METHODS OF DETERMINING THE SAFETY AND ENVIRONMENTAL IMPACT OF DUST AND EXPLOSION PROCESSES IN MINING ENTERPRISES

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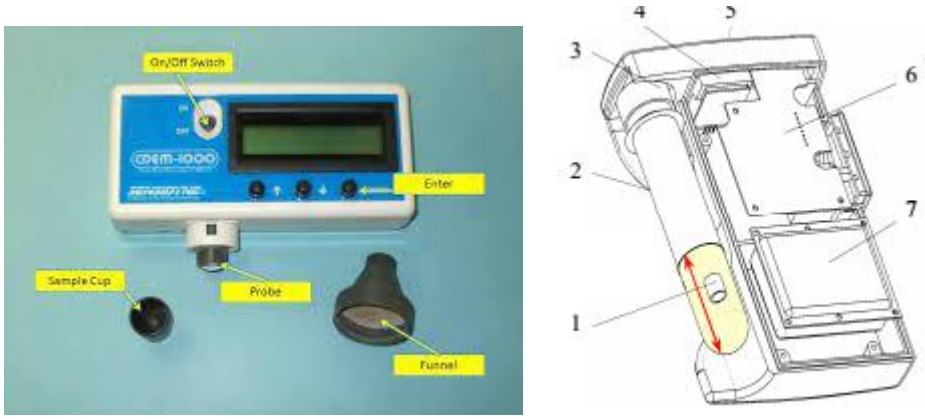
Abstract: One of the most important tasks of the enterprise is to ensure the safety of dust and explosion in the process of underground mining in mining enterprises. Mining enterprises departments of industrial safety and labor protection should be established. For example, the main method of preventing the explosion of coal dust located in the mine processing - they need to be processed with rock dust. Traditional methods of quality control of rock dust removal include and we can use radioisotope, optical and chemical methods. To implement them, the devices are environmentally equipped replaceable flasks with harmful radioactive elements, expensive optical sensors, desiccants, and chemical reagents are required. Compressed air is widely used in many fields as a safe technological energy carrier in economically developed countries, energy costs for the production and distribution of compressed air reach 10-15%. Analysis of industrial compressed air production and distribution systems sector indicates that the efficiency of the systems is relatively low. It's about not having enough attention is paid to these systems, because energy monitoring of compressed air systems has certain difficulties - the presence of complex and branched networks of air pipes with specific characteristics; low sensitivity of equipment that consumes compressed air; the complexity of inspecting pneumatic equipment, which is constant operation safety is ensured. The article analyzes the possibilities of reducing the cost of production and distribution of compressed air. The task is solved by hardware and software consists of monitoring and controlling the compressed air pressure at the main points of the network. The proposed method allows real-time detection of air currents occurring in the air duct network and sending commands for them to maintenance personnel. On the example of the Tebin Bulak mine, we considered the theories of analysis of the satisfactory approximation of the calculated air flow with the actual values. This is the practical significance of the obtained results that the developed method of monitoring the air flow in the network of air ducts is simple, it requires uncomplicated work.

Keywords: Risk of explosion in mines; coal mines; dust removal of rocks; thermogravimetry; thermogravimetric curve, compressed air, compressors, energy efficiency, air flow monitoring

