CAI-2004-16

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Underground Coal Mine

Fall of Face, Rib, Pillar or Highwall
August 17, 2004

McElroy Mine
McElroy Coal Company
Glen Easton, Marshall County, West Virginia
I.D. No. 46-01437

Accident Investigators

Jason Rinehart
Industrial Hygienist

Jan B. Lyall
Coal Mine Safety & Health Inspector (Roof Control)

Michael Gauna
Mining Engineer, Technical Support

William Gray
Mining Engineer, Technical Support

Originating Office
Mine Safety and Health Administration
District 3
604 Cheat Road
Morgantown, West Virginia 26508
Kevin G. Stricklin, District Manager

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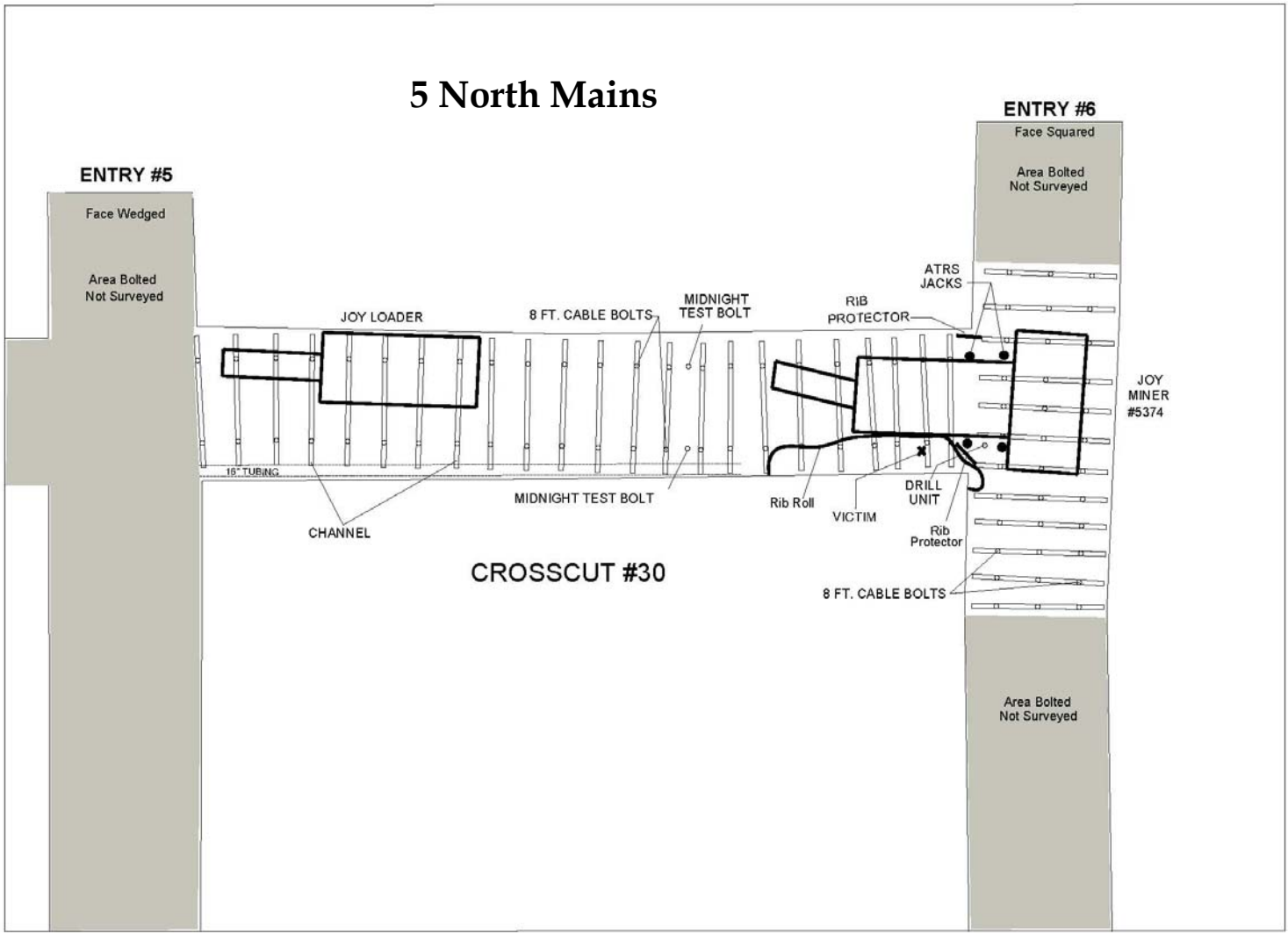
5 North Mains
ENTRY #5
Face Wedged
Area Bolted
Not Surveyed
ENTRY #6
Face Squared
Area Bolted
Not Surveyed
ATRS
JACKS
JOY LOADER
8 FT. CABLE BOLTS
MIDNIGHT
TEST BOLT
RIB
PROTECTOR
JOY
MINER
#5374
16" TUBING
MIDNIGHT TEST BOLT
Rib Roll
VICTIM
DRILL
UNIT
Rib
Protector
CHANNEL
CROSSCUT #30
8 FT. CABLE BOLTS
Area Bolted
Not Surveyed

