CAI–2016-07

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Underground Coal Mine

Fatal Explosion of Gas
July 29, 2016

Road Fork #51 Mine
Spartan Mining Company, LLC
Pineville, Wyoming County, West Virginia
ID No. 46-01544

Accident Investigators

Joshua S. Bennett
Coal Mine Safety and Health Inspector/Health Specialist

Greggory A. Ward
Coal Mine Safety and Health Inspector

Originating Office
Mine Safety and Health Administration
District 12
4499 Appalachian Highway
Pineville WV, 24874
Brian Dotson, District Manager

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PHOTO OF ACCIDENT SCENE

OVERVIEW

At 11:00 a.m. on Friday July 29, 2016, Donald E. Workman, Maintenance Foreman, and Charles H. Blankenship, Chief Electrician, traveled to the Rt. 16 #3 shaft to repair loose guarding. At approximately 12:00 p.m., the two miners were welding threaded blocks to secure the guarding from vibration when a methane explosion occurred from within the shaft. Workman, who was standing on expanded metal grating over the #3 shaft sustained serious injuries. On August 4, 2016, Mr. Workman died due to the injuries received during the accident. Blankenship did not receive any injuries during the accident.

GENERAL INFORMATION

The Road Fork #51 Mine is an underground coal mine owned by Spartan Mining Company, a subsidiary of Alpha Natural Resources, Inc. The mine is located approximately 3 miles west of Pineville, Wyoming County, West Virginia, and was developed in the Pocahontas 3 seam. Mine

ventilation is provided by a blowing main mine fan which moves approximately 462,100 cubic feet of air per minute. During the 3rd quarter of fiscal year 2016, the mine liberated 383,026 cubic feet of methane per day. Because of this methane liberation, the Mine Safety and Health Administration (MSHA) conducts a 103(i) methane spot inspection every 15 days in accordance with the Mine Act. The average mining height is 4.5 feet. The mine is operated five to six days per week, employing 135 underground and 7 surface personnel who work two production shifts and one maintenance shift per day. The average mine production is 4,500 tons of raw material daily from five mechanized mining units (MMUs) utilizing the room and pillar mining method. Coal is extracted from the face by continuous mining machines and hauled by shuttle cars to the dumping point. Coal is then transported to the surface by conveyor belts.

The principal officers for this mine at the time of the accident were:

Jeff Griffith	Mine Manager
Robert R. Donahoe	Superintendent
Ronald Miller	Mine Foreman
Charles H. Blankenship	Chief Electrician
Theodore P. Ryan	Safety Director
Jeremy T. McClung	Safety Manager
Terry Lambert	Safety Representative

A regular (E01) safety and health inspection was initiated on July 2, 2016, and was ongoing at the time of the accident. The previous E01 inspection was completed on June 16, 2016. The Non-Fatal Days Lost (NFDL) injury incidence rate for this mine operator in 2015 was 1.26, compared to the National NFDL rate of 3.19 for mines of this type.

DESCRIPTION OF THE ACCIDENT

On July 29, 2016, at approximately 11:00 a.m., Blankenship and Workman traveled to the Rt. 16 #3 shaft to repair loose guarding on the #3 pump. After repairing the guarding located on the outside perimeter of the shaft, Blankenship and Workman proceeded to make repairs on the loose guard located where the drive shaft connects to the #3 pump. This connection point is located directly over the #3 shaft. Blankenship stated he had finished welding the final threaded block to secure the guarding and Blankenship laid the welding electrode holder down on the concrete pylon that supports the angle drive. He was reaching for a battery-powered impact driver when he heard what he described as a "jet engine" coming out of the shaft. Blankenship yelled at Workman to run. When Blankenship yelled, Workman was standing directly over the #3 shaft on the opposite side of the #3 pump. Blankenship turned as he was running away from the #3 shaft and saw Workman in the air along with metal debris and a blue flame. Blankenship stated Workman never lost consciousness and walked out of the fenced area without assistance. Blankenship administered first aid, and then called Alfred Cobb, Purchasing Agent at the mine,

and requested an ambulance. George Craft, Dispatcher, called 911 at 12:09 p.m., and the call was disconnected. He called a second time at 12:11 p.m. and requested an ambulance be sent to the #3 shaft. Craft called 911 again at 12:13 p.m. and informed them there had been an explosion and a miner was burned.

