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Geological and Mineralogical Theories of Open Pit Mining in Mining Enterprises

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Abstract. *This article provides information about the geological and mineralogical condition of the mine during open pit mining. Its structural properties, chemical and physical properties are of great importance in the extraction of ores and minerals in mining enterprises. It is advisable to take into account the structure of the rock together with the mechanical properties of the rock when drawing up the scheme of mining processes. The size of the mine is important in determining the schedule of production of materials and the order of their extraction in open mining processes of mining enterprises. The purpose of this paper is to develop, validate and present a multi-stage methodology for three main interrelated components of open pit mine planning: design of controllable optimal stages, characterization of selective mining units and long-term production management of such processes. Mining optimization of planning. A hybrid solution methodology for open pit design using integer programming and local search heuristics is presented. Next, a hierarchical clustering approach with size and shape control combines blocks within the limited surface area dimensions of open pits, and thrust limits are presented, and finally, a full linear programming mathematical model of the mixed-methods mining system is introduced. uses produced capacities and aggregates as planning units to provide optimal mine utilization schedules. The open pit mining process planning tool enables the mine planner to optimize large-scale real-time multi-pit multi-process planning problems, taking into account mine fleet capacity, production capacity and method mix requirements.*

Keywords: *Open pit mining, mineralogical properties, rock, geological prospecting, mechanical properties of rock, chemical composition of rock, ore rocks.*

Introduction

It is necessary to have information about the composition, properties and geological and mineralogical conditions of ores in open-pit mining. It appears that the focus of researchers has been on obtaining information about the rock mass indirectly and automatically, which has led to an increased understanding of the interactions between the machine and the rock material. In addition to characterizing rock properties, process parameters can be used for online diagnostics of drill tool wear and other parts of machine equipment. It is difficult to approach real contact conditions due to the dynamic effects that may be associated with elastic deformations of the drill string and other structural elements with laboratory tests or their optimal selection and operation. For example, in drilling units, the influence of coupling modes on torsional, bending and axial vibrations can be observed. Therefore, simultaneous monitoring of acoustic data, voltages, currents and other signals available from on-board data acquisition systems, such as water pressure or temperature, can help to better understand some hidden dynamic processes in the machine. should give, which leads to a higher level. work through its automation and control. Acoustic telemetry and mud pulse telemetry are communication methods used in deep well drilling to provide valuable online data from the subsurface. However, acoustic signals are significantly attenuated and need repeaters to transmit

them to surface monitoring systems. Horizontal blast holes have a relatively small depth (2-6 m); Thus, acoustic signals can be recorded directly through the built-in microphone. This unique feature serves as a physical basis for monitoring the drilling process and tool position through acoustic waves generated in the rock deformation zone. Proper segmentation of continuously recorded signals is absolutely necessary for proper understanding of events in the drilling process and equipment, as with other types of underground mining machinery. Often the inner track is right at the same time. spiral and spit includes parts. So complicated conditions for opening separate horizons when building highways, quarry the efficiency of transport work and the development of a rational system application improves. The inner track is a direct continuation of the outer track. Such mixed track is usually used for opening in deep quarries: several outer horizons are opened using the outer track. and to the lower horizons of the quarry, an internal track is carried out. The deepening of the internal capital trenches route is his. It is determined by the average size of the curve and the actual length. The quarry is very deep and noticeable on the normal track in the development of mines with length, and mining condition– length in the relatively small size of the mines, especially the quarry on a large slope, the dimensions of which are not large along the length is used. Belt Finals to reduce the harmful effects of detonation the following are required: indicators of drilling and blasting operations change; (subject to certain conditions) desirable short retarded burst diameter of depth charge and application of contour explosion, inert charges; go to a series of pits placement at an angle of 60 - 90o to the contour; which screens use screws; use of artificial strengthening of belts; the stability reserve coefficient for accounts increased input. Short-term and long-term stability of slopes they differ in having working and non-working belts respectively required Coefficient of reserve strength of working belts r|u =1.15 + 1.2, r|u =1.5 in untreated clay and cracked rocks and semi-rocks— 2. Pre-slope angles of working and idle belts. It is intended to use the information specified in the selection especially robust to determine the value of angles. In the negative direction of loose rock or weakened surface, slopes it is necessary to carry out natural research and calculation of its strength. Mining Efficiency - Ore Free Mountain* by the ratio of rock volume to mined mineral unit is determined and this ratio is called the coefficient of the covering rock. Opening the ring track with internal trenches they create. if a motor vehicle is used and the probability in railway transport. Spiral track agar ring or the ore location of the dead-end tracks, the boards transportation required transport feature, career transport if it is not possible due to the conditions of the effectiveness of his work, or build a rational society. Rebuild the railways on the spiral track. It is very difficult to build and therefore it is stationary in this case need Periodic resurfacing of highways in automobile transport construction is possible. In general, the entire complex of open-pit mining works is connected to each other the following main stages of production related includes:

