

Analysis of Mine Environmental Protection and Restoration Management

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Abstract

In human survival and development, mineral resources are an important guarantee. Mineral resources play an extremely important role in economic development and social progress. Mineral resources are a kind of non-renewable resources. The continuous exploitation of mineral resources has led to more and more serious damage to the geological environment, which in turn has led to the problem of shortage of mineral resources. In the mining process will also cause damage to the environment, which seriously affects the ecological stability. So far, the increasing awareness of environmental protection and the rapid economic development in China have put the geological protection of mines on the agenda. This paper will focus on the management of mine environmental protection and restoration.

Keywords: *Mining Environment; Protection; Ecological Problems; Restoration Management*

1 INTRODUCTION

1.1 Research Background

Mining is one of the key industries that plays a crucial role in the process of construction and development in China, and with the continuous development of society and economy, China's mining development has also achieved excellent results. The mining of mineral resources has led to a faster development of human civilization and a more prosperous economy, but the extensive mining has caused damage to the mining environment, especially the degree of damage caused by open pit mining is more serious. At present, the mining environment problem has become very serious, which will not only affect human life and property, but also restrict the development of social economy. How to solve the problem of mine environment destruction, implement the scientific concept of development, add the principle of ecological economics and circular economy to mineral engineering, and realize the new mineral resources industry chain, so as to achieve a win-win situation between mineral resources development and mine environment improvement, is an urgent research topic in the scientific community.

1.2 Status of Governance

China is a vast and extensive country, has a very rich mineral resources, so the mining of mineral resources and relatively more, some of them belong to the formal mining, there are some mining irregularities will lead to more serious ecological and environmental problems. The most important problem is the mining of arable land and construction land destruction, resulting in geological disasters, water environment damage. Various kinds of waste gas, dust and slag are emitted during mining, inducing air pollution and acid rain, destroying the balance of the ecosystem, resulting in soil erosion and land desertification. Since 2000, the Chinese government has invested billions of dollars to treat and improve the mining environment in China. 2009 saw the release of the Regulations on Mine Geological Environmental Protection, which made important additions to the ecological restoration of mining areas in terms of geological hazards, topographic landscapes and underground aquifers, and clearly stipulated the establishment and implementation of a mine geological environment treatment and restoration deposit system; the 2017 China Geological Environment Bulletin" points out:the number of mining in the country has exceeded 10 billion tons, causing serious damage to the ecological environment, and the probability of geological disasters such

as mountain collapse, landslide, mudslide and ground collapse in mining areas is much higher than that in ordinary areas. In view of this, the Party and State governments attach great importance to the restoration and management of the ecological environment of mines, and the government points out that it is necessary to actively search for effective bodies and accelerate the process of mine management. The State Planning Commission Bureau also issued instructions one after another, requiring the remediation of the mining environment and restoration of the ecological balance of mines as key projects. After the 19th National Congress, "beauty" has become an important indicator for building a modern socialist country, and the slogan "green water and green mountains are the silver mountain of gold" has been put forward. Therefore, it is urgent to protect and restore the mine environment. This paper analyzes the feasibility of mine environmental protection and restoration management, and provides some reference for future mine geological environmental protection and restoration management.

2 ENVIRONMENTAL PROBLEMS ARISING IN THE MINING PROCESS

2.1 Sudden Water in the Mine Pit

During the mining process, heavy rain, flash floods, river and lake water, groundwater, old hole water, gush into the mine in large quantities through the shaft or rock fissures, faults, karst caves, etc., far exceeding the normal drainage capacity of the mine, so as to flood the shaft, endangering the lives of miners, damaging the resource environment and affecting the mine production disaster. Sudden mine water is a common sudden and intense mine disaster. Water bursts in mines can flood shafts and mining equipment, causing casualties and property damage; affect mining production, reducing production; limit the development of mineral resources, reducing recoverable reserves and shortening the effective life of the mine; destroy water resources and the water environment in mines, often causing surface water to dry up and the groundwater level to drop significantly; and sometimes cause secondary disasters such as ground collapse and ground subsidence.

2.2 Gas Explosion, Mine Earthquake and Rock Explosion

Rock explosion disaster is mainly characterized by the violent and sudden, its prevention is generally more difficult in advance. The occurrence of rock explosion will damage the structure of the support, and will also cause the mining area to fall problems. When a serious rock explosion disaster occurs, it can cause the destruction of the mine, causing mine tremors, which can result in a huge loss of life. At the same time, when the mine earthquake disaster occurs, it can also lead to fire and gas explosion and other disasters.

2.3 Ground Subsidence

As the underground mining workings move forward, the original stress balance inside the overlying rock layer is destroyed, and the stress inside the rock layer is redistributed to reach a new balance. The deformation process of the roof of the quarry is different from that of the overlying rock layer, that is, the roof rock layer of the quarry deforms, cracks at the level, bends and departs from the layer, reaches the limit collapse distance and starts to fracture and collapse, forming the initial collapse and even periodic collapse process. In the process of non-sufficient mining, the overlying rock layer of the quarry shows characteristics of collapse, fracture, delamination, movement and deformation, forming four zones, namely collapse zone, fracture zone, delamination zone and overall bending and sinking zone. After sufficient mining, the overlying rock formation forms three zones, namely collapse zone, fracture zone and bending sinkage zone, which eventually manifests as a large-scale sinking of the ground surface. The development degree of surface subsidence collapse is analyzed in relation to the elements of mining thickness, mining depth, formation lithology and geometry size of the mining area, and the mechanism is analyzed by studying the time relationship between the development process and recovery, taking the extraction area of No.3 well field as an example.

