The American Journal of Engineering and Technology
(ISSN – 2689-0984
Published: April 22, 2021 | **Pages:** 25-30
Doi: https://doi.org/10.37547/tajet/Volume03Issue04-04

IMPACT FACTOR
2021: 5. 705
OCLC - 1121105677

Investigations Of Physical And Mechanical Properties And Fracturing Of The Kyzyl-Alma Deposit

Kazakov Aziz Nigmanovich
PhD, Tashkent State Technical University, Tashkent, Uzbekistan

Khakberdiyev Muzaffar Rustamovich
Doctoral Student, Tashkent State Technical University, Tashkent, Uzbekistan

Rakhimova Mukhlisa Hasanovna
Doctoral Student, Tashkent State Technical University, Tashkent, Uzbekistan

Rasulov Abdulla Khayitbaevich
Assistant, Tashkent State Technical University, Tashkent, Uzbekistan

Eshnazarov Mustafa Shaimardanovich
Master's Degree Student, Tashkent State Technical University, Tashkent, Uzbekistan

ABSTRACT

The article examines the main factors that affect the nature of the manifestation of mountain pressure. The physical and mechanical properties of rocks are the main factor determining the nature of the manifestation of rock pressure, their stability and their tendency to self-collapse.

KEYWORDS

Tectonic cracks, zoning of deposits by rock impacts, impact-prone deposits, deformation processes, forecasting the stability of the instrument array, tectonic disturbances.

INTRODUCTION

The Kyzylalmasai goldfield is located on the southwestern spurs of the Chatkal Range in the Kacha and Karatau rivers and is part of the Kuramin structural-facies subzone of the Middle Tien Shan zone.

The "Kyzyl-Alma" locality is located in the central part of the Kyzyl-Almasay orefield. The "Central" section, which currently determines the practical significance of the field, is located in the middle part of it and is confined to the

The American Journal of Engineering and Technology
(ISSN – 2689-0984
Published: April 22, 2021 | **Pages:** 25-30
Doi: https://doi.org/10.37547/tajet/Volume03Issue04-04

IMPACT FACTOR
2021: 5. 705
OCLC - 1121105677

south-eastern end of the Kyzyl-Almasai fault. The industrial ore bodies of the deposit are confined to the zones of intensive calcination of large tectonic disturbances – secant and intraformational disruption.

The ore bodies are composed of quartz, including fragments of the host rocks. The proportion of quartz varies between 30-100% and averages 70%. The main useful components of ores are gold and silver. In general, the field is characterized by complex mining and geomechanical conditions. One of the main factors affecting the mining and geomechanical conditions of development is the physical and mechanical properties and fracturing of rocks. The study of rock fracturing at the Kyzyl-almasay deposit was carried out at the site in the area of the ore body I-Ia. Measurements of the elements of the occurrence of cracks on the horizon of tunnel No. 15 were made according to the method of the Institute "VNIMI" with the help of a mountain compass GC-2 and a tape measure RG-2. Processing of the measurement results is carried out according to the generally accepted method on a pie chart. The total number of measurements is 80. The analysis of the research results makes it possible to distinguish 9 systems of cracks, of which the main ones are two groups of cracks: large ones of tectonic origin and small ones separately (Table 1). Tectonic cracks are characterized by significant linear dimensions, low intensity (5 cracks per meter), and varying degrees of crack opening (from visible to open). Along the planes of attenuation, calcium, quartz, iron hydroxides, and clay of friction and sliding are developed. The surface of the mixers is smooth and smooth.

Table.1 Characteristic of fracturing of the ore body I-Ia at the mountain. 1165 m of the Kyzyl-almasay deposit.

System group, strike azimuth, degree	System number	Elements of occurrence, degree		Linear dimensions		Distance between cracks, sm	Number of cracks 1m workings	The proportion of cracks from the total number of measurements, %	Note
		The azimuth of the fall	Angle of incidence	Length, m	Width, sm				
Large tectonic cracks									
Latitudinal, 270^0	I	0	45	2,5-3,0	4,0	20	5	2,5	Tectonic disturbances
Sub-latitude, 80^0	II	350	45	2,5-3,0	3,0	20	5	13,4	
North-West	III	255	45	0,05-0,1	0,1-0,2	3,0-5,0	20-30	5,0	Cleavage
	IV	80	45	0,05-0,1	0,1-0,2	3,0-5,0	20-30	14,4	Cleavage
North-East 60^0	V	150	45	0,05-0,1	0,05	1,0-3,0	30-50	10,0	Shale formation
North-West 290^0	VI	200	45	0,05-0,1	0,05	1,0-3,0	30-50	11,4	Shale formation

