
Discussing the Problems and Countermeasures of Water Control in Coal Mines

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Abstract – In the current stage, with the continuous evolution of our society and the continuous innovation of science and technology, the coal mining industry has made remarkable progress. Among them, the coal mine production process needs to face many complicated situations, such as the lack of water resources and other problems. In the actual mining process of coal mine, water control plays an indispensable role, and its importance is self-evident. Because there are many problems in the process of coal mining, the most important one is hydrogeology, which is directly related to the normal operation of the whole mine. In the process of coal mine safety mining, this key link plays a vital role, because it can effectively prevent the occurrence of coal mine water damage and other events, so as to provide a reliable guarantee for the safety of staff. Therefore, the prevention and control of water must be organically combined with the geological work of coal mining enterprises, and at the same time strengthen the comprehensive understanding of the causes of geological disasters, put forward corresponding solutions to prevent the occurrence of water hazards and other accidents in coal mines.

Keywords – Coal Mine Water Control, Problem, Counterplan.

I. INTRODUCTION

While the coal mine water control work has achieved results, it faces new challenges with the change of coal mine situation and the deepening of water control work. Without an effective understanding and analysis of the problem of water prevention and control, and without a sound response strategy, it is impossible to effectively carry out the work of water control in coal mines, and it is impossible to effectively improve the effect of water control. Therefore, in order to ensure that China's coal resources development and utilization activities can be carried out smoothly, it is necessary to strengthen the research on various problems in coal mine water prevention and control work, and take effective measures to solve these problems, so as to ensure that coal mining enterprises get the maximum economic and social benefits. Therefore, we must conduct a comprehensive and in-depth analysis and interpretation of the new challenges faced by water control work in order to better respond to these challenges.

1. Analysis of the Causes of Water Damage Accidents in Coal Mines

Due to the lack of adequate flood control and waterproofing measures, as well as the imperfect management system, the situation of surface water backfilling occurred in the process of coal mining, resulting in mine water, and eventually caused flood hazards. At the same time, due to the complex geological conditions and great changes in hydrological conditions, coal mines are prone to flood accidents. Because coal mining units in the development and design stage of the mine near the water source, groundwater trend, pressure and other comprehensive investigation, resulting in the mine water leakage and other problems, which shows that they do not pay enough attention to the hydrogeological survey. In the excavation stage, due to the complex geological conditions, the mining work is faced with greater risks, which is easy to cause safety accidents and bring huge economic losses to enterprises. During the excavation of the roadway, the lack of strict supervision of

construction quality, especially the lack of control of drilling and excavation problems, led to serious difficulties, such as catastrophic problems such as capping, shaft collapse, and even drilling directly through the underground river.

Due to the late development of China's coal mining enterprises, the awareness of safety production is weak, leading to some safety accidents, the most common is the mine flood accident. In the process of coal mining construction management, because the underground waterproof gate is not set up in accordance with the regulations, it can not be cut off in time when the flooding problem occurs, thus further expanding the scope of underground flooding problem. In addition, due to the lack of effective drainage system, the mine water can not be removed. In addition, the lack of effective drainage equipment monitoring and maintenance measures, as well as the failure to implement measures such as silo excavation in a timely manner, are important factors leading to flood accidents. Therefore, in order to ensure the safety of coal mine production, it is necessary to strengthen the construction of coal mine underground waterproof gate and drainage system, and do a good job of corresponding prevention and treatment. Usually, when a water burst accident occurs in a mine, there will be some warning, with the passage of time, the gloss of the coal mine gradually fades, at the same time, the content of water mist in the air suddenly increases, the sound of water becomes clearer, the coal slurry takes on a bright red color, in addition, the H₂S smell becomes stronger. These are all signs that water poses a threat to coal mine safety. However, due to the failure of the mine driving enterprises to establish a complete monitoring mechanism, they did not grasp these precursors in time, and eventually led to water accidents.

II. THE MAIN PROBLEMS IN COAL MINE GEOLOGICAL WATER CONTROL WORK

2.1. *The Completeness of Mine Drainage System Needs to be Improved Urgently*

In the process of coal mining, coal mining units fail to pay full attention to the construction of mine drainage system, resulting in the failure to effectively design the quantity, location and volume of water silos in the mine strictly according to the design requirements. At the same time, due to the influence of many factors in underground construction, there is water accumulation in some roadways. Due to the old drainage facilities, lack of stability, coupled with the mine safety exit in strict accordance with the requirements of the water release gate and other reasons, resulting in mine water inrush can not be discharged in time, resulting in serious mine water accidents.

2.2. *Lack of Comprehensiveness of Hydrogeological Data*

Geological exploration is an indispensable prerequisite for coal mining. However, because many geological prospecting departments do not conduct a comprehensive and thorough survey of the water source, groundwater and water accumulation in mining areas in strict accordance with the requirements, they do not collect enough water damage data, mine maps and water control maps, resulting in insufficient hydrogeological data, unable to provide effective geological indications for mining, and eventually lead to highway mining, resulting in leakage of aquifers and water accumulation areas. Therefore, mining has become a serious water hazard.

