpak is located at the north-eastern part of Shu-Sarysu Basin. The mineralisation is confined to the sub-meridian front of stratal oxidation within the Zhalpak Horizon. In general, the deposit has a simple geometry and good continuity.

Two main zones have been identified, the lower zone is confined to Mynkuduk and Inkuduk horizons, while the upper zone occurs within the Zhalpak Horizon. The uranium mineralisation is controlled by stratal oxidation and the mineralisation is primarily located at the bottom of Zhalpak Horizon. High grade mineralisation is localised at the beginning of stratal oxidation pinching out (detachment from bottom confining layer). The upper part of stratal oxidation within the productive horizon is not mineralised. The host rock is a grey-coloured gravel-sandstone with rare grey-coloured clayey interlayering. Mineralised host rock has higher grade of carbonised detritus (up to 0.5% of organic carbon) and a higher concentration of heavy minerals.

There are three types of mineralisation present; namely dark-grey highly graded sandstone hosted mineralisation with high carbon content in which uranium is confined to organic material and sand clasts; grey and light grey sandstone with high uranium grades which are enriched in pyrite, have no organic carbon and where the uranium is confined to sulphides and sand clasts; and low grade light greyish sandstones in which the uranium is uniformly distributed. The uranium mineralisation occurs as coffinite.

In plan-view the mineralisation occurs in continuous north-west striking snaky bands related to the zone of stratal oxidation and has been modelled using a 0.010%U cut-off. In section view, the mineralisation occurs as blanket-like bodies along lower border of stratal oxidation or sub-roll (pocket-like) bodies, or a combination of both. In total 8 separate orebodies have been identified within three areas: namely Central (orebodies 1,2,3,4 and 5), Northern (orebodies 6 and 7) and Southern (orebody 8). Orebody 2 is the largest, the average grade is 0.032%U of uranium and some 60% of the mineralisation is classified as C1 and the remainder as C2.

Tortkuduk and Southern Moinkum

Tortkuduk and Southern Moinkum are both part of the Moinkum deposit and are situated between the Karatau Ridge in the south and lower reaches of Shu River in the north.

At Southern Moinkum, the mineralisation occurs within the Uyuksky and Kanzhugansky horizons. Southern Moinkum comprises 30% of the total resources of the deposit of which 62% are within Orebody 10 and 29% within Orebody 12. The deposit was originally explored on a 800m to 200m by 50m grid which was then infilled to 200m to 100m by 50m at the evaluation stage. The individual orebodies extend for between 1,300m to 15km along strike and vary in width up to 1.6km.

The Tortkuduk deposit is split in two areas, North and South. The depth of the mineralisation in the North Area is between 250m and 350m and it occurs within the Uyuksky and Ikansky horizons which are separated by clay horizons between 5m and 20m thick. In the South Area, the mineralisation occurs in the same horizons, but the geology is more complex, the mineralisation is deeper (varying between 350m and 500m) and the individual orebodies extend for up to 10km along strike and are up to 1,500m wide.

The exploration grid at Tortkuduk is similar to Southern Moinkum.

Kanzhugan

Kanzhugan is situated in the south of the Shu-Sarysu province and is also part of the Moinkum Deposit. The main uranium bearing horizons are Uyuksky (which contains some 67% of the resource) and Kanzhugansky.

The deposit was mainly explored using a 200m to 100m by 50m grid and the main orebodies extend along strike for between 2.2km and 5.1km and have an average width of between 200m and 780m. The average thickness of the uranium bearing sands changes from 45m to 50m to 25mm to 30m, and the depth changes from 210m to 220m to 250m to 270m, moving from south to north.

Eastern Mynkuduk

Eastern Mynkuduk occurs in the upper north-east limb of the West-Shu-Sarysu Basin and the mineralization is confined to the Inkuduk and Mynkuduksky horizons.

The individual orebodies extend for up to 15km to 20km along strike and are up to 400m to 500m wide. The thickness of the orebodies is 2m to 10m in the limbs and between 20m and 25m in the centre of the rolls. The depth of the mineralization varies from 175m to 240m within the Inkuduk Horizon and from 205m to 340m within the Mynkuduksky Horizon.

There are two main uranium orebodies, Orebody 1 and Orebody 2. Ore body 1 is an asymmetric roll while Orebody 2 has a linear shape and joins up with Orebody 2 in the north-west.

Budenovskoye

Budenovskoye is situated to the south of Inkai and extends southeast from there to the Karatau Ridge. In total the mineralization extends from North to South for some 51km though in plan view it forms complex winding rolls and limbs. The deposit is divided into 4 blocks. Blocks 1, 3 and 4 are owned by Akbastau LLP and Block 2 by Karatau LLP

The mineralization occurs primarily in the Mynkuduksky and Inkuduksky horizons, however within each of the areas either both or only one horizon could be mineralized. The orebodies in most cases comprise rolls of different shapes and forms. The thickness in the main part of the roll is about 20m but this decreases to 5m at the limbs.

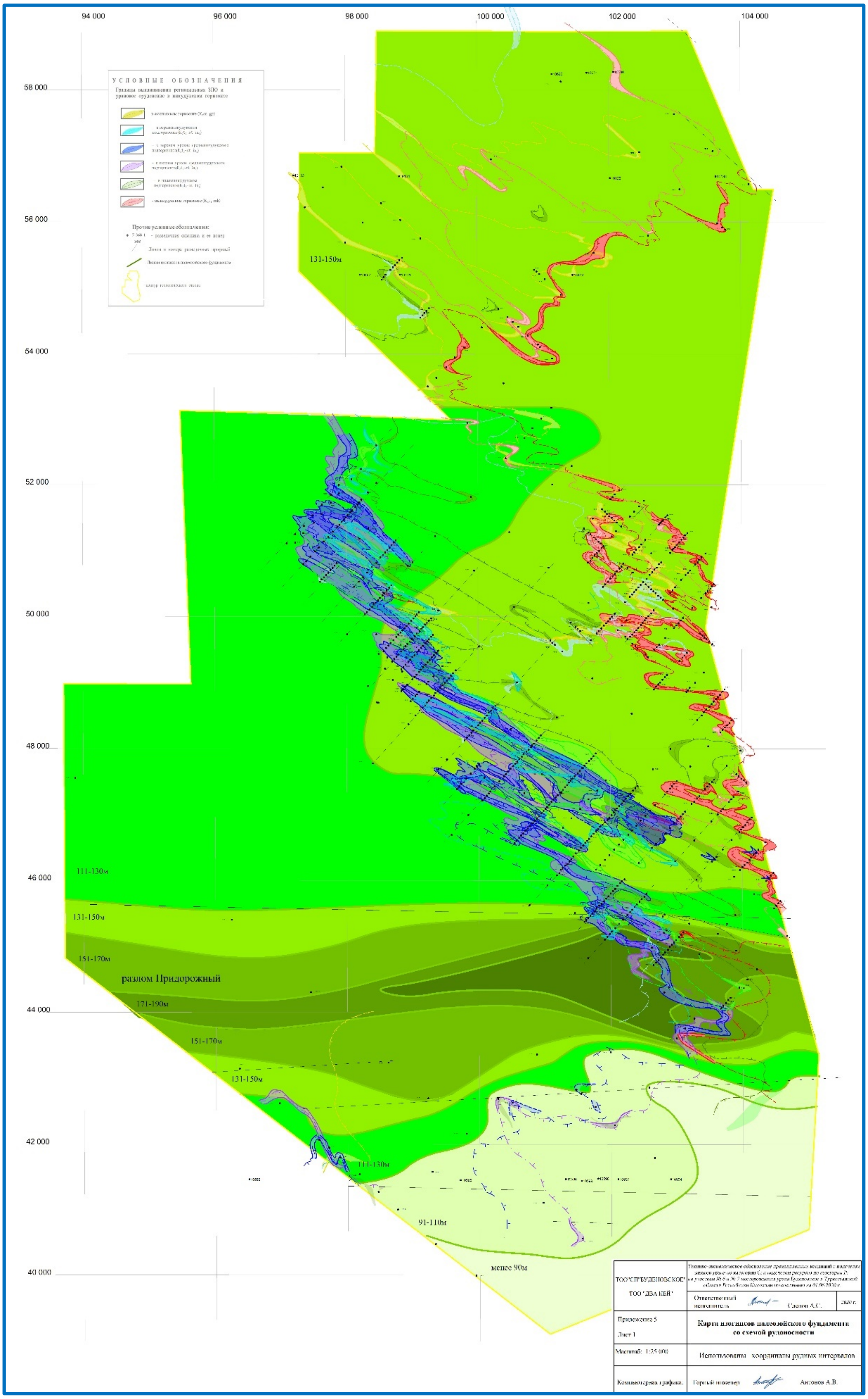
The depth of mineralization is quite deep and varies from between 520m to 670m in Block 1, to 580m to 700m in Block 2, to 670m to 705m in Block 3 and to 560m to 680m in Block 4.

The exploration grid in each case was 200m by 50m for the C1 category and 400 by 100m to 50m for the C2 category. During 2018, the Company completed a phase of exploration drilling which resulted in a first Mineral Resource declared for Budenovskoye Block 6 and Block 7 as reported herein.

The main uranium hosted horizons at Budenovskoye 6&7 are the same as at neighbour deposits of Inkai and Mynkuduk: Mynkuduksky, Inkuduksky and Zhalpak horizons. The Mynkuduk horizon includes classical alluvial cycles with total thicknesses of 0m to 30m extending to a depth of 630m to 830m. The Inkuduksky horizon unconformably overlays the Mynkuduksky, horizon, and is 60m to 80m thick occurring at depths 630m to 830m. The Zhalpak horizon is less developed in the area and is situated at depths of 540m to 770m. The Inkuduksky horizon is divided into three sub-levels subdivided by lenses of clay and siltstones.

The Mynkuduksky and Inkuduksky horizons are separated within the Budenovskoye Block 6&7 area where the Mynkuduksky horizon is developed in the north-east and the Inkuduksky horizon in the south-west of the deposit (Figure 6-7). The primary uranium minerals at Budenovskoye Block 6&7 are pitchblende and coffinite. The total carbon content within uranium bearing horizons is low, being 0.13% on average, and also contains low organic carbon ranging from 0.01% to 0.05%.

Figure 6-7: Inkuduksky and Mynkuduksky mineralisation horizons of Budenovskoye Block 6&7



6.3 Syrdarya Basin

6.3.1 Regional Geology

The geological location of the Kharassan, Irkol, Karamurun and Zarechnoye ore fields is determined by their positions within the main structures of the region which are represented by the Bolshoi Karatau horst-anticlinal uplift and the conjugated north-eastern wall of the Syrdarya Basin (Figure 6-8). These large-scale long-existent structures play a predominant role in the geological setting of the region and influenced the spatial position of facial, lithological and primary geochemical zones during accumulation of the Upper Cretaceous sediments but had a lower impact on sedimentation of the Paleogene and Neogene formations.

The current geological-structural setting of the region is the result of orogenic processes that took place in the Late Pliocene-Quaternary period.

There are two structural levels in the deposit area: 1) complex folded formations of Pre-Mesozoic basement and 2) loose-lithified sediments of Mesozoic-Cenozoic (upper) sedimentary cover which includes structural units of a recent (Cretaceous-Paleogenic) platform cover and the Neogene-Quaternary epi-platform orogenic area. Jurassic rocks are developed at the bottom of the platform cover in the fault zone. The crystalline basement rocks in the deposit area do not outcrop and are located at depths of between 1km and 3km.

All of the deposit area is covered by a complex of Neogene-Quaternary sediments with thickness ranging from 10m to 200m.

Metamorphosed and intensively dislocated basement formations belong to the geosynclinal stage of the region development. Basement rocks outcrop at the ground surface on the mountain edges of the Bolshoi Karatau uplift.

At the base of the lower structural level, there are metamorphic and carbonate-terrigenous formations of the Lower-Middle Proterozoic age, Upper Proterozoic effusives of the acidic and basic composition and terrigenous marine sediments of the Vendian age. The upper section of the basement is represented by Cambrian carbonaceous-siliceous formations, Ordovician flyshoid and terrigenous sediments, terrigenous-molasse and carbonate sediments of the Devonian and Lower Carbonic periods. Precambrian formations contain intrusions of granites, granosyenites, diorites and gabbro-diabases. Middle and Late Paleozoic strata are intruded by dykes of diorite porphyrites and syenite-porphyries. Basement rocks are subject to complex dislocations, such as upthrows, reverse faults, over-thrusts and folds.

Loose rocks of the sedimentary cover have a double-level structure and are split into lower and upper structural levels. Upper Cretaceous, Paleogene, Neogene, and Quaternary sediments are found in the sedimentary cover section.

Lower structural level

The lower structural level is represented by the Upper Cretaceous, Paleogene and Lower Neogene sediments formed in the platform conditions within a relatively stable tectonic environment.

Cretaceous sediments of the Cenomanian suite unconformably overlay basement rocks. Cenomanian sediments are represented by intercalation of red siltstones with lenses of sand (thickness varies between 0m and 400m). The Turonian section is represented by siltstones, clay sandstones and clays (75m thick). The Coniacian sediments are represented by sandstones with siltstones lenses (thickness varies between 34m and 64m).

The Santonian sediments which host ore in some deposits in the Syrdarya region are represented predominantly by green sand sediments.

The Campanian sediments which also host ore in some deposits are characterised by alluvial sedimentation and represented by yellow and brown sands.

The Maastricht sediments, the last ore hosting sediments in the region, are subdivided in two levels. The lower level is represented by grey sand sediments. The upper level consists predominantly of red siltstones and clay sediments.

Paleogene sediments which overlay unconformably Cretaceous strata are represented by a large transgressive cycle which was formed in the sea basin conditions. The rocks are represented (from bottom upwards) by carboniferous sediments, siltstones, gypsum and limestones which were formed in the arid climate conditions. The upper Eocene section is represented by clays, calcareous clays and siltstones with the total thickness of about 300m. Miocene sediments which overlay unconformably Eocene clays are represented by red siltstones. The total thickness of the Eocene section varies between 120m and 130m.

Upper structural level

Formations of the upper structural level are represented by Quaternary sediments and accumulations.

The upper Pliocene sediments overlay unconformably the Miocene formations and are represented by siltstone and clay with the average thickness of 160m.

Quaternary strata are developed throughout the area and represented by sand with the thickness of between 100m and 120m.

6.3.2 Deposit Geology

Late Cretaceous sediments contain all main commercial uranium deposits within the Karamurun uranium ore district which occur in the Turonian, Coniacian, Santonian, Campanian and Maastricht sediments. Selenium ores and a number of rare and trace elements (rhenium, scandium, vanadium, yttrium, etc.) were found at all targets within the epigenetic zones.

The North Karamurun selenium-uranium deposit and South Karamurun uranium deposit are localised in the Campanian-Maastricht formation; the Irkol uranium deposits are localised in the Turonian, Coniacian and Santonian sediments; and the North and South Kharassan selenium-uranium deposits are localised in the Santonian, Campanian and Maastricht sediments. The Zarechnoye selenium-uranium deposits were discovered in the Karatau uranium ore district, in the Campanian sediments.

6.3.3 Mineralisation

All of the uranium deposits in the Syrdaryia Basin belong to the bedded-infiltration geological-industrial type of uranium deposits, with mineralisation confined to the permeable aquifers in which oxidising ore-controlling epigenetic zones are developed.

Uranium mineralisation is controlled by the border of roll front zones of feathering out of layered oxidising zones, in narrow winding ribbon-like configurations from about 50m to 200m to 1,600m. Beside the layered oxidising zones, the mineralisation is also controlled by rock permeability along the contour of mineralization and along strike.

The uranium ore minerals comprise coffenite, nasturine and sometimes carnotite, the selenium minerals – mostly by selenium itself.

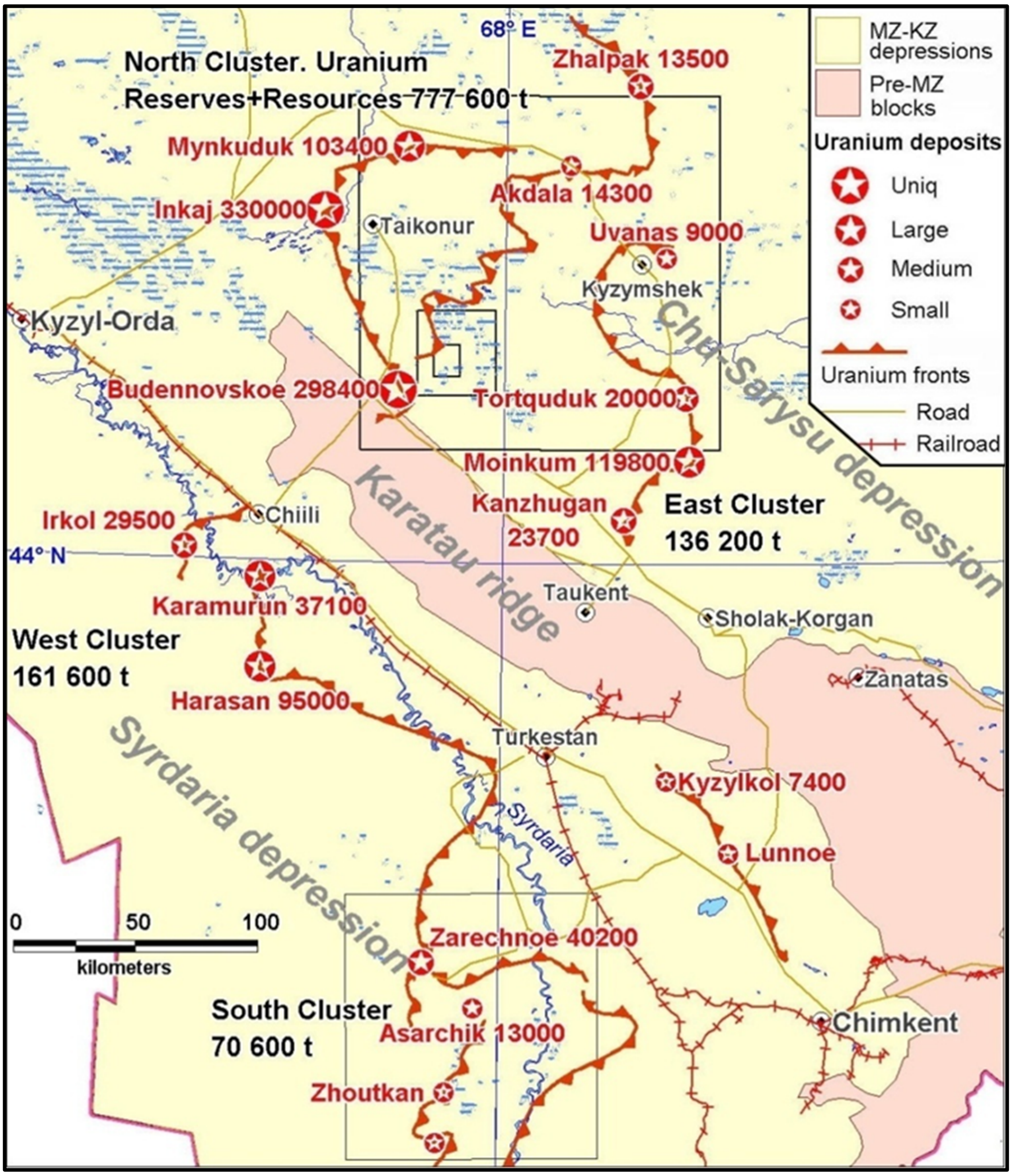
Ore-hosting rocks and ores in the Santonian, Campanian and Maastrichtian sediments are mostly composed of insoluble minerals (quartz, siliceous debris) and weakly soluble minerals (feldspars).

There are practically no deleterious impurities in ores that would complicate the in-situ leaching process, except for clay minerals with montmorillonite predominating.

Fine-grained mineralisation is advantageous for the ISR process. Predominance of hexavalent uranium in ore minerals is also favourable for uranium in-situ leaching.

The amount of siltstone-clay particles of less than 0.05mm size varies in mineralised zones between 8% and 25% and slightly increases toward the base of the Maastricht productive zone, which is fairly consistent with the sedimentation rhythm.

Figure 6-8: Geological Map of the Region



6.3.4 Individual Deposit Summaries

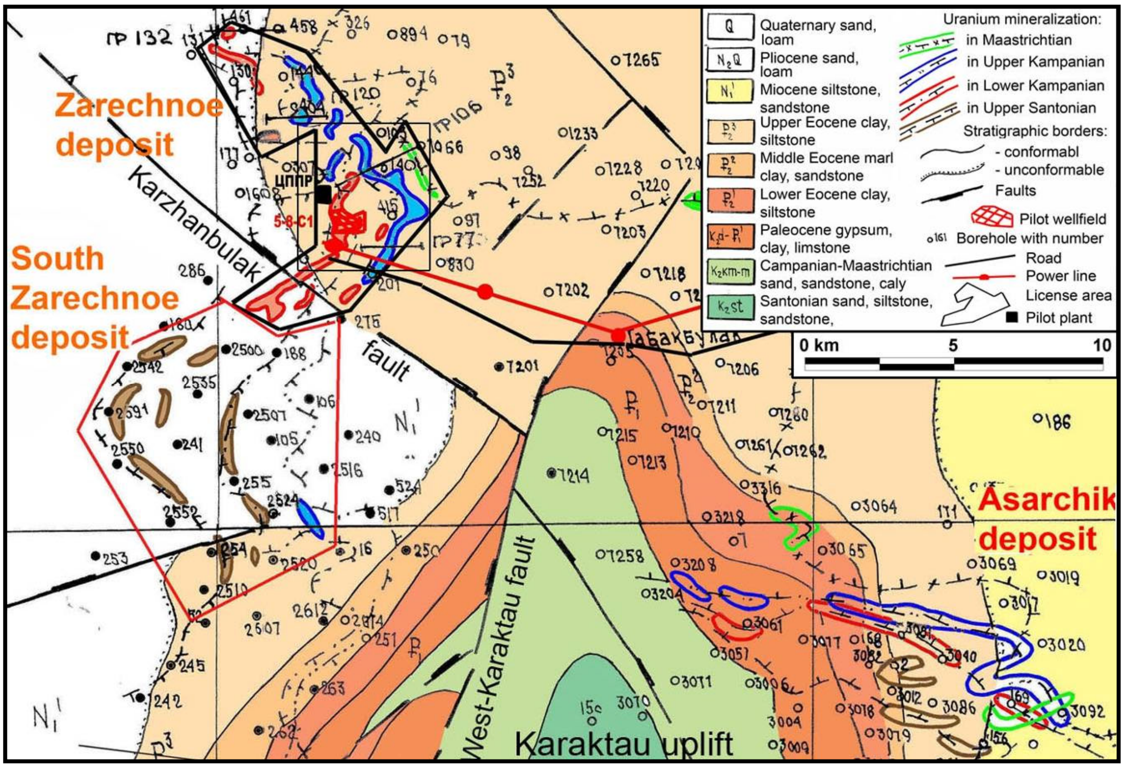
Zarechnoye

Zarechnoye comprises 9 orebodies hosted by Campanion sediments. In plan all the orebodies are presented by twisty narrow bands of different thicknesses and shapes. The lenses extend along strike for some 500m to 15km and vary in width from 50m to 1,200m. The central part of the roll has a thickness of between 1m and 12m. The parameters of mineralisation are quite consistent along the strike while across the strike but can vary significantly across strike.

The largest orebodies are 2, 3, 5 and 8, the remaining orebodies represent 12% of the total resources of the deposit. 76.2 % of the resource block of the deposit correspond to the complexity 2A for uranium roll deposits, and the remaining to complexity 3G. About 75% of the resources for 3G complexity blocks have been classified as C2 category. 95% of 2A blocks classified as C1 category. The equilibrium coefficient carried from the centre part to the limb from 0.77 to 0.62. The uranium grade in the resource block varied from 0.029%U to 0.076%U, the average thickness varies from 2.5m to 9.9m and the average productivity varies from 1.9kg/m^2 to 8.5kg/m^2.

The geological structure of Zarechnoye deposit is presented in Figure 6-9. The standard drilling grid for the deposits was 400m by 200m to 50m for C2 category and 200m by 50m for C1 category.

Figure 6-9: Zarechnoye deposit geological structure

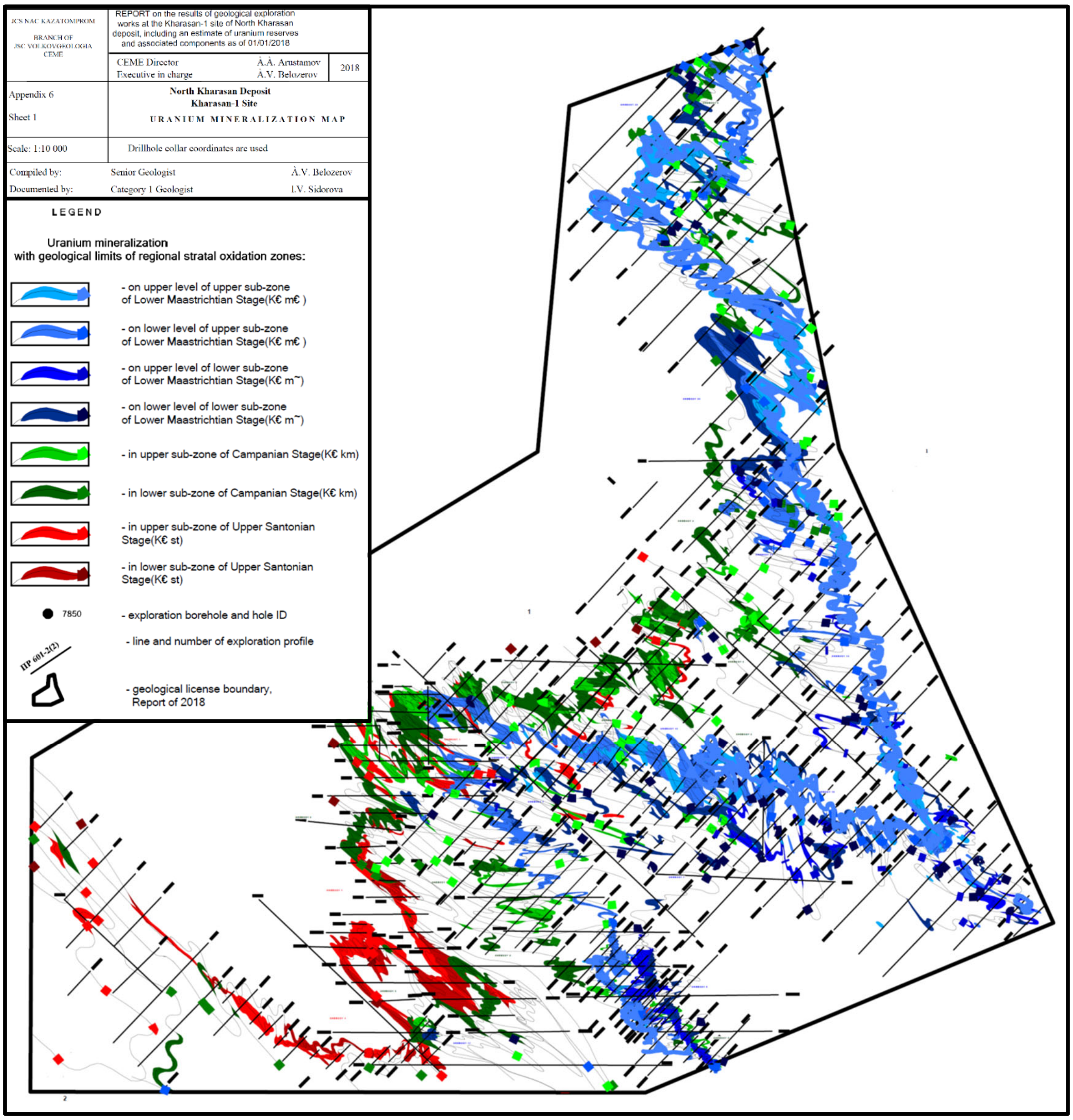


North Kharassan-1

The North Kharassan-1 deposit comprises 8 orebodies (Figure 6-10) which are hosted by Upper Cretaceous Santonian, Companion and Maastrichtian sediments. Orebodies 1, 2, 8 and 10 are classified as large bodies and 3, 5, 7, 17 as small. In plan-view all the orebodies are presented by twisty bands of different thickness and shape. The deposit corresponds to 2A roll-shape deposits complexity. The C1 category was assigned to 60% of the large orebodies and to 40% of the area for the small orebodies. The remaining was classified as C2.

The accepted drilling grid for the deposits constituted 800m to 400m by100m to 50m for C2 category and 200m by 50m for C1 category.

Figure 6-10: Ore mineralisation at North Kharassan-1



North Kharassan-2

The North Kharassan-2 deposit comprises two orebodies which largely occur within Maastrichtian sediments with only a small portion in the Companion sediments. In plan view all the orebodies are presented by twisty bands of different thickness and shape. The deposit corresponds to 2A roll-shape deposit complexity.

The C1 category is assigned to central and north-western limb of the redox front. The average thickness for C1 ore blocks varies from 3.0m to 3.9m and the uranium grade from 0.053%U to 0.128%U and the average productivity from 3.18kg/m^2 to 6.79kg/m^2. C2 category is in most cases assigned to rear area and north-western limb. The average thickness for C2 category ore blocks is between 1.4m and 4.3m with the uranium grade varying from 0.053%U to 0.128%U and an average productivity 2.08 kg/m^2 to 8.84kg/m^2. The equilibrium coefficients varies from the centre part to the limbs from 0.75 to 0.7.

The accepted drilling grid for the deposits was 800m to 400 by 100m to 50m for C2 category and 200m by 50m for C1 category.

Irkol

The Irkol deposit occurs within the Karamurun Arch and Karamurun Downfold which complicates the Syrdaryia Basin. It comprises 5 formations which correspond predominantly to Campanian and Turonian sediments. Three of the formations (1, 2 and 4) comprise 92% of the resources. 83% of the resources correspond to the central part of the roll. The equilibrium coefficient varies considerable between 0.6 and 0.85 and is 0.8 on average. In plan view all the orebodies are presented by continuous bands of different thickness and shape. The deposit corresponds to 2A roll-shape deposits complexity. The average uranium grade is 0.048%U.

The accepted drilling grid for the deposits was 400m to 200m by 50m for C2 category and 200m to 100m by 50m for C1 category and 100m by 50m to 25m for B.

Northern Karamurun

Some 86% of the North Karamurun resources correspond to upper Campanian sediments and comprise 6 formations. The second formation comprises some 70% of the resources. The orebodies are presented by multilayers which have a complex connection with each other including echelon-like rolls and layers. In plan the orebodies have a varying shapes and sizes. The average thickness of orebodies varies between 1m and 10m and have an average grade of between 0.01%U and 0.04%U and a relative productivity 0.7kg/m^2 to 32kg/m^2. The ore hosting rocks are medium and fine-grained. The equilibrium parameter varies across the deposit and is associated with uranium migration in the North-West direction, the average equilibrium coefficient being 0.8. The accepted drilling grid for the deposits was 400m to 200m by 50m for C2 category and 200m to 100m by 50m for C1 category. The C1 category was assigned to 90% of the resources.

Southern Karamurun

Southern Karamurun is located in the northwest of the Karamurun mineralisation region. Geologically, the South Karamurun deposit is similar to the North Karamurun deposit. There are six uranium mineralisation bodies, and they are primarily located within the Maastrichtian upper and lower sub-horizons with only a minor amount hosted by Campanian sediments. The mineralisation occurs as lenses, sub-bands, rolls and their combinations. Some 70% of the mineralisation occurs as coffinite and the remainder as pitchblende and carnotite. The average depth of mineralisation is between 400m and 700m and uranium grades vary between 0.01%U and 0.30%U and productivity is 2.5kg/m^2 to 8kg/m^2 for the exploitation blocks.

The accepted drilling grid for the deposit was 400m by 100m to 50m for C2 category, 200m to 100m by 50m for C1 category and 100m by 50m to 25m for B. The B category was assigned for 8% of the resources, C1 category was assigned to 49%, the rest is reported as C2 category.

6.4 Northern Kazakhstan

6.4.1 Regional Geology

Semizbai is a complex exogenic-epigenetic style deposit with paleo-epigenetic uranium mineralisation which formed due to multistage infiltration processes. The deposit is located at the Northern side of the Ishkeolmes anticlinorium which belongs to the North-Eastern part of the Kazakh Craton that submerges under the Mesozoic-Cenozoic sedimentary cover of Western Siberian plate of the Ural-Siberian epi-Paleozoic platform.

The mineralisation occurs within the Semizbai erosional-tectonic basin, which is an embedded paleo valley of sub-lateral orientation infilled with Mesozoic-Cenozoic sediments of alluvial-proluvial origin. The basin is 40km in length and between 3km to 6km wide and the sedimentary formation thickness varies between 50m at the upper valley (western part) and to 180m at the lower valley (eastern part). The difference in altitude between the western and eastern parts is

200m.

The basement of the paleovalley comprises Zhaman-Koitas Ordovician-Devonian age granite along with a limited amount of Mid-Ordovician igneous-sedimentary rocks. This basement is faulted by two main fault sets, northeast-southwest northwest-southeast striking respectively and it is at the junctions of these fault sets that anomalies of gold, molybdenum and uranium are observed.

The upper part of granite is intensively jointed, and this extends for some 10m to 30m in the northern part of the paleovalley and for between 20m and 50m at the southern end. The granite jointing is assumed to be a significant conductor of supergene water solutions and that faulting does not significantly interfere with sedimentary rocks of the paleovalley. Mesozoic-Cenozoic sediments within the basin are sub-horizontal/shallowly dipping to the east and toward the basin axis. Faults offset sedimentary units between 10s'cm to 25m.

The uranium mineralisation is controlled by two factors. Notably, there is a tendency for the mineralisation to be associated with organic-enriched rocks facial-geochemical zones within alluvial grey-coloured rocks. In addition, there is intra-formational alteration of oxidation-reduction origin. The mineralisation is also affected by alteration epigenetic alterations, such as oxidation and reduction processes, claying, limonisation, gleysation, sulphidation, bleaching and carbonatisation. Carbonatisation is the most significant alteration related to ISR production due to formation of almost impermeable formations. Carbonatised formations are present almost through the whole deposit, but mostly at the bottom of lower mineralised horizon.

The Mesozoic-Cenozoic sediments of the paleovalley are split into three levels: lower, middle and upper. The thickest is a lower level comprised of Semizbai suite (Upper Jurassic-Lower Cretaceous). The Middle level is present with pokurskaya suite (Low-Upper Cretaceous) and lyullinvorskaya suite (Eocene). Upper level is Quaternary sediments. The uranium mineralisation is hosted in river sediments of Semizbai suite divided into Lower-Semizbai and Upper-Semizbai units.

The Lower-Semizbai is split into three horizons (bottom-upwards): conglomerate (sm11), sandstone (sm12) and clay (sm13). The thickness of the Lower-Semizbai horizons varies between 20m and 60m from western side to the eastern side of the paleovalley. The Upper Semizbai is split into three horizons (bottom-upwards): silt-sandstone (sm21), silt-clay (sm22) and sandstone-clay (sm23). Upper-Semizbai suite rests erosively on Lower-Semizbai suite.

6.4.2 Deposit Geology

The Semizbai deposit consists of two mineralised zones, the Southern mineralised zone that hosts five sites and the Northern mineralised zone that hosts one site. Most of the mineralisation is related to the Lower-Semizbai unit within Southern mineralised zone, where mineralisation located within a 17.8km long and 0.4km to 1.7km wide zone and at a depth of between 25m and 100m. The mineralisation is present within two units Upper-Semizbai and Lower-Semizbai, in the sm11, sm12 and sm21 horizons. The mineralisation occurs in flattened discontinuous stratiform bodies with irregular uranium distribution which are sub-laterally elongated and form band-like and lenses-shaped bodies. The uranium grades vary between 0.020%U and 0.088%U with an average grade 0.057%U, productivity between 1.90kgU/m^2 to 9.13kgU/m^2.

About 80% of mineralisation is classified as C1 category and the remaining 20% is C2 category and the accepted drilling grid at the deposit was 100m by 100m or 200m by 50m for C2 and 100m by 50m for C1 category.

7 MINERAL RESOURCES AND ORE RESERVES

7.1 Introduction

SRK has not independently re-calculated Mineral Resource and Ore Reserve estimates for the Company's operations but has, rather, reviewed the quantity and quality of the underlying data and the methodologies used to derive and classify the estimates as reported by the Company and made an opinion on these estimates including the tonnes, grade and quality of the uranium bearing sandstones planned to be exploited in the current LoMps, based on this review. SRK has then used this knowledge to derive audited Mineral Resource and Ore Reserve statements reported in accordance with the terms and definitions of the JORC Code.

Furthermore, it is important to note that other than depletion for 2021 as reported by the Company there have been no other significant adjustments to the Mineral Resources and Ore Reserves as reported in the 2021 Statements, save to reflect the following:

- The ceasing of production at Uvanas and South Moinkum as a result of which no Mineral Resources or Ore Reserves are reported;
- A revised geological interpretation at Inkai 1b based on additional drilling which improved the confidence in the estimate and so converted a portion of the material classed as C2 to C1, but also increased the tonnage and decreased the grade, the net result being addition of 20,629tU comprising an increase in the GKZ C1 of 45,547tU and a reduction in the GKZ C2 of 24,918tU;
- An updated resource estimate for Budenovskoye 6&7 based on additional infill and extension drilling which has resulted in an increase in the GKZ C1 of 50,432tU and a reduction in the GKZ C2 of 24,268tU for an overall increase of 26,164tU; and
- Completion of updated geological model and resource estimate for Zarechnoye which has been reported in accordance with the Kazakhstan Code for the Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves (the "**KZRC Code**") and which has resulted in a net reduction in GKZ reporting terms, in both GKZ C1 (883tU) and GKC C2 (184tU).
- An increase in the GKZ C1 (189tU) following a reassessment of specific geological blocks at Southern Monikum; and
- An increase in the GKZ C1 (1,229tU) and an increase in the GKZ C2 (366tU) following a reassessment of specific geological blocks at Tortkuduk.

In addition, following completion of additional technical studies in 2021 and awarding of a mining contract this has also resulted in the initial reporting of Ore Reserves for Budenovskoye 6&7 and Zhalpak and increase in Ore Reserves at Block 4 Inkai.

The Mineral Resource and Ore Reserve statements as included herein are reported in accordance with the terms and definitions of the JORC Code and are valid as on 31 December 2021. Furthermore, the Mineral Assets are subject to further work which may result in further adjustments, specifically:

- The Company continues to undertake exploration at several of its operations which may enable the reporting of additional Mineral Resources to those presented in this CPR;
- The Company may undertake further technical work on several of its operations which will enable it to convert more of its currently reported Mineral Resources as Ore Reserves; and
- The Company may negotiate changes to its contracts with the GoK and so the stated Ore Reserves may change to reflect these.

7.2 The Company's GKZ System Statements

7.2.1 Quality and Quantity of Data

The uranium mineralisation being exploited by the Company has been explored by drilling only. The drilling was typically undertaken during several stages of exploration and comprised both core and conventional mud rotary drilling. The mud drilling was used in most cases to drill to the hangingwall of the mineralisation horizon which was then cored. The mud drilling diameter varied between 118mm and 132mm, and the core drilling diameter between 93mm and 112mm.

In general, for all deposits (which, with the exception of Zarechnoye, are categorised in the second complexity according to the Kazakh guidelines), the exploration drilling grid is 200m to 400 by 50m to 100m for the C2 category and 100m to 200m by 50m for the C1 category.

The targeted core recovery was not less than 70% for mineralisation intervals and 50% for the host rock.

All core samples were systematically logged primarily for grain size, clay content, texture, structure and mineralisation. The drillholes are geophysically and radiometrically logged with various down-hole instruments to determine indirectly the uranium content in the rocks and other parameters. The geophysical parameters measured include gamma radioactivity (measured as μR/hr), resistivity, self-potential ("**SP**"), prompt-fission neutron logging (control holes only), caliper log, thermal log and deviation survey.

The uranium grade is predominantly estimated from downhole gamma-logging which is an internationally accepted standard procedure for the determination of uranium grade. Correction factors are then applied to reflect the following: thorium and potassium correction; moisture; radon release; disequilibrium; and ore density.

The thorium and potassium content are determined from core assay at the first stage of exploration. Radon release is determined from specific tests. Disequilibrium between radium and uranium is determined from the core sampling data based on the representative selection of the samples. The ore density is determined from standard measurements carried out on the core.

Resistivity and self-potential logging is used to help determine the lithology of the host rocks. The three main lithologies that can be determined in this way being clays/siltstones, fine-medium grained sandstones and coarse sandstones/gravels. The quality of the resistivity and self-potential logging is determined from re-logging of the same holes and the control holes.

Sampling of the core is performed only for those intervals where the core recovery is above 70% and the gamma intensity based on downhole logging is above 40MkRh/h. The core is split in half and sampled using 0.1m to 1.0m intervals. The sampling intervals are selected based on lithology and the results of hand spectral logging.

For assaying the core is usually split in two halves. The first half is used for uranium and radium determination. All samples are analysed for uranium content using X-ray spectral fluorescent analyses. A selection of samples are analysed for radium using gamma-ray in complex with X-ray spectral analyses of uranium and thorium. The remaining half core is used to help interpret the gamma-logs, for density measurements, moisture determination, for chemical control analyses, selenium grade determination, and to measure the physical properties of the host rocks (density, granulometry), and for geotechnical information.

The quality of gamma logging data is determined based on the systematic re-logging of the holes and the results of logging based on control holes which are set up at each deposit. The quality of the uranium grade determination from gamma data can only be measured by comparing to assay results or to prompt-fission neutron logging data. The results of comparison are analysed for potential systematic and random error. The systematic error is calculated using the following criteria: average squared error for the thickness and grade determinations should be within 25cm for thickness 25% for the uranium grade.

The quality of the uranium and radium grade obtained using X-ray spectral fluorescent analyses is determined using control re-assay of the samples in the same laboratory (internal control), analyses of the samples using wet chemistry techniques in an external laboratory (between-method control) and analyses of the sample using same analytical method in the arbitrage laboratory (external control). The control analyses are undertaken using industry standards which determine the number of samples (not less than 30 samples for each grade class).

The quality of determination of filtration coefficient from electric logging data is determined by comparing to hydrogeological pumping results.

7.2.2 Estimation Methodology

With the exception of Zarechnoye, resource estimation is undertaken using the accepted standard in-country polygonal approach based on sections and plans. The practice of 3D modelling is not currently widely used in Kazakhstan. The mine planning and reconciliation performed is also undertaken using these polygon estimates.

The key parameters that are estimated for each polygon are:

- **Filtration:** Unique filtration parameters are typically developed for each lithology within each deposit based on resistivity and self-potential logging;
- **Clay content:** The clay content is also determined based on resistivity and self-potential logging;
- **Uranium grade:** The uranium grade is determined from the gamma logging data. The correction factors which are used to convert gamma logging data into uranium grade, and to account for equilibrium effects, radon content etc are determined via correlation with actual assay data. Unique factors are developed for each host rock and each deposit; and
- **Density:** The host rock density is determined from determinations undertaken on core material. In general, during the exploration stage some several hundred samples are collected from different lithological intervals and a different density is calculated for each lithology.

In general, the resource polygons/blocks are delineated as hard boundaries using the following criteria:

- **For the Shu-Sarysu Basin:**
  - The blocks are delineated within the same water-bearing horizon considering the local confining layer,
  - The thickness of any diluting interval should not exceed 6m for C1 but is not limited for C2,
  - The minimum grade should be 0.01%U,
  - The minimum grade*thickness accumulation value is 0.04%Um to 0.08%Um (deposit specific),
  - The minimum Filtration Ratio is 1m/day,
  - The minimum ore/waste factor is 0.75
  - The maximum clay content is 30%; and
- **For the Syrdarya Basin:**
  - The blocks are delineated within the same water-bearing horizon considering the local confining layer,

- The thickness of the diluting interval should not exceed 8m,
- The minimum grade should be 0.01%U,
- The minimum grade*thickness value is 0.06%Um,
- The minimum Filtration Ratio is 1m/day,
- The minimum ore/waste factor is 0.8,
- The maximum clay content is 20%.

For both basins, the individual blocks/polygons are derived based on uranium grade, filtration parameter and clay content, the minimum size for a C1 category polygon being 30,000m^3. Intersections which do not meet the above criteria are included to ensure continuity but are limited such that the minimum ore/waste factor is honoured. In addition, all of the intersections included in an individual block/polygon should:

- Have similar structural and morphological characteristics;
- Correspondence to the same part of the geological structure (fold limb for example);
- Have similar filtration characteristics; and
- Be on a regular intersection grid.

The extent of each polygon is then limited to:

- one quarter of the drilling grid in case where the neighbouring intersection is barren; and
- one half of the drilling grid in case where the neighbouring intersection is low grade.

After delineation of the polygons/blocks, each is allocated a thickness and uranium grade calculated as an arithmetical mean of all of the intersections within the polygon that honour the criteria. The area of the polygons is then in most cases estimated using GIS software (Mapinfo, ArcGIS). After that, the specific productivity of each area is calculated by multiplying the average grade, average thickness and density. The metal content of each block is then estimated by multiplying the specific productivity of an area by an ore/waste factor.

In the case of Zarechnoye, the bulk of the Mineral Resource is based on a 3D block model into which the key parameters have been interpolated using a kriging algorithm. Notwithstanding this the key technical assumptions and limitations given above have been applied.

7.2.3 GKZ System Statements

The Company reports its estimates using the GKZ System (albeit that in the case of Zarechnoye the estimates were originally reported using the KZRC Code and then translated into a GKZ equivalent for the purpose of 8GR reporting) and the most up to date complete statements (the "**GKZ System Statements**") available as at the date of this report are those derived for the annual 8GR reports which give the status as of 31 December 2021. The 8GR reports are also supported by TO-25 production reports and Balanced Movement reports with the 8GR reports being a statutory requirement filed with the GoK. These estimates are produced using classical Kazakh techniques and are essentially based on calculations made in previous years adjusted for mining during 2021. This section therefore comments primarily on the GKZ System Statements.

The A and B categories are the highest confidence in the GKZ System categories and are only used where the stated tonnage and grade estimates are considered to be known to a very high degree of accuracy. The C1 and C2 categories are lower confidence categories, with C2 denoting the least level of confidence of the four categories. All of these categories are considered by the Company to be appropriate for use in supporting mining plans and feasibility studies.

The actual resource classification assigned to each resource block considers the exploration grid and the complexity of the deposit. The complexity is determined using the characteristics of the deposits which reflects the ore/waste factor, the grade variability and the thickness variability.

According to the industry standard the complexity can vary from 1 to 4 (4 being most complex). All of the deposits of the Syrdarya and Shu-Sarysu basins, except for Zarechnoye have been classified as complexity 2 while the Zarechnoye deposit after the start of production was downgraded to a complexity of 3.

In the case of the Company, blocks are rarely assigned to the A or B category and so the vast majority of the resources reported by the Company are in the C1 and C2 categories, the typical drilling grid used to support a C2 classification being 200m to 400m by 50m to 100m and that for C1 being 100m to 200m by 50m.

In the case of Zarechnoye, the Company classified its Mineral Resource using the KZRC Code. Specifically, only those blocks where extraction has commenced have been classed as Measured and the remainder classed as Indicated where drilled on a spacing of 200m by 50m or less.

Table 7-1 below summarises SRK's understanding of the resource statements prepared by the Company to reflect the status of its assets as of 31 December 2021. The information used to derive this was sourced from the 8GR reports which the Company is required to submit to the GoK on an annual basis. Typically, the Company reports the contained U (not U_3O_8 as is typically used in Europe and the United States for example) and not tonnes and grade. SRK notes that all of the estimates given below reflect the resource remaining at each asset on an aggregated basis and not just the portion attributable to the Company.

SRK has reviewed the estimation methodology used by the Company to derive the above estimates and the geological assumptions made and considers these to be reasonable given the information available. SRK has also undertaken various re-calculations of the remaining resource using actual mining statistics from TO-25 reports, 8GR reports and resource depletion reports and has in all cases found no material errors or omissions. Given this, SRK considers the resource estimates reported by the Company to be a reasonable reflection of the total quantity and quality of material demonstrated to be present at the assets as of 31 December 2021 and to have been reported appropriately using the GKZ System.

Table 7-1: Company's GKZ System Statement (Aggregated basis) as of 31 December 2020 (tonnes contained U)

Entity/Deposit	GKZ System Statement						
	A (tU)	B (tU)	C1 (tU)	C2 (tU)	Subtotal (tU)	P1 (tU)	Total (tU)
Kazatomprom-SaUran LLP							
Uvanas	-	-	-	-	-	-	-
Eastern Mynkuduk	-	-	3,132	1,835	4,966	-	4,966
Kanzhugan	-	-	9,795	5,489	15,284	-	15,284
South Moinkum (Southern part)	-	-	-	351	351	-	351
Central Moinkum	-	-	3,453	7,095	10,548	-	10,548
Total	**-**	**-**	**16,379**	**14,770**	**31,149**	**-**	**31,149**
Ortalyk LLP							
Zhalpak	-	-	9,216	5,104	14,320	-	14,320
Central Mynkuduk	-	-	17,443	5,417	22,860	-	22,860
Total	**-**	**-**	**26,658**	**10,521**	**37,179**	**-**	**37,179**
RU-6 LLP							
Northern Karamurun	-	-	5,366	1,153	6,519	-	6,519
Southern Karamurun	-	-	5,394	4,147	9,541	-	9,541
Total	**-**	**-**	**10,760**	**5,300**	**16,060**	**-**	**16,060**
Appak LLP							
Western Mynkuduk	**-**	**-**	**2,078**	**14,222**	**16,300**	**-**	**16,300**
JV Inkai LLP							
Block 1 Inkai (a)	-	741	26,206	5,661	32,608	-	32,608
Block 1 Inkai (b)	-	-	61,432	15,032	76,464	-	76,464
Block 1 Inkai (c)	-	-	34,205	8,496	42,701	-	42,701
Total	**-**	**-**	**121,844**	**29,189**	**151,773**	**-**	**151,773**
Semizbai-U LLP							
Semizbai	-	-	8,393	2,833	11,225	-	11,225
Irkol	-	-	7,025	12,753	19,778	-	19,778

Entity/Deposit	GKZ System Statement						
	A (tU)	B (tU)	C1 (tU)	C2 (tU)	Subtotal (tU)	P1 (tU)	Total (tU)
Total	**-**	**-**	**15,417**	**15,586**	**31,003**	**-**	**31,003**
JV Akbastau JSC							
Block 1 Budenovskoye	-	-	8,342	4,636	12,978	-	12,978
Block 3 Budenovskoye	-	-	13,251	5,186	18,437	-	18,437
Block 4 Budenovskoye	-	-	2,956	3,554	6,510	-	6,510
Total	**-**	**-**	**24,549**	**13,376**	**37,925**	**-**	**37,925**
Karatau LLP							
Block 2 Budenovskoye	**-**	**-**	**22,084**	**16,578**	**38,663**	**-**	**38,663**
JV Zarechnoye JSC							
Zarechnoye	**-**	**11**	**4,515**	**1,267**	**5,793**	**-**	**5,793**
JV Katco LLP							
Southern Moinkum (Northern part)	-	-	4,881	2,374	7,255	-	7,255
Tortkuduk	-	-	23,216	24,405	47,620	-	47,620
Total	**-**	**-**	**28,096**	**26,779**	**54,875**	**-**	**54,875**
JV Khorassan-U LLP							
Block Kharassan 1, North Kharassan	**-**	**-**	**9,611**	**26,953**	**36,565**	**-**	**36,565**
JV SMCC LLP							
Akdala	-	-	1,789	1,132	2,921	-	2,921
Block 4, Inkai	-	-	40,121	34,836	74,956	2,158	77,114
Total	**-**	**-**	**41,910**	**35,967**	**77,877**	**2,158**	**80,035**
Baiken-U LLP							
Block Kharassan 2, North Kharassan	**-**	**-**	**9,188**	**7,856**	**17,044**	**-**	**17,044**
Kazatomprom							
Block 2 Inkai	-	-	-	42,001	42,001	-	42,001
Block 3 Inkai	-	-	40,414	42,744	83,158	-	83,158
Total	**-**	**-**	**40,414**	**84,745**	**125,159**	**-**	**125,159**
Budenovskoye LLP							
Block 6&7 Budenovskoye	-	-	50,432	63,806	114,238	5,832	120,070
Total	**-**	**-**	**50,432**	**63,806**	**114,238**	**5,832**	**120,070**
Grand Total	**-**	**11**	**423,937**	**366,915**	**791,604**	**7,990**	**799,594**
Regional							
Shu-Sarysu	-	741	374,445	309,953	685,139	7,990	693,129
Syrdarya	-	11	42,468	44,208	86,687	-	86,687
Northern Kazakhstan	-	-	7,025	12,753	19,778	-	19,778
Total	**-**	**752**	**423,937**	**366,915**	**791,604**	**7,990**	**799,594**

7.3 Audit Methodology and Approach

SRK has reviewed the reports which provide the details of exploration process for each of the deposits, the exploration process being in general the same for all of these and considers that the selected method of exploration is effective and sufficient for all of the deposits at the Mineral Assets as reported herein.

While the technique of estimating the uranium grade from gamma logging data has been well developed and applied, the challenge when using this technique is the derivation of the various correction factors required to be applied when calculating the uranium grade from gamma data. For most of the parameters, such as thorium and potassium content and density, such approach is quite acceptable as these parameters have a low variability. On the other hand, radon release and disequilibrium have a high variability, notably in this case within the deposits of Syrdarya and Shu-Sarysu provinces (between 0.4 and 1.55), and the behaviour of these coefficients is therefore quite complex. While work to determine the relationship between the disequilibrium rate and lithology and mineralisation has been carried out, the Company has typically used an average correction factor for radon release and disequilibrium either for the whole deposit or for areas of the deposit.

In SRK's opinion, the use of an average in this manner can result in the underestimation (more common) or overestimation of the uranium grade in certain areas of the deposit and so while on average the assumed uranium grades will be reliable it does mean that variations exist which have not been modelled and this results in some blocks experiencing lower extraction factors than envisaged and some higher (sometimes exceeding 100%).

Notwithstanding the above comment on variations within individual deposits, overall SRK considers that the exploration approach followed by the Company has been appropriate and specifically aimed at collecting the data appropriate to the estimation of uranium resources and that sufficient data of sufficient quality has been collected to support the resource estimates as derived by the Company and as presented here.

SRK has re-classified the resource estimates in accordance with the terms and definitions proposed in the JORC Code. Definitions for the different categories used by this reporting code are given in the glossary provided in the 2021 CPR. In doing this, SRK has typically reported those blocks classified as B or C1 by the Company as Measured and those blocks classified as C2 by the Company as Indicated. In addition, SRK has accepted the KZRC classification applied at Zarechnoye noting that the terms of this code are reasonably aligned with the JORC Code.

Notwithstanding the above SRK has, in specific instances adjusted the above approach to account for:

- Cases where the production blocks delineated by production drilling have been consistently different (±20%) to the original resource, even where there was not a systematic bias. In these cases, SRK has classified the C1 mineralisation as Indicated and only that part of the C1 which has been delineated by production drilling as Measured;
- Cases where the current GKZ statements comprise elements which SRK consider should be excluded due to infrastructural constraints or historically mined areas comprising remnant blocks, the potential extraction of which is considered technically challenging and/or not economic at currently assumed commodity prices. In these cases, SRK has made certain adjustments which collectively represent a negative adjustment of 14,838tU comprising: Semizbai (1,585tU); Irkol (5,174tU); Eastern Mynkuduk (1,065tU); Kanzhugan (4,426tU); South Karamurun (424tU); and North Karamurun (2,165tU); and
- Cases where certain 'Prognostic' P1 Mineral Resources have been defined: These have been considered insufficiently defined to consider inclusion as Inferred Mineral Resources: notably Akkum which reports 87tU respectively in accordance with the GKZ System.

SRK's audited Mineral Resource statements are reported inclusive of those Mineral Resources converted to Ore Reserves. The audited Ore Reserve is therefore a subset of the Mineral Resource and should not therefore be considered as additional to this.

SRK has not attempted to optimise the Company's LoMps. Consequently, SRK's audited Mineral Resource statements are confined to those areas that both have the potential to be mined economically and which are currently being considered for mining only. They also reflect the quantity of in-situ uranium planned to be extracted and do not take account of metallurgical recovery both as part of the in-situ leaching process and within the plant itself which typically varies between 80% and 90%.

7.4 Mineral Resources and Ore Reserve Statements

The Mineral Resource and Ore Reserve statements reported in this CPR result from a review of all available information provided by the Company to support the updating of the Mineral Resource and Ore Reserve statements as previously reported in the 2021 CPR.

7.4.1 Mineral Resources

As of 31 December 2021, the aggregated Mineral Resources for the Mineral Assets (Table 7-2; Table 7-3) total 1,424.7Mt grading 0.055%U and containing 784.4ktU and comprising:

- Measured Mineral Resources of 700.9Mt grading 0.058%U and containing 406.6ktU;
- Indicated Mineral Resources of 710.2Mt grading 0.052%U and containing 369.1ktU; and
- Inferred Mineral Resources of 13.6Mt grading 0.063%U and containing 8.6ktU.

As of 31 December 2021, the attributable Mineral Resources for the Mineral Assets (Table 7-4) total 947.5Mt grading 0.052%U and containing 495.7ktU comprising Measured and Indicated Mineral Resources of 941.6Mt grading 0.052%U and containing 491.7ktU.

Figure 7-1 provides a graphical representation of the contribution of the Mining Subsidiaries and the reporting categories within each of the Mining Subsidiaries to the aggregated Mineral Resources reported in the 2021 Statements.

Table 7-2: SRK Audited Mineral Resource Statement (Measured and Indicated) as of 31 December 2021 by Mining Subsidiary and Regional sub-division

Entity/Deposit	Measured Mineral Resources			Indicated Mineral Resources			Measured + Indicated Mineral Resources		
	(Mt)	(%U)	(ktU)	(Mt)	(%U)	(ktU)	(Mt)	(%U)	(ktU)
Kazatomprom-SaUran LLP									
Uvanas	-	-	-	-	-	-	-	-	-
Eastern Mynkuduk	6.0	0.030	1.8	7.0	0.030	2.1	13.0	0.030	3.9
Kanzhugan	2.0	0.042	0.8	26.3	0.038	10.0	28.4	0.038	10.9
South Moinkum (Southern part)	-	-	-	-	-	-	-	-	-
Central Moinkum	0.5	0.056	0.3	17.7	0.058	10.3	18.2	0.058	10.5
Total	**8.5**	**0.034**	**2.9**	**51.1**	**0.044**	**22.4**	**59.6**	**0.042**	**25.3**
Ortalyk LLP									
Zhalpak	20.5	0.045	9.2	16.6	0.031	5.1	37.1	0.039	14.3
Central Mynkuduk	37.1	0.047	17.4	14.3	0.038	5.4	51.4	0.045	22.9
Total	**57.6**	**0.046**	**26.7**	**30.9**	**0.034**	**10.5**	**88.5**	**0.042**	**37.2**
RU-6 LLP									
Northern Karamurun	4.8	0.069	3.3	2.1	0.050	1.1	6.9	0.063	4.4
Southern Karamurun	6.4	0.081	5.2	4.4	0.089	3.9	10.8	0.084	9.1
Total	**11.2**	**0.076**	**8.5**	**6.5**	**0.076**	**5.0**	**17.7**	**0.076**	**13.5**
Appak LLP									
Western Mynkuduk	6.5	0.032	2.1	39.5	0.036	14.2	46.0	0.035	16.3
JV Inkai LLP									
Block 1 Inkai (a)	35.5	0.076	26.9	9.3	0.061	5.7	44.7	0.073	32.6
Block 1 Inkai (b)	128.0	0.048	61.4	32.0	0.047	15.0	160.0	0.048	76.5
Block 1 Inkai (c)	72.8	0.047	34.2	17.3	0.049	8.5	90.1	0.047	42.7
Total	**236.2**	**0.052**	**122.6**	**58.6**	**0.050**	**29.2**	**294.8**	**0.051**	**151.8**
Semizbai-U LLP									
Semizbai	14.7	0.057	8.4	2.4	0.053	1.2	17.1	0.056	9.6
Irkol	17.1	0.041	7.0	18.0	0.042	7.6	35.2	0.042	14.6
Total	**31.9**	**0.048**	**15.4**	**20.4**	**0.043**	**8.8**	**52.3**	**0.046**	**24.2**
JV Akbastau JSC									
Block 1 Budenovskoye	7.8	0.107	8.3	5.3	0.088	4.6	13.1	0.099	13.0
Block 3 Budenovskoye	18.7	0.071	13.3	5.2	0.100	5.2	23.8	0.077	18.4
Block 4 Budenovskoye	2.1	0.141	3.0	4.2	0.084	3.6	6.3	0.103	6.5
Total	**28.6**	**0.086**	**24.5**	**14.7**	**0.091**	**13.4**	**43.2**	**0.088**	**37.9**
Karatau LLP									
Block 2 Budenovskoye	22.8	0.097	22.1	26.3	0.063	16.6	49.1	0.079	38.7
JV Zarechnoye JSC									
Zarechnoye	4.3	0.052	2.2	4.5	0.065	2.9	8.8	0.059	5.2
JV Katco LLP									
Southern Moinkum (Northern part)	7.7	0.063	4.9	4.2	0.057	2.4	11.9	0.061	7.3
Tortkuduk	19.0	0.122	23.2	20.7	0.118	24.4	39.7	0.120	47.6
Total	**26.8**	**0.105**	**28.1**	**24.8**	**0.108**	**26.8**	**51.6**	**0.106**	**54.9**
JV Khorassan-U LLP									
Block Kharassan 1, North Kharassan	9.1	0.106	9.6	25.2	0.107	27.0	34.3	0.107	36.6
JV SMCC LLP									
Akdala	3.1	0.057	1.8	2.0	0.057	1.1	5.1	0.057	2.9
Block 4, Inkai	99.6	0.040	40.1	86.2	0.040	34.8	185.8	0.040	75.0
Total	**102.7**	**0.041**	**41.9**	**88.1**	**0.041**	**36.0**	**190.9**	**0.041**	**77.9**
Baiken-U LLP									
Block Kharassan 2, North Kharassan	8.1	0.114	9.2	7.2	0.109	7.9	15.3	0.112	17.0
Kazatomprom									
Block 2 Inkai	-	-	-	133.8	0.031	42.0	133.8	0.031	42.0
Block 3 Inkai	80.3	0.050	40.4	92.1	0.046	42.7	172.3	0.048	83.1
Total	**80.3**	**0.050**	**40.4**	**225.9**	**0.038**	**84.7**	**306.1**	**0.041**	**125.1**
Budenovskoye LLP									
Block 6&7 Budenovskoye	66.5	0.076	50.4	86.5	0.074	63.8	153.0	0.075	114.2
Total	**66.5**	**0.076**	**50.4**	**86.5**	**0.074**	**63.8**	**153.0**	**0.075**	**114.2**
Grand Total	**700.9**	**0.058**	**406.6**	**710.2**	**0.052**	**369.1**	**1,411.1**	**0.055**	**775.8**
Regional									
Shu-Sarysu	636.4	0.057	361.7	646.4	0.049	317.6	1,282.8	0.053	679.3
Syrdarya	49.7	0.073	36.5	61.5	0.082	50.3	111.2	0.078	86.9
Northern Kazakhstan	14.7	0.057	8.4	2.4	0.053	1.2	17.1	0.056	9.6
Total	**700.9**	**0.058**	**406.6**	**710.2**	**0.052**	**369.1**	**1,411.1**	**0.055**	**775.8**

Table 7-3: SRK Audited Mineral Resource Statement (Inferred and Total) as of 31 December 2021 by Mining Subsidiary

Mining Subsidiary /Deposit	Inferred Mineral resources			Total Mineral Resources		
	(Mt)	(%U)	(ktU)	(Mt)	(%U)	(ktU)
Kazatomprom-SaUran LLP						
Uvanas	-	-	-	-	-	-
Eastern Mynkuduk	-	-	-	13.0	0.030	3.9
Kanzhugan	-	-	-	28.4	0.038	10.9
South Moinkum (Southern part)	-	-	-	-	-	-
Central Moinkum	-	-	-	18.2	0.058	10.5
Total	**-**	**-**	**-**	**59.6**	**0.042**	**25.3**
Ortalyk LLP						
Zhalpak	-	-	-	37.1	0.039	14.3
Central Mynkuduk	-	-	-	51.4	0.045	22.9
Total	**-**	**-**	**-**	**88.5**	**0.042**	**37.2**

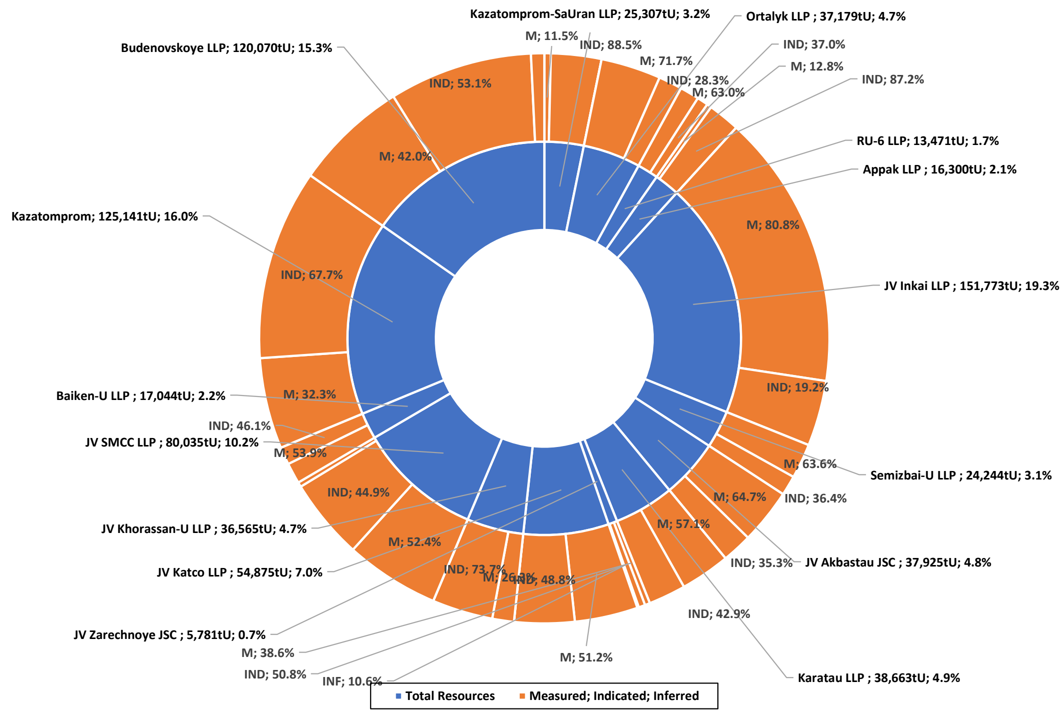
Mining Subsidiary /Deposit	Inferred Mineral resources (Mt)	(%U)	(ktU)	Total Mineral Resources (Mt)	(%U)	(ktU)
RU-6 LLP						
Northern Karamurun	-	-	-	6.9	0.063	4.4
Southern Karamurun	-	-	-	10.8	0.084	9.1
Total	**-**	**-**	**-**	**17.7**	**0.076**	**13.5**
Appak LLP						
Western Mynkuduk	-	-	-	46.0	0.035	16.3
JV Inkai LLP						
Blocks 1, Inkai (a)	-	-	-	44.7	0.073	32.6
Blocks 1, Inkai (b)	-	-	-	160.0	0.048	76.5
Blocks 1, Inkai (c)	-	-	-	90.1	0.047	42.7
Total	**-**	**-**	**-**	**294.8**	**0.051**	**151.8**
Semizbai-U LLP						
Semizbai	-	-	-	17.1	0.056	9.6
Irkol	-	-	-	35.2	0.042	14.6
Total	**-**	**-**	**-**	**52.3**	**0.046**	**24.2**
JV Akbastau JSC						
Block 1 Budenovskoye	-	-	-	13.1	0.099	13.0
Block 3 Budenovskoye	-	-	-	23.8	0.077	18.4
Block 4 Budenovskoye	-	-	-	6.3	0.103	6.5
Total	**-**	**-**	**-**	**43.2**	**0.088**	**37.9**
Karatau LLP						
Block 2, Budenovskoye	-	-	-	49.1	0.079	38.7
JV Zarechnoye JSC						
Zarechnoye	1.0	0.064	0.6	9.8	0.059	5.8
JV Katco LLP						
Southern Moinkum (Northern part)	-	-	-	11.9	0.061	7.3
Tortkuduk	-	-	-	39.7	0.120	47.6
Total	**-**	**-**	**-**	**51.6**	**0.106**	**54.9**
JV Khorassan-U LLP						
Block Kharassan 1, North Kharassan	-	-	-	34.3	0.107	36.6
JV SMCC LLP						
Akdala	-	-	-	5.1	0.057	2.9
Block 4, Inkai	5.0	0.043	2.2	190.7	0.040	77.1
Total	**5.0**	**0.043**	**2.2**	**195.9**	**0.041**	**80.0**
Baiken-U LLP						
Block Kharassan 2, North Kharassan	-	-	-	15.3	0.112	17.0
Kazatomprom						
Block 2 Inkai	-	-	-	133.8	0.031	42.0
Block 3 Inkai	-	-	-	172.3	0.048	83.1
Total	**-**	**-**	**-**	**306.1**	**0.041**	**125.1**
Budenovskoye LLP						
Block 6&7 Budenovskoye	7.6	0.077	5.8	160.6	0.075	120.1
Total	**7.6**	**0.077**	**5.8**	**160.6**	**0.075**	**120.1**
Grand Total	**13.6**	**0.063**	**8.6**	**1,424.7**	**0.055**	**784.4**
Regional						
Shu-Sarysu	12.6	0.063	8.0	1,295.4	0.053	687.3
Syrdarya	1.0	0.064	0.6	112.2	0.078	87.5
Northern Kazakhstan	-	-	-	17.1	0.056	9.6
Total	**13.6**	**0.063**	**8.6**	**1,424.7**	**0.055**	**784.4**

Table 7-4: SRK Audited Mineral Resource Statement (Attributable) as of 31 December 2021 by Mining Subsidiary

Mining Subsidiary /Deposit	Equity Interest (%)	Uranium Mining Province	Attributable Measured + Indicated (Mt)	(%U)	(ktU)	Attributable Total Mineral Resources (Mt)	(%U)	(ktU)
Kazatomprom-SaUran LLP	**100.00**							
Uvanas		Shu-Sarysu	-	-	-	-	-	-
Eastern Mynkuduk		Shu-Sarysu	13.0	0.030	3.9	13.0	0.030	3.9
Kanzhugan		Shu-Sarysu	28.4	0.038	10.9	28.4	0.038	10.9
South Moinkum (Southern part)		Shu-Sarysu	-	-	-	-	-	-
Central Moinkum		Shu-Sarysu	18.2	0.058	10.5	18.2	0.058	10.5
Total			**59.6**	**0.042**	**25.3**	**59.6**	**0.042**	**25.3**
Ortalyk LLP	**100.00**							
Zhalpak		Shu-Sarysu	37.1	0.039	14.3	37.1	0.039	14.3
Central Mynkuduk		Shu-Sarysu	51.4	0.045	22.9	51.4	0.045	22.9
Total			**88.5**	**0.042**	**37.2**	**88.5**	**0.042**	**37.2**
RU-6 LLP	**100.00**							
Northern Karamurun		Syrdarya	6.9	0.063	4.4	6.9	0.063	4.4
Southern Karamurun		Syrdarya	10.8	0.084	9.1	10.8	0.084	9.1
Total			**17.7**	**0.076**	**13.5**	**17.7**	**0.076**	**13.5**
Appak LLP	**65.00**							
Western Mynkuduk		Shu-Sarysu	29.9	0.035	10.6	29.9	0.035	10.6
JV Inkai LLP	**60.00**							
Blocks 1, Inkai (a)		Shu-Sarysu	26.8	0.073	19.6	26.8	0.073	19.6
Blocks 1, Inkai (b)		Shu-Sarysu	96.0	0.048	45.9	96.0	0.048	45.9
Blocks 1, Inkai (c)		Shu-Sarysu	54.1	0.047	25.6	54.1	0.047	25.6
Total			**176.9**	**0.051**	**91.1**	**176.9**	**0.051**	**91.1**
Semizbai-U LLP	**51.00**							
Semizbai		Northern Kazakhstan	8.7	0.056	4.9	8.7	0.056	4.9
Irkol		Syrdarya	17.9	0.042	7.4	17.9	0.042	7.4
Total			**26.7**	**0.046**	**12.4**	**26.7**	**0.046**	**12.4**
JV Akbastau JSC	**50.00**							
Block 1 Budenovskoye		Shu-Sarysu	6.5	0.099	6.5	6.5	0.099	6.5
Block 3 Budenovskoye		Shu-Sarysu	11.9	0.077	9.2	11.9	0.077	9.2
Block 4 Budenovskoye		Shu-Sarysu	3.2	0.103	3.3	3.2	0.103	3.3
Total			**21.6**	**0.088**	**19.0**	**21.6**	**0.088**	**19.0**

Mining Subsidiary /Deposit	Equity Interest (%)	Uranium Mining Province	Attributable Measured + Indicated (Mt)	(%U)	(ktU)	Attributable Total Mineral Resources (Mt)	(%U)	(ktU)
Karatau LLP	**50.00**							
Block 2, Budenovskoye		Shu-Sarysu	24.5	0.079	19.3	24.5	0.079	19.3
JV Zarechnoye JSC	**49.98**							
Zarechnoye(9)		Syrdarya	4.4	0.059	2.6	4.9	0.059	2.9
JV Katco LLP	**49.00**							
Southern Moinkum (Northern part)		Shu-Sarysu	5.8	0.061	3.6	5.8	0.061	3.6
Tortkuduk		Shu-Sarysu	19.5	0.120	23.3	19.5	0.120	23.3
Total			**25.3**	**0.106**	**26.9**	**25.3**	**0.106**	**26.9**
JV Khorassan-U LLP	**50.00**							
Block Kharassan 1, North Kharassan		Syrdarya	17.1	0.107	18.3	17.1	0.107	18.3
JV SMCC LLP	**30.00**							
Akdala		Shu-Sarysu	1.5	0.057	0.9	1.5	0.057	0.9
Block 4, Inkai		Shu-Sarysu	55.7	0.040	22.5	57.2	0.040	23.1
Total			**57.3**	**0.041**	**23.4**	**58.8**	**0.041**	**24.0**
Baiken-U LLP	**52.50**							
Block Kharassan 2, North Kharassan		Syrdarya	8.0	0.112	8.9	8.0	0.112	8.9
Kazatomprom	**100.00**							
Block 2 Inkai		Shu-Sarysu	133.8	0.031	42.0	133.8	0.031	42.0
Block 3 Inkai		Shu-Sarysu	172.3	0.048	83.1	172.3	0.048	83.1
Total			**306.1**	**0.041**	**125.1**	**306.1**	**0.041**	**125.1**
Budenovskoye LLP	**51.00**							
Block 6&7 Budenovskoye		Shu-Sarysu	78.0	0.075	58.3	81.9	0.075	61.2
Total			**78.0**	**0.075**	**58.3**	**81.9**	**0.075**	**61.2**
Grand Total			**941.6**	**0.052**	**491.7**	**947.5**	**0.052**	**495.7**
Regional								
Shu-Sarysu			867.7	0.050	436.1	873.1	0.050	439.7
Syrdarya			56.0	0.086	48.2	56.4	0.086	48.5
Northern Kazakhstan			17.9	0.042	7.4	17.9	0.042	7.4
Total			**941.6**	**0.052**	**491.7**	**947.5**	**0.052**	**495.7**

Figure 7-1: Mineral Resource distribution by Mining Subsidiary and classification category as at 31 December 2020



7.4.2 Ore Reserves

The tables below present SRK's audited Ore Reserve statements which are reported in accordance with the terms and definitions of the JORC Code. It should be noted that these statements cover the operating and development stage Mineral Assets only as none of the exploration projects (inclusive of Block 2 Inkai and Block 3 Inkai) are sufficiently advanced in terms of drilling and technical assessment to enable the reporting of Ore Reserves.

