

Prevention and Control of Mine Geological Disasters and Geological Environment Protection

Jiahui Wang

School of Henan Polytechnic University, Jiaozuo 454003, China

*1264477136@qq.com

Abstract

Mine geological disaster, also known as mine geological disaster and mining geological disaster, refers to the disaster that endangers the safety of human life and property, destroys mining engineering equipment and mining resource environment, and affects mining production due to a large number of mining roadway damage, rock and soil deformation, as well as serious changes in geological and hydrogeological conditions and natural environment in the mining area. This paper carefully analyzes the mine geological disasters from the aspects of causes, types, prevention, restoration and treatment, and suggests the establishment of laws and regulations on mine protection from the aspect of protecting the ecological environment, so as to reduce the occurrence of mine geological disasters as much as possible.

Keywords

Mining, geological hazard, prevention and cure, protection.

1. Introduction

As an important strategic material of a country or region, mineral resources play a vital role in promoting social and economic development. However, in the process of developing and exploiting mineral resources, some mines choose to save costs in order to seek more economic benefits, and adopt some unreasonable and standardized methods in resource mining. For example, the mining method is not a reasonable and standardized step and cascade type, private mining and indiscriminate mining. Before the mine is closed, closed and closed, Failed to complete the restoration and treatment of the mine ecological environment in accordance with the requirements of the law. These unreasonable mining methods aggravate people's damage to mineral resources and lead to frequent geological disasters, which not only endangers people's life and property safety, but also is not conducive to social and economic development. As an important strategic material of a country or region, mineral resources play a vital role in promoting social and economic development. However, in the process of developing and exploiting mineral resources, some mines choose to save costs in order to seek more economic benefits, and adopt some unreasonable and standardized methods in resource mining. For example, the mining method is not a reasonable and standardized step and cascade type, private mining and indiscriminate mining. Before the mine is closed, closed and closed, Failed to complete the restoration and treatment of the mine ecological environment in accordance with the requirements of the law. These unreasonable mining methods aggravate people's damage to mineral resources and lead to frequent geological disasters, which not only endangers people's life and property safety, but also is not conducive to social and economic development.

2. Organization of the Mine Geological Disaster

Because the mining process is bound to change the original stable mineral conditions and change the local geological environment, and the disasters caused or induced by man-made mining activities changing the geological environment are called mine geological disasters. The occurrence of mine geological disasters will cause immeasurable harm and damage to the ecological environment, natural resources, economy and society. China's mineral mining has a long history. For a long time, China's mineral mining technology and equipment are relatively backward. Mineral mining under this condition leads to the continuous deterioration of mine geological environment and frequent mine geological disasters and accidents. Mining geological disaster is an important factor endangering the development of mining industry. Its destructive effects include: endangering the life safety of miners, sometimes causing dozens or even hundreds of deaths; Damaging mining facilities and equipment and affecting mining production; Destroy mineral resources, land resources, water resources and mining environment.

There are many kinds of mine geological disasters, including ground and underground according to the location. Geological disasters of surface mines: mainly including ground collapse, ground subsidence, ground fissures, landslides, collapses, debris flows, coal spontaneous combustion, etc. Underground mine geological disasters: mainly including roof fall, slope, water inrush, mud inrush, underground heat damage, mine earthquake, rock burst, underground coal spontaneous combustion, damage of oil and gas well pipe sleeve, pit water pollution, etc. In a narrow sense, mine geological disasters refer to geological disasters that occur underground.

Among all kinds of mines, coal mine is the most serious. There are many kinds of mine geological disasters, high frequency, wide distribution and the greatest damage loss. In addition to coal mines, metal mines such as iron ore, copper mine, lead-zinc mine and some non-metal mines also have mine geological disasters to varying degrees, such as mining radioactive minerals and radioactive disasters.

3. Literature Geological Disaster Prevention and Control

Improve relevant mine environmental protection laws and regulations, mine enterprise management system and supervision and management mechanism, establish and improve risk assessment and environmental assessment before mining, and formulate policies, regulations and planning system for environmental protection and restoration. Strictly evaluate before mining, actively prevent during production, actively recover after mining, and incorporate the recovery of mine geological environment and land restoration into laws and regulations for compulsory implementation.

Strengthen publicity, popularize the knowledge of mine geological disaster prevention and control, improve the quality of mine mining personnel, and enhance their sense of crisis and alertness to geological disasters. Improve the skills and means of disaster prevention and reduction of all personnel in the process of mine production, and strengthen the training of mine geological disaster prevention, risk avoidance and rescue.

