ANALYSIS OF TECHNOLOGICAL SCHEMES USED FOR THE DEVELOPMENT OF DEPOSITS OF THE ZARMITAN GOLD ZONE BY UNDERGROUND MINING

Khakimov Shadiboy
Navoi State University of Mining and Technologies
Associate Professor of the Department of Mining

Kobilov Olimjon
Navoi State University of Mining and Technologies
Doctoral student of the Department of Mining
E-mail: olimjonkobilov@gmail.com

Nurmamatov Khurshidjon
Navoi State University of Mining and Technologies
2nd stage master's degree of the Department of Mining

Abstract: *In this article presents parameters of technological schemes for extraction of vascular deposits using artificial integrity in difficult geomechanical conditions for the development of vein deposits.*

Keywords: *vein deposit, underground mining, sublevel breaking, sublevel drifts, natural pillar, ore loss, massif stability, safety, hardening backfill, backfill chambers.*

Zarmitan gold zone was operated by the "Zarmitan" underground mine. The reserves of the deposit were opened by two vertical shafts "Main" and "Auxiliary" to the horizon of 720 m.

Underground mining started in 1989. The surface of the mine is equipped with appropriate infrastructure.

On the Eastern flange of the deposit, from the surface to the horizon of 600m, an exploration shaft of mine No.10 was passed.

Part of the reserves was worked out by quarries [1].

In 2005, the institute "Uzbek Scientific-Research and Project Institute of Geotechnology" completed a working project "Construction of an inclined transport exit (NTS) to open reserves of a 780m horizon in the central part of the ZZZ" and carry out repair and restoration work in the existing vertical shafts "Main" and "Auxiliary" without stopping ore mining. The NTS is designed to deliver 650

thousand tons of ore per year by underground dump trucks. Trunk cross-section: in draft – 19,5 m^2, in the light – 17,6 m^2, slope – 8^0.

In 2009 – 2010, a feasibility study was developed for the "Construction of a mining complex based on the ZZZ deposits", which includes the Gujumsay mine [2-4]. In 2010, a working project was developed for the "Exploration and development of the reserves of the eastern flank of the ZZZ using the shaft of mine No.10 of the Zarmitan mine".

In 2010 – 2019, working projects were developed "Opening and mining of reserves below the mountains. +780 m to the central and eastern flank of the ZZZ".

Similar work projects have been completed for the western flank of the deposit being developed by the Guzhumsai underground mine.

In addition, a number of scientific and research works have been carried out aimed at improving the applied development systems, introducing technologies with backfilling of the worked-out space, studies to reduce losses and impoverishment of ore at existing mines.

Exploration deposits of the Zarmitan gold ore zone (ZZZ) were carried out in two versions:

Option A – opening with a vertical shaft: The vertical shaft is equipped with a cage hoist 2T-4x2,3 (MPB 5-2-2) with a 630-kW electric motor, which provides operations for lifting and lowering people and goods from lower horizons.

Deposits with a vertical step of 60 m are divided into working horizons, opened by crosscuts and haulage drifts. The workings of the upper horizon are used as ventilation for the subsequent horizon.

Haulage of the rock mass along drifts and crosscuts to the near-shaft yard is carried out by electric locomotives 4KR-600, 7KR-600, 10KR-600 and 12KR-600.

Option B - with an inclined transport exit (NTS):

When opening from the NTS, every 60 m vertically, there are runs to the horizons and loop loading stations. Loop loading stations for ore and rock descents are built in each horizon.

To ore passes equipped with VDPU4-TM type ejectors (capacity 800-900t/h) from stopes and preparatory faces along horizontal mine workings by ST 710 loading and hauling machines with a lifting capacity of 6,5t.

Further, with reloading, the rock mass is transported by underground dump trucks MT431V (EJC – 530) with a carrying capacity of 28 (25) tons along an inclined transport shaft (exit) 5-G (1-Z) to the surface.