Not to Scale

Overview

On August 17, 2004, at approximately 4:15 a.m., Joseph F. Sabo, a 57-year old Continuous Mining Machine Roof Bolter Operator was fatally injured in a rib roll accident on the right side of the 5-North Mains section. The crew had mined through the No. 30 crosscut between the No. 5 and No. 6 entries when the roof bolters started to install the last strap. The miner operator warned Sabo the rib was beginning to work. Sabo withdrew approximately 3 feet toward the No. 5 entry (rear of the mining machine) when he stopped and placed his hand on the rib. The coal and rock rib (approximately 20 feet long by 5 feet wide and up to 10 inches thick) collapsed and pinned Sabo against the continuous mining machine (Appendix B) causing fatal injuries.

The accident was caused by failure to effectively control the rib at the work area which exposed the victim to a hazardous condition. The hazardous condition was a result from what appeared to be mining induced loading in the No. 30 crosscut between the No. 5 and No. 6 entries. Stress redistribution resulting from the completion of the crosscut shed an additional load on the surrounding pillar ribs. The additional load caused the pillar block to expand and the rib line adjacent to the right side of the continuous mining machine to fracture. Contributing to the accident was equipment incapable of installing rib support, an insufficient roof control plan, and failure to reevaluate changing conditions relative to equipment, mining procedures and practices.

GENERAL INFORMATION

The McElroy Mine, I.D. No. 46-01437 is located near Glen Easton, in Marshall County, West Virginia. McElroy Coal Company, a subsidiary of Consol Energy, operates the underground coal mine, which employs 639 persons of which 573 are underground employees. The mine employs 10 underground contract foremen through David Stanley Consultants. The mine produces approximately 6.7 millions tons of coal annually from four continuous mining machine units and two longwall units.

The mine accesses the Pittsburgh No. 8 coal seam by two slopes and eleven shafts. Miners enter the mine at two portals: The Fish Creek Portal, located near the supply slope, and the Blake's Ridge Portal. Coal is transported from the working sections to the surface via conveyor belts. Both battery and trolley-powered rail-mounted vehicles are used to transport supplies and mine personnel. The mine is ventilated with nine mine fans. The mine liberates approximately 8.1 million cubic feet of methane every 24 hours.

At the time of the accident, the 5-North Mains section consisted of two Mechanized Mining Units (MMU's) on separate splits of air. During advance mining, the active working face is ventilated by an auxiliary fan and tubing. The two sections were engaged in developing the seven entry 5-North Mains in a northward orientation. The 5-North Mains development width is approximately 616 feet with pillars established on 100-foot heading centers, 70-foot to 140-foot crosscut centers, and a 15.5 to 15.8 foot initial entry width. The 5-North Mains-left side developed No. 1 to No. 3 entries, while the 5-North Mains-right side developed the No. 4 to No. 7 entries. The 5-North-right side, No. 5 to No. 6 crosscut, was driven in an eastward orientation utilizing a Joy 14CM09-15BDX continuous mining machine with integral roof bolters to extract the coal and roof bolt the top. A Joy loading machine and two Joy shuttle cars load and transport the coal to the section belt conveyor feeder.

The principal officials for the McElroy Mine were:

Brett Harvey, President
John Zachwieja Jr., Vice President – River Division
Thomas Coram – Superintendent
William Blackwell – Safety Supervisor

The last MSHA regular Health and Safety Inspection (AAA) was completed on June 30, 2004, and another was ongoing at the time of the accident. The Nonfatal Days Lost (NFDL) incidence rate during the previous quarter for the McElroy Mine was 2.83 compared to the national average of 5.48.