These statements reflect the audited Mineral Resource Statements above but have been restricted to mineralisation planned to be exploited according to the LoMps developed by the Company and are supported by the mine project documents which are in turn based on its licence/contract agreements.

Notwithstanding this, in some cases these statements assume mining will continue subsequent to the expiry of the current contract in place with GoK reflecting SRK's understanding that it would be highly unlikely that these would not be extended ahead of the expiry date assuming that the Company has fulfilled all of its contractual requirements to that point.

The Ore Reserve statements reflect the total quantity of in-situ uranium planned to be mined and do not take account of metallurgical recovery both as part of the in-situ leaching process and within the surface processing plants themselves which typically varies between 80% and 90%.

As part of its review process, SRK has compared the planned contractual recovery figures with actual recoveries achieved for each deposit for the depleted blocks which were presented by the Company in its TO-25 reports (these documents give a detailed analysis of the blocks which were extracted during last few years therefore do not represent the whole mining statistics for the deposit). For the deposits where mining had recently been started or have not started yet the recovery statistic is not representative and was not considered (Table 7-5). In general, the recovery into solution is close to the predicted figures and most often higher. Actual recoveries higher than 85% to 90% are usually typical for the deposits with long extraction history and could be explained by acid spreading or disequilibrium issues.

Table 7-5: Planned contractual recovery and historical recovery

Company	Reporting Region	Deposit	Extraction	
			Historical (%)	Contractual (%)
JV SMCC LLP	Shu-Sarysu Basin	Akdala	102.00	90.00
JV SMCC LLP	Shu-Sarysu Basin	Block 4, 4	91.00	90.00
Semizbai-U LLP	Syrdarya Basin	Irkol	93.00	90.00
Semizbai-U LLP	Northern Kazakhstan	Semizbai	85.00	85.00
Appak LLP	Shu-Sarysu Basin	Western Mynkuduk	86.00	90.00
JV Inkai LLP	Shu-Sarysu Basin	Inkai 1 (a)	88.00	85.00
JV Inkai LLP	Shu-Sarysu Basin	Inkai 1 (b)	101.00	85.00
JV Inkai LLP	Shu-Sarysu Basin	Inkai 1 (c)	85.00	85.00
JV Khorassan LLP	Syrdarya Basin	Block 1 Kharassan, North Kharassan	117.00	90.00
Baiken-U LLP	Syrdarya Basin	Block 2 Kharassan, North Kharassan	93.00	90.00
JV Zarechnoye JSC	Syrdarya Basin	Zarechnoye	86.00	80.00
JV Katco LLP	Shu-Sarysu Basin	Southern Moinkum (Northern Part)	81.00	90.00
JV Katco LLP	Shu-Sarysu Basin	Tortkuduk	87.00	90.00
Karatau LLP	Shu-Sarysu Basin	Block 2, Budenovskoye	90.00	90.00
JV Akbastau JSC	Shu-Sarysu Basin	Block 1, Budenovskoye	95.00	90.00
JV Akbastau JSC	Shu-Sarysu Basin	Block 3, Budenovskoye	89.00	85.00
JV Akbastau JSC	Shu-Sarysu Basin	Block 4, Budenovskoye	86.60	85.00
Kazatomprom-SaUran LLP	Shu-Sarysu Basin	Uvanas	n/a	n/a
Kazatomprom-SaUran LLP	Shu-Sarysu Basin	Eastern Mynkuduk	91.00	90.00
Kazatomprom-SaUran LLP	Shu-Sarysu Basin	Kanzhugan	100.00	90.00
Kazatomprom-SaUran LLP	Shu-Sarysu Basin	South Moinkum (Southern Part)	79.00	85.00
Kazatomprom-SaUran LLP	Shu-Sarysu Basin	Central Moinkum	85.00	85.00
Ortalyk LLP	Shu-Sarysu Basin	Zhalpak	n/a	n/a
Ortalyk LLP	Shu-Sarysu Basin	Central Mynkuduk	85.00	90.00
RU-6 LLP	Syrdarya Basin	Southern Karamurun	98.00	93.00
RU-6 LLP	Syrdarya Basin	Northern Karamurun	99.00	90.00
Budenovskoye LLP	Chu-Sarysu Basin	Budenovskoye 6&7	n/a	90.00

Table 7-6 and Table 7-7 and provide details relating to the determination of relative cut-off grades for each Mining Subsidiary including operating expenditure, sales price assumptions, price discounts, realised prices, overall recovery factors, Ore Reserve (2P) cut-off grades, Mineral Resource (3R: assuming a 30% price premium) which are juxtaposed against the average grade mined in each of the Mining Subsidiaries over the LoMp. This indicates that the margin expressed by the Ore Reserve average grade over the Ore Reserve cut-off-grade ranges from a low of 55% to a high of 90% assuming of historical C1 cash costs for 2021, assumed (excepting Budenovskoye LLP based on the latest technical study), LoMp physical parameters and a long term consensus market forecast price of US$50/lb$U_3O_8$.

Table 7-6: Cut-off Grade analysis for the Mineral Assets (Physical Inputs)

Entity/Deposit	Tonnage (Mt)	Grade (%U)	Content (ktU)	MRF (%)	Product (ktU)	($MlbU_3O_8$)
Kazatomprom-SaUran LLP	52.05	0.044	23.05	87.71	20.2	52.6
Ortalyk LLP	37.18	0.100	37.18	90.00	33.5	87.0
RU-6 LLP	17.71	0.076	13.47	90.97	12.3	31.9
Appak LLP	46.00	0.035	16.30	90.00	14.7	38.1
JV Inkai LLP	252.04	0.052	131.33	85.00	111.6	290.2
Semizbai-U LLP	52.26	0.046	24.24	88.01	21.3	55.5
JV Akbastau JSC	43.24	0.088	37.93	86.71	32.9	85.5
Karatau LLP	49.08	0.079	38.66	90.00	34.8	90.5
JV Zarechnoye JSC	8.81	0.059	5.17	80.00	4.1	10.8
JV Katco LLP	47.48	0.110	52.35	90.00	47.1	122.5
JV Khorassan-U LLP	34.26	0.107	36.56	90.00	32.9	85.6
JV SMCC LLP	190.88	0.041	77.88	90.00	70.1	182.2
Baiken-U LLP	15.27	0.112	17.04	90.00	15.3	39.9
Budenovskoye LLP	152.99	0.075	114.24	90.00	102.8	267.3
Total	**999.25**	**0.063**	**625.41**	**88.53**	**553.7**	**1,439.4**

Table 7-7: Cut-off Grade analysis for the Mineral Assets

Entity/Deposit	Opex (US$/lb)	Opex (US$/tRoM)	Sales Price ($US\$/lbU_3O_8$)	Discount (%)	Realised Price ($US\$/lbU_3O_8$)	MRF (%)	2P-OCOG (%U)	3R-OCOG (%U)	2P Grade (%U)
Kazatomprom-SaUran LLP	12.85	12.97	50.0	-	50.0	87.71	0.016	0.012	0.044
Ortalyk LLP	9.85	23.05	50.0	-	50.0	90.00	0.027	0.021	0.100
RU-6 LLP	6.90	12.41	50.0	-	50.0	90.97	0.015	0.011	0.076
Appak LLP	11.86	9.83	50.0	3.50	48.3	90.00	0.012	0.009	0.035
JV Inkai LLP	6.23	7.17	50.0	3.50	48.3	85.00	0.009	0.007	0.052
Semizbai-U LLP	14.52	15.41	50.0	3.50	48.3	88.01	0.019	0.015	0.046
JV Akbastau JSC	4.84	9.57	50.0	3.50	48.3	86.71	0.012	0.009	0.088
Karatau LLP	3.55	6.55	50.0	3.50	48.3	90.00	0.008	0.006	0.079
JV Zarechnoye JSC	12.36	15.08	50.0	3.50	48.3	80.00	0.021	0.016	0.059
JV Katco LLP	8.96	23.12	50.0	3.50	48.3	90.00	0.028	0.022	0.110
JV Khorassan-U LLP	7.75	19.35	50.0	3.50	48.3	90.00	0.024	0.018	0.107
JV SMCC LLP	7.00	6.68	50.0	3.50	48.3	90.00	0.008	0.006	0.041
Baiken-U LLP	9.42	24.62	50.0	3.50	48.3	90.00	0.030	0.023	0.112
Budenovskoye LLP	15.14	26.46	50.0	3.50	48.3	90.00	0.033	0.025	0.075
Total	**9.13**	**13.15**	**50.0**	**3.08**	**48.5**	**88.53**	**0.016**	**0.012**	**0.063**

The current sales contracts between the Company, its Joint Venture partners and the Mining Subsidiary companies are subject to various sales contracts whereby the attributable sales price assumptions are subject to various adjustments. These adjustments are incorporated into the various governing agreements and are defined in accordance with the GoK uranium concentrate pricing regulations (effective 3 February 2011), whereby the saleable product is purchased by the JV partners at a commercial price equal to the uranium spot price, less a subsidiary specific price discount (maximum allowable). The Company has informed SRK that the specific price discounts as incorporated into each JV agreement is both confidential and as such may not be publicly disclosed. Accordingly, in conjunction with the Company SRK has determined the weighted average price discount based on a combination of the LoMp sales forecasts and the UxC price forecast. This analysis indicates that the weighted average price discount for all Mining Subsidiaries (excluding the wholly owned mining subsidiaries of Kazatomprom-SaUran LLP, Ortalyk LLP and RU-6 LLP) is approximately 3.50%. SRK has therefore been requested by the Company to incorporate the following into the forecast data as reported herein with respect to the price discount assumptions:

- For Kazatomprom-SaUran LLP, ME Ortalyk LLP and RU-6 LLP a price discount factor of 0.00%; and
- For all other mining subsidiaries (Appak LLP; JV Inkai LLP; Semizbai-U LLP; JV Akbastau JSC; Karatau LLP; JV Zarechnoye JSC; JV Katco LLP; JV Khorassan-U LLP; JV SMCC LLP; Baiken-U LLP; and Budenovskoye LLP, hereinafter the "JV Companies") a price discount factor of 3.50%.

The determination of operating expenditures at the Mining Subsidiaries are largely based on a combination of historical and planned statistics with modifications for changed circumstances, suppliers etc as considered appropriate. In summary the process incorporates:

- Establishing labour compliments for mining, processing and G&A activities;
- Establishing unit physical consumables for mining and processing which is either related to Uranium content or PLS volumes;

- Application of unit cost rates (including transportation costs) to the determined consumable volumes for both mining and processing activities;
- Determination of additional expenditures and recovery of these expenditures in relation to services provided by one Mining Subsidiary to another, specifically processing to final product;
- Determination of refining charges for conversion of site-products to U_3O_8 (where the final site product is not U_3O_8);
- Determination of terminal benefits liabilities or retrenchment costs based on the current minimum legal requirements in Kazakhstan being 1-month salary assumed as 1/12th of the annual labour bill relating to the labour movement determination on closure;
- Determination of both other cash and non-cash costs required to establish the Mineral Extraction Tax, Exploration Depreciation, Property Tax;
- Determination of mining contract related expenditures/provisions specifically:
  - Social Commitments included within the G&A costs and based on annual costs per deposit,
  - Liquidation provisions (cash cost, which is included as a capital item, is not directly tax deductible and not included in any depreciation determinations) which is based on a percentage of mining related expenditures inclusive of: direct mining costs; Mineral Extraction Tax (“**MET**” or royalty); mining depreciation, wellfield development depreciation (“**PGR**”), mining exploration depreciation. These expenditures are then accumulated and compared with the LoMp closure costs whereby any shortfall or excess is then incorporated on the last period of operations; and
- The Company has assessed its exposure of key activity cost centres to currency fluctuations and given the high local content for labour, key consumables such as acid and power the average currency exposure distributions amongst the following key site activities are considered to be appropriate: mining (95% KZT and 5% US$); processing (80% KZT and 20% US$); and on-site G&A (95% KZT and 5% US$).

As of 31 December 2021, the 2021 Statements reports:

- Aggregated Ore Reserves (Table 7-8) of 999.2Mt grading 0.063%U and containing 625.4ktU and comprising:
  - Proved Ore Reserves of 482.8Mt grading 0.061%U and containing 296.7ktU,
  - Probable Ore Reserves of 516.5Mt grading 0.064%U and containing 328.8ktU; and
- Attributable Ore Reserves (Table 7-9) of 549.0Mt grading 0.064%U and containing 350.8ktU.

Figure 7-2 provides a graphical representation of the contribution of the Mining Subsidiaries and the reporting categories within each of the Mining Subsidiaries to the aggregated Ore Reserves reported in the 2021 Statements.

Table 7-8: SRK Audited Ore Reserve Statement (Proved and Probable) as of 31 December 2021 by Mining Subsidiary and Regional sub-division (Aggregated 100% basis)

Entity/Deposit	Proved Ore Reserve			Probable Ore Reserve			Total Ore Reserves		
	(Mt)	(%U)	(ktU)	(Mt)	(%U)	(ktU)	(Mt)	(%U)	(ktU)
Kazatomprom-SaUran LLP									
Uvanas	-	-	-	-	-	-	-	-	-
Eastern Mynkuduk	2.5	0.030	0.8	3.0	0.030	0.9	5.5	0.030	1.6
Kanzhugan	2.0	0.042	0.8	26.3	0.038	10.0	28.4	0.038	10.9
South Moinkum (Southern part)	-	-	-	-	-	-	-	-	-
Central Moinkum	0.5	0.056	0.3	17.7	0.058	10.3	18.2	0.058	10.5
Total	**5.0**	**0.037**	**1.9**	**47.0**	**0.045**	**21.2**	**52.0**	**0.044**	**23.1**

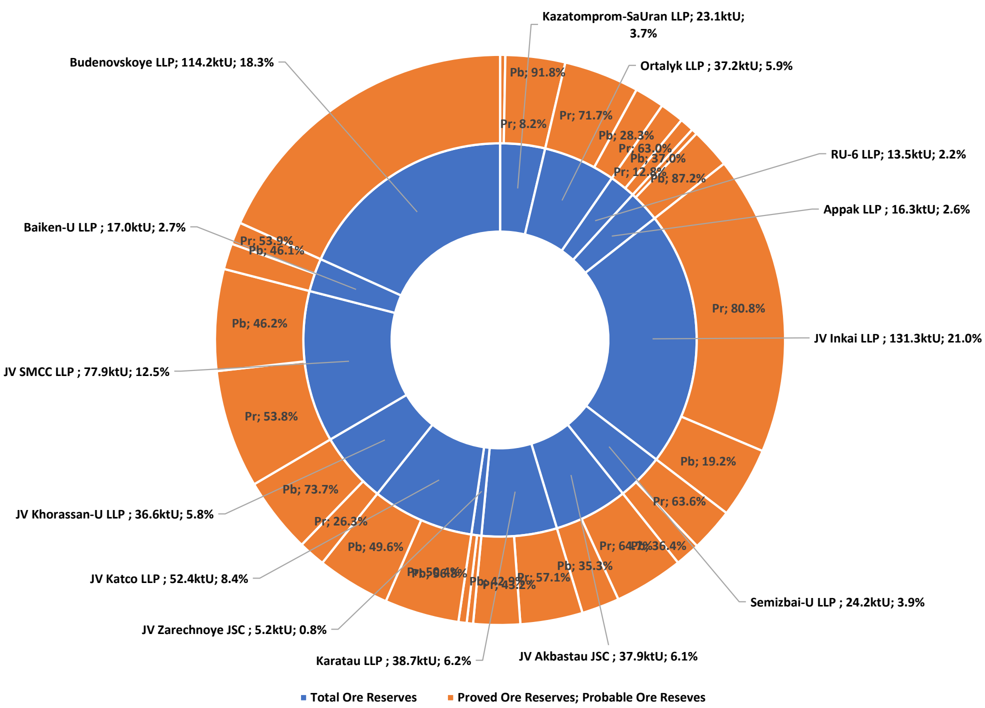
Entity/Deposit	Proved Ore Reserve (Mt)	Proved Ore Reserve (%U)	Proved Ore Reserve (ktU)	Probable Ore Reserve (Mt)	Probable Ore Reserve (%U)	Probable Ore Reserve (ktU)	Total Ore Reserves (Mt)	Total Ore Reserves (%U)	Total Ore Reserves (ktU)
Ortalyk LLP									
Zhalpak	9.2	0.100	9.2	5.1	0.100	5.1	14.3	0.100	14.3
Central Mynkuduk	17.4	0.100	17.4	5.4	0.100	5.4	22.9	0.100	22.9
Total	**26.7**	**0.100**	**26.7**	**10.5**	**0.100**	**10.5**	**37.2**	**0.100**	**37.2**
RU-6 LLP									
Northern Karamurun	4.8	0.069	3.3	2.1	0.050	1.1	6.9	0.063	4.4
Southern Karamurun	6.4	0.081	5.2	4.4	0.089	3.9	10.8	0.084	9.1
Total	**11.2**	**0.076**	**8.5**	**6.5**	**0.076**	**5.0**	**17.7**	**0.076**	**13.5**
Appak LLP									
Western Mynkuduk	6.5	0.032	2.1	39.5	0.036	14.2	46.0	0.035	16.3
JV Inkai LLP									
Block 1 Inkai (a)	35.5	0.076	26.9	9.3	0.061	5.7	44.7	0.073	32.6
Block 1 Inkai (b)	93.8	0.048	45.0	23.4	0.047	11.0	117.2	0.048	56.0
Block 1 Inkai (c)	72.8	0.047	34.2	17.3	0.049	8.5	90.1	0.047	42.7
Total	**202.0**	**0.053**	**106.2**	**50.0**	**0.050**	**25.2**	**252.0**	**0.052**	**131.3**
Semizbai-U LLP									
Semizbai	14.7	0.057	8.4	2.4	0.053	1.2	17.1	0.056	9.6
Irkol	17.1	0.041	7.0	18.0	0.042	7.6	35.2	0.042	14.6
Total	**31.9**	**0.048**	**15.4**	**20.4**	**0.043**	**8.8**	**52.3**	**0.046**	**24.2**
JV Akbastau JSC									
Block 1 Budenovskoye	7.8	0.107	8.3	5.3	0.088	4.6	13.1	0.099	13.0
Block 3 Budenovskoye	18.7	0.071	13.3	5.2	0.100	5.2	23.8	0.077	18.4
Block 4 Budenovskoye	2.1	0.141	3.0	4.2	0.084	3.6	6.3	0.103	6.5
Total	**28.6**	**0.086**	**24.5**	**14.7**	**0.091**	**13.4**	**43.2**	**0.088**	**37.9**
Karatau LLP									
Block 2 Budenovskoye	22.8	0.097	22.1	26.3	0.063	16.6	49.1	0.079	38.7
JV Zarechnoye JSC									
Zarechnoye	4.3	0.052	2.2	4.5	0.065	2.9	8.8	0.059	5.2
JV Katco LLP									
Southern Moinkum (Northern part)	5.1	0.063	3.2	2.7	0.057	1.5	7.8	0.061	4.7
Tortkuduk	19.0	0.122	23.2	20.7	0.118	24.4	39.7	0.120	47.6
Total	**24.1**	**0.110**	**26.4**	**23.4**	**0.111**	**26.0**	**47.5**	**0.110**	**52.4**
JV Khorassan-U LLP									
Block Kharassan 1, North Kharassan	9.1	0.106	9.6	25.2	0.107	27.0	34.3	0.107	36.6
JV SMCC LLP									
Akdala	3.1	0.057	1.8	2.0	0.057	1.1	5.1	0.057	2.9
Block 4, Inkai	99.6	0.040	40.1	86.2	0.040	34.8	185.8	0.040	75.0
Total	**102.7**	**0.041**	**41.9**	**88.1**	**0.041**	**36.0**	**190.9**	**0.041**	**77.9**
Baiken-U LLP									
Block Kharassan 2, North Kharassan	8.1	0.114	9.2	7.2	0.109	7.9	15.3	0.112	17.0
Kazatomprom									
Block 2 Inkai	-	-	-	-	-	-	-	-	-
Block 3 Inkai	-	-	-	-	-	-	-	-	-
Total	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Budenovskoye LLP									
Block 6&7 Budenovskoye	-	-	-	153.0	0.075	114.2	153.0	0.075	114.2
Total	**-**	**-**	**-**	**153.0**	**0.075**	**114.2**	**153.0**	**0.075**	**114.2**
Grand Total	**482.8**	**0.061**	**296.7**	**516.5**	**0.064**	**328.8**	**999.2**	**0.063**	**625.4**
Regional									
Shu-Sarysu	418.3	0.060	251.7	452.6	0.061	277.2	870.9	0.061	528.9
Syrdarya	47.3	0.080	37.9	45.8	0.096	44.0	93.1	0.088	81.9
Northern Kazakhstan	17.1	0.041	7.0	18.0	0.042	7.6	35.2	0.042	14.6
Total	**482.8**	**0.061**	**296.7**	**516.5**	**0.064**	**328.8**	**999.2**	**0.063**	**625.4**

Table 7-9: SRK Audited Ore Reserve Statement (Attributable) as of 31 December 2021 by Mining Subsidiary and Regional sub-division (Attributable basis)

Mining Subsidiary /Deposit	Equity Interest (%)	Uranium Mining Province	Attributable Ore Reserves (Mt)	Attributable Ore Reserves (%U)	Attributable Ore Reserves (ktU)
Kazatomprom-SaUran LLP	**100.00**				
Uvanas		Shu-Sarysu	-	-	-
Eastern Mynkuduk		Shu-Sarysu	5.5	0.030	1.6
Kanzhugan		Shu-Sarysu	28.4	0.038	10.9
South Moinkum (Southern part)		Shu-Sarysu	-	-	-
Central Moinkum		Shu-Sarysu	18.2	0.058	10.5
Total			**52.0**	**0.044**	**23.1**
Ortalyk LLP	**100.00**				
Zhalpak		Shu-Sarysu	14.3	0.100	14.3
Central Mynkuduk		Shu-Sarysu	22.9	0.100	22.9
Total			**37.2**	**0.100**	**37.2**
RU-6 LLP	**100.00**				
Northern Karamurun		Syrdarya	6.9	0.063	4.4
Southern Karamurun		Syrdarya	10.8	0.084	9.1
Total			**17.7**	**0.076**	**13.5**
Appak LLP	**65.00**				
Western Mynkuduk		Shu-Sarysu	29.9	0.035	10.6
JV Inkai LLP	**60.00**				
Blocks 1, Inkai (a)		Shu-Sarysu	26.8	0.073	19.6
Blocks 1, Inkai (b)		Shu-Sarysu	70.3	0.048	33.6
Blocks 1, Inkai (c)		Shu-Sarysu	54.1	0.047	25.6
Total			**151.2**	**0.052**	**78.8**
Semizbai-U LLP	**51.00**				
Semizbai		Northern Kazakhstan	8.7	0.056	4.9
Irkol		Syrdarya	17.9	0.042	7.4
Total			**26.7**	**0.046**	**12.4**
JV Akbastau JSC	**50.00**				

Mining Subsidiary /Deposit	Equity Interest (%)	Uranium Mining Province	Attributable Ore Reserves (Mt)	(%U)	(ktU)
Block 1 Budenovskoye		Shu-Sarysu	6.5	0.099	6.5
Block 3 Budenovskoye		Shu-Sarysu	11.9	0.077	9.2
Block 4 Budenovskoye		Shu-Sarysu	3.2	0.103	3.3
Total			**21.6**	**0.088**	**19.0**
Karatau LLP	**50.00**				
Block 2, Budenovskoye		Shu-Sarysu	24.5	0.079	19.3
JV Zarechnoye JSC	**49.98**				
Zarechnoye		Syrdarya	4.4	0.059	2.6
JV Katco LLP	**49.00**				
Southern Moinkum (Northern part)		Shu-Sarysu	3.8	0.061	2.3
Tortkuduk		Shu-Sarysu	19.5	0.120	23.3
Total			**23.3**	**0.110**	**25.7**
JV Khorassan-U LLP	**50.00**				
Block Kharassan 1, North Kharassan		Syrdarya	17.1	0.107	18.3
JV SMCC LLP	**30.00**				
Akdala		Shu-Sarysu	1.5	0.057	0.9
Block 4, Inkai		Shu-Sarysu	55.7	0.040	22.5
Total			**57.3**	**0.041**	**23.4**
Baiken-U LLP	**52.50**				
Block Kharassan 2, North Kharassan		Syrdarya	8.0	0.112	8.9
Kazatomprom	**100.00**				
Block 2 Inkai		Shu-Sarysu	-	-	-
Block 3 Inkai		Shu-Sarysu	-	-	-
Total			**-**	**-**	**-**
Budenovskoye LLP	**51.00**				
Block 6&7 Budenovskoye		Shu-Sarysu	78.0	0.075	58.3
Total			**78.0**	**0.075**	**58.3**
Grand Total			**549.0**	**0.064**	**350.8**
Regional					
Shu-Sarysu			475.1	0.062	295.2
Syrdarya			65.2	0.078	50.7
Northern Kazakhstan			8.7	0.056	4.9
Total			**549.0**	**0.064**	**350.8**

Figure 7-2: Ore Reserve distribution by Mining Subsidiary and classification category as of 31 December 2020



7.5 SRK Summary Comments

In SRK's opinion the Mineral Resource and Ore Reserve statements as included herein are reported in accordance with the terms and definitions of the JORC Code and are valid as of 31 December 2021. The differences between these estimates and those reported by the Company in accordance with the GKZ System as of 31 December 2021 are a result of:

- The removal of material, which is sterilised by surface infrastructure or which, following the design process, are no longer planned to be exploited by the Company;

- The exclusion of some of the 'reserves' classified as P1 in accordance with the GKZ system;
- Additional quantitative and classification adjustments made by SRK at those deposits where the production drilling has yielded results that differ materially from the exploration drilling;
- The limiting of the Ore Reserves to material supported by a LoMp;
- The limiting of Proved Ore Reserves to those deposits where pilot plant testing has been complete, mining has commenced, and reconciliation data is available; and
- Technical work undertaken by the Company during the 2021.

It should, however, be noted work is ongoing by the Company and so, in addition to normal changes in Mineral Resources and Ore Reserves as a result of production, these may also change during 20201as this work is completed. Notably:

- The Company continues to undertake exploration at several of its operations which may enable the reporting of additional Mineral Resources to those presented in this Audit Letter;
- The Company plans to undertake further technical work on several of its operations which may enable it to convert more of its currently reported Mineral Resources as Ore Reserves; and
- The Company may negotiate changes to its contracts with the GoK and so the stated Ore Reserves may change to reflect these.

8 EXPLORATION POTENTIAL AND EXPLORATION PROGRAMME

8.1 Introduction

In addition to the operating mines the Company has one Development Project which is currently in pilot production and several Exploration Prospects which are the subject of ongoing exploration, primarily drilling.

All of the exploration work is undertaken by Volkovgeology JSC on behalf of the Company and the drillholes are systematically tested for uranium, thorium and potassium content, granulometry, carbonate content, mineralogy, density and equilibrium.

8.2 Advanced Exploration Properties and Exploration Properties

The Exploration Prospects are located in the same two geological basins which host the deposits currently being mined and are generally contiguous to existing operations. Further, the geology and geometry of the prospects is similar to those currently being exploited. Notably, they are roll front deposits with snaking geometries in plan-view hosted by shallow dipping sandstones at depths of between 200m and 800m.

The approach taken to explore these prospects follows the same consistent approach. The preliminary exploration phase comprises wide spaced vertical drilling (typically along sections initially spaced 3,200m apart and then spaced 800m apart and at a spacing of 100m along sections) to locate the roll fronts. This is then followed up by an advanced exploration and evaluation phase during which much closer spaced vertical drilling is undertaken (typically on sections 400m apart and at a spacing of 50m along sections), aimed at delineating the geometry of the roll fronts and concentrations of uranium within these to the point where resource estimates can be produced. This close spaced drilling is undertaken alongside associated technical work to determine the technical and economic viability of the prospects.

The preliminary exploration phase typically takes three years and the advanced exploration another five years all of which culminates in the production of the resource estimate and a TEO Konditsii which is then used by the Company to decide on whether or not to proceed to pilot production.

The deposits currently being explored by the Company include:

- **Togusken and East Zhalpak** which are all located in the Shu-Sarysu Basin and have been explored since 2013, 2015 and 2017 respectively;
- **Akkum** which is located in the Syrdarya Basin where exploration started in 2017; and
- **Block 2 Inkai and Block 3 Inkai** which were formally part of JV Inkai LLP, and are located in the Shu-Sarysu Basin, but which were relinquished by JV Inkai LLP in H1 2018 and simultaneously acquired by the Company which now has contracts in place to explore these deposits in its own right.

Of the above, Block 2 Inkai and Block 3 Inkai are at the most advanced stage of exploration and, as commented in Section 7, this has enabled the reporting of Mineral Resources for these two projects. Togusken, East Zhalpak and Akkum are still in the preliminary exploration stage.

It should be noted that while the Company's exploration efforts are currently focussed on these six prospects, in addition to the above, both basins contain further potential which the company is in the process of evaluating with a view to commencing additional exploration work in due course as its existing deposits are depleted. Further, as noted earlier in this report, the Company has been granted a preferred status by the GoK in relation to uranium exploration and mining in Kazakhstan.

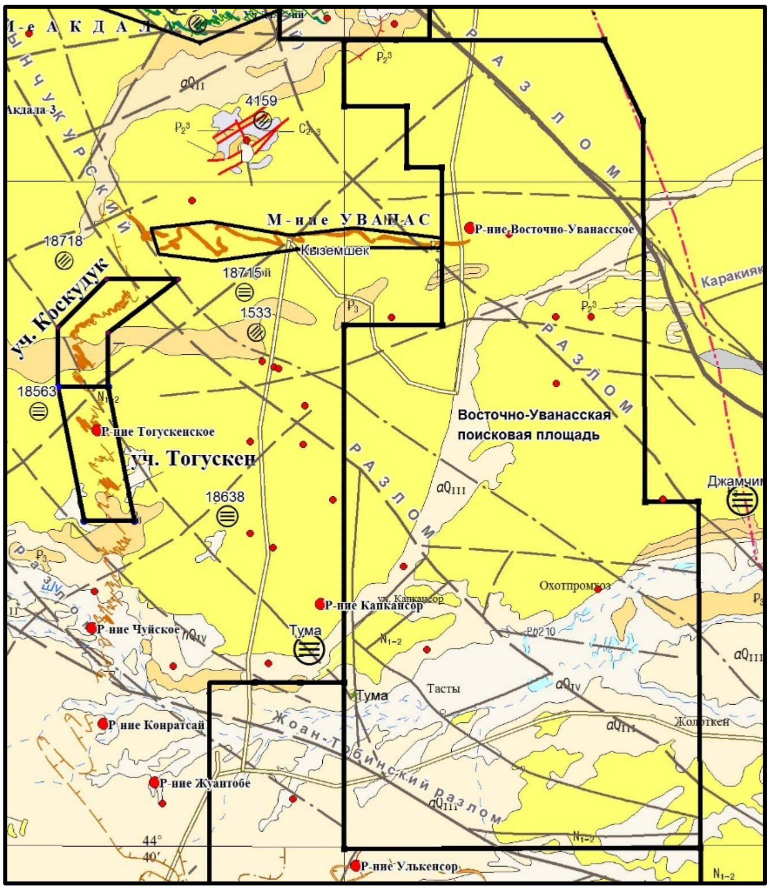
A brief description of each of the prospects currently being explored is presented below:

- **Block 2 Inkai and Block 3 Inkai** are located adjacent to, and are a continuation of, Block 1 Inkai. Given that the Company only recently signed a contract with the GoK to explore these this work has not yet commenced. Notwithstanding this, the Company has planned a three-year exploration programme for each of these aimed at improving the confidence in these and thereby upgrading more of the currently reported Indicated Mineral Resource to the Measured Category. These are material projects which have added significantly to the Company's Mineral Resource base and the signing of a contract to explore these shows the value of the preferred status the Company has in Kazakhstan in relation to uranium exploration and extraction;
- **Togusken** is located to the northwest of Uvanas, and the mineralisation occurs at a relatively shallow level (150m to 200m below surface) and within three layers all of which are being explored. To date some 300 holes have been completed and the preliminary exploration phase is drawing to a close. A report detailing the results of this is being compiled and is due for completion at the end of 2018 at which point a decision will be made on whether or not this should be progressed to the advanced stage of exploration;
- **East Zhalpak** is located to the south of Zhalpak and north of Akdala, the mineralisation is also relatively shallow, some 200m below surface, but is at an earlier stage of exploration than Togusken. Some 180 holes have been completed to date and a similar number are planned and the preliminary exploration report is due for completion at the end of 2019; and
- **Akkum** is the least explored of the active prospects to date. Drilling only commenced in September 2017 and so the preliminary exploration phase is not due to be completed until towards the end of 2020. This prospect is located south of Karamurun and north of Kharassan and the mineralised horizon is some 500m below surface.

8.3 Togusken and East Uvanas

During 2018, Volkovgeology published a summary report entitled *"Report on results of exploration and estimation works at Togusken site and Eastern Uvanas area of Shu-Sarysu depression"* which summarises the results of exploration activities completed during the 1970's and during the 2015-2018 exploration campaigns. The current licences are presently held by the Company and are limited to the undertaking of geological investigations, prior to transference to exploration and mining licences in order to proceed with further investigations.

Figure 8-1: Location of Togusken site and Eastern-Uvanas area in relation to Uvanas deposit and Koskuduk site



8.3.1 Regional geology

The Togusken and Eastern Uvanas deposits are located in Shu-Sarysu depression, the basement of which comprises Pre-Mesozoic and intrusive rocks. In the Uvanas region the deposits range in depth from 160m to 300m. The three main uranium bearing horizons are present in the area and include: Mynkuduk, Inkuduk and Zhalpak.

The Mynkuduk horizon, extends up to 30m in thickness and usually unconformably overlies Cenoman or Paleozoic rocks representing the basal part of the upper Cretaceous. This horizon comprises grey coloured alluvial sediments where the permeable section is usually fully oxidized and a partially oxidized impermeable section. The Inkuduk horizon ranges in thickness from 25m in the east to 60m in the western and southern parts of the Uvanas region). The Zhalpak horizon ranges in thickness from 25m to 80m and in certain areas is fully oxidized.

The Uvanas and neighbouring exploration areas are located on the southwestern slope of the Kokshetau rampart. The Paleozoic strata dips at approximately 12º to 16º, with the mineralized Uvanas horizon dipping at approximately 6º to 7º. Current drilling intersections indicate that there is limited if no post-mineralization faulting in the region with the only significant fault identified being a northwest striking Mynchukur fault which indicates a 10m to 30m displacement range.

8.3.2 Exploration

Togusken

Exploration activity to date includes structural drilling, exploration drilling, geophysical downhole logging, radioactive studies and environmental studies. Initial exploration in the area was conducted in 1970 when uranium mineralization at Togusken area was discovered, further exploration here was not continued due to discovery of neighbouring unique Mynkuduk deposit. Further exploration was continued in 2015 when decision on further extension of Uvanas deposit was taken. Initially in 2015 structural drillholes were drilled with core extraction from the collar to the end of drillhole to study the geology of area and to guide exploration drilling in future. During 2016 to 2018 core drilling was limited to the Uvanas horizon, with 13,529.9m drilled with average core recovery of 83.4% (Table 8-1).

Drilling, sampling and sample preparation is based on instructions used for roll-front uranium deposits and these results are verified by gamma-ray logging. Additionally, electric logging (induced polarization and apparent resistivity), downhole survey, caliper, temperature logging, induction logging and current logging were applied to 289 exploration drillholes (more than 62km) and to 6 hydrogeology and monitoring drillholes (about 950m). Gamma ray with applied correction coefficients was verified by core drilling results to achieve actual thicknesses and uranium grades of mineralization intervals in downhole logging. Electrical logging was utilized to distinguish lithologies and permeable rocks. Sampling and assaying during exploration was completed to estimate grades of U, Ra, Se, mineralogy, carbonate content, granulometric characteristics and etc (Table 8-2).

As a result, uranium mineralization was intersected in 10 drillholes of 1970 campaign and in 27 drillholes of 2015-2018 campaign. The drillhole grid extended 800m by 400m to a depth of 200m. Most of mineralisation was intersected in upper level of horizon and the lower horizon levels have less intersections. The mineralised zones are located at depths of 170m to 195m and the mineralisation grades are relatively low ranging from 0.019%U to 0.040%U and rarely reaching 0.052%U to 0.061%U. Summary of drillhole intersections present in Table 8-3 below. In general, the geology of Togusken site and observed mineralization is similar to Uvanas deposit. The key outcomes of current exploration indicate that:

- The mineralisation at Togusken is similar to that noted at the Uvanas and Kuskuduk deposits, specifically when considering petrographic-mineralogical and lithological content and in being prospective for establishment of in-situ leach ISL operation. The primary mineral is coffinite representing some 95% of uranium mineralization. Deleterious elements are either absent or insignificant. The organic carbon content of the Uvanas sandstone is approximately 0.052%U and the phosphorus content is less than 0.01%P; and
- The mineralisation intervals are characterised by high permeability with the host rocks indicating lower permeability. Laboratory ISL tests undertaken to date indicate high uranium recovery.

A polygonal resource estimate has been completed, which indicated 702tU classified as C2 in accordance with the GKZ system and 5,209tU classified as P1+P2 categories, however it is unclear at this stage whether these have been officially approved by the appropriate regulatory authorities.

Table 8-1: Exploration Drilling: Tongusken

Type of drilling	1970		2015-2018		Total	
	(No)	(m)	(No)	(m)	(No)	(m)
Exploration	45	9,249	279	59,686	324	68,934
Structural	-	-	10	3,552	10	3,552
Hydrogeology	-	-	4	859	4	859
Monitoring	-	-	2	103	2	103
Total	**45**	**9,249**	**295**	**64,200**	**340**	**73,449**

Table 8-2: Sampling and Assaying: Tongusken

Type of sampling	Unit	1970	2015-2018	Total
Mineralized core sampling for U, Ra assaying	(No)	83	1,772	1,697
Sampling for roentgen-spectral assaying	(No)	653	6,414	6,706
Point sampling for selenium	(No)	327	-	327
Sampling for identification of radiation defects	(No)	58	-	58

Type of sampling	Unit	1970	2015-2018	Total
Sampling for identification of reduction capacity	(No)	98	-	98
Sampling for identification of geochemical environment	(No)	98	-	98
Sampling for mineralogical studies	(No)	62	361	409
Water sampling	(No)	68	72	140
Sampling for carbonate content	(No)	-	930	822
Sampling for granulometric study	(No)	-	1,496	1,379
Monolith assaying	(No)	-	77	73

Table 8-3: Uranium Mineralisation (grade >0.020%U): Tongusken

Exploration campaign	Level	Intersections (No)	Average Thickness (m)	Grade (%U)
1970	Higher level	6	3.53	0.023
	Lower level	6	2.15	0.029
2015-2018	Higher level	42	2.46	0.029
	Lower level	25	3.16	0.027
Total	Higher level	48	2.6	0.033
	Lower level	31	2.96	0.027
	Both levels	79	2.74	0.028

East Uvanas

Eastern Uvanas was explored in several stages from 2015 through 2016. The first stage was conducted over the Eastern Uvanas area in 2015 when structural drillholes were drilled on a 6.4km by 6.4km grid with core drilling limited to the from Paleogenic and Upper Cretaceous sediments. A total of 61 holes (Table 8-4) were drilled and all core intervals were sent for roentgen-spectral assaying. All upper cretaceous sediments were fully oxidized, and no significant radioactive anomalies were identified. During the second stage of exploration activities 37 holes were drilled to test some targets identified in earlier exploration campaigns (1980's to 1990's). No significant mineralisation was observed, largely as a result of the full oxidization of the horizons, however a drillhole intersected 0.6m with grade of 0.0078%U at a depth of 61.7m to 62.3m in the basal part of the Yntymak horizon. Geophysical logging was conducted in all drillholes and included gamma ray, caliper, electrical logging (IP and AR) and downhole surveying, resulted to more than 18.5km being logged.

Despite the limited uranium mineralisation identified assay results for total rare-earth elements ("**TREE**") showed that across the Eastern Uvanas (Table 8-6; Table 8-7) area up to 0.01%Y to 0.04%Y were observed. Yttrium has strong correlation with TREE, and anomalous grades up to 0.054%TREE to 0.069%TREE including 0.018%Y to 0.038%Y are noted.

Table 8-4: Exploration Drilling: Uvanas

Drilling	2015 (No)	2015 (m)	2016 (No)	2016 (m)	Total (No)	Total (m)
Exploration	-	-	49	6,868	49	6,868
Structural	61	12,503	-	-	61	12,503
Total	**61**	**12,503**	**49**	**6,868**	**110**	**19,372**

Table 8-5: Sampling and Assaying: Uvanas

Type of sampling	Unit	2015	2016	Total
Core logging	(m)	5,210	3,094	8,305
Sampling for roentgen-spectral assaying	(m)	2,958	1,455	4,413
Sampling for mineralogical studies	(No)	17	-	17
Sampling for granulometric study	(No)	423	-	423
Sampling for TEO	(No)	-	595	595

Table 8-6: Average-weighted and maximum grades of yttrium in geochemical samples per horizon: Uvanas

Horizon	Average-Weighted Grades				Maximum Grades	
	Impermeable		Permeable		Impermeable	Permeable
	Sample (No)	Grade (%Y)	Sample (No)	Grade (%Y)	Sample (No)	Grade (%Y)
Pz	223	0.003	-	-	0.043	-
Mynkuduk Horizon	159	0.003	342	0.002	0.015	0.011
Inkuduk Horizon	59	0.004	1,087	0.002	0.039	0.007
Zhalpak Horizon	230	0.005	1,089	0.002	0.035	0.020
Uvanas Horizon	231	0.004	375	0.002	0.043	0.012
Uyuk Horizon	818	0.003	238	0.003	0.051	0.012

Table 8-7: Average-weighted and maximum grades of TREE in geochemical samples per horizon: Uvanas

Horizon	Average-Weighted Grades				Maximum Grades	
	Impermeable		Permeable		Impermeable	Permeable
	Sample (No)	Grade (%TREE)	Sample (No)	Grade (%TREE)	Sample (No)	Grade (%TREE)
Pz	34	0.015	-	-	0.031	-
Mynkuduk Horizon	31	0.012	27	0.008	0.031	0.017
Inkuduk Horizon	43	0.016	92	0.008	0.054	0.021
Zhalpak Horizon	83	0.017	163	0.009	0.053	0.054
Uvanas Horizon	76	0.017	86	0.007	0.085	0.028
Uyuk Horizon	224	0.016	75	0.013	0.057	0.041

The key outcomes of exploration activities at the Eastern Uvanas site completed to date are:

- No significant uranium mineralisation has been identified within the Paleogene-Eocene sediments and the potential horizons are fully oxidized; and
- Significant intersections of rare earth mineralisation is observed in the Cretaceous-Paleogene sediments and further exploration is warranted.

8.4 Exploration Programme

The Company has established an exploration programme focus on a number of prospects located in the three key geological regions of Kazakhstan: namely Shu–Sarysu, Syrdarya and North–Kazakhstan. The Company projects expenditure of approximately KZT35.2bn (US$82.9m; Table 8-8) over a 7-year period with approximately 50% of expenditures focused on the Shu-Sarysu region and approximately 30% in the Syrdarya region.

Table 8-8: Regional Exploration Programme

Region	Units	Total	2022	2023	2024	2025	2026	2027	2028
Exploration Programme									
Shu-Sarysu	(KZTm)	16,713.6	5,801.6	5,076.8	2,911.1	1,455.6	1,215.3	253.1	-
Syrdarya	(KZTm)	10,656.1	2,025.1	1,985.9	2,151.7	1,493.5	1,493.5	1,253.1	253.1
North - Kazakhstan	(KZTm)	7,847.4	1,898.6	1,898.6	1,898.6	1,898.6	253.1	-	-
Total	**(KZTm)**	**35,217.2**	**9,725.4**	**8,961.3**	**6,961.4**	**4,847.7**	**2,962.0**	**1,506.2**	**253.1**
Exploration Programme									
Shu-Sarysu	(US$m)	39.3	13.7	11.9	6.8	3.4	2.9	0.6	-
Syrdarya	(US$m)	25.1	4.8	4.7	5.1	3.5	3.5	2.9	0.6
North - Kazakhstan	(US$m)	18.5	4.5	4.5	4.5	4.5	0.6	-	-
Total	**(US$m)**	**82.9**	**22.9**	**21.1**	**16.4**	**11.4**	**7.0**	**3.5**	**0.6**

(1) All US$ estimates have been converted to US$ incorporating from a base date of 30 June 2018 to 31 December 2021 KZ CPI factor of 1.27 and converted to US$ assuming a closing exchange rate of KZT425 to one US$.

8.5 Summary Conclusions

In summary, the Company has an active exploration and development programme in place the objective of which is to delineate additional resources and reserves on an ongoing basis and so replace currently reported estimates of such as these are depleted and has a significant exploration budget assigned to facilitate this which is presented later in this report.

SRK has reviewed the exploration prospects currently being explored and is confident that these warrant the exploration planned and that it should be expected that Mineral Resources, and potentially Ore Reserves, will be reported for these in due course on completion of the planned work.

9 IN-SITU URANIUM EXTRACTION AND RECOVERY

9.1 Introduction

The following section includes discussion and comment on the in-situ leach uranium extraction and uranium recovery process through to production of the final product undertaken at the Company's mining and processing operations as well as third party refineries.

9.2 Processing Facilities

In addition to on-site facilities, the Company owns two of the three dedicated processing facilities in Kazakhstan. The dedicated processing facilities are the facility owned and operated by UMP, a processing facility owned and operated by the Company's subsidiary Kazatomprom-SaUran LLP and a third-party processing facility owned by Stepnogorsk Mining Chemical Combinate (plant) LLP ("**SMCCP**"). In addition, seven of 26 production sites operated by the Mining Subsidiaries have on-site processing facilities.

Table 9-1 presents a summary of the various process plant inputs, process methodology and the process output for the process plants at the Mining Subsidiaries and at the UMP, SMCCP refineries. Table 9-2 presents a summary of the various products recovered from the individual deposits processed at the individual Mining Subsidiary's processing and refining operations. As already commented, in some instances, the final product at the site is in the form of rich eluate (also referred to herein as "**Technical Desorbate**" or "**TD**") or Yellowcake (also referred to herein as HKPU). These products are typically further refined at either other Mining Subsidiary processing and refining facilities or third-party refineries to produce uranium concentrate (U_3O_8) in accordance with ASTM C967 with U content of at least 65% and ST RK 2573 with U content of at least 80%.

Table 9-1: Mining Subsidiary and Third-Party Refinery details

Entity	Plant Input	Technological process	Plant Output
Mining Subsidiaries			
Kazatomprom-SaUran LLP	PLS, TD (Rich Eluate)	Ion exchange sorption, desorption of uranium from pregnant resin, uranium precipitation from rich eluate with caustic sodium solution. Liquid-phase extraction employing di-2-ethylhexyl phosphoric acid with trialkylamine and hydrocarbon feed, solid-state re-extraction with 25% ammonium carbon and ammonia liquid, cleansing, filtration, calcining.	U_3O_8
ME Ortalyk LLP	PLS	Ion exchange sorption, desorption of uranium from pregnant solutions, uranium precipitation from Rich Eluate with caustic sodium solution.	HKPU (Yellow Cake)
RU-6 LLP	PLS	Ion exchange sorption, desorption of uranium from pregnant solutions, uranium precipitation from Rich Eluate with caustic sodium solution.	HKPU (Yellow Cake)
Appak LLP	PLS, TD (Rich Eluate)	Ion exchange sorption, desorption of uranium from pregnant resin, uranium precipitation from rich eluate with caustic sodium solution Neutralisation of Rich Eluate with caustic sodium solution, uranium settlement with hydrogen peroxide, pulp filtration, calcining.	U_3O_8
JV Inkai LLP	PLS, TD (Rich Eluate)	Ion exchange sorption, desorption of uranium from pregnant resin, uranium precipitation from rich eluate with caustic sodium solution. Neutralisation of Rich Eluate with ammonia, uranium settlement with hydrogen peroxide, pulp filtration, drying.	UO_4
Semizbai-U LLP	PLS	Ion exchange sorption, desorption of uranium from pregnant solutions, uranium precipitation from Rich Eluate with caustic sodium solution.	Rich eluate/ Yellow Cake
JV Akbastau JSC	PLS	Ion exchange sorption, desorption of uranium from pregnant solutions, uranium precipitation from Rich Eluate with caustic sodium solution.	TD (Rich Eluate)
Karatau LLP	PLS, TD (Rich Eluate)	Ion exchange sorption, desorption of uranium from pregnant solutions, uranium precipitation from Rich Eluate with caustic sodium solution. Neutralization of rich eluate with caustic sodium solution, uranium settlement with hydrogen peroxide, pulp filtration, calcining.	TD (Rich Eluate)
JV Zarechnoye JSC	PLS	Ion exchange sorption, desorption of uranium from pregnant solutions, uranium precipitation from Rich Eluate with caustic sodium solution.	HKPU (Yellow Cake)
JV Katco LLP	TD (Rich Eluate)	Neutralisation of rich eluate with ammonia solution, uranium settlement with ammonia solution, pulp filtration, calcining.	U_3O_8
JV Khorassan-U LLP	PLS, TD (Rich Eluate)	Ion exchange sorption, desorption of uranium from pregnant solutions, uranium precipitation from Rich Eluate with caustic sodium solution.	TD (Rich Eluate)/ HKPU (Yellow cake)
JV SMCC LLP	PLS, TD (Rich Eluate)	Ion exchange sorption, desorption of uranium from pregnant resin, uranium precipitation from rich eluate with caustic sodium solution Neutralisation of Rich Eluate with caustic sodium solution, uranium settlement with hydrogen peroxide, pulp filtration, calcining.	U_3O_8
Baiken-U LLP	PLS, TD (Rich Eluate)	Ion exchange sorption, desorption of uranium from pregnant resin, uranium precipitation from rich eluate with caustic sodium solution. Neutralisation of Rich Eluate with ammonia solution, uranium settlement with hydrogen peroxide, pulp filtration, calcining.	U_3O_8

Entity	Plant Input	Technological process	Plant Output
Budenovskoye			
Third Party Refineries			
SMCCP	TD (Rich Eluate) and HKPU (Yellow Cake)	Dissolution of yellow cake with sulphuric acid, extraction with di-2 trialkylamin, solid-phase re-extraction with ammonium bicarbonate solution, filtration, calcining.	U_3O_8
UMP	HKPU (Yellow Cake)	Dissolution of yellow cake with nitric acid, extraction with tributyl phosphate, liquid-phase re-extraction with sulphuric acid solution, neutralization and uranium settlement with ammonia liquid, filtration, calcining.	U_3O_8

Table 9-2: Mining Subsidiary site products(1)

Mining Subsidiary	Deposit	Site Product	Processing /Refining
Kazatomprom-SaUran LLP	Uvanas	U_3O_8	final product
	Eastern Mynkuduk	U_3O_8	final product
	Kanzhugan	U_3O_8	final product
	South Moinkum (Southern part)	U_3O_8	final product
	Central Moinkum	U_3O_8	final product
Ortalyk LLP	Zhalpak	HKPU	UMP
	Central Mynkuduk	HKPU	UMP
RU-6 LLP	Northern Karamurun	HKPU	UMP
	Southern Karamurun	HKPU	UMP
Appak LLP	Western Mynkuduk	U_3O_8	final product
JV Inkai LLP	Block 1 Inkai (a)	U_3O_8	final product
	Block 1 Inkai (b)	U_3O_8	final product
	Block 1 Inkai (c)	U_3O_8	final product
Semizbai-U LLP	Semizbai	TD	SMCCP
	Irkol	HKPU	UMP
JV Akbastau JSC	Block 1 Budenovskoye	TD	Karatau
	Block 3 Budenovskoye	TD	Karatau
	Block 4 Budenovskoye	TD	Karatau
Karatau LLP	Block 2 Budenovskoye	U_3O_8	final product
JV Zarechnoye JSC	Zarechnoye	HKPU	SMCCP
JV Katco LLP	Southern Moinkum (Northern part)	U_3O_8	final product
	Tortkuduk	U_3O_8	final product
JV Khorassan-U LLP	Block Kharassan 1, North Kharassan	TD/HKPU	Baiken-U/SMCCP
JV SMCC LLP	Akdala	U_3O_8	final product
	Block 4 Inkai	U_3O_8	final product
Baiken-U LLP	Block Kharassan 2, North Kharassan	U_3O_8	final product
Budenovskoye LLP	Block 6/7 Budenovskoye	U_3O_8	final product

(1) Ulba Metallurgical Plant JSC ("**UMP**") in which the Company has a 90.2% equity interest and 100% voting interest.

(2) Stepnogorsk Mining Chemical Combinate (plant), ("**SMCCP**").

9.3 Historical and Forecast Production Statistics

The 2018 CPR includes a significant quantum of historical and forecast production statistics for each of the Mining Subsidiaries and the individual deposits. As previously noted and other than for the additional of a further 18 months of statistics and depletion, the underlying LoMps have not been amended/adjusted by the Company. As such the reader is referred to Section 10.0 of the 2018 CPR for all other historical and forecast production statistics with respect to:

- Uranium production;
- Operating and constructed wells;
- Injection and extraction pumping rates;
- Extracted Pregnant Leach Solutions;
- Sulphuric Acid Consumption; and
- Uranium Recovery.

9.3.1 Uranium Production

Table 9-3: Production: historical (2015 through 2021) and forecast (2022)

Entity/Deposit	2015A (tU)	2016A (tU)	2017A (tU)	2018A (tU)	2019A (tU)	2020A (tU)	2021A (tU)	2022F (tU)
Kazatomprom-SaUran LLP								
Uvanas	288	197	78	40	30	-	-	-
Eastern Mynkuduk	1,053	1,025	896	791	795	636	1,088	550
Kanzhugan	537	543	470	410	440	300	308	365
South Moinkum (Southern part)	268	188	79	24	6	-	-	-
Central Moinkum	68	50	67	210	280	340	411	500
Total	**2,214**	**2,003**	**1,590**	**1,474**	**1,550**	**1,276**	**1,807**	**1,415**
ME Ortalyk LLP								
Zhalpak	-	-	6	110	80	17	-	50
Central Mynkuduk	1,770	1,953	1,898	1,600	1,610	1,322	1,600	1,600
Total	**1,770**	**1,953**	**1,898**	**1,710**	**1,690**	**1,339**	**1,600**	**1,650**
RU-6 LLP								

Entity/Deposit	2015A (tU)	2016A (tU)	2017A (tU)	2018A (tU)	2019A (tU)	2020A (tU)	2021A (tU)	2022F (tU)
Northern Karamurun	517	484	378	377	337	263	256	362
Southern Karamurun	438	531	340	355	283	405	545	438
Total	**956**	**1,015**	**718**	**732**	**620**	**668**	**801**	**800**
Appak LLP								
Western Mynkuduk	**880**	**1,004**	**901**	**803**	**805**	**633**	**805**	**800**
JV Inkai LLP								
Blocks 1, Inkai (a)	1,031	885	641	684	355	123	62	200
Blocks 1, Inkai (b)	1,387	1,528	1,473	1,762	2,049	1,800	2,034	2,000
Blocks 1, Inkai (c)	-	-	88	223	812	776	1,354	1,000
Total	**2,418**	**2,413**	**2,202**	**2,669**	**3,216**	**2,699**	**3,450**	**3,200**
Semizbai-U LLP								
Semizbai	440	542	450	406	406	299	406	406
Irkol	781	700	678	568	568	434	568	577
Total	**1,221**	**1,242**	**1,128**	**974**	**974**	**734**	**975**	**983**
JV Akbastau JSC								
Block 1 Budenovskoye	739	750	722	585	585	534	585	585
Block 3 Budenovskoye	480	626	875	749	814	697	844	690
Block 4 Budenovskoye	411	401	343	212	146	131	118	270
Total	**1,630**	**1,778**	**1,941**	**1,546**	**1,545**	**1,363**	**1,547**	**1,545**
Karatau LLP								
Block 2, Budenovskoye	**2,064**	**2,108**	**2,359**	**2,081**	**2,592**	**2,468**	**2,562**	**2,560**
JV Zarechnoye JSC								
Zarechnoye	**800**	**817**	**802**	**776**	**776**	**669**	**710**	**776**
JV Katco LLP								
Southern Moinkum (Northern part)	1,682	1,518	1,473	1,391	1,139	746	880	1,729
Tortkuduk	2,325	2,485	2,046	1,811	2,102	2,075	1,933	1,471
Total	**4,007**	**4,003**	**3,519**	**3,202**	**3,240**	**2,821**	**2,813**	**3,200**
JV Khorassan-U LLP								
Block Kharassan 1, North Kharassan	**1,095**	**1,354**	**1,564**	**1,607**	**1,600**	**1,460**	**1,601**	**1,600**
JV SMCC LLP								
Akdala	1,042	1,000	900	800	800	760	720	624
Block 4, Inkai	2,007	2,058	2,037	1,617	1,600	1,508	1,600	1,600
Total	**3,049**	**3,058**	**2,937**	**2,417**	**2,400**	**2,268**	**2,320**	**2,224**
Baiken-U LLP								
Block Kharassan 2, North Kharassan	**1,503**	**1,838**	**1,762**	**1,630**	**1,565**	**1,190**	**1,241**	**1,500**
Budenovskoye LLP								
Block 6/7, Budenovskoye	-	-	-	-	-	-	-	99
Grand Total	**23,607**	**24,586**	**23,321**	**21,621**	**22,575**	**19,587**	**22,232**	**22,351**

9.3.2 Operating and Constructed Wells

Table 9-4: Injection wells in operation: historical (2015 through 2021) and forecast (2022)

Entity/Deposit	2015A (No)	2016A (No)	2017A (No)	2018A (No)	2019A (No)	2020A (No)	2021A (No)	2022F (No)
Kazatomprom-SaUran LLP								
Uvanas								
Eastern Mynkuduk								
Kanzhugan								
South Moinkum (Southern part)								
Central Moinkum								
Total								
ME Ortalyk LLP								
Zhalpak								
Central Mynkuduk								
Total								
RU-6 LLP								
Northern Karamurun								
Southern Karamurun								
Total								
Appak LLP								
Western Mynkuduk								
JV Inkai LLP								
Blocks 1, Inkai (a)								
Blocks 1, Inkai (b)								
Blocks 1, Inkai (c)								
Total								
Semizbai-U LLP								
Semizbai								
Irkol								
Total								
JV Akbastau JSC								
Block 1 Budenovskoye								
Block 3 Budenovskoye								
Block 4 Budenovskoye								
Total								
Karatau LLP								
Block 2, Budenovskoye								
JV Zarechnoye JSC								
Zarechnoye								
JV Katco LLP								
Southern Moinkum (Northern part)								
Tortkuduk								
Total								
JV Khorassan-U LLP								
Block Kharassan 1, North Kharassan								
JV SMCC LLP								
Akdala								
Block 4, Inkai								
Total								
Baiken-U LLP								
Block Kharassan 2, North Kharassan								
Budenovskoye LLP								

Entity/Deposit	2015A (No)	2016A (No)	2017A (No)	2018A (No)	2019A (No)	2020A (No)	2021A (No)	2022F (No)
Block 6/7, Budenovskoye								
Grand Total								

Table 9-5: Extraction wells in operation: historical (2015 through 2021) and forecast (2022)

Entity/Deposit	2015A (No)	2016A (No)	2017A (No)	2018A (No)	2019A (No)	2020A (No)	2021A (No)	2022F (No)
Kazatomprom-SaUran LLP								
Uvanas								
Eastern Mynkuduk								
Kanzhugan								
South Moinkum (Southern part)								
Central Moinkum								
Total								
ME Ortalyk LLP								
Zhalpak								
Central Mynkuduk								
Total								
RU-6 LLP								
Northern Karamurun								
Southern Karamurun								
Total								
Appak LLP								
Western Mynkuduk								
JV Inkai LLP								
Blocks 1, Inkai (a)								
Blocks 1, Inkai (b)								
Blocks 1, Inkai (c)								
Total								
Semizbai-U LLP								
Semizbai								
Irkol								
Total								
JV Akbastau JSC								
Block 1 Budenovskoye								
Block 3 Budenovskoye								
Block 4 Budenovskoye								
Total								
Karatau LLP								
Block 2, Budenovskoye								
JV Zarechnoye JSC								
Zarechnoye								
JV Katco LLP								
Southern Moinkum (Northern part)								
Tortkuduk								
Total								
JV Khorassan-U LLP								
Block Kharassan 1, North Kharassan								
JV SMCC LLP								
Akdala								
Block 4, Inkai								
Total								
Baiken-U LLP								
Block Kharassan 2, North Kharassan								
Budenovskoye LLP								
Block 6/7, Budenovskoye								
Grand Total								

Table 9-6: Ratio of Injection to Extraction wells in operation: historical (2015 through 2021) and forecast (2022)

Entity/Deposit	2015A (No)	2016A (No)	2017A (No)	2018A (No)	2019A (No)	2020A (No)	2021A (No)	2022F (No)
Kazatomprom-SaUran LLP								
Uvanas								
Eastern Mynkuduk								
Kanzhugan								
South Moinkum (Southern part)								
Central Moinkum								
Total								
ME Ortalyk LLP								
Zhalpak								
Central Mynkuduk								
Total								
RU-6 LLP								
Northern Karamurun								
Southern Karamurun								
Total								
Appak LLP								
Western Mynkuduk								
JV Inkai LLP								
Blocks 1, Inkai (a)								
Blocks 1, Inkai (b)								
Blocks 1, Inkai (c)								
Total								
Semizbai-U LLP								
Semizbai								
Irkol								
Total								
JV Akbastau JSC								
Block 1 Budenovskoye								
Block 3 Budenovskoye								
Block 4 Budenovskoye								

Entity/Deposit	2015A (No)	2016A (No)	2017A (No)	2018A (No)	2019A (No)	2020A (No)	2021A (No)	2022F (No)
Total								
Karatau LLP								
Block 2, Budenovskoye								
JV Zarechnoye JSC								
Zarechnoye								
JV Katco LLP								
Southern Moinkum (Northern part)								
Tortkuduk								
Total								
JV Khorassan-U LLP								
Block Kharassan 1, North Kharassan								
JV SMCC LLP								
Akdala								
Block 4, Inkai								
Total								
Baiken-U LLP								
Block Kharassan 2, North Kharassan								
Budenovskoye LLP								
Block 6/7, Budenovskoye								
Grand Total								

Table 9-7: Total wells constructed: historical (2015 through 2021) and forecast (2022)

Entity/Deposit	2015A (No)	2016A (No)	2017A (No)	2018A (No)	2019A (No)	2020A (No)	2021A (No)	2022F (No)
Kazatomprom-SaUran LLP								
Uvanas								
Eastern Mynkuduk								
Kanzhugan								
South Moinkum (Southern part)								
Central Moinkum								
Total								
ME Ortalyk LLP								
Zhalpak								
Central Mynkuduk								
Total								
RU-6 LLP								
Northern Karamurun								
Southern Karamurun								
Total								
Appak LLP								
Western Mynkuduk								
JV Inkai LLP								
Blocks 1, Inkai (a)								
Blocks 1, Inkai (b)								
Blocks 1, Inkai (c)								
Total								
Semizbai-U LLP								
Semizbai								
Irkol								
Total								
JV Akbastau JSC								
Block 1 Budenovskoye								
Block 3 Budenovskoye								
Block 4 Budenovskoye								
Total								
Karatau LLP								
Block 2, Budenovskoye								
JV Zarechnoye JSC								
Zarechnoye								
JV Katco LLP								
Southern Moinkum (Northern part)								
Tortkuduk								
Total								
JV Khorassan-U LLP								
Block Kharassan 1, North Kharassan								
JV SMCC LLP								
Akdala								
Block 4, Inkai								
Total								
Baiken-U LLP								
Block Kharassan 2, North Kharassan								
Budenovskoye LLP								
Block 6/7, Budenovskoye								
Grand Total								

Table 9-8: Average well depth per constructed well: historical (2015 through 2021) and forecast (2022)

Entity/Deposit	2015A (No)	2016A (No)	2017A (No)	2018A (No)	2019A (No)	2020A (No)	2021A (No)	2022F (No)
Kazatomprom-SaUran LLP								
Uvanas								
Eastern Mynkuduk								
Kanzhugan								
South Moinkum (Southern part)								
Central Moinkum								
Total								
ME Ortalyk LLP								
Zhalpak								
Central Mynkuduk								
Total								
RU-6 LLP								

Entity/Deposit	2015A (No)	2016A (No)	2017A (No)	2018A (No)	2019A (No)	2020A (No)	2021A (No)	2022F (No)
Northern Karamurun								
Southern Karamurun								
Total								
Appak LLP								
Western Mynkuduk								
JV Inkai LLP								
Blocks 1, Inkai (a)								
Blocks 1, Inkai (b)								
Blocks 1, Inkai (c)								
Total								
Semizbai-U LLP								
Semizbai								
Irkol								
Total								
JV Akbastau JSC								
Block 1 Budenovskoye								
Block 3 Budenovskoye								
Block 4 Budenovskoye								
Total								
Karatau LLP								
Block 2, Budenovskoye								
JV Zarechnoye JSC								
Zarechnoye								
JV Katco LLP								
Southern Moinkum (Northern part)								
Tortkuduk								
Total								
JV Khorassan-U LLP								
Block Kharassan 1, North Kharassan								
JV SMCC LLP								
Akdala								
Block 4, Inkai								
Total								
Baiken-U LLP								
Block Kharassan 2, North Kharassan								
Budenovskoye LLP								
Block 6/7, Budenovskoye								
Grand Total								

9.3.3 Injection and extraction pumping rates

Table 9-9: Average injection well pumping rate: historical (2015 through 2021) and forecast (2022)

Entity/Deposit	2015A (m^3/h)	2016A (m^3/h)	2017A (m^3/h)	2018A (m^3/h)	2019A (m^3/h)	2020A (m^3/h)	2021A (m^3/h)	2022F (m^3/h)
Kazatomprom-SaUran LLP								
Uvanas								
Eastern Mynkuduk								
Kanzhugan								
South Moinkum (Southern part)								
Central Moinkum								
Total								
ME Ortalyk LLP								
Zhalpak								
Central Mynkuduk								
Total								
RU-6 LLP								
Northern Karamurun								
Southern Karamurun								
Total								
Appak LLP								
Western Mynkuduk								
JV Inkai LLP								
Blocks 1, Inkai (a)								
Blocks 1, Inkai (b)								
Blocks 1, Inkai (c)								
Total								
Semizbai-U LLP								
Semizbai								
Irkol								
Total								
JV Akbastau JSC								
Block 1 Budenovskoye								
Block 3 Budenovskoye								
Block 4 Budenovskoye								
Total								
Karatau LLP								
Block 2, Budenovskoye								
JV Zarechnoye JSC								
Zarechnoye								
JV Katco LLP								
Southern Moinkum (Northern part)								
Tortkuduk								
Total								
JV Khorassan-U LLP								
Block Kharassan 1, North Kharassan								
JV SMCC LLP								
Akdala								
Block 4, Inkai								
Total								
Baiken-U LLP								
Block Kharassan 2, North Kharassan								
Budenovskoye LLP								

Entity/Deposit	2015A (m^3/h)	2016A (m^3/h)	2017A (m^3/h)	2018A (m^3/h)	2019A (m^3/h)	2020A (m^3/h)	2021A (m^3/h)	2022F (m^3/h)
Block 6/7, Budenovskoye								
Grand Total								

Table 9-10: Average extraction well pumping rate: historical (2015 through 2021) and forecast (2022)

Entity/Deposit	2015A (m^3/h)	2016A (m^3/h)	2017A (m^3/h)	2018A (m^3/h)	2019A (m^3/h)	2020A (m^3/h)	2021A (m^3/h)	2022F (m^3/h)
Kazatomprom-SaUran LLP								
Uvanas								
Eastern Mynkuduk								
Kanzhugan								
South Moinkum (Southern part)								
Central Moinkum								
Total								
ME Ortalyk LLP								
Zhalpak								
Central Mynkuduk								
Total								
RU-6 LLP								
Northern Karamurun								
Southern Karamurun								
Total								
Appak LLP								
Western Mynkuduk								
JV Inkai LLP								
Blocks 1, Inkai (a)								
Blocks 1, Inkai (b)								
Blocks 1, Inkai (c)								
Total								
Semizbai-U LLP								
Semizbai								
Irkol								
Total								
JV Akbastau JSC								
Block 1 Budenovskoye								
Block 3 Budenovskoye								
Block 4 Budenovskoye								
Total								
Karatau LLP								
Block 2, Budenovskoye								
JV Zarechnoye JSC								
Zarechnoye								
JV Katco LLP								
Southern Moinkum (Northern part)								
Tortkuduk								
Total								
JV Khorassan-U LLP								
Block Kharassan 1, North Kharassan								
JV SMCC LLP								
Akdala								
Block 4, Inkai								
Total								
Baiken-U LLP								
Block Kharassan 2, North Kharassan								
Budenovskoye LLP								
Block 6/7, Budenovskoye								
Grand Total								

9.3.4 Extracted Pregnant Leach Solutions

Table 9-11: PLS Volume: historical (2015 through 2021) and forecast (2022)

Entity/Deposit	2015A ('000 m^3/h)	2016A ('000 m^3/h)	2017A ('000 m^3/h)	2018A ('000 m^3/h)	2019A ('000 m^3/h)	2020A ('000 m^3/h)	2021A ('000 m^3/h)	2022F ('000 m^3/h)
Kazatomprom-SaUran LLP								
Uvanas								
Eastern Mynkuduk								
Kanzhugan								
South Moinkum (Southern part)								
Central Moinkum								
Total								
ME Ortalyk LLP								
Zhalpak								
Central Mynkuduk								
Total								
RU-6 LLP								
Northern Karamurun								
Southern Karamurun								
Total								
Appak LLP								
Western Mynkuduk								
JV Inkai LLP								
Blocks 1, Inkai (a)								
Blocks 1, Inkai (b)								
Blocks 1, Inkai (c)								
Total								
Semizbai-U LLP								
Semizbai								
Irkol								
Total								
JV Akbastau JSC								

Entity/Deposit	2015A ('000 m^3/h)	2016A ('000 m^3/h)	2017A ('000 m^3/h)	2018A ('000 m^3/h)	2019A ('000 m^3/h)	2020A ('000 m^3/h)	2021A ('000 m^3/h)	2022F ('000 m^3/h)
Block 1 Budenovskoye								
Block 3 Budenovskoye								
Block 4 Budenovskoye								
Total								
Karatau LLP								
Block 2, Budenovskoye								
JV Zarechnoye JSC								
Zarechnoye								
JV Katco LLP								
Southern Moinkum (Northern part)								
Tortkuduk								
Total								
JV Khorassan-U LLP								
Block Kharassan 1, North Kharassan								
JV SMCC LLP								
Akdala								
Block 4, Inkai								
Total								
Baiken-U LLP								
Block Kharassan 2, North Kharassan								
Budenovskoye LLP								
Block 6/7, Budenovskoye								
Grand Total								

Table 9-12: PLS Grade: historical (2015 through 2021) and forecast (2022)

Entity/Deposit	2015A (g/m^3)	2016A (g/m^3)	2017A (g/m^3)	2018A (g/m^3)	2019A (g/m^3)	2020A (g/m^3)	2021A (g/m^3)	2022F (g/m^3)
Kazatomprom-SaUran LLP								
Uvanas								
Eastern Mynkuduk								
Kanzhugan								
South Moinkum (Southern part)								
Central Moinkum								
Total								
ME Ortalyk LLP								
Zhalpak								
Central Mynkuduk								
Total								
RU-6 LLP								
Northern Karamurun								
Southern Karamurun								
Total								
Appak LLP								
Western Mynkuduk								
JV Inkai LLP								
Blocks 1, Inkai (a)								
Blocks 1, Inkai (b)								
Blocks 1, Inkai (c)								
Total								
Semizbai-U LLP								
Semizbai								
Irkol								
Total								
JV Akbastau JSC								
Block 1 Budenovskoye								
Block 3 Budenovskoye								
Block 4 Budenovskoye								
Total								
Karatau LLP								
Block 2, Budenovskoye								
JV Zarechnoye JSC								
Zarechnoye								
JV Katco LLP								
Southern Moinkum (Northern part)								
Tortkuduk								
Total								
JV Khorassan-U LLP								
Block Kharassan 1, North Kharassan								
JV SMCC LLP								
Akdala								
Block 4, Inkai								
Total								
Baiken-U LLP								
Block Kharassan 2, North Kharassan								
Budenovskoye LLP								
Block 6/7, Budenovskoye								
Grand Total								

9.3.5 Sulphuric Acid Consumption

Table 9-13: Total Sulphuric Acid Consumption: historical (2015 through 2021) and forecast (2022)

Entity/Deposit	2015A (ktS)	2016A (ktS)	2017A (ktS)	2018A (ktS)	2019A (ktS)	2020A (ktS)	2021A (ktS)	2022F (ktS)
Kazatomprom-SaUran LLP								
Uvanas								
Eastern Mynkuduk								
Kanzhugan								
South Moinkum (Southern part)								
Central Moinkum								
Total								
ME Ortalyk LLP								

Entity/Deposit	2015A (ktS)	2016A (ktS)	2017A (ktS)	2018A (ktS)	2019A (ktS)	2020A (ktS)	2021A (ktS)	2022F (ktS)
Zhalpak								
Central Mynkuduk								
Total								
RU-6 LLP								
Northern Karamurun								
Southern Karamurun								
Total								
Appak LLP								
Western Mynkuduk								
JV Inkai LLP								
Blocks 1, Inkai (a)								
Blocks 1, Inkai (b)								
Blocks 1, Inkai (c)								
Total								
Semizbai-U LLP								
Semizbai								
Irkol								
Total								
JV Akbastau JSC								
Block 1 Budenovskoye								
Block 3 Budenovskoye								
Block 4 Budenovskoye								
Total								
Karatau LLP								
Block 2, Budenovskoye								
JV Zarechnoye JSC								
Zarechnoye								
JV Katco LLP								
Southern Moinkum (Northern part)								
Tortkuduk								
Total								
JV Khorassan-U LLP								
Block Kharassan 1, North Kharassan								
JV SMCC LLP								
Akdala								
Block 4, Inkai								
Total								
Baiken-U LLP								
Block Kharassan 2, North Kharassan								
Budenovskoye LLP								
Block 6/7, Budenovskoye								
Grand Total								

Table 9-14: Total Specific Sulphuric Acid Consumption: historical (2015 through 2021) and forecast (2022)

Entity/Deposit	2015A (tS/kg)	2016A (tS/kg)	2017A (tS/kg)	2018A (tS/kg)	2019A (tS/kg)	2020A (tS/kg)	2021A (tS/kg)	2022F (tS/kg)
Kazatomprom-SaUran LLP								
Uvanas								
Eastern Mynkuduk								
Kanzhugan								
South Moinkum (Southern part)								
Central Moinkum								
Total								
ME Ortalyk LLP								
Zhalpak								
Central Mynkuduk								
Total								
RU-6 LLP								
Northern Karamurun								
Southern Karamurun								
Total								
Appak LLP								
Western Mynkuduk								
JV Inkai LLP								
Blocks 1, Inkai (a)								
Blocks 1, Inkai (b)								
Blocks 1, Inkai (c)								
Total								
Semizbai-U LLP								
Semizbai								
Irkol								
Total								
JV Akbastau JSC								
Block 1 Budenovskoye								
Block 3 Budenovskoye								
Block 4 Budenovskoye								
Total								
Karatau LLP								
Block 2, Budenovskoye								
JV Zarechnoye JSC								
Zarechnoye								
JV Katco LLP								
Southern Moinkum (Northern part)								
Tortkuduk								
Total								
JV Khorassan-U LLP								
Block Kharassan 1, North Kharassan								
JV SMCC LLP								
Akdala								
Block 4, Inkai								
Total								
Baiken-U LLP								
Block Kharassan 2, North Kharassan								

Entity/Deposit	2015A (tS/kg)	2016A (tS/kg)	2017A (tS/kg)	2018A (tS/kg)	2019A (tS/kg)	2020A (tS/kg)	2021A (tS/kg)	2022F (tS/kg)
Budenovskoye LLP								
Block 6/7, Budenovskoye								
Grand Total								

9.3.6 Uranium Recovery

Entity/Deposit	2015A (%)	2016A (%)	2017A (%)	2018A (%)	2019A (%)	2020A (%)	2021A (%)	2022F (%)
Kazatomprom-SaUran LLP								
Uvanas								
Eastern Mynkuduk								
Kanzhugan								
South Moinkum (Southern part)								
Central Moinkum								
Total								
ME Ortalyk LLP								
Zhalpak								
Central Mynkuduk								
Total								
RU-6 LLP								
Northern Karamurun								
Southern Karamurun								
Total								
Appak LLP								
Western Mynkuduk								
JV Inkai LLP								
Blocks 1, Inkai (a)								
Blocks 1, Inkai (b)								
Blocks 1, Inkai (c)								
Total								
Semizbai-U LLP								
Semizbai								
Irkol								
Total								
JV Akbastau JSC								
Block 1 Budenovskoye								
Block 3 Budenovskoye								
Block 4 Budenovskoye								
Total								
Karatau LLP								
Block 2, Budenovskoye								
JV Zarechnoye JSC								
Zarechnoye								
JV Katco LLP								
Southern Moinkum (Northern part)								
Tortkuduk								
Total								
JV Khorassan-U LLP								
Block Kharassan 1, North Kharassan								
JV SMCC LLP								
Akdala								
Block 4, Inkai								
Total								
Baiken-U LLP								
Block Kharassan 2, North Kharassan								
Budenovskoye LLP								
Block 6/7, Budenovskoye								
Grand Total								

Table 9-15: PLS Uranium Recovery: historical (2015 through 2021) and forecast (2022)

Entity/Deposit	2015A (%)	2016A (%)	2017A (%)	2018A (%)	2019A (%)	2020A (%)	2021A (%)	2022F (%)
Kazatomprom-SaUran LLP								
Uvanas								
Eastern Mynkuduk								
Kanzhugan								
South Moinkum (Southern part)								
Central Moinkum								
Total								
ME Ortalyk LLP								
Zhalpak								
Central Mynkuduk								
Total								
RU-6 LLP								
Northern Karamurun								
Southern Karamurun								
Total								
Appak LLP								
Western Mynkuduk								
JV Inkai LLP								
Blocks 1, Inkai (a)								
Blocks 1, Inkai (b)								
Blocks 1, Inkai (c)								
Total								
Semizbai-U LLP								
Semizbai								
Irkol								
Total								

Entity/Deposit	2015A (%)	2016A (%)	2017A (%)	2018A (%)	2019A (%)	2020A (%)	2021A (%)	2022F (%)
JV Akbastau JSC								
Block 1 Budenovskoye								
Block 3 Budenovskoye								
Block 4 Budenovskoye								
Total								
Karatau LLP								
Block 2, Budenovskoye								
JV Zarechnoye JSC								
Zarechnoye								
JV Katco LLP								
Southern Moinkum (Northern part)								
Tortkuduk								
Total								
JV Khorassan-U LLP								
Block Kharassan 1, North Kharassan								
JV SMCC LLP								
Akdala								
Block 4, Inkai								
Total								
Baiken-U LLP								
Block Kharassan 2, North Kharassan								
Budenovskoye LLP								
Block 6/7, Budenovskoye								
Grand Total								

Table 9-16: Overall Uranium Recovery from in-situ through to final saleable product

Entity/Deposit	2015A (%)	2016A (%)	2017A (%)	2018A (%)	2019A (%)	2020A (%)	2021A (%)	2022F (%)
Kazatomprom-SaUran LLP								
ME Ortalyk LLP								
RU-6 LLP								
Appak LLP								
JV Inkai LLP								
Semizbai-U LLP								
JV Akbastau JSC								
Karatau LLP								
JV Zarechnoye JSC								
JV Katco LLP								
JV Khorassan-U LLP								
JV SMCC LLP								
Total								
Baiken-U LLP								
Budenovskoye LLP								
Total								

9.4 Mining Subsidiary Historical and Forecast Uranium Production

This section presents summary comments on the historical and forecast production volumes at each of the Mining Subsidiaries.