2.3. *Lack of Comprehensive Water Control Measures*

Due to the lack of understanding of the importance of water control in coal mines, the lack of reliable water control system, the lack of effective quality control mechanism in the process of surface water management and

underground water disaster prevention and control, making the prevention and control work ambiguous, the water disaster caused or found only simple treatment, no thorough root analysis, resulting in the root cause of water disaster can not be controlled and caused by water disaster. The frequency of accidents.

2.4. The Completeness of Mine Water Control Infrastructure System Needs to be Strengthened

The safety guarantee of underground coal mine mainly lies in the reliable water prevention and control infrastructure, but many coal mine enterprises do not pay enough attention to this, do not strictly implement the design requirements, so that the construction of water prevention and control infrastructure lacks the necessary rationality, or even too little attention, there are watertight walls, improper location, watertight gate materials unqualified, drainage system construction unreasonable and other non-standard phenomena. The safety of coal mining is seriously threatened, because the waterproofing infrastructure fails to play its due role, resulting in the mine flood cannot be effectively controlled.

2.5. Lack of Skilled Personnel

In coal mining enterprises, there is a general shortage of talents with professional skills in water prevention and control. With the increase of coal mining, the water consumption of mine is also increasing, resulting in the waste of water resources and environmental deterioration, which requires coal mine enterprises to attach great importance to the treatment of hydrogeological disasters. As coal mining enterprises pay little attention to the training of water disaster prevention professionals and fail to establish an effective internal personnel training system, the existing technical personnel are not professional enough to formulate and take effective technical treatment measures in the process of underground water disaster prevention and control, resulting in unsatisfactory water disaster prevention effect and failure to prevent water disaster accidents in time [1].

III. NEEDING ATTENTION WHEN COAL MINE WATER APPEARS

When it is detected that there is water seepage in the coal mine, it is necessary to determine the water seepage position, the amount of water and the cause. Don't walk around where water is leaking.

When moving to the outside of the coal mine, we must pay attention to the position of the fixed object on the channel, so as to avoid the pressure generated by the water flow impacting the object.

In the case of serious flooding in the coal mine, resulting in the loss of lights and road indicators in the channel, if the direction of retreat to the outside can not be judged, then if the staff feel the wind flow, they should be transferred to the wind area.

When it is found that the coal mine channel is blocked, the workers in case of danger should patiently wait for the rescue workers in turn away from the water seepage site [2].

IV. TREATMENT OF COAL MINE WATER PROBLEMS RELATED GOVERNANCE AND MEASURES

4.1. The use of Advanced Coal Mining Drilling Technology to Achieve Efficient Mining

At present, China's coal mining drilling technology has reached the world's leading level, and a number of technical problems have been overcome. With the rapid development of economic construction, people's demand for coal resources is increasing, so coal mining enterprises have also begun to pay attention to the

quality and efficiency of coal mining, which needs to strengthen the level of drilling technology. Drilling technology is an advanced method of geological exploration by drilling holes on or below the surface and using drilling technology. There are a lot of hydrogeological problems involved in the process of coal mining, so it is necessary to use advanced exploration technology to solve these problems. By conducting in-depth studies of geological materials at different distances beneath the surface, we have succeeded in determining the direction of groundwater flow and the amount of water it contains. With the continuous development of social economy and the improvement of scientific and technological level, the coal mining industry has made great progress. If cutting-edge coal mining drilling technology is used, the treatment effect can be significantly improved in the process of coal mine water treatment.

4.2. Using Infrared Detection Technology to Measure the Temperature of Coal Mines

On the basis of the assumption of thorough exploration of the ground, infrared thermometry is used to detect underground substances, and by comparing the difference between groundwater temperature and underground soil quality, it can be inferred whether there is near-surface water in the crust, and the groundwater flow and quantity can be assessed to determine whether it is suitable for coal mining [3].

4.3. Be Serious when Accepting Survey Results

After the survey, the relevant personnel will be responsible for the inspection of the work of the staff, in this regard, the relevant personnel must be highly responsible and rigorous attitude, careful comparison, calculation, verification and other work. In this stage, it is necessary to ensure that the personal safety of relevant staff is not affected by any, and take appropriate protective measures according to the actual situation. During the mining process, as soon as any problems are found, it is necessary to immediately ask the relevant responsible personnel in detail to avoid any potential situation. If necessary, the area will need to be revisited to ensure safety. If any problems are found that need to be resolved in a timely manner, it is necessary to ensure that all responsible parties can actively cooperate and participate in the specific work. We have an inescapable responsibility and obligation for our work and the lives of our people [4].