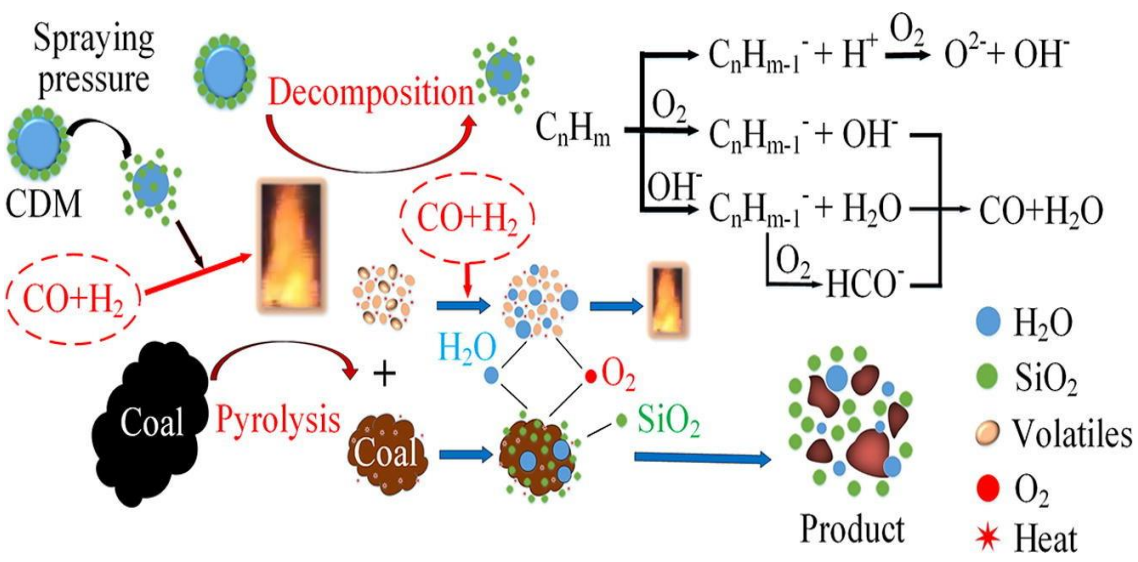
Introduction

Development of coal mines is accompanied by intensive formation and release of dust particles into the atmosphere. Airborne dust is transported over long distances and accumulates both inside and outside excavations, which not only causes disruption. in the

mines operating conditions also create dust deposition exceeding the threshold values
- the lower concentration limits of flame spread must be taken into account. In coal mines, an additional factor is created - it is necessary to identify limited areas that allow coal dust explosions to occur and spread. Conditional occurrence of dust explosion is a dangerous process. Thus, if no dust explosions were recorded during open pit mining high volume dust emissions followed by coal dust explosions have occurred in many coal-producing countries, including several mines. The issue of underground dust control and a large amount of data and research is available to assess and reduce the risk of explosions of dust-methane-air mixtures and associated worker injury in open pit coal mining processes. It is a mandatory regulatory requirement to ensure the dust and explosion-proof condition of mining operations, which is achieved by neutralizing explosive properties during coal mining. In most coal-mining countries, dust and explosion protection is the main method rock protection or rock dusting processes based on the use of non-combustible rock dust. Technical specifications" are based on limestone (dolomite) - substances with the basic chemical formula CaCO3. In coal mines, a type of stone dust with hydrophobic additives is used - stone hydrophobic. In mines engaged in intensive coal mining, several stages of rock dust application are carried out. Main after tunneling 10-20 m of mine deposits, the location of the rocks is carried out on the surface, then in the process of extraction, "secondary" and "fine reactive" dusting of rocks is carried out. Fine reactive rock dusting, in particular, was one of the first to be used in the coal mines of Australia. Rock dust removal is carried out using a wide range of pneumatic and mechanical devices. Practical experience shows that the use of rock dust does not have a significant negative effect and there are several theories on occupational health issues. The main components of rock dust (CaCO3 and hydrophobic additives natural origin) are environmentally safe processes.



Picture 1. Coal dust explosion front panel "CDEM-1000" device 1 - power button; 2 - display; 3 – "enter" button; 4 and 5 - cursor up and down buttons; 6 - dust container; 7 - optical element.



Picture 2. Situations that cause the explosion of various gases and coal dust in the mine.

