

U.S. Department of Labor

Mine Safety and Health Administration
Industrial Park Road
RR1, Box 251
Triadelphia, West Virginia 26059



April 19, 2007

MEMORANDUM FOR RICHARD A. GATES

District Manager, Coal Mine Safety and Health District 11

FROM:

JOHN P. FAINI

A handwritten signature in blue ink, appearing to read "J. Faini", is written over the printed name "JOHN P. FAINI".

Chief, Approval and Certification Center

SUBJECT:

Executive Summary of Investigation of Pyott-Boone Electronics
MineBoss Monitoring and Control System

A computerized monitoring system manufactured by Pyott-Boone Electronics was in use at Wolf Run Mining Company's Sago Mine at the time of an explosion on January 2, 2006. Portions of the hardware and software associated with this system, called 'MineBoss Monitoring and Control System,' were evaluated to determine operational status. Additionally, data associated with recordable events stored in the computer was extracted and a copy of the computer's hard disk drive was made.

On January 11 and 30, 2006 and February 1 and 2, 2006, the Pyott-Boone Electronics MineBoss Monitoring and Control System was inspected, tested, and evaluated to determine its operational status. The system was used to measure the carbon monoxide (CO) level in the conveyor belt haulage entries and near a battery charging station, in the mine and report those levels to a surface location. Certain events, such as CO concentrations above pre-defined alarm levels, were recorded by the system via a printer and stored on magnetic media. Visual and audible alarms were located underground at the 1 Left Section and 2 Left Section conveyor belt tailpieces, and mounted to an outside wall of the dispatcher's office trailer located on the surface.

The system was also used to monitor and control the operation of underground conveyor belts. Again, certain events associated with the operation of the conveyor belts were recorded and stored by the system.

The stored data, or 'event log,' was used in this evaluation. Additionally, the operation of the system was observed, and the CO monitors were inspected and tested by application of a known concentration of CO in air. All dates and times were those recorded in the event log; they were not revised to reflect the difference between actual time and the computer's real-time clock. However, it was reported by Marshall W. Robinson of Allegheny Surveys, Inc., that the computer's real-time clock, and therefore

the time recorded on the event log, was 4 minutes and 56 seconds ahead of the actual time.

The following are the significant findings of the investigation. Following these items is an approximate reproduction of the map of the underground components of the CO monitoring system, with graphical reproduction of each device.

- The Pyott-Boone Model 805C remote alarm located at the tailpiece of the 1 Left Section belt was not operational when tested. It was wired incorrectly, such that it would not provide visual or audible signals when manually operated by the dispatcher or automatically operated by the adjacent CO monitor. Based on a review of the event log, and assuming that the wiring had not been modified since the time of the accident, the alarm would not have provided audible or visual warnings at the time of the accident.
- The Pyott-Boone Model 1700 CO monitor located adjacent to the remote alarm at the tailpiece of the 1 Left Section belt did not operate properly when tested. It read '26' in clean air and '74' with 50 parts per million (ppm) CO applied to the sensor head. Additionally, it was improperly wired to the aforementioned Model 805C remote alarm, so that the alarm unit would not initiate. When wired properly, this CO monitor would cause the Model 805C remote alarm to give audible and visual warnings continuously, regardless of the CO reading. The data in the event log suggests that this condition existed at the time of the explosion. Furthermore, the data suggests that the response of this monitor was drifting, or changing without a corresponding change in the carbon monoxide content of the mine atmosphere. It appears that some corrective action was attempted on several occasions, most notably during the early morning hours of December 31, 2005. Also, it appears that the system operator had attempted to reset the device, by taking it 'off scan' and placing it back 'on scan,' at approximately 6:09 am on January 2, 2006.
- The CO monitor with address 1.34, located beside the #2 Belt near crosscut 7, was measuring CO properly on January 30, 2006, but was not reporting the value to the surface. Two fuses located in the 'Data +' and 'Data -' circuits were open-circuited. Review of the event log indicates that communications with this CO monitor were lost on January 2, 2006, at an indicated time of 6:32 am; this is most likely due to open-circuiting of the fuses. The event that caused the fuses to operate in the data communications circuitry is unknown.
- Nineteen (19) of the twenty-five (25) CO monitors inspected underground gave readings within 10% of the intended value when a test gas containing 50 ppm CO was applied to the sensor heads with the Pyott-Boone calibration adapter

and flow regulator. Additionally, one (1) of the CO monitors inspected underground was damaged, not connected to the system, and could not be tested underground.

- The monitors that did not respond properly to the test gas, or were non-functional, were as follows:

Address	Location	Zero Reading	Span Reading	Comments
1.29	Motor Barn Spur	0	40	
1.39	#3 Belt near Crosscut 38	109	109	Device failed on January 30, 2006
1.40	#4 Belt near Crosscut 8	0	75	
1.46	#4 Belt near Crosscut 57	0	19	Found face down on mine floor, covered in soot
1.47	Tail #4 Belt (intended location)	-	-	Fragment found on mine floor beside # 4 Belt between crosscuts 44 and 45, Damaged, could not test in mine
1.80	#5 Belt near Crosscut 15	110	110	Device failed between Jan 2 and Jan 30, 2006.
1.99	5 Belt tailpiece just outby the section feeder	26	74	

- The event log indicates that, at the time of the explosion, conveyor belts identified as #1, #2, #3, and #4 were most likely running. It is not possible to determine the status of the #6 belt, because of damage in the area of the belt drive, but the event log does not include an entry that indicates that it was running at the time of the explosion. It's likely that the #5 belt was not running at the time of the explosion. The event log includes entries for Belt #7 before the time of the explosion and the last entry in the event log for this belt was on December 29, 2006. The physical evidence indicates that the equipment associated with this belt was in the process of being dismantled.
- The fragment of a Pyott-Boone CO monitor recovered from the mine was determined to be the unit with address 1.47. It is the subject of a separate investigation to determine if it contributed to the explosion.
- With the exception of the unit with address 1.47, Exhibit Number 114P, there was no evidence that any of the CO monitors produced conditions that would have provided enough energy to ignite a flammable methane-air mixture. The explosion risk of Exhibit Number 114P is the subject of a separate report.

- The entries in the event log that were recorded on the morning of January 2, 2006, were evaluated. Definitions of each entry were provided and the actions that could have caused those entries were described.

Comprehensive inspection and test results can be obtained from the Chief of the A&CC, RR 1, Box 251, Industrial Park Road, Triadelphia, West Virginia 26059.

