U.S. Department of Labor

Mine Safety and Health Administration
Pittsburgh Safety & Health Technology Center
P.O. Box 18233
Pittsburgh, PA 15236

Ventilation Division

JUL 15 2004

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Rec'd from (b) (7)(C) on 5/26/2010 @ 1607hrs.
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MEMORANDUM FOR STEPHEN J. GIGLIOTTI
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FROM: GEORGE AUL
Mining Engineer, Ventilation Division

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MICHAEL GAUNA
Mining Engineer, Roof Control Division

SUBJECT: Methane Floor Outbursts at Performance Coal Company's Upper Big Branch Mine - South, MSHA I.D. 46-08436

Summary

On May 4, 2004, Acting District Manager, Coal Mine Safety and Health (CMS&H), District 4, requested assistance for controlling gas emissions from floor outbursts at Performance Coal Company's Upper Big Branch Mine. On May 26, 2004, a meeting was held at the mine site to share information with Performance Coal Company personnel pertaining to floor methane outbursts encountered in other Appalachian coal seams. Those in attendance are listed in Appendix A.

The Performance Coal Company operates the Upper Big Branch Mine located near Whitesville, West Virginia. Coal was extracted from the Eagle Coal Seam using both continuous mining machine and longwall mining methods. The mine has encountered floor outburst problems associated with longwall retreat mining.

In the Pocahontas No. 3 coal field, floor outbursts were determined to be associated with methane trapped in fracture zones below the coal seams. Methane was released from the underlying fracture system(s) through the stressing and/or stress relief of the underlying strata from the longwall panel extraction. Experience suggests that locating and degassing floor methane zones through a drilling program was highly problematic. Consequently, because of the uncertainties with floor methane outbursts, the historical means for handling the situation relies on contingency plans to mitigate such an event. Items to consider include increased air quantities along the longwall face and in the bleeder system, training, safety procedures, ground condition monitoring, mitigation plans, and gas sampling.

Background

The Upper Big Branch mine experienced a floor methane outburst in February 2004 on the 17 Longwall panel. Previously, a similar floor methane outburst occurred in the adjacent 16 Longwall panel in July, 2003. It was reported that the Harris Mine, also in the Eagle seam adjacent to the Upper Big Branch mine, has experienced similar events on longwall panels. As requested by CMS&H, District 4, information was shared with Performance Coal Company personnel pertaining to floor gas outbursts encountered in other Appalachian coal seams.

Discussion

The floor methane outbursts encountered at the Upper Big Branch Mine have a stratigraphic similarity with outbursts encountered in the Pocahontas No. 3 Coal Seam in Virginia. In the areas that the outbursts occurred, the mined coal seam is near the base of the existing coal series in the region. The Eagle coal seam is the lowest mineable coal seam at the base of the Kanawha Formation. The stratigraphically lower New River Formation containing the Beckley coal series and the underlying Pocahontas Formation containing the Pocahontas coal seams do not exist.

In the Pocahontas No. 3 Coal Seam, the floor methane outbursts were determined to be associated with gas trapped in reservoirs deep below the coal seam. Methane was released from the underlying fracture system(s) through the stressing and/or stress relief of the underlying strata from the longwall panel extraction. The gas from under the Pocahontas No. 3 seam possessed a different composition than the gas associated with coal bed methane, indicating a non-coal bed, deeper source for the gas. It is

suggested that a similar mechanism could account for the Upper Big Branch mine outbursts. This mechanism is considered likely since the outbursts do not occur during section development and only are associated with longwall panel extraction.

Gas reserves exist below the coal seam in the Upper Big Branch mine area. Numerous gas wells are present on the property which reportedly target gas sands situated approximately 2,500 feet below the Eagle coal seam. Consequently, methane trapped in zones below the Eagle Coal Seam could be released into the mine through fractures opened by longwall coal extraction. Gas analyses of the Eagle coal seam gas and the floor gas have not been completed. A comparison of the hydrocarbon content of the two gases may reveal the source of the gas.