Kazatomprom-SaUran LLP

Kazatomprom-SaUran LLP mines uranium from three deposits: Eastern Mynkuduk; Kanzhugan; and Central Moinkum with production having now ceased at Uvanas and South Moinkum. The processing facilities enable production of refined U_3O_8 through a central refinery.

Historical annual production levels have reduced from approximately 2,200tU and following various planned production cuts including depletion of Ore Reserves at Uvanas and South Moinkum is currently producing at a rate of approximately 1,810tU.

Future production comprises continuation of historical reductions to 1,000tU on depletion of Eastern Mynkuduk. The long-term production units of Kanzhugan and Central Moinkum are planned to continue at 365tU and 500tU per annum respectively until depletion of the Ore Reserves in 2048 and 2040 at Kanzhugan and Central Moinkum respectively.

Ortalyk LLP

Ortalyk LLP mines uranium from two deposits: Zhalpak; and Central Mynkuduk with the former currently pending approval for full scale production. The processing facilities enable production of HKPU on site which is then sent to the UMP for refining to U_3O_8.

Historical annual production has varied between approximately 1,800tU and 1,950tU and it is currently running at a rate of approximately 1,600tU.

Future production comprises a reversal of the planned reductions to re-establish a total annual production rate of approximately 2,000tU at Central Moinkum and with the build-up of production at Zhalpak to 900tU by 2030 resulting in an increased total production of 2,900tU prior to declining as production at Central Moinkum tails with planned depletion of the Ore Reserves in 2033. Production at Zhalpak is assumed to continue at 900tU through to planned depletion of the Ore Reserves in 2042.

RU-6 LLP

RU-6 LLP mines uranium from two deposits: Northern Karamurun; and Southern Karamurun. The processing facilities enable production of HKPU on site which is then sent to UMP for refining to U_3O_8. Historical annual production has varied between approximately 620tU and 1,015tU and it is currently producing at a rate of approximately 800tU with approximately equal production at both deposits.

Future production assumes a reversal of planned production cuts to attain approximately 833tU in 2024 which is maintained through to 2031, thereafter declining in accordance with depletion of current Ore Reserves at Northern Karamurun and Southern Karamurun in 2032 and 2040 respectively. The steady state split of production for Northern Karamurun and Southern Karamurun from 2024 onwards is approximately 380tU and 460tU per annum respectively.

Appak LLP

Appak LLP mines uranium from a single deposit Western Mynkuduk which enables production of a final saleable product U_3O_8 on site. Historical annual production has varied between approximately 630tU and 1,000tU and is currently producing at a rate of approximately 800tU.

Future production assumes a reversal of planned production cuts to attain approximately 1,000tU in 2024 which is maintained through to 2035, thereafter declining in accordance with planned depletion of current Ore Reserves in 2037.

JV Inkai LLP

JV Inkai LLP mines uranium from three deposits: Inkai 1 (a); Inkai 1 (b); and Inkai (1c). The processing facilities enable production of refined U_3O_8. Inkai 1(b) and Inkai 1 (c) are currently ramping up to full production through planned expansions to 2,000tU and 1,000tU per annum respectively.

Historical production levels have ranged from approximately 2,200tU to 3,450tU and largely reflects the planned production cuts, notably at Inkai 1 (a). The mining operations are currently producing at a rate of approximately 3,450tU with approximately 59% being derived from Inkai 1 (b).

Future production comprises a reversal of the planned reductions at Inkai 1 (a) and the completion of planned expansions at Inkai 1 (b) and Inkai 1 (c) to attain total uranium production of 4,000tU by 2024. This level is maintained through 2045, thereafter declining to approximately 3,000tU following planned depletion at Inkai 1 (a) in 2051, 1(b) in 2046 and Inkai 1 (c) in 2051. As production declines of current Ore Reserves in Inkai 1 (a) and Inkai 1 (b), production is assumed to increase at Inkai 1 (c) to 2,000tU for a short period at the end of the LoMp.

Semizbai-U LLP

Semizbai-U LLP mines uranium from two deposits: Semizbai; and Irkol. The processing facilities enable production of TD at Semizbai and HKPU at Irkol. The TD from Semizbai is sent to SMCCP and the HKPU from Irkol is sent to UMP for refining to produce U_3O_8. Historical annual production has varied between approximately 730tU and 1,240tU and it is currently producing at a rate of approximately 975tU with approximately 40% of production attributable to Semizbai.

Future production assumes a reversal of planned production cuts to attain approximately 1,100tU in 2024 which is maintained through to 2039, thereafter declining in accordance with depletion of current Ore Reserves at Semizbai and Irkol in 2042 and 2040 respectively. The steady state split of production for Semizbai and Irkol from 2023 onwards is approximately 410tU and 710tU respectively.

JV Akbastau JSC

JV Akbastau JSC mines uranium from three deposits: Block 1 Budenovskoye; Block 3 Budenovskoye; and Block 4 Budenovskoye. On site processing facilitates enable production of TD which is then transported to Karatau LLP's processing facilities for the production of the final saleable product U_3O_8.

Historical annual production has varied between approximately 1,360tU and 1,940tU and it is currently producing at a rate of approximately 1,550tU with Block 1 Budenovskoye, Block 3 Budenovskoye and Block 4 Budenovskoye contributing 585tU, 844tU and 118tU respectively.

Future production assumes a combination of reversal of the planned production cuts and planned expansion at Block 3 Budenovskoye to re-establish historical production levels of approximately 2,200tU by 2025. This production level is maintained through to 2030 with production contributions in 2030 being approximately 875tU, 970tU and 350tU for Block 1 Budenovskoye, Block 3 Budenovskoye, and Block 4 Budenovskoye respectively. The LoMp reflects depletion of current Ore Reserves at Block 1 Budenovskoye in 2037 and Block 3 Budenovskoye and Block 4 Budenovskoye in 2039.

Karatau LLP

Karatau LLP mines uranium from a single deposit Block 2 Budenovskoye with on-site processing facilities enabling production of final saleable product in the form of U_3O_8. Historical production has varied between 2,100tU and 2,600tU and it is currently producing at a rate of approximately 2,560tU.

Future production of Block 2 Budenovskoye assumes a combination of a reversal of production cuts with combined expansion to attain 3,200tU by 2024 which increases to 3,600tU by 2025 and maintained through to 2030 prior to planned depletion of the current Ore Reserves in 2032.

As Karatau LLP provides refining services to Akbastau LLP total refining production increases to approximately 5,800tU which is maintained through to 2030, thereafter declining to approximately 2,000tU when only material from Akbastau LLP is refined prior to cessation of all operations in 2039 on depletion of the current Ore Reserves for Akbastau LLP.

JV Zarechnoye JSC

JV Zarechnoye JSC mines uranium from a single deposit Zarechnoye to produce HKPU prior to refining to final saleable product (U_3O_8) at SMCCP. Historical production has ranged from approximately 670tU to 820tU and it is currently producing at a rate of approximately 710tU.

Future production is planned to largely remain at these levels until depletion of current Ore Reserves in 2028.

JV Katco LLP

JV Katco LLP mines uranium from two deposits: Southern Moinkum (Northern part); and Tortkuduk and the processing facilities on site enable production of final sealable product (U_3O_8). Historical annual production has ranged from 2,810tU to 4,000tU and it is currently producing at a rate of approximately 2,810tU with Tortkuduk contributing approximately 70% of total production.

Future production assumes a combination of planned production cuts with combined expansion to retain 4,000tU by 2026 which is maintained through to 2031 prior to planned depletion of the current Ore Reserves at Tortkuduk in 2035. Production at Southern Moinkum (Northern part) declines from 2022 onwards and is offset by planned increased production at Tortkuduk to maintain 4,000tU levels.

JV Khorassan-U LLP

JV Khorassan-U LLP mines (mining and processing undertaken by Kyzylkum LLP) uranium from one deposit, namely Block Kharassan 1, North Kharassan which produces both TD and HKPU with the TD sent to Baiken-U LLP's refining facilities and the HKPU sent to SMCCP for refining to produce final saleable products (U_3O_8).

Historical annual production has ranged from 1,100tU to 1,610tU and it is currently producing at a rate of approximately 1,600tU.

Future production assumes continued increases in planned production to attain approximately 2,200tU by 2026 which is maintained through 2033, thereafter declining to depletion of current Ore Reserves in 2038. The portion of production sent to the third-party refinery is assumed to increase to approximately 1,310tU by 2022 and cessing altogether by 2030, after which all production is refined at Baiken-U LLP's processing facilities.

JV SMCC LLP

JV SMCC LLP mines uranium from two deposits: Akdala; and Block 4 Inkai. The TD from Akdala is transported to the central refining plant which along with material from Block 4 Inkai facilitates production of the final saleable product (U_3O_8). Historical annual production has ranged from approximately 2,270tU to 3,060tU and it is currently producing at a rate of approximately 2,320tU with 69% attributed to Block 4 Inkai.

Future production assumes reversal of recent planned production cuts to re-establish historical production levels at appropriately 3,000tU by 2025, declining to 2,400tU by 2026 on depletion of current Ore Reserves at Akdala and thereafter reducing to 2,000tU in 2029 maintaining this level until 2052 with the resulting declining production tail noting depletion of Block 4 Inkai in 2057.

Baiken-U LLP

Baiken-U LLP mines uranium from a single deposit Block Kharassan 2 (North Kharassan) which is refined on site to produce final saleable product (U_3O_8). Historical annual production has ranged from approximately 1,200tU to 1,840tU and it is currently producing at rate of approximately 1,240tU.

Future production assumes that the historical planed production cuts are reversed with planned marginal increases securing production of 1,500tU by 2022 which is maintained until 2030, thereafter declining to less than 1,000tU in 2031 prior to depletion of the current Ore Reserves by 2033.

As previously noted, Baiken-U LLP provides toll processing services on behalf of JV Khorassan-U LLP and continues providing services for a further four years through to 2038 following planned depletion of its own current Ore Reserves in 2033.

Budenovskoye LLP

Budenovskoye LLP is a development project under construction which mines from a combined Block 6 and Block 7 Budenovskoye which will be refined on site to produce final saleable product (U_3O_8). Substantive production is planned for 2024 and is planned to increase over a tow year period to achieve the design capacity of 6,000tU in 2026. This production level is assumed to be maintained through to 2039 after which production declines prior to depletion of the Ore Reserves in 2045.

10 ENVIRONMENTAL AND SOCIAL LIABILITIES

10.1 Introduction

This section includes an update of the environmental and social liabilities determined as of 31 December 2021 for the Mining Subsidiaries, specifically in respect of the ARO and the Life of Mine Plan Closure Costs as agreed with the Company.

During the 2018 IPO process, SRK in addition completed a detailed assessment of the Company's Environmental, Social, Health and Safety ("**ESHS**") management systems and other related aspects. The process followed in support of this historical analysis also included conformance with international standards which resulted in a number of key findings and recommendations as outlined in the 2018 CPR referenced herein. The findings and recommendations were subsequently incorporated into a detailed action plan which implementation was binding on the Company. This CPR does not incorporate a detailed assessment of conformance and outcomes of the action plan and the extent to which the Company has progressed in this regard. Notwithstanding this aspect, SRK has reproduced the findings and recommendations as incorporated in the 2018 CPR for completeness and as a matter of historical fact.

Notwithstanding the above, SRK has however on a high level basis reviewed the Company's current ESG reporting which is considered to have substantively improved when compared with that collated and reported at the time of the IPO process and in subsequent years. Details of the historical records in this regard are provided in Section 2.2.6 Environmental and Social Governance and Section 2.2.7 Occupational Health and Safety of this CPR.

10.2 Environmental and Social Setting

Of the 26 production units, 25 are located in southern Kazakhstan across the Kyzylorda and South Kazakhstan Provinces. The Zhalpak production unit, which is subject to trial mining, is also located in the South Kazakhstan Province. The only ISR production unit outside of southern Kazakhstan is Semizbai, which straddles the North-Kazakhstan and Amkola Provinces in the northern part of Kazakhstan.

The administrative locations of the mines are outlined in Table 10-1. All mines are in terrain that is both sparsely vegetated and sparsely populated. The natural vegetation at the mine sites ranges from desert, through open shrubland to steppe. Only six mines are within 10km of human settlements. The settlements that are within 10km of some mines are very small – villages and small towns with populations below 7,000.

The locations of the ISR operations in southern Kazakhstan are shown in Figure 10-1. These are within the Syrdarya River basin and Shu-Sarysu River basin (Table 10-1). The basins are separated by the Karatau Mountains that run from the northwest to the southeast.

10.2.1 ISR Operations in the Syrdarya River Basin

The operations in the Syrdarya River basin are identified in Table 10-1 and their locations are shown in Figure 10-1.

The main industry in the Syrdarya basin involves uranium mining and agriculture in the form of livestock rearing (breeding of camels, sheep and horse) and crop production (irrigated rice-growing). Rail, road and energy communications are well developed. For all the ISR operations in the Syrdarya basin, with the exception of RU-6 LLP's operations, the surrounding land use is restricted to livestock grazing. Livestock incursions into the mining areas occur as they are not fenced (this is discussed further in Section 10.6.1).

The climate of in Syrdarya River basin is sharply continental, with hot summers, cold winters and high diurnal variations in temperature. The air temperature averages +26°C in summer (maximum +46°C in July) and -9°C in winter (the minimum is -38°C in January). Precipitation does not exceed 200mm per year. The winds blow predominantly from northern and north-easterly directions almost continuously. The speed is usually 8m/s to 12m/s with gusts up to 24m/s.

Table 10-1: Syrdarya Region: administrative locations of the ISR Mines

Province and district	Geographic area	Mining Subsidiary	Deposit name	Nearest settlements (distance from mine)
Kyzylorda Province (Shieli and Zhanakorgan districts)	Syrdarya depression	Semizbai-U LLP	Irkol	Kyzylkaiyn (9km), Ortakshyl (9.5km) and Zhanaturmys (13km)
		RU-6 LLP	Northern Karamurun Southern Karamurun	22nd intersection (1.5km), Avangard (2.6km from North Karamurun deposit), Gigant (3.8km) and Aktam (8.5km)
		JV Khorassan LLP	Block Kharassan 1, North Kharassan	Baykenzhe (7km)
		Baiken-U LLP	Block Kharassan 2, North Kharassan	Baykenzhe (10km) and Belibay (13km)
South Kazakhstan Province (Sozak district)	Syrdarya depression	JV Zarechnoye JSC	Zarechnoye	Koksaray (62km)
	Shu-Sarysu basin (south of Shu River)	JV Akbastau JSC	Block 1, Block 3 and Block 4 Budenovskoye	Aksumbe (40km) Karatau (60km)
		Budenovskoye LLP	Block 6, Block 7 Budenovskoye	
		Karatau LLP	Block 2 Budenovskoye	Aksumbe (45km)
		Katco LLP	Tortkuduk	Tasty (20km)
			Southern Moinkum (Northern part)	Taukent (50km), Tasty (50km)
		Kazatomprom-SaUran LLP	Kanzhugan	Taukent (20km)
			South Moinkum (Southern Part)	Taukent (40km)
			Central Moinkum	Taukent (50km), Tasty (50km)
	Shu-Sarysu basin (north of Shu River)	JV Inkai LLP	Block Inkai (a), (b) and (c)	Taikonur (6km)
		JV SMCC LLP	Block 4, Inkai	Taikonur (12km)
			Akdala	Kyzemshek (35km)
		Ortalyk LLP[(1)]	Central Mynkuduk	Taikonur (70km)
		Appak LLP	Western Mynkuduk	Taikonur (60km)
		Kazatomprom-SaUran LLP	Uvanas	Kyzemshek (2km), Zhuantobe (60km) and Tasty (80km)
			Eastern Mynkuduk	Kyzemshek (60km)
			Zhalpak (exploration and trial mining site)*	Kyzemshek (85km), Tasty and Zhuantobe (120km)
North-Kazakhstan Province (Ualikhanovsky district) Amkola Province (Enbekshilder district)	Semizbai depression	Semizbai-U LLP	Semizbai	Kairat and Zhas-karait villages (50km), Bestobe (60km) Stepnogorsk city (150km)

(1) Ortalyk LLP is the holder of the mining contract for the Zhalpak deposit. Kazatomprom-SaUran LLP undertaking the trial mining operations at the Zhalpak deposit under contract to Ortalyk LLP. The environmental permit for the trial mining has been issued to the Kazatomprom-SaUran LLP, as the operator of trial mining. Full-scale mining at the Zhalpak deposit will commence is scheduled for 2022 if the trial is successful.

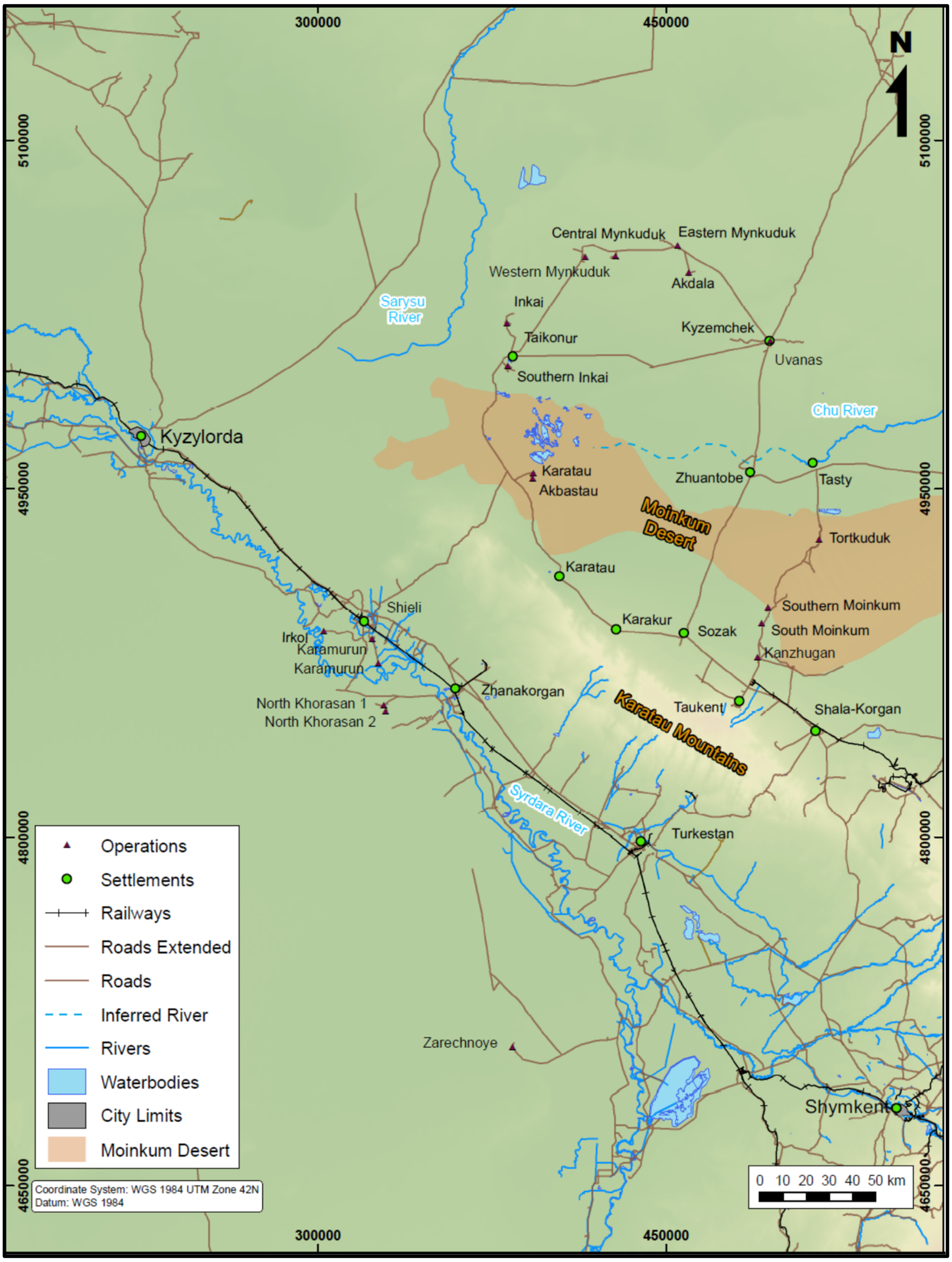
The Syrdarya River basin is approximately 150m to 185m above sea level and is characterised by an aeolian-alluvial plain rising to the foothills of the Karatau Mountains to the northeast. The Syrdarya River is the largest in southern Kazakhstan. It originates in the Kyrgyzstan highlands and flows through the Republic of Tajikistan ("**Tajikistan**") and Republic of Uzbekistan ("**Uzbekistan**") and then into Kazakhstan to the endorheic Aral Sea. The river often runs dry before reaching the Aral Sea due to over abstraction for agriculture in the upper and middle reaches and the absence of effective inter-country water sharing agreements. The river is recognised as being moderately polluted, with elevated levels of copper, zinc, and hexavalent chromium, along the length of the river (Water Quality in the Amudarya and Syrdarya River Basins Analytical Report, undated: http://www.cawater-info.net/water_quality_in_ca/files/analytic_report_en.pdf.) The prevailing sources of pollution are unknown but are assumed to be industrial activities in the catchments upstream of Kazakhstan. The river is heavily used for irrigation throughout the Kyzlorda Region.

Near the ISR mines in the Syrdarya basin, the Syrdarya River is large and perennial. The highest flows (300m^3/s to 1,000m^3/s) follow the spring snow melt (May – June). The operations are located on northern and southern sides of the Syrdarya River at some distance from the river (generally at least 5km). The exception is the Irkol deposit area, which extends across both sides of the river channel. Mining is currently only taking place on the north bank. Expansion of mining operations to the south is not under consideration in the LoMps in this report. Future development to the south of the river would be subject impact assessment and permitting.

The area around the Irkol deposit is used for livestock grazing. There is no arable cultivation, and the only residential dwellings are cattle herders' temporary summer huts.

The river in the Irkol deposit area is classified a water conservation zone. The Ministry of Agriculture Order No. 19-1/446 as of 18.05.2015 defines a water conservation zone as an area surrounding the river (up to 35m from the riverbank) where special requirements may be imposed for water protection (as a precaution against water contamination and water depletion). According to the Water Code (Article 119), the lands in the water conservation zone can be used by both legal entities and the public but will be a subject to special control. The water quality upstream and downstream of the Irkol operation is being monitored for radiation parameters by Semizbai-U LLP and is reportedly within an acceptable range.

Figure 10-1: Location of the Company's ISR Mining Operations in the Southern Part of Kazakhstan



At Block Kharassan 1, North Khorassan, there is a manmade canal about 3km to 4km to the north of the mine area that carries drainage from rice fields are at least 20km away.

The Zarechnoye mine is 200km to the south of the other ISR mines in the Syrdarya basin. It is in the Kyzylkum desert, a sand-clay plain that extends southwards to Uzbekistan and Turkmenistan and is characterised by sand dunes and salt flats. The Syrdarya River is located 50km to the east of Zarechnoye.

Land coverage in the Syrdarya basin is predominantly semi-shrub pastureland and tugai forest in the flood plains. Protected species distribution data cited in impact assessment reports for the mines (Otsenka Vozdejstviya na Okruzhayushchuyu Sredu reports: “**OVOS**”) indicate that protected tulip species and Central Asian endemics could be present around the Karamurun and Kharassan deposits. Animal species that could be present are desert or semi-desert species including saigas (antelope), gazelles, wild boars and small rodents. Larger species are reportedly rarely seen. Birds are diverse during the spring-autumn migration (up to 150 species).

The Zarechnoye mine is in an area known for its conservation of a rare bird (MacQueen's bustard or Chlamydotis macqueenii). The Arys Karaktau Nature Reserve of 404,000ha was formally established only a few months before Zarechnoye commenced operations. It is recognised as a reserve on the Bird Life International website. The key objective of reserve is to preserve the breeding grounds and stopover resting places for MacQueen's bustard, though other birds and animal species are monitored and observed. The conservation programme is currently being implemented by a working group that includes the Kazakhstan conservation agencies, World Wildlife Fund Central Asian programme and a research centre from the United Arab Emirates. Mining is not considered to be threat to the reserve by Bird Life International and controlled hunting of the MacQueen's bustard is reportedly allowed within the reserve. The Zarechnoye concession overlaps the boundaries of the nature reserve. SRK notes that an Ordnance from the Prime Minister dated 2005 requires authorities consider the boundaries of the reserve with respect to the Zarechnoye deposit. The relationship between the Zarechnoye mine, the state authorities and the ‘users’ of the reserve is reportedly positive, and the mine considers there to be no conflict of interest. SRK understands no specific requirements are currently imposed on the mine as a result of the proximity of this reserve.

RU-6 LLP’s operations are located next land used for crop cultivation (generally rice or other grain fields), as well as livestock grazing. The vegetation around Karamurun is monitored for radiological parameters every year to confirm the mine is not impacting on farm produce. This is done in partnership with a Non-Governmental Organisation (“**NGO**”) called the Nuclear Society of Kazakhstan (“**NSK**”). The NSK report dated 2017 assessed groundwater (radiation and heavy metals), soil (radiation and heavy metals) and vegetation/agricultural produce (radiation and nitrates, sulphates and phosphate) in Shieli, Akmaya and Bidaykol at locations agreed with the community. Radiation monitoring included gamma, alpha and beta testing. There were no exceedances of standards identified except for two minor elevated iron readings in Shieli.

The Zarechnoye deposit is more than 50km from the nearest human settlement (direct line) and the land around the deposit is only used for very low intensity livestock farming, mainly sheep. At some distance from the current mining operations, there are a number of artesian wells drilled early in the 19th century, that are used for livestock watering (the closest is 17km and the furthest is 80km). Access to these is in no way restricted by the mine. The wells have been measured in the past by the mine in association with NSK for uranium content, along with a number of groundwater monitoring sites in the nearest villages. The NSK confirmed there is no impact from mining.

Goods are transported to the Zarechnoye operation via road by trucks from Timur railway station, which is approximately 90km from the site.

No sites of archaeological or cultural significance are located near the deposits, except at North Khorassan 2 where a graveyard and mosque are located at the north-eastern corner of the concession. Access to these are not restricted by the mine, the area is not directly impacted by operations and the mine occasionally maintains the road to these sites.

10.2.2 ISR Operations in the Shu-Sarysu Basin

The operations in the Shu-Sarysu basin are identified in Table 10-1 and their locations are shown in Figure 10-1.

With the exception of Inkai and Inkai 4 which are located 6km and 12km from the nearest settlement (Taikonur), the mines are more than 30km from the nearest community (Table 10-1).

The climate of the Shu-Sarysu River Basin is an extreme continental climate. The air temperature averages +23°C in summer (maximum +40°C in July) and -15°C in winter (the minimum is -35°C in January). Precipitation does not exceed 140mm per year. The winds blow predominantly from the northern and north-easterly directions and almost continuously. Strong winds prevail, averaging 3.8m/s to 4.6m/s. Dust storms are common.

Like the Syrdarya River, the Shu River originates in the Kyrgyzstan highlands. It drains westwards towards the Sarysu River before disappearing into steppe near the Inkai and Inkai 4 ISR operations. The river splits into a series of saline ponds during the dry season. River flow is highest following the spring thaw (May-June).

The Shu River divides the Shu-Sarysu basin into northern and southern parts. The sandy Moinkum desert extends over the southern part and features small sand dunes and salt pans. The Betpak-Dala clay desert extends over the northern part and continues for some 200km northwards of the Shu-River.

The Shu-Sarysu basin is sparsely populated largely because the environment is harsh and water resources are limited. The mainland uses in the Shu-Sarysu basin are nomadic livestock grazing and uranium mining. The livestock includes cattle, horses, camels and karakul sheep. Reportedly, the livestock farmers travel vast distances over the Moinkum and the Betpak-Dala deserts, returning to the Shu River in spring and autumn. All of the uranium mining in the basin is by the Company's ISR mines identified in Table 10-1. The night lights of the ISR operations reveal that they cover large areas. However, at day it appears as if the operations are isolated because the extensive well fields blend into the landscape and are not visible from a distance.

The South Moinkum (Southern Part) and Central Moinkum, Southern Moinkum (Northern Part) and Tortkuduk operations extend over the Moinkum desert. JV Katco LLP uses vehicles safety flags at the latter two operations because the undulating dune terrain affects vehicle visibility. Vegetation in the Moinkum desert is dominated by desert shrubs (Haloxylon persicum, Kochia prostrata, Calligonum), with reeds (Phragmites and Tamarix) in riverine areas and species such as Agropyron, Festucca and Artemesia in the large spring flood plain. Fauna is typical of desert and semi-desert environments.

Small watercourses drain the Karatau Mountains to the south of the Moinkum desert and then, like the Shu River, disappear into the steppe. Settlements are located close to the mountains to the south and the Shu River, with the intervening desert being remote and sparsely populated.

The operations in the Betpak-Dala desert to the north of the Shu River include Uvanas, Akdala, Eastern, Central and Western Mynkuduk, Block 1 Inkai ('a', 'b' and 'c') and Block 4 Inkai. In addition, there is the Zhalpak trial mining operation about 70km north of the Uvanas operation. The Betpak-Dala desert is a flat to gently rolling plain with elevations ranging from 220mamsl to 300mamsl. The soils are mainly brown sandy deserted-steppe soils with a high content of copper and arsenic. Vegetation is represented by saxaul (Haloxylon) and saltwort communities and the fauna is represented by desert and semi-desert species. Large mammals include saiga, goitered gazelle and wolves, and small mammals include foxes, hares, jerboas, gophers. There is a wide variety of bird species as the paths of a number of annual migrations intersect the region.

Several rare species have distributions that overlap with the deposits, including tulips, mammal species and bird species. Detailed habitat maps have not been prepared for any of the mines in the Shu-Sarysu basin and formals assessment of the occurrence of critical habitat in the areas disturbed by mining have not been undertaken. This is discussed further in Section 10.6.

10.2.3 Semizbai ISR Mine

The Semizbai deposit is located in north Kazakhstan, 300km north of Astana and less than 200km from the Russian border. The mine site straddles two provinces, the Akmola and North Kazakhstan Provinces. Approximately 75% of the deposit area and over 80% of uranium reserves are in the Ualikhanovsky district of the North Kazakhstan Province, and the remainder in the Enbekshilder district of the Akmola Province.

The climate at Semizbai is sharply continental with hot summers, severe winters, and large temperature fluctuations during the day. The average monthly temperature is +18°C to 22°C (maximum +35°C) in summer and -17°C to 20°C (minimum -44°C) in winter). Average annual precipitation is around 300mm, most of which falls as rainfall in summer. Strong winds are frequent.

The mine site is in the Semizbai depression on the north-eastern edge of the Kazakh highland. The relief of the area is largely flat with a gentle slope to the north and east with elevation ranging from 90m to 140m. Vegetation is sparse and comprised mostly of low shrubs and grasses with patches of small trees. Surface water is limited to shallow marshes, saline lakes in natural depressions and ephemeral streams that flow following spring snow melt and summer rain. More permanent lakes to the east are highly saline and unsuitable for domestic, farming or industrial use. Underground waters in the deposit area have high mineralization (from 2g/l to 20g/l).

The area of the deposit is one of the least economically developed in Northern Kazakhstan. The connection between the nearest industrial centres and regional centre of Ualikhanovo is poor. The main occupation of the local population is livestock grazing and grain farming. There is a farmstead 15km from the site that has a shallow aquifer water well (15m) for domestic and farm use. Two abandoned villages within 50km of the mine, Kirovo and Koitas, were reportedly abandoned before the mine was developed as part of a voluntary move to Stepnogorsk.

10.3 Legal and Regulatory Framework

The legal and regulatory framework within which the Company operates is described in Section 4 Legislative Environment And Mining Title of this report which includes details in respect of: exploration; mining; environmental regulations; mine closure; Land Code land use regulations; water use code; atomic industry and radiation safety requirements; labour protection and occupational health and safety; and energy saving law. In addition, Section 4 includes specific details relating to the status of the Company’s agreements (Mining Contracts) and are therefore not repeated herein. Notwithstanding the foregoing and given the focus on environmental and social liabilities, details relating to these items are repeated below.

10.3.1 Subsoil Law and Subsoil Code

Mining law has been updated recently; the “**Subsoil Law**” (№291-IV 24 June 2010, amended 24 May 2018) was superseded by “**Subsoil Code**” on 29 June 2018. The Subsoil Code provides that previously issued Mining Contracts will remain in force.

Permission to mine is given by means of a mining contract, with a limited validity period. At the end of this period, a new contract must be arranged, or the site must be handed back to the Government.

Depending on the category of minerals there are three Competent Authorities, which are the Ministry of Investment and Development (solid minerals), Ministry of Energy (oil, gas, coal and uranium) and regional akimats (sand and clay). The Ministry of Investment and Development also supervises the mining industry through its sub-ordinate Committee on Geology and Subsoil Use (the "**Geology Committee**").

Mining contracts in Kazakhstan generally contain requirements related to environmental and social aspects. These include general statements about the need to meet legislative norms and specific requirements pertaining to:

- Annual payments for the social and economic development of the region and its infrastructure (amount varies depending on contract);
- Annual investments into education of employees that are citizens of Republic of Kazakhstan, generally in the order of 1% of annual operating expenditure;
- Annual financing of research and development works of Kazakhstan producers of not less than 1% of annual operating expenditures; and
- Annual payments to the liquidation fund (amount varies depending on contract).

10.3.2 Specific Requirements for Closure

The Subsoil and Subsoil Use Code provides for application of a retrospective effect to some elements of mining contracts executed prior to its effective date, including liquidation requirements. Detail on how this retrospective effect will apply is not yet available. It is therefore appropriate to discuss the requirements of the both the repealed and the current mining law, specifically:

- The recently repealed Subsoil Law (Law № 291-IV, 24 June 2010, amended 24 May 2018) and associated Rules for Mine Closure and Conservation (Rule № 634 06 June 2011, amended 27 February 2015); and
- The Subsoil Code (№ 156-VI4 June 2018) and the associated Instructions for developing a liquidation plan and a methodology for calculating the approximate cost of liquidating the consequences of operations for the extraction of solid minerals (Decree № 386 28 May 2018).

The repealed Subsoil Law requires that mines are closed when mineral resources are depleted or 'conserved' when mining operations are terminated (for example when the contract has expired). According to Article 111 of this Law, closure or conservation must be carried out in accordance with a plan designed by an authorised engineering company in the field of environmental protection and funded from a liquidation fund. Contributions to the liquidation fund, held by a bank incorporated in Kazakhstan, are made by the mine operator. At the time of closure or conservation, the mine operator can use the funds with the permission of the competent authority. The terms of payment to the fund (the frequency and amount of payments) are established by the Mining Contract. If the closure cost exceeds the fund's savings the mining operator must cover the closure cost.

Closure or conservation work is considered complete after official acceptance of this closure plan by a commission of competent authorities in the fields of environmental protection; mineral resources management; industrial safety; sanitary-epidemiological service; land management services; and local authority. The certificate of acceptance of closure or conservation work will be issued by the Environmental Protection Authority (the "**EPA**"). The GoK can decide that the operation should continue after the current Mining Contract completes its mining. In this case, the mining operator's obligations for implementation of the closure program will be waived and they will waive all rights to the accumulated liquidation fund.

The Subsoil Code has introduced new requirements regarding closure and financial assurance for closure. According to Article 54 of the Subsoil Code, mines and associated auxiliary facilities must be closed when the term of right for subsoil use has expired. Liquidation and reclamation work can be carried out during life of mine to relinquish the portion of the land and lower the cost of liquidation.

Under the Subsoil Code, the aim of the liquidation is health and safety of the population and environmental protection. The associated Instructions for planning and cost estimation are founded on this aim and require an objectives-based approach to liquidation planning. The liquidation aim is supported by principles that guide the selection of clear and measurable liquidation objectives for all project components. For each liquidation objective, subsoil users have to propose a set of liquidation options that could achieve the objective and a selected liquidation activity is chosen from these options. Liquidation criteria measure whether the selected activity achieves the specific objective.

The Subsoil Code requires financial assurance for liquidation is provided to cover 100% liquidation costs by means of a guarantee, bank deposit and/or insurance. The mine operator can use the funds for its closure activities with the permission of the competent authority.

The following legislation also has requirements pertinent to closure (relating to clean up of pollution, remediation of disturbed land and revegetation): the Environmental Code (Law No 212-III, January 2007, as amended); Instruction for land reclamation projects development (Decree №346, 17 April 2015); the Land Use Code (Law No 442 II ZPK, 20 June 2003, as amended); the Water Use Code (Law No 481, 09 July 2003, as amended); and the Forest Use Code (Law № 477-II 08 July 2003, as amended).

10.4 Primary Approvals held by the ISR Operations.

The primary environmental approvals and radiation licences held by the ISR operations are presented in Table 10-2. In addition, the ISR operations also require a licence for handling of sulphuric acid that is considered to be essential. This is a precursor licence issued under the Law “On Narcotic Drugs, Psychotropic Substances, Their Analogues and Precursors and Measures to Counteract Their Illicit Trafficking and Their Abuse”. The precursor licence is issued by the Ministry of Internal Affairs, through the Department for Combating Drug Trafficking and Drug Control.

SRK has also been informed by the Company that all ISR operations have all the necessary primary approvals for continued operations and that these remain valid as of 31 December 2021. The ISR operations are also subject to frequent state inspections as outlined below. Recently Kazatomprom-SaUran LLP undertook trial mining operations at the Zhalpak deposit under contract to ME Ortalyk LLP, the holder of the mining contract. The environmental permit for the trial mining has been issued to the Kazatomprom-SaUran LLP, as the operator of trial mining. The production build-up to achieve the rated production rate of 900tU is scheduled to commence in Q4 2022 and planned to be attained by 2030. SRK understands that all relevant approvals (e.g., OVOS) have been obtained and that there are no further substantive revisions or approvals required in order to proceed with the development programme as outlined herein. Budenovskoye LLP recently completed various technical studies to support the construction of a 6,000tU mining and processing operation at Budenovskoye Block 6 and Block 7. SRK understands that all technical studies including the OVOS has been completed and that all primary approvals have been secured to enable commencement of the planned production build up in Q4 2022 with name plate capacity of 6,000tU projected to be attained in 2026.

Table 10-2: Primary ESHS Approvals

#	Company	Deposit	Primary permits and licenses (note that some operations do not need all of the named approvals, the number and expiry date of the approvals is given)		
			Emissions permit	Licenses to operate or provide services to a radiation hazardous facility	License for handling precursors
1	JV SMCC LLP	Akdala Block 4, Inkai	KZ09VCZ00086365 31.12.2018	15005197 18.03.2020 15004797 12.03.2020	14015339 10.10.2019
2	Semizbai-U LLP	Semizbai	KZ59VCZ00144538 07.11.2019	15006612 10.04.2020 15006611 10.04.2020	14006526 13.09.2019
		Irkol	KZ08VCZ00146232 31.12.2019		
3	Appak LLP	Western Mynkuduk	KZ26VCZ00035716 31.12.2018	15008290 04.05.2020	17010701 13.062022
4	JV Inkai LLP	Block 1 Inkai (a), (b) and (c)	KZ91VCZ00123107 31.12.2022	15001154 23.01.2020 15001155 23.01.2020 15001161 23.01.2020	18005470 15.03.2023
5	JV Khorassan LLP	Block Kharassan 1, North Kharassan	KZ01VCZ00147134 31.12.2026	15005616 30.03.2020	13000467 18.01.2018 (issued to Kyzylkum LLP)
6	Baiken-U LLP	Block Kharassan 2, North Kharassan	KZ65VCZ00126388 27.01.2020	15002424 06.02.2020 15002425 06.02.2020	18005471 15.03.2023
7	JV Zarechnoye LLP	Zarechnoye	KZ25VCZ00061439 26.08.2018	14017816 26.11.2019 14017845 26.11.2019	15022800 31.12.2020
8	JV Katco LLP	Southern Moinkum (Northern part) Tortkuduk	KZ30VCZ00128279 31.12.2021 (Southern and Tortkuduk mines) KZ69VDD00067327 termless (Shanyrak mining camp) KZ18VDD00067954 31.12.2021 (Gathering ponds, filtration fields of Southern and Tortkuduk mines and Shanyrak mining camp)	15005057 16.03.2020 14019179 19.12.2019 14019180 19.12.2019 14018897 15.12.2019	16016219 21.10.2021
9	Karatau LLP	Block 2 Budenovskoye	KZ06VCZ00077301 18.12.2018	15015899 26.01.2020 15001330 26.01.2020	16007906 14.05.2021
10	JV Akbastau JSC	Block 1 Budenovskoye Block 4 Budenovskoye Block 3 Budenovskoye	KZ53VCZ00142124 31.12.2020	15002067 04.02.2020 15002066 04.02.2020 -	15015651 25.08.2020
11	Kazatomprom-SaUran LLP	Uvanas Eastern Mynkuduk	KZ66VCZ00131705 31.12.2018	16000551 18.01.2021 16000566 18.01.2021 16000549 18.01.2021	16011551 19.07.2021
		Kanzhugan South Moinkum (Southern Part)	KZ82VCZ00145482 31.12.2026		
		Central Moinkum	KZ12VCZ00145481 31.12.2026		
12	RU-6 LLP	Northern Karamurun Southern Karamurun	KZ21VCZ00144737 29.11.2018	15003287 17.02.2020 15003286 17.02.2020 15003285 17.02.2020	
13	ME Ortalyk LLP	Central Mynkuduk	KZ12VCZ00062255 31.12.2018	15019372 02.11.2020 15009084 19.05.2020	17005428 31.03.2022
		Zhalpak	KZ11VCZ00142298 31.12.2018		
14	Budenovskoye LLP	Budenovskoye Block6/7	Development Project	Development Project	Development Project

10.4.1 State Inspections

A number of state inspections are carried out by regulatory authorities to verify compliance with environmental, health and safety and radiation protection regulations. The frequency and procedure for conducting inspections is regulated by the “Commercial Code” (№ 375-V of 29th October 2015, with amendments as of 03.07.2017). The Commercial Code specifies three types of inspections: scheduled; unscheduled; and selective. Scheduled inspections take place based on the schedule published semi-annually on the General Prosecutor’s website: http://prokuror.gov.kz. The frequency of the scheduled inspection is based on an assessment of the degree of risks relating the threat to life, public health and the environment.

State inspection bodes that inspect the mines are identified below:

- Environmental state inspections are undertaken by the Committee for Environmental Regulation, Control and State Inspection (of the Ministry of Energy);
- Health and safety inspections are carried out by the Committee for Industrial Development and Industrial Safety (of the Ministry of Investment and Development) and regional inspection of labour protection (of Ministry of Labour and social protection);
- Radiation safety inspections include inspections by the Committee of Atomic and Energy Supervision and Control (of Ministry of Energy) and the Committee for Public Health Protection (of Ministry of Health); and
- Fire safety inspections are carried out by the Emergency Committee of the Ministry of Interior.

Safety violations found during safety inspections may result in imposition of fines on company management personnel receiving administrative sanctions (fines) on the company's officers.

Labour inspectors can suspend operations if there are life threatening safety violations and can suspend employees who do not have safety training. Criminal proceedings may be instituted against management personnel where safety violations lead to serious injury or death.

10.5 Health, Safety and Environmental Management Systems

Sustainable development practices have been prioritized and reported on by the Company for over a decade. For many years, the Company's Integrated Annual Reports ("**IAR**") have summarized the key aspects of its sustainability, corporate social responsibility, health and safety, and corporate governance results, highlighting an increasingly proactive and transparent approach to what now falls under the pillars of ESG. In 2019 the Company began reporting results in alignment with the United Nations' sustainable development goals, improving disclosure for investors interested in ESG factors.

As the world's largest uranium mining company and a nuclear industry leader, Kazatomprom recognizes the impact of its businesses on both local and global social development and works to address some of the key global challenges related to the environment, climate change, clean energy generation, and the social conditions in the regions where it operates. Sustainable development is a fundamental component of the Group's Development Strategy and by extension, ESG-related targets and objectives are therefore integral to the Company's plans, including:

- reducing the environmental impact of subsidiaries, associates and joint ventures;
- environmental protection, including effective water and land resources management, ecosystem and biodiversity conservation, and the reduction of emissions;
- ensuring resources are extracted in a way and at a rate that minimizes subsoil impact;
- increased oversight of energy and resource management;
- growth of socio-economic prosperity in the regions where the Company operates; and
- facilitation of access to affordable, reliable, sustainable and modern energy sources, and enhancement of energy security.

With an increasing focus on "green" priorities, Kazatomprom's ongoing improvement of its sustainable development practices is a dominant factor ensuring the long-term stability and competitiveness of the Company, as well as its ability to create incremental benefits for all stakeholders, resulting in a positive contribution to the development of the country, society in general, and the uranium industry. Throughout 2021, the Company continued taking steps to bolster its ongoing transition to a risk-based approach in sustainability management to meet the demands of transparent ESG reporting, which involves:

- identifying and assessing risks that have a direct impact on the Group's long-term financial performance and implementing measures for effective management of those risks;
- enhancing sustainability risk management practices and developing a risk culture to identify new opportunities to improve performance and gain significant competitive advantages;
- adapting intra-company reporting processes to provide reliable and accurate ESG-related metrics for future disclosure, allowing for improved assessment and evaluation by external parties;
- advancing the Company's ESG reporting and sustainability processes to meet accepted global standards, allowing recognized third-party providers to apply a corporate ESG rating

to Kazatomprom.

In 2021, Samruk-Kazyna JSC, Kazatomprom's majority shareholder, engaged an independent consultant to conduct corporate governance diagnostics in order to assign a corporate governance rating to the Company. According to the results of diagnostics, the Company demonstrated high level of corporate governance and was assigned the Corporate Governance Rating "A" (in 2020 "BBB").

Environmental protection at the Company's operations is governed and implemented through a range of key policies, management structures, monitoring and reporting functions which are reflected in the Company's public reporting in accordance with the Global Reporting Initiative Standards (specifically GRI 102-11; GRI 413-1; GRI 307-1; GRI 103-2; GRI 303-1; GRI 303-3; GRI 102-48; GRI 303-2; GRI 303-4; GRI 306-1, 306-2, 103-1, 103-2; GRI 306-3; GRI 103-1; GRI 304-1, 304-4, 304-2; and comprise the following key areas:

- environmental protection management including: ESAP Roadmap implementation; monitoring and control, certification; environmental protection training; investment in environmental protection; environmental assessment of supplies;
- emissions;
- water resources including consumption, withdrawal and discharge; and
- waste management including solid low radioactive waste management ("**SLRWM**"), biodiversity.

Table 2-14 provides a summary of the key historical Group environmental and social governance statistics as reported from 2015 through 2021. During 2021 the Company indicated that:

- all production facilities of the Group have the environmental management systems and energy management systems in place that are ISO 14001 and ISO 50001 certified;
- an independent audit certified that the Group complies with the requirements of international standards ISO 14001:2015 (environmental management systems) and ISO 45001:2018 (occupational health and safety management) when organizing export deliveries of natural uranium compounds;
- the Group's total cost of environmental protection measures amounted to KZT964.6m and the Company paid KZT187,6m in emission taxes. The fines and economic sanctions for non-compliance with the requirements of environmental laws at the enterprises of the Group reached KZT12.4 million in general
- overall, emissions at the Group's enterprises reduced by 3.3% in 2021, from 1,908t in 2020 to 1,845t in 2021. The reduction in emissions is associated with environmental protection measures implemented by subsidiaries and affiliates under the current emissions permits;
- the Group's companies actively use solar energy to generate electricity, thereby reducing air emissions resulting from the consumption of traditional fuels such as fuel oil and coal. The reduction in CO2 emissions amounted to about 3% of the total emissions. The annual electricity output generated by the Group's solar photovoltaic plants is 3.34MWh. The generated electricity is used for own needs, allowing annual savings of KZT90m;
- total water withdrawal reduced by 3.2% in 2021: from 10.5Mm^3 in 2020 to 101Mm^3 of water in 2021. In the reporting period, the water withdrawal structure did not change. Groundwater accounts for 84% of the total amount of withdrawn water. 0.06% of water is taken from surface sources, and we are witnessing a constant reduction in water intake from surface sources. Water withdrawal from municipal and other water supply systems increased by

40%, from 1.1Mm^3 to 1.6Mm^3. The increase in water consumption was associated with an increase in uranium mining in 2021. The Company endeavours to reduce the volume of water it uses in production and to this end, some of enterprises use closed water cycles. In 2021, the volume of recycled and reused water amounted to 50 '000m^3, down by 0.6% against 2020;

- wastewater discharged by the Company reached 4.8Mm^3, down by 7.9% compared to 2020.
- as of the end of the 2021, the total amount of accumulated waste made 1,017t, down by 10% compared to 2020. Industrial waste account for 87.9% of the total waste volume and in 2021, the total volume of industrial waste decreased by 10.3%; and
- the total area of land owned, leased and managed by the Group is 51,924ha and there are no nature reserves or other specially protected natural sites on the territory of Kazatomprom's uranium deposits or near their borders.

As part of the continuing work to improve the system for ensuring industrial safety and implementing the 2018 through 2028 development strategy, the Company completed the following in 2021:

- analysis of the frequency and nature of detected hazardous conditions, hazardous actions, potentially hazardous situations, and Near Misses to determine the adequacy of the corrective measures taken;
- improvement of the survey methods used to gauge the level of conscious observance of industrial safety requirements by employees and managers at all levels;
- the company was certified by TUV International Certification (Germany) for compliance with international standards ISO 45001 (HSE management systems) and ISO 14001 (environmental management systems);
- implementation of the Environmental and Social Action Plan (ESAP) continued, aimed at improving environmental and social stability in the regions where the Company operates;
- the practice of stopping unsafe work by workers (STOP cards) was introduced across all operations;
- quarterly reports on health and safety were updated, including sections for contractor safety; and
- comprehensive measures were taken to combat COVID-19 at the Company's enterprises.

Related activities under the 2018-2028 Development Strategy are continuing into 2022 comprise:

- automation of production industrial safety reporting processes;
- development and implementation of a methodology for continuous identification of hazards and risks in the workplace – 5 safety steps;
- continued implementation of the ESAP roadmap; and
- improvement of approaches to health and safety of workers.

10.5.1 Climate Action Strategy

Following global priorities, sharing a national position and striving to contribute to the implementation of the provisions of the Paris Agreement, the Company considers the action against climate change as one of its priorities. To this end, the Company is developing a Strategy for decarbonisation and achieving carbon neutrality until 2025, 2030 and 2060, which will include a Program and Action Plan to reduce GHG emissions in the context of each subsidiary and affiliate of the Company for the period up to 2025, 2030 and 2060. Low-carbon initiatives of the Company comprise:

- transition to low-carbon energy sources (gas);
- energy production from renewable sources – solar collectors, heat pump units, wind turbines are installed at the Group's production sites; and
- regular monitoring and control of greenhouse gas emissions (Scope 1)

Monitoring and recording of greenhouse gas emissions is carried out by the Industrial Safety Department, which reports directly to the Chairman of the Management Board of Kazatomprom. The Company also monitors the state of technological facilities and environmental objects, as well as introduces the best available technologies, resource and energy saving technologies. The Company discloses data on greenhouse gas emissions, which is in line with the recommendations of the Task Force on Climate-related Financial Disclosures ("**TCFD**"). The Company is working to deepen the disclosure of climate-related risks and opportunities under the TCFD methodology in future reporting periods.

Greenhouse gas emissions from operations of subsidiaries and affiliates are mainly related to auxiliary processes associated with the main production. The main sources of greenhouse gases are:

- boiler installations for heating industrial and residential premises;
- vehicles for transportation of goods and personnel;
- compressor units for supplying compressed air to technological processes;
- diesel generator sets to provide emergency power supply; and
- other sources.

The coefficients used for GHG emission calculations comply with the Guidelines for the calculation of greenhouse gas emissions from thermal power plants and boiler houses and the Guidelines for the calculation of greenhouse gas emissions into the atmosphere from motor transport enterprises issued by the Ministry of Environment and Water Resources of the Republic of Kazakhstan.

- the greenhouse gas emissions from the Company's operations amounted to 107tCO2e in 2021. The increase in GHG emissions was associated with an increase in fuel consumption by vehicles, an increase in drilling and the resumption of other works due to the ease of quarantine measures;
- the amount of fuel and energy resources saved as a result of energy saving and energy efficiency measures in 2021 amounted to 170,000GJ. The Company increased its energy consumption by 8% compared to 2020, due to increased production, extraction, and processing of raw materials
- the consumption of fuel and energy resources ("**FER**") at the Group's enterprises increased by 9.4% compared to 2020. This was due to an increase in production, extraction and processing of raw materials. At the same time, specific energy intensity decreased by 1.9% in 2021.

Actions are planned for 2022 to assess products' carbon footprint with the development of decarbonisation and carbon neutrality programme for the Company's enterprises. The solution to the issue of developing renewable energy sources and reducing greenhouse gas emissions for Kazatomprom enterprises is the further development of energy saving and energy efficiency, the main directions of which are:

- rational distribution and use of electricity, lighting, heating, hot water supply and ventilation systems;

- measures to modernize electrical equipment, replacing them with energy-saving ones; and
- implement the process of ensuring the proper technical condition and rational operation of power equipment and power plants, ensuring the proper technical condition of power equipment and power plants.

As renewable energy sources a number of the Company's enterprises are gradually installing solar collectors for hot water supply and heat pumping units for heating and hot water supply. These measures will reduce the cost of diesel fuel and consequently reduce greenhouse gas emissions. In 2022, activities are planned to design and install a 100kW wind turbine generator at the Yuzhny Inkai mine, JV SMCC LLP; work is underway to re-equip the boiler plants of the shift camp of Karatau LLP with the conversion of water heating boilers from diesel fuel to liquefied gas with commissioning in Q2 2022.

The principal plans related to environmental protection outlined for 2002 and the medium term comprise:

- establishing key performance indicators for the heads of subsidiaries and affiliates focused on the implementation of the ESAP Roadmap bullets;
- continuing training employees of subsidiaries and affiliates responsible for environmental protection, in particular: production and consumption waste management, biodiversity assessment at uranium mining deposits, environmental monitoring at enterprises;
- conducting research to explore the impact of Kazatomprom’s operations on the environment and the local population (Environmental and Social Research Programme, ESRP) and the Zero Waste Programme of Kazatomprom, seeking to develop measures to reduce and minimise production and consumption waste generated at the enterprises of the uranium mining industry;
- providing quantitative assessment of the carbon footprint of products, following the development of the Carbon Neutrality Programme;
- continuing the efforts of the internal group on planning the closure of production facilities and the decommissioning of the enterprises;
- complete the development of the environmental performance rating of the Company;
- implementing the corporate standard Methodological Guidelines on Liquidation Cost Estimate Calculation and Procedures for Regular Analysis of Current Liquidation Costs (measurement of asset retirement obligations (ARO))l
- implementing the standard Methodological Guidelines for Monitoring of the Impact on Ground and Underground Water in ISR Mining of Uranium;
- implementing the standard Guidelines for Assessment of Biodiversity at Uranium Deposits, Production Facilities and Adjacent Territories;
- conducting a second surveillance audit of the environmental management system (EMS), the health and safety management system (OHS&OHS) for compliance with the requirements of ISO 14001:2015 and ISO 45001:2018;
- implement the criteria developed for compiling the environmental rating of Kazatomprom enterprises;
- updating the standards on radiation safety: ST NAC 12.1-2010 Procedures for the Admission of Staff of Kazatomprom enterprises for Performing Radiation-hazardous Works and ST NAC 19-2016 Procedures for Organising and Conducting a Radiation Survey of the

Production Area Using the Gamma Ray Surveying;

- continuing efforts to create a database of the environmental monitoring system and the environment of uranium mining enterprises of Kazatomprom; and
- updating the corporate standard Methodological Guidelines for Management of Radioactive Waste Prior to their Disposal.

The operations do have HSE management systems, and these are integrated with quality management systems. This section outlines features of these management systems.

10.5.2 Certification

The management systems at the ISR mines are certified to the ISO 14001 environmental management standard, the OSHAS 18001 occupational health and safety, the ISO 5001 energy management standard and the ISO 9001 quality control standard. The ISO 14001 and ISO 9001 standards were updated in 2015 and as of 2020 all production facilities of the Group have environmental management systems and energy management systems in place that are ISO 14001 and ISO 50001 certified;

Documentation on training, internal auditing, allocation of responsibilities was evident at ISR mine sites that were visited by SRK. Risk assessments are undertaken and are used to inform operating procedures, action plans and emergency preparedness.

The Company recognizes that there are differences in the management systems of its various daughter companies, as these have been developed with guidance from different consultants and certification bodies, and that there are opportunities for improving alignment of these management systems.

In addition to certification the Company has also committed to the implementation of six (out of 17) priority UN Sustainable Development Goals, specifically:

- **SDG 3:** Ensure healthy lives and promote well-being for all at all ages;
- **SDG 7:** Ensure access to affordable, reliable, sustainable and modern energy for all;
- **SDG 8:** Promote sustained, inclusive, and sustainable economic growth, full and productive employment and decent work for all;
- **SDG 9:** Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;
- **SDG 12:** Ensure sustainable consumption and production patterns; and
- **SDG 13:** Take urgent action to combat climate change and its impacts.

10.5.3 Corporate Oversight

Following the IPO, the Company undertook a detailed reassessment of its management structure and capacity to address all aspects of sustainable development. The current structure no comprises three key levels:

- **Strategic Level** being where the Board of Directors provides strategic management and supervises sustainable development activities, considers issues and the results of strategic sustainable development activities. In this regard four distinct committees have been established comprising:
  - Audit Committee which audits procedures to ensure Company compliance with the requirements of legislation, ethics, and stock exchanges and supervises risks (including vis-à-vis sustainable development), the quality and accuracy of financial and non-financial information, and reporting,
  - Production Safety Committee which monitors and evaluates actions, appraises the

attainment of sustainable development goals and their efficiency, adopts remedial measures, implements a continuous improvement culture,
- Strategic Planning and Investment Committee which monitors changes in the economic environment and their impact on the Company's Development Strategy, provides recommendations on the strategic directions of the Company, and approves the investment and innovation activities,
- Nomination and Remuneration Committee which reviews and approves the appointment to the Board of Directors and Management Board, provides recommendations on the professional development of the members of the Board of Directors, the remuneration level for independent directors, and the HR policy of the Company;

- **Management Level** comprising a Management Board which controls and monitors strategic development activities, programmes and events, and monitors the attainment of sustainable development goals and KPIs and includes:
  - Sustainable Development Sponsor which controls, and monitors activities aimed at improving the sustainable development system and interactions with stakeholders,
  - Numerous departments which collectively develops sustainable development initiatives and activities and integrates sustainable development principles in key processes and aspects in a specific area of activity: Economics and Planning Department; Risk Management Department; Procurement Department; Development Strategy and Sustainable Development Department; IR Department GR and PR Department; Department of Scientific and Technological Projects; Industrial Safety Department; Human Resources Management Department; and Corporate, Governance Department
- **Operational Level** comprising the Mining Subsidiaries and other Group Companies which is directly responsible for operational management of specific sustainable development aspects; implements the sustainable development initiatives, programmes, plans, and actions assigned to it

The key HSE regulation documents include Kazatomprom's Policy for HSE, Radiological and Nuclear Safety, as well as the H&S Code, Unified Occupational Safety Management System. The documents are binding on all employees and contractors of the Group. The Management Board Chairman conducts quarterly meetings of the CEOs and executives of subsidiaries and affiliates to discuss the action plans that will help improve the health and safety culture in the Company as well as prevent accidents and injuries.

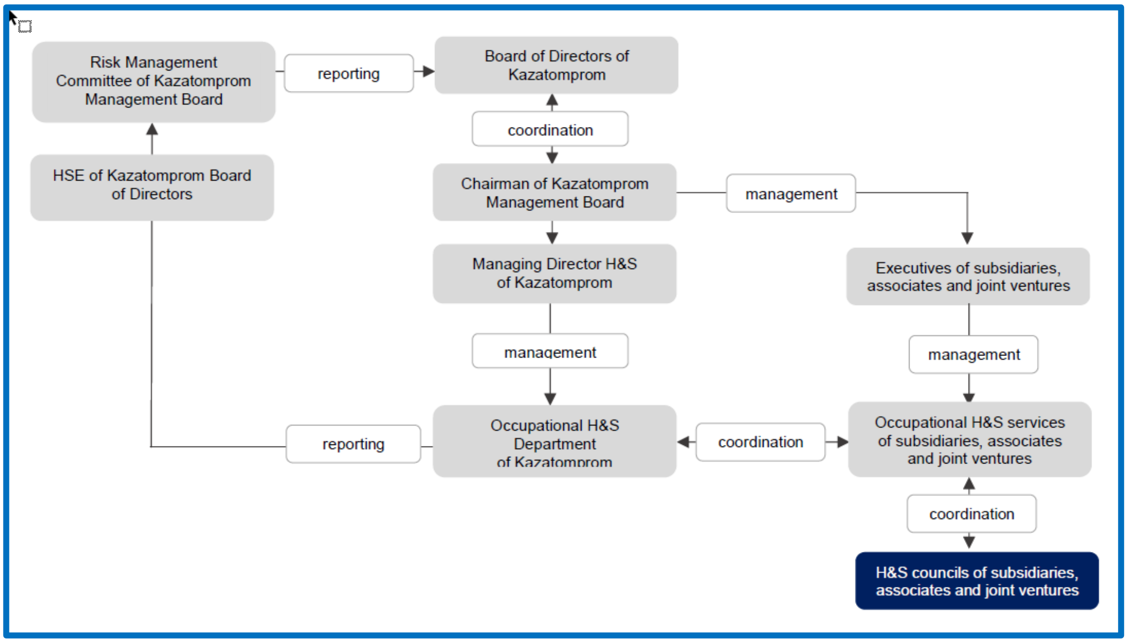
The HSE of the Board of Directors and the Risk Management Committee of Kazatomprom Management Board regularly review the results of all health and safety measures. The reports on H&S improvements and risk management are submitted to the Board of Directors for consideration and approval. The HSE Managing Director accountable to the Board Chairman is responsible for the overall coordination of the activities aimed at improving the H&S system in the Company and its subsidiaries and affiliates.

The H&S Department supervised by the HSE Managing Director is responsible for prevention of violations of H&S standards and rules, prompt response to incidents, as well as the monitoring, analysis and control of the H&S risks. All occupational H&S departments at subsidiaries and affiliates are subordinate to the CEOs. In 2021, the Company continued approving and expanding the functions and powers of the structural units responsible for H&S operational management at subsidiaries and affiliates.

Kazatomprom regularly analyses the structure of qualifications and competences of the H&S units of the Group. Following the analysis, the Company introduces the respective changes to remain in line with the requirements of national laws and the best world's practices and improve the H&S efficiency.

In 2021, TÜV International Certification conducted an audit of the Company's integrated H&S management system for compliance with ISO 45001 and ISO 14001 for the first time. The audit results confirmed the compliance of the Company's occupational health and safety management system with the requirements of international standards.

Figure 10-2: HSE Management System of the Group



The H&S risk management process is an integral part of the H&S management system, as well as of the corporate risk management system. Kazatomprom is actively working to prevent industrial injuries and occupational diseases, as well as to identify, assess, and minimize industrial risks.

All activities of the Group's enterprises are carried out in accordance with the fundamental regulatory and legal H&S documents. The main ones are the Labour Code and the Law of the Republic of Kazakhstan On Civil Protection. The Company also considers the requirements of a number of by-laws regulating the procedures for complying with the H&S requirements, in particular, the Rules for Ensuring H&S for Various Types of Activities – Geological Exploration, Mining and Processing of Uranium, Operation of Lifting Mechanisms and Pressure Vessels.

The above documents guide the procedures for investigating accidents and incidents at the Group's enterprises. The Company timely provides information regarding each lost time accidents in the workplace to the authorised government agency. In the case of group accidents or accidents with a severe injury (fatality), the Company is obliged to conduct a special investigation with the involvement of a governmental H&S inspector as required by the laws of the Republic of Kazakhstan. In accordance with the investigation procedures, Kazatomprom initiates an additional analysis of the accidents, using the Five Whys methodology to reveal the root causes of an incident.

The executives and heads of H&S services of subsidiaries and affiliates initiate meetings to review and analyse all the circumstances of the accidents that have occurred. Based on the results of the meetings, all subsidiaries and affiliates, in accordance with the notification procedures developed by Kazatomprom, receive quarterly information reports on injuries containing a detailed description of the accidents that have occurred, their root causes, and measures taken by the Company. Moreover, an information bulletin is issued and disseminated to all CEOs of subsidiaries and affiliates in case of an incident or accident.

The Company keeps a register of risks, with “occupational injury” being the major risk. To reduce occupational injuries, the Company develops and implements comprehensive measures to meet the established safety standards and constantly improve the level of H&S, as well as prevent occupational injuries. These comprehensive actions include:

- Developing measures to prevent the recurrence of accidents;
- Conducting regular inspections of the Group's assets for compliance with H&S regulatory acts;
- Regular informing of subsidiaries and affiliates about the results of the investigation of industrial injuries and providing proposals for the prevention of work-related injuries;
- Holding valid and up-to-date workplace certification, which means audits of working conditions and provision of suitable work-ware and protective equipment to employees of subsidiaries and affiliates;
- Implementing a corporate plan for the development of the H&S culture;
- Keeping records of potentially unsafe conditions, acts, and near-miss incidents at Kazatomprom companies (Near Miss reporting);
- Introducing behavioural H&S audits; and
- Ongoing use of the tool behavioural H&S audits.