DESCRIPTION OF ACCIDENT

On Tuesday, August 17, 2004, the midnight shift crew for the 5-North Mains - right side entered the mine at approximately 12:00 a.m. under the supervision of Bernie Lewis, contracted Section Foreman. The crew arrived on the section approximately 12:55 a.m. In changing out on the section, the afternoon shift crew told the midnight crew to watch the ribs. The crew assembled at the dinner hole where Lewis held a brief safety meeting on the roof control plan. At approximately 1:10 a.m., Lewis made his examination run of No. 4 through No. 7 faces. The crew consisting of Robert Stack, Miner Operator; Frank Persiani, Continuous Mining Machine Roof Bolter Operator – Left Side; Joseph Sabo, Continuous Mining Machine Roof Bolter Operator - Right Side (victim); Earl Burkhart, Loading Machine Operator; Michael Barnhart, Utilityman; Terry Hite, Shuttle Car Operator; Jere Brown, Center Roof Bolting Machine Helper and Richard Opic – Center Roof Bolting Machine Operator. The crew met Lewis as he finished his examination. The continuous mining machine was setting in the No.

30 crosscut between the No. 5 and No. 6 entry. Lewis instructed the crew they had to mine approximately 20 to 30 feet until they connected the crosscut with the No. 6 entry.

The continuous mining machine was backed up and the crew supplied the machine with roof bolts and straps, checked the sprays, and changed the bits. After supplying the continuous mining machine, Stack scaled down the left and right ribs with the head of the mining machine as he trammed the machine into place. At approximately 1:40 a.m., Lewis watched the crew begin mining, and then went to check on the center roof bolting machine crew outby the faces. After mining had started, the rib on the left side was cracking and popping. Persiani scaled the ribs on the left side of the machine, but after installing 3 to 4 roof straps (approximately 8 to 9 feet in distance), rib conditions seemed to improve. Also, Sabo had to scale down a piece of rib on the right side. Both continuous mining machine roof bolter operators scaled down ribs at different times throughout the cut.

At approximately 3:00 a.m., Lewis made an onshift examination of the area and did not detect any hazardous conditions. The crew continued to advance until they mined into the No. 6 entry. The crew was ready to place the last roof bolt and channel in the crosscut, but needed to pull the continuous mining machine up another 6 to 8 inches. The ATRS jacks were lowered and Stack moved the machine ahead. The ATRS jacks and rib protectors were extended again. Meanwhile, Stack checked on some water sprays and was on top of the machine watching the ribs for Persiani and Sabo.

Stack heard the rib pop and start cracking on right side of the continuous mining machine. He yelled twice to warn Sabo of the rib, but Sabo did not hear him. When Stack yelled a third time, Sabo turned and withdrew approximately three feet from behind the rib protector towards the rear of the machine when he paused and put his left hand on the rib. The rib collapsed and broke into two pieces when it struck Sabo. The rib pinned Sabo against the continuous mining machine, covering him from the waist down. Stack immediately checked Sabo for a pulse, but none was detected.

Barnhart, who was in the adjacent No. 6 entry, came across to help when a piece of rock slide and pinned him. Stack helped get the rock off Barnhart and then tended to Sabo. Barnhart and others from the crew used a hammer to remove the rock and coal from Sabo. Persiani and Burkhart went to the power center to get Tom Tyler, 5-North Mains Left Side Continuous Mining Machine Roof Bolter Operator and an Emergency Medical Technician (EMT), gather first aid supplies and notify the dispatcher and other crew members of the accident. Stack tried to stabilize Sabo's neck and thought he felt a pulse for a few minutes.

Tyler heard someone yelling for help and went to the accident site and assisted in moving Sabo to an area where they could begin CPR. Tyler checked Sabo but did not detect a pulse or observe any respirations. CPR was started and continued as they placed Sabo on a stretcher and the crew carried him to the personnel carrier at the end of the track. Stack and Tyler continued CPR on Sabo out of the mine. At 5:12 a.m. Sabo was transferred to the Tri-State Ambulance Service where a paramedic in consultation with a physician at West Virginia University Medical Communication Center (WVU Med Com) pronounced the victim dead at 5:22 a.m. The victim was transported to Reynolds Memorial Hospital in Glen Dale, West Virginia where he was examined by the county coroner Carol Robinson.