Steve Roche, Paramedic, and Zach Butcher, Emergency Medical Technician from STAT ambulance service, arrived on the scene at 12:29 p.m. and immediately requested an Air Evac helicopter. At 12:37 p.m., the victim was transported by STAT ambulance service from the scene of the accident to the helicopter landing zone at the Pinnacle Mine, 8 Haulage portal. Air Evac arrived at 1:14 p.m., assisted STAT in stabilizing the victim, and departed for the Cabell Huntington Hospital Burn Unit at 2:06 p.m. Mr. Workman died as a result of his internal burn injuries on August 4, 2016, at 10:31 p.m.

INVESTIGATION OF THE ACCIDENT

On July 29, 2016, at 12:36 pm, Jeremy T. McClung, Safety Manager, called MSHA call center to report that one employee had suffered a burn and laceration to the face. MSHA issued a non-contributory citation for violation of 30 CFR § 50.10, because the mine operator did not report the accident, immediately, at once, without delay, and within 15 minutes.

The call center personnel contacted Amber Tharp, District 12 Office Assistant, at 12:48 pm to report the accident. Tharp immediately reported the accident to Larry E. Bailey, Assistant District Manager (Enforcement), Joseph Presley, Staff Assistant, and Jeff Presley, Ventilation Supervisor. Bailey and Joseph Presley arrived at the accident scene at approximately 1:45pm.

Bailey dispatched Joshua S. Bennett, Health Specialist, to the mine office. At the mine office, Bennett verbally issued a 103(k) order to Ronald Miller, Mine Foreman, to preserve the accident scene and protect the miners. He conducted preliminary activities at the mine office including a review of mine maps, and he photographed records kept by the mine operator.

Bennett then traveled to the accident site where he joined Bailey, Joseph Presley, and Jeffery Presley who were securing and photographing the accident scene. Bennett photographed the accident scene and interviewed Blankenship who was the sole eyewitness to the accident. Representatives from the mine operator and the West Virginia Office of Miners Heath Safety and Training (WVOMHST) participated in the investigation.

On August 2, 2016, the 103(k) order was modified allowing the company to implement the #3 shaft gas monitoring plan. Greggory A. Ward, Mine Safety and Health Inspector, and Bennett traveled to the accident scene to collect atmospheric samples from multiple depths in the #3 shaft and to assure the operator was complying with the plan. (see Appendix B).

On August 5, 2016, Educational Field and Small Mine Services dispatched training specialist Paul Akers to the mine to conduct a review of training records and the training plan.

A total of ten formal interviews were conducted on August 17, 2016, and August 24, 2016, at the WVOMHST office located in Welch, WV (see Appendix C).

DISCUSSION

The #3 pump is installed in a raised bore shaft that was developed in the 1970's to ventilate the original Pocahontas #3 Seam Mine. A total of eighteen seals, constructed near the bottom of the slope, separate the active workings from the worked out area containing the #3 shaft. The #3 pump is installed in the 753 foot deep shaft to pump water from the sealed area so it cannot impound against the seals. The water level was measured, according to company examination records, at least once each week and the pump was turned on or off according to the water level. The approved ventilation plan requires a column of water to be maintained between 34 to 36 feet deep from the bottom of the #3 shaft. This water seal isolated the sealed area and the outside atmosphere. All eighteen seals are 50 psi Minova Tekseal seals that were approved on September 8, 2006. An overhead view sketch of the #3 shaft is located in Appendix D.

As indicated in the side view sketch of the #3 shaft (See Appendix E), seven coal seams were intersected before reaching the Pocahontas 3 seam. On August 1, 2016, MSHA lowered a multi-gas detector into the #3 shaft. From 10 feet to 20 feet deep, 2.8% methane was detected. Analytical results of an air sample collected August 02, 2016, at 700 feet below the collar of the #3 shaft opening indicated the presence of 0.0% methane and 20.83% oxygen. At approximately 600 feet down the #3 mine shaft, the results indicated 4.08% methane and 19.83% oxygen. Methane was also present at depths of 350 feet and 50 feet (see Appendix B).