Develop and apply advanced informatization, geophysical exploration means and geochemical exploration means to closely monitor mine geology, implement real-time and dynamic monitoring of potential disasters that may occur, establish mine geological disaster monitoring system, realize mine geology and environmental ecological dynamic tracking and management system, and avoid major personnel and property losses.

Strengthen the pit and mine slope design, conduct slope monitoring, strengthen the retaining wall and stabilize the geological structure of the slope. If there is cracking and deformation after

excavation, conduct geological survey in time and take preventive measures. Reasonably build tailings dam, form stable mine and tailings pond, and reduce the risk of landslide and collapse.

4. Protection and Restoration of Mine Geological Environment

4.1. Principles of Mine Geological Environment Protection and Restoration

The inevitable requirement of human society is to protect the geological environment and prevent and reduce disasters. Therefore, the protection and restoration of the mine geological environment should be based on the principle of "prevention first, combination of prevention and control, rational development, utilization, protection and restoration of the geological environment, and promoting the coordinated development of the national economy and geological environment", reasonably develop and utilize mineral resources, protect people's lives and property, and effectively protect the geological environment, Fully reflect human's subjective initiative in disaster prevention and reduction.

- 1) Adhere to the principle of "who develops, who protects, who destroys, who governs".
- 2) Adhere to the principle of "people-oriented and building a harmonious society".
- 3) Adhere to the principle of "overall planning and comprehensive treatment".
- 4) The principle of phased and subregional implementation according to priorities.
- 5) Adhere to the principle of "focusing on prevention and combining prevention and control".
- 6) Adhere to the principle of "development in protection and protection in development".
- 7) Adhere to the principle of "adjusting measures to local conditions, seeking truth from facts and managing while mining".
- 8) Adhere to the principle of "feasible technology and reasonable economy". Focus on governance effectiveness and operability.
- 9) Adhere to the principle of "design before construction".
- 10) Adhere to the principle of "safety first".

4.2. Tasks of Mine Geological Environment Protection and Restoration

The main significance of mine geological environment protection and restoration is to control or eliminate the hidden dangers of geological disasters in the mine and restore the damage to the geological environment caused by mine construction, production and other activities. The tasks of mine geological environment protection and restoration mainly include:

- 1) Establish technical support, organizational support and financial support systems for mine environmental protection and restoration and governance to ensure that all work is implemented as planned;
- 2) Establish a mine environment monitoring system to monitor and timely warn mine geological environment problems and geological disasters;
- 3) Timely treat unstable slopes, such as collapse and landslide, build slope protection and drainage ditches, and repair or rebuild damaged roads and houses;
- 4) Restore the surface vegetation in the vegetation degradation area, and carry out grass planting and afforestation projects;
- 5) Complete the landfill, compaction, leveling and earth covering of cracks in the area, carry out the conversion of farmland to forests, carry out land reclamation projects, and restore the ecological environment of the mine;
- 6) Slope protection treatment shall be carried out for the slope of the industrial square to avoid geological disasters such as free fall and landslide.

4.3. Objectives of Mine Geological Environment Protection and Restoration

Based on the investigation of mine geological environment, focusing on the geological disasters such as ground fissures and landslides caused by coal mining and geological environment problems, carry out the restoration and treatment of mine geological environment. The protection of mine geological environment will run through the whole process of mineral resources development, create a harmonious mine, realize sustainable development, and achieve "prevention in advance, treatment in the process and recovery after the event", so as to enable mining enterprises to take the road of large-scale, intensive and clean operation, and minimize or avoid environmental problems and geological disasters caused by mine development.

- 1) There are no casualties and property losses caused by geological disasters caused by coal mining in the assessment area, such as collapse, landslide, debris flow, ground fissure, ground collapse, etc. at the same time, geological disasters have been effectively controlled;
- 2) Solve the water shortage of villagers caused by coal mining;
- 3) Do not cause secondary geological disasters and stack solid wastes reasonably;
- 4) Effectively restore the vegetation resources within the mining scope, and the vegetation coverage after mining shall be equal to or greater than the original vegetation coverage level.

5. Conclusion

- 1) Make use of today's advanced technical means and mathematical analysis methods to carry out detailed exploration of mine geological environment throughout the country, evaluate and analyze the results reflecting the real current situation. Carry out nationwide planning for the treatment and restoration of mine geological environment, so that the treatment and restoration work can be carried out scientifically and reasonably.
- 2) Establish and improve the laws and regulations on mine geological environment supervision. Only on the premise of clear laws, regulations and systems on mine geological environment supervision, mining enterprises will develop healthily and green under these constraints.
- 3) Establish and improve the monitoring and prediction system of mine geological disasters, and adopt scientific and reasonable treatment projects to control and restore the geological disasters caused by mine mining.

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