IBR™
EU Power Technologies

Uranium Mining & Processing Industry in Russia, Kazakhstan, Uzbekistan, Ukraine. State & Prospects.

2022

IBR EU Power Technologies, LLC

Hungary 2022

Uranium Mining & Processing Industry in Russia, Kazakhstan, Uzbekistan, Ukraine. State & Prospects.

2022

IBR EU Power Technologies, LLC
Department of Nuclear Power & Nuclear Fuel Cycle

2022

About IBR EU Power Technologies, LLC (IBR™)

The IBR™ was established as the consulting and engineering Company acting in the fields of nuclear Power Engineering and its fuel cycle both in Russia and in the NIS. Working in close cooperation with the domestic and foreign business partners the Company provides a broad array of integrated services that enhance the worldwide commercial developments. With vast experience of the staff IBR™ is prepared to meet all requirements of customers.

Now the IBR™ is an experienced, steadily operating and developing Company. The IBR™ personnel possessing perfect knowledge of the Project Management is in a position to solve the most complicated tasks in various fields of science and industry.

The IBR™ is proud of its collaboration with the national and overseas partners including many worldwide known companies and organizations.

The IBR™ is looking forward for your continuous support and encouragement

IBR EU Power Technologies, LLC

info@ibreu.eu
http://www.ibreu.eu

Project Team

- **The IBR EU staff**
- **Selected experts from state & private institutions**

Notes

The information contained in this report has been prepared by IBR EU Power Technologies, LLC (the IBR™) based upon data obtain from sources we consider reliable and/or calculation consistent with technical principles we consider applicable.

Contents

List of Figures

List of Tables

List of Abbreviations

AECC	Angarsk Electrolyzing Chemical Combine
ARMZ	JSC Atomredmetzoloto
CMP	Chepetsk Mechanical Plant (Glazov town, Udmurtia, Russia)
FAEA	Federal Atomic Energy Agency (Russian Federation)
FSU	Former Soviet Union
FSUE	Federal State Unitary Enterprise
HEU	Highly-Enriched Uranium
JSC Atomenergoprom	JSC Atomic Power Industrial Complex
KMC	JSC Karabalta Mining Combine (Karabalta town, Kyrgyzstan)
LEU	Low-Enriched Uranium
LLC	Limited Liability Company (usually used with reference to Kazakh ”TOO” companies)
mln	Million
NIS	New Independent States (also known as CIS – the Commonwealth of Independent States, countries of the former Soviet Union except the Baltic States)
NMMC	Navoi Mining & Metallurgical Combine (Navoi town, Uzbekistan)
PM&CPA	Priargunsky Mining & Chemical Production Association (Krasnokamensk town, Chita region, Russia)
SC	State Corporation
SCC	FSUE Siberian Chemical Combine
SP	Sublimation (Conversion) Plant
SM&CC	Stepnogorsk Mining & Chemical Combine (Stepnogorsk town, Kazakhstan)
UMC	JSC Uranium Mining Company (Moscow)
UMP	Ulba Mettalurgical Plant (Ust Kamenogorsk town, East Kazakhstan)
VM&PC	Vostochnyi Mining & Processing Combine, also known under Russian abbreviation VostGOK. (Zevty Vodi town, Dnepropetrovsk region, Ukraine)
ZM&PC	Zabaikalsky Mining and Processing Combine (Pervomaysky settlement, Chita region, Russia)

Executive summary

1. A powerful system of natural uranium geological survey, mining and processing was created in the USSR. After the Soviet Union disintegration, a several new independent states inherited a strong uranium mining industry, technical expertise in uranium mining and explored, though partially, industrial scale deposits. The industry struggled to survive through the 90-th, the decade of painful reforms, extremely low uranium prices and falling production of uranium. Some uranium mining and processing enterprises were closed in the 90-th, all enterprises experienced drop of production but the industry survived and with the rise in uranium prices uranium mining industry in the former Soviet Union (FSU) was able to recover. Huge uranium deposits suitable for in-situ leaching were discovered in the Soviet times in Kazakhstan and now allowed extremely fast growth of uranium mining capacities in Kazakhstan and first of all due to Kazakh progress the total volume of uranium mined by the former Soviet republics became higher (2017 - 30,428 tU) than the Soviet record (16,000 tU) reached by the USSR in 1988. Now the countries of the former Soviet Union (first of all Kazakhstan) playing important role in the world's uranium mining industry.