INVESTIGATION OF THE ACCIDENT

William A. McGilton, St Clairsville Field Office Supervisor, was notified of the accident at 5:17 a.m. on August 17, 2004 by William Blackwell, McElroy's Safety Supervisor. McGilton verbally issued the 103 (k) order to Blackwell over the telephone. McGilton notified William Ponceroff, Assistant District Manager for Inspection Programs, and Ronald Wyatt, Staff Assistant about the accident. Wyatt telephoned Kevin Stricklin, District Manager, and informed him of the accident. Wyatt, assigned Jason Rinehart, Industrial Hygienist, and Jan Lyall, Coal Mine Safety and Health Inspector (Roof Control) to conduct the accident investigation. Wyatt notified MSHA headquarters in Arlington, Virginia and MSHA's Pittsburgh Safety and Health Technology Center (Technical Support). MSHA's Technical Support assigned William Gray, Mining Engineer, and Michael Gauna, Mining Engineer to assist in the accident investigation. Jerry Vance and Cindy Shumiloff, Education Field Services, were assigned to review the training records. Vance traveled underground to view the accident scene and Shumiloff assisted in the interviews.

Upon arriving at the mine, the investigation team was briefed regarding the circumstances surrounding the accident. The team traveled to the accident site and jointly began the investigation in conjunction with the West Virginia Office of Miners' Health, Safety, and Training (WVOMHST), and with the assistance of mine management, and the United Mine Workers of America (UMWA). Photographs, measurements, and sketches were made of the area.

On August 18, 2004 persons having knowledge of the facts surrounding the accident were interviewed by MSHA, WVOMHST, Company, and UMWA officials. Other documents and relevant information were gathered by the investigators.

On September 1, 2004 additional interviews were conducted by MSHA, WVOMHST, Company, and UMWA officials.

A list of those persons who participated in the investigation is contained in Appendix A of this report.

DISCUSSION

Geological Conditions

At the accident site, in the No. 30 crosscut between the No. 5 and No. 6 entry, the mining height was 7.5 feet high and the width was 15.5 feet. The upper portion of the pillar rib consisted of approximately 1.9 feet of mudshale and claystone with coal partings. The lower portion of the pillar rib consists of the 5.6 feet of main bench of the Pittsburgh No. 8 coal seam.

The rib roll which fatally injured the victim consisted of coal, mudshale, and claystone measured approximately 20 feet long by 5 feet wide and up to 10 inches thick. The rib fell from the top of the 7.5 foot high right side pillar rib. From the right rear of the mining machine, the rib roll extended 11 feet inby and 9 feet outby.

Overburden at the accident site is approximately 1120 feet. Overburden in the surrounding area of the 5 North Mains ranged from 980 to 1120 feet. No known over or undermining exists in the area.

Pillars

In the 5-North Mains, pillars showed evidence of rib spall. Rib spall zones are sporadic; fluctuate lengthwise from a few feet to more than 20 feet, and can extend vertically for the full entry height. The rib spalling involves the shale/mudstone/claystone at the top of the pillar and extends down over the majority of the pillar rib.

In the 5-North Mains, the pillars are on 100 foot entry centers with crosscut centers varying from 70 to 140 feet. At the accident site, the pillar formed on the right side of the machine when the crosscut was mined through is 100 x 140 foot centers. The pillar stability calculations employing Analysis of Retreat Mining Pillar Stability (ARMPS) using development mining criteria indicates that the 5-North – right side pillars have a stable core. The 100 x 140 foot center pillar adjacent and south of the accident site has an ARMPS pillar stability factor of 2.8. The smallest pillars in the vicinity of the accident site are 100 x 70 feet centers and

have an ARMPS stability factor of 1.7. However, the rib spall conditions indicated that the rib fracturing is occurring from load placed on the pillar block.

Continuous Mining Machine

The continuous mining machine was a radio remote controlled Joy 14CM09-15BDX with fixed integral roof bolters mounted on each side. The integral bolting stations are approximately 12 feet from the tip of the cutting drum and 14 feet from the rear of the machine. The machine was equipped with Joy specified rib protectors. The rib protection extends approximately 45 inches outby from the drill head location.

Roof Control Plan

The primary roof support in the accident area consisted of two 8-foot tensioned cable bolts installed toward the ends of a 14.5 foot long T-5 channel (strap). The two cable bolts are installed slightly less than 9 feet apart and approximately 3 to 3.5 feet from the rib line with the integral roof bolting machines. After the machine is moved from the place, a third cable bolt is installed in the center of the channel with a single boom roof bolting machine. The accident area is currently a test area to evaluate the cable bolts as the primary roof support.

Rib Support

Rib support was not installed in the immediate face area of the 5-North Mains. Rib support was typically installed in the track and belt entry on a systematic basis. This support consists of Tensar polymer grid screen or welded-wire panels secured with 5-foot long vertically oriented rib straps that are mechanically anchored with two 48-inch bolts installed into each strap.