In 2021, the Company conducted 14,100 behavioural audits with engagement of the Company’s managers and executives of subsidiaries and affiliates to minimize the risk of the human factor. Since 2018, the Company has been conducting behavioural safety audits. The main goal is to analyse the behaviour of employees at work (when they are performing production tasks) and thus to prevent the behaviour-related risks. Constant analysis and monitoring of data confirms that human factor is the most frequent source of risk at any production company. In addition, the Company provides strict control over compliance of the working conditions at workplaces and production sites with H&S requirements, as well as controls the technical condition of equipment, the availability of all necessary internal documents, including instructions, procedures and standards.

In 2020, Pandemic Risk was added to the corporate risk register. This risk is associated with the spread of SARS-CoV-2 and the start of COVID-19 pandemic. To ensure the safety of workers and the continuity of production during the pandemic, the Company continued managing this risk in 2021.

Kazatomprom has introduced a risk-based approach to improve the H&S system across the Company. As part of this initiative, the Occupational H&S Department of the Group has developed a register of functional risks, which includes the major occupational H&S hazards and risks. The register of functional risks is reviewed and updated annually. The risk-based approach also integrates an approach to planning and conducting inspections/audits. They are carried out as preliminary inspections/audits of the Company’s assets to identify the most dangerous production areas. The audit results help focus on the major risks, improve quality, and reduce the waste of time resources.

For corporate HSE audits, radiation protection, occupational health & safety and environmental management disciplines are represented on the corporate audit teams. Often, one member of the corporate audit team will be sourced from another Mining Subsidiary to facilitate learning across operations. The corporate audits cover:

- Conformance with legal requirements and relevant Kazakhstan standards;

- Conformance with the Company's internal standards; and
- Execution of management actions from the corporate annual reports and required by regulatory authorities; and
- Visual assessment of facilities at the operations.

The corporate audits aim to be constructive and are finalised with a meeting between the Company and the Mining Subsidiary's staff and signed agreement on the findings of the audit, which are documented in an audit report.

The corporate quarterly and annual reports on HSE performance are internal reports aimed at presenting a thorough and frank understanding on HSE performance in the organisation. The reports include information on incidents and accidents, inspections and audits, radiation doses, emissions, waste production and pollution payments. They acknowledge non-conformances recorded during inspections and audits and record how many of these have been addressed.

The corporate quarterly and annual reports on HSE performance are reviewed by the safety committee, before review by the board of directors. The safety committee will often add to the recommended management actions that are put forward for board approval. The approved management actions must then be implemented by the operations.

The corporate reports on HSE performance are also shared with all of the Company's operations so that the various operations can see the performance of their sister companies and learn from their experiences. Coupled with this, there is an annual HSE performance meeting attended by the heads of the operations, directors of joint venture companies and the Company's directors. The purpose of the meeting is to review successes and failures and to set the performance objectives for the next year. Reportedly, regulatory authorities are invited to attend this annual meeting and to report their observations made over the past year.

The safety committee was created in 2016 and is constituted of members of the board, experts qualified to advise the board and independent directors. There are currently two independent directors on the committee who are based in the United Kingdom. In addition to the above mentioned roles, the safety committee is also responsible for development and review of the Company's policy on labour, environment protection and radiation safety. It also advises the board on improvements to the corporate governance system pertaining to industrial, radiation and environmental safety. Information on the committee, the board members on the committee and the dates of committee meetings is readily available on the Company's website.

A number of corporate standards have been developed for radiation protection, occupational health and safety and environmental management. These standards are developed in consultation with regulatory authorities.

The Company has a Business Transformation Programme underway, which involves reformation of activities to achieve the strategic goals of the Company, to increase competitiveness and to make more profit at the same level of invested capital. One of the many projects implemented under this Transformation Programme was the KAP 20 Project on Complex Safety, which focused on radiation protection, occupational health and safety and environmental management. It involves development and refinement of corporate standards.

Most of the refinements pertained to occupational health and safety. The refinements include improved hazard identification and changes to safety culture that promote compliance and personal responsibility motivated by personal interests rather than punitive measures. Other refinements included improvements to training and safety instruction, improvements to the way production activities are organised and improvements to safety incident reporting. In addition, it involved introduction of new technologies that will automate some management system processes and facilitate real-time incident reporting and tracking of compliance.

Corporate control of waste management is recognised as a top management priority for the Company and in support of this the Company initiated the following standardisation in respect of:

- Standards for waste characterisation; and
- A waste control system that accounts for and monitors waste through all stages of handling from collection, through transportation and treatment/ decontamination, to final use and disposal.

As of December 2021, the Company's transformation portfolio consisted of: 5 projects and 3 events with one event specifically focused on implementing a safety culture development plan based on the Golden Safety Rules of the VISION ZERO international concept

Historical milestones recorded by the Company in respect of ESG focus comprised:

- 2011: Non-financial reporting standards were included into the Integrated Annual Report for the first time;
- 2017: 2017-2019 Sustainable Development Programme in the field of corporate and social responsibility was developed in 2017;
- 2019:
  - Sustainable Development Policy was elaborated and published,
  - the corporate function of sustainable development management was strengthened through the establishment of a dedicated unit within the Company's structure – Sustainable Development Management Unit,
  - the Integrated Annual Report included information on approaches to sustainable development management and the Company's contribution to achieving the UN Global Sustainable Development Goals,
  - priority UN SDGs and key sub-goals for each of the UN SDGs were identified;
- 2020:
  - for the first time, the ESG information in the 2020 Integrated Annual Report was independently assured in line with global best practices,
  - In-depth disclosure of GRI indicators; and
- 2021:
  - work on climate risk management began,
  - sustainable development-related risks have been defined,
  - the 2021 Integrated Annual Report includes key indicators of the UN Conference on Trade and Development (“**UNCTAD**”) Sustainable Development Goals
  - the Company successfully passed the first supervisory audit and confirmed its certificate from the TÜV International Certification (Germany) in accordance with the requirements of two international standards, ISO 45001 and ISO 14001
  - an energy management system compliant with the international ISO 50001 standard was implemented in all of the Group's companies. Energy audits are regularly carried out as part of the Group's energy management systems

The key plans identified for 2022 comprise:

- identification and assessment of climate risks;
- developing the Decarbonisation Strategy and achieving the carbon neutrality by 2025;
- development of mid-term Sustainability-related Programme;

- development of Policy on Human Rights;
- joining the UN Global Compact;
- expanding the list of GRI indicator disclosure;
- disclosure as recommended by the Task Force on Climate-related Financial Disclosures ("**TCFD**"); and
- independent ESG rating.

During 2018 the then five-man team in the corporate HSE department is effective but was stretched and needed to be significantly increased in SRK's opinion to meet the Company's then HSE aspirations and address recommendations made in this report. The department did not have sufficient capacity to handle the increasing volume of HSE performance data being collected from the operations. Historically, the department was only focused on data of importance to regulatory authorities. Following the IPO, the company embarked on a process of modernisation and capacity building which has culminated in a marked improvement in the public domain reporting as reflected in the Company's integrated annual reports. These now contain an extensive level of disclosure on sustainable development addressing the following key areas: sustainability management, socio-economic contribution; social responsibility; health and safety; climate change and energy efficiency; environmental protection; stakeholder engagement; transparent procurements; and science and innovations. These items are also supplemented by a specific annex which presents a range of ESG performance indicators for the past three years.

Notwithstanding the above and whilst both physical production, sales and financial reporting statistics are presented on a segmented and Mining Subsidiary, there is limited public data in respect of ESG reporting statistics for individual Mining Subsidiaries. Accordingly at this stage it is not possible to readily assess the individual performance of the Mining Subsidiaries relative to each other or to other operations globally, as such no direct benchmarking is possible at this stage in order to highlight areas which warrant particular focus in respect of defining the short and medium term ESG strategy.

10.5.4 Environmental Impact Assessment

As outlined above an approved OVOS is required for new projects and changes to operations. Numerous OVOS are completed for each of the ISR mines. In general, these documents based on limited environmental baseline data on climate, landscape and geomorphology, soils, radioactive characteristics, water, ecology and biodiversity and local communities and land use. They do however contain detailed project descriptions. The assessment focuses on defining targets to be applied in the environmental permits for emissions, water use and discharges, waste management.

There are no specific management plans associated with the OVOS, however, the OVOS makes recommendations for addressing identified impacts which are incorporated project designs and management system action plans.

10.5.5 Environmental Impact Management Measures

The main potential impacts of the ISR mines relate to surface disturbance, groundwater disturbance, and transportation of hazardous substances, waste disposal and stack emissions. Measures taken to mitigate key impacts are discussed below.

Surface disturbance

The ISR operations do disturb vast areas of land, the well fields extend over 10km to 20km at each mine. The disturbance is largely reversible because there is limited stripping of soil. Not all soil is stripped to develop the well fields and so natural vegetation and habitats can be readily restored after rehabilitation and closure of the mines.

The various operations limit surface disturbance as far as possible by prohibiting off-road driving. In addition, the standard of house-keeping at the operations is high. The plant sites are kept clean to minimise occupational exposures to ionising radiation and to avoid soil and water contamination. Wash down water from cleaning of the equipment and plant sites is directed to small plant slimes ponds (usually one per plant).

The mines do disturb habitats and hinder free movement of people and animals. These impacts do not appear though to be of high significance, but the mines do not have information to define the impacts precisely.

Groundwater disturbance

The mines have numerous measures in place to prevent soil and water contamination. These include:

- Filling of exploration boreholes with cementitious gel;
- Casing of production and injection wells and annual checks of the integrity of the casing;
- Monitoring of flow in pipelines and rapid attention is given to spills;
- Clean up of spills from pipeline leaks and removal of contaminated soils to a LLRW disposal facility;
- Lining of ponds holding solutions and process plant slimes; and
- Good housekeeping, with no wastes lying around.

The ISR process intrinsically causes contamination of the host aquifer that is being exploited through the introduction of acidic fluids (lixiviant). These fluids dissolve not only uranium minerals but other minerals in the host aquifer, such as clay minerals, carbonates, sulphides and feldspars. This results in increased concentrations of dissolved ions and trace metals in the groundwater. The movement of contaminated groundwater within the aquifer is controlled by the flow conditions in the mining wellfield block, with groundwater flow from injection wells to extraction wells. Under design conditions the spatial extent, or “sweep”, of the leaching fluid is contained within the extraction zone and should remain constant over the operational life of the block.

Wellhead injection rates are typically high due to the piezometric pressures that have to be exceeded in order to inject acid into the ore-hosting aquifer. Well integrity testing is undertaken annually to identify leaks and other well failures that can occur. It is in the interest of mines to maintain efficient wells and fix problems quickly so as not to impact production.

Monitoring of groundwater quality is undertaken in the ore-hosting aquifer during the life of the block and will be undertaken for a period after closure. Monitoring is undertaken within/on the perimeter of a block, to the side of the orebody and in formations above and below the ore hosting aquifer. Monitoring locations to the side of the orebody are expected to provide a control water chemistry signature while monitoring wells above and below the ore-hosting aquifer indicate vertical (upward or downward) leakage.

Lateral migration of residual leach solution during the ISR operation is expected to be between 40m to 50m and no more than 80m. The operational priority is not to lose acid through migration, so the extraction system is optimised at all times to reduce loss of acid (which is expensive) and lixiviant.

Because of the greater density of lixiviant to natural groundwater there is little upward migration but rather potential for gravity accumulation in the lower part of the aquifer. Lixiviant tends to accumulate in the lower part of the ore-hosting aquifer as a general rule, down-hydraulic gradient of the block. No specific evidence of vertical contamination into overlying or underlying aquifers has not been identified to date. When mining of a block is finished as much acid as possible is extracted from the wells to be used in the next mining block.

Where deposits are hosted by Paleocene formations, for example Uvanas, the groundwater in the host Uvanassky aquifer is a non-potable resource due to the naturally elevated uranium content and high total dissolved solids. Potable water is taken from other sources instead.

Where deposits are hosted by Cretaceous formations there is no uranium content in the Uvansky in the locality of the deposit. The Cretaceous formations themselves have a high TDS chemistry and are not suitable for drinking for this reason.

The ISR mines' monitoring reports do not evaluate the extent and migration of ISR contaminant plumes although SRK notes that contaminant simulation modelling of the ore-bearing aquifer has been undertaken in the past at Inkai (Cameco, 2017. Inkai Operation, South Kazakhstan Oblast, Republic of Kazakhstan. National Instrument 43-101, Technical Report. 23 March 2017, Cameco Corporation).

For closure, the mines are required to restore the ISR-mined aquifers to natural conditions and to support this by means of monitoring. It is envisaged that this will be achieved through natural attenuation processes that restore groundwater chemistry with time post-cessation of mining activities. Natural attenuation is governed by three major factors: velocity and direction of groundwater flow, initial chemistry of the ISR contaminants and mineral composition (including alteration mineralogy) of the host rock.

The mines' groundwater monitoring programmes need to be improved, to be in line with international standards, so that the mines can clearly demonstrate that impacts on groundwater resources and users are not significant during the operational phase and will not be significant post closure.

Transportation of hazardous substances

Large quantities of hazardous substances are transported to and from the mines. Adequate precautions are taken to prevent associated public heath safety hazards as outlined below.

The safety measures for transporting hazardous materials associated with the mining operations include: information cards in each vehicle issued by the Committee for Protection of Public Health of the Ministry of Health of the Republic of Kazakhstan; approval of the roads used the Ministry of Internal Affairs; specific driver training; washing of vehicles and testing of these for radiation contamination; specific emergency plans for accidents; drivers wearing appropriate PPE and dosimeters; equipment for containing any accidental spillage; radio communications; and GPS tracking.

Road transportation accidents are recorded and analysed to understand causes and lessons that can be learned from these. The only major accident on record is an acid transportation spill of 0.35m^3 that occurred in February 2014, between Timur railway station and Zarechnoye mine. The sub-contractor was fined and held responsible by the environmental authority but Zarechnoye mine assisted with the clean-up. The soil was removed by a third party certified to deal with acidified soil. The polluted soil was removed for neutralisation and disposal and replaced with clean soil.

Waste disposal

SRK considers that the Mining Subsidiaries need to pay more attention to waste stewardship, particularly metal LLRW decontamination services used.

Stack emissions

Stack emissions at the operations are from boilers used for heating and emissions from yellowcake driers. The latter emissions do not include particulates, which are removed by wet scrubbers and returned to the process and all stack emissions are monitored.

Fugitive radon emissions can be concentrated above the pregnant-solution settling ponds and in the process plant but are not a public exposure hazard because they are rapidly dispersed through release to the atmosphere.

10.5.6 Health & Safety and Radiation Protection at the ISR Mines

At the ISR operations, occupational health and safety and radiation protection are clearly of high priority. The commitment to this is reflected in behaviour on site as well as an abundance of posters on the walls of buildings reinforcing messages. All the operations visited had large, well-equipped training classrooms that were evidently in regular use. Most of the personnel at the ISR mines receive safety and radiation protection training.

The safety hazards on the mines include:

- Working with ionising radiation – external exposure to gamma and beta radiation, inhalation of radon and inhalation and ingestion of radioactive dust;
- Handling of hazardous substances like acid, ammonia, caustic soda and hydrogen peroxide;
- Extreme temperatures in the wellfields;
- Working at height, equipment under pressure, electricity, noise and vibration, and hoisting mechanisms; and
- Biological hazards – exposure to dangerous wildlife including insects, spiders and snakes.

The most frequently delivered training programmes cover radiation protection, industrial safety and waste management. Specialist training is also frequently delivered on the operational condition and safety of pressure vessels and on crane/ hoist maintenance of and safe working practices.

All workers and visitors in the plant and wellfield areas are required to use full PPE, which is provided by the mine and includes a jacket, boots, hard hat, gloves, a face mask and safety glasses. There are emergency wash stations at several points in the wellfields and plant sites, including showers, eye wash stands, countering agents (alkali for acid burns) and chemical cupboards.

Winter PPE is provided for the cold months and there are heated work stations in the wellfields, less than 1km apart, where staff can warm up in cold weather.

To prevent ingestion of radioactive dust staff are not permitted to eat in work areas. In a 12-hour shift, staff are required to clean-up twice. Just before meal times, they must take off PPE, shower and then have a radioactive contamination check before entering the dining area.

Rehydration drinks are allowed in work areas and are consumed after ensuring the cleanliness of the hands and the drink container. Monitoring safety performance and radiation doses is undertaken.

Kazatomprom's commitment to safety and wellbeing is demonstrated by its membership of the International Social Security Association's Vision Zero initiative to reduce workplace injuries and promote comfortable and safe working conditions guided by the Vision Zero program's "*Seven Golden rules*". These rules apply to all employees of the Company's enterprises and their contractors, the main goal of which is to achieve the goal of zero injuries:

- take leadership – demonstrate commitment;

- identify hazards – control risks;
- define targets – develop programs;
- ensure a safe and healthy system – be well-organized;
- ensure safety and health in machines, equipment and workplaces;
- improve qualifications – develop competence; and
- invest in people – motivate by participation.

The Company conducts its production activities in compliance with both Kazakh and international requirements for labour protection and industrial safety, implementing comprehensive measures to prevent incidents and accidents. Health and safety management systems that meet international standards (ISO 45001) have been implemented and annually confirmed by external audit, and the Company carries out systematic work to improve the safety culture among employees and managers at all levels. The measures undertaken in 2021 to enhance the focus on safety awareness helped to prevent major industrial accidents (including uncontrolled explosions, emissions of dangerous substances or destruction of buildings) at the Holding’s enterprises. In 2021, the Holding spent more than KZT8.29bn (in 2020: KZT7.63bn) within its occupational health and safety programs. Table 2-15 presents the historical group occupational health and safety statistics for 2015 through 2021 inclusive.

Notwithstanding the continuing actions taken to improve workplace health and safety, a number of serious accidents occurred in 2021. The accidents included: one case resulting from of the impact of moving mechanisms, one case of chemical burns, three cases of falling from a height, one case of falling on a slippery surface and two road accidents. Both fatalities occurred as a result of one road accident.

Nuclear Safety

To ensure a high level of nuclear safety, the Group's enterprises handling nuclear materials monitor the compliance with the respective technical regulations, instructions, rules and nuclear safety requirements for handling nuclear materials. At present, the companies of the Group that have nuclear materials include Ulba Metallurgical Plant JSC and Ulba FA LLP.

Kazatomprom monitors the nuclear safety performance and conducts an inventory of nuclear materials in a timely manner to ensure the nuclear safety and security of the Group's companies. In 2021, the Chief Physicist’s Services of Ulba Metallurgical Plant JSC and Ulba FA LLP implemented the following actions:

- Regular H&S knowledge testing for specialists of the finished product warehouse, uranium production, the IAEA LEU warehouse, and auxiliary units of Ulba Metallurgical Plant, as well as the area relating to the fuel pellets and fuel assemblies shop and the fuel assemblies shop at Ulba FA LLP;
- Commission inspections of nuclear safety at Ulba Metallurgical Plant JSC and Ulba FA LLP
- Emergency response training of staff and services in case of an alarm signalling about a self-sustained nuclear chain reaction in all nuclear hazardous areas of Ulba Metallurgical Plant JSC and Ulba FA LLP;
- An on-site audit of the H&S at Ulba FA LLP, which included the inspection of nuclear and radiation safety in accordance with the annual audit plan of the H&S department

Radiation Safety

In 2021, Kazatomprom provided regular monitoring of the radiation situation at workplaces, in premises, production sites, and the supervised areas. All radiation indicators are within standard limits and have not changed since 2020. In 2021, the Company did not register any radiation accidents or incidents at its enterprises. The annual dose of ionising radiation exposure did not exceed reference.

The average radiation exposure for staff was 1.44mSv/year in 2021, including natural radiation sources. The radiation from the natural background sources ranged from 0.75 to 1.36 mSv/year. In turn, the maximum annual effective dose for personnel at the Group's assets was 6.19mSv/year, which is 31% of the permitted dose limit, which is 20mSv/year.

In 2021, the Company started keeping records of the radiation exposure of staff of contracting organizations. The average radiation exposure for staff of contracting organizations employed at the Group's enterprises and engaged in decontamination of overalls and preparation of shipping packaging kits with finished products was 0.65mSv/year.

To improve radiation safety and protect personnel, Kazatomprom implements the following radiation safety improvement measures:

- conducting repair work on the premises and modernizing equipment;
- repairing and upgrading technological equipment;
- moving low-level radioactive waste to disposal sites;
- repairing and purchasing radiation control equipment;
- providing radiation safety training for employees; and
- conducting the certification of people by the authorized state agency responsible for the use of atomic energy.

10.5.7 Regulatory Compliance

Compliance with permits, regulations and sanitary norms are evaluated by means of:

- Compliance reports that must be submitted to the relevant regulator as specified in the permit or regulation;
- State inspections that are undertaken by the relevant regulatory authorities to evaluate aspects such as: industrial safety, labour protection, fire protection, radiation safety and environment; and
- Inspections carried out by the Company’s corporate HSE department and inspections carried out by enterprises themselves as part of production control.

The compliance reports include:

- Environmental monitoring reports on the monitoring undertaken as required by the environmental permit (PEK environmental reports);
- Annual reports on implementation of environmental action plans (including spend against budget);
- An annual waste inventory covering waste generation, use, neutralization and disposal;
- Annual reports on hazardous waste;
- Quarterly reports on the authorised and actual environmental emissions; and
- State statistical reports (Form 2-TP on air, water management and Form 4-OS on environmental protection costs).

State inspections are undertaken with varying frequencies. At the ISR mines, environmental inspections are generally undertaken every two or three years, health and safety inspections are undertaken annually, and radiation protection inspections are undertaken twice per year.

Non-conformances (termed “*violations*”) identified during state inspections may lead to either individual fines or legal entity fines. These will be imposed over and above the pollution fees paid where the permit limits or statutory norms are exceeded.

Individual fines imposed by the state, following state inspections, are paid by the responsible person out of their salary where the violation is deemed a failure by the individual against their documented job description and/or regulated responsibilities. In these instances, the Company is not deemed liable. These are generally administrative in nature, for example: data missing from drawings, pipework not marked with flow directions and documentation missing. There are a few potentially significant individual violations like not connecting hoses correctly or not maintaining vehicles, so they fail emission tests. These state-imposed fines paid by individuals are typical in the order of KZT10k per fine.

Legal entity violations are generally more serious. These include deviations from an approved project design; failure to submit appropriate applications for changes in project design; and working without permit for emissions into the environment. The fines in this instance vary widely, with values of KZT20k to KZT65m. The largest fine was incurred by state supervising authority to JV Katco LLP in 2016 for the absence of a permit for emissions of pollutants from five rented diesel generators and unapproved waste placement.

Historical on HSE performance indicates that most of state inspection penalties are imposed on individual persons. The total penalties on the Group was KZT12.4m for 2021 (2020: KZT11.5m). These penalties are considered normal for industry in Kazakhstan and are not deemed significant. Repeated offenses may result in greater scrutiny by the regulators. The ISR mines do strive to minimize the violations and penalties that can be incurred, and the Company promotes this culture at the corporate level.

All of the fines referred to above are imposed by the state and not by the Company or the Mining Subsidiaries. When violations are identified during state inspections, the Mining Subsidiaries respond by developing plans of action to prevent these occurring with the responsible personnel. This is done for both individual violations and corporate violations. The actions for individuals often involve training or re-training.

10.5.8 Inspections and auditing

The various operations apply a robust four tier internal audit system covering environment, radiation and health and safety. Level 1 involves daily checks by the worker (known as the master) with the results documented in a handwritten journal; Level 2 are weekly checks by superintendent with results; Level 3 are monthly checks by the chief engineer; and Level 4 is an annual check by Company management. For Levels 2 to 4 the results are documented within a form, which is filed.

Over and above the internal audits there is generally an audit by the Company every second year or so. In addition, some of the joint venture partners in the Mining Subsidiaries also audit operations independently. For example, Uranium One undertakes annual audits of the operations of JV SMCC LLP, Karatau LLP and JV Akbastau JSC. JV Katco LLP undertakes annual audits of the Tortkuduk and Southern Moinkum (Northern Part) operations.

Furthermore, the Company's customers, such as EDF Energy, undertake audits of the mines and other operations on occasion. The inspections and audits do identify numerous non-conformances, which are generally attended to promptly.

10.5.9 Environmental Monitoring

Environmental and radiation monitoring is focused on regulatory compliance and consists of the following types of monitoring:

- The stack emissions monitoring by an independent third party on a quarterly basis –

pollutants monitored include: nitrogen dioxide, nitrogen oxide, sulphur dioxide, carbon monoxide, ammonia, sulphuric acid, particulates and radiological parameters;

- Ambient air quality monitoring by an independent third party at various locations generally with in or at the border of the Sanitary Protection Zone ("**SPZ**") and, where required, within local villages;
- Water quality monitoring of the treated sewage, which is re-used in the process or discharged to an evaporation pond;
- Ambient ground water quality monitoring (discussed further below);
- Monitoring of the volumes and types of waste removed from site by third party contractors;
- For some sites, where stipulated in the permit, ambient surface water quality monitoring of rivers is undertaken – this appears to be for radiological parameters only; and
- For some sites, where stipulated in the permit, vegetation and soil monitoring for radiological parameters may be undertaken.

The results of the emission, sewage and waste monitoring are reported to the regulatory authorities as stipulated in the permits or licences but is usually on at least a quarterly basis.

The state inspectors may also undertake monitoring during their visits or review other data such as that relating to groundwater, vegetation or soils. The results of radiation monitoring undertaken in local villages and at the SPZ is reported in local newspapers to inform local communities. Also, there is often an automatic radiation monitor along with a large screen display in the village/s closest to the mine sites.

SRK is not aware of any monitoring data indicating the mines are having adverse impacts on surrounding land users, but there are some weaknesses in the monitoring programmes.

Groundwater monitoring falls within the responsibility of both the environment protection teams and the geology teams. The later teams focus on the groundwater quality within the immediate mining area with monitoring boreholes located within the ore body and occasionally in overlying aquifers. This monitoring aims to check that product leakage is not occurring, so the parameter suite is often restricted to pH, uranium and sulphate.

The environmental protection team monitoring of groundwater targets the orebody aquifer and overlying aquifers (including the perched aquifers at some sites) at the SPZ or beyond (for example village wells). The monitoring suite is slightly larger but still focused on radiological parameters. Other parameters monitored a couple of times a year are pH, total suspended solids ("**TSS**"). Additional parameters monitored on an annual basis are sulphate, iron, nitrate, calcium, magnesium and cadmium and uranium radiological parameters. Depending on the location of potential receptors and the number of monitoring locations varies from several (for example at Zarechnoye and Semizbai) to up to 170 sites (at RU-6).

In general, additional monitoring sites beyond those permitted or wider parameter suites are not evaluated though some of the Mining Subsidiaries have worked with a NGO called NSK, who undertake environmental monitoring for a wide suite of parameters at villages, drinking wells or other locations beyond the mining contract area. The testing is done on a tripartite basis between the company, the Association and local community representatives. NSK has also completed testing at the nuclear test sites to show the effects of potential historical radiation. An example is at Zarechnoye where three artesian drinking water wells located outside of the mining area were monitored for an extensive suite of anions, cations, metals and organics. The results indicate the water may not be suitable for domestic drinking water but does not indicate any negative effects as a result of mining.

The monitoring reports to the regulators and internal corporate reporting focus on compliance with sanitary norms or permit limits rather than presenting trends in the data. The data does not appear to be actively interpreted to facilitate long term management of impacts and risks, or to feed into closure planning. This is compounded by weakness of the pre-mining baseline data collected in the OVOS where the choice of monitoring locations and suite of parameters is often limited.

Waste management involves keeping inventory records and collation of receipts from all contractors taking away the various project waste streams. It is noted that the operations do keep records of their waste handling, have ‘passports’ for their wastes, each have a waste management programs coupled with standard operating procedures for most waste streams.

10.5.10 Safety Monitoring – Tracking of Safety Incidents

The Company conducts its production activities in compliance with both Kazakh and international requirements for labour protection and industrial safety, implementing comprehensive measures to prevent incidents and accidents. Health and safety management systems that meet international standards (ISO 45001) have been implemented and annually confirmed by external audit, and the Company carries out systematic work to improve the safety culture among employees and managers at all levels. The measures undertaken in 2021 to enhance the focus on safety awareness helped to prevent major industrial accidents (including uncontrolled explosions, emissions of dangerous substances or destruction of buildings) at the Holding’s enterprises. In 2021, the Holding spent more than KZT8.29bn (in 2020: KZT7.63bn) within its occupational health and safety programs. Table 2-15 presents the historical group occupational health and safety statistics for 2015 through 2021 inclusive.

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10.5.11 Radiation Protection Monitoring

Staff exposed to ionising radiation on the mines are identified as Group ‘A, workers. The radiation doses received by these personnel is determined by measuring and adding doses received via three pathways: external gamma radiation; inhalation of radon and inhalation of radioactive dust. Total annual effective doses are calculated and compared with the annual effective dose limits. Personal dosimeters are used to determine doses received from gamma radiation and area monitoring is undertaken to calculate doses from radon and uranium dust.

Summaries of doses received by staff on a quarterly basis are published on a notice board in the administration building. Each Group ‘A’ employee is provided with the monitoring data and is required to sign off that they have received and understood the results. Long-term effective dose data records are kept for every Group ‘A’ employee, and they can take this data with them to share with another employer if they resign from the Company. This monitoring aligns with international good practice as defined by the IAEA. JV Katco LLP, JV Inkai LLP, Baiken-U LLP and joint venture companies that have Uranium One as a partner, complement the above-mentioned dose monitoring with urine monitoring.

The total uranium in the urine is determined (by means of inductively coupled plasma mass spectrometry) on an annual basis for all Group A personnel and on a monthly basis for personnel working in the drier unit of the plant. The Company is considering introducing this monitoring as a corporate requirement and is awaiting the development of a corresponding standard for this by the Ministry of Health, at present there is no standard for this in Kazakhstan.

SRK understands that the annual effective doses received by most Group A personnel in the Group Companies is less than 5mSv/year and no doses exceed the applicable annual dose limit legal limit is 20mSv/year in a calendar year (in special cases employers may apply a dose limit of 100mSv in 5 years with no more than 50mSv in a single year). The maximum annual effective dose received by an individual working at the ISR mines was 6.9mSv in 2015, 9.6mSv in 2016, 5.50mSv in 2017, 4.97mSv in 2018, 4.94mSv in 2019, 4.94mSv in 2020 and 6.19mSv in 2021. The value recorded in 2016 was measured at JV SMCC LLP's Inkai 4 Mine and was attributed in to an increase in the U_3O_8 production. Upgrades were made to the gas cleaning and ventilation systems in the plant and doses were much reduced thereafter.

10.5.12 Emergency Preparedness and Response

The operations have emergency preparedness and response plans developed on the basis of risk assessments. The plans are developed for a range of emergency scenarios including: fire; acid spills; radiation emergencies; failures of ponds and consequent discharges; failures in the process plant; failures of storage facilities for hazardous substances; emergency energy shut downs; and road accidents. The plans identify responsible people, the actions of the response team, the actions of employees, and equipment and materials required together with details of where these are stored.

Plans for emergencies that could extend beyond the site boundaries are developed in consultation with public health authorities, the Akim (the mayor/ elected leader of the local authority), the police and the Committee on Atomic Energy, as required.

Emergency plans are subject to review, and approval as follows:

- Action plans for emergency response on a local scale are approved by local executive bodies (akimats);
- Action plans for emergency response on a global and regional scale are approved by the central executive bodies of the Republic of Kazakhstan (Emergency Committee of the Ministry of Interior);
- Action plans for site-level emergency response and remediation are approved by the organizations themselves; and
- Accident elimination plans are approved by the head of the organization and coordinated with professional emergency services and/or units.

The plans that SRK observed do align with international good practice. Staff are trained on emergency actions to be taken and emergency drills are undertaken. The training and drill records are checked as part of the regular state inspections.

10.5.13 Community Stakeholder Engagement

Formal stakeholder engagement is limited to the legally required public hearings that have be held whenever an OVOS is submitted to the environmental regulator. The hearing may be facilitated by the Company or by the technical institute responsible for the OVOS. They generally take place in the villages and/or town closest to the mine site. The meeting protocol (minutes), along with the attendance register, is kept with the associated OVOS report.

Other methods of engagement that occur include:

- Public-display-dosimeters display the radiation background in several local villages including Shieli, Sholak-Korgan, Taukent, Zhuantobe and Kyzemcheck, and at the Timur station;
- Notices in newspapers publishing annual or quarterly radiation results, including results of

radiation surveys in the villages and the surrounds.

- Articles in local newspapers;
- Presentations at the local schools to raise awareness of radiation safety issues and dispel fears around radiation exposure;
- Public hearings organised by the NGO NSK following preparation of their independent monitoring reports; and
- Regular meetings with Akims (mayor/ leader of the local authorities).

The frequency and extent of engagement with local communities by the operations correlates with the proximity of the communities to mining operations. Mines that are within 10km of local communities engage with local communities more actively.

The standard method of making a grievance in Kazakhstan is to register complaints with the Akim, not directly with the Company. The Akim will bring the grievances to the attention of a director of the Company.

Many mines are in regular contact with the local Akim. Uvanas mine engages Kyzemchek Akim on a daily basis and involves the Akim in many of its management meetings. Karatau and Akbastau mines engage with the local Akim more than ten times a month. Most mines meet with Akims at least once a month.

Several operations explained to SRK that a Company director is assigned responsibility for liaison with the community. Reception days are scheduled on a weekly basis and on these days the director will receive people in his office and hear their comments and concerns. The same director is generally also responsible for staff grievances. Reception days are also used to hear staff grievances. Comments and grievances received from the community are formally documented and attended to.

The experience of the mines is that the community engagement is almost always focused on requests for financial support; contract opportunities for local service providers; and employment opportunities, with people being very keen to be employed at the mines.

Although engagement with the communities is occurring, it does not align with recognised good international practice. The potentially affected communities, and their characteristics and interests in the operations, have not been formally identified. The mines do not hold a register of interested parties from local communities and do not have stakeholder engagement plans for ongoing engagement of the communities and documented grievance procedures.

The Company attributes the above finding to cultural differences. It is traditional for people to communicate through Akims. The Akims are appointed by the GoK and it is their responsibility to have a good understanding of the communities that they serve and to facilitate communication between local communities and industry.

10.5.14 Working Conditions

Working conditions in all Group Companies are overseen by the corporate Department of Social Development and Government Relations, which aims to promote favourable working conditions.

Working conditions are defined in collective agreements that are negotiated between staff representatives and company. The agreements are signed by participants in the negotiation and are valid for a couple of years or longer. Each operation has its own collective agreement on working conditions. The agreements are not uniform throughout the group. Some operations can offer more generous conditions than others.

The working conditions covered in the collective agreements cover facilities where the operations are located, living conditions, medical services, quality food, safe working conditions and specific working conditions for specific groups. The collective agreements also cover compensation and retirement.

The collective agreements are drafted through a negotiation process. The drafts are reviewed by Company economists, lawyers and health and safety specialists to check they are realistic and there is no risk of violation of legislation. Following internal checks, the draft agreement is sent out to the State Labour Inspectorate to check again that there is conformance with relevant legislation. Once approved by all parties, the document is signed and made public.

Most of the mine staff (about 83%) reportedly belong to the Professional Union of Workers of the Atomic Industry. The union is generally involved in the drafting of collective agreements through the staff representatives involved in drafting of the collective agreements.

Employees are able to submit grievances by various means ranging from suggestion boxes, through engagement of supervisors or engagement with a Company director on a reception day (held weekly at the operations), to the Labour Inspector. Annual reviews show that employee grievances are generally resolved at the Company level.

The Company reception days are scheduled so that staff will have an opportunity to speak with the director, regardless of their shift hours. Staff grievances are also handled through a complaints box usually located at reception. In addition, all Group Companies have a hotline for employee concerns and access to this is not limited to employees; staff are allowed to give the number to anyone they want to. Furthermore, there is a hotline number on the Company's website and grievances reported via this number are published on the website.

Employee grievances are recorded and responded to. Employees can also submit grievances anonymously. These are documented separately from other grievances.

Two thirds of the employee grievances received pertain to procurement complaints (such as complaints about unclear qualifying criteria) and labour conflicts. About 6% of the grievances are about property theft and about 6% are about mismanagement. The rest are diverse in theme.

The Group Companies are subject to an annual review of social stability, undertaken by an independent company. The review engages randomly selected employees, and they answer questions on life satisfaction, level of happiness, family conditions and financial stability.

Reports on the annual reviews of social stability are available for the Group Companies.

Findings of the annual reviews of social stability over the period 2013 to 2021 are summarised in various public reports and the social stability ratings of all Group Companies are considered as good and generally increased from 72% in 2015 to 83% in 2017, however by 2021 this declined to historical levels reporting 73%. The higher historical ratings were attributed to factors such as the creation of a favourable psychological climate, improved working conditions and safety measures, improvement of a power supply, financial remuneration and professional development.

10.5.15 Social Investment

The Company has prepared a Corporate Social Responsibility program that has been approved by the Resolution of the Government of the Republic of Kazakhstan on April 15, 2015, No. 239. It has five key focus areas:

- Regulation of labour relations and ensuring special security of employees, including: training and continual professional development of staff and potential employees and a collective agreement with the trade union;

- Participation in social stability rating identification survey that focuses on the wellbeing and views of employees;
- Labour and environmental protection including establishment of management systems and monitoring of occupational health and environmental controls;
- Socioeconomic development of the operations areas, which is discussed in more detail below; and
- Charity and sponsorship, which is also discussed below.

As a large company, Kazatomprom has a significant impact on the environment and life of local communities. Kazatomprom's mining and production facilities operate in five regions of Kazakhstan: Turkistan, Kyzylorda, East Kazakhstan, Akmola, and Northern Kazakhstan regions. Kazatomprom recognises that the long-term success of its business depends on social and economic stability maintained in the regions of operations and in the country as a whole, on mutually beneficial relations with representatives of the central and local authorities, as well as on the quality of working and living conditions for its employees.

Much of the social investment made by the mines is via annual payments made terms of the conditions of mining contracts to a social fund that is used by the local government. The mines also make other social investments through the Company and individually, in consultation with local Akims.

In December 2014, the Company concluded cooperation memorandums with the Akimats (governments) of Kyzylorda and South Kazakhstan Provinces on socio-economic development. In 2015/16 this included transferring 19 social facilities free of charge to the local executive bodies, together with the funds for their maintenance (amounting to KZT1.6bn). A further KZT1.6bn was agreed to be transferred to each region for new developments.

In 2016 significant charitable activities by the Company were organised to be carried out through a single fund called the "Samruk-Kazyna Trust". In 2017 KZT1.1bn was transferred to the Kyzylorda and South Kazakhstan Provinces for new developments.

In total, Kazatomprom allocated KZT1.6bn in 2021 as part of its commitments under subsoil use contracts for socio-economic and infrastructure development to the budgets of the regions where it operates.

Social Development Projects

Kazatomprom initiated a number of socially significant projects in 2021, including the construction of an ambulance station, children's playgrounds and sports grounds, the purchase of educational equipment, improvement of settlements, financial assistance to vulnerable social groups in the form of coal, food baskets, school supplies, New Year presents, as well as a number of other socially significant initiatives. As of the end of 2021, the Company had allocated KZT0.9bn for the implementation of socially significant projects.

Charitable Contributions

In January 2016, the Board of Directors of Samruk-Kazyna JSC approved the Charity Policy and the Charity Programme of the Fund, as part of which Kazatomprom implements projects and programs aimed at solving socially palpable issues.

To support local communities, subsidiaries and affiliates can implement charity initiatives independently. Subsidiaries and affiliates participate in annual charity events and cultural activities in the regions where they operate. In particular, they assist children from orphanages and large families and provide social support and sponsor communities, thus, helping improve local public services and amenities. They also play an active role in environmental campaigns and volunteer clean-up days, as well as in organising public events and celebrations.

In addition, subsidiaries and affiliates implement the community development programmes as part of the Company's philanthropic and sponsorship activities. These programmes are based on the requests of the local communities and vulnerable groups, through the engagement of the Akimats, the Council of Elders, if any, and volunteers. The Company operates a hotline that received requests, including requests from external stakeholders.

Healthcare Support

Projects in this area seek to support the development of healthcare institutions, including purchase of medical equipment, as well as targeted assistance to people with serious diseases: payment for expensive operations, purchase of medicines and rehabilitation.

In the reporting period, Ulba Metallurgical Plant JSC arranged supply of liquid oxygen, which is produced at the UMP nitrogen-hydrogen-oxygen station, to three medical institutions in Ust-Kamenogorsk, where inpatient clinics for the treatment of patients with COVID-19 are functioning.

In June 2021, JV Katco LLP signed a contract with the Turkistan Oblast Akimat to finance the construction of a 25-brigade regional ambulance station.

Education Support

The main areas of science and education development included in Kazatomprom's social policy are comprehensive support and assistance to educational institutions in the regions where it operates.

In 2020, JV KATKO developed a number of projects as part of the 2020-2025 strategy roadmap: among such projects is education and support for schoolchildren and students in Sozak district. 10 students from the region, who are studying at various universities and colleges in Kazakhstan, receive a monthly allowance of KZT50,000. These are future engineers, doctors, teachers, etc. Also in 2021, the Company assisted 18 students, children of its employees, to obtain higher education. JV KATKO pays for their education in the energy sector at universities of the Republic of Kazakhstan.

In cooperation with the Sozak District Akimat, in 2020-2021, KATKO sponsored a total of KZT142m to fully equip multimedia, biology and physics classrooms at 14 schools in Sozak district. The company also began a partnership with the National Geographic Qazaqstan magazine and provided subscriptions to the magazine for 74 schools in Turkistan and the Sozak District. In the framework of cooperation, the editors of the magazine arrange online seminars in the Kazakh language for teachers and students on environmental awareness. JV KATCO also financed the complete equipping of multimedia classrooms at seven schools of the district for a total of KZT67.5m.

The following social projects are scheduled for 2022:

- Financing the construction and repair of social infrastructure facilities, including the construction of an ambulance station in Turkestan;
- Construction of children's and sports grounds;
- Providing assistance to socially vulnerable groups (war veterans, pensioners, large families, etc.); and
- Organising community events in villages where the Company operates

To engage local residents more actively, Kazatomprom will cooperate with local executive authorities in 2022 to train local residents to register in the HR eKAP information system used to publish job openings in the Company, subsidiaries and affiliates and register potential candidates for employment. Each of the planned meetings in the regions will present the HR eKAP system and explain how to create electronic CVs and responses to job openings.

The various ISR mines make charitable payments locally to help vulnerable people, local communities and local schools. This is not formally planned but responsive in nature to requests that are generally received through the Akim. The responsible person is generally the director responsible for community liaison. Each mine is assigned one or more villages that it is responsible for supporting. Where there are many mines near one village, a mine may be assigned a village/ villages more than 100km away.

Examples of support given include:

- Small payments to local low income families to help with food, winter heating, school books and other basic needs, and also with gifts and holidays;
- School and/or tertiary education bursaries, with the later beneficiaries often being recruited to the company;
- Support to World War II veterans;
- Support to vulnerable pensioners;
- Social or cultural events in the area;
- Supply of drinking water wells; and
- Developing football fields and playgrounds.

10.6 Issues to be addressed: Residual Impacts and Cumulative Impacts

The ISR mines are designed and operated to minimise ESHS impacts. This combined with remote setting of the mines and a relative absence of sensitive receptors, does reduce the ESHS risks associated with the operations. Nevertheless, SRK sees that there are refinements that can be made to the ESHS management at the mines. The mines have insufficient understanding of environmental and social context and do not use the full potential of monitoring to ensure or prove they do not have any impacts, individually and cumulatively. These potential impacts pertain to surface disturbance and groundwater contamination as discussed further below (Sections 10.6.1 and 10.6.2).

The cumulative impacts of clusters of mines could be significant. These have not been defined.

10.6.1 Surface Disturbance and Associated Impacts on Ecology and Land use

While ISR mining does not permanently displace soils and subsoils like open pit mining, it does cause soil disturbance in the short term. The well fields do occupy large areas of land, stretching over distances of up to 20km, and do somewhat hinder free movement of people, livestock and wild animals. There must be some impacts on habitats, plants and animal species of conservation importance and nomadic farmers, however these are not defined clearly and monitored specifically.

Nomadic livestock farming was observed by SRK in the environs of most ISR operations. The mines do not have a documented understanding of this land use, based on consultation with famers and social studies. At some mines, livestock movement is not seen to be an issue because it is not frequent. At other mines, such as the Block Kharassan 1 (North Kharassan) and Block Kharassan 2 (North Kharassan) deposits, the livestock movement through the wellfields can sometimes be a problem. Farmers are instructed to keep out of the wellfields, but they ignore warning signs and herds of livestock have to be directed out of the wellfields by mine security. Potential risks associated with this include physical harm to livestock as a result of interaction with mine infrastructure and equipment (for example, being hit by a vehicle). Also, there is a risk of livestock damaging pipework and thus potentially increasing the risk of a spill.

Exposures of livestock to radiation are not monitored but are not expected to be significant.

At Block 1 Inkai there are artesian wells near to the mine that create pools of water on surface that are used for livestock watering. Herds of horses were seen to be grazing near the mine. Inkai does monitor surface water and groundwater as required by regulatory authorities but does not present interpreted data in a way that can be used to readily demonstrate the mine has no potential impacts on the livestock.

Some mines have photographs on their walls showing how the steppe desert environment changes through the seasons, including photos showing fields of tulips that emerge in spring. The mines do not have data to quickly prove that they are not affecting plant populations, individually and cumulatively.

About 3km to 4km to the north of Block Kharassan 1 (North Kharassan) there is a manmade canal (drainage from the rice fields which are at least 20km away). Neither this nor the Syrdarya River are monitored by the mine, and there is no baseline data for these, as this is not required by regulators.

The Karamurun wellfields are located in what used to be either livestock grazing or arable land (generally rice or other grain fields). There are crops grown in close proximity to the process plant and mine area, so the vegetation is monitored for radiological parameters every year. Surface water samples are taken annually for radioactivity measurements in partnership with branch of The Republican State Enterprise on the right of economic management *"National Centre of Expertise"* of the Public Health Protection Committee of the Ministry of Health of the Republic of Kazakhstan.

No displacement of local farmers will be required for the life of mine plans considered in this report. However, it is still noted that the process for land acquisition specified by national law is not aligned with good international practice with respect to transparency, communication and post-acquisition monitoring of compulsory acquisitions.

10.6.2 Groundwater Impacts

The Company's ISR mines have measures in place to prevent water contamination. They can also present strong rationale verbally why they are not impacting on groundwater resources, based on the argument that vertical and horizontal spread of contaminants from mining is limited. However, supporting information is not readily available for public review. In addition, the available monitoring data is not presented in a manner that robustly proves there are no groundwater resources and users affected by the operations.

Better interpretation of monitoring data to prove that the individual mines are not having impacts on receptors and to understand the cumulative impacts of the mines is recommended by SRK. SRK does however note that monitoring has been undertaken by a NGO, NSK, to confirm that the Karamurun and Zarechnoye operations are not impacting on the groundwater resources and users in the vicinity of these operations (Section 10.2.1).

The mines also need to use their monitoring data to define closure objectives and criteria in advance of closure of the mines.

The mines envisage that the ISR-mined aquifers will be restored to natural conditions after closure of the mines by natural attenuation.

SRK is currently only aware of documented natural attenuation programmes at the mine sites through published case studies, for example: research on natural attenuation at the Irkol deposit published in 2002 by the Company and a high-level case study on environmental protection at the Akdala deposit presented in an IAEA TECDOC handbook. The Irkol study covered monitoring data over a 13-year period up to 1997 in a post-ISR environment. The monitoring data demonstrates that natural attenuation is almost completely effective over this period of time in reducing the impact on groundwater at the site, with contaminated fluids moving less than a few hundreds of metres from the wellfield and contaminant levels returning to natural levels over this time period. The natural attenuation method is considered effective on this basis with the only negative aspect being the time required for full restoration ("tens of years").

10.7 Closure Planning and Cost Estimates

To date neither the Company nor the Mining Subsidiaries have established formal mine closure plans to determine the potential mine closure liabilities in accordance with the international Environmental and Social Standards referenced in 1.2.2. As such "**Mine Closure**" related liabilities do not incorporate technological and engineering solutions which reflect Good International Industry Practice ("**GIIP**") and "**Best Available Technology**" to where practicable achieve "**Ground Zero**" or "**Walk Away**" remediation status. Significant additional base line technical assessments of current landforms including mining operations, waste management facilities, supporting surface infrastructure and processing facilities, to establish the existing impacts to 31 December 2021. In addition, further analysis of all expanded footprints and additional landforms established as part of implementation of the LoMp is also required to assess the cumulative impact of continued operations through to depletion of the Ore Reserves. On this basis any reassessment of mine closure costs for both currently in-place infrastructure and LoMp infrastructure in accordance with international standards is likely to result in higher mine closure costs than reported herein. This is not to say that these matters are wholly absent, but rather require refinement and integration with the formal LoMps to ensure that there is a wholistic approach to development of detailed engineered, designed, estimated and schedule closure plan.

During 2020 the Government of Kazakhstan also published additional regulations to support the updated legislation regarding certain environmental aspects and as such SRK recommends that further work is required to assess any potential impact of these on future ARO estimates. As part of an earlier review by SRK's of the Company's recently developed ARO Standard, SRK concluded that *"the Standard is comprehensive and is likely to provide guidance to the operations related to Closure Plan preparation and the estimate of closure liability. There are areas where the document can be, however, SRK is of the view that Standard complies to most aspects of GIIP and would allow the operations to generate a fair value and defensible estimate of ARO."*

The Company's current focus is limited to that associated with the derivation of ARO estimates for incorporation into its annual public reporting process. As such there is limited focus of expanding this horizon to include an assessment of the LoMp Mine Closure costs associated with the projected depletion of the Ore Reserves. This remains a limitation and whilst not universally determined in the mining and metals sector is an important consideration when supporting the declaration of Mineral Resources and Ore Reserves for operating mines and development projects.

Notwithstanding the above, during the authoring of the 2018 CPR in support of the IPO process, SRK in conjunction with the Company developed a standardised inventory based assessment methodology of the estimation of environmental and social liabilities. This methodology largely focused on the establishment of standardised 'Mine Closure Workbooks' to assess both Asset Retirement Obligations as well as LoMp Mine Closure costs. This methodology has largely remained unchanged since 2018 and whilst incorporating updated physical estimates and unit expenditure rates in certain instances is not considered aligned with the more recently developed standards and practices applied internationally. The limitations apply to both the

ARO and LoMp Mine Closure estimates and are further increased in respect of the LoMp Mine Closure estimates specifically where new infrastructure and extended mining area disturbance footprints are assumed:

- The lack of or limited detailed engineering surveys for established structural and linear infrastructure and in certain instances reliance on high-level volumetric estimates based on surface plans and satellite imagery;
- The lack of site specific intrusive investigations to establish the presence or otherwise of groundwater and/or sub-soil pollutants;
- The lack of formally engineered mine closure plans developed to a minimum of pre-feasibility study level sufficient to develop spatial and time bound schedules of activities and expenditures and thereby justifying contingency allowances of less than 25%;
- The limited consideration for future planned infrastructure associated with extension of the mining areas;
- Omission of labour related retrenchment expenditures on planned cessation or unplanned suspension and/or termination of mining operations;
- Limited consideration for remediation of early stage exploration assets;
- Inconsistent application of ground-zero assumptions whereby certain infrastructure is assumed to remain in place for post-closure use;
- Inconsistent assumptions in respect of concurrent and post closure monitoring and vegetation time periods; and
- Over time non-standardised approaches/assumptions in certain limited areas specifically in respect of securing updated and current money terms quotes/estimates for key activities and variations in certain well factors relied upon for determination of radioactive waste tonnages.

Notwithstanding the above and by comparison to other mining operations which incorporate greater environmental disturbance footprints, the principal risks are considered to be relatively limited and specifically focused on the poor level of site specific investigations focused on the determination of groundwater, sub-strata and soil contamination both in the vicinity of wellfield and processing infrastructure.

The section below reviews the Company's approach to closure planning and summarises closure cost estimates made to date. The estimates are life of mine closure cost estimates that present the cost that a mine operator would incur to perform all the actions required to fulfil the closure liabilities.

In addition, the mining contracts contain specific requirements related to closure. The magnitude of provisions is usually stated in the contracts as a percentage of operating expenditure that must be allocated annually into a dedicated liquidation fund account (both in local and international currencies) in a Kazakhstan bank. These payments vary significantly between contracts which are deposit specific. Generally, the payments are in the amount of 0.10% to 6.77% of the annual operating expenditure and summarised in Table 10-3 below. For the deposits at Kazatomprom-SaUran LLP the individual contract liquidation percentages are as follows: Uvanas (6.77%); Eastern Mynkuduk (1.27%); Kanzhugan (5.40%); South Moinkum (1.00%); and Central Moinkum (1.00%).

Contributions to the liquidation fund are made by mining contract holders according to the frequency and amounts specified in the mining contract. At the time of closure or rehabilitation, the mine operator can use the funds with the permission of the Competent Authority. If the closure cost exceeds the fund's savings the mining operator must cover the closure cost. In case closure cost are less than the amount accumulated in fund then the remainder is returned to the operator as taxable income. The liquidation funds closing balances as on 31 December 2021 (Table 10-3) are not allowed to be used for personnel retrenchment payments according to legislation. In addition to these liquidation fund contributions for each mining contract there is also a requirement to contribute to a predefined social fund which defines annual US$ denominated amounts per mining contract which comprise:

- For Kazatomprom SaUran LLP: Uvanas (US$200kpa); Eastern Mynkuduk (US$200kpa); Kanzhugan (US$300kpa); South Moinkum (US$300kpa); and Central Moinkum (US$300kpa);
- For ME Ortalyk LLP US$100kpa for each mining contract;
- For RU-6 LLP: South Karamurun (US$260kpa); and North Karamurun (US$100kpa);
- For JV Inkai LLP US$30kpa in total with no sub-deposit subdivision;
- For Semizbai-U LLP: Semizbai (US$100kpa); and Irkol (US$0kpa);
- For JV Akbastau JSC: Budenovskoye, Block 1 (US$150kpa); Budenovskoye, Block 3 and Budenovskoye Block 4 combined (US$250kpa);
- For JV Katco LLP US$30kpa in total with no sub-deposit subdivision; and
- For JV SMCC LLP: Akdala (US$50kpa) and Southern Inkai (US$100kpa).

For all other Mining Subsidiaries there is only one deposit per subsidiary and one mining contract and as such the values apply whilst the operations remain in production.

Table 10-3: Liquidation Fund Closing Balances (31/12/2020)

Mining Subsidiary	Liquidation Fund (KZTm)	(US$m)	Contributions[1] Min	Max	Social (US$kpa)
Operating Properties					
Kazatomprom-SaUran LLP	6,412.9	15.1	1.00	6.77	1,300
ME Ortalyk LLP	1,636.8	3.9	1.00	1.00	200
RU-6 LLP	2,433.0	5.7	1.00	1.00	260
Appak LLP	2,364.2	5.6	1.00	1.00	100
JV Inkai LLP[2]	257.1	0.6	1.00	1.00	30
Semizbai-U LLP	1,533.0	3.6	1.00	1.00	170
JV Akbastau JSC	1,430.8	3.4	1.00	1.00	500
Karatau LLP	1,201.3	2.8	1.00	1.00	140
JV Zarechnoye JSC	1,407.9	3.3	0.10	0.10	50
JV Katco LLP	21,097.1	49.6	1.00	1.00	30
JV Khorassan-U LLP	1,205.0	2.8	1.00	1.00	120
JV SMCC LLP	3,304.8	7.8	0.10	1.00	150
Baiken-U LLP	1,653.5	3.9	1.00	1.00	100
Budenovskoye LLP	107.7	0.3	1.00	1.00	500
Subtotal	**46,045.2**	**108.3**	**0.10**	**6.77**	**3,650**
Advanced Exploration Properties					
Kazatomprom	n/a	n/a	n/a	n/a	n/a
Subtotal	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Total	**46,045.2**	**108.3**			**3,650**
Attributable	**27,829.8**	**65.5**			**2,702**

(1) Liquidation Fund percentages applied to the sum of mining, MET, Mining Depreciation, PGR, GRR gross-up by an assumed 20% margin.

(2) Payments are made annually and make 0.5% of an annual gross profit within the first five years, 1% from an annual gross profit within the next 15 years and 1.5% from an annual gross profit during the period which has remained till the end of working off. At accumulation of sum exceeding US$500k, the Subsoil user will not have the further obligations on payments, and the percent charged for this sum can be used for holding of current reclamation.

10.7.1 Scope of Liquidation Programmes

The Mining Subsidiaries have developed liquidation programmes as required by legislation and mining contracts. The liquidation programmes are prepared to estimate the amount of funds required to settle closure liabilities upon completion of the approved mining contract. Implementation of the Liquidation Programme for an ISR operation typically follows the following:

- Pre-liquidation environmental and radiation surveys;
- Preparation of detailed reclamation and liquidation projects and obtaining required government approvals. This includes actions required to write off the remaining GKZ

System 'reserves' from state balance and may require confirmation drilling and sampling;

- Liquidation of well fields, processing and auxiliary facilities followed by land reclamation;
- Disposal of LLRW and industrial waste from dismantling; and
- Monitoring of the environment during and post closure, and specifically the monitoring of groundwater after closure activities are completed.

The scope of work (Table 10-4) required by legislation includes removal of the facilities and infrastructure tabulated below and subsequent land rehabilitation.

Table 10-4: ISR mine components and respective closure actions

Location	Infrastructure	Closure actions
Closure of wells	• Production and injections wells • Monitoring wells	• Injection of cement and clay mixture into a well to isolate the aquifers • Removal of soil to a depth of 1.0m to 1.5m (treated as LLRW) • Cutting the casing of a well to a depth of 1.0m to 1.5m (treated as LLRW) • Installation of well plug (either timber capping or cement filling) • Filling the void with clean soil • Re-sloping and revegetation of disturbed areas
Technological blocks and wells	• Technological units of acidification and distribution of solutions ("**TUZ**") • Pipelines for transportation of barren\pregnant solutions and sulfuric acid • Electrical equipment, including cabling and equipment • Access roads	• Removal of all equipment from technological units of acidification and distribution of solutions • Removal of all containers where the equipment was installed • Removal of pipelines connecting the units to wells, which includes digging the buried pipelines, removal and cutting of pipelines, backfilling the trenches from excavated pipelines • Removal of electrical equipment including cabling, substations and powerline towers • Re-sloping and revegetation of disturbed areas
Infrastructure connecting technological blocks with processing facilities	• Pregnant solution pipelines (HDPE) • Barren solution pipelines (HDPE) • Sulfuric acid pipelines (steel) • Valve and distribution chambers • Power transmission towers and cabling	• Draining and flushing of the pipelines to remove the residual solution • Excavation of pregnant and barren solutions pipelines (acid pipelines are installed on surface supports rather than being installed underground) • Cutting and transportation of pipelines off-site • Removal of distribution and valve chambers • Backfilling of the trenches and valve chambers with non-contaminated soil • Power transmission towers and cabling removal
Processing sites	• Pregnant and barren solution ponds • Processing facilities and final product preparation and storages • Solutions pumping stations • Chemical storage facilities for sulfuric acid, hydrogen peroxide, ammonia nitrate • Processing site pipelines • Boiler houses and electrical substations and cabling • Warehouses and workshops • Water intake wells, pumping stations and storage facilities	**Solutions ponds:** • Removal of residual solutions and any sediment • Removal of liners • Radiological survey and backfilling the ponds with clean non-contaminated soil • Re-sloping and revegetation of surface areas **Chemicals storage facilities:** • Removal of residual chemicals from tanks and secondary containments • Flushing of pipelines • Dismantling of the facilities and basement • Removal of waste • Re-sloping and revegetation of disturbed areas **Pipelines:** • Removal of aerial pipelines • Removal of buried pipelines and backfilling the trenches with clean soil **Processing plant:** • Shutdown of plant • Draining and cleaning of equipment parts to reduce risk for contamination during dismantling works • Dismantling of all equipment and pipelines (considered to be LLRW and directed to LLRW facility) • Demolition of buildings and slabs • Radiological survey of the process plant demolition waste and plant area
Auxiliary site infrastructure and buildings	• Administrative offices, shift camps (if applicable), canteens and change rooms • Sewage water treatment facilities and ponds • Industrial and domestic waste management and disposal facilities • Open storage yards, roads, garages, fuel storage and	• These facilities are removed when the rest of the closure works are complete • If possible, these facilities can be transferred to a third parties for subsequent use • If there is no post closure user of the facilities then the buildings are demolished and the waste is treated non-

Location	Infrastructure	Closure actions
	distribution facilities	radioactive waste and is disposed on in industrial landfill after chemical and radiological survey
LLRW disposal facilities (if applicable to a specific site).		• Closure of the cells and radiological surveys for confirmation of safety

All closure actions must be supplemented with radiological surveys to ensure that no contaminated waste is misplaced. Creation of a temporary site to store LLRW from facilities demolition and contaminated equipment is required to accommodate the waste generated before it is sent to LLRW facility.

Active reclamation of groundwater in production aquifers is not required by legislation and is not included into the liquidation programmes but extended periods of groundwater monitoring to assess the recovery of water quality are part of the liquidation programmes.

LLRW Management and Disposal

Material management is a critical activity to comply with the objectives of cost and time associated to decommissioning projects. The availability of treatment processes and suitable facilities for material management on-site, such as disposal locations for the radioactive wastes to be generated, is essential to assure the success of a project.

The waste generated by the dismantling must be managed taking in account the acceptance criteria existing at the storage and/or treatment centres. It is important to be familiar with all the flows of material to be managed and to ensure that they are all properly documented and authorised, so that waste can be dispatched from the site as soon as possible.

The ISR operations liquidation programmes have different assumptions on the amount of waste generated during decommissioning works of wellfields and processing facilities. Several of the operations use a conservative approach and consider that all equipment that was in contact with uranium bearing solutions or uranium products is considered to be LLRW and decontamination process is not efficient to separate the radioactive and non-radioactive waste with required level of precision which may pose risk to the environment and public safety.

Metal LLRW is currently not supposed to be disposed of in LLRW facilities. Some companies rely on transferring radioactive metal wastes to Kazmetrao, a third-party company that provides decontamination services for various types of LLRW metal waste. No further details are available on the efficiency of decontamination and the final destination of decontaminated metal (the Kazmetrao products).

The LLRW facilities that are owned by the Company and supposed to receive the waste from closure works. The total capacity of the existing facilities is lower than required to accommodate all future LLRW that will be generated during closure of the Company's operations. Expanding the LLRW facilities will incur additional costs during closure. The cost of construction of an additional 80,000m^3 cell at Stepnoye LLRW facility was estimated to be KZT207m in 2014. The Inkai liquidation programme considers increasing the capacity of its own LLRW facility to accommodate the liquidation wastes. The expected cost of increasing the Inkai LLRW facility as per the liquidation programme is estimated at KZT281m to increase capacity from 10,000m^3 to 66,000m^3.

The Company's vision for the management of the LLRW during closure of the Mineral Assets comprises development of an internal standard that defines procedures on liquidation of mining operations, specifically:

- The standard prescribes that the owner of the each LLRW storage facility has to make forecasts of the LLRW that it will accept for next three to five years (with annual corrections) to facilitate creation of additional storage space for waste to be accommodated as required;

- When a mine is approaching end of LoM it will develop an actual liquidation project where the amount of closure LLRW is defined – this information is then provided to the owner of the facility who is responsible for creation of additional disposal capacity by expanding the existing facilities. The construction work is either financed from the LLRW facility owner's budget or requesting required amounts of financial resources from the Company; and
- An independent company, Kazmetrao, will receive and decontaminate metal LLRW.

Some operations include decontamination of equipment and piping as a strategy to reduce the amount of LLRW generation during closure. However, the efficiency of decontamination is not clear and influences the amount of LLRW for disposal.

10.7.2 ARO Physical and Cost Category Breakdown Structure

The ARO cost as developed for each of the Mineral Assets incorporates assumptions for determination of physical quantities to which unit rates are applied, however these can vary on an asset specific level. The following summarises the key components relied upon and reflects the level of detail relied upon in support of the ARO closure cost estimates.

Physical Input Volumes

- **Costs for the closure of the geotechnical polygons ("GTP"):**
  - Elimination of wells: number of downloadable (including observational) and pumping wells,
  - Technological blocks removal: number of technological blocks,
  - Pipelines removal: total length of pregnant solution pipelines ("**PS**"), barren solution pipelines ("**BP**"), repair and recovery solution pipeline ("**RRS**") and acid pipelines; total length of trenches of PS, BS, RRS pipelines; mass of acid pipelines removal; mass of acid pipeline supports removal; number of valve chambers; length of power line cables; number of power transmission lines,
  - Reclamation of the GTP surface: based on the number of technological units;
- **Dismantling of processing facilities and infrastructure** - on the basis of volume data, mass of concrete slabs, mass of equipment, area of disturbed land in the following categories: process buildings; pump stations; chemical facility; conventional buildings; hard surface coating; sand ponds; pipelines/engineering networks; profiling and restoration of the vegetation layer of the infrastructure sites;
- **Waste Management (low level radioactive waste: "LLRW"):**
  - Formation of LLRW from closure of wells: based on the specific formation by the number of wells,
  - Formation of the LLRW from the dismantling of technological blocks, per 1 unit: specific formation per 1 block and number of blocks,
  - The formation of the LLRW from the dismantling of pipelines: based on the length of the pipelines PS, BS, RRS according to specific indicators of formation of the LLRW; and based on the number of valve chambers and the specific formation of the LLRW in the dismantling of the valve chambers\wells,
  - The formation of the LLRW from the dismantling of buildings and equipment: mass of LLRW from buildings and concrete slabs dismantling; mass of the LLRW equipment,
  - Disposal of LLRW in LLRW disposal facilities, including the cost of transfer for disposal and transportation: calculated on the basis of single quotations and the total mass of the formation of the LLRW in all categories; and
- **Costs for monitoring and control after conservation:**

  - Based on unitary pricing and assumptions for: numbers of complete monitoring cycles 5 years after preservation; number of years of groundwater monitoring; and vegetation maintenance duration.

Cost Category Unit Rates

- **Costs for the closure of the wellfields:**
  - Closure of wells - the cost of closure of 1 well is formed from the cost of the following categories of costs required for closure: materials (bentonite, cement, water); salary of staff (driller, driller assistant, driver); fuel equipment (well repair facility, excavator, shovel/loader),
  - Dismantling of technological units - calculation is made on the basis of cost: equipment rental (equipment rental price per day including fuel, operating time of equipment, coefficient of equipment use); human resources (daily rate, duration of work, number of staff required),
  - Pipelines removal: earthwork and backfilling to a depth of 2m; average cost per unit of pipeline cutting; the average cost per unit of acid line piping removal; the cost per unit of removal of acid pipe supports; average cost of dismantling valve chambers; dismantle of power line cables; dismantling of transmission line supports,
  - Reclamation of the GTP surface: the average area of the 1st technological block; area of disturbed lands 1 block; the cost of remediation per 1m^2;
- **Dismantling of processing facilities and infrastructure** on the basis of volume units, the mass of building structures, the mass of equipment and the area of disturbed land for reclamation by the following main types of facilities: process buildings; pump stations; chemical facility; conventional buildings; hard surface coating; sand ponds; pipelines / engineering networks; and profiling and restoration of the vegetation layer of the infrastructure sites;
- **Waste Management (LLRW):**
  - Formation of LLRW from closure of wells: the percentage of wells with the formation of LLRW; development of LLRW soil from 1 well as measured in tonnes; generation of radioactive waste in the dismantling of wellheads (1m of HDPE casing);
  - The formation of the LLRW from the dismantling of technological blocks, per 1 unit according to the specific formation of the mass: pipes; equipment; containers; contaminated soil,
  - The formation of the LLRW from the dismantling of pipelines: specific mass of pipelines (PS, PR, RRS) per 1km according to the assumption of the formation of LLRW; specific formation of the LLRW when dismantling valve chambers \ wells per 1 chamber \ well;
  - The formation of the LLRW from the dismantling of buildings and equipment: weight of LLRW from buildings and concrete slabs dismantling; weight of the LLRW equipment;
  - Disposal of the LLRW in LLRW disposal facilities, including the cost of transfer for disposal and transportation: cost of disposal per t of LLRW; transportation distance to LLRW facility; the cost of transportation to the LLRW test site; and
- **Post closure monitoring and control costs** - were provided and accounted for individually by the Mining Subsidiaries due to differences in the configuration and area of enterprise facilities, the assumptions for monitoring and the need to maintain the restoration of vegetation after reclamation:
  - Cost of a full monitoring cycle 5 years after closure,
  - Groundwater monitoring per year,

- Maintenance of vegetation restoration in rehabilitated areas in year.

10.7.3 Closure Liability Estimates

The closure liability estimates as reported herein are derived from the Mine Closure Workbooks for the determination of both ARO and LoMp Mine Closure related environmental liabilities. The estimates as presented are subject to the limitations noted in Section 10.7 above. As such SRK notes that these estimates can be considered as scoping/conceptual level estimates which can be improved through application of the newly developed ARO standard as well as addressing the limitations noted above. Subject to these limitations, SRK considers that the closure costs estimated in liquidation programmes present a good basis to assess the closure liabilities of the Mining Subsidiaries. Whilst the liquidation programmes have detailed description of scope of work, basis for calculation of the liabilities and description of assumptions used to estimate the amount of work, these remain essentially 'inventory' style estimates and remain limited specifically given the absence of a cost estimate which is underpinned by an engineered design, scheduled activities to address all decommissioning, rehabilitation and monitoring and detailed cost estimates. A key limitation noted is the lack of detailed site specific investigations to assess the extent to which the immediate soils and sub-strata including groundwater may have been contaminated in the immediate vicinity of wellfield and processing operations. In general, it should be noted that the operations are relatively remote and despite these limitations are unlikely to impact adversely on local populations and any substantive distances from the immediate vicinity of the operations. This aside in order to address any potential risks further investigations are required to be completed.

The Company's current focus in respect of liability estimates is limited to the ARO determinations as presented herein, and other than that assessed in the initial Liquidation Programme determination as such there is no substantive focus on the LoMp closure costs relating to depletion of the Ore Reserves as reported herein. This is a specific weakness which would also benefit from the development of a similar Companywide standard developed for ARO estimates in 2020.

However, there is potential to improve these to reduce risks of underestimated closure liabilities:

- There is no unified approach to closure liabilities assessment across the Mineral Assets. This complicates auditing and management of closure liabilities for the Mineral Assets;
- All operations do have liquidation programmes or liquidation cost estimates that assess the LoM closure liabilities at a moment in time, however they are not updated regularly to reflect the change in liabilities due to economic changes (cost of fuel, manpower, closure materials etc.) and changes in production plans that alter the amount of infrastructure to be removed. Mine development projects have changed since the Liquidation Programmes were initially developed without updating the liquidation programmes;
- The scope of work that is included into Liquidation Programmes does not always include dismantling of processing equipment and related estimation of LLRW that will be generated and disposed of. This is one of the key cost component of closure liabilities;
- The Liquidation Programmes do not account for the cost of expansion of LLRW disposal facilities that will be required to accommodate the waste generated during closure of operations; and
- None of Mineral Assets have reached closure stage thus limited specific experience on closure of wellfields and processing facilities is available. Notwithstanding this statement, SRK notes that at Kazatomprom-SaUran LLP wellfield operations have now ceased at Uvanas and South Moinkum, however the development of detailed mine closure plans other

than that reflected in the approved Liquidation Programmes has not yet advanced in respect of detailed planning and implementation.

The existing closure costs prepared in liquidation programmes were derived using a combination of national cost estimation norms and methodology for various construction works, site specific assumptions on equipment and manpower productivity and actual data from third parties.

SRK's approach to assessment of closure liabilities for the Mineral Assets included preparation of the closure costs based on information available from technical documentation, data requests regarding site infrastructure and unit costs for various activities to develop the closure costs. With the exception of a few Mining Subsidiaries, these rates have essentially been indexed in accordance with KZ CPI since 30 June 2018 and as such are not supported by updated current quotes from third-party suppliers lor first principal operator estimates. As such the estimates of the LoMp determinations reflect a degree of risk which may not be accounted for in the generic 10% contingency assumption applied.

At the time of the original base analysis completed in 2018 H1, the assumptions and approach developed for JV Katco LLP were recognised as being the most aligned with international practice, specifically as:

- the closure approach follows internal requirements of Orano that follow international guidelines;
- the closure approach is developed by a multidisciplinary internal group on closure planning that includes representatives of technical, financial and environmental, health and safety departments;
- the closure cost estimation approach uses actual costs of manpower, materials, site specific productivity of personnel and equipment; and
- estimation of processing facilities and auxiliary buildings dismantling costs is based on data from technical passports of the facilities and unit costs for dismantling calculated in cost estimation software per unit of volume of facilities, concrete slabs and equipment weight.

The standardised closure unit costs that have recently been developed for the Mineral Assets and applied for estimation of liabilities of all operations include:

- **liquidation of injecting and producing wells:** materials costs, equipment and fuel costs, and manpower cost;
- **liquidation of technological blocks:** TUZ dismantling, pipelines removal and waste transportation off-site;
- **pipelines and infrastructure removal:** excavation, cutting costs; valve chamber removal, powerlines and transmission towers removal costs;
- re-sloping of disturbed wellfield areas;
- **decommissioning and dismantling:** processing facilities and auxiliary infrastructure including determination of volume of buildings, concrete slab volume, equipment weight;
- **LLRW disposal:** transportation costs, disposal costs; and
- **post-closure monitoring and controls:** groundwater monitoring and vegetation maintenance.

