CAI-2007-18

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Underground Coal Mine

Fatal Fall of Roof Accident
September 3, 2007

Bronzite Mine
Consol of Kentucky, Inc
Williamson, Mingo County, West Virginia
MSHA I.D. No. 46-08892

Accident Investigator

James R. Humphrey
Coal Mine Safety and Health Inspector

Originating Office
Mine Safety and Health Administration
District 4
100 Bluestone Road
Mount Hope, West Virginia 25880

Robert G. Hardman, District Manager

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OVERVIEW

At approximately 4:55 p.m. on Monday, September 3, 2007, Brent Reynolds, a 35-year old continuous mining machine operator, was fatally injured when a portion of the mine roof collapsed. The accident occurred after one shuttle car had been loaded from the face of the No. 4 entry, and the victim and the section foreman, knelt in the intersection, behind the third and fourth rows of permanent roof supports. As the two miners were talking, a large portion of mine roof fell without warning, resulting in fatal injuries to Reynolds.

The accident occurred because adverse roof conditions, comprised of interbedded shale and siltstone, with slickensided claystone, overlain by a 4-inch thick rider seam, exceeded or nearly exceeded the length of the 4-foot roof bolt used as primary roof support. Although the rider seam was detected during roof bolting activities which took place during rehabilitation of the area, adequate roof control measures were not taken.

GENERAL INFORMATION

The Consol of Kentucky Inc, Bronzite Mine is located near Williamson in Mingo County, West Virginia. Consol of Kentucky Inc. is a subsidiary of Consol

Energy, Inc. The mine was operated by Northstar Contractors, Inc. from June 24, 2004, until August 7, 2007, for Consol Energy Inc. Consol of Kentucky Inc, assumed operation of the mine on August 8, 2007.

The Bronzite Mine operates in the Coalburg bituminous coal seam which averages 8 to 10 feet in height. Miners enter the mine through drift portals via battery-powered, rubber-tired, self-propelled personnel carriers.

The mine employs 42 persons, and operates one continuous mining section, which utilizes the room-and-pillar method of mining. Two continuous mining machines in the active section produce approximately 1,500 tons of raw coal daily on two 10-hour production shifts per day, 6 days a week. The two production crews are referred to as the "A-Crew" and the "B-Crew." These two crews rotate every week between the day shift and the evening shift. The mine has no history of methane liberation.

The principal officers for Consol of Kentucky Inc are:

Peter B. Lilly	President
John Goroncy	Superintendent
Brett Holbrook	Assistant Superintendent
Clell Scarberry	Mine Foreman
Marshall R. Fugate	Safety Director

An MSHA inspection of this operation was started on August 21, 2007, and was on-going at the time of the accident. The most recent inspection day was 12 days prior to the accident on August 21, 2007. The Non Fatal Days Lost (NFDL) incidence rate for the mine was 0.00 while the national average NFDL rate for mines of this type was 4.60.

DESCRIPTION OF ACCIDENT

On Monday, September 3, 2007, at approximately 7:30 a.m., the A-Crew, under the direction of Ron Yates, section foreman entered the mine via a battery-powered, rubber-tired, self-propelled personnel carrier to the active working section (MMU-001). The setup crew from the previous shift was still installing the conveyor belt outby the active section when the day shift crew arrived. Yates directed the preparation of the section for production and completion of the conveyor belt move. Between 10:30 a.m. and 11:00 a.m., the installation of the section conveyor belt was completed. The section crew then began loading gob material that had been pushed up from existing haulways.

With the roadways clear of material, production began in the right crosscut off of the No. 6 entry. Mining proceeded to the face of the No. 5 entry, without incident. At approximately 4:00 p.m., Shane Johnson, A-Crew continuous mining machine operator moved the continuous mining machine into the No. 4 entry. Mining proceeded and the entry was developed to depth of approximately 25 feet.

Yates performed a preshift examination of the working section between 1:30 p.m. and 3:00 p.m. Yates called Charles Hilton Jr., section foreman of the "B-Crew," and gave him the results of the preshift examination at 3:30 p.m. Yates again traveled the working faces at 4:15 p.m., while he conducted his final on-shift examination of the working section.

The B-Crew boarded the personnel carrier at the surface area of the mine at 4:20 p.m. and arrived one cross-cut outby the dumping point of the working section at approximately 4:45 p.m. The B-Crew members exited the personnel carrier and traveled to the working section. The A-Crew members briefed the B-Crew members on the location of equipment and pertinent mining conditions prior to leaving the section.