The American Journal of Engineering and Technology
(ISSN – 2689-0984
Published: April 22, 2021 | **Pages:** 25-30
Doi: https://doi.org/10.37547/tajet/Volume03Issue04-04

IMPACT FACTOR
2021: 5. 705
OCLC - 1121105677

		200	45	0,05-0,1	0,05	1,0-3,0	30-50	8,4	Shale formation
Small cracks									
North-West 320^0	VII	50	45	0,3-0,5	0,1	20-25	25-30	13,5	
North-West 315^0	VIII	225	45	0,3-0,5	0,1	20-25	25-30	6,7	
North-East 315^0	IX	320	45	0,3-0,5	0,1	20-25	25-30	15,1	

Individual cracks are characterized by small linear dimensions. Their length is from 30 to 50 cm, they have a significant intensity (25-30 cracks per meter). Cracks are characterized by a small degree of disclosure (less than 1 mm). Quartz, iron hydroxides, and sulfides are developed along the cracks. The proportion of individual cracks is 35.5%.

During the measurement process, visual observations were made of the actual stability of the workings. The analysis of these observations allows us to note that the stability of the workings located across the strike of the ore body is higher than the workings oriented along the strike of the deposit. In the roof of the workings, as a rule, a "tent" is formed. This can be explained by the presence of significant horizontal stresses of tectonic origin in the rock mass of the deposit. In this case, the maximum stresses act across the strike of the ore body. And the workings passed across the strike of the ore body have the smallest cross-sectional area in the direction of maximum stresses and therefore they are more stable.

In general, it should be noted that the manifestations of rock pressure (delamination, collapse) occur in the most developed systems of cracks.

One of the main factors that most affect the geomechanical conditions of the massif and the manifestation of rock pressure in a dynamic form are the strength and deformation properties of rocks.

As is known, the structure of the mountain range is a heterogeneous environment, both in petrographic and mineralogical composition. Therefore, when developing impact-prone deposits, it is necessary to clearly zone the rock mass according to physical, mechanical and structural features, with the allocation of characteristic zones and areas with abnormal deviations that pose a certain danger when conducting mining and mining operations.

The Kyzylalmasay deposit is one of the most complex types of ore formation. It is characterized by a high intensity of fracturing, weak adhesion of individual blocks of the massif, and relatively low strength of ores and rocks. At the same time, the properties of the massif, both strength and structural, are ambiguous within the ore body and fluctuate in a fairly wide range. This circumstance predetermined the need to study the properties of rocks and massifs in order to develop recommendations for choosing the most effective shock-proof mining technology.

The American Journal of Engineering and Technology
(ISSN – 2689-0984
Published: April 22, 2021 | **Pages:** 25-30
Doi: https://doi.org/10.37547/tajet/Volume03Issue04-04

IMPACT FACTOR
2021: 5. 705
OCLC - 1121105677

The strength of the rocks in the massif is determined based on the strength of the sample and the structural attenuation coefficient.

$$\sigma_{сж}^{м} = \sigma_{сж}^{0} \cdot \lambda$$

Where $\sigma_{сж}^{м}$ - rock strength in the massif, Mpa;

$\sigma_{сж}^{0}$ - compressive strength of rocks in the sample, MPa;

λ - the coefficient of structural attenuation of the array.

The study of the physical and mechanical properties and structural features of rocks and ores is the initial stage in solving problems of managing rock pressures and assessing the impact hazard of the deposit. Also, the results of these studies are used in setting boundary conditions in theoretical problems and in modelling, as well as in determining the quantitative characteristics of the stress state.

To study the physical and mechanical properties of ores and host rocks at the site in the area of ore body No. 1, several samples were taken to determine the uniaxial compression strength, tensile strength, density, internal friction angle under static load, adhesion and elastic modulus.

The host rocks are represented by shales, syenite-diorite porphyrites, and felsites.

Studies of the physical and mechanical properties of the host rocks were carried out in accordance with GOST 21153.2-84, GOST 21153.3-84, GOST 21153.1-75. The results of the studies are shown in Table 2.

As can be seen from Table 2, ore, shale quarried, shale metamorphosed (with the parallel application of the load to the direction of layering) and felsites are characterized by similar strength properties. Syenite-diorite porphyrites are characterized by much greater strength. The variation in strength values for a particular rock is explained by the degree of disturbance of the samples, i.e., the number of cracks and their spatial location in the sample. It can be noted that syenite-diorite porphyrites, which are characterized by the highest strength of all the studied rocks, have the lowest value of the static modulus of elasticity.