SRK estimates do not include miscellaneous costs related to types of works for which data was not readily available or constitutes non-material cost. A contingency of 10% was applied to the cost estimates of ARO closure liabilities to account for scoping nature of the estimates. The estimates of ARO closure costs do not include the labour termination costs which are included into LoM plan models separately based on one-month labour costs of the entire workforce on closure.

The resulting closure costs are higher than those in the liquidation programmes and demonstrate that it is necessary to update the liquidation programmes estimates to reflect the potential changes in project design, missing closure cost components and up to date costs of various activities required to settle the closure liabilities. Table 10-5 and Table 10-7 below summarises information regarding ARO and LoMp closure liabilities of the Mineral Assets respectively:

- Asset Retirement Obligation determinations as of 31 December 2021:
  - a total liability of KZT106,451.2m (US$250.5m) and on an equity attributable basis KZT71,951.3m (US$169.3m),
  - Liquidation Fund closing balance as of 31 December 2021 as provided by the Company which total KZT46,045.2m (US$108.3m) and on an equity attributable basis KZT27,829.8m (US$65.5m),
  - overall total funding shortfall of KZT60,406.0m (US$142.1m) and on an equity attributable basis KZT44,121.5m (US$103.8m); and
- Life of Mine plan Mine Closure determinations as of 31 December 2021:
  - a total liability of KZT264,273.3m (US$621.8m) and on an attributable basis KZT165,298.3m (US$388.9m),
  - Liquidation Fund closing balance as of 31 December 2021 as provided by the Company which total KZT46,045.2m (US$108.3m) and on an equity attributable basis KZT27,829.8m (US$65.5m),
  - overall total funding shortfall of KZT218,228.1m (US$513.5m) and on an equity attributable basis KZT137,468.5m (US$323.5m). Note that in this scenario on cessation of mining operation the total funding shortfall will be further reduced by assumed continued contributions to the Liquidation Fund which are further assessed in Section 11 of this CPR.

Table 10-5: Mineral Assets ARO and Liquidation Fund Closing Balances

Mining Subsidiary	ARO (KZTm)	(US$m)	Liquidation Fund (KZTm)	(US$m)	Excess (Shortfall) (KZTm)	(US$m)
Operating Properties						
Kazatomprom-SaUran LLP	13,697.9	32.2	6,412.9	15.1	(7,285.0)	(17.1)
ME Ortalyk LLP	5,224.9	12.3	1,636.8	3.9	(3,588.1)	(8.4)
RU-6 LLP	19,211.4	45.2	2,433.0	5.7	(16,778.4)	(39.5)
Appak LLP	4,228.6	9.9	2,364.2	5.6	(1,864.4)	(4.4)
JV Inkai LLP	8,741.0	20.6	257.1	0.6	(8,483.9)	(20.0)
Semizbai-U LLP	6,141.1	14.4	1,533.0	3.6	(4,608.1)	(10.8)
JV Akbastau JSC	3,915.2	9.2	1,430.8	3.4	(2,484.5)	(5.8)
Karatau LLP	4,126.4	9.7	1,201.3	2.8	(2,925.1)	(6.9)
JV Zarechnoye JSC	2,234.3	5.3	1,407.9	3.3	(826.3)	(1.9)
JV Katco LLP	24,285.6	57.1	21,097.1	49.6	(3,188.5)	(7.5)
JV Khorassan-U LLP	2,865.5	6.7	1,205.0	2.8	(1,660.5)	(3.9)
JV SMCC LLP	8,721.6	20.5	3,304.8	7.8	(5,416.8)	(12.7)
Baiken-U LLP	3,057.7	7.2	1,653.5	3.9	(1,404.2)	(3.3)
Budenovskoye LLP	-	-	107.7	0.3	107.7	0.3
Subtotal	**106,451.2**	**250.5**	**46,045.2**	**108.3**	**(60,406.0)**	**(142.1)**
Advanced Exploration Properties						
Kazatomprom	-	-	-			
Total	**106,451.2**	**250.5**	**46,045.2**	**108.3**	**(60,406.0)**	**(142.1)**
Attributable	**71,951.3**	**169.3**	**27,829.8**	**65.5**	**(44,121.5)**	**(103.8)**

Table 10-6: Mineral Assets LoMp Mine Closure Costs and Liquidation Fund Closing Balances

Mining Subsidiary	LoMp (KZTm)	(US$m)	Liquidation Fund (KZTm)	(US$m)	Excess (Shortfall) (KZTm)	(US$m)
Operating Properties						
Kazatomprom-SaUran LLP	25,189.5	59.3	6,412.9	15.1	(18,776.6)	(44.2)
ME Ortalyk LLP	16,577.1	39.0	1,636.8	3.9	(14,940.2)	(35.2)
RU-6 LLP	26,632.9	62.7	2,433.0	5.7	(24,199.9)	(56.9)
Appak LLP	8,697.6	20.5	2,364.2	5.6	(6,333.5)	(14.9)
JV Inkai LLP	31,139.7	73.3	257.1	0.6	(30,882.6)	(72.7)

Mining Subsidiary	LoMp (KZTm)	(US$m)	Liquidation Fund (KZTm)	(US$m)	Excess (Shortfall) (KZTm)	(US$m)
Semizbai-U LLP	14,521.9	34.2	1,533.0	3.6	(12,988.9)	(30.6)
JV Akbastau JSC	15,414.0	36.3	1,430.8	3.4	(13,983.3)	(32.9)
Karatau LLP	9,301.8	21.9	1,201.3	2.8	(8,100.5)	(19.1)
JV Zarechnoye JSC	4,345.1	10.2	1,407.9	3.3	(2,937.2)	(6.9)
JV Katco LLP	25,531.5	60.1	21,097.1	49.6	(4,434.4)	(10.4)
JV Khorassan-U LLP	8,013.2	18.9	1,205.0	2.8	(6,808.2)	(16.0)
JV SMCC LLP	29,663.7	69.8	3,304.8	7.8	(26,358.9)	(62.0)
Baiken-U LLP	6,308.7	14.8	1,653.5	3.9	(4,655.3)	(11.0)
Budenovskoye LLP	42,936.5	101.0	107.7	0.3	(42,828.8)	(100.8)
Subtotal	**264,273.3**	**621.8**	**46,045.2**	**108.3**	**(218,228.1)**	**(513.5)**
Advanced Exploration Properties						
Kazatomprom	-	-	-	-	-	-
Total	**264,273.3**	**621.8**	**46,045.2**	**108.3**	**(218,228.1)**	**(513.5)**
Attributable	**165,298.3**	**388.9**	**27,829.8**	**65.5**	**(137,468.5)**	**(323.5)**

The total retrenchment costs (Table 10-7) as of 31 December 2021 report a total of KZT4,392.1m (US$10.3m) and KZT2,549.4m (US$6.0m) reported on an equity attributable basis. Incorporating these estimates into the total Environmental and Social Liabilities results in:

- a total ARO of KZT110,843.2m (US$260.8m) and KZT74,491.7m (US$175.3m) on an equity attributable basis; and
- a total LoMp of KZT268,656.4m (US$632.1m) and KZT167,838.8m (US$394.9m) on an equity attributable basis. Note that in this scenario on cessation of mining operation the total funding shortfall will be further reduced by assumed continued contributions to the Liquidation Fund which are further assessed in Section 11 of this CPR.

Table 10-7: Mineral Assets Retrenchment, ARO (including Retrenchment) and LoMp Mine Closure Costs (including Retrenchment)

Mining Subsidiary	Retrenchment (KZTm)	(US$m)	ARO + Retrenchment (KZTm)	(US$m)	LoMp + Retrenchment (KZTm)	(US$m)
Operating Properties						
Kazatomprom-SaUran LLP	214.8	0.5	13,912.7	32.7	25,404.2	59.8
ME Ortalyk LLP	284.0	0.7	5,508.9	13.0	16,861.1	39.7
RU-6 LLP	177.3	0.4	19,388.6	45.6	26,810.1	63.1
Appak LLP	130.2	0.3	4,358.8	10.3	8,827.9	20.8
JV Inkai LLP	598.3	1.4	9,339.2	22.0	31,738.0	74.7
Semizbai-U LLP	104.6	0.2	6,245.7	14.7	14,626.5	34.4
JV Akbastau JSC	26.4	0.1	3,941.7	9.3	15,440.5	36.3
Karatau LLP	417.1	1.0	4,543.5	10.7	9,718.9	22.9
JV Zarechnoye JSC	169.4	0.4	2,403.7	5.7	4,514.5	10.6
JV Katco LLP	546.0	1.3	24,831.7	58.4	26,077.5	61.4
JV Khorassan-U LLP	25.6	0.1	2,891.1	6.8	8,038.8	18.9
JV SMCC LLP	412.6	1.0	9,134.2	21.5	30,076.3	70.8
Baiken-U LLP	379.5	0.9	3,437.1	8.1	6,688.2	15.7
Budenovskoye LLP	897.4	2.1	897.4	2.1	43,833.9	103.1
Subtotal	**4,383.2**	**10.3**	**110,834.3**	**260.8**	**268,656.4**	**632.1**
Advanced Exploration Properties						
Kazatomprom	-	-	-	-	-	-
Total	**4,383.2**	**10.3**	**110,834.3**	**260.8**	**268,656.4**	**632.1**
Attributable	**2,540.5**	**6.0**	**74,491.7**	**175.3**	**167,838.8**	**394.9**

Further analysis of the total funding shortfall for the Environmental and Social Liabilities inclusive of retrenchment report:

- For the ARO scenario a total of KZT64,789.2m (US$152.4m) and KZT46,661.9m (US$109.8m) on an equity attributable basis; and
- For the LoMp scenario a total of KZT222,611.3m (US$523.8m) and KZT140,009.0m (US$329.4m) on an equity attributable basis

Table 10-8: Mineral ARO and LoMp Mine Closure Cost Excess/(Shortfall)

Mining Subsidiary	ARO Excess/(Shortfall) (KZTm)	(US$m)	LoMp Excess/(Shortfall)(1) (KZTm)	(US$m)
Operating Properties				
Kazatomprom-SaUran LLP	(7,499.8)	(17.6)	(18,991.3)	(44.7)
ME Ortalyk LLP	(3,872.1)	(9.1)	(15,224.2)	(35.8)
RU-6 LLP	(16,955.6)	(39.9)	(24,377.1)	(57.4)
Appak LLP	(1,994.6)	(4.7)	(6,463.7)	(15.2)
JV Inkai LLP	(9,082.1)	(21.4)	(31,480.9)	(74.1)
Semizbai-U LLP	(4,712.7)	(11.1)	(13,093.5)	(30.8)
JV Akbastau JSC	(2,510.9)	(5.9)	(14,009.7)	(33.0)
Karatau LLP	(3,342.2)	(7.9)	(8,517.6)	(20.0)
JV Zarechnoye JSC	(995.7)	(2.3)	(3,106.6)	(7.3)
JV Katco LLP	(3,734.6)	(8.8)	(4,980.4)	(11.7)
JV Khorassan-U LLP	(1,686.1)	(4.0)	(6,833.7)	(16.1)
JV SMCC LLP	(5,829.4)	(13.7)	(26,771.5)	(63.0)
Baiken-U LLP	(1,783.6)	(4.2)	(5,034.7)	(11.8)
Budenovskoye LLP	(789.7)	(1.9)	(43,726.2)	(102.9)

Mining Subsidiary	ARO Excess/(Shortfall) (KZTm)	(US$m)	LoMp Excess/(Shortfall)[1] (KZTm)	(US$m)
Subtotal	**(64,789.2)**	**(152.4)**	**(222,611.3)**	**(523.8)**
Advanced Exploration Properties				
Kazatomprom	-	-	-	-
Total	**(64,789.2)**	**(152.4)**	**(222,611.3)**	**(523.8)**
Attributable	**(46,661.9)**	**(109.8)**	**(140,009.0)**	**(329.4)**

(1) Note that in this scenario on cessation of mining operation the total funding shortfall will be further reduced by assumed continued contributions to the Liquidation Fund which are further assessed in Section 11 of this CPR.

Table 10-9 presents a summary of the evolution of the ARO estimates from the initial IPO estimates determined as on 30 June 2018 through to 31 December 2021. The key observations in respect of these estimates are as follows:

- the ARO estimates as presented do not yet benefit from application of the recently developed group standard in all instances;
- Whilst the general inflationary index from 1 July 2018 through to 31 December 2021 indicates a factor of 1.27 reflecting a 27% increase, there are a number of estimates which continue to reflect overall increases which are less than this, notably: Kazatomprom-SaUran LLP (8.4%), Semizbai-U LLP (21.3%), JV Akbastau JSC (15.1%); Karatau LLP (6.8%) and JV SMCC LLP (10.2%). Given that a number of the ARO estimates in respect of unit rates reflect relatively low increases in overall expenditures when compared to general indexation there is a risk that following completion of re-quotation/estimation based on 2021/2022 estimates that the total estimate may require to be increased by approximately 18%;
- Over time a general degree of inconsistency has evolved in the approach specifically when considering unit rate assumptions for physical and unit rate expenditure assumptions and the assumed period for post closure monitoring of groundwater and vegetation maintenance;
- In certain instances, a number of unit rate assumptions are applied on the basis of an unit rate per technological block. Whilst the assessment of the number of technological blocks are relatively well known for input to the ARO scenarios the determination for the LoMp scenarios are less accurate given that subdivision of geological blocks into technological blocks largely occurs at the stage of wellfield drilling in readiness for implementation of extraction. Furthermore, the overall area of technological blocks are not entirely consistent as such it would be more prudent to consider/assess the merits of application of expenditure rates based per area per individual site;
- The determinations for JV Katco LLP have increased appreciably over time and this is generally attributed to a more detailed integrated approach in addition to the application of updated unit expenditure assumptions;
- The recent increase for RU-6 LLP is significantly impacted by a significant increase in the total area required to be profiled and revegetated in respect of the processing facilities and is currently reported at 2,173ha;
- Given the cessation of wellfield operations at two of the deposits at Kazatomprom-SaUran LLP the development of detailed closure programmes with accompanying planned and scheduled activities and expenditures has not fully progressed to completion. Assuming that this will ultimately include updated and current market quotes from third parties this would serve as a useful basis for benchmarking indexed assumptions and other Mining Subsidiary estimates as appropriate; and
- For certain exploration properties and development properties no specific assessment of associated environmental liabilities have yet been undertaken to remedy any disturbance incurred to date. Whilst by comparison to the operating mines these will be limited this is an omission which should be incorporated into the Company’s environmental and social liability assessments. The extent to which these are then formally classified as ARO estimates is a

separate consideration, however in respect of total liabilities this warrants further investigation and technical analysis to at the very least incorporate within the current life of asset or Life of Mine plan determinations.

Table 10-9: ARO evolution (2018 (IPO) through 2021 inclusive

Mining Subsidiary	2018 (IPO) (KZtm)	2018 (KZtm)	2019 (KZtm)	2020 (KZtm)	2021 (KZtm)
Operating Properties					
Kazatomprom-SaUran LLP	12,633.1	12,873.4	12,854.7	13,350.2	13,697.9
Ortalyk LLP	3,734.1	3,849.1	4,201.2	4,374.6	5,224.9
RU-6 LLP	6,448.9	6,692.4	6,873.0	6,927.2	19,211.4
Appak LLP	2,724.2	2,827.6	3,003.4	3,869.8	4,228.6
JV Inkai LLP	5,615.9	6,365.4	7,263.7	7,925.9	8,741.0
Semizbai-U LLP	5,063.4	5,204.7	5,539.2	5,877.3	6,141.1
JV Akbastau JSC	3,402.0	3,749.8	3,690.1	3,873.0	3,915.2
Karatau LLP	3,863.9	3,937.8	4,019.1	4,073.4	4,126.4
JV Zarechnoye JSC	1,355.4	1,483.8	1,432.0	1,680.0	2,234.3
JV Katco LLP	9,293.1	9,444.6	14,843.5	16,757.6	24,285.6
JV Khorassan-U LLP	1,904.6	2,143.2	2,282.0	2,467.2	2,865.5
JV SMCC LLP	7,912.6	8,309.3	8,396.8	8,672.4	8,721.6
Baiken-U LLP	2,293.8	2,529.7	2,755.0	2,983.2	3,057.7
Budenovskoye LLP	-	-	-	-	-
Subtotal	**66,245.1**	**69,410.8**	**77,153.5**	**82,831.8**	**106,451.2**
Advanced Exploration Properties					
Kazatomprom	-	-	-	-	-
Total	**66,245.1**	**69,410.8**	**77,153.5**	**82,831.8**	**106,451.2**
Attributable	**43,933.1**	**45,832.2**	**50,014.2**	**53,346.0**	**71,951.3**

Table 10-10 presents a summary of the assessment of the LoMp estimates from the initial IPO estimates determined as on 30 June 2018 and 31 December 2021. The key observations in respect of these estimates are as follows:

- Where unchanged by recent re-assessments all unit costs have been indexed from 1 July 2018 through to 31 December 2021 assuming an CP related indexation factor of 1.27. The total weighted average increase in the total LoMp Mine Closure cost is noted at a factor of 1.45 or 45%, however this is the net result of the combined impact of unit cost indexation, depletion and addition of Ore Reserves, production expansion and assumed construction and commissioning of development projects as noted below;
- Certain of the Mineral Assets have only noted depletion with limited additional Ore Reserves. In these instances, the increase in expenditures is to a degree countered by the reduced quantum of waste production an related treatment. In contrast there are a number of specific assets which are also impacted by:
  - increased quantum of Ore Reserves which results in not only increased wellfield operations (number of wells required to be constructed and rehabilitated) but also requirement for increased processing of waste production,
  - expansion programmes which assume increased production through establishment of expanded wellfield operations and processing facilities (ME Ortalyk LLP at 2,500tU by 1 January 2025 expanding to 2,900tU by 2030; JV Inkai at 4,000tU by 1 January 2024; Karatau LLP at 3,600tU by 1 January 2025; and JV Khorassan-U LLP at 2,200tU by2026),
  - assumed implementation of new development projects such as Budenovskoye LLP which assumes the construction of a new mining and processing operation with construction completion in Q4 2024 and attaining a total production capacity of 6,000tU per annum attained by 1 January 2026; and
- Similar comments equally apply to certain unit rate assumptions and the lack of 2022 money terms requoted/re-estimated unit expenditure assumptions when compared to the generally indexed based current assumptions. In this instance there remains some risk that the derived expenditures may be understated specifically as certain cost elements have increased in excess of general inflation in Kazakhstan.

Table 10-10: LoMp Mine Closure evolution (2018 (IPO) and 2021

Mining Subsidiary	2018 H2 (KZtm)	2021 (KZtm)	Variance (KZtm)	(%)
Operating Properties				
Kazatomprom-SaUran LLP	18,590.7	25,404.2	6,813.6	36.7
Ortalyk LLP	4,841.1	16,861.1	12,019.9	248.3
RU-6 LLP	8,979.4	26,810.1	17,830.8	198.6
Appak LLP	5,604.2	8,827.9	3,223.7	57.5
JV Inkai LLP	8,339.7	31,738.0	23,398.2	280.6
Semizbai-U LLP	9,819.1	14,626.5	4,807.4	49.0
JV Akbastau JSC	7,256.8	15,440.5	8,183.7	112.8
Karatau LLP	7,017.9	9,718.9	2,700.9	38.5
JV Zarechnoye JSC	2,995.8	4,514.5	1,518.7	50.7
JV Katco LLP	12,172.0	26,077.5	13,905.5	114.2
JV Khorassan-U LLP	5,666.8	8,038.8	2,371.9	41.9
JV SMCC LLP	14,102.0	30,076.3	15,974.3	113.3
Baiken-U LLP	4,012.7	6,688.2	2,675.5	66.7
Budenovskoye LLP	-	43,833.9	43,833.9	-
Subtotal	**109,398.3**	**268,656.4**	**159,258.1**	**145.6**
Advanced Exploration Properties				
Kazatomprom	-	-		
Subtotal				
Total	**109,398.3**	**268,656.4**	**159,258.1**	**145.6**
Attributable	**69,835.1**	**167,838.8**	**98,003.7**	**140.3**

In general, there are elements of the ARO and LoMp closure estimates for certain of the Mining Subsidiaries which are not supported by detailed closure plan designs, scheduled activities and current on-market third party quotes. Specifically in respect of the decommissioning, demolition and rehabilitation of processing infrastructure the level of general contingency at 10% is considered to be too low and specifically for the LoMp estimates it may be appropriate to increase this to an overall contingency of 25%. Notwithstanding the above it is also apparent that the contribution to liabilities from wellfield rehabilitation comprises approximately 25% of all expenditures with the balance being largely focused on decommissioning of processing facilities (ARO – 30%; LoMp – 15%) and waste management (ARO – 40%; LoMp 55%). As such and assuming that further site specific investigations do not identify the need for other pollution mitigation actions (groundwater abstraction and treatment) then the most significant uncertainty is directly related to the estimation of the decommissioning of the processing facilities and associated infrastructure. In this instance increasing the contingency to 25% would generally result in an overall increase of approximately 13% to 15%.

10.7.4 Key Mine Closure Risks Identified

Uranium ISR operations have certain risks at closure that have to be investigated and as appropriate technically re-assessed to enable the development of appropriately detailed closure plans in accordance with international best practice. Accordingly, the successful implementation of mine closure programmes which assure environmental and public safety is contingent on these items being appropriately addressed during subsequent mine closure updates:

- **Liquidation Programme/Mine Closure Programme development:**
  - site specific investigation of potential sub-soil, sub-strata and groundwater contamination in the vicinity of wellfield operations, processing facilities and associated infrastructure,
  - se-assessment of all assumed unit rates and other expenditure assumptions based on 2022 quotations and as appropriate third party suppliers,
  - re-assessment of common unified factors (physical) and as necessary implementation of local site specific factors where warranted with specific focus on: assumed post closure management/monitoring/maintenance periods; unit rates applied to determine waste volumes to be ultimately treated from wellfield operations and processing/other infrastructure,
  - comparative re-evaluation of the current Liquidation Programme assumptions, ARO and LoM Closure estimates based on the recent updates completed in respect of JV Katco LLP,

  - completion of detailed engineering designs, scheduled activities and expenditures to establish a minimum of PFS estimates for all Mine Closure programmes; and
  - incorporation of element specific contingencies which reflect the appropriate degree of uncertainty specifically where investigations and the level of design, estimation and scheduling of activities has not been completed to PFS level; and
- **Implementation of Mine Closure Programmes:**
  - failure to properly close injection\pumping\monitoring wells may result in water infiltration to adjacent aquifers,
  - insufficient monitoring to demonstrate improvement in groundwater quality with time and, ultimately, attainment of pre-mining groundwater chemistry conditions,
  - LLRW management at closure, specifically: improper handling of contaminated waste resulting in exposure of personnel and public to ionizing radiation post closure; lack of capacity in existing LLRW storage facilities to accommodate all waste from the Mineral Assets upon closure at the end of LoM resulting in additional expenditures for expansion; limited of capacity of Kazmetrao to accept large quantities of metal LLRW for decontamination arising from mine closure; and unauthorised use of contaminated equipment\materials by third parties,
  - poor revegetation rates requiring extended periods of vegetation maintenance, and
  - social impacts related to closure of operations and retrenchment of personnel upon closure.

10.8 Conformance with International Standards

This section reviews the conformance of the Company's ESHS management at its ISR mines with international good practice as defined by the International Finance Corporation ("**IFC**") Performance Standards ("**PS**") on Environmental and Social Sustainability (2012) and the relevant Work Bank Group ("**WBG**") Environmental Health and Safety Guidelines ("**EHSG**") which date to 2007 at the time of authoring the 2018 CPR. For uranium mining operations, the IAEA Safety Standards and IAEA Security Series are also relevant. This section begins with a comment on how relevant Kazakhstan legislation aligns with international good practice and then focuses on the Company's ESHS management.

The following details reflect that reported by SRK in 2018 and are included as a matter of historical fact. This assessment was subsequently utilised to inform the agreed action plan developed during the IPO process; however, the current status of items to be addressed in the action plan have not been updated as part of this CPR.

10.8.1 Status of Relevant Law in Kazakhstan

The IFC PS and the WBG EHSG are applied by financiers when reviewing projects and operations in all countries other than designated countries identified by the Equator Principles. These standards and guidelines are not applied to designated countries on the grounds they have adequate legislation and institutional capacity to protect their people and the natural environment. For designated countries, the review only focuses on compliance with relevant host country laws, regulations and permits. The designated countries comprise most of the member countries of the Organisation for Economic Co-operation and Development ("**OECD**").

Kazakhstan is not a designated country but aspires to become a member of the OECD, it participates in a country programme with the OECD and agencies of the OECD (http://equatorprinciples. com/designated-countries/).

Since Kazakhstan became independent it has worked with international agencies to align legislation with international good practice and to observe obligations in international legal instruments that it has signed. Legal reforms were given additional impetus by the Kazakhstan 2050 Strategy, announced by the President in 2012, which aims to make the country one of the top 30 most developed countries by 2050. There has been extensive legal reform in Kazakhstan to facilitate the country's transition to a market economy and improve the business climate for foreign investors.

Kazakhstan has substantial environmental legislation and advanced legislation on nuclear safety and security.

The Environmental Code has been amended 17 times since 2007 when it was enacted. It is now a vast legal instrument comprising 47 Chapters and 326 Articles. SRK understands that it has been compiled with input from many international advisors and considering legislation of OECD countries, including numerous EU Directives. Kazakhstan is continuing to revise its Environmental Code to facilitate the country's transition to a green economy. Commitment to this transition is expressed in the Country's 2013 Green Economy Concept Policy.

The environmental legislation is also likely to be revised to address shortcomings identified by international reviews of this legislation that have been invited by the Kazakhstan government. An example of an international review recently undertaken is that of the OECD in 2016 (OECD, 2017. Development Pathways Multi-dimensional Review of Kazakhstan (Volume 2). http://www.oecd.org/publications/multi-dimensional-review-of-kazakhstan-9789264269200-en.htm). Factors that limit the effectiveness of environmental legislation of Kazakhstan, as identified in this OECD review, include:

- The frequent changes to the legislation, which currently hinder the formation of uniform law enforcement practices;
- Sub-ordinate legislation is not yet fully aligned with the Environmental Code;
- The approaches to dealing with environmental damage, and liability for environmental damage, focus too much on financial penalties paid to government rather than restoration and do not motivate avoidance of damage enough;
- The approach to impact assessment, which is highly prescribed, does not always result in a thorough understanding of the unique environmental and social setting of each project;
- The judgements about the applicable limit values for discharges of pollutants from sites are too prescribed and do not involve value judgements;
- Emission limit values (for emissions and effluents) are based on ambient standards for the environment (maximum permissible concentrations) that are often unrealistic (academically derived and, in many cases, impossibly strict), they should be set taking account of local conditions, what is desirable from the environmental point of view and what is feasible from a technical and economic standpoint;
- Emissions limits are set for a very large number of parameters, rather than priority parameters leading to a high administrative burden that cannot be justified in terms of environmental and health gain; and
- Payments for emissions and fines for environmental damage paid to government are not routinely invested in environmental protection, they tend to be used for other purposes and there is a dependence on these that could hinder implementation of alternative pollution control regimes.

SRK agrees with the above based on experience reviewing mines in Kazakhstan. To some extent these are reflected in the findings of the ESHS review of the Mineral Assets. The ESHS management at the Mineral Assets does however conform to international standard in many respects. This could be attributed to both positive corporate governance and an additional nuclear safety legislation that the mines have to observe.

Kazakhstan did not have legislative base for regulating nuclear safety and security when it became independent in 1991 but has now established a robust legislative base. It invited the IAEA to scrutinise its regulatory structures in 2012 and 2016. The first review was undertaken in the form of an IAEA Integrated Regulatory Review Service review and the second was undertaken in the form of an IAEA Integrated Nuclear Infrastructure Review mission. The latter mission was focused on evaluating Kazakhstan's interest developing nuclear power generation capacity to support the country's development. The findings of the latter mission have been made public (https://www.iaea.org/services/review-missions). From the report on this mission, it is apparent that the IAEA recognises that Kazakhstan:

- Has progressed recommendations from previous reviews;
- Adheres to relevant international legal instruments;
- Has terms of international safeguards agreement in place;
- Has appropriate radiation protection programmes;
- Has legislation based on the IAEA recommendations and standards on safety (particularly, the Fundamental Safety Principles IAEA Safety Standards Series No. SF-1);
- Actively participates in the IAEA technical cooperation programme;
- Has established a regulatory body (the Committee for Atomic and Energy Supervision and Control) with experienced leadership (although it will need to be expanded to cover the future nuclear power programme); and
- Has benefited from training from the IAEA and other international organizations and participates in international meetings to share experience.

Kazakhstan is party to the key IAEA Conventions on nuclear safety, nuclear security and on emergency preparedness and response. It is also party to the Non-Proliferation of Nuclear Weapons Treaty ("**NPT**") and has signed a Comprehensive Safeguards Agreement and an Additional Protocol with the IAEA (https://www.iaea.org/resources/legal/country-factsheets).

The IAEA noted in its recent review mission (the 2016 mission – as outlined above) that Kazakhstan authorities are aware of their obligations under international agreements pertaining to nuclear safety and security and have ample experience in the implementation of the agreements.

Kazakhstan joined the International Labour Organization ("**ILO**") in 1993 and has ratified key ILO conventions pertaining to minimum employment age, prohibition on the use of forced labour and the worst forms of child labour, prohibition on discrimination in employment, equal pay, and collective bargaining. The Constitution and the national labour legislation guarantee basic workers' rights, including the occupational safety and health, the right to organize and the right the right to organize and the right to strike. They also prohibit discrimination, child labour and forced labour.

10.8.2 Conformance of the Company's ESHS Management with International Standards

An appraisal of conformance of the Company's ESHS management at the Mineral Assets with the IFC PS has been undertaken. The appraisal findings are summarised in Appendix A. As part of this appraisal, SRK has also considered conformance with the WBG EHSG. SRK has found that the Company's ESHS management largely conforms to these standards and guidelines. The non-conformances with these standards and guidelines pertain only to a few matters – a couple of matters result in non-conformances with several items/ paragraphs in the standards and guidelines. These matters are summarised in the Table 10-11.

SRK has made a number of recommendations to address the non-conformances (Appendix **Error! Reference source not found.**). Other non-conformances with the IFC Performance Standards are that the HSE and the human resources policies of the Company do not refer specifically to the IFC Performance Standards or explicitly aim to meet the principles in the standards.

Table 10-11: Key Non-Conformances with the IFC PS and WBG ESHG

Non-conformance		Relevant sections of this report	
Description	Relevant IFC PS paragraphs (p) and WBG ESHG sections (s)	Providing insight on this matter	Providing recommendations
The mines have insufficient understanding of environmental and social context.	This is a non-conformance with PS-1 p-7 to p-12. This also has knock-on effect on compliance with other paragraphs of PS1 pertaining to management and monitoring of impacts, and staff awareness of and competence to manage impacts. It also means that emergency response plans may not adequately address risks to the health and safety of surrounding land users, which results in potential non-conformance with PS-1 p-20 & 21 and PS-4 p-11. In addition, it results in non-conformance with PS-4 p-5 general requirements, specifically with the WBG ESHG requirement pertaining to land use and biodiversity. Furthermore, it results in non-conformance with PS-6 pertaining to biodiversity and conservation.	Sections 10.5.4, 10.6 and 10.8 Appendix **Error! Reference source not found.**	Section 10.8.3: Recommendations 1A to 1H
The mines do engage with local communities, directly and indirectly through Akims, but this engagement is not fully aligned with international best practice. Akims play a major role in the engagement process. The role of the mines in the planning and implementation of the engagement is not active enough to meet the IFC PS.	This results in partial non-conformance with PS-1, p-25 to p-31 and p-33 to p-36.	Section 10.5.13	Section 10.8.4 Recommendations 2A to 2C
The mines have limited knowledge of the metal LLRW decontamination service that they use in terms of capacity to process wastes, processes used, ESHS management practices	This results in non-conformance with PS4-12.	Sections 5.4.4, 10.7.3 and 10.7.4	Section 10.8.5: Recommendations 3A and 3B
Closure plans and cost estimates need to be updated	This results in a partial non-conformance with PS1-16	Section 10.7	Section 10.8.6: Recommendations4 A to 4D

10.8.3 Understanding of Context

Finding 1

The Mining Subsidiaries have insufficient understanding of environmental and social context and do not use the full potential of monitoring to ensure or prove that they do not have impacts on sensitive receptors, individually and cumulatively. With the current global trend of increased awareness of environmental issues and increased litigation, the mines need to shift their environmental impact definition and monitoring paradigms beyond regulatory compliance.

Recommendation 1 (Recommendations 1A to 1H for Finding 1): In respect of the above finding, SRK recommends that the Mining Subsidiaries implement the following with the aim of defining and monitoring impacts of the mines individually and cumulatively:

- **Recommendation 1A:** Review existing baseline data and collect new data to clearly define the impacts of the mines on habitats, plants and animal species of conservation importance and surrounding land uses such as nomadic farming;
- **Recommendation 1B:** Compile habitat maps that delineate the different habitats disturbed by mining. Ascertain whether there are any habitats that fall into the critical habitat category;
- **Recommendation 1C:** Collate existing baseline data and collect new data to define the impacts of the mine on water resources and groundwater;
- **Recommendation 1D:** Update management plans to address any new impacts on ecology, water users and land users that are identified;

- **Recommendation 1E:** Update emergency response plans to address risks to the health and safety of surrounding land users;
- **Recommendation 1F:** Refine the existing monitoring programmes so that the data is collected and interpreted in a way that demonstrates that the mine is not impacting on ecology, biodiversity, surrounding land users and water resources;
- **Recommendation 1G:** Bring in external expertise to assist with impact identification and train staff to monitor and address impacts on ecology, water resources and land use; and
- **Recommendation 1 H:** Estimate and report on both Scope 1 and Scope 2 greenhouse gas emissions (not just Scope 1 emissions).

10.8.4 Stakeholder Engagement

Finding 2

The Mining Subsidiaries do engage with local communities, but this engagement is not fully aligned with international best practice. The mines have not undertaken social baseline studies that define how people are using land and water around the mines and do not each have community stakeholder database and stakeholder engagement plan. Grievance procedures are not framed in the context of good international practice and documented.

Recommendation 2 (Recommendations 2A to 2C for Finding 2): In respect of the above finding, SRK recommends that the ISR mines implement the following:

- **Recommendation 2A:** As part of the upgrade of information on surrounding land uses (see above), undertake a social scan that identifies potentially affected communities, and their characteristics and interests in the operations that are relevant to effective engagement;
- **Recommendation 2B:** Develop and implement stakeholder engagement plans for each operation; and
- **Recommendation 2C:** Review and refine grievance mechanisms such that they align with international good practice.

10.8.5 Decontaminated Metal Waste Stewardship

Finding 3

Kazmetrao is an independent company providing metal LLRW decontamination services to the ISR mines. A number of mines assume that much of the metal LLRW waste arising from closure can be handled by Kazmetrao. This assumption is questionable. Also, the Kazmetrao decontamination operations have not been audited by the Mining Subsidiaries and neither the decontamination methods nor final destinations of the decontaminated wastes are known.

Recommendation 3 (Recommendations 3A to 3B for Finding 3)

- **Recommendation 3A:** Evaluate whether the assumptions of the mines about the quantities of metal LLRW waste that can be decontaminated at closure match with the capacity of decontamination service providers.
- **Recommendation 3B:** Metal LLRW decontamination services should be subject to scrutiny. The Company should have evidence that these are being operated to acceptable standards and should obtain chain of custody documentation on the decontaminated waste to its final destination.

10.8.6 Ongoing Refinement of Closure Plans

Finding 4

The Mining Subsidiaries have developed closure plans and cost estimates, in the form of liquidation programmes required by legislation and mining contracts. SRK estimates that the closure costs are generally significantly higher than those given in the liquidation programmes. Whilst the CPR includes updated estimates of both the ARO and LoMp closure liabilities the recommendations as reported in the 2018 CPR generally remain valid.

Recommendation 4 (Recommendations 4A to 4D for Finding 4)

The following recommendations on the closure planning and liabilities assessments are suggested for the Mining Subsidiaries to align with international practice:

- **Recommendation 4A:** Create internal closure planning group in the Company and each Mining Subsidiary to carry out gap analysis of existing liquidation programs;
- **Recommendation 4B:** Agree closure criteria with stakeholders (regulatory authorities and local communities);
- **Recommendation 4C:** Update liquidation programs to reflect current project designs and productions plans using realistic closure criteria, assumptions and costs; and
- **Recommendation 4D:** Regularly review the liquidation programs and cost estimates to ensure that sufficient resources are allocated to cover closure liabilities.

10.8.7 Capacity of the Corporate HSE Department

Finding 5

The five-man team in the corporate HSE department was at the time of publishing the 2018 CPR considered effective but was considered stretched and need to be significantly increased to meet the Company's current HSE aspirations and address recommendations made in this report (as above). The department also does not have sufficient capacity to handle the increasing volume of HSE performance data being collected from the operations. Historically, the department was only focused on data of importance to regulatory authorities, but it is now collecting and processing additional data to review and report on the Company's performance in a manner aligned with best international practice.

Recommendation 5

- **Recommendation 5:** Significantly increase the capacity of the corporate HSE department. The capacity should be at least doubled.

10.9 Conclusion and Recommendations

The following section summarises the key recommendations relating to Environmental and Social Governance issues at the Mining Subsidiaries. The 2018 CPR included a number of specific but generic recommendations relating to certain of these items which were then incorporated into an agreed Action Plan. The current status of the Action Plan or any specific outcomes have not been fully assessed as part of this CPR, as the primary focus has been to assess and update the current estimates of mine closure liabilities as reflected in the update ARO and LoMp closure estimates. Notwithstanding this statement there are notable improvements in reporting in accordance with various international standards and enhanced capacity to achieve this is apparent.

Notwithstanding the above the Mineral Assets are generally designed and operated to minimise environmental, social, health and safety impacts. This coupled with the remote setting of most of the mining and processing operations and a relative absence of sensitive receptors, does reduce the ESHS risks associated with the operations. The Mineral Assets are strictly regulated by the GoK, frequently inspected by state authorities and regularly audited by the Company's HSE department. The standard of HSE management at the operations is high in that they have certified HSE management systems, non-conformances are acknowledged and addressed promptly and there is evidence of continuous improvement in HSE management.

The Company's corporate oversight of the operations involves a frank understanding on HSE performance in the organisation. The Company, like the Mining Subsidiaries, is open to opportunities for improvement and this is reflected in initiatives like the KAP 20 Project on implementation of target operational model of complex safety management. The internal annual and quarterly corporate reports on HSE performance are reviewed by the board of directors and are shared with all of the Mineral Assets so that the various operations can see the performance of their sister companies and learn from their experiences. In addition, the Mineral Assets have a positive socio-economic impact through employment of large numbers of people and various social investments.

Nevertheless, SRK sees that there are refinements that can be made to the ESHS management at the mines and are summarised below.

10.9.1 2018 CPR Recommendations

Whilst certain of these items also address environmental and social liabilities, specifically in respect of ARO determination and mine closure costs, the current status of all recommendations incorporated into the agreed Action Plan has not been assessed as part of this CPR. Notwithstanding this statement there are notable improvements in reporting in accordance with various international standards and enhanced capacity to achieve this is apparent.

In respect of other items, we also recognise the development of the ARO standard, however there are additional aspects in respect of both the ARO liability estimation and specifically the LoMp Mine Closure liabilities which need to be improved as outlined herein. In this regard there are specific recommendations included in Section 10.9.3 below.

As such it is recommended that a detailed updated of the status of all items noted in Section 10.8 is completed and a revised/updated Action Plan developed as appropriate. Notwithstanding this perspective, it is clear that in respect of certain areas, notably public domain reporting and compliance with various Environmental and Social Governance standards, the Company has significantly improved in this regard as noted in Section 2.2.6 Environmental and Social Governance and Section 2.2.7 Occupational Health and Safety.

10.9.2 Decontaminated Metal Waste Stewardship

Kazmetrao is an independent company providing metal LLRW decontamination services to the ISR mines. A number of mines assume that much of the metal LLRW waste arising from closure can be handled by Kazmetrao. This assumption is questionable. Also, the Kazmetrao decontamination operations have not been audited by the Mining Subsidiaries and neither the decontamination methods nor final destinations of the decontaminated wastes are known.

The key recommendations identified comprise:

- To evaluate whether the assumptions of the mines about the quantities of metal LLRW waste that can be decontaminated at closure match with the capacity of decontamination service providers; and
- Metal LLRW decontamination services should be subject to scrutiny. The Company should have evidence that these are being operated to acceptable standards and should obtain chain of custody documentation on the decontaminated waste to its final destination.

In this regard it is key that a detailed stewardship assessment of decontaminated waste is undertaken and combined with the LoMp volumes as determined in this CPR such that demonstrable evidence of both capacity and processes required to facilitate this are in place over the project LoMp and not only in respect of immediate closure as assumed in the ARO Scenario estimation of environmental liabilities.

10.9.3 Ongoing Refinement of ARO estimates and LoMp Closure Plans

To date neither the Company nor the Mining Subsidiaries have established formal mine closure plans to determine the potential mine closure liabilities in accordance with the international Environmental and Social Standards referenced in 1.2.2. As such "**Mine Closure**" related liabilities do not incorporate technological and engineering solutions which reflect Good International Industry Practice ("**GIIP**") and "**Best Available Technology**" to where practicable achieve "**Ground Zero**" or "**Walk Away**" remediation status. Significant additional base line technical assessments of current landforms including mining operations, waste management facilities, supporting surface infrastructure and processing facilities, to establish the existing impacts to 31 December 2021. In addition, further analysis of all expanded footprints and additional landforms established as part of implementation of the LoMp is also required to assess the cumulative impact of continued operations through to depletion of the Ore Reserves. On this basis any reassessment of mine closure costs for both currently in-place infrastructure and LoMp infrastructure in accordance with international standards is likely to result in higher mine closure costs than reported herein. This is not to say that these matters are wholly absent, but rather require refinement and integration with the formal LoMps to ensure that there is a wholistic approach to development of detailed engineered, designed, estimated and schedule closure plan.

During 2020 the Government of Kazakhstan has also published additional regulations to support the updated legislation regarding certain environmental aspects and as such SRK recommends that further work is required to assess any potential impact of these on future ARO estimates. As part of SRK's review of the Company's ARO Standard, SRK concluded that "*the Standard is comprehensive and is likely to provide guidance to the operations related to Closure Plan preparation and the estimate of closure liability. There are areas where the document can be improved as described above and summarised in the table below. However, SRK is of the view that Standard complies to most aspects of GIIP and would allow the operations to generate a fair value and defensible estimate of ARO*."

Compared with 2020 the 2021 the ARO estimates reflect an average of 28.6% as measured in KZT with noticeable increases over and above inflation for Ortalyk LLP, Karatau LLP, Zarechnoye JV, JV Katco LLP, RU-6 LLP and JV Khorassan-U LLP. These changes reflect completion of recent detailed updates completed by JV partners specifically in respect of JV Katco LLP, changes in respect of increased remediation as drilling moves into more challenging environments, changes following implementation of the revised ARO strategy documents including aligning unit rate assumptions for remediation. Furthermore, in certain instances the 2021 ARO estimates, when compared with the 2020 ARO estimates indicate increases which are less than KZ CPI, which reflect the net remediation related to reduced number of wells drilled during 2021.

SRK recognise the impact of the above adjustments noted in 2021, however further investigation is required to better understand the impact of the approach noted at JV Katco LLP and the extent to which this may also impact the remainder of the Mineral Assets. Accordingly, SRK considers that further work is required as part of a more detailed assessment incorporating the LoMp environmental liabilities to better assess these impacts and also in light of any changes to the new regulations accompanying the revised legislation.

Uranium ISR operations have certain risks at closure that have to be investigated and as appropriate technically re-assessed to enable the development of appropriately detailed closure plans in accordance with international best practice. Accordingly, the successful implementation of mine closure programmes which assure environmental and public safety is contingent on these items being appropriately addressed during subsequent mine closure updates:

- **Liquidation Programme/Mine Closure Programme development:**
  - site specific investigation of potential sub-soil, sub-strata and groundwater contamination in the vicinity of wellfield operations, processing facilities and associated infrastructure,
  - se-assessment of all assumed unit rates and other expenditure assumptions based on 2022 quotations and as appropriate third party suppliers,
  - re-assessment of common unified factors (physical) and as necessary implementation of local site specific factors where warranted with specific focus on: assumed post closure management/monitoring/maintenance periods; unit rates applied to determine waste volumes to be ultimately treated from wellfield operations and processing/other infrastructure,
  - comparative re-evaluation of the current Liquidation Programme assumptions, ARO and LoM Closure estimates based on the recent updates completed in respect of JV Katco LLP,
  - completion of detailed engineering designs, scheduled activities and expenditures to establish a minimum of PFS estimates for all Mine Closure programmes; and
  - incorporation of element specific contingencies which reflect the appropriate degree of uncertainty specifically where investigations and the level of design, estimation and scheduling of activities has not been completed to PFS level; and
- **Implementation of Mine Closure Programmes:**
  - failure to properly close injection\pumping\monitoring wells may result in water infiltration to adjacent aquifers,
  - insufficient monitoring to demonstrate improvement in groundwater quality with time and, ultimately, attainment of pre-mining groundwater chemistry conditions,
  - LLRW management at closure, specifically: improper handling of contaminated waste resulting in exposure of personnel and public to ionizing radiation post closure; lack of capacity in existing LLRW storage facilities to accommodate all waste from the Mineral Assets upon closure at the end of LoM resulting in additional expenditures for expansion; limited of capacity of Kazmetrao to accept large quantities of metal LLRW for decontamination arising from mine closure; and unauthorised use of contaminated equipment\materials by third parties,
  - poor revegetation rates requiring extended periods of vegetation maintenance, and
  - social impacts related to closure of operations and retrenchment of personnel upon closure; and
- **Other related recommendations (Liquidation Programmes):** The Mining Subsidiaries have developed closure plans and cost estimates, in the form of liquidation programmes required by legislation and mining contracts. SRK estimates that the closure costs are generally at least double those given in the liquidation programmes. The estimates provided in this report have been updated with input from the Company. Closure plans and cost estimates need to be updated on a regular basis. The following recommendations on the closure planning and liabilities assessments are suggested for the Mining Subsidiaries to align with international practice:

- To create internal closure planning group in the Company and each Mining Subsidiary to carry out gap analysis of existing liquidation programs;
- To agree closure criteria with stakeholders (regulatory authorities and local communities);
- To update liquidation programs to reflect current project designs and productions plans using realistic closure criteria, assumptions and costs; and
- To regularly review the liquidation programs and cost estimates to ensure that sufficient resources are allocated to cover closure liabilities.

11 LIFE OF MINE PLANS

11.1 Introduction

This section includes discussion and comment on the TEPs as established by the Company in developing its LoMps. Specifically, details are provided in respect of the: Mining Subsidiaries and Company's equity interests; Life of Mine planning process; and TEPs. In conjunction with the Company, SRK has developed post-tax pre-finance cashflow models based on the following key inputs:

- Final products produced at each site, or an independent/Company related refinery;
- Mass balance determinations from in-situ grades through, PLS concentration, PLS processing and refining to final product;
- LoMp production sourced from Proved and Probable Ore Reserves, unless explicitly stated otherwise;
- TEPs presented at the Mining Subsidiary Level and reported on a 100% basis, that is to say not on an equity attributable basis to the Company, unless explicitly stated otherwise;
- Revenues and expenditures reported in real terms as at the Base Technical Information Date and provided in annual increments along with LoMp totals; and
- Forecast sales from the Mining Subsidiaries determined as attributable to the Company are assumed to be to the Company and not from the Company to any third parties. SRK has been informed by the Company that in some rare cases, a portion of the historical sales from the Mining Subsidiaries may also have been sold directly to any third party. Such sales if occurred, are however considered by the Company to be marginal.

SRK notes that whilst the disclosure guidance of the ESMA Recommendations, notably *"Appendix II – Mining Competent Person's Report – recommended content"* (hereinafter **"Mining CPR"**) inclusion of a Valuation of the Mineral Assets is not mandatory. Accordingly, the granularity of disclosure as included in this section of the CPR has been prepared on the basis of that considered to be the minimum level of detail required in order for an appropriately expertised valuator to undertake a valuation of the Mineral Assets. Accordingly, SRK highlights the following:

- Disclosure includes all technical and economic parameters in respect of saleable production, operating expenditures (mining, processing, G&A, retrenchment), Mineral Extraction Tax (royalty), capital expenditures (including development capital sustaining capital, environmental liabilities) and sales revenue determinations. In respect of the latter, the assumptions are derived from the commodity pricing forecasts as provided by UxC and relevant price discount (Table 11-7) applicable to each Mining Subsidiary;
- Commodity sales are net of movement in work-in-progress and details for the relevant days and opening balances are included in this CPR;
- Determinations of both cash and non-cash costs are in practice in certain instances determined at a deposit level, however, for the purpose of simplification, the reporting detail presented in this CPR is provided at a Mining Subsidiary level; and
- In order to determine post-tax pre-finance cashflows as would normally be required to support a valuation of the Mineral Assets, other non-technical parameters (Section 11.3.8) are necessary to be considered.

The determination of cash costs in the metals and mining sector varies both within and between commodity focus companies. Furthermore, it would appear that with respect to reporting standards, that defined by the World Gold Council ("**WGC**") and published (2018) ("**WGC 2018**") in its guidance noted on “*all-in sustaining costs*” and “*all-in costs*” metrics would appear to be the most comprehensive. This was an advance from the cash cost reporting methodology introduced in 1996 which focused solely on the mining and processing costs incurred. In contrast WGC 2018 focuses on costs incurred in the complete mining life cycle from exploration to closure.

With respect to the uranium sector, comparative assessment of the approach adopted by mining companies yield varying interpretations with no explicit reporting of adherence to any specific standard. Accordingly, and in conjunction with the Company, SRK has determined historical cash costs which is largely based on the WGC guidance. To this end the following definitions have been adopted:

- C1 cash costs (“**C1**”) comprising all direct cash expenditures required to secure the sales volumes and sales revenues as determined and include, mining, processing, general and administration, Mineral Extraction Tax, Reimbursable Services, Distribution, Toll Refining and Retrenchment costs; and
- All in sustaining Costs (“**AISC**”) comprising the C1 cash costs as well as the production well construction costs, sustaining costs, contributions to the liquidation fund .

For clarification these costs specifically to do not include any significant non-cash items and as such being presented on a cash basis and cannot be directly compared with any historical cash costs or AISC as derived either by the Company or other competitors operating in the uranium sector. Furthermore, SRK notes that both historical and forecast unit cash costs as reported herein are expressed per tonne of U_3O_8 sold with the primary variance between both produced and sold being largely attributable to movement in Work-in-Progress (“**WIP**”) as determined by the change in closing balances between the reporting periods. For certain Mining Subsidiaries the variance between that which is produced and that which is sold in respect of tonnes of U in the final product is not significant and accordingly reporting on either an as produced or as sold basis is not considered significant, specifically when considering forecast data. This aside, SRK notes that certain of the Mining Subsidiaries have due to various market conditions, not sold all that was produced historically, thereby resulting in increased product stockpiles. This is specifically the case for Kazatomprom-SaUran LLP, and in this specific instance the unit of cash cost reporting adopted is on an as produced U_3O_8 basis.

11.2 Mining Subsidiaries

The Company has equity interests in 14 Mining Subsidiaries incorporated in Kazakhstan which are either managed directly by the Company or through JV or Associated Company arrangements. Table 11-1 presents the corporate details relating to each of the Mining Subsidiaries including deposit name, equity interest, depletion and cessation of services year and the first year of commercial production. Additional details in respect the Company’s principal partners in the JV or Associated Companies are included in Section 2.2.1 of this CPR. The equity interests as reflected in Table 11-1 which incorporate all recently completed transactions as on 31 December 2021.

Table 11-1: Mining Subsidiary details

Mining Subsidiary	Equity Interest (%)	Deposit	LoMp Depletion[(1)] (year)	LoMp Services (year)	First Production (year)	Production Requirement (tU)
Kazatomprom-SaUran LLP[(3)]	100	Uvanas	2019		1997	Varied
		Eastern Mynkuduk	2028		1997	1,000
		Kanzhugan	2048	2048	1997	550
		South Moinkum (Southern part)	2019		2001	Varied
		Central Moinkum	2040		2014	550
			2040	**2048**	**1997**	
Ortalyk LLP	100	Zhalpak	n/a		2018	900
		Central Mynkuduk	2033		2007	2,000

Mining Subsidiary	Equity Interest (%)	Deposit	LoMp Depletion[(1)] (year)	Services (year)	First Production (year)	Production Requirement (tU)
			2033		**2007**	
RU-6 LLP	100.0	Northern Karamurun	2031		1997	1,000
		Southern Karamurun	2035		1997	
			2035		**1997**	
Appak LLP	65.00	Western Mynkuduk	**2036**		**2008**	**1,000**
JV Inkai LLP	60.00[(2)]	Block 1 Inkai (a)	2049		2008	4,000
		Block 1 Inkai (b)	2046		2008	
		Block 1 Inkai (c)	2052		2015	
			2052		**2008**	
Semizbai-U LLP	51.00	Semizbai	2042		2009	500
		Irkol	2043		2008	700
			2043		**2008**	
JV Akbastau JSC	50.00	Block 1 Budenovskoye	2038		2009	731
		Block 3 Budenovskoye	2045		2009	1,200
		Block 4 Budenovskoye	2045		2009	
			2045		**2009**	
Karatau LLP	50.00	Block 2 Budenovskoye	**2033**	**2045**	**2007**	**3,200**
JV Zarechnoye JSC	49.98	Zarechnoye	**2025**		2007	**1,000**
JV Katco LLP	49.00	Southern Moinkum (Northern part)	2027		2001	2,000
		Tortkuduk	2035		2007	2,000
			2035		**2001**	
JV Khorassan-U LLP[(2)]	50.00	Block Kharassan 1, North Kharassan	**2038**		**2008**	**2,000**
JV SMCC LLP	30.00	Akdala	2025		2004	1,000
		Block 4 Inkai	2036		2007	2,000
			2036		**2004**	
Baiken-U LLP[(2)]	52.50	Block Kharassan 2, North Kharassan	**2032**	**2038**	**2009**	**2,000**
Budenovskoye LLP	51.00	Block 6/7 Budenovskoye,	**2045**		**2024**	**6,000**
Total			**2052**		**1997**	

(1) LoMp: date of depletion of Ore Reserves in the current Life of Mine plans for the Mineral Assets.

(2) For JV Inkai LLP, the Company's equity participation is determined based on a prescribed formula based on uranium production within the following bands: 0tU to 1,500tU (40.00%); 1,500tU to 2,000tU (50.00%); 2,000tU to 4,000tU (60.00%).

(3) At Kazatomprom-SaUran LLP, two deposits have limited production and no further Ore Reserves and Mineral Resources are reported in the 2021 Statements.

The Mining Subsidiaries comprise operating companies which extract uranium using in-situ leach mining methods to produce a PLS which is then subject to further processing to derive the final product at each of the processing plants. The final products at each site (Table 11-2) varies and include:

- **Rich Eluate (**Technical Desorbate or TD**):** produced from pumping of the original PLS into absorption columns where ion exchange resins (sorbents) are loaded with uranium. The Uranium-loaded ion-exchange resin is sent to desorption to produce a rich eluate which typically has uranium content of 1,000x higher than the PLS;
- **Yellowcake (**HKPU**):** produced from precipitation and filtration of the rich eluate to produce a product which uranium concentration ranges from 45% to 50% and has an accompanying moisture range of 20% to 25%. Typically, this product is transported to third party refiners to produce U_3O_8; and
- **U_3O_8:** uranium concentrate in accordance with ASTM C967 with U content of at least 65% and ST RK 2573 with U content of at least 80% and is typically produced through calcination of Yellowcake.

Table 11-2: Mining Subsidiary site products[(1)]

Mining Subsidiary	Deposit	Site Product	Processing /Refining
Kazatomprom-SaUran LLP	Uvanas	U_3O_8	final product
	Eastern Mynkuduk	U_3O_8	final product
	Kanzhugan	U_3O_8	final product
	South Moinkum (Southern part)	U_3O_8	final product
	Central Moinkum	U_3O_8	final product
Ortalyk LLP	Zhalpak	HKPU	UMP
	Central Mynkuduk	HKPU	UMP
RU-6 LLP	Northern Karamurun	HKPU	UMP
	Southern Karamurun	HKPU	UMP
Appak LLP	Western Mynkuduk	U_3O_8	final product
JV Inkai LLP	Block 1 Inkai (a)	U_3O_8	final product
	Block 1 Inkai (b)	U_3O_8	final product
	Block 1 Inkai (c)	U_3O_8	final product
Semizbai-U LLP	Semizbai	TD	SMCCP
	Irkol	HKPU	UMP
JV Akbastau JSC	Block 1 Budenovskoye	TD	Karatau
	Block 3 Budenovskoye	TD	Karatau

Mining Subsidiary	Deposit	Site Product	Processing /Refining
	Block 4 Budenovskoye	TD	Karatau
Karatau LLP	Block 2 Budenovskoye	U_3O_8	final product
JV Zarechnoye JSC	Zarechnoye	HKPU	SMCCP
JV Katco LLP	Southern Moinkum (Northern part)	U_3O_8	final product
	Tortkuduk	U_3O_8	final product
JV Khorassan-U LLP	Block Kharassan 1, North Kharassan	TD/HKPU	Baiken-U/SMCCP
JV SMCC LLP	Akdala	U_3O_8	final product
	Block 4 Inkai	U_3O_8	final product
Baiken-U LLP	Block Kharassan 2, North Kharassan	U_3O_8	final product
Budenovskoye LLP	Budenovskoye Block 6/7	U_3O_8	final product

(1) Ulba Metallurgical Plant JSC ("**UMP**") in which the Company has a 90.2% equity interest and 100% voting interest.

(2) Stepnogorsk Mining Chemical Combinate (plant), ("**SMCCP**").

Furthermore, certain of the Mining Subsidiaries provide mining and processing services to other Mining Subsidiaries, specifically where:

- A portion of the TD production from JV Khorassan-U LLP is processed at Baiken-U LLP processing facilities to produce U_3O_8 concentrate;
- All TD produced at JV Akbastau JSC is processed at Karatau LLP to produce U_3O_8 concentrate; and
- A subsidiary company, Kyzylkum LLP provides all mining and processing services on behalf of JV Khorassan-U LLP. The Company's equity interest in Kyzylkum LLP is noted at 30.00% (Uranium One 30%; Energy Asia 30%) and whilst the majority of expenditures relating to the provision of services is charged to JV Khorassan-U LLP, there remains a portion of expenditures which are not and are funded by shareholder loans to the subsidiary. In summary, all operating costs incurred by Kyzylkum LLP (mining, processing and G&A) are charged to JV Khorassan-U LLP as is the depreciation charge associated with all capital expenditures incurred by Kyzylkum LLP. Section **Error! Reference source not found.** (Table 11 [xxx]) provides an annual schedule of these expenditures which are not included in the LoMp assumptions

All costs associated with the provision of processing services by Baiken-U LLP and Karatau LLP are passed on at cost and reported as services costs to the receiver and services revenue by the provider. In respect of the latter such revenues are allocated as positive operating expenditures.

In respect of RU-6 LLP and Kazatomprom-SaUran LLP, the Company allocates a portion of Company corporate overheads which are charged as a unit rate per tonne of U on site production. Direct expenditures associated with the Mining Subsidiaries which are not included in the LoMps reported herein are exploration and technical study expenditures undertaken by Volkovgeologia JSC in which the Company has a 65% equity interest. Annual expenditures associated with all exploration activities as currently scheduled by the Company are summarised in Section **Error! Reference source not found.**.

For the avoidance of doubt, the scope of work of the CPR was specifically limited to the Mining Subsidiaries and does not include any technical or economic assessments of the assets and liabilities of the other divisions of the Company, specifically: Volkov, UMP in which the Company holds a 90% equity (and 100% voting) interest, TH KazakAtom AG wholly owned by the Company, or any other of the Company's subsidiaries, joint ventures or associates.

11.3 Company Life-of-Mine planning process

The LoM planning process followed by the Company for the Mineral Assets largely reflect standard practices for ISR operations in Kazakhstan. For pre-production Mineral Assets, the current regulatory process necessitates the generation of key technical documents generated in support of the permitting and contract process which include: scoping/conceptual studies Techniko-Economicheskoe Predlozhenye "**TEEP**"; pre-feasibility studies (Techniko-

Ekonomicheskoe Obosnovanie Konditsy “**TEO Konditsy**”, Techniko-economicheskie Rasschety – “**TER**”, Techniko-economicheskie Soobrazheniya - “**TES**”; feasibility studies Techniko-Ekonomicheskoe Obosnovanie Proyekta – “**TEO Project**”; and environmental and social impact assessments - “**OVOS**”. Historically these and other additional documents including business plans, work programmes and detailed design documents are generated in support of the permitting process and award of the mining contract.

These documents are normally generated either directly by the Mining Subsidiaries or outsourced to licensed technical institutes and are only updated should operating conditions, ownership or other initial contract require amendment. As such these documents are not routinely updated and serve as the official reference document in support the decision for construction and commencement of operations. Furthermore, the resulting production and associated expenditure projections are largely undertaken with reliance on essentially two-dimensional semi manual techniques and do not benefit from reliance on computerised geological models which interface with a hydrogeological/chemical model incorporating both spatial and time-related functionalities.

Notwithstanding certain ‘manual’ limitations associated with the above, process, a significant amount of detailed work is undertaken which is further supported by well testing as part of the commitment to commencement of commercial production. The initial assumptions are then revised accordingly, and relationships established to account for physical and chemical characteristics (geology, hydrogeology, permeability, mineralogy, concentration) of the deposits, well designs and configuration.

On attaining commercial production, the planning focus changes to the short term where the focus is on a one-year plan with monthly schedules and designs with extensions to a five-year period to support capital programmes and production volume changes. This limited focus does constrain the updating of the LoMp such that the technical and economic evaluation of the remaining Ore Reserves beyond a five-year period through detailed production planning is not able to be assessed/tested to the same degree as initially considered for the first five years. Furthermore, it is not current practice to assess the impact of historical performance, re-interpretations or changed assumptions with respect to the spatial and time-related aspects of any given operation.

This aside, the Company does collate a significant amount of historical monthly technical and economic data which reports details in respect of well construction, well production and performance including PLS concentrations and volumes, physical consumable volumes and unit rates, process recoveries and performance, operating and capital expenditures.

The LoMp projections as developed by the Company and reported herein incorporate 18-month budget parameters and any adjustments deemed necessary for the following three years, thereafter, relying on the application of unit rates until depletion of the Ore Reserves. The resulting projections rely on development of key parameters per deposit which incorporate annual projections for:

- Assumed production of Uranium quantity (tonnes of U) in the final site products, generally reflecting that projected in the first five years thereafter generally aligned with the contract terms;
- PLS uranium concentrations (mgU/l);
- Injection well pumping rates (m^3/h);
- Number of Injection wells in operation;

- Determination of Extraction wells, observation wells, exploration wells, and re-drilled (damaged) wells, through application of appropriate ratios;
- Determination of wells require to be constructed, largely based on historical norms which essentially reflect the well design configurations (hexagonal or row);
- Determination of operating expenditures based on activity-element details, where unit rates are determined from historical and planned performance for: labour, power, consumables (acid, reagents etc), water, consumable transportation costs, overheads and other costs; and
- Establishing development and sustaining capital requirements whereby well construction is largely based on well numbers, depths and unit rates per unit length (metres) drilled, and provisions for longer term sustaining costs. Any specific capital items for development/expansion are typically defined within the first five years and account for expansion and or extension of services into new wellfield areas.

Determination of other sales revenue and expenditure elements largely follow well established processes and are largely directly comparable with historical performance. Where appropriate these elements are separately described below.

SRK considers that a number of improvements in the LoMp process presently followed by the Company could be made and in certain operations a degree of computerisation has been initiated, specifically in respect of Mineral Resource estimation, development of mine plans and Ore Reserve reporting. Whilst these advances have not been uniformly adopted at all Mining Subsidiaries, the combination of the relative simplicity of the ISR mining operations and significant historical data with relatively consistent performance ensures that the LoMp assumptions are reasonably well grounded. Furthermore, SRK has assessed historical performance from 2015 through 2021 inclusive and where appropriate modified the forecast data as developed by the Company accordingly.

11.3.1 Production

Production estimates largely follow the process outlined above on a deposit level and include:

- The Ore Reserves as reported in Table 11-3 on an aggregate (100%) basis;
- Uranium content in PLS;
- Uranium content in TD (desorbate/rich eluate);
- Recovery of Uranium in TD to Uranium in the final site product being (TD, HKPU, U_3O_8) through application of a process recovery rate; and
- Recovery from final site product to U_3O_8 where this occurs off-site.

Furthermore, it is critical to note that each Mining Contract stipulates an agreed overall site product recovery of Uranium from the in-situ content. These typically range from 80% to 90% and essentially reflect the point at which commercial production may cease. Accordingly, the Company monitors the cumulative production from individual wells over time to determine to what extent the contractual recovery has been achieved. To date SRK has confirmed that the contractual recoveries as forecasted are broadly aligned with actual results as reflected in the historical tables reported herein.

The final sales product at the Mining Subsidiaries is subsequently determined based on the determination actual production at the various stages of production and the determination of the movement WIP and finished goods. This determination requires detailed calculations pertaining to various opening balances and WIP days assumptions. SRK has reflected these determinations in the underlying LoMp with the final aggregated sales presented at a Mining

Subsidiary level. Accordingly, in support of such determinations, Table 11-5 provides the supporting details for the determination of WIP by Mining Subsidiary for the historical periods from 2017 through 2021.

Table 11-3: Mining Subsidiary Ore Reserves and LoMp depletion year (Aggregate 100% basis)

Mining Subsidiary	Deposit	Proved Ore Reserves			Probable Ore Reserves			Ore Reserves			LoMp
		Tonnage (Mt)	Grade (%U)	Content (ktU)	Tonnage (Mt)	Grade (%U)	Content (ktU)	Tonnage (Mt)	Grade (%U)	Content (ktU)	Depl'n (year)
Kazatomprom-SaUran LLP											
	Uvanas	-	-	-	-	-	-	-	-	-	n/a
	Eastern Mynkuduk	2.5	0.030	0.8	3.0	0.030	0.9	5.5	0.030	1.6	2028
	Kanzhugan	2.0	0.042	0.8	26.3	0.038	10.0	28.4	0.038	10.9	2048
	South Moinkum (Southern part)	-	-	-	-	-	-	-	-	-	n/a
	Central Moinkum	0.5	0.056	0.3	17.7	0.058	10.3	18.2	0.058	10.5	2040
	Subtotal	**5.0**	**0.037**	**1.9**	**47.0**	**0.045**	**21.2**	**52.0**	**0.044**	**23.1**	**2048**
Ortalyk LLP											
	Zhalpak	9.2	0.100	9.2	5.1	0.100	5.1	14.3	0.100	14.3	2042
	Central Mynkuduk	17.4	0.100	17.4	5.4	0.100	5.4	22.9	0.100	22.9	2033
	Subtotal	**26.7**	**0.100**	**26.7**	**10.5**	**0.100**	**10.5**	**37.2**	**0.100**	**37.2**	**2042**
RU-6 LLP											
	Northern Karamurun	4.8	0.069	3.3	2.1	0.050	1.1	6.9	0.063	4.4	2040
	Southern Karamurun	6.4	0.081	5.2	4.4	0.089	3.9	10.8	0.084	9.1	2034
	Subtotal	**11.2**	**0.076**	**8.5**	**6.5**	**0.076**	**5.0**	**17.7**	**0.076**	**13.5**	**2040**
Appak LLP											
	Western Mynkuduk	**6.5**	**0.032**	**2.1**	**39.5**	**0.036**	**14.2**	**46.0**	**0.035**	**16.3**	**2037**
JV Inkai LLP											
	Block 1 Inkai (a)	35.5	0.076	26.9	9.3	0.061	5.7	44.7	0.073	32.6	2051
	Block 1 Inkai (b)	93.8	0.048	45.0	23.4	0.047	11.0	117.2	0.048	56.0	2046
	Block 1 Inkai (c)	72.8	0.047	34.2	17.3	0.049	8.5	90.1	0.047	42.7	2051
	Subtotal	**202.0**	**0.053**	**106.2**	**50.0**	**0.050**	**25.2**	**252.0**	**0.052**	**131.3**	**2051**
Semizbai-U LLP											
	Semizbai	14.7	0.057	8.4	2.4	0.053	1.2	17.1	0.056	9.6	2042
	Irkol	17.1	0.041	7.0	18.0	0.042	7.6	35.2	0.042	14.6	2040
	Subtotal	**31.9**	**0.048**	**15.4**	**20.4**	**0.043**	**8.8**	**52.3**	**0.046**	**24.2**	**2042**
JV Akbastau JSC											
	Block 1 Budenovskoye	7.8	0.107	8.3	5.3	0.088	4.6	13.1	0.099	13.0	2037
	Block 3 Budenovskoye	18.7	0.071	13.3	5.2	0.100	5.2	23.8	0.077	18.4	2039
	Block 4 Budenovskoye	2.1	0.141	3.0	4.2	0.084	3.6	6.3	0.103	6.5	2039
	Subtotal	**28.6**	**0.086**	**24.5**	**14.7**	**0.091**	**13.4**	**43.2**	**0.088**	**37.9**	**2039**
Karatau LLP											
	Block 2 Budenovskoye	**22.8**	**0.097**	**22.1**	**26.3**	**0.063**	**16.6**	**49.1**	**0.079**	**38.7**	**2032**
JV Zarechnoye JSC											
	Zarechnoye	**4.3**	**0.052**	**2.2**	**4.5**	**0.065**	**2.9**	**8.8**	**0.059**	**5.2**	**2028**
JV Katco LLP											
	Southern Moinkum (Northern part)	5.1	0.063	3.2	2.7	0.057	1.5	7.8	0.061	4.7	2028
	Tortkuduk	19.0	0.122	23.2	20.7	0.118	24.4	39.7	0.120	47.6	2035
	Subtotal	**24.1**	**0.110**	**26.4**	**23.4**	**0.111**	**26.0**	**47.5**	**0.110**	**52.4**	**2035**
JV Khorassan-U LLP											
	Block Kharassan 1, North Kharassan 1	**9.1**	**0.106**	**9.6**	**25.2**	**0.107**	**27.0**	**34.3**	**0.107**	**36.6**	**2038**
JV SMCC LLP											
	Akdala	3.1	0.057	1.8	2.0	0.057	1.1	5.1	0.057	2.9	2025
	Block 4 Inkai	99.6	0.040	40.1	86.2	0.040	34.8	185.8	0.040	75.0	2057
	Subtotal	**102.7**	**0.041**	**41.9**	**88.1**	**0.041**	**36.0**	**190.9**	**0.041**	**77.9**	**2057**
Baiken-U LLP											
	Block Kharassan 2, North Kharassan 1	**8.1**	**0.114**	**9.2**	**7.2**	**0.109**	**7.9**	**15.3**	**0.112**	**17.0**	**2033**
Budenovskoye LLP											
	Block 6/7 Budenovskoye	**-**	**-**	**-**	**153.0**	**0.075**	**114.2**	**153.0**	**0.075**	**114.2**	**2045**
Total		**482.8**	**0.061**	**296.7**	**516.5**	**0.064**	**328.8**	**999.2**	**0.063**	**625.4**	**2057**

Figure 11-1: Ore Reserve contribution by Mining Subsidiary

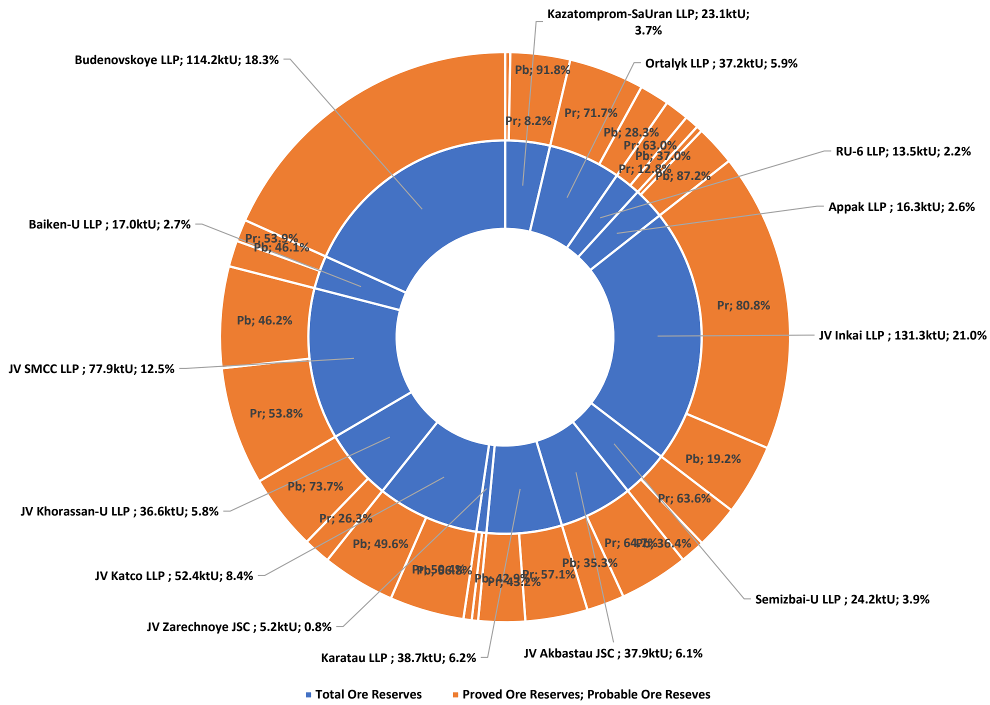


Table 11-4: Company Attributable Ore Reserves and LoMp depletion year

Mining Subsidiary	Deposit	Attributable Ore Reserves Tonnage (Mt)	Grade (%U)	Content (ktU)	LoMp Depletion (year)
Kazatomprom-SaUran LLP					
	Uvanas	-	-	-	n/a
	Eastern Mynkuduk	5.5	0.030	1.6	2028
	Kanzhugan	28.4	0.038	10.9	2048
	South Moinkum (Southern part)	-	-	-	n/a
	Central Moinkum	18.2	0.058	10.5	2040
	Subtotal	**52.0**	**0.044**	**23.1**	**2048**
Ortalyk LLP					
	Zhalpak	14.3	0.100	14.3	2042
	Central Mynkuduk	22.9	0.100	22.9	2033
	Subtotal	**37.2**	**0.100**	**37.2**	**2042**
RU-6 LLP					
	Northern Karamurun	6.9	0.063	4.4	2040
	Southern Karamurun	10.8	0.084	9.1	2034
Subtotal	**Subtotal**	**17.7**	**0.076**	**13.5**	**2040**
Appak LLP					
	Western Mynkuduk	**29.9**	**0.035**	**10.6**	**2037**
JV Inkai LLP					
	Block 1 Inkai (a)	26.8	0.073	19.6	2051
	Block 1 Inkai (b)	70.3	0.048	33.6	2046
	Block 1 Inkai (c)	54.1	0.047	25.6	2051
	Subtotal	**151.2**	**0.052**	**78.8**	**2051**
Semizbai-U LLP					
	Semizbai	8.7	0.056	4.9	2042
	Irkol	17.9	0.042	7.4	2040
	Subtotal	**26.7**	**0.046**	**12.4**	**2042**
JV Akbastau JSC					
	Block 1 Budenovskoye	6.5	0.099	6.5	2037
	Block 3 Budenovskoye	11.9	0.077	9.2	2039
	Block 4 Budenovskoye	3.2	0.103	3.3	2039
	Subtotal	**21.6**	**0.088**	**19.0**	**2039**
Karatau LLP					
	Block 2 Budenovskoye	**24.5**	**0.079**	**19.3**	**2032**
JV Zarechnoye JSC					
	Zarechnoye	**4.4**	**0.059**	**2.6**	**2028**
JV Katco LLP					
	Southern Moinkum (Northern part)	3.8	0.061	2.3	2028
	Tortkuduk	19.5	0.120	23.3	2035
	Subtotal	**23.3**	**0.110**	**25.7**	**2057**
JV Khorassan-U LLP					
	Block Kharassan 1, North Kharassan	**17.1**	**0.107**	**18.3**	**2038**
JV SMCC LLP					
	Akdala	1.5	0.057	0.9	2025
	Block 4 Inkai	55.7	0.040	22.5	2057
	Subtotal	**57.3**	**0.041**	**23.4**	**2057**
Baiken-U LLP					
	Block Kharassan 2, North Kharassan	**8.0**	**0.112**	**8.9**	**2033**

Mining Subsidiary	Deposit	Attributable Ore Reserves Tonnage (Mt)	Grade (%U)	Content (ktU)	LoMp Depletion (year)
Budenovskoye LLP					
	Block 6/7 Budenovskoye	**78.0**	**0.075**	**58.3**	**2045**
Total		**549.0**	**0.064**	**350.8**	**2057**

Table 11-5: Mining Subsidiary Work in Progress and WIP days assumptions

Mining Subsidiary	Units	2017	2018	2019	2020	2021
Work In Progress c/b						
Kazatomprom-SaUran LLP	(tU)					
ME Ortalyk LLP	(tU)					
RU-6 LLP	(tU)					
Appak LLP	(tU)					
JV Inkai LLP	(tU)					
Semizbai-U LLP	(tU)					
JV Akbastau JSC	(tU)					
Karatau LLP	(tU)					
JV Zarechnoye JSC	(tU)					
JV Katco LLP	(tU)					
JV Khorassan-U LLP	(tU)					
JV SMCC LLP	(tU)					
Baiken-U LLP	(tU)					
Budenovskoye LLP	(tU)					
Total	**(tU)**	-	-	-	-	-
Work In Progress						
Kazatomprom-SaUran LLP	(days)					
ME Ortalyk LLP	(days)					
RU-6 LLP	(days)					
Appak LLP	(days)					
JV Inkai LLP	(days)					
Semizbai-U LLP	(days)					
JV Akbastau JSC	(days)					
Karatau LLP	(days)					
JV Zarechnoye JSC	(days)					
JV Katco LLP	(days)					
JV Khorassan-U LLP	(days)					
JV SMCC LLP	(days)					
Baiken-U LLP	(days)					
Budenovskoye LLP	(days)					
Total	**(days)**	-	-	-	-	-
Production						
Kazatomprom-SaUran LLP	(tU)					
ME Ortalyk LLP	(tU)					
RU-6 LLP	(tU)					
Appak LLP	(tU)					
JV Inkai LLP	(tU)					
Semizbai-U LLP	(tU)					
JV Akbastau JSC	(tU)					
Karatau LLP	(tU)					
JV Zarechnoye JSC	(tU)					
JV Katco LLP	(tU)					
JV Khorassan-U LLP	(tU)					
JV SMCC LLP	(tU)					
Baiken-U LLP	(tU)					
Budenovskoye LLP	(tU)					
Total	**(tU)**	-	-	-	-	-

11.3.2 Production Flexibility

The current LoMps as developed by the Company's reflect a combination of: the Company's overall strategic marketing objectives; operational performance; physical constraints (well, processing and refining capacities); contractual commitments as recorded in the respective Mining Contracts for each deposit as held by the respective Mining Subsidiary. As such and pending any changes to the Mining Contracts as well as any other constraints, there remains a fixed production cap on the maximum production from each deposit. In the event that the Company wishes to change production levels as defined in the Mining Contracts, the Company must apply for such amendments through revised regulatory submissions which would then, if approved, be incorporated into revised Mining Contracts.