Johnson backed the continuous mining machine under permanent roof support and laid the remote control box for the continuous mining machine on the end of the conveyor boom. Johnson then met with Brent Reynolds, B-Crew continuous mining machine operator, and told Reynolds that the continuous mining machine was sitting in the No. 4 heading and that he had extracted approximately 25 feet of coal from the face. Johnson indicated to Reynolds that no loose material fell from the mine roof, and nothing looked unusual about the mine roof. Johnson and the remaining A-Crew loaded onto the personnel carrier and traveled toward the surface of the mine.

Hilton left the personnel carrier and traveled to the No. 1 working face to begin an on-shift examination of the working section and equipment. He made his way across the section and walked around the conveyor boom of the continuous mining machine located in the No. 4 entry. Hilton continued his examination across the working section to the face of right crosscut in the No. 6 entry. No hazardous conditions were observed during the on-shift examination.

Hilton then traveled back to the No. 4 working face and looked at the mine roof to insure that Reynolds was under permanent roof support. Reynolds had just completed loading the first shuttle car. The loaded shuttle left the continuous mining machine to dump its load onto the section loading point. Reynolds was positioned on his knees between the third and fourth row of permanent roof supports in the intersection of the No. 4 entry. Hilton knelt down on the outby

side of Reynolds to talk to him about the mining cycle and dust parameter checks.

At approximately 4:55 p.m., while kneeling beside Reynolds, a large portion of the immediate mine roof collapsed, onto Hilton and Reynolds. The collapsed roof covered Hilton from his knees down to his feet. Hilton struggled to free himself and Reynolds. When Hilton was able to free himself from the fallen roof rock, he ran to the mine phone, and immediately called for help. Hilton notified Brett Holbrook, assistant superintendent, on the mine phone and requested additional help and an ambulance.

Tracy Dingus, B-Crew roof bolting machine operator, was operating the roof bolting machine in the No. 6 right working face at the time of the roof fall. Dingus thought he had heard something, turned and observed Hilton get up, and run toward the section loading point. Dingus rushed to the accident site and began to help.

Hilton returned to the accident scene where additional crew members were using a lifting jack to lift the fallen roof rock. Reynolds was removed from beneath the fallen rock and CPR was administered. Reynolds was transported to the surface of the mine on a rubber-tire personnel carrier. Upon arrival at the surface, the victim was transported via ambulance to Williamson Memorial Hospital, located in Williamson, Mingo County, West Virginia. The victim was pronounced dead at 6:18 p.m.

INVESTIGATION OF THE ACCIDENT

The Mine Safety and Health Administration (MSHA) was notified of the accident at 5:04 p.m. on Monday, September 3, 2007 when Brett Holbrook, assistant superintendent, telephoned the MSHA Hotline. MSHA personnel from the Logan and Mount Hope field offices were immediately dispatched to the mine. A 103(k) order was issued to insure the safety of all persons during the accident investigation.

The investigation was conducted with the assistance of the MSHA Approval and Certification Center (Technical Support), West Virginia Office of Miners' Health, Safety and Training (WVOMHST), the mine operator, and the miners.

The accident scene was photographed, sketched and surveyed, and interviews were conducted. A list of the persons who participated in the investigation is contained in Appendix A. The on-site portion of the investigation was completed, and the 103(k) order was terminated, on October 15, 2007.

DISCUSSION

Geologic Conditions

The roof conditions in the mine were complex, with numerous rock formations of varying thickness. The rock formations are comprised of shale, claystone, and up to two rider seams. Abundant kettle bottoms are exposed in the immediate roof throughout the mine. Kettle bottoms are smooth, rounded pieces of rock within the mine roof which may drop without warning. Primary roof support utilized 4-foot, ¾-inch diameter, fully grouted, headed rebar. Steel straps and cable bolts were used sporadically as supplemental support.

The No. 4 panel had been developed for 3 crosscuts north of the Mains, and the roof fall occurred inby the second crosscut of the No. 4 Panel, which was also the last open crosscut. Overburden at the accident site is estimated to be 304 feet. Entry and cross-cut widths on the No. 4 panel ranged from approximately 18 to 20 feet within two cross-cuts outby the roof fall. At the top of the seam being mined, an approximately 4-inch thick coal rider was exposed in the rib. Near the site of the roof fall, the 4-inch rider rose quickly into the roof, and the underlying claystone, shale, and siltstone, increased in thickness. The increased thickness of the shale and siltstone exceeded or nearly exceeded the length of the 4-foot roof bolts used as primary support.

