Available online www.jsaer.com

***Journal of Scientific and Engineering Research*, 2018, 5(8):171-176**

Research Article

ISSN: 2394-2630
CODEN(USA): JSERBR

Analysis on the Problems and Strategies of Mine Emergency Rescue System in China

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Abstract Mine emergency rescue plays a huge role in preventing mine accidents from expanding and timely saving losses. The article starts from the importance of mine emergency rescue, and analyzes the problems of mine emergency management chaos, emergency rescue plan is not perfect, emergency rescue technical equipment is backward, miners' on-site disposal ability is poor, etc., and it is targeted. From the dissemination of emergency management concepts, improving the scientific nature of emergency plans, promoting the actual combat of emergency drills, increasing the R & D and application of technical equipment, and enhancing the sense of ownership of miners, the paper puts forward a summary of the content of the article.

Keywords Emergency rescue; Emergency management; Rescue plan; Technical equipment; Coping strategy

1. Introduction

The coal industry is China's pillar industry, and two-thirds of China's energy consumption comes from coal. Along with the continuous increase in the amount of coal mining, coal mine safety issues have become more prominent, and serious accidents have occurred. Coupled with the special working environment of coal mine production, the catastrophic accidents in coal mines have caused great harm to the society. Therefore, emergency rescue for major accidents has become a focus of the international community's attention to social disaster reduction. When an accident or disaster is inevitable, a timely and effective emergency rescue operation is the only effective measure to resist the spread of the accident, expand and mitigate the harmful consequences. [1]. Studies have shown that an effective emergency rescue system can reduce the loss of an accident to 6% without emergency [2-3]. Therefore, the analysis and research on mine emergency rescue system in China, and put forward targeted strategies and suggestions, it has important theoretical and practical significance for promoting mine safety construction and ensuring the life safety of first-line miners.

2. Problems in mine emergency rescue system in China

The mine emergency rescue system should include the following main contents: the organization of emergency rescue; emergency rescue plan; emergency training and exercises; emergency rescue operations; site clearance; post-accident recovery and after-treatment [4-5]. Although China's mine emergency rescue system has made great progress in recent years, there are still many problems such as emergency management chaos, emergency rescue plans are not perfect, emergency rescue technical equipment is backward; miners have poor on-site disposal capabilities, and so on.

2.1. The importance of emergency management is not enough, and there are still insufficient understandings

Emergency management is the basis of coal mine safety production management. Coal mine accident emergency management is to control accidents to expand and reduce accident losses in the face of unexpected events such as natural disasters and accidents, and to implement pre-existing control, in-process handling, and incident response. A series of activities managed after the event [6]. Most coal mines in China do not have a unified management mechanism for emergency work. The entire emergency rescue system lacks unified planning, supervision and guidance. The local government faces many independent emergency rescue systems, regardless of funding, personnel, or rescue. The establishment of the system and the supervision and management of emergency work are at a loss. There is a lack of effective unified deployment and management of emergency team construction, rescue equipment deployment, maintenance and emergency response mechanisms. Emergency resources and information are not realized in the true sense. The sharing will inevitably lead to a slow response of the system, low emergency response capability, and waste of resource allocation. Moreover, because the time for emergency management work is sudden, it is only a state of preventive standby. Therefore, the leaders of many mining companies do not attach great importance to emergency management, and simply believe that they should do a good job in daily safety management. Work is fine [7]. It is precisely because of the lack of understanding of emergency management from the superior management to the grassroots practitioners that the development of mine emergency rescue work is difficult, and even the best theory and technology are difficult to put into practical application.

2.2. The emergency rescue plan is not perfect, and the disaster emergency drill is ineffective

The accident emergency rescue plan is to control the development of the situation as soon as possible and prevent the accident from spreading, thereby reducing the harm caused by the accident and reducing the accident loss. The mine emergency rescue plan is a systematic project [8]. However, the framework and level of the mine's emergency plan are not reasonable. The comprehensive opinions and suggestions of various personnel have not been widely consulted in the preparation. Many of them are based solely on production experience, and even more are directly used in other mines. The emergency rescue plan is hard-wired, and expert review cannot be strictly implemented. It cannot be continuously updated according to changes in laws and regulations and actual conditions of mine mining. Many mine emergency rescue plans are not targeted, lacking maneuverability and guidance, and have lost their application value. The disaster prevention and treatment plan failed to conduct a detailed analysis of various types of accident-prone locations, and proposed specific prevention and emergency management measures, including lack of standardization procedures for operational procedures including grading response and emergency command.

Because the mine emergency drills involve a wide range of departments, more participants, higher activity areas and higher cost of activities, subjective attention is also an important reason. Even if the drill is carried out, it is only a part of the operation that is simple in operation and low in cost. In fact, the more important the link, the higher the cost of the exercise Due to the omission of important drills, the emergency plan lacks practical testing. The problems in the design of the plan have not been corrected and become hidden dangers. Once an emergency occurs, it will be reflected in the implementation of the emergency plan. Reduce the effectiveness of the implementation of the emergency plan, and then affect the normal implementation of the plan [9]. If the plan only stays at the level of the text file, and there is no targeted actual exercise, even if the plan is very thorough and meticulous, it can only be on paper [10].