2. The New Independent States developed uranium mining and processing management systems on the basis of existing structures inherited from Soviet centrally planned economy. The strict regulating role of the state in uranium mining and processing management has been retained in all the countries. Yet, at present, classical Soviet-style system, in which state enterprises directly subordinated to relevant ministries, is still in place only in Ukraine (where the system is being modernized now) and Uzbekistan. In Kazakhstan management of uranium mining is vested with a holding company that is considered a more modern and efficient approach. Ukraine and Russia are now making steps aimed at reforming their nuclear industries. For Russia it will mean creation of a giant holding company comparable only to Orano group. Until recently it was thought that JSC Atomenergoprom is going to become the center of civil nuclear industry in Russia. Yet, in the end of 2009 State Corporation Rosatom declared that it will be such a center whereas JSC Atomenergoprom will be just a formal main shareholder for the enterprises of the Russian nuclear industry. Thus in Russia JSC Atomredmetzoloto (ARMZ) is directly subordinated to SC Rosatom and comprises managerial functions in all aspects of uranium mining. Foreign enterprises from 2013 were consolidated under the control of uranium producing company Uranium One Holding N.V. In Ukraine such a holding company named State Corporation Nuclear Fuel of Ukraine will naturally be much smaller and Ukrainian uranium mining industry is to report directly to the management of SC Nuclear Fuel of Ukraine. No significant changes in management system are expected in Kazakhstan and Uzbekistan in the near future.

3. At present uranium mining is carried out in Kazakhstan, Russia, Uzbekistan and Ukraine. The Soviet Union had the largest base of explored uranium resources in the world but they were unequally inherited by successor states. The largest undeveloped deposits suitable for in-situ leaching remained in Kazakhstan that allowed the country to extend its mining capacity very promptly when market conditions became favorable. Russia inherited large undeveloped deposits but mostly suitable for capital intensive underground mining in extremely harsh conditions of the East Siberia. Ukraine has just one large undeveloped deposit also suitable for underground mining. Russia, Kazakhstan and Ukraine made public ambitious plans aimed at extremely rapid development of uranium mining but all current plans seem too optimistic. Russia has already reconsidered its plans making that much more realistic. Ukrainian plans have been inspired to great extent by political issues. Ukraine has very limited state financial resources to develop new mining projects and it would be politically difficult for unstable Ukrainian government to attract foreign investments and avoid accusations of selling most important mineral resource to foreigners. If the state does not find necessary funding the Ukrainian uranium mining industry will not be able to achieve ambitious targets on its own. When it regards Kazakh development plans, in our opinion, they are much more realistic, though also too ambitious. These plans could be fulfilled due to enormous potential of Kazakh deposits but, in our opinion, with a delay of a year or so. Resource base of explored Uzbek deposits is very limited in comparison to Kazakh uranium resources. Now Uzbekistan's reserves are estimated at 185.8 thousand tons (2.3% of the world reserves). Uzbekistan mines some 3.5 thousand tons of uranium annually.

4. The fact that the Soviet Union paid a lot of attention to uranium exploration allows the industry to develop already explored deposits but makes current exploration activities aimed at finding new, still undiscovered deposits very difficult. As a result, in the foreseeable future, all activities in uranium mining in the former Soviet Union will be based on the existing pool of reserved deposits. The probability of discovering new industrial-scale deposits remains extremely low in the near future.

5. Present technological basis of uranium mining industry was to a great extent inherited from the Soviet times. As a result, the strong aspects of Soviet mining industry supported development in some areas whereas weak points of Soviet technology and machinery remain the problem in other areas. For example, industrial scale experience in acid in-situ leaching of uranium deposits in the Soviet republics of Central Asia supported rapid

recovery of Kazakh and Uzbek industry based on deposits suitable for in-situ leaching. Moreover, expertise of Kazakh specialists allowed Kazakh industry to introduce the most modern technologies at their mines in a very short period. On the other hand, relatively obsolete underground mining equipment remained the problem of Russian and Ukrainian mining enterprises. At the collapse of the Soviet Union the existing level of processing technologies allowed production of very pure U_3O_8 and in this sphere there has been no need for significant technical improvements.