Presently the prevailing legislation reflects two key routes for obtaining new Mining Contracts:

- The "**Subsoil Law**" legislation of Kazakhstan effective 24/06/2010; and
- The Code of the Republic of Kazakhstan regarding "**Subsoil Code**" effective 27/12/2017.

The applicability of the various legislation is dependent upon the effective dates of either historical mining contracts prior (Subsoil Law) to 27/12/2017 or any new applications made subsequent to or on (Subsoil Code) 27/12/2017. Both the Subsoil Law and the Subsoil Code govern the award of exploration and mining contracts and as such include substantive details relating to the process of award and articles governing transitional provisions for exploration and mining contracts signed prior to 27/12/2017 are included in the Subsoil Law, specifically Articles 277 and 278.

Application and enforcement of the legislation is the responsibility of:

- the Ministry of Energy of the Kazakhstan ("**MoE**", also referred to herein as the "**Competent Authority**"; and
- the Ministry of Environmental Protection of the Kazakhstan ("**MoEP**") and the Ministry of Emergency Situations of Kazakhstan ("**MoES**"), hereinafter the "**State Bodies**".

With respect to Subsoil Law the key provisions and processes are as follows:

- Chapter 5 which governs direct negotiations ("**Direct Negotiations Protocol**") with the regulatory authorities and notes that this agreement must be concluded within 2 months or alternatively refused;
- Article 62, paragraph 3, governs the preparation of a draft contract, and following submission under must be approved by the Competent Authority and the State Bodies within 30 calendar days;
- Article 64, development of the project prospecting within 8 months subsequent to signing of the Direct Negotiations Protocol;
- Article 67 relating to the payment of the subscription bonus within 20 days following agreement with the Regulatory Authorities. The subscription bonus is determined in accordance with a defined formula noted in Article 726 and is dependent on the quantum of 'reserves' defined;
- Article 68 relating to the registration of the contract which must be concluded within 18 months subsequent to signing the Direct Negotiations Protocol;
- Completion of Exploration Programme in accordance with the programme agreed with the Regulatory Authorities. Typically, this can extend for a period of one to four years with allowance for 2 times two year extensions for a total of 8 years. The period of assessment of technical data can be up to 5 years. In respect of Subsoil Code this is defined as a period of one to six years with a possibility of extending for 5 years;
- Completion of Pilot Well Programme, typically completed within a three to five year period; and
- Completion of technical studies defined as "**PRGR**" reports which is typically completed within a one year time frame, of which there are two types:
  - PRGR 1: a technical document which defines the project criteria and assumptions in accordance with the extraction of solid minerals for a new development;
  - PRGR 2: a technical document which includes a detailed mine plan for a project under development. This is also the key document and the basis for development of the annual budget which is also submitted to the Regulatory Authorities.

  The time frame for development of these studies and documents is approximately 1 year and these include: generation of both Feasibility Studies and Environmental Impact Assessments; approval by the Central Commission for Exploration and Development Department of the MoE.

  Furthermore, the documents and development of exploration/exploitation programmes must adhere to various legislation and ultimately are approved by the Ministry of Investment and Development of the Republic of Kazakhstan. All contracts for extraction are obtained through direct negotiations with the MoE.

With respect to the Subsoil Code, the key processes comprise:

- Submission of application for exploration licence to the Competent Authority;
- Approval or refusal of aforementioned application within 10 working days;
- Development of detailed exploration programme;
- Preparation of geological reports, see PRGR above.

Presently only licensed companies are permitted to author various technical studies as required under the governing legislation and these are typically held by either governmental or non-governmental/private technical institutes who are expertised in the generation of such documents.

Accordingly, the time frames for obtaining and/or amending a mining contract are critically dependent on the development stage whereby:

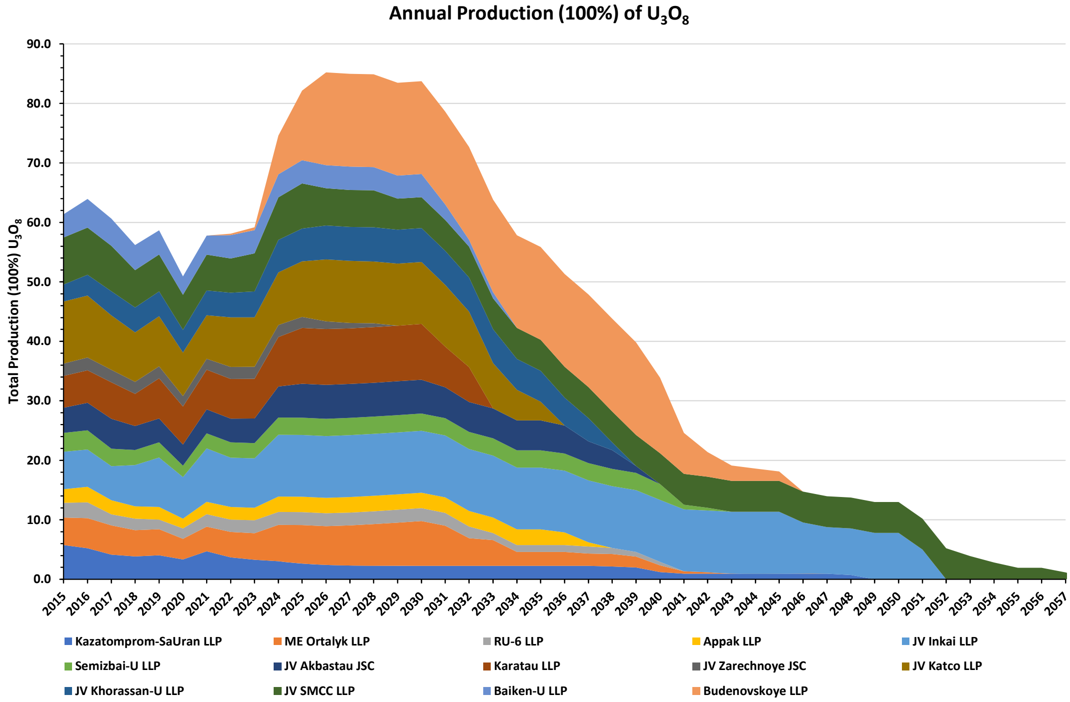
- For greenfield sites the combined timeframe for exploration (1 to 8 years), pilot well (3 to 5 years) and technical study periods (1 year) could extend from 5 years to 14 years);
- For projects where exploration is complete, but no pilot wells conducted, the combined time frame could be 4 to 6 years; and
- For projects where pilot wells are completed, or which are already under development/production and assuming that no further exploration is required the combined time frame could be as short as 1 year assuming that the relevant technical studies are largely developed. Notwithstanding this aspect, SRK notes that for a defined time frame, the Company can adjust the forecast production rate within a range of ±20% without recourse to permanent revision of the Mining Contract through re-application and ultimately regulatory approval.

For all existing mining operations, reported production (Table 11-6) is limited to that stipulated in the relevant Mining Contracts (see Section 2.3) for the relevant site products (Table 11-2). During 2017 the Company re-assessed its short term production plans in accordance with anticipated market conditions and reduced production by approximately 20%. The current LoMp as developed by the Company assumes that the reduction is planned to be unwound by 2024. Total production of uranium (tU) at the Mining Subsidiaries is therefore expected to increase to 29ktU by 2024 and further to 33ktU by 2026, maintaining production above 30KtU by 2031 and thereafter declining as the number of operating Mining Subsidiaries reduce from 13 in 2031 to four by 2037 as the impact of production tails are noted. Figure 11-2 presents a summary of the production profile for each mining subsidiary in tonnes of U_3O_8.

Table 11-6: Mining Subsidiary consolidated (100%) Uranium production: historical and forecast production(1)

Mining Subsidiary	2015A (tU)	2016A (tU)	2017A (tU)	2018A (tU)	2019A (tU)	2020A (tU)	2021A (tU)	2022F (tU)	2023F (tU)	2024F (tU)	2025F (tU)	2026F (tU)
Kazatomprom-SaUran LLP	2,214	2,003	1,590	1,474	1,550	1,276	1,807	1,415	1,265	1,165	1,004	933
ME Ortalyk LLP	1,770	1,953	1,898	1,710	1,690	1,339	1,600	1,650	1,720	2,350	2,500	2,500
RU-6 LLP	956	1,015	718	732	620	668	801	800	833	833	833	833
Appak LLP	880	1,004	901	803	805	633	805	800	800	1,000	1,000	1,000
JV Inkai LLP	2,418	2,413	2,202	2,669	3,216	2,699	3,450	3,200	3,200	4,000	4,000	4,000
Semizbai-U LLP	1,221	1,242	1,128	974	974	734	975	983	983	1,117	1,117	1,117
JV Akbastau JSC	1,630	1,778	1,941	1,546	1,545	1,363	1,547	1,545	1,600	2,000	2,194	2,194
Karatau LLP	2,064	2,108	2,359	2,081	2,592	2,468	2,562	2,560	2,560	3,200	3,600	3,600
JV Zarechnoye JSC	800	817	802	776	776	669	710	776	776	776	714	500
JV Katco LLP	4,007	4,003	3,519	3,202	3,240	2,821	2,813	3,200	3,200	3,400	3,600	4,000
JV Khorassan-U LLP	1,095	1,354	1,564	1,607	1,600	1,460	1,601	1,600	1,680	2,100	2,119	2,200
JV SMCC LLP	3,049	3,058	2,937	2,417	2,400	2,268	2,320	2,224	2,460	2,750	2,924	2,400
Baiken-U LLP	1,503	1,838	1,762	1,630	1,565	1,190	1,241	1,500	1,500	1,500	1,500	1,500
Budenovskoye LLP	-	-	-	-	-	-	-	99	180	2,500	4,500	6,000
Total	**23,607**	**24,586**	**23,321**	**21,621**	**22,575**	**19,587**	**22,232**	**22,351**	**22,757**	**28,691**	**31,605**	**32,777**

Figure 11-2: Annual production (100%) of Uranium Concentrate (U_3O_8)



Accordingly, the key opportunities to arrest the production decline beyond 2031 and maintain sales of U_3O_8 in the 40Mlb to 60Mlb range is dependent upon a combination of:

- Re-assessing the production rates at existing Mining Subsidiaries:
  - Completion of appropriate technical studies to assess the potential for re-assessment of the optimal production rates at long (> 15 years) life Mining Subsidiaries, e.g. JV Inkai LLP, JV SMCC LLP, JV Zarechnoye JSC, Budenovskoye LLP,
  - Completion of further technical studies to roll-up the production tails at various of the Mining Subsidiaries, e.g., ME Ortalyk LLP, and RU-6 LLP and Semizbai-U LLP.

  To date the Company has completed various high level conceptual studies at several of the Mining Subsidiaries deposits and these have identified the potential to increase production. These have not been updated since the 2018 CPR, specifically since completion of the additional technical studies which informs the current production profile. This aside SRK considers that the following potential increases remain indicative of potential increased production:

  - Semizbai-U LLP: to increase production by approximately 240tU from 2024 onwards,
  - Appak LLP: to increase production from 1,000tU to 1,200tU from 2021 onwards,
  - JV Inkai LLP: to increase production from 4,000tU to 4,800tU from 2024 onwards,
  - JV Khorassan-U LLP: to increase production to 2,400tU from 2024 onwards and by capping at this level enabling increased processing at Baiken-U LLP ,
  - Baiken-U LLP: to increase production from 1,500tU to 2,400tU from 2024 onwards albeit for a short period,
  - JV Zarechnoye JSC: to continue production through further exploration and extraction of material currently classified as Inferred Mineral Resources,
  - JV Katco LLP: to increase production to 4,800tU from 2026 onwards,
  - Karatau LLP: to increase production from 3,600tU to 3,840tU from 2025 onwards,

- Kazatomprom-SaUran LLP: to increase production 285tU from 2026 onwards,
- RU-6 LLP: to increase production from 833tU to 1,200tU from 2024 onwards;

The combined impact of the above increases would be to expand production levels from the current profiles from 2024 through 2029 with production increasing to 35ktU by 2024, 37ktU by 2027 and thereafter declining and realigning with the current profile. These increases whilst subject to further technical studies, are largely possible given: the relative simplicity of the ISR mining operations and the expansion of the production well footprint within the mining areas; and where necessary through additional capital programmes expansion of existing processing and refining capacities;

- Completion of Feasibility Studies in respect of advanced exploration properties: properties for which Mineral Resources have been defined but for which insufficient technical work has been completed to support the declaration of Ore Reserves: specifically;
  - the Block 2 Inkai and Block 3 Inkai deposits owned by the Company and reporting total Mineral Resources of 306.1Mt grading 0.041%U for content of 125.1ktU. Further technical work is required to be completed to support investigations targeting production in the range of 2,000tU to 3,000tU with an initial contract term of 25 years. This will also require completion of further exploration to enable upgrading of the current classification and commencement of direct negotiations with the competent authorities to secure the necessary mining contracts; and
- Completion of further exploration activities specifically in respect of :
  - the Company's existing mining operations where potential exists for re-assessing and extending the boundaries of known mineralisation;
  - the Company's broader regional exploration programme as outlined by the planned US$82.9m programme over the next 7 years (see Section 8 and Section 11.3.7 of the CPR).

To this end the Company is currently undertaking various technical studies to advance the conceptual studies to Pre-feasibility and Feasibility study status with a view to developing appropriately detailed plans to support any planned expansions in production capacity. The decision to implement such plans are obviously dependent on market conditions and furthermore securing the necessary approvals from the Competent Authority and State Bodies to amend existing Mining Contracts.

11.3.3 Sales Revenue

The current sales contracts between the Company, its Joint Venture partners and the Mining Subsidiary companies are subject to various sales contracts whereby the attributable sales price assumptions are subject to various adjustments. These adjustments are incorporated into the various governing agreements and are defined in accordance with the GoK uranium concentrate pricing regulations (effective 3 February 2011), whereby the saleable product is purchased by the JV partners at a commercial price equal to the uranium spot price, less a subsidiary specific price discount (maximum allowable). The Company has informed SRK that the specific price discounts as incorporated into each JV agreement is both confidential and as such may not be publicly disclosed. Accordingly, in conjunction with the Company SRK has determined the weighted average price discount based on a combination of the LoMp sales forecasts and the UxC price forecast. This analysis indicates that the weighted average price discount for all Mining Subsidiaries (excluding the wholly owned mining subsidiaries of Kazatomprom-SaUran LLP, Ortalyk LLP and RU-6 LLP) is approximately 3.50%. Accordingly, for determination of any forecast data, SRK notes the following:

- For Kazatomprom-SaUran LLP, Ortalyk LLP and RU-6 LLP a price discount factor of 0.00%; and
- For all other mining subsidiaries (JV SMCC LLP; Semizbai-U LLP; Appak LLP; JV Inkai LLP; JV Khorassan-U LLP; Baiken-U LLP; JV Zarechnoye JSC; JV Katco LLP; Karatau LLP; JV Akbastau JSC: hereinafter the "**JV Companies**") a price discount factor of 3.50%.

Table 11-7: Mining Subsidiary Revenue discounts and sales pricing assumptions (US$/lbU$_3O_8$): 2022 through 2030

Subsidiary	Units	2022	2023	2024	2025	2026	2027	2028	2029	2030
Base Case	(US$/lbU$_3$0$_8$)	42.33	42.43	44.02	44.70	45.89	46.32	49.26	51.15	53.67
JV Companies										
Price Discount	(%)	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
JV Companies	(US$/lbU$_3$0$_8$)	40.85	40.94	42.48	43.14	44.28	44.70	47.54	49.36	51.79
Wholly Owned										
Price Discount	(%)	-	-	-	-	-	-	-	-	-
Kazatomprom-SaUran LLP	(US$/lbU$_3$0$_8$)	42.33	42.43	44.02	44.70	45.89	46.32	49.26	51.15	53.67
ME Ortalyk LLP	(US$/lbU$_3$0$_8$)	42.33	42.43	44.02	44.70	45.89	46.32	49.26	51.15	53.67
RU-6 LLP	(US$/lbU$_3$0$_8$)	42.33	42.43	44.02	44.70	45.89	46.32	49.26	51.15	53.67

Table 11-8: Mining Subsidiary Revenue discounts and sales pricing assumptions (US$/lbU$_3O_8$): 2031 through 2039

Subsidiary	Units	2031	2032	2033	2034	2035	2036	2037	2038	2039
Base Case	(US$/lbU$_3$0$_8$)	55.35	56.61	57.80	59.06	58.85	60.03	61.23	61.23	61.23
JV Companies										
Price Discount	(%)	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
JV Companies	(US$/lbU$_3$0$_8$)	53.41	54.63	55.78	56.99	56.79	57.93	59.08	59.08	59.08
Wholly Owned										
Price Discount	(%)	-	-	-	-	-	-	-	-	-
Kazatomprom-SaUran LLP	(US$/lbU$_3$0$_8$)	55.35	56.61	57.80	59.06	58.85	60.03	61.23	61.23	61.23
ME Ortalyk LLP	(US$/lbU$_3$0$_8$)	55.35	56.61	57.80	59.06	58.85	60.03	61.23	61.23	61.23
RU-6 LLP	(US$/lbU$_3$0$_8$)	55.35	56.61	57.80	59.06	58.85	60.03	61.23	61.23	61.23

11.3.4 Operating Expenditure

The determination of operating expenditures at the Mining Subsidiaries are largely based on a combination of historical and planned statistics with modifications for changed circumstances, suppliers etc as considered appropriate. In summary the process incorporates:

- Establishing labour compliments for mining, processing and G&A activities;
- Establishing unit physical consumables for mining and processing which is either related to Uranium content or PLS volumes;
- Application of unit cost rates (including transportation costs) to the determined consumable volumes for both mining and processing activities;
- Determination of additional expenditures and recovery of these expenditures in relation to services provided by one Mining Subsidiary to another, specifically processing to final product;
- Determination of refining charges for conversion of site-products to U_3O_8 (where the final site product is not U_3O_8);
- Determination of terminal benefits liabilities or retrenchment costs based on the current minimum legal requirements in Kazakhstan being 1-month salary assumed as 1/12th of the annual labour bill relating to the labour movement determination on closure;
- Determination of both other cash and non-cash costs required to establish the Mineral Extraction Tax, Exploration Depreciation, Property Tax;
- Determination of mining contract related expenditures/provisions specifically:
  - Social Commitments included within the G&A costs and based on annual costs per deposit as noted in (Table 11-9) below,
  - Liquidation provisions (cash cost which is included as a capital item, is not directly tax deductible and not included in any depreciation determinations) which is based on a

percentage (Table 11-9) of mining related expenditures inclusive of: direct mining costs; Mineral Extraction Tax ("**MET**" or royalty); mining depreciation, wellfield development depreciation ("**PGR**"), mining exploration depreciation. These expenditures are then accumulated and compared with the LoMp closure costs as presented in Table 10-5 whereby any shortfall or excess is then incorporated on the last period of operations; and

- The Company has assessed its exposure of key activity cost centres to currency fluctuations and given the high local content for labour, key consumables such as acid and power the average currency exposure distributions amongst the following key site activities are considered to be appropriate:
  - Mining: 95% KZT and 5% US$,
  - Processing: 80% KZT and 20% US$,
  - On-site G&A: 95% KZT and 5% US$.

Table 11-9: Mining Subsidiary Liquidation Fund contribution percentages and social cost contributions

Mining Subsidiary	Deposit	Liquidation Fund[1] (%)	Social Costs (US$kpa)
Kazatomprom-SaUran LLP	Uvanas	6.77	200
	Eastern Mynkuduk	1.27	200
	Kanzhugan	3.47	300
	South Moinkum (Southern part)	1.00	300
	Central Moinkum	1.00	300
ME Ortalyk LLP	Zhalpak	1.00	100
	Central Mynkuduk		100
RU-6 LLP	Northern Karamurun Southern Karamurun	1.00	260
Appak LLP	Western Mynkuduk	1.00	100
JV Inkai LLP[2]	Block 1 Inkai (a) Block 1 Inkai (b) Block 1 Inkai (c)	1.00	30
Semizbai-U LLP	Semizbai	1.00	100
	Irkol	1.00	70
JV Akbastau JSC	Block 1 Budenovskoye	1.00	150
	Block 3 Budenovskoye and Block 4 Budenovskoye	1.00	350
Karatau LLP	Block 2 Budenovskoye	1.00	140
JV Zarechnoye JSC	Zarechnoye	0.10	50
JV Katco LLP	Southern Moinkum (Northern part) Tortkuduk	1.00	30
JV Khorassan-U LLP	Block Kharassan 1, North Kharassan	1.00	120
JV SMCC LLP	Akdala	0.10	50
	Block 4 Inkai	1.00	100
Baiken-U LLP	Block Kharassan 2, North Kharassan	1.00	100
Budenovskoye LLP	Block 6/7 Budenovskoye	1.00	500

(1) Liquidation Fund percentages applied to the sum of mining, MET, Mining Depreciation, PGR, GRR gross-up by an assumed 20% margin.

(2) Payments are made annually and make 0.5% of an annual gross profit within the first five years, 1% from an annual gross profit within the next 15 years and 1.5% from an annual gross profit during the period which has remained till the end of working off. At accumulation of sum exceeding US$500k, the Subsoil user will not have the further obligations on payments, and the percent charged for this sum can be used for holding of current reclamation.

Table 11-10 presents the historical average number of human resources statistics in the reporting period for the Mining Subsidiaries for 2015 through 2021 inclusive. For the 12 month period ended 31 December 2021 the average number engaged at the Mining Subsidiaries were [x,xxx].

Table 11-10: Mining Subsidiary Human Resources historical statistics

Mining Subsidiary	2015 (No)	2016 (No)	2017 (No)	2018 (No)	2019 (No)	2020 (No)	2021 (No)
Kazatomprom-SaUran LLP	980	961	898	876			
ME Ortalyk LLP	569	570	551	541			
RU-6 LLP	394	398	340	298			
Appak LLP	601	650	655	681			
JV Inkai LLP	11	13	14	14			
Semizbai-U LLP	479	502	494	509			
JV Akbastau JSC	474	499	502	491			
Karatau LLP	428	420	412	378			
JV Zarechnoye JSC	1,249	1,294	1,232	1,189			
JV Katco LLP	629	612	592	583			
JV Khorassan-U LLP	44	43	46	50			
JV SMCC LLP	1,233	1,303	1,450	1,305			
Baiken-U LLP	522	535	516	498			
Total	**7,613**	**7,800**	**7,701**	**7,413**	**-**	**-**	**-**

11.3.5 Capital Expenditure

Capital expenditures are generally segregated into four key elements:

- Well construction costs which are determined through application of unit construction and equipping costs per unit length (metres) developed. Well construction is assumed to cease two years prior to planned cessation of production on depletion of the Ore Reserves;
- Expansion/Development capital relating to defined one-off activities and typically include, expansion of processing facilities, extension of services and transport routes to new well-field areas, implementation of new systems and processes;
- Sustaining Capital largely reflecting recurring, infrastructure, maintenance and equipment replacement related costs which are assumed to cease three years prior to cessation of production; and
- Liquidation Fund Contributions/Closure Costs.

The key capital expenditure programmes as incorporated in to the LoMps comprise:

- **Appak LLP:** construction of a satellite processing facility and associated expenditure;
- **JV Inkai LLP**: construction of facilities to expand production to 4,000tUpa and other major repairs by 1 January 2024;
- **Budenovskoye LLP:** construction of mining and processing facilities to enable production of 6,000tU by 2026;
- **JV Katco LLP:** capital commitments for the implementation of the Tortkuduk project inclusive of infrastructure facilities;
- **Karatau LLP:** expansion for refining production to 3,600tUpa at Block 2 Budenovskoye by 2025;
- **Ortalyk LLP:** construction of additional facilities at Zhalpak in order to support expanded production to 900tU by 2030.

The Company has assessed the exposure of capital expenditures to currency fluctuations and given that the majority of components are locally sourced the currency exposure averages approximately 85% in KZT and 15% in US$, which appear reasonable given the current context.

11.3.6 LoM Closure estimates (Aggregated basis)

The total environmental liabilities as determined for the Mining Subsidiaries are based on the assessment of the closure related costs as on 31 December 2021 and on cessation of planned mining and processing operations. The resulting analysis indicates a total (100%) ARO, LoMp Closure and Retrenchment Liability of KZT106.5bn (US$250.5m), KZT264.3bn (US$621.8m) and KZT4.4bn (US$10.3m) respectively. As on 31 December 2021 the opening balance of the liquidation fund was reported as KZT46.0bn (US$108.3m) and the contributions to the liquidations fund over the LoMp period at KZT[xx.x]bn (US$[xx.x]m) results in an estimated fund balance on closure of KZT[xx.x]bn (US$[xxx.x]m), thereby indicating a shortfall of KZT[xx.x]bn (US$[xxx.x]m), which is addressed by the closure expenditures as included in the final year of the Financial Models for each of the Mining Subsidiaries.

These ARO and Environmental closure costs estimates are reported inclusive of a 10% contingency and specifically exclude any provisions for Retrenchment Liabilities. The ARO liabilities are an estimate of closure requirements assuming immediate closure as at 31 December 2021. The LoMp closure costs reflect closure on depletion of the LoMps and effectively are inclusive of the ARO estimates.

Table 11-11: Mining Subsidiary Environmental Closure and Retrenchment Liabilities

Mining Subsidiary	ARO (KZTm)	LoMp (KZTm)	Liquidation Fund Closing Balance (KZTm)	Contributions (KZTm)	On Closure (KZTm)	Retrenchment (KZTm)
Kazatomprom-SaUran LLP	13,697.9	25,189.5	6,412.9		6,412.9	214.8
ME Ortalyk LLP	5,224.9	16,577.1	1,636.8		1,636.8	284.0
RU-6 LLP	19,211.4	26,632.9	2,433.0		2,433.0	177.3
Appak LLP	4,228.6	8,697.6	2,364.2		2,364.2	130.2
JV Inkai LLP	8,741.0	31,139.7	257.1		257.1	598.3
Semizbai-U LLP	6,141.1	14,521.9	1,533.0		1,533.0	104.6
JV Akbastau JSC	3,915.2	15,414.0	1,430.8		1,430.8	26.4
Karatau LLP	4,126.4	9,301.8	1,201.3		1,201.3	417.1
JV Zarechnoye JSC	2,234.3	4,345.1	1,407.9		1,407.9	169.4
JV Katco LLP	24,285.6	25,531.5	21,097.1		21,097.1	546.0
JV Khorassan-U LLP	2,865.5	8,013.2	1,205.0		1,205.0	25.6
JV SMCC LLP	8,721.6	29,663.7	3,304.8		3,304.8	412.6
Baiken-U LLP	3,057.7	6,308.7	1,653.5		1,653.5	379.5
Budenovskoye LLP	-	42,936.5	107.7		107.7	897.4
Total	**106,451.2**	**264,273**	**46,045.2**	**-**	**46,045.2**	**4,383.2**

11.3.7 Exploration Expenditures

In addition to the LoMp related expenditures, the Company has developed a detailed exploration programme which is focused on various projects as detailed in Section 8 of the CPR. The expenditures are separately defined to the TEPs (i.e., not reflected in the LoMps) and comprise total expenditure of KZT35.3bn (US$82.9m) over a period of 7 years as reported in Table 11-12.

Table 11-12: Mining Subsidiary related Exploration Expenditures

Region	Units	Total	2022	2023	2024	2025	2026	2027	2028
Exploration Programme									
Shu-Sarysu	(KZTm)	16,713.6	5,801.6	5,076.8	2,911.1	1,455.6	1,215.3	253.1	-
Syrdarya	(KZTm)	10,656.1	2,025.1	1,985.9	2,151.7	1,493.5	1,493.5	1,253.1	253.1
North - Kazakhstan	(KZTm)	7,847.4	1,898.6	1,898.6	1,898.6	1,898.6	253.1	-	-
Total	**(KZTm)**	**35,217.2**	**9,725.4**	**8,961.3**	**6,961.4**	**4,847.7**	**2,962.0**	**1,506.2**	**253.1**
Exploration Programme									
Shu-Sarysu	(US$m)	39.3	13.7	11.9	6.8	3.4	2.9	0.6	-
Syrdarya	(US$m)	25.1	4.8	4.7	5.1	3.5	3.5	2.9	0.6
North - Kazakhstan	(US$m)	18.5	4.5	4.5	4.5	4.5	0.6	-	-
Total	**(US$m)**	**82.9**	**22.9**	**21.1**	**16.4**	**11.4**	**7.0**	**3.5**	**0.6**

(1) All US$ estimates have been converted to US$ incorporating from a base date of 30 June 2018 to 31 December 2021 KZ CPI factor of 1.27 and converted to US$ assuming a closing exchange rate of KZT425 to one US$.

11.3.8 Common Assumptions

The following section includes a summary description of the common cash and non-cash assumptions which in conjunction with the TEPs are required to derive the post-tax pre-finance cash flows for the Mining Subsidiaries. For the avoidance of doubt, the following applies to the TEPs as reported in the CPR:

- The PGR has been determined on a deposit basis where applicable and utilised for the determination of the MET and the Property Tax;
- The MET is separately reported in the TEPs and the Property Tax is distributed between the mining and processing operating expenditures as noted in the detailed explanations provided below; and
- Details considered necessary in support of determination of wellfield development depreciation (PGR), exploration depreciation (GRR), Depreciation, and Corporate Income Tax. No detail at a Mining Subsidiary level or Company level is provided for Working Capital Determinations.

PGR

In accordance with the relevant taxation codes of Kazakhstan, PGR (wellfield development depreciation) is a tax-deductible non-cash item which is determined from a unit cost rate (the "**PGR Rate**") applied to the depleted Ore Reserves (in-situ U content). The PGR Rate is determined from the sum of the PGR opening balance of well field expenditures (KZT) in the period and additional expenditures incurred in the period, divided by a sub-set of the Ore Reserves, specifically that portion of the Ore Reserves (U content) which is directly accessible by constructed wells (sum of opening balance in the period + following period in-situ production (U content). The PGR Rate is then multiplied by the depleted Ore Reserves to determine the tax-deductible non-cash charge in the period and the PGR closing balance is determined by the net assessment of the PGR opening balance and the PGR charge determined in the period. Table 11-13 presents the historical details of the closing period values in respect of PGR components for 2018 through 2021.

Table 11-13: Mining Subsidiary PGR Volumes and Values (closing period)

Mining Subsidiary	Units	2018	2019	2020	2021
PGR Volumes c/b					
Kazatomprom-SaUran LLP	(tU)	4,993	4,833	4,020	3,988
ME Ortalyk LLP	(tU)	2,711	2,717	2,760	2,466
RU-6 LLP	(tU)	2,954	2,625	2,813	2,892
Appak LLP	(tU)	2,447	1,803	1,435	1,570
JV Inkai LLP	(tU)	4,901	4,825	4,896	3,944
Semizbai-U LLP	(tU)	2,902	2,847	2,578	2,529
JV Akbastau JSC	(tU)	2,277	2,454	1,574	1,730
Karatau LLP	(tU)	3,070	2,540	2,621	2,344
JV Zarechnoye JSC	(tU)	2,502	2,420	2,323	1,082
JV Katco LLP	(tU)	4,881	4,604	4,540	54,875
JV Khorassan-U LLP	(tU)	4,108	3,168	2,235	3,041
JV SMCC LLP	(tU)	4,813	4,560	4,529	4,471
Baiken-U LLP	(tU)	3,176	2,970	3,030	2,597
Budenovskoye LLP	(tU)				
Total	**(tU)**	**45,735**	**42,366**	**39,354**	**87,529**
PGR Value c/b					
Kazatomprom-SaUran LLP	(KZTm)	11,088	12,373	14,657	15,533
ME Ortalyk LLP	(KZTm)	9,909	9,557	10,506	10,792
RU-6 LLP	(KZTm)	7,838	6,689	7,021	7,689
Appak LLP	(KZTm)	3,942	3,246	4,595	8,002
JV Inkai LLP	(KZTm)	19,901	24,120	22,219	21,300
Semizbai-U LLP	(KZTm)	5,611	6,703	7,331	7,819
JV Akbastau JSC	(KZTm)	4,758	4,548	4,524	6,739
Karatau LLP	(KZTm)	6,772	7,682	7,181	7,068
JV Zarechnoye JSC	(KZTm)	8,406	8,520	8,328	6,660
JV Katco LLP	(KZTm)	22,590	22,080	20,544	25,830
JV Khorassan-U LLP	(KZTm)	9,637	7,421	6,299	8,921
JV SMCC LLP	(KZTm)	9,615	10,521	10,997	10,730
Baiken-U LLP	(KZTm)	9,246	8,919	9,128	7,555
Budenovskoye LLP	(KZTm)				
Total	**(KZTm)**	**129,313**	**132,379**	**133,330**	**144,638**

GRR

In accordance with the relevant taxation codes of Kazakhstan, GRR (exploration depreciation) is a tax-deductible non-cash item which is determined based on the undepreciated opening balance of GRR multiplied by a depletion ratio, which depletion ratio is based on the ratio of in period production divided by (total LoMp production less the cumulative production to the prior period). Table 11-14 the historical details of the closing period values in respect of GRR components for 2018 through 2021.

Table 11-14: Mining Subsidiary GRR and Values (closing period)

Mining Subsidiary	Units	2018	2019	2020	2021
Kazatomprom-SaUran LLP	(KZTm)	2,870	2,789	2,692	2,575
ME Ortalyk LLP	(KZTm)	328	1,100	289	1,130
RU-6 LLP	(KZTm)	-	-	-	-
Appak LLP	(KZTm)	2,158	2,318	1,985	1,879
JV Inkai LLP	(KZTm)	20,320	18,145	17,728	17,100
Semizbai-U LLP	(KZTm)	31	36	36	36
JV Akbastau JSC	(KZTm)	6,893	6,635	6,404	17,994
Karatau LLP	(KZTm)	3,202	3,009	2,827	2,651
JV Zarechnoye JSC	(KZTm)	664	535	438	2,432
JV Katco LLP	(KZTm)	4,432	1,785	1,975	2,532
JV Khorassan-U LLP	(KZTm)	9,893	9,481	9,097	8,675
JV SMCC LLP	(KZTm)	6,479	6,290	6,101	5,919
Baiken-U LLP	(KZTm)	7,193	6,611	6,168	5,707
Budenovskoye LLP	(KZTm)	-	-	-	-
Total	**(KZTm)**	**64,463**	**58,734**	**55,740**	**68,630**

Mineral Extraction Tax ("MET")

In accordance with the relevant taxation codes of Kazakhstan, MET is form of '*mineral royalty*' determined by application of 29% tax charge to the taxable expenditures. The tax charge is a cash cost of mining and is based on an assumed 20% profit margin on certain expenditures and a MET rate of 18.50% and where the tax charge of 29% is determined by the following formulae: (1+20%)*18.5%/(1-(1+20%)*18.5%). The taxable expenditures comprise all direct expenditures associated with the mining operations and specifically exclude (processing and G&A) but include the period PGR charge and any other depreciation charges attributable to direct mining activities.

Property Tax ("PT")

In accordance with the relevant taxation codes of Kazakhstan, PT is a tax charge derived from application of a rate of 1.50% to the average of the opening and closing balances of PGR determined in the period. The property tax as determined is then apportioned in a ratio of 40% to the mining costs and 60% to the processing costs.

Depreciation

In accordance with the relevant taxation codes of Kazakhstan, Depreciation is a tax-deductible charge and is determined by depreciation of expansion and sustaining capital related expenditures through allocation to: production depreciation (70%) and accounting depreciation (30%). With respect to production depreciation this is based on the undepreciated opening balance of production depreciation multiplied by a depletion ratio, which is based on the ratio of in period production divided by (total LoMp production less the cumulative production to the prior period). With respect to accounting depreciation all related expenditures are depreciated on a straight-line basis for four years. The opening balances for production depreciation and accounting depreciation is determined by distributing the overall opening balance to production depreciation (70%) and accounting depreciation (30%). The overall depreciation charge is then apportioned to Mining, Processing and G&A activities by the assumed distribution determined in the prior reporting period that being the twelve-month period ended 31 December. Table 11-15, Table 11-16 and Table 11-17 presents historical information (from 2018 through 2021 inclusive) for the historical cost of plant property and equipment ("**PPE**"), carrying amount of PPE and depreciation and amortisation (excluding wellfield expenditures) respectively.

Table 11-15: Mining Subsidiary historical cost of plant property and equipment

Mining Subsidiary	Units	2018	2019	2020	2021
Kazatomprom-SaUran LLP	(KZTm)	6,518	5,962	16,214	21,732
ME Ortalyk LLP	(KZTm)	12,749	11,704	18,906	19,055
RU-6 LLP	(KZTm)	3,058	4,607	7,240	8,125
Appak LLP	(KZTm)	4,118	4,284	9,420	10,290
JV Inkai LLP	(KZTm)	59,706	60,001	99,090	102,568
Semizbai-U LLP	(KZTm)	7,990	9,217	17,145	17,360
JV Akbastau JSC	(KZTm)	7,509	7,436	11,314	11,889
Karatau LLP	(KZTm)	11,733	16,363	29,041	29,224
JV Zarechnoye JSC	(KZTm)	2,811	2,498	8,701	9,013
JV Katco LLP	(KZTm)	17,502	17,303	52,624	56,738
JV Khorassan-U LLP	(KZTm)	10,738	9,953	16,102	16,609
JV SMCC LLP	(KZTm)	12,290	11,417	20,615	22,380
Baiken-U LLP	(KZTm)	11,318	10,975	20,273	20,627
Budenovskoye LLP	(KZTm)	-	-	-	-
Total	**(KZTm)**	**168,040**	**171,720**	**326,685**	**345,610**

Table 11-16: Mining Subsidiary carrying amount of plant property and equipment

Mining Subsidiary	Units	2018	2019	2020	2021
Kazatomprom-SaUran LLP	(KZTm)	15,085	15,192	6,159	10,837
ME Ortalyk LLP	(KZTm)	18,168	18,174	11,617	11,067
RU-6 LLP	(KZTm)	5,589	7,196	4,423	4,950
Appak LLP	(KZTm)	8,280	8,622	4,798	5,531
JV Inkai LLP	(KZTm)	95,428	97,786	59,275	60,614
Semizbai-U LLP	(KZTm)	16,346	16,997	8,747	8,250
JV Akbastau JSC	(KZTm)	10,831	11,163	7,171	7,357
Karatau LLP	(KZTm)	22,708	28,306	16,179	14,939
JV Zarechnoye JSC	(KZTm)	8,435	8,564	2,338	2,260
JV Katco LLP	(KZTm)	50,212	51,234	17,172	20,457
JV Khorassan-U LLP	(KZTm)	15,379	15,228	10,195	10,156
JV SMCC LLP	(KZTm)	19,269	20,017	10,496	10,667
Baiken-U LLP	(KZTm)	19,475	20,116	10,313	9,923
Budenovskoye LLP	(KZTm)	-	-	-	-
Total	**(KZTm)**	**305,205**	**318,595**	**168,883**	**177,008**

Table 11-17: Mining Subsidiary depreciation and amortisation (excluding wellfield expenditures)

Mining Subsidiary	Units	2018	2019	2020	2021
Kazatomprom-SaUran LLP	(KZTm)	15,085	15,192	6,159	10,837
ME Ortalyk LLP	(KZTm)	18,168	18,174	11,617	11,067

Mining Subsidiary	Units	2018	2019	2020	2021
RU-6 LLP	(KZTm)	5,589	7,196	4,423	4,950
Appak LLP	(KZTm)	8,280	8,622	4,798	5,531
JV Inkai LLP	(KZTm)	95,428	97,786	59,275	60,614
Semizbai-U LLP	(KZTm)	16,346	16,997	8,747	8,250
JV Akbastau JSC	(KZTm)	10,831	11,163	7,171	7,357
Karatau LLP	(KZTm)	22,708	28,306	16,179	14,939
JV Zarechnoye JSC	(KZTm)	8,435	8,564	2,338	2,260
JV Katco LLP	(KZTm)	50,212	51,234	17,172	20,457
JV Khorassan-U LLP	(KZTm)	15,379	15,228	10,195	10,156
JV SMCC LLP	(KZTm)	19,269	20,017	10,496	10,667
Baiken-U LLP	(KZTm)	19,475	20,116	10,313	9,923
Budenovskoye LLP	(KZTm)	-	-	-	-
Total	**(KZTm)**	**305,205**	**318,595**	**168,883**	**177,008**

Corporate Income Tax ("CIT")

In accordance with the relevant tax codes of Kazakhstan, CIT is determined by application of a 20% tax rate to the taxable income, which taxable income is derived through deductions from Earnings Before Interest Tax, Depreciation and Amortisation ("**EBITDA**") of the following items: Depreciation, PGR, GRR interest and tax.

Working Capital

The Financial Models include a range of assumptions required in order to determine the working capital movement in respect of debtors, creditors and stores/inventory value. These assumptions include closing balances and respective days for each element and determined separately for each Mining Subsidiary. Table 11-18 and Table 11-19 presents the working capital closing balances and days respectively for the period 2018 through 2021 inclusive.

Table 11-18: Mining Subsidiary working capital closing balances (2018 through 2021)

Mining Subsidiary	Units	2018	2019	2020	2021
Debtors					
Kazatomprom-SaUran LLP	(KZTm)				
ME Ortalyk LLP	(KZTm)				
RU-6 LLP	(KZTm)				
Appak LLP	(KZTm)				
JV Inkai LLP	(KZTm)				
Semizbai-U LLP	(KZTm)				
JV Akbastau JSC	(KZTm)				
Karatau LLP	(KZTm)				
JV Zarechnoye JSC	(KZTm)				
JV Katco LLP	(KZTm)				
JV Khorassan-U LLP	(KZTm)				
JV SMCC LLP	(KZTm)				
Baiken-U LLP	(KZTm)				
Budenovskoye LLP	(KZTm)				
Total	**(KZTm)**	**-**	**-**	**-**	**-**
Creditors					
Kazatomprom-SaUran LLP	(KZTm)				
ME Ortalyk LLP	(KZTm)				
RU-6 LLP	(KZTm)				
Appak LLP	(KZTm)				
JV Inkai LLP	(KZTm)				
Semizbai-U LLP	(KZTm)				
JV Akbastau JSC	(KZTm)				
Karatau LLP	(KZTm)				
JV Zarechnoye JSC	(KZTm)				
JV Katco LLP	(KZTm)				
JV Khorassan-U LLP	(KZTm)				
JV SMCC LLP	(KZTm)				
Baiken-U LLP	(KZTm)				
Budenovskoye LLP	(KZTm)				
Total	**(KZTm)**	**-**	**-**	**-**	**-**
Stores					
Kazatomprom-SaUran LLP	(KZTm)				
ME Ortalyk LLP	(KZTm)				
RU-6 LLP	(KZTm)				
Appak LLP	(KZTm)				
JV Inkai LLP	(KZTm)				
Semizbai-U LLP	(KZTm)				
JV Akbastau JSC	(KZTm)				
Karatau LLP	(KZTm)				
JV Zarechnoye JSC	(KZTm)				
JV Katco LLP	(KZTm)				
JV Khorassan-U LLP	(KZTm)				
JV SMCC LLP	(KZTm)				
Baiken-U LLP	(KZTm)				
Budenovskoye LLP	(KZTm)				
Total	**(KZTm)**	**-**	**-**	**-**	**-**

Table 11-19: Mining Subsidiary working capital days (2018 through 2021)

Mining Subsidiary	Units	2018	2019	2020	2021
Debtors					
Kazatomprom-SaUran LLP	(Days)				

Mining Subsidiary	Units	2018	2019	2020	2021
ME Ortalyk LLP	(Days)				
RU-6 LLP	(Days)				
Appak LLP	(Days)				
JV Inkai LLP	(Days)				
Semizbai-U LLP	(Days)				
JV Akbastau JSC	(Days)				
Karatau LLP	(Days)				
JV Zarechnoye JSC	(Days)				
JV Katco LLP	(Days)				
JV Khorassan-U LLP	(Days)				
JV SMCC LLP	(Days)				
Baiken-U LLP	(Days)				
Budenovskoye LLP	(Days)				
Total	**(Days)**	-	-	-	-
Creditors					
Kazatomprom-SaUran LLP	(Days)				
ME Ortalyk LLP	(Days)				
RU-6 LLP	(Days)				
Appak LLP	(Days)				
JV Inkai LLP	(Days)				
Semizbai-U LLP	(Days)				
JV Akbastau JSC	(Days)				
Karatau LLP	(Days)				
JV Zarechnoye JSC	(Days)				
JV Katco LLP	(Days)				
JV Khorassan-U LLP	(Days)				
JV SMCC LLP	(Days)				
Baiken-U LLP	(Days)				
Budenovskoye LLP	(Days)				
Total	**(Days)**	-	-	-	-
Stores					
Kazatomprom-SaUran LLP	(Days)				
ME Ortalyk LLP	(Days)				
RU-6 LLP	(Days)				
Appak LLP	(Days)				
JV Inkai LLP	(Days)				
Semizbai-U LLP	(Days)				
JV Akbastau JSC	(Days)				
Karatau LLP	(Days)				
JV Zarechnoye JSC	(Days)				
JV Katco LLP	(Days)				
JV Khorassan-U LLP	(Days)				
JV SMCC LLP	(Days)				
Baiken-U LLP	(Days)				
Budenovskoye LLP	(Days)				
Total	**(Days)**	-	-	-	-

11.4 Financial Models

The Financial Models for the Mining Subsidiaries as developed by SRK include the assumed projections of production, sales, operating and capital expenditures, CIT and free cashflow for annual periods from 1 January 2022 onwards through to depletion of the Ore Reserves for each Mining Subsidiary. Details regarding the key commodity price and macro-economic assumptions as incorporated in to the Financial Models are included in Section 3 of this CPR and comprise: a base commodity price of US$42.33/lb$U_3O_8$ for 2022 increasing to US$53.67/lb$U_3O_8$ by 2030 and to US$61.23/lb$U_3O_8$ by 2037 and remaining constant thereafter; a constant exchange rate of KZT425 to one US$. The Financial Models are reported in real terms where all sales and expenditures are reported on 1 January 2022 money terms.

Production assumptions as incorporated into the LoMps are derived at a deposit level as are certain cost elements, specifically the direct mining related expenditures. Given the considerable volume of detail generated at the deposit level, the following tables are consolidated for each Mining Subsidiary.

The information contained in historical (2015 through 2021) operating performance tables as reported in this CPR has been collated from the Company's period-end unaudited management accounts and other unaudited internal reporting data and is provided as a historical record of production, sales, sales revenue, operating expenditures and capital expenditures as they related to the individual Mining Subsidiaries. As this information is unaudited it cannot be directly compared with metrics derived from audited historical financial statements as may be reported in the public domain. Furthermore, the historical statistics are presented in order to provide a benchmark reference point against which the LoMp assumptions can be compared.

In addition, certain financial metrics presented in the tables below are provided for illustrative purposes only and should not be treated as indicative of similar metrics for the Company as a whole; for example, EBITDA of the individual Mining Subsidiaries presented in the tables below is not indicative of the Company's total EBITDA or similar metrics or any component thereof.

The LoMp forecasts comprise projections for all Mining Subsidiaries and present annual assumptions for production, sales, operating and capital expenditure items, CIT and free cashflow over the LoMp from 2022 onwards. These are limited to the depletion of the Ore Reserves and specifically do not include any production derived from Inferred Mineral Resources.

The specific tables for each of the Mining Subsidiaries, the total Mining Subsidiaries and attributable to the Company are included in the following sub-sections as noted below

- **Kazatomprom-SaUran LLP:** Financial Model (Table 11-20 through Table 11-23 inclusive); production physicals (Table 11-24 through Table 11-27 inclusive);
- **ME Ortalyk LLP:** Financial Model (Table 11-28 through Table 11-31 inclusive); production physicals (Table 11-32 through Table 11-35 inclusive);
- **RU-6 LLP:** Financial Model (Table 11-36 through Table 11-38 inclusive); production physicals (Table 11-39 through Table 11-41 inclusive);
- **Appak LLP:** Financial Model (Table 11-42 through Table 11-44 inclusive); production physicals (Table 11-45 through Table 11-47 inclusive);
- **JV Inkai LLP:** Financial Model (Table 11-48 through Table 11-52 inclusive); production physicals (Table 11-53 through Table 11-57 inclusive);
- **Semizbai LLP:** Financial Model (Table 11-58 through Table 11-61 inclusive); production physicals (Table 11-62 through Table 11-65 inclusive);
- **JV Akbastau LLP:** Financial Model (Table 11-66 through Table 11-68 inclusive); production physicals (Table 11-69 through Table 11-71 inclusive);
- **Karatau LLP:** Financial Model (Table 11-72 through Table 11-74 inclusive); production physicals (Table 11-75 through Table 11-77 inclusive);
- **JV Zarechnoye:** Financial Model (Table 11-78 through Table 11-79 inclusive); production physicals (Table 11-80 through Table 11-81 inclusive);
- **JV Katco LLP:** Financial Model (Table 11-82 through Table 11-84 inclusive); production physicals (Table 11-85 through Table 11-87 inclusive);
- **JV Khorasan LLP:** Financial Model (Table 11-88 through Table 11-90 inclusive); production physicals (Table 11-91 through Table 11-93 inclusive);
- **JV SMCC LLP:** Financial Model (Table 11-94 through Table 11-98 inclusive); production physicals (Table 11-99 through Table 11-103 inclusive);
- **Baiken-U LLP:** Financial Model (Table 11-104 through Table 11-106 inclusive); production physicals (Table 11-107 through Table 11-109 inclusive);
- **Budenovskoye LLP:** Financial Model (Table 11-110 through Table 11-113 inclusive); production physicals (Table 11-114 through Table 11-117 inclusive);
- **Mining Subsidiaries:** Financial Model (Table 11-118 through Table 11-122 inclusive);
- **Company Attributable (KZT):** Financial Model (Table 11-123 through Table 11-127 inclusive); and
- **Company Attributable (US$):** Financial Model (Table 11-128 through Table 11-132 inclusive).

11.4.1 Kazatomprom-SaUran LLP

Table 11-20: Kazatomprom-SaUran LLP (100%) Financial Model: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU$_3$O$_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lbU$_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lbU$_3O_8$)									
Realised Price	(KZT/lbU$_3$O$_8$)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU$_3$O$_8$)									
AISC	(KZT/lbU$_3$O$_8$)									
C1	(US$/lbU$_3O_8$)									
AISC	(US$/lbU$_3O_8$)									

Table 11-21: Kazatomprom-SaUran LLP (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU$_3$O$_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lbU$_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lbU$_3O_8$)									
Realised Price	(KZT/lbU$_3$O$_8$)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-22: Kazatomprom-SaUran LLP (100%) Financial Model: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-23: Kazatomprom-SaUran LLP (100%) Financial Model: Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-24: Kazatomprom-SaUran LLP (100%) Physicals: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-25: Kazatomprom-SaUran LLP (100%) Physicals: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-26: Kazatomprom-SaUran LLP (100%) Physicals: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-27: Kazatomprom-SaUran LLP (100%) Physicals: Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

11.4.2 ME Ortalyk LLP

Table 11-28: ME Ortalyk LLP (100%) Financial Model: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-29: ME Ortalyk LLP (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-30: ME Ortalyk LLP (100%) Financial Model: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-31: ME Ortalyk LLP (100%) Financial Model: Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-32: ME Ortalyk LLP (100%) Physicals: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-33: ME Ortalyk LLP (100%) Physicals: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-34: ME Ortalyk LLP (100%) Physicals: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Active Wells	**(No)**									

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-35: ME Ortalyk LLP (100%) Physicals: Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

11.4.3 RU-6 LLP

Table 11-36: RU-6 LLP (100%) Financial Model: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU$_3$O$_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lbU$_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lbU$_3O_8$)									
Realised Price	(KZT/lbU$_3$O$_8$)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU$_3$O$_8$)									
AISC	(KZT/lbU$_3$O$_8$)									
C1	(US$/lbU$_3O_8$)									
AISC	(US$/lbU$_3O_8$)									

Table 11-37: RU-6 LLP (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	($MlbU_3O_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/$lbU_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/$lbU_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/$lbU_3O_8$)									
AISC	(US$/$lbU_3O_8$)									

Table 11-38: RU-6 LLP (100%) Financial Model: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	($MlbU_3O_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/$lbU_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/$lbU_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-39: RU-6 LLP (100%) Physicals: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-40: RU-6 LLP (100%) Physicals: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-41: RU-6 LLP (100%) Physicals: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

11.4.4 Appak LLP

Table 11-42: Appak LLP (100%) Financial Model: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-43: Appak LLP (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-44: Appak LLP (100%) Financial Model: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-45: Appak LLP (100%) Physicals: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-46: Appak LLP (100%) Physicals: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-47: Appak LLP (100%) Physicals: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

11.4.5 JV Inkai LLP

Table 11-48: JV Inkai LLP (100%) Financial Model: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-49: JV Inkai LLP (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-50: JV Inkai LLP (100%) Financial Model: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-51: JV Inkai LLP (100%) Financial Model: Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Macro-Economics										
Exchange Rate	(KZT:US\$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US\$/lbU_3O_8)									
Premium/(Discount)	(%)									
Realised Price	(US\$/lbU_3O_8)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US\$/lbU_3O_8)									
AISC	(US\$/lbU_3O_8)									

Table 11-52: JV Inkai LLP (100%) Financial Model: Forecast (2050 through 2058)

Statistic	Units	2050	2051	2052	2053	2054	2055	2056	2057	2058
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US\$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US\$/lbU_3O_8)									
Premium/(Discount)	(%)									
Realised Price	(US\$/lbU_3O_8)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US\$/lbU_3O_8)									
AISC	(US\$/lbU_3O_8)									

Table 11-53: JV Inkai LLP (100%) Physicals: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-54: JV Inkai LLP (100%) Physicals: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-55: JV Inkai LLP (100%) Physicals: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-56: JV Inkai LLP (100%) Physicals: Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-57: JV Inkai LLP (100%) Physicals: Forecast (2041 through 2049)

Statistic	Units	2050	2051	2052	2053	2054	2055	2056	2057	2058
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

11.4.6 Semizbai LLP

Table 11-58: Semizbai LLP (100%) Financial Model: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU$_3$O$_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lbU$_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lbU$_3O_8$)									
Realised Price	(KZT/lbU$_3$O$_8$)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU$_3$O$_8$)									
AISC	(KZT/lbU$_3$O$_8$)									
C1	(US$/lbU$_3O_8$)									
AISC	(US$/lbU$_3O_8$)									

Table 11-59: Semizbai LLP (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU$_3$O$_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lbU$_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lbU$_3O_8$)									
Realised Price	(KZT/lbU$_3$O$_8$)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-60: Semizbai LLP (100%) Financial Model: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-61: Semizbai LLP (100%) Financial Model: Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-62: Semizbai LLP (100%) Physicals: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-63: Semizbai LLP (100%) Physicals: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-64: Semizbai LLP (100%) Physicals: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-65: Semizbai LLP (100%) Physicals: Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
PLS Volume	(m^3)									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

11.4.7 JV Akbastau JSC

Table 11-66: JVC Akbastau JSC (100%) Financial Model: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	($MlbU_3O_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-67: JVC Akbastau JSC (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	($MlbU_3O_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-68: JVC Akbastau JSC (100%) Financial Model: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-69: JVC Akbastau JSC (100%) Physicals: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-70: JVC Akbastau JSC (100%) Physicals: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-71: JVC Akbastau JSC (100%) Physicals: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

11.4.8 Karatau LLP

Table 11-72: Karatau LLP (100%) Financial Model: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-73: Karatau LLP (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-74: Karatau LLP (100%) Financial Model: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-75: Karatau LLP (100%) Physicals: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-76: Karatau LLP (100%) Physicals: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-77: Karatau LLP (100%) Physicals: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

11.4.9 JV Zarechnoye LLP

Table 11-78: JV Zarechnoye LLP (100%) Financial Model: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Final Product	(MlbU)									
Final Product	(MlbU$_3$O$_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lbU$_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lbU$_3O_8$)									
Realised Price	(KZT/lbU$_3$O$_8$)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU$_3$O$_8$)									
AISC	(KZT/lbU$_3$O$_8$)									
C1	(US$/lbU$_3O_8$)									
AISC	(US$/lbU$_3O_8$)									

Table 11-79: JV Zarechnoye LLP (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU$_3$O$_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lbU$_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lbU$_3O_8$)									
Realised Price	(KZT/lbU$_3$O$_8$)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU$_3$O$_8$)									
AISC	(KZT/lbU$_3$O$_8$)									
C1	(US$/lbU$_3O_8$)									
AISC	(US$/lbU$_3O_8$)									

Table 11-80: JV Zarechnoye LLP (100%) Physicals: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-81: JV Zarechnoye LLP (100%) Physicals: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

11.4.10 JV Katco LLP

Table 11-82: JV Katco LLP (100%) Financial Model: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-83: JV Katco LLP (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-84: JV Katco LLP (100%) Financial Model: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-85: JV Katco LLP (100%) Physicals: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-86: JV Katco LLP (100%) Physicals: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-87: JV Katco LLP (100%) Physicals: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

11.4.11 JV Khorasan-U LLP

Table 11-88: JV Khorasan-U LLP (100%) Financial Model: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-89: JV Khorasan-U LLP (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-90: JV Khorasan-U LLP (100%) Financial Model: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU$_3$O$_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lbU$_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lbU$_3O_8$)									
Realised Price	(KZT/lbU$_3$O$_8$)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU$_3$O$_8$)									
AISC	(KZT/lbU$_3$O$_8$)									
C1	(US$/lbU$_3O_8$)									
AISC	(US$/lbU$_3O_8$)									

Table 11-91: JV Khorasan-U LLP (100%) Physicals: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-92: JV Khorasan-U LLP (100%) Physicals: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-93: JV Khorasan-U LLP (100%) Physicals: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

11.4.12 JV SMCC LLP

Table 11-94: JV SMCC LLP (100%) Financial Model: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	($MlbU_3O_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/$lbU_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/$lbU_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/$lbU_3O_8$)									
AISC	(US$/$lbU_3O_8$)									

Table 11-95: JV SMCC LLP (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	($MlbU_3O_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/$lbU_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/$lbU_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-96: JV SMCC LLP (100%) Financial Model: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-97: JV SMCC LLP (100%) Financial Model: Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-98: JV SMCC LLP (100%) Financial Model: Forecast (2050 through 2058)

Statistic	Units	2050	2051	2052	2053	2054	2055	2056	2057	2058
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-99: JV SMCC LLP (100%) Physicals: Historical (2015 through 2021) and

Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-100: JV SMCC LLP (100%) Physicals: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-101: JV SMCC LLP (100%) Physicals: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-102: JV SMCC LLP (100%) Physicals: Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-103: JV SMCC LLP (100%) Physicals: Forecast (2041 through 2049)

Statistic	Units	2050	2051	2052	2053	2054	2055	2056	2057	2058
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

11.4.13 Baiken-U LLP

Table 11-104: Baiken-U LLP (100%) Financial Model: Historical (2015 through 2021) and

Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU$_3$O$_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lbU$_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lbU$_3O_8$)									
Realised Price	(KZT/lbU$_3$O$_8$)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU$_3$O$_8$)									
AISC	(KZT/lbU$_3$O$_8$)									
C1	(US$/lbU$_3O_8$)									
AISC	(US$/lbU$_3O_8$)									

Table 11-105: Baiken-U LLP (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU$_3$O$_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lbU$_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lbU$_3O_8$)									
Realised Price	(KZT/lbU$_3$O$_8$)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-106: Baiken-U LLP (100%) Financial Model: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-107: Baiken-U LLP (100%) Physicals: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-108: Baiken-U LLP (100%) Physicals: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
PLS Volume	(m^3)									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-109: Baiken-U LLP (100%) Physicals: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	(m^3)									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

11.4.14 Budenovskoye LLP

Table 11-110: Budenovskoye LLP (100%) Financial Model: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-111: Budenovskoye LLP (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU$_3$O$_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lbU$_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lbU$_3O_8$)									
Realised Price	(KZT/lbU$_3$O$_8$)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU$_3$O$_8$)									
AISC	(KZT/lbU$_3$O$_8$)									
C1	(US$/lbU$_3O_8$)									
AISC	(US$/lbU$_3O_8$)									

Table 11-112: Budenovskoye LLP (100%) Financial Model: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU$_3$O$_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lbU$_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lbU$_3O_8$)									
Realised Price	(KZT/lbU$_3$O$_8$)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU$_3$O$_8$)									
AISC	(KZT/lbU$_3$O$_8$)									
C1	(US$/lbU$_3O_8$)									
AISC	(US$/lbU$_3O_8$)									

Table 11-113: Budenovskoye LLP (100%) Financial Model: Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU$_3$O$_8$)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lbU$_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lbU$_3O_8$)									
Realised Price	(KZT/lbU$_3$O$_8$)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU$_3$O$_8$)									
AISC	(KZT/lbU$_3$O$_8$)									
C1	(US$/lbU$_3O_8$)									
AISC	(US$/lbU$_3O_8$)									

Table 11-114: JV Inkai LLP (100%) Physicals: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-115: JV Inkai LLP (100%) Physicals: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-116: JV Inkai LLP (100%) Physicals: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

Table 11-117: JV Inkai LLP (100%) Physicals: Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Active Wells	**(No)**									
Injection	(No)									
Extraction	(No)									
Pumping Rate	(m^3/h)									
Mined	**(tU)**									
PLS Volume	**(m^3)**									
PLS Grade	(mgU/l)									
Final Product Produced	**(tU)**									
Overall Recovery	**(%)**									
Well Construction	**(No)**									
Injection	(No)									
Extraction	(No)									
Other	(No)									
Human Resources	**(No)**									

11.4.15 Total Mining Subsidiaries

Table 11-118: Mining Subsidiaries (100%) Financial Model: Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-119: Mining Subsidiaries (100%) Financial Model: Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-120: Mining Subsidiaries (100%) Financial Model: Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-121: Mining Subsidiaries (100%) Financial Model: Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-122: Mining Subsidiaries (100%) Financial Model: Forecast (2050 through 2058)

Statistic	Units	2050	2051	2052	2053	2054	2055	2056	2057	2058
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									

Statistic	Units	2050	2051	2052	2053	2054	2055	2056	2057	2058
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

11.4.16 Company Attributable Mining Subsidiaries (KZT)

Table 11-123: Mining Subsidiaries (100%) Financial Model (KZT): Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-124: Mining Subsidiaries (100%) Financial Model (KZT): Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-125: Mining Subsidiaries (100%) Financial Model (KZT): Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-126: Mining Subsidiaries (100%) Financial Model (KZT): Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-127: Mining Subsidiaries (100%) Financial Model (KZT): Forecast (2050 through 2058)

Statistic	Units	2050	2051	2052	2053	2054	2055	2056	2057	2058
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										

Statistic	Units	2050	2051	2052	2053	2054	2055	2056	2057	2058
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

11.4.17 Company Attributable Mining Subsidiaries (US$)

Table 11-128: Mining Subsidiaries (100%) Financial Model (US$): Historical (2015 through 2021) and Forecast (Total LoMp and 2022)

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										

Statistic	Units	2015	2016	2017	2018	2019	2020	2021	Total	2022
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-129: Mining Subsidiaries (100%) Financial Model (US$): Forecast (2023 through 2031)

Statistic	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-130: Mining Subsidiaries (100%) Financial Model (US$): Forecast (2032 through 2040)

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									

Statistic	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-131: Mining Subsidiaries (100%) Financial Model (US$): Forecast (2041 through 2049)

Statistic	Units	2041	2042	2043	2044	2045	2046	2047	2048	2049
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

Table 11-132: Mining Subsidiaries (100%) Financial Model (US$): Forecast (2050 through 2058)

Statistic	Units	2050	2051	2052	2053	2054	2055	2056	2057	2058
Production										
Mining	(Mt)									
Grade	(%U)									
Content	(tU)									
PLS	(tU)									
Product	(tU)									
Overall Recovery	(%)									
Leach	(%)									
Processing	(%)									
Sales										
Final Product	(tU)									

Statistic	Units	2050	2051	2052	2053	2054	2055	2056	2057	2058
Final Product	(MlbU)									
Final Product	(MlbU_3O_8)									
Macro-Economics										
Exchange Rate	(KZT:US$)									
CPI - KZ	(%)									
CPI - US	(%)									
Sales Price										
Benchmark Price	(US$/lb$U_3O_8$)									
Premium/(Discount)	(%)									
Realised Price	(US$/lb$U_3O_8$)									
Realised Price	(KZT/lbU_3O_8)									
Sales Revenue										
Product	(KZTbn)									
Operating Expenditure										
Mining	(KZTbn)									
Processing	(KZTbn)									
G&A	(KZTbn)									
Taxes (excl MET,CIT,VAT)	(KZTbn)									
MET	(KZTbn)									
Reimbursable Services	(KZTbn)									
Distribution	(KZTbn)									
Toll Refining	(KZTbn)									
Retrenchment	(KZTbn)									
Total	**(KZTbn)**									
EBITDA	**(KZTbn)**									
CIT	**(KZTbn)**									
Capital Expenditure										
Well Construction	(KZTbn)									
Expansion	(KZTbn)									
Sustaining	(KZTbn)									
Liquidation Fund/Closure	(KZTbn)									
Retrenchment Costs	(KZTbn)									
Working Capital Movement	(KZTbn)									
Total	**(KZTbn)**									
Free Cashflow	**(KZTbn)**									
Unit Expenditures										
C1	(KZT/lbU_3O_8)									
AISC	(KZT/lbU_3O_8)									
C1	(US$/lb$U_3O_8$)									
AISC	(US$/lb$U_3O_8$)									

11.4.18 Other Expenditures

In addition to the LoMp related expenditures, the Company incurs additional cash expenditures which are not attributed to any specific Mining Subsidiary and are either incurred wholly by the Company (exploration expenditures) or on an attributable basis (50% of Kyzylkum LLP expenditures not charged as services to JV Khorassan-U LLP).

Table 11-133: JV Kyzylkum LLP unallocated cash expenditures (100%)

Statistic	Units	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030
Unallocated Expenditures	(KZTbn)										
	(US$m)										
Statistic	**Units**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Unallocated Expenditures	(KZTbn)										
	(US$m)										
Statistic	**Units**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**
Unallocated Expenditures	(KZTbn)										
	(US$m)										

The Company has also developed a detailed exploration programme which is focused on various projects as detailed in Section 8 of the CPR. The expenditures are separately defined to the TEPs (i.e., not reflected in the LoMps) and comprise total expenditure of KZT35.2bn (US$82.9m) over a period of 7 years as reported in Table 11-134.

Table 11-134: Exploration Expenditures (100%)

Region	Units	Total	2022	2023	2024	2025	2026	2027	2028
Exploration Programme									
Shu-Sarysu	(KZTm)	16,713.6	5,801.6	5,076.8	2,911.1	1,455.6	1,215.3	253.1	-
Syrdarya	(KZTm)	10,656.1	2,025.1	1,985.9	2,151.7	1,493.5	1,493.5	1,253.1	253.1
North - Kazakhstan	(KZTm)	7,847.4	1,898.6	1,898.6	1,898.6	1,898.6	253.1	-	-
Total	**(KZTm)**	**35,217.2**	**9,725.4**	**8,961.3**	**6,961.4**	**4,847.7**	**2,962.0**	**1,506.2**	**253.1**
Exploration Programme									
Shu-Sarysu	(US$m)	39.3	13.7	11.9	6.8	3.4	2.9	0.6	-
Syrdarya	(US$m)	25.1	4.8	4.7	5.1	3.5	3.5	2.9	0.6
North - Kazakhstan	(US$m)	18.5	4.5	4.5	4.5	4.5	0.6	-	-
Total	**(US$m)**	**82.9**	**22.9**	**21.1**	**16.4**	**11.4**	**7.0**	**3.5**	**0.6**

(1) All US$ estimates have been converted to US$ incorporating from a base date of 30 June 2018 to 31 December 2021 KZ CPI factor of 1.27 and converted to US$ assuming a closing exchange rate of KZT425 to one US$.

