

Study on Gob-Side Entry Retaining of Field Application

Bin Yin ^{1,a}, Weidong Lu ^{1,b}, Yue Wang ¹

1 Department of Safety Engineering, Xinjiang Institute of Engineering, Urumqi, 830000, China

^almgdyinbin@163.com, ^bluweidong1990@126.com

Keywords: Gob-side entry retaining; Support technology; Ventilation system of 'Y'

Abstract: In this paper, it introduced the general situation of the mining area and described the superiority in high gas mine. The article pointed out the concrete scheme of gob-side entry retaining and analyzed the benefit of economy and society, so we can see the advantage clearly. Because of the technology has been successfully applied in this mining are, we can see the better prospect of extension in the others high gas mining areas.

Introduction

The mine of Duerping is a high gas mining area, affected by seasonal changes, working face corner gas concentration is often at a critical value, to a large extent affect the safety in production. In order to more effectively control the gas concentration in the working face backflow, to ensure that the gas in the recovery process is not overrun, decided to adopt the "Y" type ventilation system along the empty lane along the empty lane for the stope return airway to ensure smooth air flow, effectively control the working face of the corner gas concentration, eliminating the safety of production in a big risk^[1]. The mine of 2#, 3# and 8# coal seam is the main mining coal seam, the gas emission volume is unstable, often the phenomenon of gas overrun, to the safety of production has a great impact, but also increased the production team The pressure in the production process, causing great hidden dangers. The successful implementation of roadway along, it show a good promotion prospects.

Gob-side entry retaining

It is generally applicable to thin and medium-thickness coal seam with gentle slope and inclined thickness below 2m. There are three types of roadway layout along goaf roadway: advance gob-side entry retaining, retrogressive gob-side entry retaining and reciprocating gob-side entry retaining. Progressive gob-side entry: face forward mining, leaving along the goaf along the roadway. Retreated roadway along goaf: first excavated section of the roadway to the mining area boundaries, mining face after the retreat and then leave the roadway along the air as the next section of the return airway. This way to overcome the forward-style recovery in front of the coal seam is unknown and stay alley face coal mining and other shortcomings, but to increase the roadway excavation workload.

Ventilation options

Stope ventilation system is a subsystem of mine ventilation system. Stope is the underground operating point, but also underground personnel and equipment are the most concentrated locations, stope ventilation system has a direct impact on mine safety production^[2]. There are six kinds of basic ventilation modes, such as "W" type, "Y" type and "H" type. Ventilating methods of each kind have their own characteristics and application advantages^[3-5]. Combining with the specific situation, Mining area selection "Y" type ventilation. The advantage of the ventilation system is that according to the location of different sources of gas stoves, reasonable regulation of the proportion of the air volume of the slot, or even change the direction of air flow. In general, the main inlet is mainly used to dilute the coal wall gas and coal mining block off gas; auxiliary inlet is mainly used to dilute the adjacent layer into the mined-out area along the roadway after the leakage of gas^[1]. "Y" type ventilation system can effectively solve the problem of over-limit gas in the upper corner, and this method is a more effective method for high-gas close-neighbor mining working face.

General situation of mining

The mining of 62507 area north of the five back to the wind Lane, east 62507 mining area (mining), west of 62511 mining area (already dig), south of the north five right-wing belt Lane. Cover Hill thickness of 441-650m, the average thickness of 545m. The average thickness of 2.05m, the reserve of 880,000 tons, the sandstone shale and the siltstone with the top of 2.81m, and the old roof is 11.26m in the middle sandstone. The whole surface is monoclinic structure. Designed to stop line for an anticline structure, the axial north-east, wing inclination of 5 degrees. The fault is not exposed in the working face, but there may be a normal fault with a drop of about 1.0m in the vicinity of the collapse column, which will have certain influence on the recovery. Two mining face collapse pillars, roof collapse near the collapse column, a greater pressure on the mining impact. The roof joint fracture development, the main joint direction for the North East, prone to help.

Technical solutions

Construction methods and roof management

- (1) with three seven-footed logs in the cut line from the coal to help 1200mm Department of "goods" shaped to form a group of columns, column spacing 2000mm, and then with the mining column pushed into the heap.
- (2) Yokokawa mouth in advance to play the first inside the crib, wooden pallets from the lateral lane is not to help 1000mm, to prevent the process of promoting the roof sinking.
- (3) When advancing to 4m from Yokokawa Port, use the point column instead of cutting the top pillar and promote three cycles, spacing 600mm, row spacing of 800mm, to make a second wooden stack prerequisites.
- (4) after playing the second set of wooden pallets, continue to play cutting a row of the top column, in order to set up a third wooden stack ready.
- (5) After the third wooden pallet set up, with the support of the form of change back to the original provisions of the column column support.
- (6) wooden pallets are used to play six feet of logs are set to "well" shape, and set up package angle column; the use of double-stranded wire # 8 will be tied to a solid pile.

