



Case study on the application of UNFC in energy and water resources in Kazakhstan

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The systems for assessing resources and mineral reserves in force in Kazakhstan



- In Kazakhstan, for the classification of reserves and resources of solid minerals, energy, raw materials and groundwater, the **GKZ state local system** operates
- Also, since 2018, in Kazakhstan, the **Code KAZRC** developed in accordance with the **CRIRSCO template**, has been operating in parallel

Approximate ratio of resources and reserves according to CRIRSCO template, UNFC and GKZ RK



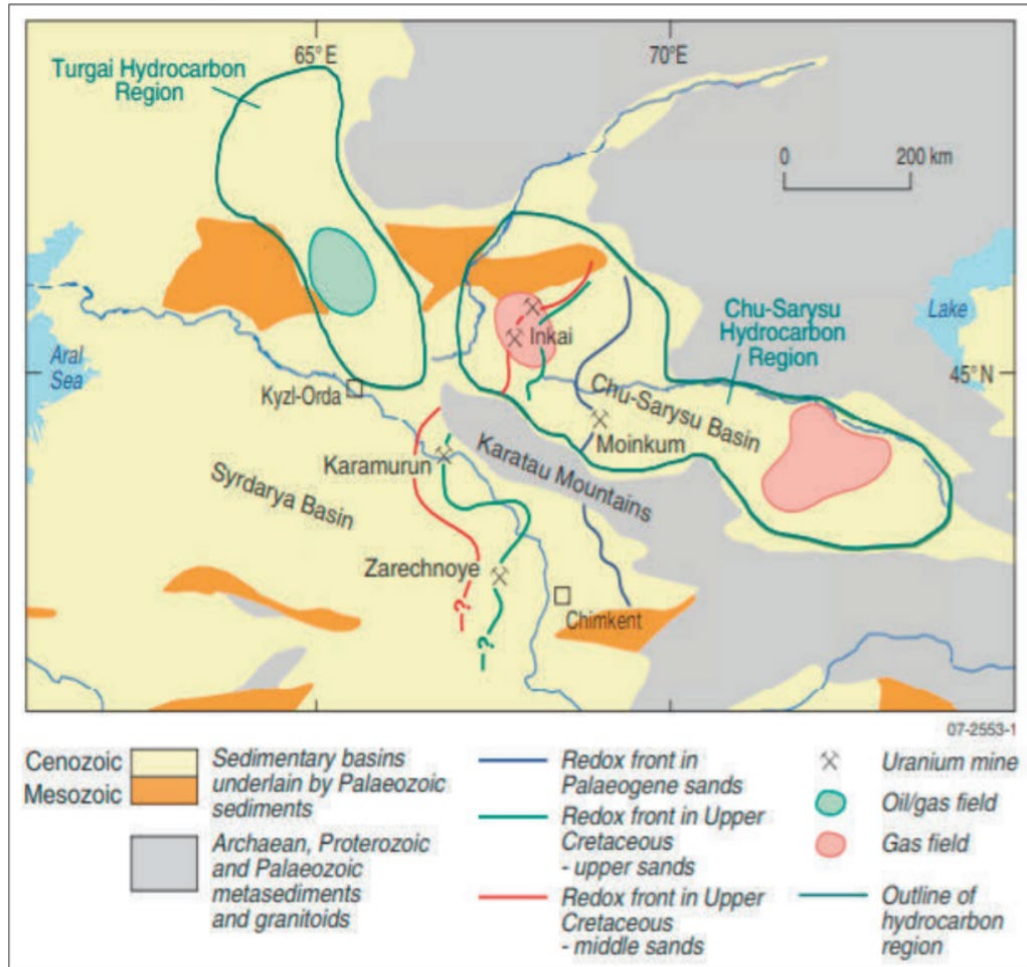
CRIRSCO Template		UNFC-2019 "minimum" Categories			UNFC-2019 Class	GKZ RK	
						Solid minerals	Groundwater
Mineral Reserve	Proved	E1	F1	G1	Viable Projects	A, B	A, B
	Probable			G2		B, C1	
Mineral Resource	Measured	E2	F2	G1	Potentially Viable Projects		B, C1
	Indicated			G2		C1, C2	C1, C2
	Inferred			G3			
Exploration Results		E3	F3	G4	Prospective Projects	C2, P1	P
						P2, P3	

