Application of comprehensive exploration technology in mine geological exploration

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Abstract:

For mine engineering construction projects, it is necessary to carry out exploration work for mine geology. If the exploration work for mine geology is not implemented in place, it will affect the normal development of mine project work. In order to effectively ensure the smooth progress of mine geological exploration, it is necessary to use comprehensive exploration technology to ensure the high quality of geological exploration work. Based on this, the article analyzes and discusses the function of comprehensive exploration technology in geological exploration.

Keywords:

Mine geological exploration; Comprehensive exploration technology; Technology application

Introduction:

Scientific and technological progress promotes the rapid development of economy, the demand for natural resources is increasing, and the degree of exploitation and utilization of mineral resources is also increasing. As a big energy consumer, mineral resources play a very important role in the economic development of our country. Therefore, we must do a good job in mine geological exploration, which is the basic link to carry out good mine work. Comprehensive exploration technology can help mine geological exploration to carry out better work, so the study of this content has very important practical significance.

1 Importance of mine geological exploration

For mine engineering projects, the first task that needs to be done well is to carry out geological exploration. By carrying out mine geological exploration, geological workers can carefully understand the geological information of the mine, and through a comprehensive understanding of the geological situation can facilitate the subsequent mining. At the same time, geological exploration can also effectively protect the hydrogeological environment of the mine and ensure the follow-up work on the basis of protecting the geological environment. It can be seen that the geological exploration of mines plays a very important role, which can effectively improve the work efficiency of mining and provide help for the improvement of economic benefits of enterprises.

2 Comprehensive exploration techniques and methods

For the comprehensive exploration technology, the biggest feature is that the tools used are relatively simple and convenient to carry, strong flexibility, no need to rely on more manpower, and can effectively improve the work efficiency to a great extent. The geological survey data obtained through the comprehensive exploration technology is more accurate, and the comprehensive exploration technology can be used to survey multiple exploration sites, so that the sample data of the survey area can be comprehensively mastered and the accuracy of the exploration results can be ensured. Below, the comprehensive exploration technology and methods are listed one by one:

2.1 GPS Technology

As an important part of exploration technology, GPS technology plays an obvious role in geological exploration. The data transmission between the radio signal and the satellite signal is realized, and the transmission between the signals forms navigation positioning to achieve accurate positioning. GPS technology is characterized by high accuracy, all-weather, automation, convenience

and high efficiency, which is very suitable for application in the exploration of mine hydrogeological environment. The use of GPS technology for mining geological exploration first requires workers to collect data, and then send the data received by the ground to the ground station in the form of wireless transmission. After that use GPS synchronous satellite signals to transmit the collected location information of the exploration area, and finally collect and analyze all kinds of information.

2.2 Remote Sensing Technology

The main theoretical basis of remote sensing technology is electromagnetic wave, and various types of sensing instruments are used to realize the radiation and reflection of electromagnetic wave information of distant targets. By collecting and processing information to obtain the final image, the acquired image can accurately reflect the location of various scenes on the ground. Remote sensing technology can effectively help geological exploration and geological disaster prevention work, and remote sensing technology can efficiently and quickly acquire, transmit, store and process information. At present, the remote sensing technology can realize the transformation of multi-mode remote sensing in a single band, realize the switch between modes, and use the multi-analysis system to ensure that the address image is more clear.

2.3 High-density resistivity method

This method belongs to one of the array exploration methods, and the high density resistivity method can achieve accurate acquisition of survey results. This method is mainly based on the different characteristics of rock and soil conductivity, the use of artificial to apply a stable current field, and then to study the distribution of conduction current in the ground. In the actual measurement process using the high-density resistivity method, all the electrodes need to be placed at each measurement point on the observation slope. The data acquisition work mainly uses program-controlled electrode conversion device and microcomputer engineering electrical measuring instrument. These two tools can realize simple processing of data results, and get various graphical results after processing.

2.4 Multichannel transient surface wave method

The multi-channel transient surface wave method uses surface waves to impact different media in the formation, and new surface waves can be generated by the impact. The device sensor can receive the waves transmitted from the surface, and use the information to analyze the ore layer structure by recording the intensity, wave frequency and vertical component information. The characteristics of surface waves change with the change of the medium, and the propagation speed will be different. Therefore, accuracy and flexibility are its advantages, which can facilitate the exploration of mine hydrogeological environment.