Personal Protective Equipment

Based upon interviews, the victim was wearing a set of ear plugs with the ear muffs over them to prevent hearing loss. This may have been a factor in the victim not hearing Stack's first warnings that the rib was working. Although at the time of the accident, the continuous mining machine was not mining nor were the continuous mining machine roof bolters drilling. Auxiliary fans were not operating in the area.

Training Records

An examination of the training records revealed that Mr. Sabo had the required training in accordance with 30 CFR, Part 48. Sabo had received annual retraining on January 17, 2004 and task training for a continuous miner roof bolting machine on September 30, 2003.

ROOT CAUSE ANALYSIS

An analysis was conducted to identify the most basic cause of the accident that was correctable through management controls. During analysis, causal factors were identified that, if eliminated would have either prevented the accident or mitigated its consequences.

Listed below are causal factors identified during the analysis and their corresponding corrective actions implemented to prevent a reoccurrence of the accident.

Causal Factor: Hazardous rib conditions were permitted to exist in the work area. The standards, policies, and administrative controls in use at the mine did not ensure that the ribs were adequately supported or otherwise controlled to protect persons from the hazards associated with rib rolls. The operator's policy was to control ribs by scaling them down.

Corrective Action: The approved roof control plan was revised to include rib bolting as mining advanced.

Causal Factor: The operator failed to provide corrective actions for known deficiencies in their rib control policy. The operator's policy was to train personnel in the hazards of rib rolls and to scale the ribs. There were four rib rolls since June 2003 that caused lost work days. Also, between July 12, 2004 and August 17, 2004 the operator has been cited eight times for not adequately controlling the ribs under 75.202 (a).

Corrective Action: The approved roof control plan was revised to include rib bolting as mining advances to protect miners from the hazards of rib rolls.

Casual Factor: The roof control plan was inadequate and unsuitable to prevailing geologic conditions. The operator failed to adopt recommendations of on cycle rib bolting.

Corrective Action: The approved roof control plan was revised to include rib bolting as mining advanced. The continuous mining machines were retrofitted

with rib drills to install rib bolts in accordance with the approved roof control plan.

Causal Factor: There was no policy or procedure developed to perform a detailed review of design changes as the mining environment changed. Management failed to review the equipment performance based upon mining conditions. As rib conditions deteriorated, continuous mining machines were not modified to address changing conditions.

Corrective Action: Rib drills were retrofitted to the continuous mining machine to install rib bolts as mining advanced.

Causal Factor: Existing equipment was unable to install needed rib support and was thereby unsuited to current conditions. The continuous mining machine was not designed to install rib support during advance mining. The need to rib bolt on advanced was never anticipated in the design of the continuous mining machine.

Corrective Action: Rib drills were retrofitted to the continuous mining machine to install rib bolts as mining advanced.

CONCLUSION

The accident was caused by failure to effectively control the rib at the work area which exposed the victim to a hazardous condition. The hazardous condition was a result from what appeared to be mining induced loading in the No. 30 crosscut between the No. 5 and No. 6 entries. Stress redistribution resulting from the completion of the crosscut shed an additional load on the surrounding pillar ribs. The additional load caused the pillar block to expand and the rib line adjacent to the right side of the continuous mining machine to fracture. Contributing to the accident was equipment incapable of installing rib support, an insufficient roof control plan, and failure to reevaluate changing conditions relative to equipment, mining procedures and practices.

Approved By:

_____ _____

Kevin G. Stricklin Date
District Manager

ENFORCEMENT ACTION

- 103 (k) Order, No. 7147415 was issued to McElroy Coal Company to ensure the safety to all persons until an investigation was completed and the area deemed safe.

- A 104 (d)(2) Order, No. 7147163 was issued to McElroy Coal Company for a violation of 30 CFR 75.223 (a)(2): Adequate revisions to the roof control plan were not proposed by the operator when accident and injury experience indicated the plan was inadequate. On August 17, 2004, a rib roll occurred resulting in fatal injuries to the right side roof bolter operator. The rib roll located on the 5-North Mains – Right side in the No. 30 crosscut between the No. 5 and No. 6 entries measured 20 feet long, 5 feet high and up to 10 inches thick.