4.4. Establish a Comprehensive Waterproof System and Increase Investment in Equipment

In order to ensure the safety and reliability of water prevention and control work, it is necessary to establish a more comprehensive water security system, need more professional and technical personnel to join the professional water prevention and control, but also need to establish and improve the various systems related to water prevention and control, such as the follow-up system of water prevention and control professional, waterproofing professional technical management system, water situation professional detection system, flood stoppage restoration system. As well as the competent departments, testing agencies, professional team system. We also provide various guarantees in terms of authorities, testing facilities, professional teams and management systems.

4.5. Strengthen the Standardization and Scientific Management of Water Resources

In water control work, water survey and observation is a crucial responsibility, it can provide us with the necessary information and data, in order to better understand and respond to possible water problems. The normal production of mine can be ensured by scientific arrangement of underground drainage system and

formulation of drainage scheme. Water surveys, analyses and records must be carried out every week, as well as possible water hazards, to ensure sustainable use and protection of water resources. In order to ensure timely and accurate understanding of the current hydrological situation and the possibility of flood disaster, relevant departments should regularly organize technical personnel to carry out in-depth on-site investigation activities [7]. In addition, a monthly thematic meeting is required to conduct a comprehensive survey of water control efforts and conduct water disaster detection to ensure the sustainable use and protection of water resources; We should also do a good job in daily management. Through scientific planning of underground drainage system and formulation of scientific drainage scheme, the normal production and operation of mine can be ensured. In order to ensure the safety and efficiency of coal mining, the research on coal mine hydrogeological exploration technology should be strengthened. Establish a comprehensive water level monitoring and control system to realize the daily mine water quantity, water height, water temperature, water quality and other dynamic situation of monitoring and control; Hydrogeological exploration should be done well before coal mining, and the underground hydrogeological structure and its change law can be mastered through geological exploration. When digging a mine, it is necessary to follow the principle of "first detection and then mining, detection and mining need to be separated". For areas in doubt, mining should be stopped immediately, while for areas in danger, measures should be taken to eliminate the danger. Before excavating the old cave, it is necessary to carry out a comprehensive detection and inventory of the goaf in order to completely remove the water in the goaf. In the process of roadway excavation, the hidden danger of water should be detected timely and accurately. For the detected water in the gob, it is necessary to adopt ultra-high detection technology for effective prevention. In the detection process, the mining detection technology must be strictly followed, and a series of safe and complete preventive technical measures must be formulated. All aspects of design, construction, detection and engineering acceptance must be strictly checked.

4.6. Enhance the Safety Awareness of Employees to Ensure the Safety of the Workplace

The main function of safety awareness is to ensure that staff can take preventive measures in the course of their work to avoid potential risks and problems. Therefore, we must pay attention to the safety of coal mine production, only in this way can better ensure the economic and social benefits of enterprises. In the water control work of coal mining, preventive measures must be taken in advance to strengthen the control of coal mining from the source, so as to further improve the defects of the entire coal mining system [8]. Before coal mining, the staff must conduct a comprehensive investigation and analysis of the local coal mine geology, climate and natural conditions to ensure that the mining work is adapted to the actual local conditions. If it does not meet the corresponding standards, it will bring threats to the safety of coal mines, and even lead to casualties. Therefore, before the coal mine water control work, the relevant units must conduct a comprehensive review and evaluation of the water control system they have developed to ensure that it complies with national laws and regulations and industry norms and standards. It is very important to do a good job in the prevention and control of water damage in coal mines. In addition to considering the local hydrological conditions and coal seam mining conditions and other factors, it is also necessary to consider the development of mine construction plan. In addition, the coal mining face should be rationally planned in strict accordance with the national standards. In order to ensure that the design drawings and related requirements of the coal mining system can be strictly followed, the construction unit and the supervision personnel must complete the supervision duties within the specified work period, and only after meeting the requirements to the maximum extent can they be in-

-tegrated with the main project and put into use together.

V. CONCLUSIONS

In order to ensure the long-term stability of coal mine safety production, it is necessary to strengthen the ideological consciousness of all personnel, implement the responsibility to everyone, establish a long-term system and mechanism, standardize the work of water prevention and control, and improve the professional skill level of relevant responsible personnel. Therefore, it is very important to do a good job in mine water disaster control. Only the implementation of effective water control measures can ensure the safety of coal mine production, so as to promote the orderly and healthy development of coal mine management.

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Shengjun ZHANG, Male, Han nationality, born in Dangshan, Anhui Province, was born in November 1983. He is a member of the Communist Party of China (CPC) and started to work in 2008. He graduated from China University of Mining and Technology with bachelor's degree and master's degree in hydrology and water resources Engineering and Geological engineering respectively. He has successively served as technician, technical leader, Director engineer of production Technology Section, special engineer (responsible person of mine geological water control), special engineer and manager of geological survey department of Yongmei Group. He has rich practical experience and innovation ability in the technical management of coal mine geology, water damage prevention and control.