Delivery of materials and transportation of people through mine workings in underground mines is carried out:

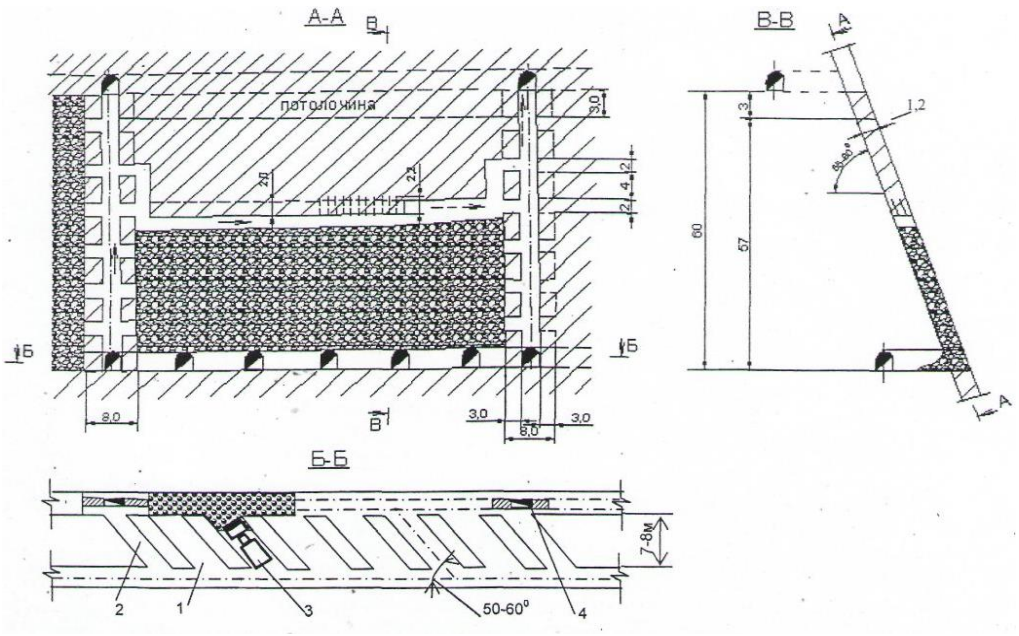
- along the “Auxiliary” shaft - in cargo – human cages 1NV3.1 with a carrying capacity of 7.0 tons and a capacity of 18 people;

- along an inclined transport shaft (exit) and horizontal workings - in self-propelled vehicles with a diesel engine of the 1VOM-A, DZ, VV and VLG types for the transportation of various cargoes, fuel, explosives and people, respectively.

Improving the stripping scheme is aimed at achieving the highest possible productivity of mines through the use of high-performance equipment [5-9].

For the development of ore veins up to 2 m thick, the system with blasthole breaking and ore storage is considered as the most optimal one (see Fig. 1).

Preparation of blocks for breaking in the system of development with ore stockpiling consists in carrying out a transport ore or field drift, loading ort-arrivals, block ore and field rises on the flanks, driving drifts by scraping, outlet funnels and vents.



1,2 – orts of races; 3 – loading and hauling machine; 4 – block rising

Fig. 1. Mining system with blasthole breaking and ore storage

Ore bodies with a thickness of more than 2m are mined by a system of mining with sublevel ore breaking, with the addition to the design of traditional schemes, sectional ramps (see Fig. 2). The cross-section of preparatory-cut workings was increased up to 9,8 m^2.

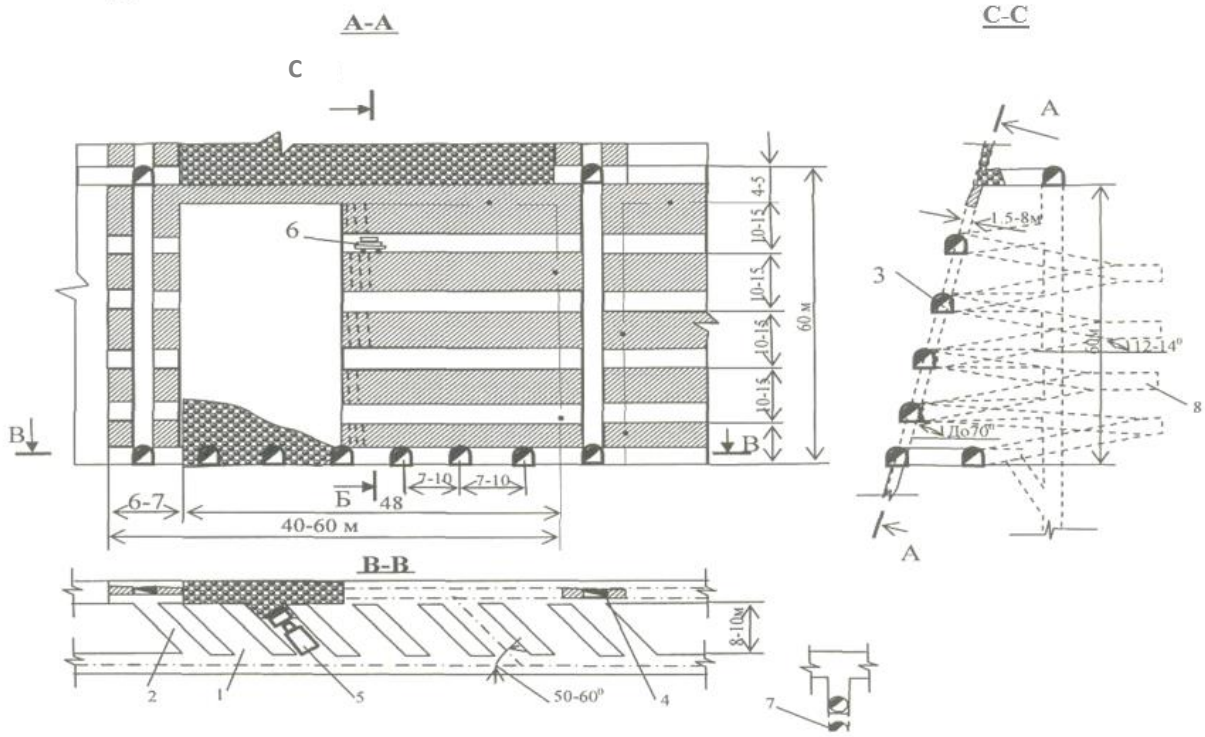
The preparation of blocks for a clearing excavation consists in carrying out field transport and delivery drifts with an unloading chamber, ore passes, loading ords and a material and running riser. The driving of rising workings, depending on the conditions of development, is carried out both in the field and in the ore. The height of