2.5 X-ray secondary emission spectrum analysis

X-ray secondary emission spectrum analysis is mainly used to measure trace elements in mine materials, and determine the types and contents of them. With the help of X-ray photons, the effect of excitation of atoms in substances can be achieved, and the composition of substances can be determined after excitation, so as to carry out chemical analysis. X-ray secondary emission spectrum analysis technology can clearly show the complex underground fault situation, and can accurately judge the water source.

2.6 In-situ Testing

This test method is mainly used to determine the engineering mechanical properties of rock and soil, by ensuring the basic natural structure, natural water content and natural stress state in the original position of the rock and soil layer, and then the determination is used for geological exploration. In situ testing is mainly used in difficult-to-sample formations, and other techniques are needed to help avoid the need for low-layer deformation.

2.7 Digital Technology

The digital technology can realize the digital and data conversion of complex information, build the digital model of the converted numbers and data, and use the computer to do unified processing. In the process of mine geological exploration, digital exploration technology is frequently applied. The use of digital technology can use computers to show the basic structure of the mine, ensuring that all information is relevant.

2.8 Application of comprehensive technology of green geological exploration

At present, the traditional geological exploration technology has a great impact on the ecological environment, which is

easy to destroy the ecological balance and affect the sustainable development of the environment. Therefore, we should actively carry out concept innovation, change the traditional application mode, and perfect the existing technology; Further promote green exploration to reduce the destruction of vegetation around the project; Establish a high quality construction environment and reduce the discharge of sewage, garbage and mud. Reasonable application of shallow sampling drilling can effectively avoid the excavation of the surface, change the traditional way of probing, give full play to its technical advantages, and promote the protection of surface soil to meet the current construction requirements. In fact, for shallow sampling drilling at this stage, its technology has certain limitations, suitable for the application of the technology is limited, such as the ecosystem has been damaged. Long-term geological prospecting activities in some areas have resulted in serious soil and water loss, obvious grassland degradation, and gradual collapse of ecological system. At this time, if the trough mode is chosen, the ecological environment will suffer greater damage and have adverse effects, so shallow sampling should be applied reasonably. Shallow sampling can make it develop rapidly, but its overall ecosystem balance ability is still weak, easy to cause environmental imbalance, so shallow sampling drilling technology should be the main. This method is also suitable for some areas with thicker soil layers and sparse plant growth. The flexible application of shallow sampling drilling is conducive to the reduction of surface excavation, the reduction of investment in restoration and treatment projects, the protection of ecological environment, and the realization of prospecting.

3 Application of comprehensive exploration technology in mine geological exploration

3.1 Necessity of comprehensive application of various exploration technologies

In the process of mine geological exploration, because of the uncertainty of mine geological conditions, if only a single exploration technology can not effectively deal with the complex geological conditions. Therefore, it is necessary to use a variety of comprehensive exploration technology to effectively cope with the geological exploration of mines. Comprehensive geological exploration technology can deal with complex geological conditions by various means, which can effectively avoid the limitations of a single technology and improve the accuracy of mine geological exploration as far as possible.

3.2 Main points of comprehensive exploration technology

There are two main tasks in the process of using comprehensive exploration technology to carry out mine geological exploration. The first point is to analyze the geological conditions to be surveyed, carry out comprehensive treatment according to the geological conditions, and carry out geological exploration in strict accordance with the technical operation rules. In order to effectively ensure the accuracy and efficiency of the survey results, the survey team should be divided into several groups. Each group delimits its own exploration area and carries out exploration work simultaneously, comprehensively analyzes all the data collected, and uses computers to analyze the data for accurate exploration of mine geology. At the same time, it is necessary to sort out and file the data. The second point is to set up a counting template to integrate the data obtained by various exploration techniques into one template and make comprehensive comparison to achieve the final exploration goal.

3.3 On-site inspection and monitoring

In order to ensure the quality and safety of geotechnical engineering in the actual work process, on-site inspection and detection are needed. The main content of site inspection includes the verification of geotechnical engineering before construction, and the realization of quality control. The monitoring content mainly covers various loads, geotechnical reaction properties, structures in the construction process and their impact on the environment, etc. Through effective monitoring and inspection of the site, engineering technical parameters can be effectively modified, so as to obtain more ideal data parameters and provide important technical support for geotechnical engineering.

4 Conclusion

To sum up, mine geological exploration work is very important, as exploration technicians must be fully prepared for work. In the face of the complex geological environment of the mine, the comprehensive exploration technology is used to ensure the accuracy and comprehensiveness of the exploration work and facilitate the smooth development of the follow-up work.

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