The roof fall was approximately 45 feet long, approximately 18 feet wide and approximately 5 feet thick. The roof fall material consisted of layers of shale and siltstone with intersecting slickensided formations. Slickensided formations are polished rock masses within the mine roof which are prone to falling if they are not provided with adequate supplemental support. The fall cavity extended nearly rib to rib in the entry inby the intersection, which had just been mined and was not yet bolted. The roof fall extended outward approximately halfway into the four-way intersection, and bounded against a slickensided formation. The part of the fall cavity that occurred in the intersection was localized along a horseback, a hazardous mass of rock with a slippery surface in the roof.

The right run extracted out of the face of the No. 4 working face measured 30 ½ feet from the deepest point of penetration to the first row of permanent roof supports. The left run measured 18 feet 6 inches from the deepest point of penetration to the first row of permanent roof supports. This unsupported span of roof caused the initial fall, which subsequently exceeded the anchorage capacity of four rows of the installed permanent roof support.

The mine roof on the left side of the No. 4 panel was comprised of sandstone in entries 1 through 3. Additionally the mine roof on the right side of the No. 4 panel was also comprised of sandstone in entries 6 and 7. The center of the

section, entries 4 and 5, the mine roof was comprised of shale. Multiple slickensided formations were present in the middle portions of the panel. In the right crosscut of the number 5 entry, located one crosscut outby the accident site, a roof fall cavity was present in the mine roof. The roof fall occurred due to the presence of a slickensided formation and the lack of bolt anchorage in competent rock. The left crosscut off of the number 4 entry, located one crosscut outby the accident site; the right crosscut off of the number 4 entry, located one crosscut outby the accident site; and the number 5 entry immediately outby the last-open-crosscut intersection all contained slickensided formations. Despite the abundant presence of slickensided formations in the middle of the panel, longer roof support or supplemental roof support such as cable bolts were not installed in these areas. However, in these areas, one additional 4-foot roof bolt was added per row, and 4-foot roof bolts were spotted along the ribs to address areas where rib sloughage had occurred.

Ten-foot long cable bolts were available on the mining section for installation as supplemental roof support. Two cable bolts were installed in the intersection of the number 4 entry located two crosscuts outby the accident site. This intersection was the location of the coal feeder, which is used to load coal onto the conveyor belt for transport through the mine.

Rehabilitation of the Travelways on the No. 4 Panel prior to Activating

Holbrook observed the travelways of the No. 4 Panel about a month before production began. Holbrook observed a lot of mine roof flaking out between permanent roof supports, several rib rolls and the travelways needing cleaned of the fallen pieces of mine roof and rib rolls. Holbrook reported the conditions to Clell Scarberry, mine foreman.

Scarberry began the rehabilitation work in the No. 4 Panel about two weeks prior to the accident. Kevin Williams, general laborer, operated a roof bolting machine, installing 4 foot fully grouted roof bolts during the rehabilitation work. Williams stated that they had encountered an area in the No. 5 cross-cut right, two cross-cuts outby the faces, where a slickensided horse back fell out, pulling the existing 4 foot fully grouted roof bolts out of the roof. A thin coal rider seam was present immediately above the slickensided horse back in this area. Williams stated that they had installed some cable bolts in some of the intersections of the new panel. Williams stated that in some places he drilled through a rider seam while in other locations the rider seam was not penetrated. Williams stated that coal dust would be present in the dust box, an indication of a rider seam having been encountered during drilling.

Scarberry had visited the rehabilitation work site during some of the installation of the supplemental roof supports. Scarberry indicated that the 4 foot roof bolts

were installed to reduce the distances from the coal rib to the first permanent roof support where the coal ribs had rolled out, and to replace roof bolts where pieces of the mine roof had flaked away from the bolt. The accident scene and the immediate area surrounding the accident had numerous 4-foot roof bolts installed.

Prior to mining, Scarberry had instructed the work force to install all permanent roof supports in the new panel on 4 foot centers or closer, with five 4 foot roof bolts to a row and to install 10 foot cable bolts in the intersection, but he did not elaborate on how many cable bolts were to be installed in the intersections.