the sublevels is 10–12 m, determined taking into account the possible curvature of wells during their drilling [10-12].

Walkers from rising workings pass through every 10-12 m to access sublevel drifts.

The working parameters, bottom design, height and length of blocks are formed typical of the mining system with ore stockpiling. Ore breaking - borehole. A set of fan wells are located in a vertical plane and are drilled from sublevel drifts. Broken ore is collected in a trench cutting at the delivery horizon and is delivered with a loading-dump machine to a block ore pass, through which it enters the haulage horizon [13].

In the mining systems used to mine single or distant ore bodies, ore preparation has been adopted. And the preparation of ore bodies parallel in plan was carried out according to the scheme: - field drift with orts.



1 – delivery drift; 2 – trench drift; 3 – break-in of the riser with drilling sublevels; 4 – block rising; 5 – camera borders; 6 – interfloor pillar (ceiling); 7 – collapsed rock; 8 – spiral ramp, which served as haulage for the upper horizon; 9 – inter-chamber rear sight; 10 – ore pass; 11 – drilling underground drifts; 12 – blast holes; 13–loading bays

Fig. 2. Underground braking system using portable equipment

All workings are passed basically without fastening.

Driving of haulage and other horizontal workings is carried out using self-propelled equipment, instead of rock drills, manual rock drills, scrapers and rock loading machines on rails [14].

The driving of raised workings is carried out both by conventional and mechanized methods using the KPV-4 tunneling complex without fastening.

The specific volume of preparatory and threaded workings per 1000 tons of operational reserves is:

- in the development system with small-hole breaking and ore storage 70-100m³, including preparatory – 30-45m³, rifled – 40-55m³;

- in development systems from sublevel drifts 70-80m³, including preparatory – 20-25 m³, threaded – 50-55 m³.

Hole drilling in the development system with small-hole breaking and ore storage is carried out with telescopic perforators. Ore was loaded into trolleys by a PPN-1S loading machine.

At present, loading and delivery of ore to concentration units is carried out by loading and hauling machines.

A self-propelled drilling machine is used instead of the NKR-100m rig to drill wells in the development system from sublevel drifts.

The operational loss of ore consists of ore lost at the contacts of the ore body with rock, broken ore lost during tapping and reserves left in natural ore pillars. The reasons for the dilution of ore are the ingress of waste rocks and substandard ores during ore breaking and tapping. At the same time, their planned values on average for the field are: losses at the level of 5% and impoverishment - up to 20%.