Labor organization

- (1) The head of each class is responsible for the specific implementation of the work of the roadway along the roadway and the preparation of the materials.
- (2) The captain of each class is responsible for the work of the coordination and safety confirmation.
- (3) acceptance of the class acceptance of the project quality, substandard engineering firm rework.

Safety technical measures

- (1) During the construction of roadway along goaf, the anchor, anchor and net of the main road are not recovered to ensure the strength of retaining roadway and reduce the slab.
- (2) All personnel must be strictly kneeling before the operation to ask the top, to deal with all the pumice rock. And in the work site to set up a signal point column, found that the roof must be evacuated personnel exception, to be hidden after treatment, to confirm the safety of any hidden danger before they can continue operations.
- (3) The gas concentration in the working place must be checked by the gasman before the column is set up. Only the gas concentration below 0.8% can be operated.
- (4) Operation must first observe a good way out, must ensure that smooth escape route, and by the person responsible for inspecting the roof, coal to help the situation and found an exception must be immediately withdrawn from the staff to stop work, deal with before proceeding.
- (5) If it is found that the mined-out area pressure appears, when the roof broken, it must be reduced to

stay in the pile column, cut the distance between the pillars to ensure that the next left-lane without taking roof collapse collapse.

(6) Round wooden point pillars, stack columns, wrapping pillars and wooden stacks to wear shoes hats, set up must be connected to the bottom, the bottom must dig to the hard bottom, the top must be backed with a wooden wedge.

(7) Lane along the left Lane, the staff to do a good job of mutual security work to eliminate all meet the collision accident.

(8) The tool used for working along the roadway must be copper tools.

(9) lane Lane during the operation of any person shall not engage in any production activities and the face of any mechanical equipment to prevent the roof due to shake off the gangue wounding.

(10) The alley of floating coal must be cleaned up classes, is strictly prohibited to fly into the lane along the left Lane, to prevent spontaneous combustion.

(11) Two or more wood must be used to coordinate with each other, so that the same password, with the same release, so as to avoid accidents.

(12) The person responsible for the class to observe the roof pressure cycle law, to lay the column to provide technical guidance.

Benefit Analysis

After the application of gob-side entry retaining technology in the mining area, not only reached the goal of controlling the gas concentration to improve the working surface environment, but also achieved certain economic benefits, as follows:

(1) Monthly labor 276, logs (2.6m 350, 2.0m 100), the cumulative use of wood 50m³, is expected to require the end of the project 500 m³ of timber, 2,700 jobs; compared to the previous technical program, Saving a lot of manpower, material and financial resources;

(2) The effective control of the face gas concentration, greatly improving the work environment of the underground workers, to provide security for the production, with immeasurable social value.

conclusion

(1) The use of columns, columns staggered support roof, effectively control the amount of roof subsidence, but also saves the support material;

(2) When it is 4m away from Yokokawa Port, three rows of dense point columns are used instead of the cutting columns to form a safety environment for the erection of wooden stacks while avoiding the work of entering the mined-out area. The safety factor is much higher improve;

(3) The use of three wooden stacks support Yokokawa mouth triangle, effective control of the roof, to prevent the roof fall caused by poor ventilation, causing gas accumulation;

(4) As the mine is a high-gas mine, gas control is very important. 62509, the progress of gob-side entry retaining in the mining area provides a reference example for the gas management of fully mechanized face, which has a good prospect of popularization.

References

- [1] Boxuan Huang. Ventilation and Fire Protection of Stope [M]. Bei Jing: China Coal Industry Publishing House, 1992, In Chinese.
- [2] Dehui Ren, Kun Ding. No pillar mining of highly biogas and flammable seam [M]. Bei Jing: China Coal Industry Publishing House, 1991, In Chinese.
- [3] Bin Sun. Talking about the coal spontaneous combustion of U type ventilation system[J].Coal Technology,2003,22(07):58-5, In Chinese.
- [4] Pengjun Wang, Jinsheng Li, Jinmin Ma. The Application of Grid and H Shape Ventilation System in Gasy Mines[J].Shanxi Coal,2009,29(04):45-47, In Chinese.
- [5] Yongxin Xu. Coal Mining Science [M]. Xu Zhou: China University of Mining and Technology Press, 2009, In Chinese.