Existing technologies allow monitoring the parameters of various industrial systems objects and display them in a mnemonic diagram displayed on the operator's screen. More and more mining companies are starting to implement modern telecommunications solutions and technologies that significantly reduce the possibility of production errors and allow optimization the progress of production processes creates several opportunities. However, there are no existing approaches for real-time monitoring depends on the energy efficiency of the compressed air production and distribution systems. In many cases, single indicator of technical or operational problems characterizing compressed air systems causes an increase in the power consumption of the compressor station. The increase in energy consumption not only increases the efficiency of compressor devices and creates technical problems, this process but also occurs with uncontrolled air currents. Thus, a system that includes real-time mode should be used and monitoring of key technical parameters, waste compressed air detection procedures and rapid it will be effective for mining enterprises to implement a warning system to manage the elimination of the causes of wasteful air consumption. A review of the technical aspect of improving the energy efficiency of compressed air production and it is necessary to introduce distribution systems in mining enterprises. It is customary to divide compressed air systems into two parts: production and compressed air distribution processes. The first part includes the compressor units themselves, air filters, air and collectors, dryers, etc. The second part includes control valves, distribution air channels and including compressed air equipment and process equipment. The second part generally represents the external network of the compressor unit.

Discussion

The branching of the network of air ducts in mining enterprises and the large number of consumers of compressed air require strict consideration of the losses that occur during transportation. Available technical tools allow to control the main parameters and is seen as a carrier of energy at all stages of its movement. However, their widespread use is limited by them high cost and the need for additional maintenance costs. In some cases, special software is required, which is used as part of the necessary functional tasks. In our opinion, In such conditions, methods based on the observation of the main parameters of the energy carrier in real time, allowing monitoring of air flows in the mines and taking into account the factors, appear. To mining enterprises is considered a more appropriate process. Timely detection of

detected air currents can significantly reduce harmful substances and avoids losses and wasted costs in compressed air systems. The design of compressor stations and the calculation of air duct networks for stationary compressed design operating modes of compressed air consumers do not cause great difficulties. The main function of the compressor unit is to supply air and end user with relevant process parameters including pressure, flow and air considered as Important parameters of the external network of the compressor block are length, diameters pipelines and the presence of local resistance are considered. In the corresponding calculation and subsequent processes the selection of these parameters allows to minimize losses and use machines with the least compressors and opportunities to increase energy efficiency and energy efficiency.

Conclusion

The ventilation system in the mines should be fully developed. One of the methods of technical implementation of effective control of compressed air flow networks - software and hardware monitoring of air currents in overhead cable sections consists of real-time network-based monitoring. A mathematical model is formed that takes into account the characteristics and availability of air networks. The presence of pressure value indicators at the control points of the network makes it possible to determine air flows in the network and networks are formed according to the calculation method. Results of experimental studies in the air pipeline network on the example of the Tebin Bulak mine, the calculated parameters deviated from the actual values of air flow by no more than 9%. Implementation of this system precise energy service management reduces the electricity consumption of drives in developed countries, compressor units of mines are equal to 4000 kW/h per year. The software of this method allows real-time monitoring of the air duct network. In mining enterprises, various processes such as mining and loading and transportation of rocks are carried out. For example, I observed the first blasting processes at the Tebin Bulak mine. 521 detonators were detonated and I waited for heavy dust to rise in the mine. The dust spread over a great distance. Otelbayev Azizbek, a student of the Nukus Mining Institute under the Navoi State University of Mining and Technology, conducted many studies and researches about these mining enterprises. Azizbek has been conducting many studies on the activities of mining enterprises. Many of his articles have been published in international journals. Currently, Azizbek is conducting research on reducing the damage caused by blasting of dust in the atmosphere during open-pit mining processes.