The accident investigation team was not able to determine the exact source of the methane gas in this shaft, but, evidence from analytical data obtained in the #3 shaft indicates that one or all of the previously intersected coal seams are potential sources of methane. The #3 shaft had no means of ventilation, so only naturally occurring, barometric pressure changes reduced or increased the amount of methane gas in the #3 shaft.

An explosive mixture of methane gas was ignited when sparks or smoldering metal from the welding operations fell into the shaft. The ensuing flames and forces of the explosion exited through the surface opening. The exact force of the explosion was not determined, however, it moved steel I-beams weighing 1,240 pounds and the heavy gauge expanded metal grating they supported several feet. One piece of the expanded metal grating was propelled outside the #3 shaft perimeter fencing approximately 29 feet.

At least four prominent signs stating "no smoking or open flames within 100 feet" were present on the inside perimeter fence surrounding the #3 shaft. No effort to shield the area above the #3 shaft to prevent sparks and or smoldering metal from entering the shaft was made. Examinations conducted did not assure that methane gas was or was not present throughout the entirety of the shaft.

Mine Examinations

Examinations of the #3 shaft and the #3 pump were performed by both mine management and non-management miners. The details of these examinations were compiled from statements given by the examiners and from record books kept in the mine office.

At least once each week, as indicated by the mine operator's records, a water gauge was used to assure the water level in the #3 shaft was being maintained at the required level. In addition to recording the water level, Brent Prichard, Safety Technician, recorded information about the operation and maintenance of the pump. On July 26, 2016, he heard a vibration coming from what he thought was the pump drive shaft. He verbally reported this to Miller who then verbally reported the vibration to Blankenship.

On July 27, 2016, Blankenship traveled to the #3 shaft to conduct the monthly electrical exam required by 30 CFR §77.900-1 and assessed the reported vibration. Blankenship recorded no hazards and no presence of methane gas in the electrical exam records. Blankenship stated the vibration was due to loose guarding installed around the rotating drive shaft. According to Blankenship, the guarding was still in place and repairs could wait until the necessary equipment was gathered.

Blankenship stated he used an LD102 methane detector above the expanded metal grating over the #3 shaft prior to welding at the time of the accident. This model detector requires constant pressure to remain on and is normally used in conjunction with an extendable probe. A LD102 detector was never recovered at the accident scene. A 20-foot extendable probe was located at the #3 shaft but, Blankenship stated he did not use it and only took one gas reading above the collar of the #3 shaft prior to welding. During the accident investigation and corresponding interviews, the accident investigation team determined examinations for methane, that day were taken at the collar of the shaft. To fully comply with 30 CFR §77.1112(a) and (b), the methane test should have been made down the entire length of the shaft.

Experience and Training

Workman had 40 years of total mining experience and started working at the Road Fork #51 mine on April 22, 2016.

Workman held certifications in West Virginia which included:

- West Virginia Underground Certified Mine Foreman
- West Virginia Certified Underground/Surface Low, Medium and High Voltage Electrician
- West Virginia Certified Shot Firer's Certificate
- West Virginia Surface Miner
- West Virginia Certified EMT
- US Department of Labor Certified Instructor

Even though this was Workman's first time doing this specific task, his previous training and mining experience made him aware of the hazards, safety aspects, and safe work procedures associated with this task.

Blankenship has 44 years of total mining experience. He has been employed at Road Fork #51 mine since May 19, 2008, as chief electrician.

The review of the training records performed by Akers found no deficiencies with the training records for Workman and Blankenship.

ROOT CAUSE ANALYSIS

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

Listed below are the root causes identified during the analysis and the corresponding corrective actions implemented to prevent a reoccurrence.

1. Root Cause: Suitable precautions were not taken to prevent smoldering metal or sparks from entering the unventilated #3 shaft as required by 30 CFR §77.1112(a).