REFERENCES

1. Hakimov Sh.I., Qobilov O.S., Abruyev S.Sh., «Murakkab kon-geologik sharoitda madanni nimqavatlardan maydalab tushirish tizimi samaradorligini oshirih,» III-Xalqaro konferensiya materiallari, Navoiy, 2022.
2. Хакимов Ш.И., Таджиев Ш.Т., Кобилов О.С., & Ашуралиев У.Т. Обоснование количества перегрузочных узлов в рабочих горизонтах шахты при использовании подземного транспорта и погрузочно-доставочных машин. In Ф79 Форум гірників–2019: матеріали міжнар. конф., 26–27 вересня 2019 р., м. Дніпро: Журфонд, 2019–379 с. (р. 291)
3. Хакимов Ш.И., Таджиев Ш.Т., Кобилов О.С., Определение минимальная длина и ширина карьерного поля при разработке горизонтальных пластовых месторождений, № 3, 34-38., 2020.

4. Таджиев Ш.Т., Кобилов О.С., Ермекбаев У.Б., & Ашуралиев У.Т. Исследование особенностей технологии разработки жильных месторождений кызыкумского региона подземным способом с использованием самоходных комплексов. In Ф79 Форум гірників–2019: матеріали міжнар. конф., 26–27 вересня 2019 р., м. Дніпро: Журфонд, 2019– 379 с. (р. 32).
5. Раимжанов Б.Р., Хакимов Ш.И., Хамзаев С.А. Sublevel Mining System with Artificial Pillars Made of a Hardening Backfills for The Development of Veins in Difficult Geomechanical Conditions //Texas Journal of Multidisciplinary Studies. – Vol. 03. – Issue 12-12. – 2021. – P.98-103. https://zienjournals.com /index.php /tjm/article/view/394
6. Раимжанов Б.Р., Хакимов Ш.И., Хамзаев С.А., Равшанов А.А. Технологическая схема подэтажной системы разработки с искусственными целиками из твердеющих смесей для сложных геомеханических условий //Горный вестник Узбекистана. – Навои, 2022. – 1(88), – С. 16-20.
7. Хакимов Ш.И., Таджиев Ш.Т., Кобилов О.С., Гиязов О.М. Обоснование высоты этажа при разработке крутопадающих жильных месторождений //Горный вестник Узбекистана №1 (80) 2020 г. – с. 7-9.
8. Хакимов Ш.И., Кобилов О.С., Тошназаров А.Х., Суннатов С., Пулатов Д.Ш. Оценка возможности увеличения высоты этажа при разработке крутопадающих жильных месторождений // Материалы международной научно-технической конференции на тему: «Перспективы инновационного развития горно-металлургического комплекса». – Навои, 2018. – С. 65.
9. Хакимов Ш.И., Кобилов О.С. Повышение эффективности систем подэтажного обрушения в сложных горно-геологических условиях // «Материалы Международной научно-практической конференции «Интеграция науки, образования и производства – залог прогресса и процветания», посвященной 5-летию основания Навоийского отделения Академии наук Республики Узбекистан», Том I: 9-10 июня 2022. – С. 356.
10. Хакимов Ш.И., Кобилов О.С. Новая технологическая решения совершенствования систем разработки с подэтажной отбойкой руды в сложных горно-геологических условиях // Innovations in technology and science education. – Volume 1. – Issue 1. 2022. – С. 130.
11. Таджиев Ш.Т., et al. "Подработка массива горных пород и подготовительных выработок при разработке пластов подземным способом." Стратегия

развития геологического исследования недр: настоящее и будущее (к 100-летию МГРИ-РГГРУ). 2018..

12. Xakimov Shadiboy Ikmatullayevich, Qobilov Olimjon Sirojovich, & Abruyev Samandar Shodmon o‘g‘li. (2023). Murakkab kon-geologik sharoitdagi tog‘ jinslar massivi holatini boshqarishda qotuvchi to‘lg‘azmalarni qo‘llash samaradorligini asoslash. Innovative development in educational activities, 2(2), 124–133. https://doi.org/10.5281/zenodo.7583985
13. Xakimov Shadiboy Ikmatullayevich, Qobilov Olimjon Sirojovich, & Abruyev Samandar Shodmon o‘g‘li. (2023). Tomirsimon konlarni sun’iy butunliklarni qo‘llash bilan qazib olish texnologik sxemalarining parametrlari. Innovative development in educational activities, 2(3), 95–101. https://doi.org/10.5281/zenodo.7644430
14. Назаров Заир Садикович, Ермекбаев Умиджон Бобакулович, & Гиязов Отабек Мухитдинович. Разработка программы и аппарата выполнения исследований по обоснованию параметров и показателей разработки сложноструктурных месторождений фосфоритофых руд. Innovative Development in Educational Activities, 2(3), 29–35. Retrieved from https://openidea.uz/index.php/idea/article/view/738