References:

1. Ravshanov Z. 3D Technological System of Management of Geological Exploration Processes of Mining Enterprises //Scienceweb academic papers collection. – 2022.
2. Bekbawlievich S. B. et al. PROSPECTS FOR THE RATIONAL USE OF IRON ORE OF SULTAN UVAYS AT THE TEBINBULAK DEPOSIT //Galaxy International Interdisciplinary Research Journal. – 2021. – Т. 9. – №. 12. – С. 609-613.
3. Xolmatov O. M. et al. MURUNTAU KONI OLTINLI RUDALARINI UYUMDA TANLAB ERITISH USULIDA O'ZLASHTIRISHNING GEOTEXNOLOGIK SHAROITLARINI O'RGANISH //Eurasian Journal of Academic Research. – 2022. – Т. 2. – №. 11. – С. 790-797.
4. Саидова Л. Ш. и др. АНАЛИЗ ИССЛЕДОВАНИЙ ПО ПОДЪЕМУ ГОРНОЙ МАССЫ ИЗ ГЛУБОКИХ КАРЬЕРОВ И ВЫБОР ГОРНОТРАНСПОРТНОГО ОБОРУДОВАНИЯ ДЛЯ

ОТКРЫТЫХ ГОРНЫХ РАБОТ //Eurasian Journal of Academic Research. – 2022. – Т. 2. – №. 11. – С. 811-816.
5. Ҳайитов О. Ғ. и др. ЧУҚУР КАРЬЕРЛАРДА КОН ЖИНСЛАРИНИ АВТОМОБИЛ ТРАНСПОРТИДА ТАШИШ ИШЛАРИНИ ҲИСОБЛАШ //Eurasian Journal of Academic Research. – 2022. – Т. 2. – №. 11. – С. 798-803.
6. Bekturganova, Z., & Jumamuratov, R. (2017). МЕТОДЫ ОБУЧЕНИЯ САМОСТОЯТЕЛЬНОЙ РАБОТЕ УЧАЩИХСЯ НА УРОКЕ ХИМИИ.
7. Kaipbergenov A. The methodology of teaching chemistry based on the use of computer programs //Scienceweb academic papers collection. – 2019.
8. Бектурганова, З., Жумамуратов, Р., & Султанов, Д. (2017). РЕКОМЕНДАЦИИ ПО РАЗРАБОТКЕ И ПРОВЕДЕНИЮ С МЕТОДОМ ПРОБЛЕМНОГО ОБУЧЕНИЯ НА УРОКАХ ХИМИИ.
9. Yeshmuratova A. MINE BLASTING PROCESSES OPTIMIZATION STAGES OF DIGITAL TECHNOLOGY OF DETONATORS //Scienceweb academic papers collection. – 2023.
10. Utepbaeva G. et al. FOAM FLOTATION PROCESS, STAGES AND TECHNOLOGICAL PARAMETERS //Science and innovation. – 2023. – Т. 2. – №. A2. – С. 136-140.
11. Утемисов А. О., Юлдашова Х. Б. К. СИСТЕМЫ АВТОМАТИЧЕСКОГО УПРАВЛЕНИЯ //Universum: технические науки. – 2022. – №. 5-2 (98). – С. 45-47.