   Corrective Action: After the accident, the operator submitted an addendum to the ventilation plan and it was approved by MSHA. This addendum lists safety precautions regarding the #3 shaft. The safety precautions include, but are not limited to, the following: No flame cutting, welding or grinding within 35 feet of the #3 shaft is permitted. If cutting or welding is needed within 35 feet of the shaft, a barrier will be installed to prevent sparks or hot slag from entering the shaft. Also, a cutting and welding plan shall be submitted to MSHA and must be approved by MSHA before cutting and welding is performed. Furthermore, the shaft will be continuously ventilated at all times. The shaft will be continuously monitored for methane at depths of 50 feet, 350 feet, and 550 feet any time work is done on the site. Work will be stopped if methane is detected at 1% or greater.

2. Root Cause: Mine management failed to conduct adequate examinations for methane in the #3 shaft immediately before and periodically while welding directly over the #3 shaft as required by 30 CFR §77.1112(b). Though the methane concentration was below 1% above the shaft, no attempt was made to determine the concentration of methane below the collar of the #3 shaft.

   Corrective Action: The operator submitted an addendum indicating the safety precautions to be taken during the #3 Shaft Rehabilitation/Ventilation Plan. This addendum has been made part of the approved ventilation plan.

CONCLUSION

A methane gas explosion occurred when sparks or smoldering metal fell from the collar of the shaft from welding being conducted directly over the #3 shaft. The methane explosion fatally injured the maintenance foreman. The mine operator failed to shield the #3 shaft from sparks produced while welding operations were taking place over the open #3 shaft. Also, the #3 shaft had not been adequately examined for methane gas and it was not ventilated.

Signed by:

Brian Dotson — 3-24-2017

Brian M. Dotson, District Manager — Date

ENFORCEMENT ACTIONS

1. Section 103(k) Order No. 9061954 issued on July 29, 2016, to Spartan Mining Company, LLC, Road Fork #51 Mine:

   A serious accident occurred at the Rt. 16 #3 shaft. Two miners were performing maintenance work when a methane ignition damaged the framework at the top of the shaft and caused burns and lacerations to the miner. This 103k order is being issued to protect the safety of miners and preserve the evidence at the accident scene.

2. A 104(d)(1) Citation, No. 9066442, was issued for a violation of 30 CFR §77.1112(a).

   The operator did not take suitable precautions to insure that smoldering metal or sparks did not result in a fire in the Rt.16 #3 shaft where welding operations were taking place. This shaft was not ventilated which allowed an explosive mixture of methane gas to accumulate in the shaft. This explosive mixture was then ignited by a spark or smoldering metal from the welding operations falling into the shaft which resulted in a miner being severely injured on 07/29/2016. The miner died due to these injuries six days later (08/04/2016). This violation is an unwarrantable failure to comply with a mandatory Health and Safety standard. The operator engaged in more than ordinary negligence by failing to take suitable precautions prior to welding directly over top of the shaft.

3. A 104(d)(1) Order No. 9066444 was issued for violation of 30 CFR §77.1112(b).

   Prior to and during welding over the #3 shaft the examination conducted by the mine operator did not ensure that an explosive mixture of methane gas was not present. The lack of adequate examinations and the fact that suitable precautions were not taken to insure that sparks and or smoldering metal (citation #9066442) did not result in a fire, resulted in an explosion causing serious injury to a miner on 07/29/2016. The miner died due to these injuries six days later on 08/04/2016. This violation is an unwarrantable failure to comply with a mandatory standard. The operator engaged in more than ordinary negligence by not conducting an adequate examination for methane gas in the shaft prior to and during welding operations.

APPENDIX A

Persons Participating in the Investigation

Spartan Mining Company

Jeremy T. McClung.....Safety Manager
Theodore P. Ryan.....Safety Director
Brent Prichard.....Safety Technician
Ronald Miller.....Mine Foreman
Terry Lambert.....Safety Representative
Jackie Banther.....Evening Shift Maintenance Foreman
Eric Silkwood.....Alpha Natural Resources Company Lawyer

West Virginia Office of Miners Health Safety and Training

Eugene White.....Director
David E. Thompson.....District Inspector
Steven G. Stanley.....Electrical Inspector
John O'Brian ..... Acting Inspector at Large
Greg Norman .....Deputy Director
Doug Depta ..... Assistant Inspector at Large