Objects of the Case study



- In accordance with the objectives of the project, the South Inkai uranium deposit, of the roll-front type, located in South Kazakhstan, and a groundwater deposit combined with it in the subsoil - the explored area for water supply to the Taikonyr village and production facilities of the South Inkai mine, were taken as the objects of research.
- In the area of the uranium deposit, no sources of surface water suitable for use have been found, therefore, groundwater is the only source of water supply

Uranium resources of Kazakhstan



- The total identified uranium resources (reasonably assured and inferred) as of 1 January 2017 amounted to **M10,65 t** of uranium metal (tU). Kazakhstan ranks second in reserves (**M1,7 t**) after Australia and first in production (about 40 thousand tons).
- This situation is ensured thanks to the unique uranium ore province, which is located in South Kazakhstan, the deposits of which are of the roll-front deposits, which are processed by the ISL method

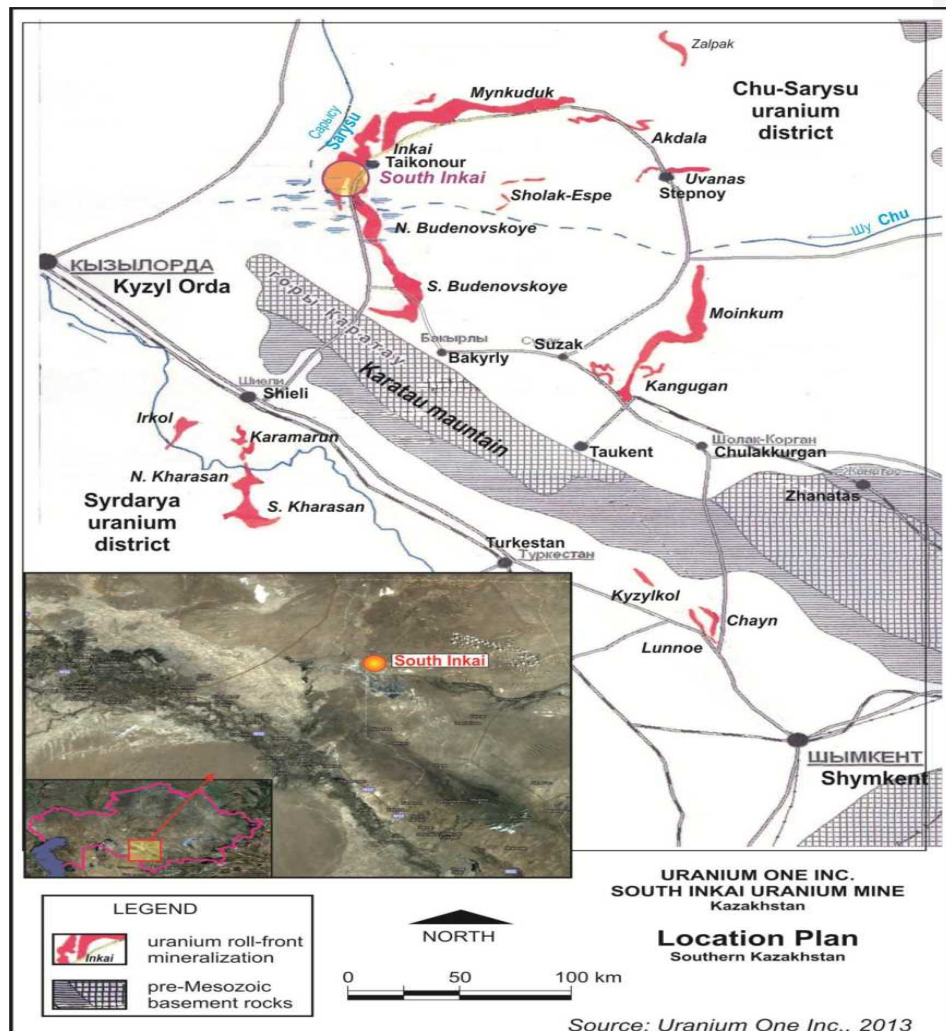
Water resources of Kazakhstan



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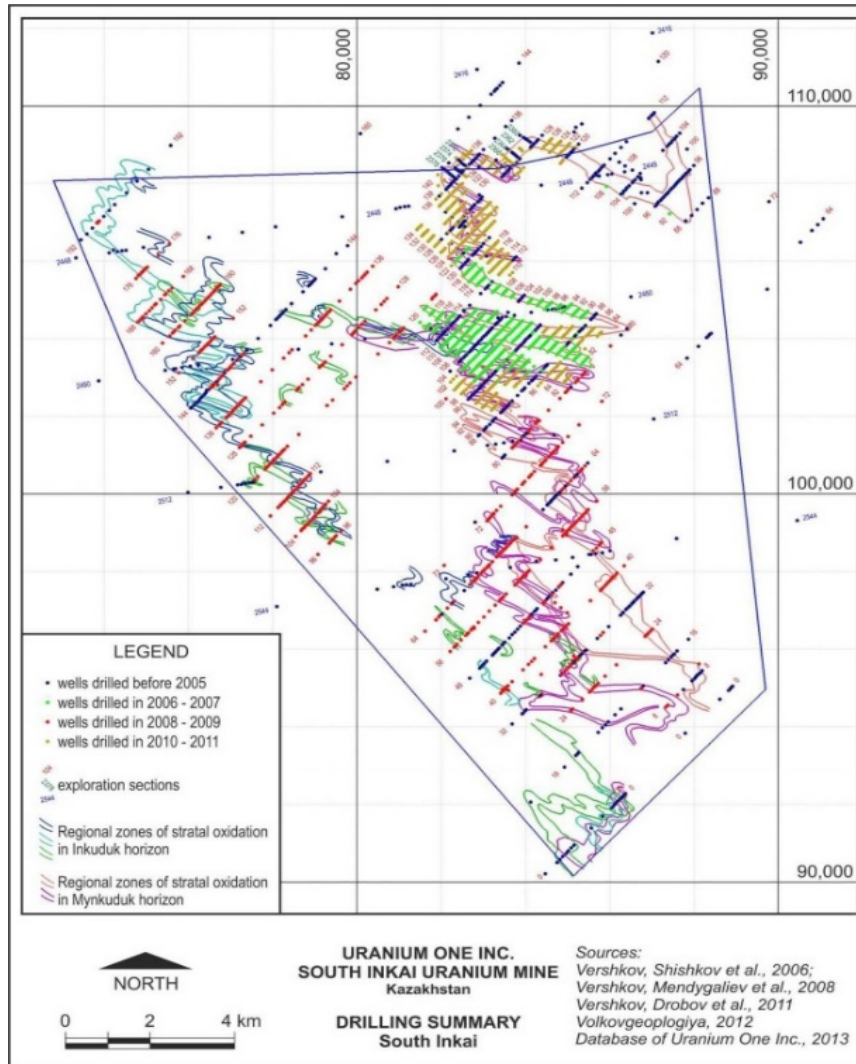
- The total resources of surface waters of Kazakhstan are estimated at an average of **100.8 km³/year**, of which **56.84 km³/year** are formed in Kazakhstan, and **43.9 km³/year** come from adjacent territories.
- The provision of local surface water resources per inhabitant is very low - **3.2 thousand m³/year**. For comparison, in Russia there are **27.8 thousand m³/year** per one inhabitant, in Kyrgyzstan - **12.7 thousand m³/year**.
- With a large deficit of surface water, the total groundwater resources are **64.3 km³/year**, and **40.4 km³/year** of them are fresh water. Groundwater, which is essential, is underutilized. That is, it is quite obvious that it is the widespread use of groundwater that can guarantee all the country's needs for water resources.