12. Kaipbergenov A. T., Utemisov A. O., Yuldashova H. B. K. STEADY OF AUTOMATIC CONTROL SISTEMS //Academic research in educational sciences. – 2022. – Т. 3. – №. 6. – С. 918-921.
13. Djaksimuratov, K., O'razmatov, J., Yuldashev, S., Toshpulatov, D., & O'telbayev, A. (2021). Geological-Geochemical and Mineralogical Properties of Basalt Rocks of Karakalpakstan.
14. Djaksimuratov, K., O'razmatov, J., Mnajatdinov, D., & O'telbayev, A. (2021). PROPERTIES OF COAL, PROCESSES IN COAL MINING COMPANIES, METHODS OF COAL MINING IN THE WORLD.
15. Djaksimuratov, K., Toshev, O., O'razmatov, J., & O'telbayev, A. (2021). MEASURING AND CRUSHING THE STRENGTH OF ROCKS USE OF VARIOUS TYPES OF SURFACTANTS FOR GRINDING.
16. Djaksimuratov, K., Ravshanov, Z., O'razmatov, J., & O'telbayev, A. (2021). Comprehensive monitoring of surface deformation in underground mining, prevention of mining damage. Modern technologies and their role in mining.
17. Djaksimuratov, K., O'razmatov, J., Maulenov, N., & O'telbayev, A. (2021). FACTORS INFLUENCING THE CONDITIONS OF OPEN PIT MINING, ORE MASS AND DEFORMATION, PROCESSES THAT LEAD TO IMBALANCE DURING EXCAVATION.
18. Djaksimuratov, K., Jumabayeva, G., Maulenov, N., & Rametullayeva, M. (2022). Improving the Efficiency of Excavators Increasing the Efficiency of Temporary Ditch Excavator.
19. Djaksimuratov, K., Jumabayeva, G., Maulenov, N., & Rametullayeva, M. (2022). MONITORING THE CONDITION OF THE DEPOSIT IN MINING ENTERPRISES. MODERN METHODS OF DETERMINING THE LOCATION OF MINERALS.
20. Djaksimuratov, K., Jumabayeva, G., Maulenov, N., & Rametullayeva, M. (2022). CORROSION OF METALS AND FACTORS AFFECTING IT. METHODS OF PREVENTING CORROSION OF METALS.
21. Kulmuratova, A., Utepbaeva, G., Azizov, A., Yo'ldashova, H., & O'telbayev, A. (2022). AUTOMATION AND ROBOTIZATION OF UNDERGROUND MINES.

