ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 2 , February 2020

Selection and Justification of Methods for Opening the SOUTHBAY Field

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ABSTRACT: The materials of the report on the results of geological exploration of the deposit of the Republican State Committee for Geology and Mineral Resources and the final results of semi-industrial tests were used, the question of the relevance of integrated mining from the bowels and the comprehensive extraction of useful components were also raised. The article describes the geological, mining and technological characteristics of the Soutbay deposit as a raw material base for tungsten ores for mining and processing in industrial volume. The proposals on the technology of mining tungsten-containing ores from Soutbay and Burgut sections by open and underground mining methods, respectively, are disclosed.

KEY WORDS: rocks, workings, sandstone, stress, deposits, cross-section, depth, massif, fortress, coal, trunk, anchor, lining, density, circle, four-angle, ventilation, congress, barrel, drilling and blasting method, subsoil, concentrate, extraction, thickness, spray concrete.

I.INTRODUCTION

The Sautbai field is located in the Uchkuduk district of the Navoi region, 40 km from the city of Uchkuduk. The nearest settlement is the village of Kokpatas, which is connected to the field by a dirt road.

The terrain of the Southbay deposit is weakly dissected with a slope to the south. Permanent watercourses are absent. Groundwater during the survey was not opened. The climate of the region is sharply continental, desert arid with dry and hot summers, cold and little snowy winters, with constant winds.

The average annual temperature is + 13°C (absolute minimum -29,8°C and maximum + 47,2°C). The average annual rainfall is negligible and amounts to 118-122 mm. The prevailing wind direction is northeast and the seismicity of the area is 7 points.

The field includes Southbay and Burgut sites. The Burgut site is located at a distance of 0,5 km to the south-east of the Southbay site. Both sections of the field are united by one geological structure. The ore-bearing horizon is not sustained in terms of power, and its composition and maximum development have been established in the central part of the Southbay site, where it reaches the surface. According to the results of exploration at the Sautbai area, ore bodies with various parameters were outlined.

They have a fairly simple stratiform or lenticular shape with a steep sub-consonant with a host rock fall. The fall of ore bodies to the east at angles of 70-80^{o} and up to 30^{o}.

The bulk of the ore bodies is composed of scheelite-carbonate-aluminosilicate ores, associated with pyroxene skarn, skarnoid, skarnovannymhornfelses, schists. The content of tungsten trioxide WO_3 in ores varies from the first tenths to 3,3%. The richest ores are located in pyroxene skarns. Scheelite-carbonate ores and scheelite-aluminosilicate ores have a slight development - with a content of up to 0,1-0,2%.

Ores of the Burgut site in terms of mineral composition, structural and textural features practically do not differ from the ores of the Southbay site.The main widespread ore minerals are: scheelite, pyrrhotite, marcasite, pyrite, bismuthin, native gold [1].

The reserves were calculated by analogy with the Ingichki and Koytash tungsten deposits (underground mining) with an on-board WO_3 content of 0,15%, minimum industrial content in the metering unit of 0,38%. The WO_3 reserves of Southbay and Burgut sites were accepted as industrial and operational in accordance with the established procedure.

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II. SIGNIFICANCE OF THE SYSTEM

Power supply of the field must be solved with the NMMC powered by a substation in the city of Uchkuduk. The source of technical and drinking water supply to the mining and processing complex can be underground waters, which are explored and approved in the appropriate order (For example, the Tuzkuduk site).
The development of the Southbay site of the Southbay tungsten ore deposit, with favorable mining and geological conditions and the nature of the terrain, it is advisable to carry out the open pit method - a quarry depth of up to 250 m [6-p.19].
At the same time, it is possible to work out a quarry with a ledge height in the extinguished condition - 15 m, a truck berm width - 15 m and a safety guard of 10 m. To ensure better ore production, the height of the mining ledges should be 5 m with selective mining, and the overburden ledges - 15 m [2].
The relief of the Southbay area allows you to open part of the horizons of the quarries directly from the surface with internal trench trenches, and open the lower horizons - temporary, constructed respectively inside the quarry or on their ultimate contour. The location of the exit trenches in the quarry can be chosen taking into account the relief, the location of the dump of rocks and the direction of ore export. The opening of working ledges can be provided for with trench trenches, from which overburden and mining operations begin at the horizons [6-p.320].