11.4.19 Graphical Analysis

The following figures present graphical representation of the key outcomes from the Financial Models for the Mining Subsidiaries and for the consolidated Mining Subsidiaries on a total

(100%) and as deemed appropriate attributable basis and include:

- Total annual sales of Uranium Concentrate (Figure 11-3: 100%; Figure 11-4: attributable);
- Total Cash Cost C1 (Figure 11-5);
- All in Sustaining Costs (Figure 11-6);
- Capital Expenditure per Mining Subsidiary (Figure 11-7);
- Capital Expenditure element contribution (Figure 11-8);
- KZT Mining Subsidiary Financial Model metrics (Figure 11-9); and
- KZT Mining Subsidiary Financial Model metrics (Figure 11-10).

Figure 11-3: Mining Subsidiary Annual sales (100%) of Uranium Concentrate (MlbU_3O_8)

Figure 11-4: Mining Subsidiary Annual sales (attributable) of Uranium Concentrate (MlbU_3O_8)

Figure 11-5: Cash Cost C1 (US$/Mlb$U_3O_8$)

Figure 11-6: All in Sustaining Costs (US$/Mlb$U_3O_8$)

Figure 11-7: Mining Subsidiary Capital Expenditure excluding closure costs (KZT)

Figure 11-8: Capital Expenditure element contribution (KZT)

Figure 11-9: Mining Subsidiary Financial Model (KZT): 100%

Figure 11-10: Mining Subsidiary Financial Model (KZT): Attributable

12 RISKS AND OPPORTUNITIES

12.1 Introduction

The following section includes a discussion on the key risks and opportunities as they relate to the Mineral Assets specifically with regards to the: Mineral Resources and Ore Reserves; Environmental Liabilities; the Exploration Programme; and the LoMps as reported herein.

12.2 Risks

The key risks relating to the Mineral Assets are:

- **The risk relating to the limited availability of computerised geological and mine planning technologies at the Mining Subsidiaries**. Specifically, SRK notes that Feasibility Studies are largely completed in support of the initial application for the Mining Contract or where regulatory approvals are required for updating of the Mining Contract. Furthermore, whilst updates and changes to such studies occur periodically, the present LoMps are largely focused on one- or two-year detailed plans with extensions thereafter based on a combination of that included in the original historical studies, the conditions of the Mining Contract and unit rates and norms derived from historical statistics and modified as considered appropriate. Whilst the geological, hydrogeological and other physical characteristics may not change significantly in certain deposits, the lack of integrated geological modelling and mine planning, in a computerised environment limits the ability of technical practitioners at the Mining Subsidiaries to:
  - Rapidly assess and update geological models and mine plans in response to changed physical and economic criteria,
  - Incorporate constraints and or variances in spatial changes relating to physical characteristics in the geological modelling and mine planning process,
  - Routinely updated Mineral Resource and Ore Reserve statements in response to changed assumptions, specifically with respect to reporting in accordance with the Reporting Standards,
  - Assess the impact of strategic options to maximise mineral asset value.

  Notwithstanding the above, SRK recognises the Company's ongoing strategy to further the process of geological modelling specifically through consideration of machine learning as part of the Kazatomprom Transformation Programme. This is a project focused on development of a bespoke tool for automating modelling of orebody contours based on machine learning and geostatistics algorithms. To date the Company's developed programme enables geologists to complete various modelling scenarios using accumulated historical data and is currently being tested at various Mining Subsidiary operations. During 2021 the Company also completed updated geological model and resource estimate for Zarechnoye which has been reported in accordance with the Kazakhstan Code for the Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves (the "**KZRC Code**"). In this instance a modern three dimensional computerised geological model was created, this being the basis for the latest updated estimates and reported in accordance with the KZRC Code;
- **The risk that contractual recoveries as assumed for Zhalpak, and Budenovskoye Block 6&7 are not achieved or deemed not to be sustainable given that these assumptions are not supported by completed pilot test well programmes;**
- **The risk that any shortfall in capital expenditures noted during the COVID-19 pandemic is not addressed in the short to medium term specifically with respect to expenditures related to well construction;**

- **Project development risk** associated with construction and commissioning of the new mining and processing facilities JV Budenovskoye LLP (2026; 2,000tu) and production expansion/build-up at Ortalyk LLP (2030: 2,900tU), JV Inkai LLP (2024: 4,000tU), Karatau LLP (2025, 3,600tU), JV Khorassan-U LLP (2025: 2,200tU);
- **The risk that changes in technical and economic parameters result in the Ore Reserves as reported herein becoming un-economic in changed circumstances**:
  - Specifically, should the spot uranium price net of any applicable price discounts fall below US$15.00/lb$U_3O_8$ when considering C1 cash cost reporting and US$20.00/lb$U_3O_8$ when considering AISC cash reporting,
  - In the event that key commodity input costs are subject to higher than inflationary pressures, notably in respect of sulphuric acid costs;
- **The risk that the Company's current monopoly with respect to exploration, development and operation of uranium Mineral Assets ceases due to**:
  - Changes in regulatory practice/policy,
  - Changes in national legislation;
- **The risk that the Company due to continued weakened commodity prices is unable to provide sufficient contributions to the liquidation funds in order to meet its environmental liability obligation**;
- **The risk that further changes in environmental and social policy and or legislation requires adherence to more stringent closure criteria** thereby increasing the closure cost liabilities as reported herein; and
- **The risk that further technical work planned to be completed by the Company indicates that the closure liabilities as reported herein, specifically the contingencies applied are understated** for the LoMp closure costs.

12.3 Opportunities

The LoMps which accompany the Ore Reserves as reported herein take no account of the potential the Company has to increase the amount of uranium it produces annually by expanding production at its existing operations, to extend the lives of its existing operations by ongoing exploration at, and in the vicinity of, these operations and the likelihood that it will continue to bring new operations into production for some time to come. In SRK's opinion, this is the key opportunity open to the Company and is a function of the active exploration and development programme the Company has in place, its position as the national atomic company of Kazakhstan with responsibility for mining in Kazakhstan and the preferential rights it has with the Government of Kazakhstan to obtain subsoil use rights through direct negotiations, as opposed to through a tender process.

The Company recognises this opportunity and has allocated a significant budget (KZT35,217.2m: US$82.9m) to continue to explore several projects which are at various stages in the exploration cycle and progress these to the development stage if justified. SRK has reviewed the most advanced of these projects, expects resource estimates for these to start to be produced from next year and fully expects that these will be developed into uranium mines in due course.

The key opportunities relating to the Mineral Assets are:

- **The opportunity to increase the Mineral Resources as reported herein through completion of the Exploration Programme**, specifically:
  - To upgrade the current Mineral Resource classification at Block 2 Inkai and Block 3 Inkai,

  - To extend the regional exploration programmes within Kazakhstan given the opportunity offered by the Company's present monopoly with respect to exploration of uranium deposits;
- **To increase the Company's Ore Reserve base through advancement of further technical studies as outlined in this CPR** specifically in respect of Block 2 Inkai and Block 3 Inkai; and
- **Maintain U_3O_8 sales at the Mining Subsidiaries at levels ranging from 40MlbU_3O_8 to 60Mlb U_3O_8 post 2032**, through completion of:
  - the Company's planned regional and deposit specific exploration programme,
  - further technical studies which support increased production at existing operations and advancement of exploration properties with delineated Mineral Resources to Feasibility Study and ultimately project development stages.

13 CONCLUSIONS

13.1 Introduction

The following sections provide a summary SRK's principal findings in respect of the review of the Company's Mineral Assets as reported upon herein with specific focus on: Mineral Assets; Mineral Resource and Ore Reserves; Environmental Liabilities; the Exploration Programme; LoMp; and the associated Risks and Opportunities. SRK has conducted a comprehensive review and assessment of all material issues likely to influence the future operations of the Mineral Assets. The Mineral Resources and Ore Reserves and the ARO and LoMp closure costs for the Mineral Assets, as provided and taken in good faith by SRK, have been reviewed and adjusted by SRK where considered appropriate.

Forecast sales from the Mining Subsidiaries which are reported herein as attributable to the Company are assumed to be to the Company and not from the Company to any third party. SRK has been informed by the Company that in some rare cases, a portion of the historical sales from the Mining Subsidiaries may also have been sold directly to any third party. Such sales if occurred, are however considered by the Company to be marginal

13.2 The Mineral Assets

The Group Mineral Assets are located in three (Shu-Sarysu with 1,469.69km^2; Syrdarya with 545.58km^2; and North Kazakhstan with 44.00km^2) of the six uranium geological provinces of Kazakhstan, cover a total licence area of 2,059.27km^2 and comprise 29 deposits/blocks categorised as: 23 Producing Properties; two Development Properties and two Advanced Exploration Properties and two properties classified as Ceased Production based on the classifications as reported in Section (1.2.2). In addition, the Company's Exploration Programme covers several less advanced Exploration Properties also located in the three regions in which the Company is active. The Mineral Assets are largely held through subsidiaries (7), Joint Venture (2), Joint Operations (2) and Associate (3) companies (the 14 Mining Subsidiaries - Table 13-1) which in conjunction with the Company are directly responsible for uranium mining and downstream processing activities. Two of these Mining Subsidiaries are wholly owned, and the remaining 12 Mining Subsidiaries comprise entities which are partly owned by the Company. Historical development of the Mineral Assets dates from initial discovery in 1963 with the most recent discovery being in 1982. Initial production commenced at Kazatomprom-SaUran LLP and RU-6 LLP in 1997 (Table 13-1). A number of the Mining Subsidiaries include long life assets with production planned to extend beyond 2035 with the currently defined Ore Reserves depleted in 2057.

As at the Effective Date of the CPR, the Company reported (Table 13-2):

- Aggregated Ore Reserves of 999.2Mt grading 0.063%U and containing 625.4ktU and total Mineral Resources of Mineral Resources of 1,424.7Mt grading 0.055%U and containing 784.4ktU; and
- Attributable Ore Reserves of 549.0Mt grading 0.064%U and containing 350.8ktU and attributable Mineral Resources of 947.5Mt grading 0.052%U and containing 495.7ktU.

Table 13-3 and Table 13-4 presents consolidated (100%) and equity attributable historical operating statistics for the Mining Subsidiaries from 2015 through 2021. For the reporting period ended 31 December 2021 the salient consolidated (100%) operating statistics indicated as follows:

- Production and final product sales of 21,819tU (2020: 19,477tU) and 54.5MlbU_3O_8 (2020: 52.2MlbU_3O_8) respectively;

- Realised sales price of US$34.64/lb$U_3O_8$ (2020: US$27.76/lb$U_3O_8$);
- Total capital expenditure of KZT(97,412m); and
- Unit cash costs of US$8.22/lb$U_3O_8$ (2020: US$8.00lb$U_3O_8$) and US$11.60/lbU_3O_8 (2020: US$10.83lb$U_3O_8$) for C1 and AISC respectively.

Table 13-1: Mineral Assets salient statistics

Mining Subsidiary	Equity Interest (%)	Geological Region	Deposits /Prdn Units (No)	Contracts (No)	Licence Area (km^2)	Discovery (year)	Prdn Start (year)	LoMp[1] Depletion (year)	Prdn (tU)
Operating Properties									
Kazatomprom-SaUran LLP[3]	100.00	Shu-Sarysu	5[3]	5	252.90	1963	1997	2048	1,665
Ortalyk LLP	100.00	Shu-Sarysu	2	2	186.40	1964	2007	2042	2,900
RU-6 LLP	100.00	Syrdarya	2	1	59.58	1979	1997	2040	833
Appak LLP	65.00	Shu-Sarysu	1	1	133.46	1976	2008	2037	1,000
JV Inkai LLP[2]	60.00	Shu-Sarysu	3	1	139.00	1976	2001	2051	4,000
Semizbai-U LLP	51.00	Syrdarya; Northern Kazakhstan	2	2	71.20	1973	2008	2042	1,117
JV Akbastau JSC	50.00	Shu-Sarysu	3	2	2.71	1976	1997	2039	2,194
Karatau LLP	50.00	Shu-Sarysu	1	1	17.28	1979	2007	2032	3,600
JV Zarechnoye JSC	49.98	Syrdarya	1	1	38.00	1977	2007	2028	776
JV Katco LLP	49.00	Shu-Sarysu	2	1	45.73	1976	2001	2035	4,000
JV Khorassan-U LLP	50.00	Syrdarya	1	1	70.80	1972	2008	2038	2,200
JV SMCC LLP	30.00	Shu-Sarysu	2	2	116.91	1976	2004	2057	2,924
Baiken-U LLP	52.50	Shu-Sarysu	1	1	350.00	1972	2009	2033	1,500
Budenovskoye LLP	51.00	Chu-Sarysu	1	1	151.30	2017	2024	2045	6,000
Subtotal			**27**	**22**	**1,635.27**	**1963**	**1997**	**2057**	**33,008**
Advanced Exploration Properties									
Kazatomprom	100.00	Shu-Sarysu	2	2	424.00	1976	n/a	n/a	n/a
Subtotal			**2**	**2**	**424.00**	**1976**	n/a	n/a	n/a
Grand Total			**29**	**24**	**2,059.27**	**1963**	**1997**	**2057**	**33,008**

(1) LoMp: date of depletion of Ore Reserves; maximum production in the current Life of Mine plans for the Mineral Assets.

(2) For JV Inkai LLP, the Company's equity participation is determined based on a prescribed formula based on uranium production within the following bands: 0tU to 1,500tU (40.00%); 1,500tU to 2,000tU (50.00%); 2,000tU to 4,000tU (77.50%); 4,000tU (60%) for 2022 onwards.

(3) At Kazatomprom-SaUran LLP, two deposits have limited production and no further Ore Reserves and Mineral Resources are reported in the 2021 Statements.

Table 13-2: Aggregated Mineral Resources and Ore Reserves as on 31 December 2021 for the Mineral Assets[1]

Mining Subsidiary	Deposits (No)	Ore Reserves (Mt)	Ore Reserves (%U)	Ore Reserves (ktU)	Mineral Resources (Mt)	Mineral Resources (%U)	Mineral Resources (ktU)
Operating Properties							
Kazatomprom-SaUran LLP	5	52.0	0.044	23.1	59.6	0.042	25.3
Ortalyk LLP	2	37.2	0.100	37.2	88.5	0.042	37.2
RU-6 LLP	2	17.7	0.076	13.5	17.7	0.076	13.5
Appak LLP	1	46.0	0.035	16.3	46.0	0.035	16.3
JV Inkai LLP	3	252.0	0.052	131.3	294.8	0.051	151.8
Semizbai-U LLP	2	52.3	0.046	24.2	52.3	0.046	24.2
JV Akbastau JSC	3	43.2	0.088	37.9	43.2	0.088	37.9
Karatau LLP	1	49.1	0.079	38.7	49.1	0.079	38.7
JV Zarechnoye JSC	1	8.8	0.059	5.2	9.8	0.059	5.8
JV Katco LLP	2	47.5	0.110	52.4	51.6	0.106	54.9
JV Khorassan-U LLP	1	34.3	0.107	36.6	34.3	0.107	36.6
JV SMCC LLP	2	190.9	0.041	77.9	195.9	0.041	80.0
Baiken-U LLP	1	15.3	0.112	17.0	15.3	0.112	17.0
Budenovskoye LLP	1	153.0	0.075	114.2	160.6	0.075	120.1
Subtotal	**27**	**999.2**	**0.063**	**625.4**	**1,118.5**	**0.059**	**659.2**
Advanced Exploration Properties							
Kazatomprom	2	n/a	n/a	n/a	306.1	0.041	125.1
Subtotal	**2**	n/a	n/a	n/a	**306.1**	**0.041**	**125.1**
Grand Total	**29**	**999.2**	**0.063**	**625.4**	**1,424.7**	**0.055**	**784.4**

(1) Ore Reserves and Mineral Resources have been assessed assuming the commodity price profiles as reported in Section 3 of this CPR. For Ore Reserves the long-term uranium price ("**LTUP**") is reported in the Consensus Market Forecast as US$49/lb$U_3O_8$ to which a 30% premium has been added to derive the assumed Uranium Price of US$64/ lb$U_3O_8$.

Table 13-3: Mining Subsidiary historical operating statistics (100%)

Mining Subsidiary	Units	2015	2016	2017	2018	2019	2020	2021
Physicals								
Production	(tU)	23,607	24,586	23,321	21,705	22,808	19,477	21,819
Sales	(MlbU)	49.7	51.9	51.1	48.7	49.9	44.3	46.3
Final Product Sales	(MlbU_3O_8)	58.6	61.2	60.2	57.5	58.8	52.2	54.5
Macro Economics								
Exchange Rate	(KZT:US$)	222	342	326	345	383	413	426
Commodity Price								
Benchmark	(US$/lb$U_3O_8$)	39.32	25.72	21.31	22.92	24.78	28.61	35.92
Discount	(%)	2.68	2.56	2.51	3.08	2.99	3.00	3.56
Realised	(US$/lb$U_3O_8$)	38.27	25.06	20.78	22.21	24.03	27.76	34.64
Financial								
Sales Revenue	**(KZTm)**	**499,660**	**524,572**	**408,047**	**440,279**	**541,178**	**599,243**	**804,985**
Cash Costs (Sales)	**(KZTm)**	**120,461**	**125,233**	**119,637**	**124,763**	**120,783**	**102,294**	**110,443**
Capex	**(KZTm)**	**66,368**	**74,322**	**85,062**	**82,235**	**69,342**	**76,907**	**97,412**
Well Construction	(KZTm)	47,014	50,778	55,918	57,396	49,994	48,229	73,222
Sustaining & Expansion	(KZTm)	16,430	21,052	25,535	18,041	16,980	12,717	17,865

Mining Subsidiary	Units	2015	2016	2017	2018	2019	2020	2021
Liquidation	(KZTm)	2,923	2,492	3,609	6,798	2,368	15,961	6,325
Unit Costs								
C1 (Sales - 100%)	(US$/lb$U_3O_8$)	15.41	10.05	10.37	10.08	8.59	8.00	8.22
AISC (Sales - 100%)	(US$/lb$U_3O_8$)	20.29	13.42	14.51	13.65	11.25	10.83	11.60

Table 13-4: Mining Subsidiary historical operating statistics (attributable)

Mining Subsidiary	Units	2015	2016	2017	2018	2019	2020	2021
Physicals								
Production	(tU)	12,851	13,187	12,093	11,476	13,291	10,736	11,858
Sales	(MlbU)	26.3	25.4	25.9	26.5	28.8	24.3	25.0
Final Product Sales	(MlbU_3O_8)	31.1	30.0	30.5	31.3	34.0	28.7	29.4
Macro Economics								
Exchange Rate	(KZT:US$)	222	342	326	345	383	413	426
Commodity Price								
Benchmark	(US$/lb$U_3O_8$)	39.61	26.57	21.53	21.28	24.35	28.33	35.63
Discount	(%)	1.82	1.92	1.92	3.00	2.98	2.96	3.85
Realised	(US$/lb$U_3O_8$)	38.89	26.06	21.12	20.64	23.62	27.49	34.26
Financial								
Sales Revenue	**(KZTm)**	**268,398**	**267,055**	**210,227**	**222,753**	**307,347**	**325,873**	**429,827**
Cash Costs (Sales)	**(KZTm)**	**120,461**	**125,233**	**119,637**	**124,763**	**117,785**	**102,809**	**110,443**
Capex	**(KZTm)**	**34,818**	**37,317**	**42,553**	**47,864**	**39,735**	**44,209**	**55,438**
Well Construction	(KZTm)	25,377	27,079	29,109	30,610	28,701	28,712	42,510
Sustaining & Expansion	(KZTm)	7,310	8,815	11,393	11,941	9,470	7,359	9,180
Liquidation	(KZTm)	2,131	1,422	2,051	5,314	1,563	8,138	3,748
Unit Costs								
C1 (Sales - 100%)	(US$/lb$U_3O_8$)	17.45	12.22	12.02	11.56	9.05	8.67	8.80
AISC (Sales - 100%)	(US$/lb$U_3O_8$)	22.19	15.67	16.09	15.07	9.05	11.72	12.44

13.3 Mineral Resources

As of 31 December 2021, the aggregated Mineral Resources for the Mineral Assets (Table 13-5) total 1,424.7Mt grading 0.055%U and containing 784.4ktU and comprising:

- Measured Mineral Resources of 700.9Mt grading 0.058%U and containing 406.6ktU;
- Indicated Mineral Resources of 710.2Mt grading 0.052%U and containing 369.1ktU; and
- Inferred Mineral Resources of 13.6Mt grading 0.063%U and containing 8.6ktU.

As of 31 December 2021, the attributable Mineral Resources for the Mineral Assets (Table 13-5) total 947.5Mt grading 0.052%U and containing 495.7ktU comprising Measured and Indicated Mineral Resources of 941.6Mt grading 0.052%U and containing 491.7ktU.

In all instances SRK concludes that:

- The Mineral Resource statements have an effective date of 31 December 2021;
- The Mineral Resources statements as reported herein are reported in accordance with the terms and definitions of the JORC Code;
- The Mineral Resources have been assessed with regards to economic potential assuming appropriate modifying factors and cut-off-grade determinations as reported in Table 7-6 and Table 7-7 included in the Main Report of this CPR and assuming a 30% premium in respect of the Long Term Prices which are utilised to support the reporting of Ore Reserves; and
- The Measured and Indicated Mineral Resources are inclusive of those Mineral Resources modified to produce the Ore Reserves.

The Competent Person who has overall responsibility for the Mineral Resources as reported herein is Dr Mike Armitage, C.Eng, C. Geol, FGS, MIMM, PhD. He is a Chartered Geologist and a Fellow of the Geological Society which is a Recognised Professional Organisation ("**RPO**") included in a list promulgated by the Australian Securities Exchange ("**ASX**") from time to time. He is an associate corporate consultant of SRK and has over 39 years' experience in the mining and metals industry and also has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the JORC Code. Dr Armitage has been responsible for the reporting of Mineral Resources and Ore Reserves on various properties internationally during the past 30 years.

Table 13-5: Mining Subsidiary Mineral Resources: 100% and Attributable

Classification/Mining Subsidiary	Aggregated (100%)			Equity	Attributable		
	Tonnage (Mt)	Grade (%U)	Content (ktU)	(%)	Tonnage (Mt)	Grade (%U)	Content (ktU)
Measured							
Kazatomprom-SaUran LLP	8.5	0.034	2.9	100.00	8.5	0.034	2.9
ME Ortalyk LLP	57.6	0.046	26.7	100.00	57.6	0.046	26.7
RU-6 LLP	11.2	0.076	8.5	100.00	11.2	0.076	8.5
Appak LLP	6.5	0.032	2.1	65.00	4.2	0.032	1.4
JV Inkai LLP	236.2	0.052	122.6	60.00	141.7	0.052	73.6
Semizbai-U LLP	31.9	0.048	15.4	51.00	16.2	0.048	7.9
JV Akbastau JSC	28.6	0.086	24.5	50.00	14.3	0.086	12.3
Karatau LLP	22.8	0.097	22.1	50.00	11.4	0.097	11.0
JV Zarechnoye JSC	4.3	0.052	2.2	49.98	2.1	0.052	1.1
JV Katco LLP	26.8	0.105	28.1	49.00	13.1	0.105	13.8
JV Khorassan-U LLP	9.1	0.106	9.6	50.00	4.5	0.106	4.8
JV SMCC LLP	102.7	0.041	41.9	30.00	30.8	0.041	12.6
Baiken-U LLP	8.1	0.114	9.2	52.50	4.2	0.114	4.8
Kazatomprom	80.3	0.050	40.4	100.00	80.3	0.050	40.4
Budenovskoye LLP	66.5	0.076	50.4	51.00	33.9	0.076	25.7
Subtotal	**700.9**	**0.058**	**406.6**		**434.2**	**0.057**	**247.4**
Indicated							
Kazatomprom-SaUran LLP	51.1	0.044	22.4	100.00	51.1	0.044	22.4
ME Ortalyk LLP	30.9	0.034	10.5	100.00	30.9	0.034	10.5
RU-6 LLP	6.5	0.076	5.0	100.00	6.5	0.076	5.0
Appak LLP	39.5	0.036	14.2	65.00	25.7	0.036	9.2
JV Inkai LLP	58.6	0.050	29.2	60.00	35.2	0.050	17.5
Semizbai-U LLP	20.4	0.043	8.8	51.00	10.4	0.043	4.5
JV Akbastau JSC	14.7	0.091	13.4	50.00	7.3	0.091	6.7
Karatau LLP	26.3	0.063	16.6	50.00	13.2	0.063	8.3
JV Zarechnoye JSC	4.5	0.065	2.9	49.98	2.3	0.065	1.5
JV Katco LLP	24.8	0.108	26.8	49.00	12.2	0.108	13.1
JV Khorassan-U LLP	25.2	0.107	27.0	50.00	12.6	0.107	13.5
JV SMCC LLP	88.1	0.041	36.0	30.00	26.4	0.041	10.8
Baiken-U LLP	7.2	0.109	7.9	52.50	3.8	0.109	4.1
Kazatomprom	225.9	0.038	84.7	100.00	225.9	0.038	84.7
Budenovskoye LLP	86.5	0.074	63.8	51.00	44.1	0.074	32.5
Subtotal	**710.2**	**0.052**	**369.1**		**507.4**	**0.048**	**244.4**
Measured + Indicated							
Kazatomprom-SaUran LLP	59.6	0.042	25.3	100.00	59.6	0.042	25.3
ME Ortalyk LLP	88.5	0.042	37.2	100.00	88.5	0.042	37.2
RU-6 LLP	17.7	0.076	13.5	100.00	17.7	0.076	13.5
Appak LLP	46.0	0.035	16.3	65.00	29.9	0.035	10.6
JV Inkai LLP	294.8	0.051	151.8	60.00	176.9	0.051	91.1
Semizbai-U LLP	52.3	0.046	24.2	51.00	26.7	0.046	12.4
JV Akbastau JSC	43.2	0.088	37.9	50.00	21.6	0.088	19.0
Karatau LLP	49.1	0.079	38.7	50.00	24.5	0.079	19.3
JV Zarechnoye JSC	8.8	0.059	5.2	49.98	4.4	0.059	2.6
JV Katco LLP	51.6	0.106	54.9	49.00	25.3	0.106	26.9
JV Khorassan-U LLP	34.3	0.107	36.6	50.00	17.1	0.107	18.3
JV SMCC LLP	190.9	0.041	77.9	30.00	57.3	0.041	23.4
Baiken-U LLP	15.3	0.112	17.0	52.50	8.0	0.112	8.9
Kazatomprom	306.1	0.041	125.1	100.00	306.1	0.041	125.1
Budenovskoye LLP	153.0	0.075	114.2	51.00	78.0	0.075	58.3
Total	**1,411.1**	**0.055**	**775.8**		**941.6**	**0.052**	**491.7**
Inferred							
Kazatomprom-SaUran LLP	-	-	-	100.00	-	-	-
ME Ortalyk LLP	-	-	-	100.00	-	-	-
RU-6 LLP	-	-	-	100.00	-	-	-
Appak LLP	-	-	-	65.00	-	-	-
JV Inkai LLP	-	-	-	60.00	-	-	-
Semizbai-U LLP	-	-	-	51.00	-	-	-
JV Akbastau JSC	-	-	-	50.00	-	-	-
Karatau LLP	-	-	-	50.00	-	-	-
JV Zarechnoye JSC	1.0	0.064	0.6	49.98	0.5	0.064	0.3
JV Katco LLP	-	-	-	49.00	-	-	-
JV Khorassan-U LLP	-	-	-	50.00	-	-	-
JV SMCC LLP	5.0	0.043	2.2	30.00	1.5	0.043	0.6
Baiken-U LLP	-	-	-	52.50	-	-	-
Kazatomprom	-	-	-	100.00	-	-	-
Budenovskoye LLP	7.6	0.077	5.8	51.00	3.9	0.077	3.0
Subtotal	**13.6**	**0.063**	**8.6**		**5.9**	**0.067**	**3.9**
Mineral Resources							
Kazatomprom-SaUran LLP	59.6	0.042	25.3	100.00	59.6	0.042	25.3
ME Ortalyk LLP	88.5	0.042	37.2	100.00	88.5	0.042	37.2
RU-6 LLP	17.7	0.076	13.5	100.00	17.7	0.076	13.5
Appak LLP	46.0	0.035	16.3	65.00	29.9	0.035	10.6
JV Inkai LLP	294.8	0.051	151.8	60.00	176.9	0.051	91.1
Semizbai-U LLP	52.3	0.046	24.2	51.00	26.7	0.046	12.4
JV Akbastau JSC	43.2	0.088	37.9	50.00	21.6	0.088	19.0
Karatau LLP	49.1	0.079	38.7	50.00	24.5	0.079	19.3
JV Zarechnoye JSC	9.8	0.059	5.8	49.98	4.9	0.059	2.9
JV Katco LLP	51.6	0.106	54.9	49.00	25.3	0.106	26.9
JV Khorassan-U LLP	34.3	0.107	36.6	50.00	17.1	0.107	18.3
JV SMCC LLP	195.9	0.041	80.0	30.00	58.8	0.041	24.0
Baiken-U LLP	15.3	0.112	17.0	52.50	8.0	0.112	8.9
Kazatomprom	306.1	0.041	125.1	52.50	306.1	0.041	125.1
Budenovskoye LLP	160.6	0.075	120.1	52.50	81.9	0.075	61.2
Total	**1,424.7**	**0.055**	**784.4**		**947.5**	**0.052**	**495.7**

13.4 Ore Reserves

As at the Effective Date of the CPR, the total Ore Reserves (Table 13-6) reported by SRK in this CPR for the Mining Subsidiaries as on 31 December 2020, totalled 999.2Mt grading 0.063%U and containing 625.4ktU and comprising:

- Proved Ore Reserves of 482.8Mt grading 0.061%U and containing 296.7ktU; and
- Probable Ore Reserves of 516.5Mt grading 0.064%U and containing 328.8ktU.

On an attributable basis (Table 13-6) the total Ore Reserves reported by SRK in this CPR for the Mining Subsidiaries totalled 549.0Mt grading 0.064%U and containing 350.8ktU comprising:

- Proved Ore Reserves totalling 263.7Mt grading 0.064%U and containing 169.5ktU; and
- Probable Ore Reserves totalling 285.2Mt grading 0.064%U and containing 181.3ktU.

In all instances SRK concludes that:

- The Ore Reserve statements have an effective date of 31 December 2020;
- The Ore Reserve statements as reported herein are reported in accordance with the terms and definitions of the JORC Code (2012); and
- The principal technical and economic inputs relied on for reporting the Ore Reserves have been assessed for each of the Mining Subsidiaries and are reported in in Table 7-6 and Table 7-7 (Main Report) and assuming a long term consensus market forecast price of US$50/lb$U_3O_8$.

The Competent Person who has responsibility for the Ore Reserves as reported herein is Dr Iestyn Humphreys, FMIMM, AIME, PhD who is a Corporate Consultant, and Practice Leader with SRK. He is a Fellow of the IMMM which is a RPO included in a list promulgated by the ASX from time to time. Iestyn Humphreys has 32 years' experience in the mining and metals industry and also has been involved in the preparation of Competent Persons' Reports comprising technical evaluations of various mineral assets internationally during the past five years which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the JORC Code.

Table 13-6: Mining Subsidiary Ore Reserves: Aggregated and Attributable

Classification/Mining Subsidiary	Aggregated (100%)			Equity	Attributable		
	Tonnage (Mt)	Grade (%U)	Content (ktU)	(%)	Tonnage (Mt)	Grade (%U)	Content (ktU)
Proved							
Kazatomprom-SaUran LLP	5.0	0.037	1.9	100.00	5.0	0.037	1.9
ME Ortalyk LLP	26.7	0.100	26.7	100.00	26.7	0.100	26.7
RU-6 LLP	11.2	0.076	8.5	100.00	11.2	0.076	8.5
Appak LLP	6.5	0.032	2.1	65.00	4.2	0.032	1.4
JV Inkai LLP	202.0	0.053	106.2	60.00	121.2	0.053	63.7
Semizbai-U LLP	31.9	0.048	15.4	51.00	16.2	0.048	7.9
JV Akbastau JSC	28.6	0.086	24.5	50.00	14.3	0.086	12.3
Karatau LLP	22.8	0.097	22.1	50.00	11.4	0.097	11.0
JV Zarechnoye JSC	4.3	0.052	2.2	49.98	2.1	0.052	1.1
JV Katco LLP	24.1	0.110	26.4	49.00	11.8	0.110	12.9
JV Khorassan-U LLP	9.1	0.106	9.6	50.00	4.5	0.106	4.8
JV SMCC LLP	102.7	0.041	41.9	30.00	30.8	0.041	12.6
Baiken-U LLP	8.1	0.114	9.2	52.50	4.2	0.114	4.8
Budenovskoye LLP	-	-	-	51.00	-	-	-
Subtotal	**482.8**	**0.061**	**296.7**		**263.7**	**0.064**	**169.5**
Probable							
Kazatomprom-SaUran LLP	47.0	0.045	21.2	100.00	47.0	0.045	21.2
ME Ortalyk LLP	10.5	0.100	10.5	100.00	10.5	0.100	10.5
RU-6 LLP	6.5	0.076	5.0	100.00	6.5	0.076	5.0
Appak LLP	39.5	0.036	14.2	65.00	25.7	0.036	9.2
JV Inkai LLP	50.0	0.050	25.2	60.00	30.0	0.050	15.1
Semizbai-U LLP	20.4	0.043	8.8	51.00	10.4	0.043	4.5
JV Akbastau JSC	14.7	0.091	13.4	50.00	7.3	0.091	6.7
Karatau LLP	26.3	0.063	16.6	50.00	13.2	0.063	8.3
JV Zarechnoye JSC	4.5	0.065	2.9	49.98	2.3	0.065	1.5
JV Katco LLP	23.4	0.111	26.0	49.00	11.5	0.111	12.7
JV Khorassan-U LLP	25.2	0.107	27.0	50.00	12.6	0.107	13.5
JV SMCC LLP	88.1	0.041	36.0	30.00	26.4	0.041	10.8

Classification/Mining Subsidiary	Aggregated (100%)			Equity	Attributable		
	Tonnage (Mt)	Grade (%U)	Content (ktU)	(%)	Tonnage (Mt)	Grade (%U)	Content (ktU)
Baiken-U LLP	7.2	0.109	7.9	52.50	3.8	0.109	4.1
Budenovskoye LLP	153.0	0.075	114.2	51.00	78.0	0.075	58.3
Subtotal	**516.5**	**0.064**	**328.8**		**285.2**	**0.064**	**181.3**
Ore Reserves							
Kazatomprom-SaUran LLP	52.0	0.044	23.1	100.00	52.0	0.044	23.1
ME Ortalyk LLP	37.2	0.100	37.2	100.00	37.2	0.100	37.2
RU-6 LLP	17.7	0.076	13.5	100.00	17.7	0.076	13.5
Appak LLP	46.0	0.035	16.3	65.00	29.9	0.035	10.6
JV Inkai LLP	252.0	0.052	131.3	60.00	151.2	0.052	78.8
Semizbai-U LLP	52.3	0.046	24.2	51.00	26.7	0.046	12.4
JV Akbastau JSC	43.2	0.088	37.9	50.00	21.6	0.088	19.0
Karatau LLP	49.1	0.079	38.7	50.00	24.5	0.079	19.3
JV Zarechnoye JSC	8.8	0.059	5.2	49.98	4.4	0.059	2.6
JV Katco LLP	47.5	0.110	52.4	49.00	23.3	0.110	25.7
JV Khorassan-U LLP	34.3	0.107	36.6	50.00	17.1	0.107	18.3
JV SMCC LLP	190.9	0.041	77.9	30.00	57.3	0.041	23.4
Baiken-U LLP	15.3	0.112	17.0	52.50	8.0	0.112	8.9
Budenovskoye LLP	153.0	0.075	114.2	51.00	78.0	0.075	58.3
Total	**999.2**	**0.063**	**625.4**		**549.0**	**0.064**	**350.8**

13.5 Environmental Liabilities

To date neither the Company nor the Mining Subsidiaries have established formal mine closure plans to determine the potential mine closure liabilities in accordance with the international Environmental and Social Standards referenced in 1.2.2. As such "**Mine Closure**" related liabilities do not incorporate technological and engineering solutions which reflect Good International Industry Practice ("**GIIP**") and "**Best Available Technology**" to where practicable achieve "**Ground Zero**" or "**Walk Away**" remediation status. Significant additional base line technical assessments of current landforms including mining operations, waste management facilities, supporting surface infrastructure and processing facilities, to establish the existing impacts to 31 December 2021. In addition, further analysis of all expanded footprints and additional landforms established as part of implementation of the LoMp is also required to assess the cumulative impact of continued operations through to depletion of the Ore Reserves. On this basis any reassessment of mine closure costs for both currently in-place infrastructure and LoMp infrastructure in accordance with international standards is likely to result in higher mine closure costs than reported herein. This is not to say that these matters are wholly absent, but rather require refinement and integration with the formal LoMps to ensure that there is a wholistic approach to development of detailed engineered, designed, estimated and schedule closure plan.

Accordingly, it is important that any references and/or consideration of the Environmental and Social Liabilities noted below must ben considered alongside the detailed disclosure noted in Section 10.7 and Section 10.9.3 of this CPR.

SRK concludes that as of the Effective Date of this CPR, the total Environmental and Social Liabilities for the Mineral Assets comprise:

- Asset Retirement Obligation determinations as of 31 December 2021:
  - a total liability of KZT106,451.2m (US$250.5m) and on an equity attributable basis KZT71,951.3m (US$169.3m),
  - Liquidation Fund closing balance as of 31 December 2021 as provided by the Company which total KZT46,045.2m (US$108.3m) and on an equity attributable basis KZT27,829.8m (US$65.5m);
  - overall total funding shortfall of KZT60,406.0m (US$142.1m) and on an equity attributable basis KZT44,121.5m (US$103.8m).
- Life of Mine plan Mine Closure determinations as of 31 December 2021:
  - a total liability of KZT264,273.3m (US$621.8m) and on an attributable basis KZT165,298.3m (US$388.9m);

- Liquidation Fund closing balance as of 31 December 2021 as provided by the Company which total KZT46,045.2m (US$108.3m) and on an equity attributable basis KZT27,829.8m (US$65.5m);
- overall total funding shortfall of KZT218,228.1m (US$513.5m) and on an equity attributable basis KZT137,468.5m (US$323.5m). Note that in this scenario on cessation of mining operation the total funding shortfall will be further reduced by assumed continued contributions to the Liquidation Fund which are further assessed in Section 11 of this CPR.

Table 13-7: Mineral Assets ARO and Liquidation Fund Closing Balances

Mining Subsidiary	ARO		Liquidation Fund		Excess (Shortfall)	
	(KZTm)	(US$m)	(KZTm)	(US$m)	(KZTm)	(US$m)
Operating Properties						
Kazatomprom-SaUran LLP	13,697.9	32.2	6,412.9	15.1	(7,285.0)	(17.1)
ME Ortalyk LLP	5,224.9	12.3	1,636.8	3.9	(3,588.1)	(8.4)
RU-6 LLP	19,211.4	45.2	2,433.0	5.7	(16,778.4)	(39.5)
Appak LLP	4,228.6	9.9	2,364.2	5.6	(1,864.4)	(4.4)
JV Inkai LLP	8,741.0	20.6	257.1	0.6	(8,483.9)	(20.0)
Semizbai-U LLP	6,141.1	14.4	1,533.0	3.6	(4,608.1)	(10.8)
JV Akbastau JSC	3,915.2	9.2	1,430.8	3.4	(2,484.5)	(5.8)
Karatau LLP	4,126.4	9.7	1,201.3	2.8	(2,925.1)	(6.9)
JV Zarechnoye JSC	2,234.3	5.3	1,407.9	3.3	(826.3)	(1.9)
JV Katco LLP	24,285.6	57.1	21,097.1	49.6	(3,188.5)	(7.5)
JV Khorassan-U LLP	2,865.5	6.7	1,205.0	2.8	(1,660.5)	(3.9)
JV SMCC LLP	8,721.6	20.5	3,304.8	7.8	(5,416.8)	(12.7)
Baiken-U LLP	3,057.7	7.2	1,653.5	3.9	(1,404.2)	(3.3)
Budenovskoye LLP	-	-	107.7	0.3	107.7	0.3
Subtotal	**106,451.2**	**250.5**	**46,045.2**	**108.3**	**(60,406.0)**	**(142.1)**
Advanced Exploration Properties						
Kazatomprom	-	-	-			
Total	**106,451.2**	**250.5**	**46,045.2**	**108.3**	**(60,406.0)**	**(142.1)**
Attributable	**71,951.3**	**169.3**	**27,829.8**	**65.5**	**(44,121.5)**	**(103.8)**

Table 13-8: Mineral Assets LoMp Mine Closure Costs and Liquidation Fund Closing Balances

Mining Subsidiary	LoMp		Liquidation Fund		Excess (Shortfall)	
	(KZTm)	(US$m)	(KZTm)	(US$m)	(KZTm)	(US$m)
Operating Properties						
Kazatomprom-SaUran LLP	25,189.5	59.3	6,412.9	15.1	(18,776.6)	(44.2)
ME Ortalyk LLP	16,577.1	39.0	1,636.8	3.9	(14,940.2)	(35.2)
RU-6 LLP	26,632.9	62.7	2,433.0	5.7	(24,199.9)	(56.9)
Appak LLP	8,697.6	20.5	2,364.2	5.6	(6,333.5)	(14.9)
JV Inkai LLP	31,139.7	73.3	257.1	0.6	(30,882.6)	(72.7)
Semizbai-U LLP	14,521.9	34.2	1,533.0	3.6	(12,988.9)	(30.6)
JV Akbastau JSC	15,414.0	36.3	1,430.8	3.4	(13,983.3)	(32.9)
Karatau LLP	9,301.8	21.9	1,201.3	2.8	(8,100.5)	(19.1)
JV Zarechnoye JSC	4,345.1	10.2	1,407.9	3.3	(2,937.2)	(6.9)
JV Katco LLP	25,531.5	60.1	21,097.1	49.6	(4,434.4)	(10.4)
JV Khorassan-U LLP	8,013.2	18.9	1,205.0	2.8	(6,808.2)	(16.0)
JV SMCC LLP	29,663.7	69.8	3,304.8	7.8	(26,358.9)	(62.0)
Baiken-U LLP	6,308.7	14.8	1,653.5	3.9	(4,655.3)	(11.0)
Budenovskoye LLP	42,936.5	101.0	107.7	0.3	(42,828.8)	(100.8)
Subtotal	**264,273.3**	**621.8**	**46,045.2**	**108.3**	**(218,228.1)**	**(513.5)**
Advanced Exploration Properties						
Kazatomprom	-	-	-	-	-	-
Total	**264,273.3**	**621.8**	**46,045.2**	**108.3**	**(218,228.1)**	**(513.5)**
Attributable	**165,298.3**	**388.9**	**27,829.8**	**65.5**	**(137,468.5)**	**(323.5)**

The total retrenchment costs (Table 13-9) as of 31 December 2021 report a total of KZT4,392.1m (US$10.3m) and KZT2,549.4m (US$6.0m) reported on an equity attributable basis. Incorporating these estimates into the total Environmental and Social Liabilities results in:

- a total ARO of KZT110,843.2m (US$260.8m) and KZT74,491.7m (US$175.3m) on an equity attributable basis; and
- a total LoMp of KZT268,656.4m (US$632.1m) and KZT167,838.8m (US$394.9m) on an equity attributable basis. Note that in this scenario on cessation of mining operation the total funding shortfall will be further reduced by assumed continued contributions to the Liquidation Fund which are reported in Section 11 of this CPR.

Table 13-9: Mineral Assets Retrenchment, ARO (including Retrenchment) and LoMp Mine Closure Costs (including Retrenchment)

Mining Subsidiary	Retrenchment		ARO + Retrenchment		LoMp + Retrenchment	
	(KZTm)	(US$m)	(KZTm)	(US$m)	(KZTm)	(US$m)
Operating Properties						
Kazatomprom-SaUran LLP	214.8	0.5	13,912.7	32.7	25,404.2	59.8

Mining Subsidiary	Retrenchment (KZTm)	(US$m)	ARO + Retrenchment (KZTm)	(US$m)	LoMp + Retrenchment (KZTm)	(US$m)
ME Ortalyk LLP	284.0	0.7	5,508.9	13.0	16,861.1	39.7
RU-6 LLP	177.3	0.4	19,388.6	45.6	26,810.1	63.1
Appak LLP	130.2	0.3	4,358.8	10.3	8,827.9	20.8
JV Inkai LLP	598.3	1.4	9,339.2	22.0	31,738.0	74.7
Semizbai-U LLP	104.6	0.2	6,245.7	14.7	14,626.5	34.4
JV Akbastau JSC	26.4	0.1	3,941.7	9.3	15,440.5	36.3
Karatau LLP	417.1	1.0	4,543.5	10.7	9,718.9	22.9
JV Zarechnoye JSC	169.4	0.4	2,403.7	5.7	4,514.5	10.6
JV Katco LLP	546.0	1.3	24,831.7	58.4	26,077.5	61.4
JV Khorassan-U LLP	25.6	0.1	2,891.1	6.8	8,038.8	18.9
JV SMCC LLP	412.6	1.0	9,134.2	21.5	30,076.3	70.8
Baiken-U LLP	379.5	0.9	3,437.1	8.1	6,688.2	15.7
Budenovskoye LLP	897.4	2.1	897.4	2.1	43,833.9	103.1
Subtotal	**4,383.2**	**10.3**	**110,834.3**	**260.8**	**268,656.4**	**632.1**
Advanced Exploration Properties						
Kazatomprom	-	-	-	-	-	-
Total	**4,383.2**	**10.3**	**110,834.3**	**260.8**	**268,656.4**	**632.1**
Attributable	**2,540.5**	**6.0**	**74,491.7**	**175.3**	**167,838.8**	**394.9**

13.6 Exploration Programme

The Company has developed an extensive Exploration Programme to conduct further technical work in respect of a number of prospects located in three key geological regions of Kazakhstan: namely Shu–Sarysu, Syrdarya and North–Kazakhstan. The Company forecasts expenditure of approximately KZT35.2bn (US$82.9m; Table 13-10) over a 7-year period to end 2028 with some approximately 50% of expenditures focused on the Shu-Sarysu region and approximately 30% in the Syrdarya region.

The Exploration Programme encompasses a schedule of activities and expenditures comprising both exploration drilling and other related activities certain of which are contractually committed until 2023, notably in respect of Block 2 Inkai and Block 3 Inkai. SRK concludes that the Exploration Programme as forecasted herein (specifically to 2023) includes appropriate supporting details including physical activities, scopes of work and accompanying expenditure assumptions and are considered warranted given the exploration activities completed to date.

Beyond this period, SRK highlights that the expenditures as projected are dependent upon the successful outcome of prior activities and as such inherently include a degree of uncertainty.

SRK concludes that the combination of the historical work completed in respect of the Development Projects, Advanced Exploration Project and Exploration Properties to date and the supporting technical studies, specifically the outcome of the exploration works warrants execution of the Exploration Programme as planned and reported herein.

Table 13-10: Exploration Programme(1)

Region	Units	Total	2022	2023	2024	2025	2026	2027	2028
Exploration Programme									
Shu-Sarysu	(KZTm)	16,713.6	5,801.6	5,076.8	2,911.1	1,455.6	1,215.3	253.1	-
Syrdarya	(KZTm)	10,656.1	2,025.1	1,985.9	2,151.7	1,493.5	1,493.5	1,253.1	253.1
North - Kazakhstan	(KZTm)	7,847.4	1,898.6	1,898.6	1,898.6	1,898.6	253.1	-	-
Total	**(KZTm)**	**35,217.2**	**9,725.4**	**8,961.3**	**6,961.4**	**4,847.7**	**2,962.0**	**1,506.2**	**253.1**
Exploration Programme									
Shu-Sarysu	(US$m)	39.3	13.7	11.9	6.8	3.4	2.9	0.6	-
Syrdarya	(US$m)	25.1	4.8	4.7	5.1	3.5	3.5	2.9	0.6
North - Kazakhstan	(US$m)	18.5	4.5	4.5	4.5	4.5	0.6	-	-
Total	**(US$m)**	**82.9**	**22.9**	**21.1**	**16.4**	**11.4**	**7.0**	**3.5**	**0.6**

(1) All US$ estimates have been converted to US$ incorporating from a base date of 30 June 2018 to 31 December 2021 KZ CPI factor of 1.27 and converted to US$ assuming a closing exchange rate of KZT425 to one US$.

13.7 Life-of-Mine Plans

The Life-of-Mine plans as reported herein are limited to the depletion Ore Reserves as reported in Table 13-2 and have been developed in combination with the Company with reliance on:

- The detailed two-year budgets developed by the Mining Subsidiaries at a deposit level of detail;
- An assessment of key technical and economic parameters with focus on identifying any significant departure from historical performance, specifically from 2015 through 2021;
- The five year capital expenditure programmes and supporting details for specific expansions

and mine area extensions as noted in Section 11.3.5 of this CPR; and

- A review of supporting Feasibility Studies and other technical studies completed in respect of key expansion projects.

Table 13-11 through Table 13-15 present a summary of the annual LoMp schedules of all technical and economic parameters consolidated for the Mining Subsidiaries in KZT currency from the details provided in each of the Mining Subsidiaries. The current LoMp assumes depletion of all Ore Reserves by 2057 with uranium production reflecting the combined impact of a reversal of the impacts of planned historical cuts and future expansions/extensions at the Mining Subsidiaries. Total production of uranium is therefore expected to increase from 22ktU to 29ktU by 2024, averaging 32ktU to 33ktU through to 2030 and thereafter declining as the number of operating subsidiaries reduces from 13 in 2032, 7 in 2040, 4 in 2045 and ultimately 1 from 2052 onwards reflecting the impact of production tails.

The Mining Subsidiaries have LoMp forecast aggregated Sales of [x,xxx.xx]MlbU_3O_8 with an estimated C1 LoMp unit cash cost of US$[xx.xx]/lb$U_3O_8$ and AISC of US$[xx.xx]/lb$U_3O_8$ and capital expenditure requirements of US$[x.xx]bn (inclusive of environmental closure costs).

Table 13-16 through Table 13-20 provides similar details for the attributable TEPs to the Company assuming the equity percentages as reported in Table 13-1.

The Company's equity attributable LoMp forecasts for the Mining Subsidiaries indicate: Sales of [xxx.x]MlbU_3O_8 with an estimated C1 LoMp unit cash cost of US$[xx.xx]/lb$U_3O_8$ and AISC of US$[xx.xx]/lb$U_3O_8$ and capital expenditure requirements of US$[x.xx]bn (inclusive of environmental closure costs).

The planned increases in production and associated capital expenditures are noted in Section 11.3.5 and comprise some KZT[xx.xx]bn expended from 2022 through 2026. In order to sustain production over the LoMp period, other capital expenditures (Table [xx.xx] through Table [xx.xxx] comprise both allocations for well construction which ranges from KZT[xx]bn to KZT[xx]bn over the next ten years thereafter reducing in line with production and general infrastructure related sustaining capital which ranges from KZT[xx]bn to KZT[xx]bn over the next ten year period.

C1 unit cash costs per unit of sales are expected to range in the US$[x.xx]/lb$U_3O_8$ to US$[xx.xx]/lb$U_3O_8$ over the next ten years in real terms (1 January 2022) with corresponding values for AISC being US$[xx.xx]/lb$U_3O_8$ to US$[xx.xx]/lb$U_3O_8$.

With respect to Kyzylkum LLP, the total unallocated cash expenditures as reported on a 100% basis totals KZT[xx.x]bn which is expended form 2022 through 20[xx] inclusive as noted in Table [11-xxx] and Table [11x-xxx] which in US$ amounts to US$[xx.x]m. The Company's equity interest in Kyzylkum LLP is 50% with 30% held by Uranium One and 20% by EAHL. The cash expenditures attributable to the Company comprise 50% of the forecast expenditures as noted in Table [11-xxx] through Table [11-xxx].

13.7.1 Mining Subsidiary 100% Technical Economic Parameters

Table 13-11: Mining Subsidiary historical operating statistics (100%)

Mining Subsidiary	Units	Total	2022	2023	2024	2025	2026	2027	2028
Physicals									
Production	(tU)								
Sales	(MlbU)								
Final Product Sales	(MlbU_3O_8)								
Macro Economics									
Exchange Rate	(KZT:US$)								
Commodity Price									
Benchmark	(US$/lb$U_3O_8$)								
Discount	(%)								
Realised	(US$/lb$U_3O_8$)								
Financial									
Sales Revenue	**(KZTm)**								
Cash Costs (Sales)	**(KZTm)**								

Mining Subsidiary	Units	Total	2022	2023	2024	2025	2026	2027	2028
Capex	**(KZTm)**								
Well Construction	(KZTm)								
Sustaining & Expansion	(KZTm)								
Liquidation	(KZTm)								
Mine Closure	(KZTm)								
Unit Costs									
C1 (Sales - 100%)	(US$/lb$U_3O_8$)								
AISC (Sales - 100%)	(US$/lb$U_3O_8$)								

Table 13-12: Mining Subsidiary historical operating statistics (100%)

Mining Subsidiary	Units	2029	2030	2031	2032	2033	2034	2035	2036
Physicals									
Production	(tU)								
Sales	(MlbU)								
Final Product Sales	(MlbU_3O_8)								
Macro Economics									
Exchange Rate	(KZT:US$)								
Commodity Price									
Benchmark	(US$/lb$U_3O_8$)								
Discount	(%)								
Realised	(US$/lb$U_3O_8$)								
Financial									
Sales Revenue	**(KZTm)**								
Cash Costs (Sales)	**(KZTm)**								
Capex	**(KZTm)**								
Well Construction	(KZTm)								
Sustaining & Expansion	(KZTm)								
Liquidation	(KZTm)								
Mine Closure	(KZTm)								
Unit Costs									
C1 (Sales - 100%)	(US$/lb$U_3O_8$)								
AISC (Sales - 100%)	(US$/lb$U_3O_8$)								

Table 13-13: Mining Subsidiary historical operating statistics (100%)

Mining Subsidiary	Units	2037	2038	2039	2040	2041	2042	2043	2044
Physicals									
Production	(tU)								
Sales	(MlbU)								
Final Product Sales	(MlbU_3O_8)								
Macro Economics									
Exchange Rate	(KZT:US$)								
Commodity Price									
Benchmark	(US$/lb$U_3O_8$)								
Discount	(%)								
Realised	(US$/lb$U_3O_8$)								
Financial									
Sales Revenue	**(KZTm)**								
Cash Costs (Sales)	**(KZTm)**								
Capex	**(KZTm)**								
Well Construction	(KZTm)								
Sustaining & Expansion	(KZTm)								
Liquidation	(KZTm)								
Mine Closure	(KZTm)								
Unit Costs									
C1 (Sales - 100%)	(US$/lb$U_3O_8$)								
AISC (Sales - 100%)	(US$/lb$U_3O_8$)								

Table 13-14: Mining Subsidiary historical operating statistics (100%)

Mining Subsidiary	Units	2045	2046	2047	2048	2049	2050	2051	2052
Physicals									
Production	(tU)								
Sales	(MlbU)								
Final Product Sales	(MlbU_3O_8)								
Macro Economics									
Exchange Rate	(KZT:US$)								
Commodity Price									
Benchmark	(US$/lb$U_3O_8$)								
Discount	(%)								
Realised	(US$/lb$U_3O_8$)								
Financial									
Sales Revenue	**(KZTm)**								
Cash Costs (Sales)	**(KZTm)**								
Capex	**(KZTm)**								
Well Construction	(KZTm)								
Sustaining & Expansion	(KZTm)								
Liquidation	(KZTm)								
Mine Closure	(KZTm)								
Unit Costs									
C1 (Sales - 100%)	(US$/lb$U_3O_8$)								
AISC (Sales - 100%)	(US$/lb$U_3O_8$)								

Table 13-15: Mining Subsidiary historical operating statistics (100%)

Mining Subsidiary	Units	2053	2054	2055	2067	2057	2058	2059	2060
Physicals									
Production	(tU)								
Sales	(MlbU)								
Final Product Sales	(MlbU_3O_8)								
Macro Economics									
Exchange Rate	(KZT:US$)								
Commodity Price									

Mining Subsidiary	Units	2053	2054	2055	2067	2057	2058	2059	2060
Benchmark	(US\$/lbU_3O_8)								
Discount	(%)								
Realised	(US\$/lbU_3O_8)								
Financial									
Sales Revenue	**(KZTm)**								
Cash Costs (Sales)	**(KZTm)**								
Capex	**(KZTm)**								
Well Construction	(KZTm)								
Sustaining & Expansion	(KZTm)								
Liquidation	(KZTm)								
Mine Closure	(KZTm)								
Unit Costs									
C1 (Sales - 100%)	(US\$/lbU_3O_8)								
AISC (Sales - 100%)	(US\$/lbU_3O_8)								

13.7.2 Mining Subsidiary Attributable Technical Economic Parameters

Table 13-16: Mining Subsidiary historical operating statistics (Attributable)

Mining Subsidiary	Units	Total	2022	2023	2024	2025	2026	2027	2028
Physicals									
Production	(tU)								
Sales	(MlbU)								
Final Product Sales	(MlbU_3O_8)								
Macro Economics									
Exchange Rate	(KZT:US\$)								
Commodity Price									
Benchmark	(US\$/lbU_3O_8)								
Discount	(%)								
Realised	(US\$/lbU_3O_8)								
Financial									
Sales Revenue	**(KZTm)**								
Cash Costs (Sales)	**(KZTm)**								
Capex	**(KZTm)**								
Well Construction	(KZTm)								
Sustaining & Expansion	(KZTm)								
Liquidation	(KZTm)								
Mine Closure	(KZTm)								
Unit Costs									
C1 (Sales - 100%)	(US\$/lbU_3O_8)								
AISC (Sales - 100%)	(US\$/lbU_3O_8)								

Table 13-17: Mining Subsidiary historical operating statistics (Attributable)

Mining Subsidiary	Units	2029	2030	2031	2032	2033	2034	2035	2036
Physicals									
Production	(tU)								
Sales	(MlbU)								
Final Product Sales	(MlbU_3O_8)								
Macro Economics									
Exchange Rate	(KZT:US\$)								
Commodity Price									
Benchmark	(US\$/lbU_3O_8)								
Discount	(%)								
Realised	(US\$/lbU_3O_8)								
Financial									
Sales Revenue	**(KZTm)**								
Cash Costs (Sales)	**(KZTm)**								
Capex	**(KZTm)**								
Well Construction	(KZTm)								
Sustaining & Expansion	(KZTm)								
Liquidation	(KZTm)								
Mine Closure	(KZTm)								
Unit Costs									
C1 (Sales - 100%)	(US\$/lbU_3O_8)								
AISC (Sales - 100%)	(US\$/lbU_3O_8)								

Table 13-18: Mining Subsidiary historical operating statistics (Attributable)

Mining Subsidiary	Units	2037	2038	2039	2040	2041	2042	2043	2044
Physicals									
Production	(tU)								
Sales	(MlbU)								
Final Product Sales	(MlbU_3O_8)								
Macro Economics									
Exchange Rate	(KZT:US\$)								
Commodity Price									
Benchmark	(US\$/lbU_3O_8)								
Discount	(%)								
Realised	(US\$/lbU_3O_8)								
Financial									
Sales Revenue	**(KZTm)**								
Cash Costs (Sales)	**(KZTm)**								
Capex	**(KZTm)**								
Well Construction	(KZTm)								
Sustaining & Expansion	(KZTm)								
Liquidation	(KZTm)								
Mine Closure	(KZTm)								
Unit Costs									
C1 (Sales - 100%)	(US\$/lbU_3O_8)								
AISC (Sales - 100%)	(US\$/lbU_3O_8)								

Table 13-19: Mining Subsidiary historical operating statistics (Attributable)

Mining Subsidiary	Units	2045	2046	2047	2048	2049	2050	2051	2052
Physicals									
Production	(tU)								
Sales	(MlbU)								
Final Product Sales	($MlbU_3O_8$)								
Macro Economics									
Exchange Rate	(KZT:US$)								
Commodity Price									
Benchmark	(US$/$lbU_3O_8$)								
Discount	(%)								
Realised	(US$/$lbU_3O_8$)								
Financial									
Sales Revenue	**(KZTm)**								
Cash Costs (Sales)	**(KZTm)**								
Capex	**(KZTm)**								
Well Construction	(KZTm)								
Sustaining & Expansion	(KZTm)								
Liquidation	(KZTm)								
Mine Closure	(KZTm)								
Unit Costs									
C1 (Sales - 100%)	(US$/$lbU_3O_8$)								
AISC (Sales - 100%)	(US$/$lbU_3O_8$)								

Table 13-20: Mining Subsidiary historical operating statistics (Attributable)

Mining Subsidiary	Units	2053	2054	2055	2067	2057	2058	2059	2060
Physicals									
Production	(tU)								
Sales	(MlbU)								
Final Product Sales	($MlbU_3O_8$)								
Macro Economics									
Exchange Rate	(KZT:US$)								
Commodity Price									
Benchmark	(US$/$lbU_3O_8$)								
Discount	(%)								
Realised	(US$/$lbU_3O_8$)								
Financial									
Sales Revenue	**(KZTm)**								
Cash Costs (Sales)	**(KZTm)**								
Capex	**(KZTm)**								
Well Construction	(KZTm)								
Sustaining & Expansion	(KZTm)								
Liquidation	(KZTm)								
Mine Closure	(KZTm)								
Unit Costs									
C1 (Sales - 100%)	(US$/$lbU_3O_8$)								
AISC (Sales - 100%)	(US$/$lbU_3O_8$)								

13.8 Production Flexibility

The Company's annual sales profiles reflect the current LoMp generated in support of the overall Ore Reserve statement dated 1 January 2022. Current annual sales at [xx.x]Mlb (2021) is planned to increase to [xx.x]$MlbU_3O_8$ by 2026 through a combination of a reversal of historical production cuts, planned expansions at certain of the Mining Subsidiaries (Ortalyk LLP, JV Inkai LLP, JV Akbastau JSC, Karatau LLP, JV Khorassan-U LLP and Budenovskoye LLP). The decline in production beyond 2030 is largely as a result of depletion of Ore Reserves at the various deposits noted in Table 11-3. By 20[xx] annual sales drop below [xx]$MlbU_3O_8$ and continue to decline sharply to [xx]$MlbU_3O_8$ by 2051 when only JV SMCC LLP remains as the sole operating Mining Subsidiary.

The opportunity to expand or maintain production at a strategic level (e.g., 60$MlbU_3O_8$) is dependent upon realising the opportunities noted in the Section11.3.2 (**Error! Reference source not found.**). These opportunities are subject to completion of further exploration and as appropriate further technical studies to both validate the optimal production scenario as well as ensure that the resulting forecasts are technically feasible and economically viable. This aside, SRK notes that owing to the relative simplicity of the nature of the mining operations and assuming that all necessary regulatory approvals are achieved, the process of establishing a revised strategic plan, subject to prevailing market assumptions, is relatively straight forward and not as complex as normally experienced elsewhere in the mining and metals sector.

13.9 Risks and Opportunities

The key risks relating to the Mineral Assets as identified by SRK relate to:

- Changes in technical and economic assumptions which define the economic viability of the

Ore Reserves as reported herein, specifically:

- The risk that contractual recoveries as assumed for Zhalpak, and Budenovskoye Block 6&7 are not achieved or deemed not to be sustainable given that these assumptions are not supported by completed pilot test well programmes,
- The risk that any shortfall in capital expenditures noted during the COVID-19 pandemic is not addressed in the short to medium term specifically with respect to expenditures related to well construction,
- Project development risk associated with construction and commissioning of the new mining and processing facilities JV Budenovskoye LLP (2026; 2,000tu) and production expansion/build-up at Ortalyk LLP (2030: 2,900tU), JV Inkai LLP (2024: 4,000tU), Karatau LLP (2025, 3,600tU), JV Khorassan-U LLP (2025: 2,200tU),
- Should the spot market uranium prices fall below US$15/lb$U_3O_8$ when considering C1 cash cost reporting and US$20.00/lb$U_3O_8$ when considering AISC cash reporting,
- Should commodity input costs, e.g., sulphuric acid, rise significantly as a result of local shortages or general above inflationary increases in the international market; and

- Changes in legislation and/or regulatory practices which impact on:
  - The criteria applied for determination of environmental closure costs,
  - The Company's current monopoly in respect of exploration, development and operation of uranium Mineral Assets.

The key opportunities relating to the Mineral Assets as identified by SRK relate to:

- Increased Mineral Resources as a result of successful outcomes to the Company's planned Exploration Programme in respect of the Exploration Properties;
- Increased Ore Reserves as a result of completion of successful technical studies with respect to certain Advanced Exploration Properties of Block 2 Inkai and Block 3 Inkai; and
- Further capitalising on the current Monopoly and expanding the footprint of the current regional Exploration Programme.

13.10 Summary Conclusions

This CPR is addressed to and may be relied upon by the Company, the Directors of the Company and its advisors in support of the declaration of: Mineral Resource and Ore Reserve Statements reported in accordance with the terms and definitions of the JORC Code; the ARO Statements and the LoMp closure costs for the Mineral Assets and reported as on 31 December 20201

Accordingly, SRK has confirms that it:

- Accepts reliance as regards the CPR for any benefit of the Company and its Advisors; and
- Takes responsibility for the CPR and declares that it has taken all reasonable care to ensure that the information contained in the CPR is, to the best of its knowledge, in accordance with the facts and contains no omission likely to affect its import.

SRK believes that its opinion must be considered as a whole and that selecting portions of the analysis or factors considered by it, without considering all factors and analyses together, could create a misleading view of the process underlying the opinions presented in this CPR. SRK has no obligation or undertaking to advise any person of any development in relation to Mineral Assets which comes to its attention after the date of this CPR or to review, revise or update the CPR or opinion in respect of any such development occurring after the date of this CPR.

The work completed by SRK in preparing this report has enabled it to present Mineral Resource and Ore Reserve estimates for all of the Company's operating mines, Development Projects and Advanced Exploration Properties as on 31 December 2021.

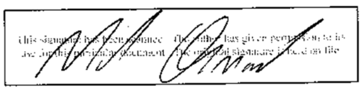
The work completed by SRK in preparing this report has enabled it to present:

- Mineral Resource and Ore Reserve estimates for all of the Company's operating mines, Development Projects and Advanced Exploration Properties;
- A review of the Company's Exploration Programme and the potential in the Company's Exploration Properties;
- An assessment of the Environmental and Social practices relating to the Mineral Assets specifically:
  - the regulatory framework in which the Company operates;
  - the key features of the HSE management systems in effect at the operations;
  - the potential ESHS risks at each of the operations;
  - the asset retirement obligations and mine closure liabilities associated with the operations and the conformance of the operations to international standards in respect if environmental and social impact management.
- An assessment of the technical and economic parameters as incorporated into the LoMp for the Mineral Assets through development of detailed post-tax pre-finance cashflow models which deplete the Ore Reserves as reported herein; and
- A summary of the key risks and opportunities as they relate to the Mineral Assets.

The observations, comments and conclusions presented in this report represent SRK's opinion as of 30 June 2022 and are based on a review of documentation provided by the Company, site visits to all operations conducted in the authoring of the 2022 CPR, follow up site visits to review the basis of determination for the revised Mineral Resources and discussions with the Company's management and representatives. SRK cannot accept any liability, either direct or consequential for the validity of information that has been accepted in good faith.

For and behalf of SRK Consulting (UK) Limited

Dr Iestyn Humphreys,
Corporate Consultant (Due Diligence),
SRK Consulting (UK) Limited.



Dr Mike Armitage,
Corporate Consultant (Geology),
SRK Consulting (UK) Limited.

Glossary

Glossary – Mineral Resources and Ore Reserves

Mineral Resource	A 'Mineral Resource' is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade (or quality), and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade (or quality), continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling. Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories.
Indicated Mineral Resource	An 'Indicated Mineral Resource' is that part of a Mineral Resource for which quantity, grade (or quality), densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes, and is sufficient to assume geological and grade (or quality) continuity between points of observation where data and samples are gathered. An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Ore Reserve.
Inferred Mineral Resource	An 'Inferred Mineral Resource' is that part of a Mineral Resource for which quantity and grade (or quality) are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade (or quality) continuity. It is based on exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to an Ore Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.
Measured Mineral Resource	A 'Measured Mineral Resource' is that part of a Mineral Resource for which quantity, grade (or quality), densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit. Geological evidence is derived from detailed and reliable exploration, sampling and testing gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes, and is sufficient to confirm geological and grade (or quality) continuity between points of observation where data and samples are gathered. A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proved Ore Reserve or under certain circumstances to a Probable Ore Reserve.
Ore Reserve	An 'Ore Reserve' is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that

include application of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified.

The reference point at which Reserves are defined, usually the point where the ore is delivered to the processing plant, must be stated. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.

Probable Ore Reserve — A ‘Probable Ore Reserve’ is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Ore Reserve is lower than that applying to a Proved Ore Reserve.

Proved Ore Reserve — A ‘Proved Ore Reserve’ is the economically mineable part of a Measured Mineral Resource. A Proved Ore Reserve implies a high degree of confidence in the Modifying Factors.

Glossary – Development Stages

Producing Property — Mineral assets for which current Ore Reserves are declared and mining and processing operations have been commissioned and are in production.

Development Property — Mineral assets for which Ore Reserves have been declared and are essentially supported by a minimum of a pre-feasibility study which on a multi-disciplinary basis demonstrates that the consideration is technically feasible and economically viable.

Pre-Development Property

Mineral assets for which Mineral Resources have been defined but where a decision to proceed with development has not been made.

Advanced Exploration Property

Mineral assets for which only Mineral Resources have been declared.

Exploration Property — Mineral assets for which no Mineral Resources have been declared.

Glossary – Technical Studies

Feasibility Study — A Feasibility Study is a comprehensive technical and economic study of the selected development option for a mineral project that includes appropriately detailed assessments of applicable Modifying Factors together with any other relevant operational factors and detailed financial analysis that are necessary to demonstrate at the time of reporting that extraction is reasonably justified (economically mineable). The results of the study may reasonably serve as the basis for a final decision by a proponent or financial institution to proceed with, or finance, the development of the project. The confidence level of the study will be higher than that of a Pre-Feasibility Study.

Preliminary Feasibility Study

A Preliminary Feasibility Study (Pre-Feasibility Study) is a comprehensive study of a range of options for the technical and economic viability of a mineral project that has advanced to a stage where a preferred mining method, in the case of underground mining, or the pit configuration, in the case of an open pit, is established and an effective method of mineral processing is determined. It includes a financial analysis based on reasonable assumptions on the Modifying Factors and the evaluation of any other relevant factors which are sufficient for a Competent Person, acting reasonably, to determine if all or part of the Mineral Resources may be converted to an Ore Reserve at the time of reporting. A Pre-Feasibility Study is at a lower confidence level than a Feasibility Study.

Scoping Study — A Scoping Study is an order of magnitude technical and economic study of the potential viability of Mineral Resources. It includes appropriate assessments of realistically assumed Modifying Factors together with any other relevant operational factors that are necessary to demonstrate at the time of reporting that progress to a Pre-Feasibility Study can be reasonably justified.

Glossary – Financial Terms

PGR In accordance with the relevant taxation codes of Kazakhstan, PGR (wellfield development depreciation) is a tax-deductible non-cash item which is determined from a unit cost rate (the "**PGR Rate**") applied to the depleted Ore Reserves (in-situ U content). The PGR Rate is determined from the sum of the PGR opening balance of well field expenditures (KZT) in the period and additional expenditures incurred in the period, divided by a sub-set of the Ore Reserves, specifically that portion of the Ore Reserves (U content) which is directly accessible by constructed wells (sum of opening balance in the period + following period in-situ production (U content). The PGR Rate is then multiplied by the depleted Ore Reserves to determine the tax-deductible non-cash charge in the period and the PGR closing balance is determined by the net assessment of the PGR opening balance and the PGR charge determined in the period.

GRR In accordance with the relevant taxation codes of Kazakhstan, GRR (exploration depreciation) is a tax-deductible non-cash item which is determined based on the undepreciated opening balance of GRR multiplied by a depletion ratio, which depletion ratio is based on the ratio of in period production divided by (total LoMp production less the cumulative production to the prior period).

Mineral Extraction Tax ("MET")

In accordance with the relevant taxation codes of Kazakhstan, MET is form of 'mineral royalty' determined by application of 29% tax charge to the taxable expenditures. The tax charge is a cash cost of mining and is based on an assumed 20% profit margin on certain expenditures and a MET rate of 18.50% and where the tax charge of 29% is determined by the following formulae: (1+20%)*18.5%/(1-(1+20%)*18.5%). The taxable expenditures comprise all direct expenditures associated with the mining operations and specifically exclude (processing and G&A) but include the period PGR charge and any other depreciation charges attributable to direct mining activities.

Property Tax ("PT")

In accordance with the relevant taxation codes of Kazakhstan, PT is a tax charge derived from application of a rate of 1.50% to the average of the opening and closing balances of PGR determined in the period. The property tax as determined is then apportioned in a ratio of 40% to the mining costs and 60% to the processing costs.

Depreciation In accordance with the relevant taxation codes of Kazakhstan, Depreciation is a tax deductible charge and is determined by depreciation of expansion and sustaining capital related expenditures through allocation to: production depreciation (70%) and accounting depreciation (30%). With respect to production depreciation this is based on the undepreciated opening balance of production depreciation multiplied by a depletion ratio, which depletion ratio is based on the ratio of in period production divided by (total Life-of-Mine plan production less the cumulative production to the prior period). With respect to accounting depreciation all related expenditures are depreciated on a straight line basis for four years. The opening balances for production depreciation and accounting depreciation is determined by distributing the overall opening balance to: production depreciation (70%) and accounting depreciation (30%). The overall depreciation charge is then apportioned to Mining, Processing and G&A activities by the assumed distribution determined in the prior reporting period that being the 6 month period ended 30 June 2018.

