Analysis on Emergency Management of Coal Mine Safety Production in China

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Abstract. The working environment of coal mines is special and there are many dangerous sources, resulting in frequent accidents. As the demand for coal in the society increases, the depth of coal mining continues to deepen, and deep mining faces more security problems. This paper analyzes the relevant literatures of coal mine emergency management in recent years, clarifies the current situation of emergency management in China's coal mines, points out the problems existing in China's coal mine emergency management and suggestions for improving the overall level of coal mine emergency management, and provides reference for promoting the better development of coal mine safety production in China. Prevent more emergencies, reduce casualties and financial losses, and realize the transition from high-risk industries to the security industry at an early date.

1. Introduction
Coal is an indispensable source of production and life. The sustainable development of coal is related to the health of the national economy and national energy security [1]. As the breadth and intensity of coal mining continues to deepen, safety issues are also emerging [2]. There are many risk factors in coal mines that can lead to major accidents, such as fires, gas explosions, roof collapse, coal and gas outbursts, and rapid and effective emergency rescue will save more lives [3]. At present, the construction of an efficient, coordinated and unified coal mine emergency management system has become an important research topic of coal mine safety [4].

2. Current Status of Coal Mine Emergency Management
The coal industry is the industry with the most losses and the most serious casualties in China's industrial production. Although the overall situation tends to improve in recent years, compared with other industries, it is still in a situation of frequent accidents. In 2017, there were 219 accidents and 375 deaths in coal mines nationwide, a decrease of 30 and 151 persons, a decrease of 12% and 28.7% respectively. In the past years, the safety production situation of coal mines has continued to stabilize and improve. In 2018, the coal mine safety supervision and supervision departments and coal mining enterprises in various coal-producing areas realized the “four declines” in total coal mine accidents, major accidents, major accidents and millions of tons of deaths. According to the State Administration of Coal Supervision, there were 217 accidents and 333 deaths in coal mines nationwide in 2018. Among them, there were 17 major accidents and 69 deaths, a decrease of 9 cases and 35 persons, down 34.6% and 33.7% respectively; 2 major accidents and 34 deaths, a decrease of 4 cases and 35 persons, respectively, down 66.7%, 50.7%; no major accidents occurred for 25 consecutive months. With the increasing investment in coal mine safety production by enterprises and governments, the death rate of millions of tons of coal mines in China has also decreased [5]. In 2018, the death rate per
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million tons of coal mines was 0.093, down 12.3% year-on-year, and fell below 0.1 for the first time. The best level of history.

The state has always attached great importance to the revision of coal mine safety production regulations. The Safety Production Law, revised in 2014, is the fundamental law in the field of safety production. Among them, detailed regulations have been formulated for emergency management, and then the “Safety Supervision Regulations for Coal Mines” and “Mine Mine Defense” Emergency management is regulated in the Fire Fighting Code, Basic Requirements for Coal Mine Safety Equipment, Coal Mine Safety Regulations, Mine Rescue Regulations, etc. [6]. In order to comprehensively promote the rule of law, it provides an effective legal basis for strict management of mines.

During the "Twelfth Five-Year Plan" period, all regions, departments and coal mining enterprises have always regarded coal mine safety as the top priority of safety production, strengthened the legalization of coal mine safety, improved the supervision and supervision system, innovated the working mechanism, and improved the efficiency of law enforcement. Accelerate the elimination of backward and unsafe production capacity, promote the progress of safety technology, and effectively enhance the emergency rescue capability. On this basis, the state has put forward higher requirements for emergency management. The “13th Five-Year Plan for Coal Mine Safety Production” proposes that by 2020, the number of coal mine deaths will drop by more than 15%, and the death rate of coal million tons will fall by more than 15%. The serious accidents in coal mines have been effectively curbed [8].

At present, relying on large-scale mining enterprises and related units, China has built 8 national mine emergency rescue teams and 14 regional mine emergency rescue teams. The development and manufacture of technical equipment of the team has also developed in recent years [7], and strengthened The ability of mine emergency rescue. In order to strengthen the emergency team, the team will be managed at the national, regional, provincial, and enterprise levels, and the teams will work together to cope with emergencies.

3. Problems
(a) Comprehensive laws and regulations are the basic guarantee for the safe production of coal mines. In the coal-producing countries such as the United States, Australia, and Russia, there are complete laws and regulations and a system. The mining industry has become one of the safest industries in these countries [9]. There are more than ten regulations and standards related to coal mine emergency rescue work in China, but there is no sound system, but only part of it. In addition, the working environment of coal mines is special, and the broad regulations cannot accurately and effectively deal with coal mine emergencies, and lack of targeted coal mine emergency rescue regulations and standards.