III. LITERATURE SURVEY

For the Southbay site, a transport development system is recommended with overburden transportation by truck to external dumps, and ores to the crushing unit for large crushing of the processing complex [4 - p.108].
Mining and transportation equipment is used depending on the annual overburden and production productivity [3].
The volumetric weight of ore in the deposit is 3,0 t/m^3, and the coefficient of fortress is according to the MM scale. Protodiakonova*f*=8-12.
It is proposed that the rock mass be prepared for excavation by a blasting method while maintaining the geological structure of the massif — by blasting in a “clamped medium” onto a retaining wall. When blasting practically in a squeezed medium, the coefficient of loosening of rocks in the collapse changes along the height of the collapse.
In the lower part of the collapse at the bottom of the ledge of the rock after the explosion, they are connected and K_p = 1,03-1,10. In the middle part of the collapse, blown loose cohesive rocks and Cr = 1,12-1,20. In the upper (swollen) part of the collapse of the rock, bulk and K_p = 1,3-1,5 [6- sec. 119].
Ore mining is provided on the side of the hanging side so that the slope of the ledge is consistent with the angle of incidence of the ore deposit. In addition, to average ore it is necessary to organize a special averaging-storage warehouse.
The waste rock dump should be placed beyond the contour of the quarry. Ores and host rocks of the deposit are rocky, non-toxic and not prone to spontaneous combustion. Automobile transport is most effective at enterprises with an annual cargo turnover of up to 25 million tons with a distance of displacement of rock mass up to 3-5 km.
The great maneuverability, mobility and mutual independence of dump trucks allow them to be widely used in quarry construction, in the development of complex structural deposits with irregular contours and small size of quarry fields (length 2-3 km, depth 150-200 m).
The road plan and profile must comply with the requirements of building codes and rules. The roadway inside the quarry is protected from the prism of collapse with an earthen rampart or a protective wall. The height of the shaft should be at least half the diameter of the wheel of the largest truck load capacity. All places of loading and unloading, bends, trenches, as well as internal quarry roads with active traffic are illuminated in the dark.
A special road service monitors the state of transport communications, providing safe conditions for the movement of machines [6 - p. 216,266]. Opening and development of reserves at the Burgut deposit site, where the angle of incidence of ore bodies 65-85° should be carried out by underground method [4]. It is advisable to develop the site at the end of the open mining of the Southbay site.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
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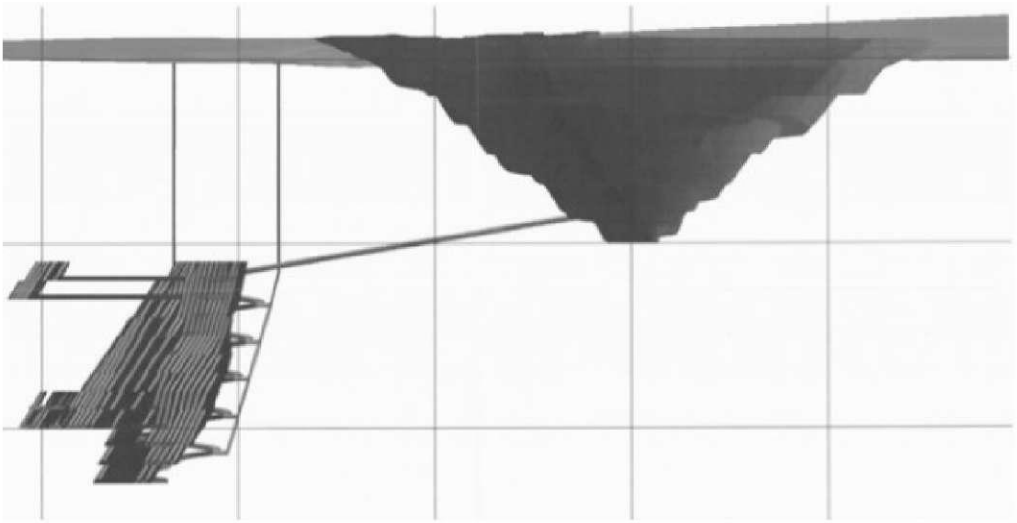

Fig1.Combined scheme of the Southbay quarry and the underground section of Burgut

The Burgut site is recommended to be opened with an inclined transport exit, which can later be used to transport ore, deliver equipment and materials and to provide underground mining with compressed air, process water and ventilation, and a vertical shaft.