Corporate Income Tax ("CIT")

In accordance with the relevant tax codes of Kazakhstan, CIT is determined by application of a 20% tax rate to the taxable income, which taxable income is derived through deductions from Earnings Before Interest Tax, Depreciation and Amortisation: Depreciation, PGR, GRR interest and tax.

Working Capital

The LoMps do not include any determinations for working capital movement in respect of debtors, creditors and stores/inventory and furthermore no details in support of the necessary inputs for determination of the working Capital Movement inputs (opening balances and assumed days) for each subsidiary are included herein.

Glossary – Terms

Acid	A pH of less than 7.0.
Acidification	The process by which the target area is subject to injection of fluids by dissolving the uranium bearing and gangue minerals.
Alluvial	Relating to or derived from alluvium. Deposition of sediment over a long period of time by a river; an alluvial layer.
Admission	the admission to trading on the Main Market of the London Stock Exchange.
Advisors	Credit Suisse Securities (Europe) Limited and J.P. Morgan Securities plc.
Aggregated	100%
Agropyron	A genus of Eurasian plants in the grass family), native to Europe and Asia but widely naturalised in North America.
AIX Limited	the stock exchange of the Astana International Financial Centre
Alkaline	A pH greater than 7.
Akdala	A uranium deposit owned by JV SMCC LLP.
All In Sustaining Costs	All direct cash expenditures required to secure the sales volumes and sales revenues as determined and include, mining (net of capitalised costs), processing, general and administration, transportation, treatment charges, refining charges, royalties and by-product credits and in addition other costs necessary to sustain mining operations including capitalised operating costs, sustaining capital, closure costs and working capital movements.
Ammonia Hydroxide	A neutralising compound used for treatment of acidic bearing solutions prior to precipitation.
Ammonium diuranate	The precipitate of uranium $(NH_4)_2U_2O_7$ formed from precipitation of uranium from acidic solutions.
Anticline	A type of fold that is an arch-like shape and has its oldest beds at its core. A typical anticline is convex up in which the hinge or crest is the location where the curvature is greatest, and the limbs are the sides of the fold that dip away from the hinge.
Apatite	A widely occurring pale green to purple mineral, consisting of calcium phosphate with some fluorine, chlorine, and other elements. It is used in the manufacture of fertilizers.
Appak LLP	A Mining Subsidiary in which the Company has a 65% equity interest.
Aquifer	An underground stratum that will yield water in sufficient quantity to be of value as a source of supply. An aquifer is not a stratum that merely contains water, for this would apply to all strata in the ground-water area. An aquifer must yield water.
Aquitard	A zone within the Earth that restricts the flow of groundwater from one aquifer to another. A completely impermeable aquitard is called an aquiclude or aquifuge. Aquitards comprise layers of either clay or non-porous rock with low hydraulic conductivity.
Argillaceous	Rocks in which clay minerals are a secondary but significant component.
Artemesia	A large, diverse genus of plants with between 200 and 400 species belonging to the daisy family Asteraceae.
Artesian	An aquifer is a geologic layer of porous and permeable material such as sand and gravel, limestone, or sandstone, through which water flows and is stored. An artesian aquifer is a confined aquifer containing groundwater under positive pressure.
Assay	To analyse the proportions of metals in an ore; to test an ore or mineral for composition, purity, weight, or other properties of commercial interest.
Asset Retirement Obligation	A legal obligation associated with the retirement of a tangible long-lived asset in which the timing or method of settlement may be conditional on a future event, the occurrence of which may not be within the control of the entity

	burdened by the obligation. The liability equals the present value of the expected cost of retirement/remediation. An asset equal to the initial liability is added to the balance sheet, and depreciated over the life of the asset. The result is an increase in both assets and liabilities, while the total expected cost is recognized over time, with the accrual steadily increasing on a compounded basis.
Associates	Entities over which the Group has, directly or indirectly, significant influence, but not sole or joint control, which is typical for a shareholding of between 20% and 50% of the voting rights. The Group’s investments in associates are accounted for using the equity method of accounting.
Atomic Energy Law	Law of the Republic of Kazakhstan of 12 January 2016 No 442-V On the Use of Atomic Energy.
Authigenic	Authigenesis is the process whereby a mineral or sedimentary rock deposit is generated where it is found or observed. Such deposits are described as authigenic.
Baiken-U LLP	A Mining Subsidiary in which the Company has, subsequent to completion of the Transactions (see Transaction) a 52.50% equity interest.
Barite	A mineral consisting of barium sulphate. Used as a weighting agent for drilling fluids in oil and gas exploration to suppress high formation pressures and prevent blowouts.
Barren solution	In hydrometallurgical treatment from which all possible valuable constituents have been removed; it is usually recycled back to plant for reuse in the process.
Base Case	The base case spot market uranium price forecast as provided by Ux Consulting Company.
Basement	Any rock below sedimentary rocks or sedimentary basins that are metamorphic or igneous in origin.
Basin	A general region with an overall history of subsidence and thick sedimentary section.
Bedding	The arrangement of a sedimentary rock in beds or layers of varying thickness and character; the general physical and structural character or pattern of the beds and their contacts within a rock mass, such as cross-bedding and graded bedding; a collective term denoting the existence of beds.
Bentonite	An absorbent aluminium phyllosilicate clay consisting mostly of montmorillonite. The main uses of bentonite are for drilling mud, binder, purifier, absorbent, and as a groundwater barrier.
Beryllium	A chemical element in the periodic table that has the symbol Be and atomic number 4. A toxic bivalent element, beryllium is a steel grey, strong, light-weight yet brittle, alkaline earth metal, that is primarily used as a hardening agent in alloys (most notably, beryllium copper).
Biogenic	A product made by or of life forms. The term encompasses constituents, secretions, and metabolites of plants or animals. In context of molecular biology, biogenic substances are referred to as biomolecules.
Block 1 Budenovskoye	A uranium deposit owned by JV Akbastau JSC.
Block 2, Budenovskoye	A uranium deposit owned by JV Akbastau JSC.
Block 3, Budenovskoye	A uranium deposit owned by JV Akbastau JSC.
Block 4, Budenovskoye	A uranium deposit owned by Karatau LLP.
Block 6, Budenovskoye	A uranium deposit owned by Budenovskoye LLP.
Block 7, Budenovskoye	A uranium deposit owned by Budenovskoye LLP.
Block 2 Inkai	A uranium deposit owned by the Company.
Block 3 Inkai	A uranium deposit owned by the Company.
Block 4, Inkai	A uranium deposit owned by JV SMCC LLP.
Block Kharassan 1, North Kharassan	

	A uranium deposit owned by JV Khorassan LLP.
Block Kharassan 2, North Kharassan	
	A uranium deposit owned by Baiken LLP.
Block 1 Inkai (a), (b) and (c)	
	The uranium deposits owned by JV Inkai LLP.
Breccia	Rock consisting of angular fragments of stones cemented by finer calcareous material.
Budenovskoye LLP	A Mining Subsidiary in which the Company has, subsequent to completion of the Transactions (see Transaction) a 51.00% equity interest.
C1 Cash Cost	All direct cash expenditures required to secure the sales volumes and sales revenues as determined and include, mining (net of capitalised costs), processing, general and administration, transportation, treatment charges, refining charges, royalties and by-product credits.
Cadmium	A soft, bluish-white metal, similar in many respects to zinc, copper, and lead ores. Almost all cadmium is obtained as a by-product in the treatment of these ores. Symbol, Cd.
Calcareous	Containing calcium carbonate.
Calcination	A thermal treatment process in the absence or limited supply of air or oxygen applied to ores and other solid materials to bring about a thermal decomposition.
Calcite	A rock-forming mineral with a chemical formula of $CaCO_3$. It is extremely common and found throughout the world in sedimentary, metamorphic, and igneous rocks.
Calcium	A chemical element with symbol Ca and atomic number 20. The largest use of calcium is in steelmaking, due to its strong chemical affinity for oxygen and sulphur.
Caledonian	An orogeny encompasses events that occurred from the Ordovician to Early Devonian, roughly 490Ma to 390Ma.
Caliper Log	A well logging tool that provides a continuous measurement of the size and shape of a borehole along its depth.
Calligonum	A genus of plants in the family Polygonaceae with about 80 species across the Mediterranean Sea region, Asia and North America.
Capital Expenditure	An amount spent to acquire or upgrade productive assets (such as buildings, machinery and equipment, vehicles) in order to increase the capacity or efficiency of a company for more than one accounting period: initial capital expenditure is normally referred to as project capital; capital expenditure associated with subsequent non-recurring activities are defined as deferred capital; and capital expenditure associated with recurring activities (periodic maintenance, tailings dam lifts) are defined as sustaining capital.
Cameco	Cameco Corporation.
Campanian	The fifth of six ages of the Late Cretaceous epoch which spans the time from 84Ma to 72Ma.
Carbon	A non-metallic element, found free in nature in three allotropic forms: amorphous, graphite, and diamond. A fourth form, known as "white" carbon, is now thought to exist. Symbol, C.
Carbonate	A compound containing the acid radical CO_3 of carbonic acid. Bases react with carbonic acid to form carbonates.
Carbonaceous	Rocks or sediments consisting of or containing carbon or its compounds.
Carnotite	A potassium uranium vanadate radioactive mineral. A bright to greenish yellow mineral that occurs typically as crusts and flakes in sandstones.
Caustic Magnesia	A highly reactive form of magnesium oxide produced by calcining or burning crude magnesite at relatively low temperatures.
Caustic Soda	See Sodium Hydroxide.
Cation	A positively charged ion, i.e. one that would be attracted to the cathode in

	electrolysis.
Cenomanian	The oldest or earliest age of the Late Cretaceous epoch or the lowest stage of the Upper Cretaceous series.
Cenozoic	The current and most recent of the three Phanerozoic geological eras, following the Mesozoic Era and extending from 66Ma to the present day.
Central Moinkum	A uranium deposit owned by Kazatomprom-SaUran LLP.
Central Mynkuduk	A uranium deposit owned by Ortalyk LLP.
C1 (exc MET)	C1 cash costs excluding Mineral Extraction Tax.
China	Peoples’ Republic of China.
Chloride	A compound of chlorine with another element or group, especially a salt of the anion Cl^- or an organic compound with chlorine bonded to an alkyl group.
Clay	A finely-grained natural rock or soil material that combines one or more clay minerals with possible traces of quartz, metal oxides and organic matter.
Coal	A combustible black or brownish-black sedimentary rock usually occurring in rock strata in layers or veins called coal beds or coal seams.
Cobalt	A chemical element with symbol Co and atomic number 27 primarily used in the manufacture of magnetic, wear-resistant and high-strength alloys.
Coffinite	A uranium-bearing silicate mineral.
Collophane	A variety of Carbonate-rich Apatite. A name used for the massive, cryptocrystalline, colloidal (amorphous) varieties of Carbonate-rich Fluorapatite or Carbonate-rich Hydroxylapatite, such as those that constitute the bulk of phosphate rock and fossil bone.
Company	Joint Stock Company National Atomic Company Kazatomprom.
Competent Authority	Ministry of Energy of the Kazakhstan.
Competent Person	A minerals industry professional who is a Member or Fellow of The Australasian Institute of Mining and Metallurgy, or of the Australian Institute of Geoscientists, or of a ‘Recognised Professional Organisation’, as included in a list available on the JORC and ASX websites. These organisations have enforceable disciplinary processes including the powers to suspend or expel a member.
Commercial Code	№ 375-V of 29th October 2015, with amendments as of 03.07.2017.
Conglomerate	A coarse-grained clastic sedimentary rock, composed of rounded to sub-angular fragments larger than 2mm in diameter (granules, pebbles, cobbles, boulders) set in a fine-grained matrix of sand or silt, and commonly cemented by calcium carbonate, iron oxide, silica, or hardened clay; the consolidated equivalent of gravel.
Coniacian	A subdivision of the Late Cretaceous epoch or Upper Cretaceous series and spans the time between 90Ma and 86Ma.
Conceptual Closure Plan	Mine closure planning involves planning effectively for the after-mining landscape – all activities required before, during, and after the operating life of a mine that are needed to produce an acceptable landscape economically. The most important benefit of closure planning is identification of critical activities to achieve successful reclamation. Closure planning usually identifies areas of needed research. It also identifies planning constraints (and sometimes opportunities) especially identifying safe methods and locations for tailings storage. These plans provide some assurance that the mine is not “painting itself into a corner” and provide a starting basis to estimate financial assurance levels – important to both mines and regulators. It also forms a base case against which future planning changes can be compared. Much of this work falls under the concept of “design for closure” introduced 30 years ago.
Constitution	The Constitution of the Republic of Kazakhstan (adopted at the republican referendum on August 30, 1995) (with amendments and additions as of March 10, 2017.

Consumer Price Index	A measure of changes in the price level of market basket of consumer goods and services purchased by households. The CPI is a statistical estimate constructed using the prices of a sample of representative items whose prices are collected periodically.
Consumer Price Inflation	Consumer Price Index reflected as a percentage change between stated timelines, monthly, annual (end of period, average).
Copper	A reddish metallic element that takes on a bright metallic luster and is malleable, ductile, and a good conductor of heat and electricity. Symbol, Cu.
Core Recovery	The amount of the drilled rock withdrawn as core in core drilling, generally expressed as a percentage of the total length of the interval cored.
Cretaceous	A geologic period and system that spans 79Ma from the end of the Jurassic Period 145Ma to the beginning of the Paleogene Period 66Ma. A relatively warm climate, resulting in high eustatic sea levels that created numerous shallow inland seas.
C or crescent shaped deposits	Roll-front deposits that transect the host lithology.
Cut-off-Grade	The lowest grade of mineralised material that qualifies as ore in a given deposit; rock of the lowest assay included in an ore estimate.
Danian	The oldest age or lowest stage of the Paleocene epoch or series, the Paleogene period or system and the Cenozoic era or erathem.
Desorption	A process opposite to sorption, and involves the treatment of saturated sorbent with chemical solutions and the conversion of uranium ions into a solution known as rich eluate.
Devonian	A geologic period and system of the Palaeozoic, spanning 60Ma from the end of the Silurian, 419Ma, to the beginning of the Carboniferous, 359Ma.
Diabase	A dark-coloured igneous rock. It is compositionally equivalent to gabbro and basalt but texturally between them. Diabase is a common rock type. It occurs mostly in shallow intrusions (dikes and sills) of basaltic composition.
di-2-ethylhexyl phosphoric acid	A diester of phosphoric acid and 2-ethylhexanol used in the solvent extraction of uranium, as well as the rare-earth metals.
Diorite	A speckled, coarse-grained igneous rock consisting essentially of plagioclase, feldspar, and hornblende or other mafic minerals.
Dip	The angle at which a planar feature is inclined to the horizontal plane.
Direct Negotiations Protocol	A provision under Subsoil Law which governs direct negotiations.
Disequilibrium	When a solute is more concentrated in one of the two body compartments than the other.
Diuranate	A form of uranium oxide.
3D modelling	The process of three dimensional geological modelling of mineral deposits and the surrounding rock mass.
Drill rig	A drill machine complete with all tools and accessory equipment needed to drill boreholes.
Drill Slimes	a slurry inclusive of fine particles produced as part of the well drilling process.
Eastern Mynkuduk	A uranium deposit owned by Kazatomprom-SaUran LLP.
Effective Date	31 December 2018.
Energy Asia Limited	A consortium made of six Japanese power companies which subsequent to the transactions (see Transactions) has a 47.50% equity interest in Baiken-U LLP.
Environmental Code	Law No 212-III, January 2007, as amended.
Environmental Emissions Permit	A permit required “According to Article 109”.
Environmental and Social Impact Assessment	

	A process for predicting and assessing the potential environmental and social impacts of a proposed project, evaluating alternatives and designing appropriate mitigation, management and monitoring measures.
Environmental and Social Management Systems	
	A set of policies, procedures, tools and internal capacity to identify and manage a financial institution's exposure to the environmental and social risks of its clients/investees.
Environmental and Social Liabilities	
	All bio-physical and social liabilities relating to the closure of a mining and processing operation which inter alia may include physical remediation and retrenchment expenditures as well as post closure monitoring expenditures.
Eocene	Epoch, lasting from 56Ma to 3Ma, is a major division of the geologic timescale and the second epoch of the Paleogene Period in the Cenozoic Era.
Ephemeral stream	A stream that flows only briefly during and following a period of rainfall in the immediate locality.
Epigenetic	Formed later than the surrounding or underlying rock formation.
Equity Investment	Entities in which the Group has less than 20% of the voting rights. Equity investments are recognised at fair value as other investments in the Company's consolidated International Financial Reporting Standards financial statements.
Exploration Programme	The Exploration Programme for the Development Property, the Advanced Exploration Property and the Exploration Properties of the Company comprising annual schedules of activities and expenditures not included in the Life-of-Mine plans for the Mineral Assets.
Exploration Work Programme	
	The exploration programme of schedules activities required to be submitted for initial application of an exploration licence.
Extraction Well	A borehole equipped with submersible pumps for extracting the leached solution from the underground environment.
Feldspar	A group of rock-forming tectosilicate minerals that make up about 41% of the Earth's continental crust by weight. Feldspars crystallize from magma as veins in both intrusive and extrusive igneous rocks and are also present in many types of metamorphic rock.
Festuca	A genus of flowering plants belonging to the grass family, Poaceae (subfamily Pooideae). They are evergreen or herbaceous perennial tufted grasses.
Filtration	Removal of suspended and/or colloidal material from a liquid by passing the suspension through a relatively fine porous medium, e.g., a canvas or other fabric diaphragm; the process is activated by suction or pressure, and commonly includes filter aids. The products are clear liquid and a filter cake.
Fold	A curve or bend of a planar structure such as rock strata, bedding planes, foliation, or cleavage. A fold is usually a product of deformation, although its definition is descriptive and not genetic and may include primary structures.
Forest Use Code	Law № 477-II 08 July 2003, as amended.
Form 2-TP	A statistical report on air and water management reported to the regulatory authorities in Kazakhstan.
Form 4-OS	A report on the environmental protection costs reported to the regulatory authorities in Kazakhstan.
Fuel pellets	The fuel used by nuclear power stations for the generation of electricity.
Gabbro	A phaneritic (coarse-grained), mafic intrusive igneous rock formed from the slow cooling of magnesium-rich and iron-rich magma into a holocrystalline mass deep beneath the Earth's surface.
Gamma logging	A method of measuring naturally occurring gamma radiation to characterize the rock or sediment in a borehole or drill hole.
Gamma Radioactivity/Gamma-Ray	

	A penetrating electromagnetic radiation arising from the radioactive decay of atomic nuclei. It consists of photons in the highest observed range of photon energy.
Geochemical	Compounds that make up the earth, its atmosphere, and its seas.
Geochemistry	The study of the relative and absolute abundances of the elements and their nuclides (isotopes) in the Earth; the distribution and migration of the individual elements or suites of elements in the various parts of the Earth (the atmosphere, hydrosphere, lithosphere, etc.), and in minerals and rocks, and also the study of principles governing this distribution and migration. Geochemistry may be defined very broadly to include all parts of geology that involve chemical changes, or it may be focused more narrowly on the distribution of the elements.
Geology Committee	The Ministry of Investment and Development also supervises the mining industry through its sub-ordinate Committee on Geology and Subsoil Use.
Geosyncline	A large-scale depression in the earth's crust containing very thick deposits.
GKZ System	The State Commission of Kazakhstan on Mineral Reserves.
GKZ System Statements	The 'reserve' statements for the Mineral Assets dated 1 January 2018 and published in compliance with the GKZ system.
Global Offering	Offering of the ordinary shares of the Company on the AIX Limited being the stock exchange of the Astana International Financial Centre; and global depositary receipts on the Main Market of the London Stock Exchange, market operated by the London Stock Exchange Group plc.
Gold	A chemical element with symbol Au and atomic number 79.
8GR	An annual form submitted by Sub Soil Users to report on the declaration of 'reserves' in accordance with the GKZ System.
Graben	An elongate, relatively depressed crustal unit or block that is bounded by faults on its long sides. It is a structural form that may or may not be geomorphologically expressed as a rift valley.
Grade	The relative quantity or the percentage of ore-mineral or metal content in an orebody.
Granite	A common type of felsic intrusive igneous rock that is granular and phaneritic in texture.
Granosyenites	A term for a syenitic rock closer to granitic composition.
Grid power	Power supplied by an electrical grid is an interconnected network for delivering electricity from producers to consumers. It consists of generating stations that produce electrical power, high voltage transmission lines that carry power from distant sources to demand centres, and distribution lines that connect individual customers.
Groundwater	Water that collects or flows beneath the Earth's surface, filling the porous spaces in soil, sediment, and rocks. Groundwater originates from rain and from melting snow and ice and is the source of water for aquifers, springs, and wells. The upper surface of groundwater is the water table.
Group	the Company together with its subsidiaries.
Group A personnel	A category of employees employed by the Company.
Gypsum	A soft sulphate mineral composed of calcium sulphate dihydrate.
Haloxylon persicum	A small tree belonging to the family Amaranthaceae.
Hangingwall	The overlying side of an orebody, fault, or mine working, especially the wall rock above an inclined vein or fault.
Hexagonal configuration	Wellfield design engaged at certain of the Company's operations.
Hexavalent	Having a valency of six where a compound is noted to be in a +6 oxidation state.
Horst	A raised fault block bounded by normal faults. A horst is a raised block of the Earth's crust that has lifted, or has remained stationary, while the land on

	either side (graben) has subsided.
Hydraulic conductivity	A property of soils and rocks, that describes the ease with which a fluid (usually water) can move through pore spaces or fractures.
Hydrocarbon	A organic compound consisting entirely of hydrogen and carbon.
Hydrochemical facies	A term used in this paper to denote the diagnostic chemical aspect of ground-water solutions occurring in hydrologic systems.
Hydrofluoric acid	A solution of hydrogen fluoride in water used to convert UO_2 to refined uranium products.
Hydrogenous	Of or containing hydrogen.
Hydrogen peroxide	A chemical compound with the formula H_2O_2 used to aid the precipitation of uranium from solution to produce yellow cake.
Hydrogen sulphide	A chemical compound with the formula H_2S which is a colourless chalcogen hydride gas.
Hydrogeology	Branch of geology that deals with the distribution and movement of groundwater in the soil and rocks.
Hydrogeological characterisation	The process by which a hydrogeological system/domain is characterised in respect of physical properties governing the flow of water.
Hydrology	The branch of science concerned with the properties of the earth's water, and especially its movement in relation to land.
IAEA Safety Standards	The fundamental principles, requirements and recommendations to ensure nuclear safety.
IAEA Security Series	International consensus guidance on all aspects of nuclear security.
IAEA TECDOC handbook.	Handbook on the Physical Protection of Nuclear Materials and Facilities Restricted.
Igneous	Formed through the cooling and solidification of magma or lava.
Injection Well	A borehole in which fluid is placed deep underground into porous rock formations, such as sandstone or limestone, or into or below the shallow soil layer. The fluid may be water, wastewater, brine (salt water), or water mixed with chemicals.
Ion exchange	An exchange of ions between two electrolytes or between an electrolyte solution and a complex. In most cases the term is used to denote the processes of purification, separation, and decontamination of aqueous and other ion-containing solutions with solid polymeric or mineralic ion exchangers.
In-situ	Ore or waste material in its original unmined state.
In-situ Leaching	Also called “solution mining.” The process initially involves drilling of holes into the ore deposit and pumping of a leaching solution into the deposit where it makes contact with the ore. The solution is then collected and further processed and refined to produce a saleable product.
In-Situ Leach Recovery	See In-situ Leaching.
Intercalations	A special form of inter-bedding, where two distinct depositional environments in close spatial proximity migrate back and forth across the border zone.
Ion	An atom or molecule with a net electric charge due to the loss or gain of one or more electrons.
Ionizing radiation	Radiation consisting of particles, X-rays, or gamma rays with sufficient energy to cause ionization in the medium through which it passes.
Irkol	A uranium deposit owned by Semizbai-U LLP.
Iron	A chemical element with symbol Fe and atomic number 26.
ISO 14001	The international standard that specifies requirements for an effective environmental management system.
ISO 5001	The international standard that specifies requirements for a energy

	management system.
ISO 9001	The international standard that specifies requirements for a quality management system.
Joint Operation	Entities in respect of which the Group has joint control and has rights to their assets, and revenues and has obligations relating to their expenses as well as financial obligations in proportion to the Group's holding share therein. The Group's joint operations, being JV Akbastau JSC and Karatau LLP, are consolidated as joint operations since 1 January 2018.
Joint Stock Company	A business entity in which shares of the company's stock can be bought and sold by shareholders. Each shareholder owns company stock in proportion, evidenced by their shares.
Joint Venture	Entities that are under the joint control of the Group acting collectively with other parties, and decisions over the relevant activities of such entity require unanimous consent of all parties sharing control. The Group's interests in joint ventures are accounted for using the equity method.
JORC Code	The Mineral Resource statements included in this CPR are reported in accordance with the 2012 Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves as published by the Joint Ore Reserves Committee of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia.
JSC Sovereign Wealth Fund Samruk-Kazyna	A sovereign wealth fund and joint stock company in Kazakhstan which owns, either in whole or in part, a number of major companies in the country. This includes the national rail and postal service, the state oil and gas company KazMunayGas, the state uranium company Kazatomprom, Air Astana, and numerous financial groups. The state is the sole shareholder of the fund.
Jurassic	The second period of the Mesozoic Era, thought to have covered the span of time between 190Ma and 135Ma.
JV Akbastau JSC	A Mining Subsidiary in which the Company has a 50.00% equity interest.
JV Baiken-U LLP	A Mining Subsidiary in which the Company has a 52.50% equity interest.
JV Companies	JV SMCC LLP; Semizbai-U LLP; Appak LLP; JV Inkai LLP; JV Khorassan-U LLP; Baiken-U LLP; JV Zarechnoye JSC; JV Katco LLP; Karatau LLP; JV Akbastau JSC.
JV Inkai LLP	A Mining Subsidiary in which the Company has a 60.00% equity interest.
JV Katco LLP	A Mining Subsidiary in which the Company has a 49.00% equity interest.
JV Khorassan-U LLP	A Mining Subsidiary in which the Company has a 50.00% equity interest.
JV SMCC LLP	A Mining Subsidiary in which the Company has a 30.00% equity interest.
JV Zarechnoye JSC	A Mining Subsidiary in which the Company has a 49.98% equity interest.
Kanzhugan	A uranium deposit owned by Kazatomprom-SaUran LLP.
Kaolinite	A clay mineral, with a soft consistency and earthy texture. It is easily broken and can be moulded or shaped, especially when wet.
KAP Agreement	The contractual agreement between SRK and the Company governing the authoring of the CPR.
KAP 20 Project	A company wide project on Complex Safety, which focuses on radiation protection, occupational health and safety and environmental management.
Karatau LLP	A Mining Subsidiary in which the Company has a 49.98% equity interest.
Karst	A topography formed from the dissolution of soluble rocks such as limestone, dolomite, and gypsum. It is characterized by underground drainage systems with sinkholes and caves.
Kazatomprom-SaUran LLP	A Mining Subsidiary in which the Company has a 100.00% equity interest.
Kochia prostrata	A Eurasian plant in the subfamily Camphorosmoideae of the family Amaranthaceae (formerly treated as Chenopodiaceae).

Kyzylkum LLP	A subsidiary entity in which the Company holds a 30% interest, which undertakes mining and processing on behalf of JV Khorassan-U LLP.
Labour Use Code	The Labour Code of the Republic of Kazakhstan of November 23, 2015 No. 414-V (as amended and supplemented as of June 13, 2017).
Lacustrine	Relating to or associated with lakes. Lacustrine deposits are sedimentary rock formations which formed in the bottom of ancient lakes.
Land Code	Law No 442 II ZPK, 20 June 2003, amended 29 June 2018.
Land Code	Law No 442 II ZPK, 2003, amended 29 June 2018.
Law on Civil Protection	Law of the Republic of Kazakhstan of April 11, 2014 No. 188-V On Civil Protection (as amended and supplemented as of June 13, 2017).
Leaching	A process where ore is soluble and impurities are insoluble, widely used extractive metallurgy technique which converts metals into soluble salts in aqueous media.
Leach liquor	The solution containing the metal ions to be recovered and certain undesirable metal ions which require removal.
Lead	A chemical element with symbol Pb and atomic number 82.
Lignite	Often referred to as brown coal, is a soft, brown, combustible, sedimentary rock formed from naturally compressed peat. It is considered the lowest rank of coal due to its relatively low heat content. It has a carbon content around 60% to 70%.
Life-of-mine	The time in which, through the employment of the available capital, the Ore Reserves-or such reasonable extension of the ore reserves as conservative geological analysis may justify-will be extracted.
Life-of-mine plan	The production plan which provides physical details in monthly, quarterly or annual time increments in respect of mined waste and ore through to processed material, recovered saleable products and waste materials from a processing facility. The duration of the plan typically reflects the Life-or-Mine, and normally limited to depletion of ‘Ore Reserves’.
Limestone	A sedimentary rock consisting chiefly (more than 50% by weight or by areal percentages under the microscope) of calcium carbonate, primarily in the form of the mineral calcite, and with or without magnesium carbonate; specif. a carbonate sedimentary rock containing more than 95% calcite and less than 5% dolomite.
Liquidation Fund	The fund established for financing of environmental liabilities, specifically bio-physical closure costs.
Lixiviant	A liquid medium used in hydrometallurgy to selectively extract the desired metal from the ore or mineral. It assists in rapid and complete leaching. The metal can be recovered from it in a concentrated form after leaching.
Loaded Resin	Resin loaded with uranium in the ion exchange separation of uranium from Alkaline Leachate.
Loam	Soil whose mineral composition is about 40%: 40%: 20% concentration of sand-silt-clay, respectively.
Maastricht	A geological formation whose strata date back to Late Cretaceous 66Ma.
Magnesium	A chemical element with symbol Mg and atomic number 12. Magnesium is used in super-strong, lightweight materials and alloys.
Main Market	The market operated by the London Stock Exchange Group plc.
Marble	A metamorphic rock composed of recrystallized carbonate minerals, most commonly calcite or dolomite.
Marlstone	A calcium carbonate or lime-rich mud or mudstone which contains variable amounts of clays and silt.
Marubeni Corporation	A joint venture partner which holds an equity interest in JV Khorassan-U LLP.
Mercury	A chemical element with symbol Hg and atomic number 80.

Mesozoic	An interval of geological time from about 252Ma to 66Ma. It is also called the Age of Reptiles.
Metallogenic	Geographic area characterized by a particular assemblage of mineral deposits, or by a distinctive style of mineralization.
Metamorphite	Rocks subjected to a change of minerals or geologic texture in pre-existing rocks (protoliths), without the protolith melting into liquid magma. The change occurs primarily due to heat, pressure, and the introduction of chemically active fluids.
Metasomite	Rocks which have been subject to chemical alteration by hydrothermal and other fluids.
Mineral Assets	The entire suite of producing properties, development properties, advanced exploration properties and exploration properties comprising deposits and all related production facilities (mining, processing, infrastructure).
Mineral Extraction Tax	In accordance with the relevant taxation codes of Kazakhstan, Mineral Extraction Tax ("**MET**") is form of 'mineral royalty' determined by application of 29% tax charge to the taxable expenditures. The tax charge is a cash cost of mining and is based on an assumed 20% profit margin on certain expenditures and a MET rate of 18.50% and where the tax charge of 29% is determined by the following formulae: (1+20%)*18.5%/(1-(1+20%)*18.5%). The taxable expenditures comprise all direct expenditures associated with the mining operations and specifically exclude (processing and G&A) but include the period PGR charge and any other depreciation charges attributable to direct mining activities.
Mining Contracts	The Subsoil Use Contracts which govern the exploration, development and production for and of uranium for each of the Mineral Assets.
Mining Subsidiaries	The 14 Mining Subsidiaries which own the Mineral Assets and including: Kazatomprom-SaUran LLP (100,00%); Ortalyk LLP (100.00%); RU-6 LLP (100.00%); Appak LLP (65.00%); JV Inkai LLP (60.00%); Semizbai-U LLP (51.00%); JV Akbastau JSC (50.00%); Karatau LLP (50.00%); JV Zarechnoye JSC (49.98%); JV Katco LLP (49.00%); JV Khorassan-U LLP (50.00%); JV SMCC LLP (30.00%); Baiken-U LLP (52.50%); and Budenovskoye LLP (51.00%).
Miocene	The first geological epoch of the Neogene Period and extends from about 23Ma to 5.3Ma.
Molasse	Sandstones, shales and conglomerates that form as terrestrial or shallow marine deposits in front of rising mountain chains.
Molybdenum	A silvery-white, very hard, metallic element. Symbol, Mo. Valuable as an alloying agent with steel and nickel. Used for electrodes in electrically heated glass furnaces, in nuclear energy applications, and for missile and aircraft parts.
Monitoring wells	A small diameter drilled into the ground, which are used for level monitoring of groundwater and water quality analysis.
Mud Rotary Drilling	One of the main methods of well drilling for water and oil in areas that contain unconsolidated formations. In mud rotary drilling, fluid is pumped down the hollow drill pipe, called the kelly, and forced out of jets in the drill bit.
Namibia	Republic of Namibia.
Neogene	A geologic period and system that spans 21Ma from the end of the Paleogene Period 23Ma to the beginning of the present Quaternary Period 2.6Ma.
Nitrate	A polyatomic ion with the molecular formula NO^{-}_{2}.
Nominal Terms	Expenditures or revenues expressed in nominal terms are unadjusted from the date in which they are recorded, specifically they will include inflationary aspects as determined form a specified reference date.
Northern Karamurun	A uranium deposit owned by RU-6 LLP.
North Kazakhstan Province	An administrative division of the Republic of Kazakhstan.

Niobium	Formerly known as columbium, is a chemical element with symbol Nb (formerly Cb) and atomic number 41. Niobium is used mostly in alloys, the largest part in special steel such as that used in gas pipelines.
Oligocene	A geologic epoch of the Paleogene Period and extends from about 34Ma to 23Ma before the present.
Operating Expenditure	An operating expense, operating expenditure, operational expense, operational expenditure or opex is an ongoing cost for running a product, business, or system.
Orano	Orano S.A.
Ordovician	A geologic period and system, the second of six periods of the Paleozoic Era. The Ordovician spans 41Ma from the end of the Cambrian Period 485Ma to the start of the Silurian Period 444Ma.
Orogenic	An orogen or orogenic belt develops when a continental plate crumples and is pushed upwards to form one or more mountain ranges; this involves a series of geological processes collectively called orogenesis. Orogeny is the primary mechanism by which mountains are built on continents.
Ortalyk LLP	A Mining Subsidiary in which the Company has a 100.00% equity interest.
OSHAS 18001	Occupational Health and Safety Assessment Series, (officially BS OHSAS 18001) is a British Standard for occupational health and safety management systems.
Other Segment	One of the three structural divisions/segments of the Company comprising services and marketing activities.
Outcrop	The part of a rock formation that appears at the surface of the ground.
Oxidant	An oxidizing agent (oxidant, oxidizer) is a substance that has the ability to oxidize other substances, in other words to cause them to lose electrons. Common oxidizing agents are oxygen, hydrogen peroxide and the halogens.
Palaeocene	A geological epoch that lasted from about 66Ma to 56Ma.
Paleogene	Relating to or denoting the earlier division of the Tertiary period, comprising the Palaeocene, Eocene, and Oligocene epochs.
Palaeoproterozoic	The first era of the Proterozoic eon. It came after the Archaean eon, and lasted from 2,500Ma to 1,600Ma.
Permian	A geologic period and system which spans 47Ma from the end of the Carboniferous Period 299Ma, to the beginning of the Triassic period 252Ma.
Permits and Notifications Law	Law of the Republic of Kazakhstan No 219-I of April 23, 1998 On Radiation Safety of the Population.
Phosphate	A non-detrital sedimentary rock which contains high amounts of phosphate minerals.
Phragmites	A genus of four species of large perennial grasses found in wetlands throughout temperate and tropical regions of the world.
Piper Plot	A graphical representation of the chemistry of a water sample or samples.
Pliocene	The epoch in the geologic timescale that extends from 5.3Ma to 2.Ma. It is the second and youngest epoch of the Neogene Period in the Cenozoic Era.
Polymetallic	An ore that is the source of more than one metal suitable for recovery.
Polymictic	Holomictic lakes that are too shallow to develop thermal stratification; thus, their waters can mix from top to bottom throughout the ice-free period.
Porphyry	A textural term for an igneous rock consisting of large-grained crystals such as feldspar or quartz dispersed in a fine-grained silicate rich, generally aphanitic matrix or groundmass.
Potable	Water that is safe to drink or to use for food preparation, without risk of health problems.
Precipitate	The solids resulting from the precipitation process.
Precipitation	The action or process of precipitating a substance from a solution.

Preg robbing	Ores containing carbonaceous material which can inhibit the leaching efficiency of target minerals/metals.
Process slimes	The residual sludge or waste derived from the processing of uranium bearing solutions.
Project for Appraisal Works	A document governing the schedule of works required to advance a exploration property to the next development stage.
Proluvial	Loose formations that are the products of rock fragmentation and that are carried by streams of water to the foot of highlands.
Prompt-fission neutron logging	A means of measuring epithermal and thermal data to derive assays of uranium concentration. A probe inserted into a borehole uses a small D-T accelerator to send out a burst of 14 MeV neutrons into the formation around the borehole, and it then detects prompt epithermal neutrons returning from thermal fissioning of 235U in the formation.
Property Tax	In accordance with the relevant taxation codes of Kazakhstan, Property Tax (“**PT**”) is a tax charge derived from application of a rate of 1.50% to the average of the opening and closing balances of PGR determined in the period. The property tax as determined is then apportioned in a ratio of 40% to the mining costs and 60% to the processing costs.
Proterozoic	A geological eon spanning the time from the appearance of oxygen in Earth’s atmosphere to just before the proliferation of complex life (such as trilobites or corals) on the Earth. The Proterozoic Eon extended from 2.5Ga to 541Ma.
Publication Date	15 February 2019.
Pyrite	The mineral pyrite, or iron pyrite, also known as fool's gold, is an iron sulphide with the chemical formula FeS_2. Pyrite is considered the most common of the sulphide minerals.
Quaternary	The current and most recent of the three periods of the Cenozoic Era and follows the Neogene Period and spans from 2.6Ma to the present.
Radiation Safety Law	Law of the Republic of Kazakhstan No 219-I of April 23, 1998 On Radiation Safety of the Population.
Radioecological surveys	Radioecology is the branch of ecology concerning the presence of radioactivity in Earth’s ecosystems. Investigations in radioecology include field sampling, experimental field and laboratory procedures, and the development of environmentally predictive simulation models, all in an attempt to understand the migration methods of radioactive material throughout the environment.
Radionuclides	An atom that has excess nuclear energy, making it unstable and subject to radioactive decay through emissions defined as ionising radiation.
Rare earth elements	Any of a group of chemically similar metallic elements comprising the lanthanide series and (usually) scandium and yttrium. They are not especially rare, but they tend to occur together in nature and are difficult to separate from one another.
Real terms	Values which has been adjusted to remove the impact of inflation, e.g. where nominal values have been adjusted to determine values which are base dated to a specific date.
Receptor	Environmental and Social Receptors which are impacted by the mining and processing operations.
Recipients	The recipients of this CPR.
Red Book	A recognised world reference on uranium jointly prepared by the Nuclear Energy Agency and the International Atomic Energy Agency (latest edition “Uranium 2016: Resources, Production and Demand”).
Resistivity	Electrical resistivity is an intrinsic property of a material that is measured as its resistance to current per unit length for a uniform cross section.
Retrenchment	The action of making an employee redundant.

Rhenium	A chemical element with symbol Re and atomic number 75. Nickel-based superalloys of rhenium are used in the combustion chambers, turbine blades, and exhaust nozzles of jet engines.
Rich Eluate	A uranium bearing solution formed by the treatment of saturated sorbent with chemical solutions and the conversion of uranium ions into a solution.
Riverine	Relating to or situated on a river or riverbank.
Roll front	Roll-front uranium deposits are generally hosted within permeable and porous sandstones or conglomerates. The mechanism for deposit formation is dissolution of uranium from the formation or nearby strata and the transport of this soluble uranium into the host unit. When the fluids change redox state, generally in contact with carbon-rich organic matter, uranium precipitates to form a ‘front’.
RosAtom	Rosatom State Nuclear Energy Corporation.
Row Configuration	Wellfield design engaged at certain of the Company’s operations.
RU-6 LLP	A Mining Subsidiary in which the Company has a 100.00% equity interest.
Russia	Russian Federation.
Samruk-Kazyna Trust	The incorporated entity through which the Company’s charitable activities are enacted.
Sandstone	A clastic sedimentary rock composed mainly of sand-sized (0.0625mm to 2mm) mineral particles or rock fragments.
Santonian	A subdivision of the Late Cretaceous epoch or Upper Cretaceous series. It spans the time between 86Ma and 84Ma.
Scrubbing	The process of removing air polluting gasses and/or particulates from industrial exhaust systems.
Sedimentary	Rock that has formed from sediment deposited by water or air.
Selenium	A chemical element with symbol Se and atomic number 34. Commercial uses for selenium today are glassmaking and pigments and as a semiconductor is also used in photocells.
Self Potential	A naturally occurring electric potential difference in the Earth, measured by an electrode relative to a fixed reference electrode.
Semizbai	A uranium deposit which is owned by Semizbai-U LLP.
Semizbai-U LLP	A Mining Subsidiary in which the Company has a 100.00% equity interest.
Shale	A fine-grained sedimentary rock that forms from the compaction of silt and clay-size mineral particles that we commonly call “mud”.
Shares	The ordinary shares of the Company.
Shu-Sarysu Province	A uranium province located in the Republic of Kazakhstan.
Silicate	Rock-forming minerals with predominantly silicate anions. They are the largest and most important class of rock-forming minerals and make up approximately 90% of the Earth's crust.
Siliceous	Sedimentary rocks that have silica (SiO_2) as the principal constituent.
Siltstone	A sedimentary rock which has a grain size in the silt range, finer than sandstone and coarser than claystones.
Silver	A precious shiny greyish-white metal, the chemical element of atomic number 47.
Sodium Chloride	Also known as salt, is an ionic compound with the chemical formula NaCl,
Sodium Diuranate	A uranium salt also known as the yellow oxide of uranium.
Sorption	A physical and chemical process by which one substance becomes attached to another.
South Africa	Republic of South Africa.
Southern Karamurun	A uranium deposit owned by RU-6.
Southern Moinkum (Northern Part)	A uranium deposit owned by JV Katco LLP.

South Moinkum (Southern Part)	
	A uranium deposit owned by Kazatomprom-SaUran LLP.
Spot Market	A public financial market in which financial instruments or commodities are traded for immediate delivery.
State Bodies	Ministry of Environmental Protection of the Kazakhstan and Ministry of Emergency Situations of Kazakhstan.
Steppe	An ecoregion, in the montane grasslands and shrublands and temperate grasslands, savannas and shrublands biomes, characterized by grassland plains without trees apart from those near rivers and lakes.
Strike	The course or bearing of the outcrop of an inclined bed, vein, or fault plane on a level surface; the direction of a horizontal line perpendicular to the direction of the dip.
Subsoil and Subsoil Use Law or “Subsoil Law”	
	The main legislative act governing extractive activities first enacted in 1996; last amendment – May, 2018: №291-IV 24 June 2010, amended 24 May 2018
Subsoil and Subsoil Use Code or “Subsoil Code”	
	№ 156-VI4 June 2018 or Effective 27/12/2017.
Subsoil Use Agreements	
	A legally binding agreement between the duly authorised representative of the Government of Kazakhstan and the Subsoil User (see below) which has been granted rights for the exploration and/or production of minerals.
Subsoil User	Legally incorporated entities which have been granted rights for the exploration and/or production of minerals.
Subsidiary	Entities that the Group controls by having (i) the power to direct their relevant activities that significantly affect their returns, (ii) exposure, or rights, to variable returns from its involvement with these entities, and (iii) the ability to use its power over these entities to affect the amount of the Group’s returns. The existence and effect of substantive rights, including substantive potential voting rights, are considered when assessing whether the Group has power over another entity.
Sulphur	The chemical element of atomic number 16, a yellow combustible non-metal. that occurs widely in nature, especially in volcanic deposits, minerals, natural gas, and petroleum. It is used to make gunpowder and fertilizer, to vulcanize rubber, and to produce sulfuric acid.
Syenite	A coarse-grained grey igneous rock composed mainly of alkali feldspar and ferromagnesian minerals such as hornblende.
Synsedimentary	A fault or fold that forms or grows within a sediment during sedimentation.
Syrdarya Province	A uranium province located in Kazakhstan.
Tamarix	Species of flowering plants in the family Tamaricaceae, native to drier areas of Eurasia and Africa.
Tantalum	A chemical element with symbol Ta and atomic number 73. A rare, hard, blue-grey, lustrous transition metal that is highly corrosion-resistant. It is part of the refractory metals group, which are widely used as minor components in alloys.
Technical Economic Parameters	
	Assumed production, sales volumes, sales revenue, operating and capital expenditure relating to depletion of the Ore Reserves from 1 January 2019.
TEO Konditsii	A technical study completed in accordance with local regulatory requirements in Kazakhstan.
Terrigenous	Derived from the erosion of rocks on land; that is, they are derived from terrestrial (as opposed to marine) environments.
Tertiary	Relating to or denoting the first period of the Cenozoic era, between the Cretaceous and Quaternary periods, and comprising the Palaeogene and Neogene sub-periods.

Thermal log	A measure of measurement of the fraction or percentage of pore volume in a volume of rock.
Third Party	Someone who is not one of the main people involved in a business agreement or legal case, but who is involved in it in a minor role.
Thorium	A weakly radioactive metallic chemical element with symbol Th and atomic number 90.
Thorium and potassium correction	Correction factors applied in assessing the output from thermal logging.
Thrust	A break in the Earth's crust, across which older rocks are pushed above younger rocks.
Tin	A chemical element with the symbol Sn and atomic number 50. A soft, malleable, ductile and highly crystalline silvery-white metal.
Trade and Transport Company LLP	A subsidiary of the Company which facilitates transportation of goods to and from the Mining Subsidiaries operations.
TO-25	A form of management report comprising physical statistics relating to the extraction and production of uranium from the Mineral Assets.
Toll Refining	Where the owner of ore or concentrate contracts the refining of the metal to another party for a fee but the refined metal remains under the original ownership for final sale or disposition.
Tortkuduk	A uranium deposit owned by JV Katco LLP.
Trialkylamine	A group of organic chemical compounds derived from ammonia.
Tributyl phosphate	An organophosphorus compound with the chemical formula 3PO used in the solvent extraction of uranium.
Tugai Forest	A form of riparian forest or woodland associated with fluvial and floodplain areas in arid climates.
Turonian	The second age in the Late Cretaceous epoch, or a stage in the Upper Cretaceous series. It spans the time between 94Ma and 90Ma.
Tyauamunite	A very rare uranium mineral and a member of the carnotite group.
UMP Segment	One of the structural/divisions of the Company responsible for production and sales of products containing beryllium, tantalum and niobium, hydrofluoric acid and by-products. This segment is also engaged in processing of uranium raw materials under tolling arrangements and production of UO_2 powder and fuel pellets.
Unconformity	a surface of contact between two groups of unconformable strata.
United States	United States of America.
U-PRICE™	A recursive system of eleven regression equations and three identities that quantify the casual relationships and interdependencies among key variables of the uranium industry as developed by Ux Consulting Limited.
Uraninite	Formerly pitchblende, is a radioactive, uranium-rich mineral and ore with a chemical composition that is largely UO_2, but due to oxidation the mineral typically contains variable proportions of U_3O_8.
Uranium	A chemical element with symbol U and atomic number 92.
Uranium Segment	One of the structural/divisions of the Company responsible for uranium mining and processing operations from the Group’s mines, the Group’s purchases of uranium from the Group’s joint ventures and associates engaged in uranium production, and external sales and marketing of uranium products, in each case other than production and sales of UO_2 powder and fuel pellets.
Uranophane	Also known as uranotile, is a rare calcium uranium silicate hydrate mineral that forms from the oxidation of other uranium-bearing minerals. It has a yellow colour and is radioactive.
Uranyl phosphate	A compound of uranium, phosphorus, and oxygen and noted as the phosphates of uranium.

Uvanas	A uranium deposit owned by Kazatomprom-SaUran LLP.
UxC Report	A industry market specialist report supporting the analysis of the uranium market including the uranium price forecasts as relied upon in this CPR and authored by Ux Consulting Limited.
Vanadium	A chemical element with symbol V and atomic number 23. A grey metal that is normally used as an alloying agent for iron and steel. It is also used to strengthen titanium based alloys.
Vein	An epigenetic mineral filling of a fault or other fracture in a host rock, in tabular or sheetlike form, often with associated replacement of the host rock; a mineral deposit of this form and origin.
Vendian	The latest period of the Proterozoic era, spanning the time between 650Ma and 544Ma. Sometimes referred to as the Ediacaran period, the Vendian is distinguished by fossils representing a characteristic collection of complex soft-bodied organisms found at several localities around the world.
Volcanic	Characteristic of, pertaining to, situated in or upon, formed in, or derived from volcanoes.
Volkovgeologia JSC	A geology and geotechnology company which is primarily engaged in prospecting, exploration and analysis of uranium deposits on behalf of the Group and in which the Group holds equity of 100.00%.
Water Use Code	Law No 481, 2003, amended 29 June 2018.
Water table	The surface where the water pressure head is equal to the atmospheric pressure. It may be visualized as the “surface” of the subsurface materials that are saturated with groundwater in a given vicinity.
Wellfield	The land immediately above and surrounding the wells drilled for extraction of uranium.
Western Mynkuduk	A uranium deposit owned by Appak LLP.
WGC 2013	World Gold Council Report 2013.
X-ray	A form of electromagnetic radiation.
X-ray spectral fluorescent analyses	An x-ray instrument used for routine, relatively non-destructive chemical analyses of rocks, minerals, sediments and fluids.
Yellow Cake	A type of uranium concentrate powder obtained from leach solutions, in an intermediate step in the processing of uranium ores. It is a step in the processing of uranium after it has been mined but before fuel fabrication or uranium enrichment. Modern yellowcake typically contains 70% to 90% triuranium octoxide by weight.
Zarechnoye	A uranium deposit owned by JV Zarechnoye JSC.
Zhalpak	A uranium deposit owned by Ortalyk LLP.
2018 Statements	Mineral Resources and Ore Reserve statements for the Mineral Assets reported in accordance with the terms and definitions of the JORC Code as at 31 December 2018.

Abbreviations

ACA	Associated of Chartered Accountants
AEP	Advanced Exploration Property
AIME	American Institute of Mining Engineers
AISC	All in sustaining cash costs
AIX	Astana International Financial Centre
ARO	Asset Retirement Obligation
ASTM C 967	Standard specification for uranium concentrate with uranium content of at least 65%
ASX	Australian Securities Exchange
B	See C1

BSc	Bachelor of Science
C1	A measure of geological confidence in accordance with the GKZ system (A, B, C1, C2 in decreasing order of confidence)
C2	See C1
$CaCO_3$	Calcium Carbonate
Capex	Capital Expenditure
C. Chem	Chartered Chemist
C.Eng	Chartered Engineer
C. Geol	Chartered Geologist
CIT	Corporate Income Tax
CO_2	Carbon Dioxide
CPI	Consumer Price Inflation
CPR	Competent Persons Report
CRIRSCO	Committee for Mineral Reserves International Reporting Standards
DP	Development Property
DPA 1998	Data Protection Act 1998 of the United Kingdom
EAHL	Energy Asia Holdings Ltd
EHSG	Environmental Health and Safety Guidelines
EIA	Environmental Impact Assessment
EBITDA	Earnings Before Interest Tax, Depreciation and Amortisation
EP	Exploration Property
EPA	Environmental Protection Authority
ESHS	Environmental, Safety and Health System
Eur. Geol.	European Geologist
FCA	Financial Conduct Authority
FGS	Fellow of the Geological Society
FMIMM	Fellow of the Institute of Materials, Minerals and Mining
FS	Feasibility Study
FSMA	Financial Services and Markets Act 2000 of the United Kingdom
G&A	General and Administration
GIIP	Good International Industry Practice
GIS	Geographic information system
GoK	Government of Kazakhstan
GPS	Global Positioning System
GRR	Exploration Depreciation
H1	1st half of the financial/calendar year in this case being 1 January through 30 June
H2	2nd half of the financial/calendar year in this case being 1 July through 31 December
HCO_3^-	anion of carbonic acid
HDPE	High-density polyethylene
HKPU	Yellow Cake
HSE	Health, Safety and Environment
IAEA	International Atomic Energy Agency
IFRS	International Financial Reporting Standards
ILO	International Labour Organization
ISR	in-situ leach recovery
IX	ion exchange

JV	Joint Venture
K	Potassium
KAP	Joint Stock Company National Atomic Company Kazatomprom
Kazakhstan	Republic of Kazakhstan
Kazatomprom	Joint Stock Company National Atomic Company Kazatomprom
KAZ ETS	Kazakhstan Emissions Trading System
LLRW	Low Level Radioactive Waste
LoMp	Life of Mine plan
LSE	London Stock Exchange
LTIFR	Lost time injury frequency rate
MAusIMM	Member of the Australasian Institute of Mining and Metallurgy
MET	Mineral Extraction Tax
MIMMM	Member of the Institute of Materials, Minerals and Mining
MICAEW	Member of the Institute of Chartered Accountants of England and Wales
MoE	Ministry of Energy of the Kazakhstan
MoEP	Ministry of Environmental Protection of the Kazakhstan
MoES	Ministry of Emergency Situations of Kazakhstan
MRSC	Member of the Royal Society of Chemistry
MSc	Master of Science
NEA	Nuclear Energy Agency
NGO	Non-Governmental Organisation
NGWA	National Groundwater Association
NORM	naturally occurring radioactive materials
NPT	Non-Proliferation of Nuclear Weapons Treaty
NSK	Nuclear Society of Kazakhstan
OECD	Organisation for Economic Co-operation and Development
Opex	Operating Expenditure
OVOS	Otsenka Vozdejstviya na Okruzhayushchuyu Sredu
2P	Proved and Probable Ore Reserves
PFS	Pre-Feasibility Study
PGR	Wellfield development depreciation
pH	A logarithmic scale used to specify the acidity or basicity of an aqueous solution.
PhD	Doctorate of Philosophy
PLS	Pregnant Leach Solution
PNS	Professional Natural Scientist
PP	Producing Property
PPE	personal protective equipment
PS	Performance Standards
PT	Property Tax
RPO	Recognised Professional Organisation
Russia	Russian Federation
SMCCP	Stepnogorsk Mining Chemical Combinate (plant) LLP
SP	Self Potential
SPZ	Sanitary Protection Zone
SRK	Joint Stock Company National Atomic Company Kazatomprom
SRK Group	SRK Consulting (Global) Limited
ST RK 2573	Standard specification for uranium concentrate with uranium content of at

	least 80%
TD	Technical Desorbate, a intermediary compound in the process of producing uranium concentrates
TDS	Total Dissolved Solids
TEEP	Techniko-Economicheskoe Predlozhenye
TEO	Technico Economicheskiye Obosnovaniye
TEO Konditsy	Techniko-Ekonomicheskoe Obosnovanie Konditsy
TEO Project	Techniko-Ekonomicheskoe Obosnovanie Proyekta
TEPs	Technical Economic Parameters
TER	Techniko-economicheskie Rasschety
TES	Techniko-economicheskie Soobrazheniya
Th	A weakly radioactive metallic chemical element with symbol Th and atomic number 90
THK	Trade House KazakAtom AG
TSS	Total Suspended Solids
TUZ	Technological units of acidification and distribution of solutions
UEC	Uranium Enrichment Centre
UEIP	JSC Urals Electrochemical Integrated Plant
UK	United Kingdom of Great Britain and Northern Ireland
UKLA	United Kingdom Listing Authority
UME	Uranium Metal Content Equivalent
UMP	Ulba Metallurgic Plant JSC
URM	the weight of pure uranium in a particular product, for natural uranium, triuranium octoxide and other uranium products
United States	United States of America
UF_6	Uranium hexafluoride is the chemical form of uranium that is used during the uranium enrichment process.
UO_2	UO_2 powder suitable for making heavy water reactor fuel pellets or uranium hexafluoride (UF_6)
$UO_2(CO_3)_3^{4-}$	uranyl carbonate
$UO_2(SO_4)_3^{4-}$	uranyl sulphate
U_3O_8	Triuranium octoxide a form of uranium concentrate
UxC	Ux Consulting Company
WBG	Work Bank Group
WGC	World Gold Council
WGC 2013	June 2013 World Gold Council Publication
WIP	Work In Progress
YoY	Year on Year

Units

amsl	above mean sea level
Bq/g	Becquerel per gramme
g	a gramme
Ga	a billion years ago
g/l	a gramme per litre
g/t	a gramme per tonne
GWh	a billion watt hours
ha	hectare
Hz	a hertz

kgU/m^2	a kilogramme of Uranium per square metre
kgS/kgU	a kilogramme of Sulphur per kilogramme of Uranium
klpm	a thousand litres per month
km	a kilometre
km^2	a square kilometre
kt	a thousand metric tonnes
ktpa	a thousand tonnes per annum
ktS	a thousand tonnes of Sulphur
ktU	a thousand tonnes of Uranium
kV	a thousand volts
kW/t	a thousand watts per tonne
kWh	a thousand watt hours
KZT	Kazakhstan Tenge
KZTbn	a billion Kazakhstan Tenge
KZT/kgU	Kazakhstan Tenge
KZT/lbU	Kazakhstan Tenge per pound of Uranium
KZTm	a million Kazakhstan Tenge
l	a litre
l/day	litres per day
m	a metre
mbgl	metres below ground level
m^2/day	a square metre/day
m^3	a cubic metre
m^3/d	a cubic metre per day
m^3/hr	a cubic metre per hour
Ma	a million years ago
mabsl	meters above sea level
mamsl	metres above mean sea level
mbgl	metres below ground level
m/d	metres per day
mgU/l	milli gramme of Uranium per litre
m^3/hr	a cubic metre per hour
MkRh/h	Roentgens per hour
Mlb	a million pounds
MlbU	a million pounds of Uranium
$MlbU_3O_8$	a million pounds of Triuranium Octoxide
Mlpm	a million litres per month
Mlpa	a million litres per annum
mm	a millimetre
m/s	a metre per second
MPa	a Mega Pascal
mSv	milli sivert
mSv/y	milli sivert per year
Mt	a million tonnes
Mtpa	a million tonnes per annum
MW	a million watts
MWh	a million watt hours
m/y	metres per year

No	number of
ppm	parts per million
t	a metric tonne of Triuranium Octoxide
t/h	tonnes per hour
tU	a metric tonne of Uranium
tU_3O_8	a metric tonne of
US$	a United States Dollar
US$bn	a billion United States Dollars
US$k	a thousand United States Dollars
US$/kg	United States Dollars per kilogramme
US$/lb	United States Dollars per pound
US$/lbU	United States Dollar per pound of Uranium
US$/lb$U_3O_8$	United States Dollar per pound of Uranium
US$m	a million United States Dollars
US$/t	United States dollars per tonne
V	volts
°	a degree
°C	a degree Celsius
‘	a minute
%	percentage
%U	percentage of Uranium
%Um	grade thickness accumulation
% w/w	the proportion of a particular substance within a mixture, as measured by weight or mass
µm	a micron or $1x10^{-6}$
µR/h	micro Roentgen per hour

APPENDIX
A IFC PERFORMANCE STANDARDS APPRIASAL

Performance Standard (PS)		Non-conformances	Recommendations
Section heading	Para		
PS1: Assessment and Management of Environmental and Social Risks and Impacts			
Environmental and social assessment and management system	5	Compliant, fully fledged management systems have been established at the operations (Section 10.5), but there is room for improvement of these as outlined below.	None
Policy	6	The Company's HSE policy does not specifically aim for consistency with the principles of the IFC Performance Standards. The policy does however reference other international standards – specifically, the Global Reporting Initiative Standards, management system standards (specifically, ISO 14001, ISO 10018, OHSAS 18001) and International Atomic Energy Agency's (IAEIA's) recommendations. The public version of the policy is an abridged version and does not refer to any international standards. The policy does not specifically reference adequate engagement with potentially affected communities, management of impacts on neighbouring land users, conservation of biodiversity and ecosystem services, and conservation of cultural heritage.	Consider including explicit commitments in the HSE policy to: engagement with potentially affected communities; mitigate impacts on neighbouring land users; conservation of biodiversity and ecosystem services; and conservation of cultural heritage.
Identification of risks and impacts	7 - 12	The mines have insufficient understanding of environmental and social context. More detailed information on the setting of the operations is required to define impacts on ecology, water resources and land use, including cumulative impacts on sensitive receptors (Sections 10.5.9 and 10.7).	Review existing baseline data and collect additional data to define impacts on ecology, water resources and land use, including cumulative impacts on sensitive receptors.
Management programs	13 - 16	Closure targets and completion criteria are not well-defined, particular attention needs to be paid to closure completion criteria for groundwater and the involvement of stakeholders in the agreement of criteria (Sections 10.6 and 10.7). Closure plans/ liquidation programs (and corresponding cost estimates) need to be updated to reflect current designs and production plans and include all components of project infrastructure (Section 10.7).	Update management programs to address impacts on ecology, water resources and land users. Establish closure completion criteria for all operations and agree these with regulatory authorities and other stakeholders. Update closure plans/ liquidation programs (and corresponding cost estimates) to reflect current designs and production plans and all components of project infrastructure.
Organizational capacity and competency	17 - 19	Awareness of and competence to monitor and manage impacts on ecology, water resources and land use should be improved at all operations.	Bring in external expertise to assist with impact identification and train staff to monitor and address impacts on ecology, water resources and land use. Bring in external expertise to assist with development of stakeholder engagement plans and review of grievance mechanisms.
Emergency preparedness and response	20 - 21	Emergency plans do not specifically identify land users that could be affected and have not been developed in consultation with these parties (but have been developed in consultation with Akims) (Section 10.5.12).	Identify emergency scenarios that could impact on local land users, update plans to reflect findings and in consultation with the potentially affected people. Ensure these people are aware of actions to be taken in the event of an emergency. (Plans should conform with the UNEP APPEL for Mining Guideline: Awareness and Preparedness for Emergencies at Local Level.)

<table>
<tr><th colspan="2">Performance Standard (PS)</th><th rowspan="2">Non-conformances</th><th rowspan="2">Recommendations</th></tr>
<tr><th>Section heading</th><th>Para</th></tr>
<tr><td>Monitoring and review</td><td>22 - 23</td><td>Monitoring data is not collected and interpreted in ways that demonstrate there are no impacts on ecology, biodiversity, water resources and surrounding land users (Section 10.6).</td><td>Improve monitoring programs to prove that there are no significant impacts on sensitive receptors and to develop and refine closure completion criteria. The improvements required include identification of sensitive receptors (people, ecological receptors and water resources), review of parameters monitored, appropriate QA/QC controls and interpretation of the monitoring data.</td></tr>
<tr><td>Stakeholder engagement (engagement with local communities)</td><td>25 - 36</td><td>The operations do engage with local communities (Section 10.5.13), but this engagement does not conform with the requirements of the standard in the following respects:
Potentially affected communities, and their characteristics and interests in the operations, have not been formally identified;
There is no formal stakeholder engagement plan for the affected communities;
Procedures for registering engagements and recording issues raised and responses are not defined;
Grievance mechanisms exist (grievances are handled through Akims and also by means of weekly reception days) but are not specifically aligned with the standard.</td><td>As part of the upgrade of information on surrounding land uses (see above), undertake a social scan that identifies potentially affected communities, and their characteristics and interests in the operations that are relevant to effective engagement.

Develop and implement stakeholder engagement plans for each operation.

Review and refine grievance mechanisms such that they are aligned with the standard.</td></tr>
<tr><td colspan="4">PS2: Labour and working conditions</td></tr>
<tr><td>Human resources policies and procedures
Working conditions and terms of employment</td><td>8 – 12</td><td>Compliant, the Company’s human resource policy sets out approaches to managing workers in line with national law.
(Note that the Company’s human resource policy does not refer specifically to PS2 – this is not deemed a non-compliance.)
See Section 10.5.14 for more background on working conditions. Note collective agreement conditions apply to all employees, employees, regardless of whether the employee is a citizen of Kazakhstan or foreign.</td><td>Consider committing to compliance with PS2.</td></tr>
<tr><td>Workers’ organisations</td><td>13 & 14</td><td>Compliant (Section 4.2.8 and 10.5.14)</td><td>None</td></tr>
<tr><td>Non-discrimination and equal opportunities</td><td>15 to 17</td><td>Compliant (Section 4.2.8)</td><td>None</td></tr>
<tr><td rowspan="2">Retrenchment</td><td>18</td><td>Collective agreements require negotiation with the union in terms of rights and interests of workers in the event of a reduction in staff.
Alternatives to retrenchment such as reduced working hours to save jobs are allowable under the Labour Code.</td><td>None</td></tr>
<tr><td>19</td><td>Legal requirement. (Labour Code Article 113)</td><td>None</td></tr>
<tr><td>Grievance mechanism</td><td>20</td><td>Compliant, Section 10.5.14</td><td>None</td></tr>
<tr><td>Child labour</td><td>21</td><td>Compliant / legally required (Section 4.2.8)</td><td>None</td></tr>
<tr><td>Forced labour</td><td>22</td><td>Compliant / legally required (Section 4.2.8)</td><td>None</td></tr>
<tr><td>Occupational health & safety</td><td>23</td><td>Compliant (Sections 10.5.2, 10.5.3, 10.5.6, 10.5.7, 10.5.8, 10.5.10, 10.5.11, 10.5.12 and 10.5.14)</td><td>None</td></tr>
<tr><td>Workers engaged by third parties</td><td>24 - 26</td><td>Rules for workers engaged by third parties are being developed by the Company, as part of a working group established by Samruk-Kazyna. These rules will address this requirement.</td><td>None</td></tr>
</table>

Performance Standard (PS) Section heading	Para	Non-conformances	Recommendations
Supply chain	27 - 29	Relevant legislation is outlined in Section 4.2.8. All potential suppliers are required to comply with relevant legislation. Potential suppliers and service providers are subject to pre-qualification that evaluates their commitment to observance of fundamental human rights in the workplace. This is a requirement under the Policy of Samruk-Kazyna JSC on procurements management approved by the decision of the Board of Directors No. 125 dated December 10, 2015, which is applied by the ISR operations.	None
PS3: Resource Efficiency and Pollution Prevention			
Requirements	4 - 6	The mines are designed and operated in accordance with relevant legislation and observing IAEA recommendations. The limit values observed by the mines are generally stricter than those given in the World Bank Group ("**WBG**") Environmental Health and Safety Guidelines ("**ESG**"). Non-conformances with WBG EHSG were not observed, except that the mines do have insufficient understanding of environmental and social context – this matter is repeated throughout this table (see PS 1 and PS 6). In other words, the mines are not in compliance with land use and biodiversity clauses in the WBG EHS.	All recommendations for PS 1 are relevant.
Greenhouse Gases	7 - 8	All mines actively seek to improve their energy efficiency. The mines have ISO 5001 certified energy management systems (this exceeds the requirement of the standard). The mines greenhouse gas emissions are estimated and are below the threshold of 25,000 tonnes of CO_2^- equivalent produced annually.	None
Water consumption	9	Compliant, water consumption is minimised.	None
Pollution prevention	10-11	See comments for PS 1 Para 22-23, which pertain to monitoring of impacts.	See recommendation for PS 1 Para 22-23.
Wastes	12	On the subject of waste disposal, SRK notes the following: • Kazmetrao is an independent company providing metal LLRW decontamination services to the ISR mines. A number of mines assume that much of the metal LLRW waste arising from closure can be handled by Kazmetrao. This assumption needs to be checked. The Kazmetrao decontamination operations have not been audited by the Mining Subsidiaries and neither the decontamination methods nor final destinations of the decontaminated metal are known (Sections 5.4.4) • While the various operations do keep detailed waste inventories, the Company is still developing a holistic view of waste management by operations. It has committed to developing a waste management system that accounts for and monitors waste through all stages of handling through to final use or disposal by 2019, for implementation by all daughter companies by 2020. (Section 10.5.3)	The LLRW decontamination services offered by third parties should be subject to scrutiny. The Company should have evidence that these are being operated to acceptable standards and should obtain chain of custody documentation on the decontaminated waste to its final destination.
Hazardous materials management	13	Compliant, with the exception of the issue raised for Kazmetrao above.	None

Performance Standard (PS) Section heading	Para	Non-conformances	Recommendations
Pesticide use & management	14 - 17	Not relevant	None
PS4: Community health and safety, and security			
Community health and safety	5	See comments for PS 1 Para 7 -12 and 22 - 23 Impacts on land uses and water resources need to be better defined and monitored (Section 10.6)	See recommendations for PS 1 Para 7 -12 and 22 - 23
Infrastructure and equipment design and safety	6	Compliant. The operations are designed and undertaken to minimise ESHS impacts. This coupled with remote setting of most mines and a relative absence of sensitive receptors (Section 10.2) does reduce the ESHS risks associated with the operations.	None
Hazardous materials management and safety	7		None
Ecosystem services	8	See comment for PS 1 Para 7-12 Potential impacts on ecosystem services have not been defined	See comments for PS 1 Para 7 -12
Community exposure to disease	9 to 11	Not a significant risk at these mines.	None
Emergency Preparedness and Response	11	See comment for PS 1 Para 20 and 21	See Recommendation for PS 1 Para 20 and 21
Security personnel	12 to 14	Security personnel are not formally provided with training on providing security and respecting human rights. This would be important in situations where land users and their livestock are escorted out of wellfields by security personnel. SRK is not aware of any human rights abuses by security personnel.	Refer to the Voluntary Principles on Security and Human rights http://www.voluntaryprinciples.org/ Consider implementation of the Voluntary Principles, and participation in the Voluntary Principles Initiative, to align corporate policies and procedures with internationally recognized human rights principles in the provision of security for their operations.
PS5: Land Acquisition and Involuntary Resettlement			
Physical displacement	19 to 24, 31 & 32	Not relevant, no displacement required in the current life of mine plans	None
Economic displacement	25 to 32	Not relevant, no displacement required in the current life of mine plans Livestock farmers could be economically displaced by future mining on Semizbai' s Irkol concession in the vicinity of the Syrdarya River, but this is not being considered in the current life of mine plan for this operation.	If farmers are displaced, a livelihood restoration plan should be developed and implemented in accordance with PS 5.
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources			
Protection and conservation of biodiversity	6 -10	The biodiversity and ecological settings and impacts of the mines are not defined at the level expected by the performance standards. Cumulative impacts have not been assessed. (Section 10.6) The differing values attached to biodiversity and ecosystem services by land users (such as nomadic farmers), other affected communities and other stakeholders have not been formally determined. (Section 10.6)	Review existing baseline data and collect new data to clearly define the impacts of the mines on habitats, plants and animal species of conservation importance and surrounding land uses such as nomadic farming. Compile habitat maps that delineate the different habitats disturbed by mining. Ascertain whether there are any habitats that fall into the critical habitat category. Update management plans based on the above and to align with PS 6.
Modified habitat	11 - 12	Habitats that have been/ will be disturbed by the ISR operations have not been mapped and defined. It is expected that most of the habitats will be of the natural habitat class. It has not been confirmed that there are no habitats that fall in the critical habitat	
Natural habitat	13 - 15		

Performance Standard (PS) Section heading	Para	Non-conformances	Recommendations
Critical habitat	16 - 19	category. (Section 10.6)	Refine the existing monitoring programmes so that the data is collected and interpreted in a way that demonstrates that the mines are not impacting on ecology, biodiversity and surrounding land users. Undertake all of the above in consultation with other land users and with the aim of defining and monitoring impacts of the mines individually and cumulatively.
Legally protected & internationally recognised areas	20	The Zarechnoye concession does overlap with the boundaries of the Arys Karaktau Nature Reserve. The reserve was established at the same time as the mine and the mine is not considered to adversely impact on the conservation objectives of the reserve. (Section 10.2.1).	No recommendations other than the above recommendations for PS 6 are given.
Alien invasive species	21 - 23	Specific measures are not taken to control invasive alien species.	As part of the above-mentioned tasks, consider the presence of alien invasive species and special controls that may be required.
Management of ecosystem Services	24 - 25	See comment for PS 1 Para. 7-19. Potential impacts on ecosystem services have not been defined. The contextual information require to do this is not available.	The above management measures are applicable.
Sustainable management of living natural resources	26 - 29	Not relevant	None
Supply chain	30	Suppliers are not required to prove that they are not contributing to significant conversion of natural and/or critical habitats.	Require suppliers to provide verification that they are not contributing to significant conversion of natural and/or critical habitats.
PS 7: Indigenous Peoples			
Not applicable	Reportedly, no indigenous people are affected by the ISR mine developments.		
PS 8: Cultural Heritage			
Protection of cultural heritage in project design and execution - general	6&7	Compliant	None
Consultation and community access	9 & 10	There is no evidence that there has been community consultation to fully understand the local cultural heritage.	When updating the land-use baseline for the operations, consult local communities, particularly people with long living memories, to fully understand the local cultural heritage. Where possible, allow continued access to cultural heritage sites.
Procedures for chance finds and removal of cultural heritage	8 & 11 & 12	No chance find procedures have been established.	Establish chance find procedures for handling and removal of cultural heritage, should this be required.
Critical cultural heritage	13 to 15	Not applicable	None
Use of cultural heritage	16	Not applicable	None