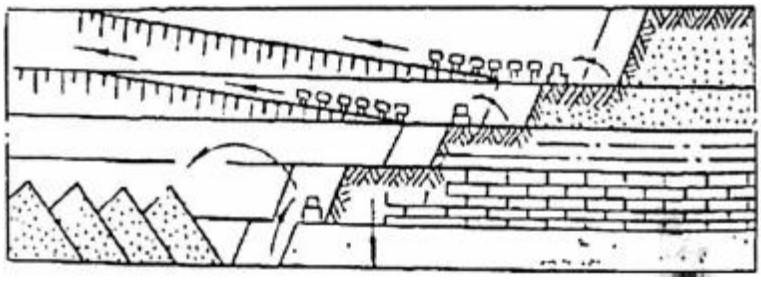
1) The quarry is intended for mining capital works preparation of the part:

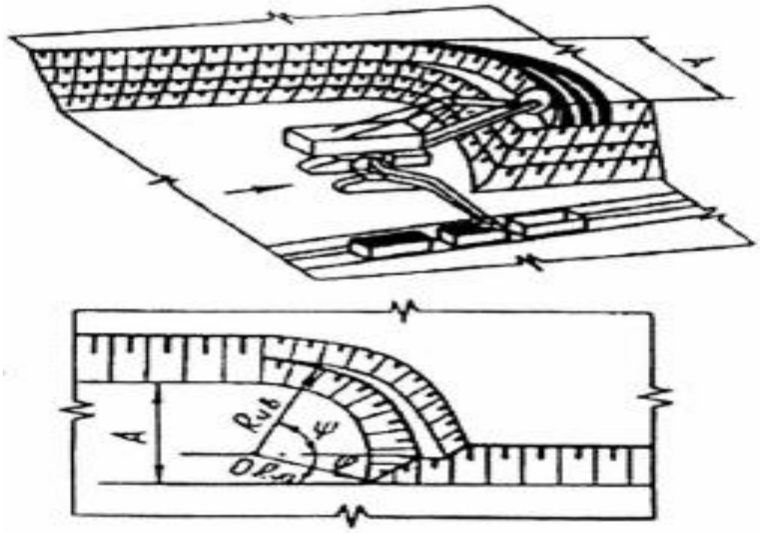
2) Drying of the mine and possible coming from the surface barrier from waters;

3) Mining - capital works;

4) Mining operations;

5) Reclamation after the completion of mining operations





The surface part of the mine. i.e. drying and top of mine remove water from the part. usually a drying drainage canvas (ditch) is carried out with the help of . In order to protect the quarry (mine) from surface water (rainwater, snowmelt water and adjacent water waters coming from reservoirs) where mining works are carried out drainage ditches are laid outside the area contour. Preliminary drying of the mine - before the start of mining operations will be held. For this purpose, underground drainage ditches are laid in the mine or wells that lower the water level are drilled in the mine. Current or operational drying - with mining which is carried out at the same time and water from the mined area consists of exclusion. Loss of water coming to the quarry in a combined method, that is, using open and underground water removal is done. In the first case, water to the water collector collected and pumped to the surface. in the second case while. through special wells is collected in underground drainage basins and drainage rises to the surface along the mine shaft. Mining capital works. The main purpose of mining-capital works is mining is to open and consists of capital and cutting trenches. Mining - vehicles during the construction of the quarry is to ensure that it reaches the mineral. Capital Moat is a working horizon opening service open pit slope. ground vehicles ensures that it reaches the mine from the surface of the earth. A cutting trench is a horizontal open pit mine that is useful creating a working face to mine a mineral or overburden will give. Mining operations – minerals should ensure extraction with minimum costs. The majority in most cases during the extraction of minerals. The scope of work corresponds to the opening work and it is an open pit mine it is the most important aspect of their activity. Mining - mineral coating and flour separation of mixed rocks, as well as their displacement and including placement in tumors. Mining works - in the specified volume. with the required quality and includes mining and transportation operations with minimal loss takes. Mining includes the following steps: useful excavation-loading, transporting, stacking or unloading of fossils. Open pit mining and mining, covering and describes a specific procedure for moving mixed genders. Planned development of rocks and rational use of devices. Often a quarry area for separate layers divided into horizontal layers. Rock layers consecutively from top to bottom, regardless of the direction of plasticization they do. The probable number of layers is the depth of the quarry in the plan and depending on the size. The strength of the layers according to the depth of the quarry may be different. When layers are processed simultaneously belts are formed. The number of arches according to the bed in the profile of the quarry area load carrying capacity, its angle of descent, development of rocks complexity, means of pickup and drop-off used depends. They work with a single belt with a very small power bearing; where the vertical force is mv<2-K3 m, and the horizontal bearing is the same. development with bucket excavators is not efficient, horizontal and fresh in sloping and large beds with capacity mg < 20^40 Cutting the belt is not only the mineral lying above complete extraction from the horizon, but also by mixed rocks due to additional displacement. The mineral has a small capacity (mv=4-K20 m) from horizontal beds of normal height it is made with a belt and inclined and large beds (mg = 20 ^ 40 m) the section of the next belt lies above it becomes possible after taking a bearing on the horizon. Medium the carrying capacity of the quarry (mv= 15-^40 m. mg = 5CH-120 m) One profile can be developed

