Feasibility Study on Environmental Adaptability Test Platform of Rescue Drilling Rig

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Abstract. The environmental adaptability test platform of rescue rig mainly studies the environmental adaptability of ground and underground emergency rescue rig, lifting and rescue cabin and other equipment. It provides verification means and standard basis for safety, and improves the reliability and adaptability of drilling rescue technology and equipment. It provides a platform for emergency rescue drill, actual operation and scenario simulation. After the completion of the platform, it has reached the international advanced level.

1. Introduction
In June 2017, in order to implement the outline of the 13th five year plan for national economic and social development of the people's Republic of China, the opinions of the CPC Central Committee and the State Council on promoting the reform and development in the field of work safety, the notice of the general office of the State Council on printing and distributing the 13th five year plan for work safety (GBF [2017] No. 3), and the suggestions on strengthening the construction of safety supervision and supervision capacity to ensure safety In order to meet the requirements of supervision, supervision and law enforcement, the emergency management department (the former State Administration of work safety) and the national development and Reform Commission (NDRC) organized and compiled the "supervision capacity building plan for work safety supervision departments and coal mine safety supervision institutions (2016-2020)". Another section of your paper.

2. Current situation of emergency rescue
Since the beginning of this century, there have been many successful cases of using surface drilling channels to rescue trapped people underground. On July 25, 2002, a flooding accident occurred in kuixi coal mine in Pennsylvania, USA. nine miners were trapped underground. They retreated to the top of the mine and waited for rescue. After three days of drilling and pumping water, all nine miners were rescued. On August 5, 2010, a copper gold mine named San Jose in Atacama Desert in northern Chile collapsed, resulting in 32 miners working underground As of October 13, 2010, 33 trapped miners in San Jose copper mine in Chile were rescued after 69 days of long waiting. The trapped miners took the Phoenix 2 lift cabin and passed through 622 meters On December 25, 2015, the gypsum mine of Yurong Trading Co., Ltd., Baotai Town, northeast of Pingyi County, Shandong
Province, collapsed due to the collapse of the adjacent abandoned gypsum mine goaf. On January 29, the four surviving miners trapped in the mine collapsed from 220 It is the first time that large-diameter drilling technology has been successfully used in China, which is a milestone in the history of mine rescue.

Figure 1 Drilling rescue site of Pingyi gypsum mine

3. Existing problems
With the high-yield and efficient development of coal mine, the performance and function of underground rescue drilling rig have been developed in many aspects, the types of equipment have increased, and a large number of new rescue technologies and equipment have appeared. In the rescue process, the following problems are reflected.

Figure 2 Storage site of rescue drilling rig

1) Emergency rescue requires high reliability, safety and process adaptability of rescue technology and equipment. At present, there is no environmental adaptability engineering test field for rescue drilling rig and supporting equipment.
2) As the final part of rescue, the adaptability, safety and reliability of rescue equipment directly affect the rescue results, but there is a lack of professional rescue equipment field test platform.

3) Underground drilling rescue is an important part of the rescue system. At present, there is a lack of underground professional drilling rescue equipment engineering test field, and the adaptability of underground rescue technology and equipment cannot be guaranteed.

4. Necessity of project construction
1) The construction of environmental adaptability test platform for mine rescue rig is the need of implementing the decision of the Party Central Committee and the State Council on safety production. It is the top priority of work safety in the 13th Five Year Plan period to resolutely curb the frequent occurrence of major and special events. In the 13th five year plan for work safety, it is listed as a key project to "build and improve the national technical support base for major accident prevention and control in mines, hazardous chemicals, occupational hazards, urban safety, emergency rescue and other industries"; and it is also listed in the plan for supervision and supervision capacity building of work safety supervision departments and coal mine safety supervision institutions (2016-2020) (hereinafter referred to as the plan),It is pointed out that "environmental adaptability test platform for rescue drilling rig".

2) The construction of drilling rescue technology and equipment test field can meet the needs of reliability, feasibility and applicability verification. The rapid, safe and accurate technical requirements of ground rescue wells put forward more stringent conditions for the applicability and reliability of construction equipment. The existing ground rescue drilling rig, drilling tools and drilling technology can not fully meet the needs of mine emergency rescue ground wells. Therefore, it is necessary to analyze and evaluate the common key issues in the field of environmental adaptability of drilling rescue technology and equipment through platform construction, and provide verification conditions for the safety evaluation of new drilling rescue technology and equipment.

3) It is necessary to build the environment adaptability platform of rescue drilling rig to support the engineering test of drilling rescue technology and equipment and the formulation and revision of relevant technical standards. Industry standard is one of the main basis for mine safety production management department to carry out supervision and supervision work, and it is also a regulation that industry practitioners must abide by. Its formulation needs a large number of tests and inspection means to verify as the basic support. Through the construction of environmental adaptability platform of rescue drilling rig, it provides necessary technical support for the formulation of safety standards and specifications such as drilling lifting rescue technology, equipment and new materials.

5. Construction contents and objectives
Three sets of analysis and verification systems are built on the platform, including the ground rescue drilling rig test system, rescue lift cabin test drilling system, underground emergency rescue channel and equipment test system. The overall system diagram is shown in Figure 3.
Based on the analysis of the existing technical capability parameters and process adaptability of the existing rescue drilling rig and supporting equipment, combined with the requirements of the future equipment and process development trend. The final hole diameter is 215.9mm and the hole depth is not less than 270m. A rescue drilling drill system, the hole diameter is 930mm, and the hole depth is to bedrock test hole, can carry out small-diameter life support hole. After the completion of the test, it can be used repeatedly after filling; 1 large-diameter rescue lifting hole with final hole diameter of 580mm and drilling depth of no less than 270m will be constructed; 1 underground rescue channel with test hole diameter of 600mm and hole depth of 20m will be constructed, and 1 simulated collapse roadway with net section of 3.8m × 3M and length of 38m will be constructed. The platform is equipped with drilling rescue auxiliary equipment, which can be matched with all types of rescue rigs to meet the simulation drilling of existing ground rescue holes and technology; the matching detection equipment of the platform can carry out all-round electromechanical and hydraulic detection of existing general models in the actual drilling state.

6. Summary
After the completion of the platform, it will fill the gap of domestic rescue rig environmental adaptability test platform, and become the leading international rescue rig environmental adaptability test base, which can meet the requirements of analysis and verification ability in the field of rescue rig. 5-10 years.

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