The urgency of the problem



- For the semi-desert South Kazakhstan, on the territory of which a **unique uranium province** is located, where **dozens of mines** operate, the issue of water supply is very urgent
- This example shows the effective use of **groundwater, which is widespread in the subsoil together with uranium mineralization**, to supply fresh water to the population of the village and mine personnel, and process water to the production process of the South Inkai mine

South Inkai uranium deposit



- Uranium resources and reserves of the South Inkai deposit were estimated in 2018 in accordance with the NI-43-101, for submission on the Toronto Stock Exchange (Report CSA Global Pty Ltd, 2018 for Uranium One Inc.)

- The assessment of groundwater reserves was carried out in accordance with the requirements of the State Reserves Committee of the Kazakhstan

South Inkai Mineral Resources and Mineral Reserves - CRIRSCO and UNFC Categories Correlation

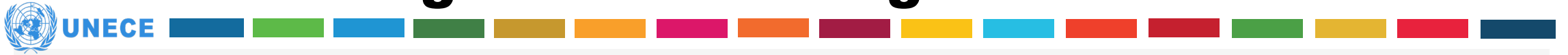
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Category CRIRSCO	Category UNFC	Total tonnes (x1,000)	Grade, % U	Total M Kg U
Resources:				
Measured	E2F2G1	36,680.9	0.022	8.2
Indicated	E2F2G2	21,132.2	0.020	4.1
Inferred	E3F2G3	116,394.6	0.025	29.0
Reserves:				
Proven	E1.1F1.1G1	214,104.1	0.030	64.7
Probable	E1.1F1.1G2	166,913.0	0.024	39.4

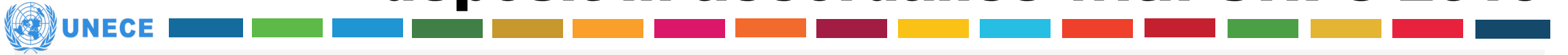
- Conversion of Mineral Resources and Mineral Reserves according to the NI-43-101 standard into the UNFC was made on the basis of the Bridging document between CRIRSCO and the UNFC

Summary of Resources of the groundwater by categories according to the GKZ standard



Section	Category	Resource, m3/day
section 1 (wells 520g, 536g)	C1	648
section 1 (wells 520g, 536g)	C2	216
section 2 industrial site (well 0909)	C1	660
section 3 (well No. 0910)	C1	325
Total	C1	1633
	C2	216

Classification of groundwater of the South Inkai deposit in accordance with UNFC-2019



Class UNFC-2019	Categories, and Sub-categories UNFC	m3/day
Viable Projects	E1.1F1.1G1	1633
Potentially Viable Projects	E2F2G2	216

Socio-environmental-economic viability and impact assessment



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The long-term profitable mining and processing of uranium at the South Inkai deposit, as well as the strategic plan, **calculated until 2045**, to continue the profitable operation of the enterprise, testifies to the economic and socio-ecological viability of the project.

When mining and processing radioactive uranium ores, environmental safety issues are of particular importance. For this reason, government and subsoil users pay great attention to the environmental safety of production and health protection of production personnel and the local population.

In accordance with the Environmental and Water Codes of Kazakhstan, before the start of the development of the South Inkai field, all necessary studies were carried out.

Environmental issues of groundwater utilization



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Socio-environmental-economic viability and impact assessment Groundwater resources that meet the needs of production and local population water are an important and integral part of uranium production.

As an integral part of ensuring the social sphere and economy of the project, water resources are undoubtedly socially and economically viable.

Considering that after the liquidation of the uranium mine, water resources will meet the needs of the local population in water for decades, their social significance is obvious.

Advantages of UNFC at national- and project-level decision making



An important task of the development of the mineral resource complex of Kazakhstan is to increase the resource base of solid minerals and hydrocarbons. UNFC-2019 can create the most favorable conditions for investors.

Limitations in the use of the UNFC include the need for significant adjustment of national legislation both in Kazakhstan and in other countries. And this process, as you know, always happens very slowly.

The legal provisions existing in Kazakhstan today, enshrined in the Constitution of the Republic of Kazakhstan, speak of the ownership of minerals, described as “the property of the people”. Therefore, for the implementation of the UNFC, it is also necessary to develop mechanisms of state control in this area.

Thank you!

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