Mine Safety and Health Administration

Larry E. Bailey.....Assistant District Manager (Enforcement)
Jeffrey Presley..... Ventilation Supervisor
Joseph Presley..... Staff Assistant
Joshua S. Bennett..... Health Specialist/Lead Accident Investigator
Greggory A. Ward.....Mine Safety and Health Inspector/Accident Investigator
John H. Long.....Mine Safety and Health Inspector
Paul Akers..... Educational Field and Small Mine Services

APPENDIX B

Air Sample and Barometric Pressure Analysis

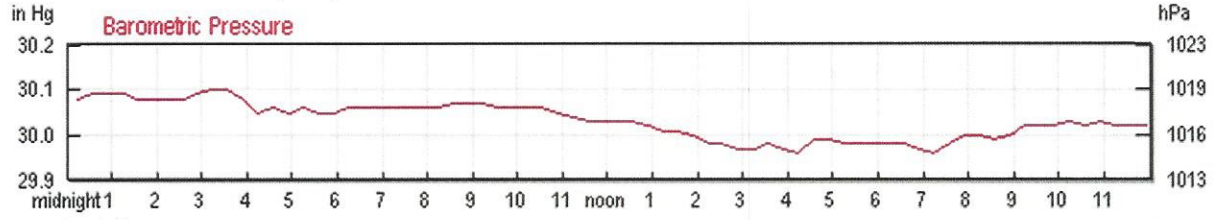
Air Samples Collected August 2, 2016

Location in Mine(time taken)	Lab Bottle #	Hydrogen ppm	Oxygen %	Methane %	Carbon Monoxide ppm	Carbon Dioxide %	Acetylene ppm	Ethylene ppm	Ethane ppm
50' Down Rt. 16 Shaft (1048)	ZB18817	NDA	19.32	3.98	34.0	0.48	NDA	NDA	59.1
50' Down Rt. 16 Shaft (1045)	ZB18818	NDA	19.33	3.94	33.5	0.49	NDA	NDA	58.3
350' Down Rt. 16 Shaft (1147)	ZB18819	NDA	19.31	4.08	31.6	0.47	NDA	NDA	60.6
350' Down Rt. 16 Shaft (1150)	ZB18820	NDA	19.31	4.08	31.7	0.47	NDA	NDA	60.1
600' Down Rt. 16 Pump (0152)	ZB18821	NDA	19.67	3.07	19.9	0.32	NDA	NDA	44.0
600' Down Rt. 16 Pump (0154)	ZB18822	NDA	19.83	3.10	20.2	0.32	NDA	NDA	43.6
700' Down Rt. 16 Shaft (1247)	ZB18823	NDA	20.83	NDA	NDA	0.04	NDA	NDA	NDA
700' Down Rt. 16 Shaft (1245)	ZB18824	NDA	20.87	NDA	NDA	0.04	NDA	NDA	NDA

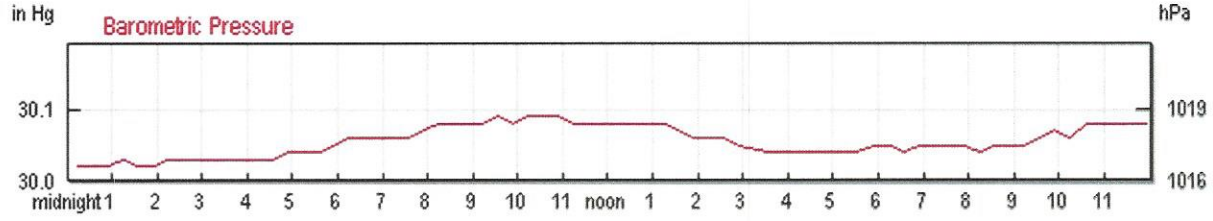
ppm = parts per million
NDA = No Detectable Amount