2.3. Emergency rescue technology and equipment are backward, and emergency rescue forces are scattered

China, the United States, Australia and other major coal-producing countries have attached great importance to the development and application of coal mine accident emergency rescue technology and equipment, reducing the casualties and property losses of accidents, but it is still difficult to meet the needs of coal mine accident emergency rescue [11]. In terms of disaster perception, at present, coal mine accident detection and alarms are mainly completed manually. There are problems such as late discovery, long reporting time, slow response, etc. The emergency response time is long, which will miss the best gold rescue time. Especially when all the

personnel on the scene of the accident are killed, the mine will not be able to find the accident in time; in the emergency communication, the communication terminal is fixed telephone, not portable, and the catastrophe resistance is poor. If the accident occurs, the communication cable will be broken and the communication terminal will be damaged. Etc.; distress (difficult) personnel positioning. Existing mine personnel positioning system substations and card readers need underground power supply. When gas overruns or gas explosions, fires, floods, roof collapses, etc. occur, the system will not work properly after the underground power grid is out of power [12].

The emergency rescue force is scattered in multiple departments. There is no specific and specific emergency rescue technology. The emergency rescue and technical coordination of each department are applicable to their own departments and cannot complete the task of unified coordination [13]. At present, China has not yet formed a unified emergency management organization, which makes the entire emergency response system lack unified planning, supervision and guidance. Many coal mine bases have their own mine rescue teams, but when the accident happens, medical, fire, public security, security inspection, communications and other departments quickly reflect, the first time to arrive at the accident site, it is also very important for disaster relief. The significance, even the support coordination and equipment transfer of the adjacent mine rescue team, will play a key role in emergency rescue.

2.4. On-site emergency response capability is poor, miners' emergency rescue participation

At present, the emergency rescue work of coal mine disasters in China mainly relies on professional rescue teams for rescue, while mine rescue teams are generally on the ground standby, not at the production site. Once an accident occurs in the underground, it is often because the miners lack professional rescue knowledge, and the self-rescue and mutual rescue ability are low. It takes a certain time for the ground rescue team to arrive at the scene of the accident, which is likely to cause further expansion of the disaster and disorder of the accident scene [14]. The on-site emergency response capability is mainly manifested in: Many self-rescuers carried by many miners are no longer usable, and some miners will not operate in time; the rescue equipment deployed under the mine is unmaintained for a long time, in disasters. The role of the medium is very limited; the emergency rescue supplies are insufficient, most coal mines only set up the upper and lower firehouses, equipped

with fire extinguishers, triangular rafts and other fire-fighting equipment; lack of sophisticated large-scale drainage and other supporting facilities, and the configuration of the equipment Poorly, it is impossible to clear the obstacles for the rescue team in a short time, thus missing the best rescue time; the miners rely on experience for the disposal of disasters, and the ability to execute the emergency plan is poor; when the disaster occurs, there is a lack of unified organization and leadership. They are fighting each other and cannot concentrate their strengths on timely rescue and relief.

Miners may have better mining conditions and accidents in the underground than rescue forces from outside the mine. Even the rescue team of the coal mine group company, it is difficult to fully grasp the underground due to the continuous mining and the update schedule of the data. Happening Nowadays, after the disaster in the mine, most of them rely on the rescue team to rescue the mine. The value of other miners who have not gone down is still not well grasped. This is very unfavorable for fast and accurate underground rescue.

3. Strategies for improving mine emergency rescue systems

3.1. Dissemination of emergency management concepts is deeply rooted in the hearts of the people and builds a new mechanism for emergency management

On the one hand, it should strengthen the emergency publicity and education of the responsible persons at all levels of coal mining enterprises, especially the propaganda and education of enterprise leaders, improve their understanding of emergency management work, and make them truly recognize the importance of emergency management work, so that in daily work It can strengthen the support for emergency management; on the other hand, improve the management level of emergency management, so that emergency management can be implemented. It is best to arrange a major enterprise leader to be responsible for emergency management. This aspect can make other. The functional departments can coordinate the development of emergency rescue work,

and can coordinate the relationship between various departments in the rescue work, so that the emergency management work can be carried out smoothly.

In addition, through the establishment of a coal mine emergency management capability evaluation system, it is possible to identify problems and deficiencies in the coal mine emergency management work, improve and improve its emergency management capabilities for coal mine emergencies, and at the same time, check and evaluate coal mine response for relevant government departments. The management level of the accident provides a basis for the government to scientifically formulate relevant policies on coal mine emergency management, and promote and promote the healthy development of coal mine emergency management [15].