ROOT-CAUSE ANALYSIS

An analysis was conducted to identify the underlying cause of the accident that was correctable through reasonable management controls. Listed below are root causes identified during the analysis and the corresponding corrective actions implemented to prevent a recurrence of the accident:

Root cause: In the area of the fall where 3 rows of 4-foot fully grouted roof supports were installed, a 4-inch coal seam (rider seam) was present. The effect of the presence of the existing coal seam (rider seam) and the slickensided claystone in the immediate mine roof in the last open intersection in the No. 4 entry while performing roof bolting operations was not recognized. After the recovery work was completed and the area of the fall was re-bolted, several 1-inch holes were present in the immediate roof, indicating that a portion of the 4-foot fully grouted roof bolts only penetrating through the rider seam into the immediate roof a depth of 1 inch.

Corrective Action: The mine operator submitted a revision to the roof control plan to the District Manager on September 10, 2007. The revision requires: 1) The minimum length of fully grouted resin bolts are to be 72 inches, bolt diameter is to be 3/4" and 7/8" and 60 minimum grade steel; 2) At the beginning of each newly mined cut of coal, a test hole will be drilled to a depth of 10 feet; 3) Prior to turning a new cross-cut, six cable bolts, ten feet in length will be installed in each intersection. The cable bolts will be installed in the approximate locations shown in the roof control plan.

CONCLUSION

Brent Reynolds, continuous mining machine operator, was fatally injured when a portion of the mine roof collapsed as mining was being conducted in the face of the No. 4 entry. The accident occurred as the victim and the section foreman were kneeling in an intersection waiting for a shuttle car to return. As the two miners were talking, a large portion of mine roof fell without warning, resulting in fatal injuries to Reynolds. At the time of the fall, Reynolds was positioned beneath permanent roof support, at the third and fourth rows of installed roof bolts.

The accident occurred because adverse roof conditions, comprised of interbedded shale and siltstone, with slickensided claystone, overlain by a 4-inch thick rider seam, exceeded or nearly exceeded the length of the 4-foot roof bolt used as primary roof support. Although the rider seam was detected during roof bolting activities which took place during rehabilitation of the area, adequate roof control measures were not taken.

Approved By:

Robert G. Hardman
District Manager

02/29/2008
Date

ENFORCEMENT ACTIONS

1. A 103(k) Order, No. 7270908 was issued to ensure the safety of the miners until the investigation could be completed.

2. A 104(a) Citation, No. 7259309, was issued citing 30 CFR, section 75.220(a)(1), and stating in part that the mine operator did not follow the approved roof control plan approved by the District Manager, that is suitable to the prevailing geological conditions, and the mining system to be used at the mine. Adverse roof conditions were encountered and appropriate supplemental roof support was not installed.

   In several areas, the installed 4-foot fully grouted roof bolts did not completely penetrate through the overlying slickensided claystone and coal seam into firm competent strata. In other areas of the roof fall, the installed roof supports penetrated the adverse roof material into the overlying solid roof by approximately one inch.

   The approved roof control plan requires, when adverse roof conditions are encountered such as horsebacks, slicken sided slope formations, clay veins, kettle bottoms, surface cracks, mud streaks or similar type of condition in the mine roof, supplemental roof supports shall be installed in addition to primary roof support, as appropriate in the affected areas.

   This condition is a contributing factor to a fatal fall of roof mining accident.

Appendix A
Persons Participating in the Investigation

Consol of Kentucky Inc

John Goroncy ..... Superintendent
Brett Holbrook ..... Assistant Superintendent
Clell Scarberry ..... General Mine Foreman
Ron Yates ..... A-Crew Section Foreman
Charles Hilton ..... B-Crew Section Foreman
Dennis Burke ..... A-Crew Roof Bolt Machine Operator
Chester Burchett ..... Mechanic/Electrician
Tracy Dingus ..... B-Crew Roof Bolt Machine Operator
Harman Ellis ..... A-Crew Belt Man
Shane Johnson ..... A-Crew Continuous Mining Machine Operator
Greg Meade ..... A-Crew Scoop Operator
Michael Vance ..... A-Crew Shuttle Car Operator
Sammy Walker ..... B-Crew General Laborer
Jimmy Webb ..... B-Crew Shuttle Car Operator
Ricky Webb ..... A-Crew Roof bolt Machine Operator
William Webb ..... A-Crew Ram Car Operator
Kevin Williams ..... A-Crew General Laborer