Barometric Pressure Graphs

Information from July 28, 2016



Information from July 29, 2016



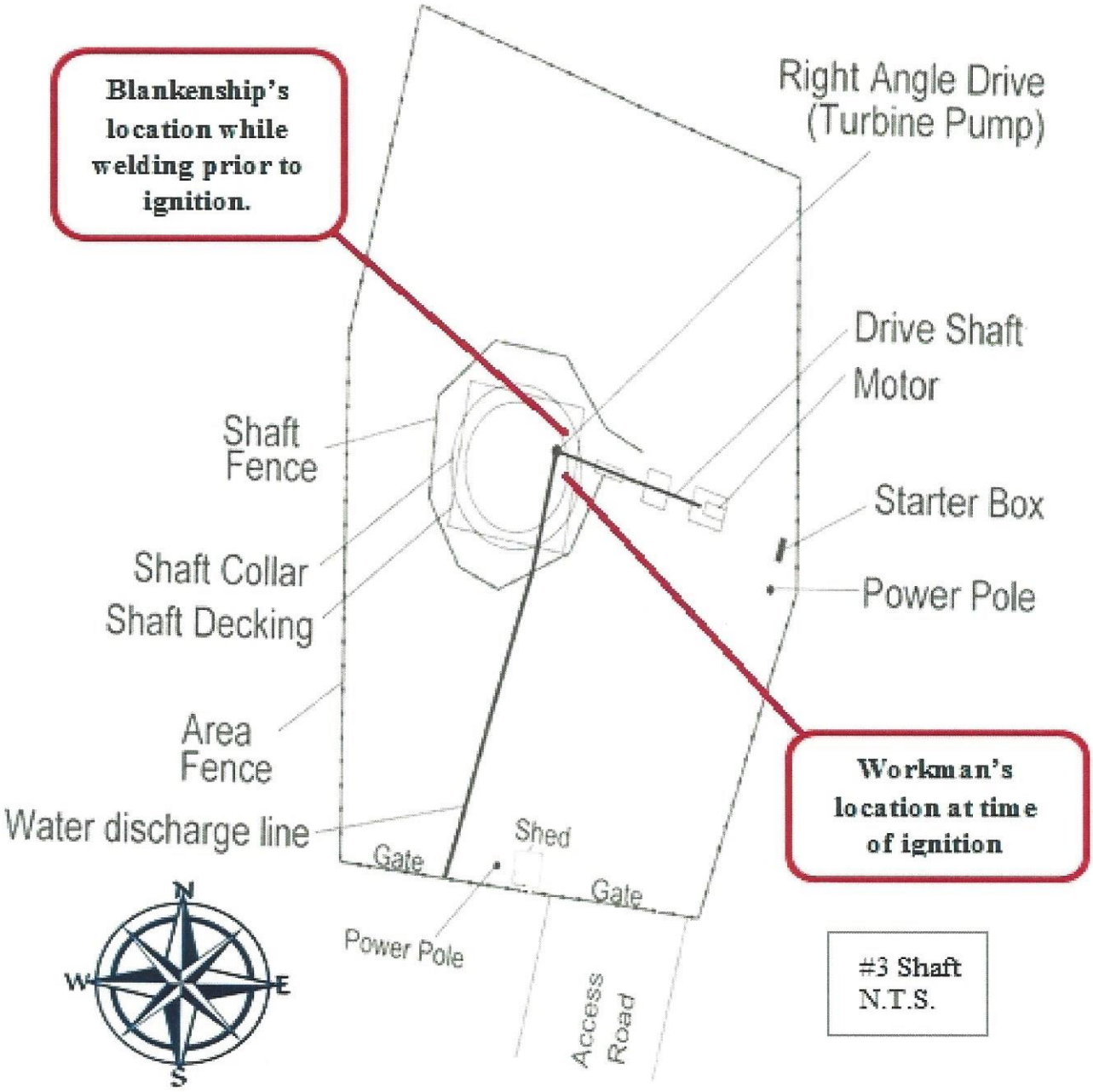
APPENDIX C

List of Persons Interviewed

Jeremy T. McClung.....Safety Manager
Theodore P. Ryan.....Safety Director
Brent Prichard..... Safety Technician
Ronald Miller.....Mine Foreman
Jackie Banther.....Evening Shift Maintenance Foreman
Charles H. Blankenship..... Chief Electrician
Robert R. Donahoe.....Superintendent
George Craft..... Dispatcher
Terry Lambert.....Safety Representative
Alfred Cobb, Jr.....Purchasing Agent