22. Ravshanov, Z., O'razmatov, J., Zaytova, M., Kulmuratova, A., & O'telbayev, A. (2022). Conveyor belt structure and mode of operation in mines.
23. Djaksimuratov, K., Maulenov, N., Joldasbayeva, A., O'razmatov, J., & O'telbayev, A. (2022). Model Of Stages of Determination of Strength of Dynamic Fracture of Rocks and Digital Technological Verification.
24. Djaksimuratov, K., Ravshanov, Z., Ergasheva, Z., O'razmatov, J., & O'telbayev, A. (2022). Underground mine mining systems and technological parameters of mine development.
25. Djaksimuratov, K., Maulenov, N., Joldasbayeva, A., O'razmatov, J., & O'telbayev, A. (2022). Methods of Determining the Effect of Temperature and Pressure on the Composition of Rocks.
26. Ravshanov, Z., Joldasbayeva, A., Bayramova, M., & O'telbayev, A. (2023). MINING TECHNOLOGICAL EQUIPMENT THAT DETERMINES THE SLOPE ANGLES OF THE MINE BY MEANS OF LASER BEAMS.
27. Yeshmuratova, A., Kulmuratova, A., Maulenov, N., & Otemisov, U. (2023). MINE BLASTING PROCESSES OPTIMIZATION STAGES OF DIGITAL TECHNOLOGY OF DETONATORS.
28. Ravshanov, Z., Joldasbayeva, A., Maulenov, N., & O'telbayev, A. (2023). Determination of mineral location coordinates in geotechnology and mining enterprises.
29. Ravshanov, Z., Joldasbayeva, A., Bayramova, M., & Madreymov, A. (2023). IN GEOLOGICAL AND GEOTECHNICAL PROCESSES IN THE MINE USE OF TECHNOLOGICAL SCANNING EQUIPMENT IN THE UNDERGROUND MINING METHOD.
30. Djaksimuratov, K., Jumabayeva, G., Maulenov, N., & Rametullayeva, M. (2022). Casting And Evaluation of Properties for an Aluminum Alloy Material and Optimizing the Quality Control Parameters.
31. Djaksimuratov, K., Jumabayeva, G., Batirova, U., & O'telbayev, A. (2023). GROUNDWATER CONTROL IN MINES
32. Abdiramanova, Z., Jumabayeva, G., Batirova, U., & O'telbayev, A. (2023). ACTIVITY OF TEBINBULAK IRON ORE MINING ENTERPRISES IN THE REPUBLIC OF KARAKALPAKSTAN.
33. Qurbonov.A.A, Djaksimuratov Karamatdin Mustapaevich, & O'telbayev Azizbek Alisher o'g'li. (2021). FACTORS INFLUENCING THE CONDITIONS OF OPEN PIT MINING, ORE MASS AND DEFORMATION. PROCESSES THAT LEAD TO IMBALANCE DURING EXCAVATION. Eurasian Journal of Academic Research, 1(6), 45–49. https://doi.org/10.5281/zenodo.5500210
34. O'telbayev Azizbek Alisher o'g'li. (2022). STRENGTH PROPERTIES OF ROCKS AND FACTORS INFLUENCING THEM AND THE PROCESS OF CHANGING THE PROPERTIES OF ROCKS. https://doi.org/10.5281/zenodo.6034442
35. Joldasbayeva, A., Maulenov, N., Mnajatdinov, D., & O'telbayev, A. (2023). PROCESSES OF DRAWING UP A VENTILATION SYSTEM SCHEME IN MINES.
36. Jumabayeva Guljahon Jaqsilikovna. (2023). CONTROL OF UNDERGROUND WATER IN THE MINE, DETECTION AND PREVENTION OF RISKS. ACADEMIC RESEARCH IN MODERN SCIENCE, 2(5), 159–166. https://doi.org/10.5281/zenodo.7648010
37. Утемисов А. О., Юлдашова Х. Б. К. СИСТЕМЫ АВТОМАТИЧЕСКОГО УПРАВЛЕНИЯ //Universum: технические науки. – 2022. – №. 5-2 (98). – С. 45-47.
38. Tolibayev Y. et al. WITH CHARGE MELTING METHODS AND LOW METAL CONTENT IN THE FURNACE EFFECT OF ELECTRODES //Международная конференция академических наук. – 2023. – Т. 2. – №. 2. – С. 151-160.