Considerations

Locating and degassing floor methane zones through a drilling program is highly problematic. The fracture zones are not visible underground and their position can only be ascertained as generalized trends. The locations of the gas zones are revealed by methane released from fractures produced by disturbance of the extracted longwall. Gas well stimulation programs may not be effective if the well is not located in the exact area of the gas zone.

Consequently, the historical means for handling the situation relies on contingency plans to mitigate such an event. Items for consideration include:

1) Increased longwall face airflow will more effectively dilute the methane released from the outburst closer to the source and safely remove it from the face area. Increasing airflow after an event does not address the condition when the hazard potential was greatest.

2) Provide adequate ventilation in the longwall bleeder system. A floor gas outburst can occur in the caved zone behind the longwall shields. Increased airflow in the bleeder system would be more effective in diluting additional gas released by the outburst. Airflow in the bleeder entries can be improved by removing restrictions, such as water. Bleeder system performance is paramount for providing adequate dilution of gob gases, especially near the active areas.

3) Be aware of the conditions associated with the occurrence of an outburst, such as approximate panel position. Insure that all crews recognize that mining has advanced into a zone with a potential for a floor outburst. Consider developing a plan to outline procedures to manage the sudden release of gas from the floor outburst. Insure that all crews understand the plan especially with regards to personnel restrictions and removal of electrical power.

4) Use any precursors such as rapidly yielding shield legs or unusual noises to indicate that a floor outburst may be initiating. Monitor shield leg pressures in outburst prone areas so the longwall crew can be rapidly removed from the face.

5) The floor outburst zone appears to be in close proximity to future longwall stop positions. Consequently, ventilation requirements and examinations during longwall recovery operations in areas susceptible to floor outbursts could be critical. Normally, longwall recovery operations are accomplished with reduced airflow, because the minimal mining alleviates methane problems. Longwall face airflow similar to that used for mining may be required during recovery.

6) Consider restricting cutting and welding activities in areas that have a high probability of floor gas outburst occurrence. If this type of work must be conducted, special precautions should be applied. Listed below are some procedures develop by other mining companies that have experienced similar problems:

- A diligent effort should be applied while checking for methane. Gas tests taken more often and closer than 1 foot from the floor may be useful in detecting gas emissions from small fractures in the floor.

- Gas checks should be taken underneath the pan line where methane may accumulate. Raising the pan line allows better access for testing and permits airflow to dilute accumulations of methane.

- Fire extinguishers, water, and rock dust should be at the work site.

- A welding mat or blanket may be used to catch hot material to prevent it from coming in contact with a methane feeder. After the work is completed, the hot material should be cooled and removed from the face area.

7) Consider developing a plan for sealing the fractures after the outburst occurs. Chemical grouts that are reactive with water may be poured or injected into the fracture to help slow the flow of gas. Store additional supplies near the longwall face so that they are readily available.

8) Should a methane outburst occur, it would be beneficial to sample the gas and immediately conduct an analysis for the higher order hydrocarbons. This gas chemistry should be compared to the composition of the Eagle seam(s) methane to determine if the gas is similar or dissimilar. The gas chemistry could determine if the source is coal bed methane or another methane source. A means for collecting gas would involve drilling a hole in the pillar rib in the face area and immediately installing a glue injection packer fitted with a closed valve. Coal bed gas could be accumulated in the hole and be collected for analysis.

If you should have any questions regarding this report, or if we can be of further assistance, please contact George Aul at (304) 547-2318 or Mike Gauna at (304) 547-2311.

Appendix A

Personnel Who Attended May 26 Meeting

MSHA Personnel

George Aul, Mining Engineer, PSHTC, Technical Support
Michael Gauna, Mining Engineer, PSHTC, Technical Support
Don Winston, Mining Engineer, CMS&H, District 4

Performance Coal Company Personnel

Tim Comer, President, New River Energy Corporation
George Levo, Senior Mining Engineer, Performance Coal Company
Mike Milam, Performance Coal Company, Upper Big Branch Mine
Bill Potter, Performance Coal Company, Upper Big Branch Mine

cc: ROOF(M. Guana)
Roof Control Files
VENT(G. Aul)
(D. Beiter)
(R. Stoltz)
Vent Files-SUB-D75

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