IV. METHODOLOGY

The preparation of the deposit and treatment units is carried out by underground mining and development workings using a blasting method using self-propelled equipment.

Given the geological and mining conditions for mining the ore bodies of the underground section of Burgut, it is advisable to adopt a sub-chamber chamber development system with borehole drilling. And the preparation of the ore field to produce field underground mine workings [7- p. 106,138]. The main concentrate of tungsten is scheelite. In skarns, skaroids, scheelite usually forms uneven impregnation in the form of isometric grains with a size of 0,1-0,3 mm. And of the associated components, gold (from 1,0-1,2 to 4 g/t), copper (0,05-0,2%) and bismuth (0,01-0,4%) can be of practical importance.

The technological properties of ore deposits have been studied in sufficient detail in laboratory, enlarged laboratory and semi-industrial samples during the evaluation and exploration work. The technological schemes of tests, taking into account the high content of sulfides, included both scheelite and sulfide flotation.

According to the industrial tests conducted in the Ingichkinsky OMTE of samples from the Southbay site, the WO3 content in the obtained concentrate was 55,6% with an extraction of 66,65%, in the gravity concentrate it was 31,68% with an extraction of 8,84%.

The average WO_3 content in the marketed product was 51,1% with a total recovery of 75,49%. The yield of sulfide concentrate was 11,8%.The concentrate contains sulfur (30,1%), copper (0,67% with 90,97% recovery), bismuth (0,12% with 65,3% recovery), gold (5 g/t with 84,3% recovery).

V. EXPERIMENTAL RESULTS

On the basis of technological tests, it is predicted to obtain high-quality concentrate with a content of 65% with 100% extraction. And the tungsten ores of the Burgut site are characterized, in comparison with the Southbay site, with lower carbonate content, which can reduce the acid consumption for their leaching.

The Law of the Republic of Uzbekistan on subsoil states that subsoil is the property of the Republic of Uzbekistan, is subject to rational use and protected by the state ; users of subsurface resources are required to prevent selective mining of rich sections of mineral deposits ;the basic requirements for the rational use and protection of the subsoil are to ensure the completeness of the geological study and integrated use of the subsoil and to ensure the most complete extraction from the subsoil of economically viable reserves of the main and, together with them, the occurring minerals, associated useful components [5].

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 2 , February 2020

The 2001 Protocol of the State Reserves Committee of the Republic of Uzbekistan noted that tungsten ore reserves of the Sautbai area were calculated below 250 m by category C_2, the protocol of 2017 on the Burghut site, in addition to balance reserves, approved off-balance reserves of category C_2 and estimated forecast resources.

The legal entity is instructed by the same protocol to conduct geological exploration to refine the parameters of ore bodies by thickening the exploration network with to calculate the reserves of tungsten ores by categories C_1+C_2 with the involvement of additional volumes of production, which will undoubtedly lead to an improvement in the economic efficiency of the entire complex, additional technological tests to determine the possibility of extracting associated components (gold, copper, bismuth) [6].

VI. CONCLUSION AND FUTURE WORK

These works will allow solving urgent issues of increasing the mineral resource potential of the Southbay deposit (Southbay and Burgut sites) and the comprehensive extraction of useful mineral resources of the Republic as a whole. A comprehensive geological and economic assessment of deposits, based not only on the accounting of the main minerals and components, but also associated (including overburden, valuable ore minerals, elements-impurities of ore concentrates, concentration and redistribution waste, drainage water), significantly increases the economic potential of explored reserves, helps to reduce losses in production, enrichment and redistribution.

In addition, it creates favorable conditions for involving deposits in the economy, the development of which only for the main component is unprofitable or even unprofitable. Along with this, the integrated use of deposits is one of the main components of the ecologization of subsoil use. The share of associated components in the cost of commodity production of ore deposits is often tens of percent, reaching 45 - 50% in titanium-zirconium placers and copper deposits and 70% in polymetallic deposits[7].

Almost all of the rare-earth and dispersed elements needed in technology, which do not form independent deposits in nature, can be obtained only through the integrated processing of non-ferrous metal ores. Cobalt, nickel, titanium, vanadium, phosphorus and other valuable elements can also be extracted from many iron ores. And in the example of the tungsten ore deposit we are considering - gold, copper, bismuth, etc.

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ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 2 , February 2020

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