2.4 Caving

Topping refers to the phenomenon of natural collapse of the upper mine rock layer in underground mining. It is caused by the destruction of the originally balanced mine pressure after mining. Sometimes in coal mining work, the upper coal seam is systematically released, also known as "roofing". There are many reasons for the occurrence of

roofing accidents, but the root cause is the mining pressure activity during the mining process. During the process of mining pressure activity of the roof plate, different degrees of deformation occur, firstly, cracks appear along the roof plate joints, resulting in the phenomenon of separation.

2.5 Mudslides, Landslides and Debris Flows

With the increasing frequency of mining in China, the frequency of these disasters is also increasing. Mudslides, landslides and collapses are all disasters that often occur when mining open-pit mines, and they also cause extremely serious casualties.

3 ANALYSIS OF EFFECTIVE COUNTERMEASURES FOR MINE ENVIRONMENT DAMAGE MANAGEMENT

3.1 Scientific Classification of Mine Geological Environment Protection and Restoration Management Level

First of all, it is necessary to recognize the basic condition of mine geological environment, and then make specific classification according to the mine environment, geomorphological characteristics, resource extraction method, mine scale, environmental damage degree and mine extraction period, etc., and classify mine geological environment scientifically according to the classification treatment, classification guidance and zoning promotion treatment guidelines, and treat them differently, and build effective mine geological environment protection and restoration treatment according to local conditions. In addition, for each time period, mine type, area and scale of mines, we should adopt targeted environmental restoration management mode. Secondly, we should strictly follow the principle of comprehensive protection and focus on the environmental management of mines, and at the same time, we should make scientific and reasonable classification of the level of geological environment management of mines. In addition, it is necessary to systematically evaluate and grade the management of mine geological environment, which is divided into level 1 (very serious), level 2 (serious), level 3 (more serious), and level 4 (general) for the extent of influence and damage of mine geological environment, and the extent of influence and damage of mine geological environment is expressed in red, orange, yellow and blue respectively, and the sensitive factor index model is used to effectively combine the The comprehensive evaluation mechanism of the classified and zoned ecological environment is carried out comprehensively, the corresponding mine geological environment is evaluated separately according to the results of the comprehensive evaluation, the overall pattern of mine geological environment management and protection is clearly restored, and the related resource development and environmental zoning management strategies are proposed, and the ecological protection is carried out in an orderly manner according to the "Guidelines for the Protection and Management of Mine Geological Environment" issued and implemented. The classification and zoning work will promote the assessment and investigation, protection and restoration of the geological environment of mines in a comprehensive manner.

3.2 Scientific Construction of Ecological Compensation Mechanism

A distinctive feature of the ecological compensation mechanism is to improve the public finance system and enhance the financial transfer payments in each region. Firstly, in order to achieve resource conservation, we should vigorously implement the mechanism of reimbursable use of resources; secondly, we should effectively realize the collection of water resources fee and mineral resources compensation fee, and set up a reserve fund system for natural ecological environment management of mines; thirdly, we should actively build a long-term mechanism and continuously construct and improve the ecological compensation mechanism. Fourthly, we should actively link with the actual situation in China to build up a system of environmental protection policies, regulations and technical standards for mining areas that are in line with the national development, and the system should involve all aspects of the development of mining areas. It is also necessary to specify in the law the environmental impact assessment of new mining projects, the measures to protect the environment of mining rights, the reconstruction of scrapped mines, and the methods to implement environmental compensation mechanisms. The relevant authorities in China also need to organize hearings, seminars or other means to obtain the opinions and suggestions of experts in the field and

social groups to study and implement effective methods of compensation for environmental damage in mines in as short a time as possible.

3.3 Strengthen Public Participation and Publicity

It is necessary to vigorously strengthen environmental protection publicity, constantly strengthen public service awareness, take more effective measures to put in place mine environmental protection and treatment, constantly strengthen mine environmental protection and knowledge training, optimize and innovate the management concept of mining enterprises, constantly improve the actual technical level of environmental protection, analyze the typical cases of more successful treatment, and ensure the continuous formation of a good social culture. Encourage public participation and popularize the relevant laws and regulations and environmental protection knowledge to the surrounding residents to ensure that the relevant rights and obligations are clear. The public should be involved in the process of environmental management through various forms of public participation, listening to public opinion and supervision, and democratic decision-making. In the process of propaganda, the public and the miners can learn the relevant guidelines to further clarify their responsibilities and obligations, to further implement the environmental protection and management of the mine, to strengthen the environmental protection concept of the management of mining enterprises, to continuously strengthen their own environmental protection awareness and skills, and to create a good corporate environmental protection atmosphere.

4 CONCLUSION

In general, the development of mines has a very important impact on national economic growth, environmental carrying capacity and its own sustainable development. From the mine environment supervision, regulations and other systems to continuously improve, and constantly improve the level of mine environment management technology, so that China's mine environment management work can be carried out in a comprehensive and orderly manner, the full realization of the development, protection and management of the side of the goal, and constantly promote the development of mining resources and healthy and stable development.

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