simultaneously with two belts. Power bearing (mv>2(K40 m. mg>80-450 m) three and more develop with more arches or smaller arches. Sometimes the rocks are developed on slopes and slopes depending on the layer, the slope has different strength (depending on the strength of the layers). carried with layers (belts). Separate the layers in a row designed in advance. It rarely works from the center of the quarry site to its boundaries they do with large (more than 25-30°) layers. It is located in solid arrays under the given conditions providing working slopes of much larger quarry boards and allows to reduce the volumes of purchase works. However opening horizons and transportation of ore mass in such a mine becomes much more difficult. The strip is one of the most important elements of open welding. The height of the arch is reasonable if: mining safety, construction at a high level release the minimum amount of productive work. Reception and opening works the annual amount to be paid and the minimum expenses for them. Belt height directly affects overall career performance indicates: the quality of the mined mineral; forward displacement speed; mine the pace of work deepening and, accordingly, career development output capacity: duration of quarry construction; mining capital works volume: previous works. total length of roads inside the quarry; worker and the slope angle of the free-standing planks. The reasonable height of the arches depends on some factors irreplaceable; from the factors listed above based on the combined effect of certain natural conditions and the worker should be chosen taking into account the possibility of opening horizons. Analytical methods for determining the belt height of these factors does not take into account everything. Mining operations safety is the main requirement. In the development of horizontal and inclined beds, bed and the strength of cover rocks is usually the height and number of arches predetermines. Horizontal and inclined plates alternate. The height of the arch is determined by the individual plates and the strength between them depending on the underlying loose rocks. mineral quality determined taking into account the statute. The strength of the slope is crucial important. In such rocks, according to safety rules, a belt height does not exceed the maximum height of the excavator need. Often stone and on steep and large slopes with semi-rocky rocks. The height of the tape is mainly an indicator of technological processes and is useful loss of minerals, necessary development of the quarry determined by the possibilities and conditions of opening work horizons. Preparation of stone and blasted rock. The cost of transportation increases the height of the belt reduced by excavating blasted rocks the minimum costs correspond to the height of the arch up to 15 - 20 m. At the same time, according to the rules of technical use (TFQ) arch height, overturning height in rock and semi-rock rocks provided that the following. excavator max should not be more than 1.5 times the excavation height: birva in two-row blasting - maximum excavation of the excavator height. and in multi-row blasting - one and a half digging equal to the maximum height. A blast from such overturners prevent the formation of "tails" during the excavation process additional measures should be taken. Simple and in increased VV consumption and oblique drilling of pits. I and II cracks when the erupted rocks are scattered with the permission of Davkontekhnazort bodies in category rocks roof height Nu > 1.5 Nch.max is allowed. The speed of the trench is equal to the height of the belt inversely proportional. This is the rate of mining depending on the tempo. The greater the height of the belt, the greater the career This is the potential of the mineral's production capacity. This rule is especially important in the first period of career important. At the same time, the required size of the opening work is the working belts reduce the number of working boards of the quarry and increase the slope angle. As a result, the height of the belt decreases. In this too the required drift rate and the length of the receiving front are reduced. Quarry in the open exploitation of mineral deposits during the entire period of construction and use prevent deformation and durability of belts provision is very important. Among the many factors that determine the strength of the slope. A group of geological factors is decisive (content. condition. Mine structure and properties of rocks). They are deformations of the array conditions. selection of slope stability calculation schemes. the nature of anti-deformation measures and calculation parameters defines the dimensions.

Conclusion

Mining geological coordination composition from the group of hydrogeological factors (carbonate cracks igneous rocks. as a result of swelling of clay rocks, etc.) and the influence of underground water, which changes its state of strength is the main one; under the influence of hydrostatic and

hydrodynamic forces filtration failure on slopes may occur (leakage and suffocation). Contact zone and structural fault hydration deformation. The third group consists of technological factors. Indicators of opening of solders. Mining to the career plan geological condition and serviceability of the array intensity of flow development and ventilation of cotton gins. determines the development of deformation processes (cutting and breaking contacts \ etc.). Open mining Deformation and geological work is carried out at high shear rates. There is no time to develop stages. to the slope of these working belts. This allows you to reach a very large angle. Quarry boards are convex, convex and flat in plan can have boMaxes of the form Other things being equal. Slopes with a curved shape in plan are more than flat strength improves. Blasting is the origin of the seismic effect, the slope of the belt don't crack the front line and put it on low power, and the belt itself was not strong leads to the formation and development of the surface.

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