

“AGREED”
Production director of the GOK Bozymchak


T.U. Bitugaev
2024

“APPROVED”
Technical director
of KAZ Minerals Bozymchak LLC


Y.A. Alpiyev
2024

TECHNICAL SPECIFICATION

to provide consulting services on the technical review of the current mining method applied at the SLC underground mine of the Bozymchak deposit, with consideration of the application of other alternative mining methods (UG Mining Method Selection Study)

No.	Name	Composition of item
1.	Name of enterprise	Underground SLC Bozymchak Mine, KAZMinerals Bozymchak LLC
2.	Type of works	To provide consulting services on the technical review of the current mining method applied at the SLC underground mine of the Bozymchak deposit, with consideration of the application of other alternative mining methods to achieve minimum dilution and losses in ore production and maximum economic value of the project
3.	Customer	KAZ Minerals Bozymchak LLC
4.	Name of project organization	Based upon a tender
5.	Main tasks of work	<ol style="list-style-type: none">1. To perform a technical review of the current SLC mining method at the Bozymchak underground mine to understand its applicability in the conditions of the Central ore body of the Bozymchak deposit (design and mine planning review).2. One site visit is required to perform the technical review of exciting SLC mining method.3. Based on the geological and geotechnical factors* of the Central ore body of the Bozymchak deposit, as well as current economic** and technical factors***, analyze the trade-offs for choosing alternative mining methods to extract the Mineral Resources of the Central ore body.4. Develop a Life of Mine Planning in Deswik Software (from 2025) based on: Geotechnical assessment, stability of the mine and stope design. Dilution and Cut-off estimations. Mining methods applied (and choosing). Mine design (development and stopes). Cut-off optimization and Scheduling.5. Financial analysis (unit costs, capital costs, operational costs, etc.).6. Provide the Client with all the LoMP results (mining physicals and cost schedules) to evaluate the financial model.7. Provide the Client with the LoMP Scenario results in Deswik Software formats (CAD/Shed, etc.).

8. Provide a detailed report on the scope performed with conclusions and recommendations.
9. **Restrictions in mine scheduling:**
To achieve 1.1Mtpa production rate with a short ramp-up period.
360-400m³/s of fresh air (Main-fan capacity).
20/80% of ore blending with serpentinites and skarns for the plant feeding (if serpentinite materials is above this proportion when mining, transfer them to recent years).
When mine planning use the current underground equipment fleet the mine has.
Use Kyrgyzstan legislations in the field of Safety and Environmental when mine designing.

*These include the geometry of the deposit (ore thickness, general shape, dip, plunge, depth below the surface), rock quality (ore zone, hanging wall and footwall, i.e., structures, strength, stress, stability), ore variability (ore boundaries, ore uniformity, continuity, grade distribution), etc.

The Central ore body of Bozymchak deposit is arc-shaped formation with sedimentary rocks (limestones, sandstones), intrusive and metamorphic complexes take part in the geological structure of the deposit. Mineralization is associated with the contact of Lower carboniferous limestones with granodiorites of Late Carboniferous age. The ore bodies of the deposit are composed of skarns and serpentinites, interspersed with sulphides and associated gold. Ore minerals - chalcopyrite, bornite, pyrite, sphalerite, pale ore, chalcosine, covellite and pyrrhotite.

Size of the Central ore body – 900m strike; 10-23m thickness; dip 75-86°; 350m depth.

Ground conditions: The rock masses at Bozymchak are primarily moderately fractured with a typical GSI of 60 to 65 in limestone, granodiorite and skarn. In local areas, higher GSI values can be expected, including some >75, representative of massive conditions. Limited information is available regarding the serpentinite ore bodies. However, it is possible that GSI is consistently less than 50, i.e., highly fractured.

Intact Rock Strength and Stiffness Properties given in the Table-2 below.

Table 2 – Intact Rock Strength and Stiffness Properties from IGD Uro RAS Geotechnical Analysis [3]

Material Type	Unit Weight (kN/m ³)	UCS (MPa)	Tensile Strength (MPa)	Young's Modulus (GPa)	Poisson's Ratio	Cohesion (MPa)	Friction Angle (°)
Limestone	27.8	123	6	56		21-30	33
Granodiorite	28.3	244	16	65		20-28	35
Skarn (Ore)	30.7	174	6	47	0.26	32-40	34
Serpentinite (Ore)	27.1	110	8	77	0.19	21-30	33

**These include cost modelling, metal price assumptions, ore values, etc.

***These involve annual productivity of the plant, applied equipment, health and safety, environmental impact, ore dilution, mine recovery, flexibility of methods, machinery and mining rate, etc.

6.

Input data provided by the Customer

1. Block model of the Central ore body and Block model Report.
2. Geotechnical models available, and fault models.
3. Geotechnical reports available.

		<ol style="list-style-type: none"> 4. Surface topography wireframes. 5. Depleted pit survey wireframes. 6. As built wireframes of the underground tunnels and stopes as of 01/07/2024. 7. Development and stope forecast wireframes until December 31, 2024. 8. Current LoMP of the Bozymchak Mine in Deswik format. 9. As built ventilation model. 10. The current official design (underground mine design, 2020, Kazgiprotsvetmet, LLP). 11. Economic Inputs available (Costs, Prices, Mill recoveries, Refining charges, etc.).
7.	Due dates for scientific support and designer's supervision	Three (3) calendar months.
8.	Requirements for certification, assets and personnel of the vendor (supporting documents to be attached)	Worldwide Consultancy Company that has geotechnical and underground mining specialization/expertise (SLC/SLS, SLOS, Bench and fill Stopping, Cut&Fill, AVOCA, etc.). One person should have mine design and scheduling experience in the SLC mining method to perform the due diligence scope when visiting the site (at least 7 years).

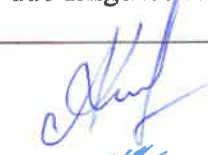




Chief engineer of the GOK

Director of mineral resources department

Director of the mine

Chief surveyor

Created by: Lead mining engineer


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