39. Tolibayev Y. et al. ENVIRONMENTALLY FRIENDLY METHODS OF MINING METAL ORES //Академические исследования в современной науке. – 2023. – Т. 2. – №. 7. – С. 45-56.
40. Tolibayev Y. et al. METHODS OF ENSURING THE INCREASE IN THE QUALITY OF EXTRACTION OF NON-FERROUS, RARE, RARE EARTH METALS //Science and innovation in the education system. – 2023. – Т. 2. – №. 3. – С. 22-31.
41. Tolibayev Y. et al. DISADVANTAGES OF TECHNOLOGICAL AUTOMATION IN METAL MELTING //Development and innovations in science. – 2023. – Т. 2. – №. 2. – С. 136-146.
42. Tolibayev Y. et al. IN METALLURGICAL PROCESS MODELING SYSTEM HIGH TEMPERATURE COPPER REFINING PROCESSES //Models and methods in modern science. – 2023. – Т. 2. – №. 3. – С. 12-22.
43. Najimova Nursuliw Bazarbaevna. (2023). GENERAL INFORMATION ABOUT CHEMICAL PROCESSES AND REACTORS. EURASIAN JOURNAL OF ACADEMIC RESEARCH, 3(3), 28–37. https://doi.org/10.5281/zenodo.7773462
44. Ravshanov, Z., Ergasheva, Z., Maxsitaliyeva, L., Pardaev, S., & O'telbayev, A. (2022). 3D Technological System of Management of Geological Exploration Processes of Mining Enterprises.
45. Yeshmuratova Amangul Artikbayevna, Amanbaev Nursultan Salamat o'g'li, O'telbayev Azizbek Alisher o'g'li. (2023). ENSURING COMPUTER DATA AND MANAGEMENT SYSTEM SECURITY. INTERNATIONAL BULLETIN OF APPLIED SCIENCE AND TECHNOLOGY, 3(4), 282–287. https://doi.org/10.5281/zenodo.7809865
46. Yeshmuratova Amangul Artikbayevna. (2023). TECHNOLOGICAL METHODS OF ENSURING INFORMATION SECURITY IN TECHNICAL SYSTEMS. EURASIAN JOURNAL OF ACADEMIC RESEARCH, 3(4), 188–192. https://doi.org/10.5281/zenodo.7809700
47. Elmurodovich T. O. et al. Measuring and crushing the strength of rocks use of various types of surfactants for grinding //ACADEMICIA: An International Multidisciplinary Research Journal. – 2021. – Т. 11. – №. 10. – С. 557-561.
48. Mustapaevich D. K. et al. FACTORS INFLUENCING THE CONDITIONS OF OPEN PIT MINING, ORE MASS AND DEFORMATION, PROCESSES THAT LEAD TO IMBALANCE DURING EXCAVATION //Galaxy International Interdisciplinary Research Journal. – 2021. – Т. 9. – №. 10. – С. 648-650.
49. Jumabayeva Guljahon Jaqsilikovna. (2023). CONTROL OF UNDERGROUND WATER IN THE MINE, DETECTION AND PREVENTION OF RISKS. ACADEMIC RESEARCH IN MODERN SCIENCE, 2(5), 159–166. https://doi.org/10.5281/zenodo.7648010
50. Нажимова Н. Б. и др. ВЛИЯНИЕ ИНФОРМАЦИОННЫХ И КОММУНИКАЦИОННЫХ ТЕХНОЛОГИЙ И ЛАБОРАТОРНОЙ МОДЕЛИ ПРИ ОБУЧЕНИИ ХИМИИ //ЛУЧШАЯ ИССЛЕДОВАТЕЛЬСКАЯ РАБОТА 2021. – 2021. – С. 416-420.
51. Нажимова Н. Б. и др. ҚОРАҚАЛПОҒИСТОН ФОСФОРИТЛАРИ ВА ГЛАУКОНИТЛАРИ ТАВСИФИ ҲАМДА УЛАРНИНГ ХУСУСИЯТЛАРИ //Oriental renaissance: Innovative, educational, natural and social sciences. – 2022. – Т. 2. – №. 12. – С. 186-190. .
52. Jumabayeva , G. . (2023). PLANNING AND MINE DESIGN IN OPEN-PIT MINING PROCESSES AT MINING ENTERPRISES. Евразийский журнал академических исследований, 3(3 Part 2), 135–143. извлечено от https://in-academy.uz/index.php/ejar/article/view/11147
53. Kaipbergenov, B., & Utemisov, A. (2015). Classification and analysis of computer programs for the physical preparation of athletes and expasure of prospects for their studies.