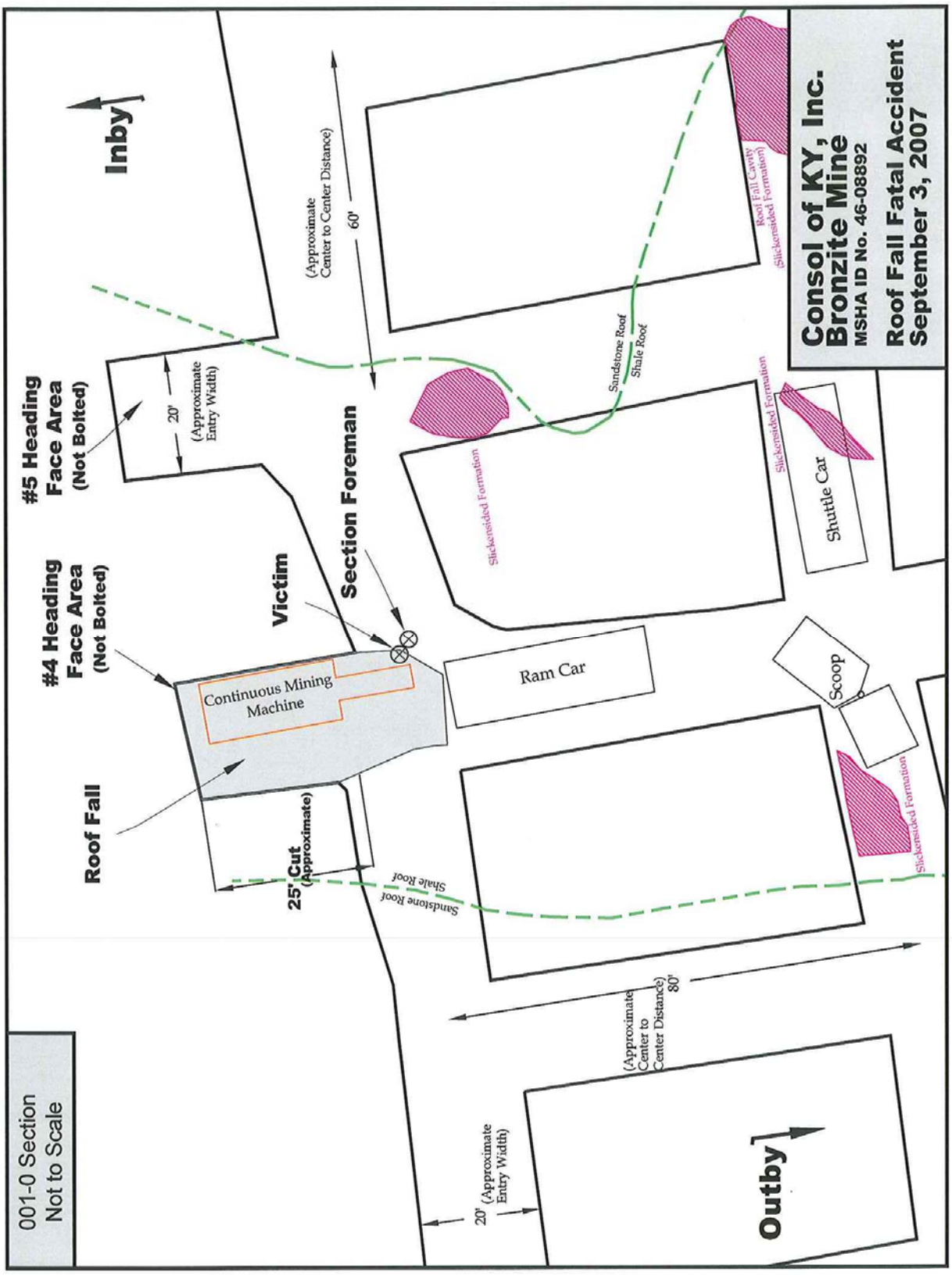
West Virginia Office of Miner's Health, Safety and Training

Terry Farley ..... Accident Investigator
Eugene White ..... Inspector-at-Large
Steve Cox ..... Assistant Inspector-at-Large

Mine Safety and Health Administration

Dennis Holbrook ..... CMS&H Inspector/Accident Investigator
Don Winston ..... Supervisory/Roof Control
Lee Barker ..... Specialist /Roof Control
Sandin Phillipson ..... Geologist, Pittsburgh Safety & Health Techical Center
James R. Humphrey ..... CMS&H Inspector/Accident Investigator