(b) A series of emergency rescue teams are currently established. In some areas with high coal production, concentrated production, and large area, the emergency management capability and rescue capacity are still insufficient. Emergency rescue is a highly professional job. Rescuers need professional training and many practical simulations. However, many coal mining companies pay attention to the physical training of ambulance personnel and neglect the training of professional knowledge, which makes it impossible to cope when an emergency occurs, causing serious accidents [10]. Due to the limited investment of many enterprises, the construction and operation funds of the rescue team are difficult to guarantee, which limits the construction and development of the team, and the level of emergency rescue equipment has not been improved.

(c) Setting a good emergency rescue plan can complete emergency measures and rescue operations more quickly and efficiently. The environment and conditions in different regions are different, and the sudden incidents are different. Each coal mine should have an emergency plan for its own situation. However, some coal mines only have a general description of the important content, lacking analysis for their own enterprises, and missing important information. The targeted emergency preparedness, so the emergency plan is difficult to play in the event of an accident. In recent years, many laws and regulations promulgated in China have stipulated that mining enterprises should conduct drills on the basis of preparing emergency plans. However, at present, the practice forms of
many coal mines are not close enough to actual combat, and some even have not conducted drills, resulting in accidents. And still can't cope and deal with it.

(d) Deep mining of coal mines is a problem faced by the world coal mining countries. Although the average mining depth is not very deep in China, most of the coal mines have a depth of more than 1,000 meters. The emergency management methods of shallow mining cannot ensure the safe production of coal mines. Therefore, there is no emergency management system for deep mining.

4. Suggestions for Improving Emergency Management Capabilities

Emergency management should include the entire process of the accident and combine it with the accident prevention work before the accident to reduce the possibility of accidents. In the event of an accident, the root cause of the accident should be found in time, the chain of the accident should be cut off, and the deterioration of the accident should be stopped. After the accident, emergency-related measures should be fully utilized to reduce the loss of personnel and finances and minimize the damage of the accident.

(a) The emergency management regulations that can be put in place are the basic requirements for emergency management. They should be improved in the existing emergency management regulations, and more requirements and special regulations should be formulated for the emergency management of the coal industry. Enterprises and units in various regions should also build a operative and efficient system based on their own actual conditions and work.

(b) The most important thing for emergency rescue is that the speed is fast and the treatment measures are accurate and effective. The emergency plan is the premise and general policy of the emergency rescue operation. From the macro comprehensive plan, it is the general outline of the entire emergency plan. From the micro-special plan, it is a detailed emergency plan for special accidents. It is necessary not only to analyze the accidents that may occur in the coal mine, but also to develop emergency rescue measures for the scene after the accident. On the basis of preparing the emergency plan, enrich the form of the plan drill, close to the actual training, and improve the emergency management ability and quality of the ambulance personnel. Increase the number of trainings for all employees, analyze the causes of each accident, and strengthen employees' awareness of crisis.

(c) In terms of equipment, it is necessary to not only update and maintain it regularly, but also to update it in time [11]. Each upgrade and replacement of the equipment will provide a safer working environment for the coal mine and will also increase the safety production capacity of the coal mine.

(d) Nowadays, with the rapid development of information technology, the traditional coal mine emergency management system should be gradually informatized, fully integrate advanced computer technology and information technology into the coal mine emergency management system [12], and provide pre-warning and incidents for emergencies. Provide more accurate information for response and recovery. Enterprises must have corresponding technical support and make full use of their technical equipment and personnel reserves.

(e) The deep mining of coal mines has higher standards for emergency management. First of all, it is necessary to ensure the environmental safety of the mine. For example, the mine pressure is severe and the requirements for support will be higher. The deeper the mining, the greater the gas pressure, and the ventilation should be increased. Quantity and so on. Secondly, deep mining pressure and ground temperature increase, miners are prone to mental paralysis, so it is necessary to increase the number of miners rotation to avoid physical discomfort and cause accidents.

5. Conclusions

China has been on the road of developing emergency management, but there are still many problems that are not perfect. Coal plays a supporting role in social and economic development, and emergencies are always the main factor affecting coal mine safety production. This paper summarizes the current situation of emergency management in China's coal mining industry and puts forward suggestions for existing problems. On the basis of doing a good job in traditional emergency management, we will introduce advanced technology, strengthen the emergency management system based on the status quo, combine various characteristics of coal mines, strengthen emergency
management capabilities, improve the safety production efficiency of coal mines, and ensure the safety of life and property of miners.

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