54. Нажимова Н. Б. ИССЛЕДОВАНИЕ ТЕРМИЧЕСКИХ СВОЙСТВ СЫРЬЯ АСФАЛЬТОБЕТОННЫХ СМЕСЕЙ //ПРОРЫВНЫЕ НАУЧНЫЕ ИССЛЕДОВАНИЯ: ПРОБЛЕМЫ, ЗАКОНОМЕРНОСТИ, ПЕРСПЕКТИВЫ. – 2020. – С. 30-32.
55. Ravshanov, Z., Ergasheva, Z., Maxsitaliyeva, L., Pardaev, S., & O'telbayev, A. (2022). 3D Technological System of Management of Geological Exploration Processes of Mining Enterprises.
56. Djaksimuratov, K., O'razmatov, J., Mnajatdinov, D., & O'telbayev, A. (2021). PROPERTIES OF COAL, PROCESSES IN COAL MINING COMPANIES, METHODS OF COAL MINING IN THE WORLD.
57. Ravshanov, Z. (2022). MINING PROCESSES OF DRILLING MACHINES. INFORMATION ABOUT THE TECHNOLOGICAL ALARM SYSTEM OF DRILLING MACHINES.
58. O'telbayev, A. (2022). STRENGTH PROPERTIES OF ROCKS AND FACTORS INFLUENCING THEM AND THE PROCESS OF CHANGING THE PROPERTIES OF ROCKS. «BEST INNOVATOR IN SCIENCE - 2022» Organized by Innovative Academy. https://doi.org/https://doi.org/10.5281/zenodo.6034441
59. Kulmuratova Aliya Janabay qizi, Utepbaeva Gulnaz Saken qizi, O'telbayev Azizbek Alisher o'g'li, Azizov Azatbek Jumabek o'g'li, & Yo'ldashova Hilola Baxtiyor qizi. (2022). AUTOMATION AND ROBOTIZATION OF UNDERGROUND MINES. Open Access Repository, 9(10), 20–28. https://doi.org/10.17605/OSF.IO/UYH93
60. Ravshanov Zavqiddin Yahyo o'g'li, O'telbayev Azizbek Alisher o'g'li, O'razmatov Jonibek Ikromboy o'g'li, Zaytova Madina Nazarbay qizi, & Kulmuratova Aliya Janabay qizi. (2022). Conveyor belt structure and mode of operation in mines. Eurasian Journal of Engineering and Technology, 11, 72–80. Retrieved from https://geniusjournals.org/index.php/ejet/article/view/2360
61. Туремуратов Ш. Н., Нажимова Н. Б. Химические и физико-химические свойства карбонатных минералов плато Устюрт //Universum: химия и биология. – 2020. – №. 10-1 (76). – С. 61-63.
62. Кадирбаев А. Б. и др. ПРИМЕР ИСПОЛЬЗОВАНИЯ ТРАДИЦИОННЫХ ТЕХНОЛОГИЙ ПРОИЗВОДСТВА ИЗВЕСТИ //ПРИОРИТЕТНЫЕ НАПРАВЛЕНИЯ РАЗВИТИЯ НАУКИ И ОБРАЗОВАНИЯ. – 2021. – С. 15-17.
63. Ravshanov Zavqiddin Yahyo o'g'li, O'telbayev Azizbek Alisher o'g'li, Joldasbayeva Aysulu Baxitbay qizi, & Bayramova Minevvar Axmet qizi. (2023). MINING TECHNOLOGICAL EQUIPMENT THAT DETERMINES THE SLOPE ANGLES OF THE MINE BY MEANS OF LASER BEAMS. Neo Scientific Peer Reviewed Journal, 6, 17–23. Retrieved from https://neojournals.com/index.php/nspj/article/view/96
64. Нажимова Н. Б. и др. РОЛЬ МИНЕРАЛЬНОГО НАПОЛНИТЕЛЯ В АСФАЛЬТОВОЙ СМЕСИ //МОЛОДОЙ УЧЁНЫЙ. – 2021. – С. 15-18.
65. Ravshanov Zavqiddin Yahyo o'g'li, Joldasbayeva Aysulu Baxitbay qizi, Maulenov Nurlibek Axmet o'g'li, & O'telbayev Azizbek Alisher o'g'li. (2023). Determination of mineral location coordinates in geotechnology and mining enterprises. Global Scientific Review, 11, 8–14. Retrieved from http://scienticreview.com/index.php/gsr/article/view/134
66. Кадиров В. Р. и др. Расчет Устойчивости Нижнего Участка Борта Карьера «Мурунтау» С Учетом Программной Комплекс «Ustoi» //Central Asian Journal of Theoretical and Applied Science. – 2021. – Т. 2. – №. 12. – С. 335-341.

67. Umirzoqov A. JUSTIFICATION OF RATIONAL PARAMETERS OF TRANSSHIPMENT POINTS FROM AUTOMOBILE CONVEYOR TO RAILWAY TRANSPORT //Scienceweb academic papers collection. – 2020.
68. O‘g‘li R. Z. Y., Abdaaliyevna E. Z. 3D Technological System of Management of Geological Exploration Processes of Mining Enterprises. – 2022.