  Between August 16, 2002 and April 15, 2004 there have been eight lost-work day injuries occur due to rib rolls at this mine with the last four resulting in broken bones.
    - April 15, 2004 – broken right leg – located near the tool car – 5-South
    - March 27, 2004 – broken pelvis – left side of continuous mining machine – 5-South, 2-Left
    - October 21, 2003 – broken leg – left side of continuous mining machine – 5-North
    - June 20, 2003 – broken ankle – beside the loading machine, 5-South
    - April 19, 2003 – Lost-work days - rib roll struck shuttle car operator on the right leg
    - January 8, 2003 – Lost-work days – loader operator was struck by rib roll on right leg
    - October 30, 2002 – Lost-work days – rib fall strikes miner in the back and upper extremities
    - August 16, 2002 – Lost-work days – rib struck miner standing beside the continuous mining machine, 5-South, 4-Right

During the past month, preceding the accident, the company was cited five times for not adequately supporting or otherwise controlling the ribs under 75. 202 (a).

- A 104 (d)(2) Order, No. 7147164 was issued to McElroy Coal Company for a violation of 30 CFR 75.220 (a)(1): The operator failed to take adequate additional measures to protect persons when encountering the unusual hazards of continual sloughing and spalling of the coal and rock rib of the 5-North Mains – right side active mining section.

The operator's measures of scaling the ribs required the bolter operator, (victim), when working at the roof bolting controls or assigned work station, to be inby ribs that continued to slough and spall.

A rib roll measuring 20 feet long, 5 feet high, and up to 10 inches thick occurred in the No. 30 crosscut between the No. 5 and No. 6 entries resulting in a fatality of the right side roof bolter operator. This area was mined just prior to the accident occurring.

On May 19, 2004, a meeting was held between MSHA District 3, WVOMHST, UMWA, and Consol management about the rib conditions at this mine. During the meeting, the operator was put on notice that the current roof control plan was inadequate due to the severity of recent accidents and the number of 75.202 (a) citations at this operation.

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The roof control plan is the minimum measures that are required by the operator. A reasonably prudent mine operator would have proposed and implemented additional measures to control the ribs.

APPENDIX A

Persons Participating in the Investigation

McElroy Coal Company/Consol Energy
Steve Addington, Master Mechanic*
Charles E. Bane, Safety Director for Mining Operation
Dan Beam – Section Foreman*
Bill Blackwell, Safety Supervisor
Elizabeth S. Chamberlin, General Manager - Safety
Thomas Coram – Superintendant
Steve Green - Surveyor
Chris Hartley - Surveyor
Greg Hasenfus – Geo Mechanical Engineer
Mike Sinozich - Chief Inspector

United Mine Workers of America
Rick Aultman – Safety Committee, Local 1638
Michael Barnhart – Utilityman*
Theodore Bier – Shuttle Car Operator*
Jere Brown – Center Bolter Helper*
Earl Burkhart – Loader Operator*
Hoya Clemens – President, Local 1638
Rich Eddy – President, District 31
Robert Hite – Shuttle Car Operator*
Tom Ice – Miner Operator*
Ron Kincaid - Continuous Mining Machine Roof Bolter Operator*
Melvin Melott Jr. – Mechanic*
Jan Niceswanger – Safety Committee
Dennis O'Dell – International Representative
Richart Opic – Center Bolter*
Frank Persiani – Continuous Mining Machine Roof Bolter Operator*
Robert Stack – Miner Operator
Thomas Tyler – Continuous Mining Machine Roof Bolter Operator*

David Stanley Consultants, LLC
Bernard Lewis – Section Foreman*

West Virginia Office of Miners' Health, Safety and Training
Doug Conaway - Director
Terry Farley - Administrator
John Hall – District Mine Inspector
Alan Lander – District Mine Instructor
Brian Mills – District Inspector-at-Large
Jim Whetsell – District Mine Inspector – Roof Control

Mine Safety and Health Administration
Nelson Blake – Chief, Roof Control Section
Howard Epperly – Engineering Technician – Accident Reduction Programs
William Gray – Mining Engineer – Technical Support – Roof Control
Michael Gauna – Mining Engineer – Technical Support – Roof Control
Jan Lyall – CMS&H Inspector (Roof Control)
Terry Marshall – Mechanical Engineer
William A. McGilton – Supervisory CMS&H Inspector
William Ponceroff – Assistant District Manager For Inspection Programs
Jason Rinehart – Industrial Hygienist
Cindy Shumiloff – Mine Safety and Health Specialist (Training)
Kevin Stricklin – District Manager
Charles Thomas – Division of Safety – Roof Control
Jerry Vance – Mine Safety and Health Specialist (Training)
Ronald Wyatt – Staff Assistant

***Persons Interviewed**

Appendix B