Appendix B


Consol of KY, Inc.
Bronzite Mine
MSHA ID No. 46-08892
Roof Fall Fatal Accident
September 3, 2007
001-0 Section
Not to Scale
Inby
Outby
#5 Heading
Face Area
(Not Bolted)
#4 Heading
Face Area
(Not Bolted)
20'
(Approximate
Entry Width)
(Approximate
Center to Center Distance)
60'
Victim
Section Foreman
Roof Fall
Continuous Mining
Machine
25' Cut
(Approximate)
Sandstone Roof
Shale Roof
Slickensided Formation
Roof Fall Cavity
(Slickensided Formation)
Sandstone Roof
Shale Roof
Slickensided Formation
Shuttle Car
Ram Car
Scoop
Slickensided Formation
(Approximate
Center to
Center Distance)
80'
20'
(Approximate
Entry Width)

Appendix C

Accident Investigation Data - Victim Information
Event Number: 4 1 1 4 2 9 7

U.S. Department of Labor
Mine Safety and Health Administration

Victim Information: 1

1. Name of Injured/Ill Employee:	2. Sex	3. Victim's Age	4. Last Four Digits of SSN:	5. Degree of Injury:
Brent Reynolds	*M*	*35*		*01 Fatal*

6. Date(MM/DD/YY) and Time(24 Hr.) Of Death: *a. Date: 09/03/2007 b.Time: 18:18*

7. Date and Time Started: *a. Date: 09/03/2007 b.Time: 16:30*

8. Regular Job Title: *036 Continuous Mining Machine Operator*

9. Work Activity when Injured: *049 Continuous Mining Machine Operator*

10. Was this work activity part of regular job? Yes X No

11. Experience	Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days
a. This Work Activity:	8	0	0	b. Regular Job Title:	8	0	0	c: This Mine:	0	40	0	d. Total Mining:	16	0	0

12. What Directly Inflicted Injury or Illness: *121 Mine Roof Fell*

13. Nature of Injury or Illness: *170 Crushing*

14. Training Deficiencies:
Hazard: | New/Newly-Employed Experienced Miner: | Annual: | Task:

15. Company of Employment:(If different from production operator) *Operator*
Independent Contractor ID: (if applicable)

16. On-site Emergency Medical Treatment:
Not Applicable: | First-Aid: | CPR: X | EMT: X | Medical Professional: | None:

17. Part 50 Document Control Number: (form 7000-1)

18. Union Affiliation of Victim: *9999 None (No Union Affiliation)*

Victim Information:

1. Name of Injured/Ill Employee:	2. Sex	3. Victim's Age	4. Last Four Digits of SSN:	5. Degree of Injury:

6. Date(MM/DD/YY) and Time(24 Hr.) Of Death:

7. Date and Time Started:

8. Regular Job Title:

9. Work Activity when Injured:

10. Was this work activity part of regular job? Yes | No

11. Experience:	Years	Weeks	Days		Years	Weeks	Days		Years	Week	Days		Years	Weeks	Days
a. This Work Activity:				b. Regular Job Title:				c: This Mine:				d. Total Mining:			

12. What Directly Inflicted Injury or Illness?

13.Nature of Injury or Illness:

14. Training Deficiencies:
Hazard: | New/Newly-Employed Experienced Miner: | Annual: | Task:

15. Company of Employment: (If different from production operator)
Independent Contractor ID: (if applicable)

16. On-site Emergency Medical Treatment:
Not Applicable: | First-Aid: | CPR: | EMT: | Medical Professional: | None:

17.Part 50 Document Control Number: (form 7000-1)

18. Union Affiliation of Victim:

Victim Information:

1. Name of Injured/Ill Employee:	2. Sex	3. Victim's Age	4. Last Four Digits of SSN:	5. Degree of Injury:

6. Date(MM/DD/YY) and Time(24 Hr.) Of Death:

7. Date and Time Started:

8. Regular Job Title:

9. Work Activity when Injured:

10. Was this work activity part of regular job? Yes | No

11. Experience:	Years	Weeks	Days		Years	Weeks	Days		Years	Week	Days		Years	Weeks	Days
a. This Work Activity:				b. Regular Job Title:				c: This Mine:				d. Total Mining:			

12. What Directly Inflicted Injury or Illness?

13. Nature of Injury or Illness:

14. Training Deficiencies:
Hazard: | New/Newly-Employed Experienced Miner: | Annual: | Task:

15.Company of Employment:(If different from production operator)
Independent Contractor ID: (if applicable)

16. On-site Emergency Medical Treatment:
Not Applicable: | First-Aid: | CPR: | EMT: | Medical Professional: | None:

17. Part 50 Document Control Number: (form 7000-1)

18. Union Affiliation of Victim:

MSHA Form 7000-50b, Dec 1994 Printed 11/26/2007 9:25:03 AM