Table 2. Studies of the physical and mechanical properties of the host ore rocks at the Kyzylalmasay deposit

Name of breeds	Density, kg/м³	Strength, MPa		Modulus of elasticity, MPa	Grip, MPa	Internal friction angle, degree
		When compressed	When stretched			
Ore	-	81,4	5,4	0,315	22,0	32
Shale, quartered	2600	$\frac{80,4-105,2}{98,6}$	11,8	0,345	6,3	-
Metamorphosed shales	2560	151,3 (90,9)²	18,2 (10,9)²	0,269	14,0	36

The American Journal of Engineering and Technology
(ISSN – 2689-0984
Published: April 22, 2021 | **Pages:** 25-30
Doi: https://doi.org/10.37547/tajet/Volume03Issue04-04

IMPACT FACTOR
2021: 5. 705
OCLC - 1121105677

Felsites	**2690**	$\frac{83,8-88,3}{86,4}$	**9,5**	-	-	-
Syenite-diorite porphyrites	**2790**	$\frac{146,4-186,8}{171,6}$	**18,9**	**0,278**	**34,0**	**32**

As can be seen from Table 2. within the limits of the deposit there are rocks and ores with high strength properties, capable of accumulating stress and brittle fracture, i.e. prone to dynamic manifestations of rock pressure.

REFERENCES

1. CJSC Scientific – Production Enterprise navgeokom Laser scanning//methodical manual 2006.
2. Nurpeisova M. B., Kasymkanova Kh. M., Kirgizbaeva G. M. (2006). Application of satellite technologies in surveying the observation of the process of displacement, Mountain journal of Kazakhstan, №5. p. 8-10.
3. Nurpeisova M. B., K. T. Minakov (2008). The use of laser devices in surveying jobs the Mining journal of Kazakhstan, N. 6, pp. 23-26.
4. Sayyidkosimov S. S., Kazakov A. N., Khakberdiev M. R. (2017). Models of tectonic stress fields in the rock mass under conditions of underground mining of gold deposits. Mountain information and analytical bulletin. Moscow: special issue. pp. 23-36.
5. Mukhitdinov Sh. R., Kazakov A. N., Khakberdiev M. R. (2019). Assessment of the category of impact hazard of the rock mass at the Charmitan field. Monitoring science and technology. Scientific and technical journal. No. 2. pp. 24-29.
6. Sayyidkosimov S.S., Kazakov A.N. Khakberdiev M.R. (2019). Modeling of geomechanical processes in the conditions of underground mining of ore deposits. "Traditions and innovations of resource-saving technologies in mineral mining and processing. Universitas " Publishing Petroșani, (Monograph) p. 170-195.
7. Sayyidkosimov S. S. (2016). Analysis of the stress-strain state of the mountain massif. Republican Scientific and Technical Conference " Mining and Metallurgical Complex: Achievements, Problems and Prospects of innovative development" Navoi. p. 14-15.
8. Kazakov A. N., Rakhimova M. Kh., Khakberdiev M. R. (2018). Four-stage multispectral GIS-technology for geomechanical stability control of tailings dams. "Modern problems and prospects for improving rational and safe subsurface use" International Scientific and Technical Conference. pp. 192-194.
9. Kazakov A. N., Khakberdiev M. R. (2017). Analysis of methods and tools for predicting impact hazard. International scientific-practical conference "Scientific and personnel support for innovative development of mining and metallurgical complex". Almaty. pp. 84-88.

Published: April 22, 2021 | **Pages:** 25-30
Doi: https://doi.org/10.37547/tajet/Volume03Issue04-04

10. Rahimova H. M., Kazakov, A. N., Shamsieva N. M., Khakberdiev M. R. (2020). Geodezicheskie survey monitoring to ensure the stability of tailings dams MOF AGMK on the nature of the flow of geomechanical processes. International Journal of Research, Vol. 07 Iss.04. pp. 908-924.
11. Sayyidkosimov S. S. (2016). Determination of the initial stresses of the rock mass of the Kochbulak deposit. The 6th International Scientific and Practical Conference of young scientists and Students "Experience of the past-a look into the future". Tula, pp. 49-53.
12. Popov V. N. and dr. (2000). Marksheyderskoe delo. M., "Nedra".
13. Sayyidkasimov S. S. (2016). Determination of the initial stresses of the rock mass of the Kochbulak deposit. The 6th International Scientific and Practical Conference of young scientists and students "Experience of the past-a look into the future". Tula, pp. 49-53.
14. Olimjon Allanazarov, Nurali Umarov. (2020). Update of cadastre map and plans on the basis of remote sound materials. Society and innovations. Special Issue -2, No 01. pp. 449-453.