3.2. Improve the scientific nature of emergency plans and promote the actual combat of emergency drills

The complete emergency plan mainly includes: emergency plan overview, prevention procedures, preparation procedures, emergency procedures, recovery procedures, plan management and review improvement [16]. For mine accidents, the emergency rescue plan should grasp the safety priority and recovery ventilation priority of the distressed and rescued personnel in the rescue. Before the preparation, extensive reference should be made to the opinions of management personnel and first-line miners. In the preparation, more grassroots miners should participate in it, which not only can increase the practicability of the plan, but also facilitate the promotion and publicity of the emergency plan in actual production. In the implementation, it must also be modified and supplemented with changes in objective conditions, such as changes in mining plans and changes in ventilation systems. The work of modifying and supplementing the emergency response plan for accidents should be carried out on a regular basis [17]. The revised plan should be studied in a quarterly or semi-annual manner, and the supporting drawings and materials should be revised to make the emergency plan and the actual production of the mine more conformable, and truly "there is a law to follow".

The drill is the best measure to detect emergency management of major accidents [18]. Nowadays, the mines conduct anti-wind exercises every year according to regulations. However, only the drills for disasters such as mine gas and floods are actually arranged on the mine schedule, and the drills can be performed according to the real guns in the event of disasters. Therefore, on the one hand, the government management department should improve the rules and regulations for emergency rescue drills, and ensure that each miner participates in the drill every year from the system; on the other hand, major mining groups should take emergency drills seriously and take some safety. Investing and coordinating the efforts of all parties to make the emergency drills solid; secondly, the grassroots managers and first-line miners must recognize the importance of the drills and place themselves in the scene of the disaster.

3.3. Increase the R&D and application of technical equipment, and coordinate the adjustment efforts of all parties

The research and development units of various mining equipment should increase the research and development of emergency rescue equipment while developing mining equipment. Research and development of disaster-awareness, emergency communication, accurate positioning of people in distress (difficult), remote detection in disaster areas, wind flow control after disasters, rapid construction of escape routes, intelligent emergency plans and auxiliary decision-making, etc., have important theoretical significance and practicality value [19]. Develop a fast-start emergency rescue platform commonly used abroad. There are various mine drawings in the more advanced emergency rescue platforms, such as mine ventilation system maps and power supply and water supply system maps. In the emergency rescue, open the emergency rescue command plan text, you can immediately carry out targeted rescue command according to the plan, and open the rescue personnel module to timely deploy rescue personnel [20]. At the same time, mines should also form a matching mechanism in terms of the proportion of funds invested and the application of new equipment, ensuring that equipment is frequently inspected and updated frequently, providing protection for underground workers in the event of disasters, providing more time and labor for rescuers. Preparation to improve the efficiency of rescue.

It can learn from the United States 911. When a disaster occurs, it should be handled by the emergency management department as soon as it is reported. The medical, fire, public security, security, communications, and other departments can receive instructions at the first time, and relevant experts can make the first time. Rescue advice. When the emergency forces and resources related to mining enterprises are relatively weak, they

should seek to establish formal mutual assistance agreements with neighboring enterprises or regions in advance, and make appropriate arrangements to receive timely assistance from external rescue forces and resources in emergency rescue. In addition, it should also sign corresponding mutual assistance agreements with social professional technical service agencies and material supply enterprises.

3.4. Increase the training of underground miners and improve the post-disaster disposal capacity of miners

Comprehensive education and training for employees to ensure that all employees understand and master all kinds of accident emergency plans. This is the key to establishing emergency rescue. All levels of management personnel and first-line miners must be familiar with the requirements of various types of accident emergency rescue, because of accidents. It happens at the forefront. The key to the emergency response of the initial accident is to organize the training of all employees, so that employees can understand the emergency response plan of the accident emergency disposal method, rational planning, strengthen organization and coordination, and do a good job in all aspects of training. Carry out various forms of emergency management, self-rescue, mutual rescue common sense, make full use of various training and education resources, networks, television, comics and other means, through safety talks, accident warning education, emergency plan drills and other forms. Improve the autonomy of miners' learning. Participation, improve the quality and effectiveness of training.

In the first-line miners, part-time rescue workers are trained in batches, learn to use common rescue equipment and rescue theory, and conduct regular joint drills with mine rescue teams to give full play to the role of miners in mine rescue and increase their emergency rescue. The degree of participation in the middle. Only when the whole people are soldiers, and give full play to the role of miners, the situation of mine emergency rescue in China can achieve a real improvement [21]. It is also possible to send personnel to the relevant agencies for systematic training in the mine safety department, so as to better command underground miners to carry out self-help and mutual rescue in time when disasters occur.

Conclusion

Mine emergency rescue is a systematic project. It requires the coordinated efforts of the government, enterprises and employees to raise awareness of emergency rescue, expand publicity, and increase special funds for emergency rescue, both to ensure safe production from the source and to occur in disasters. Prepare emergency plans beforehand, prevent problems before they occur, behave in an orderly manner after the disaster, coordinate the efforts of various departments, and do accident investigation and resettlement after the disaster. The improvement of mine emergency rescue is not a day's work, nor is it a separate attack. It requires multiple coordination efforts. Research workers, ambulance personnel, and first-line miners are important participants in the emergency rescue system. Only by giving full play to the advantages of all parties. Constantly learning from advanced foreign technology, the emergency rescue situation of mines in China will surely get better and better.

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