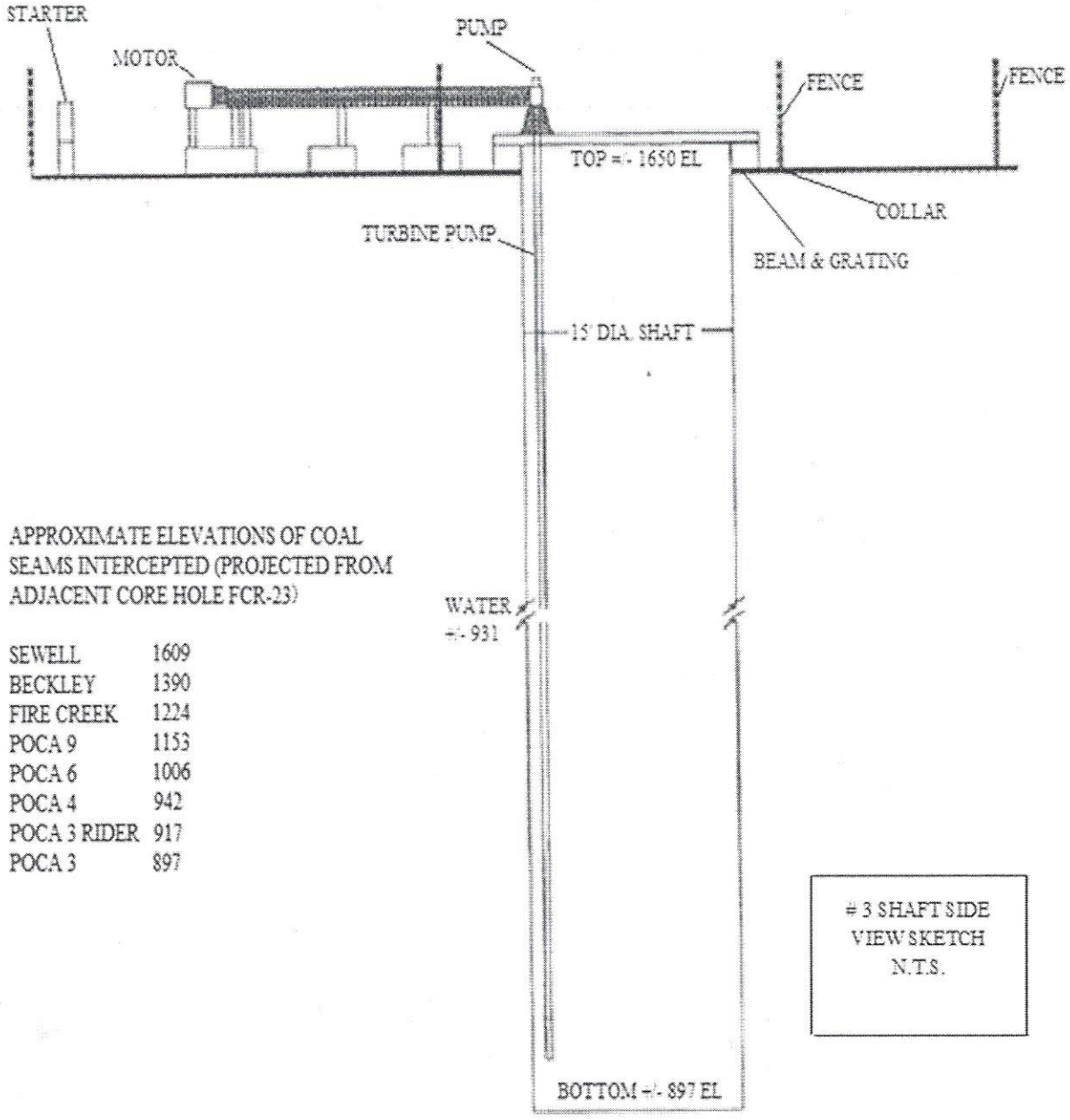
APPENDIX D

Overhead View Sketch of the #3 Shaft



APPENDIX E

Side View Sketch of the #3 Shaft



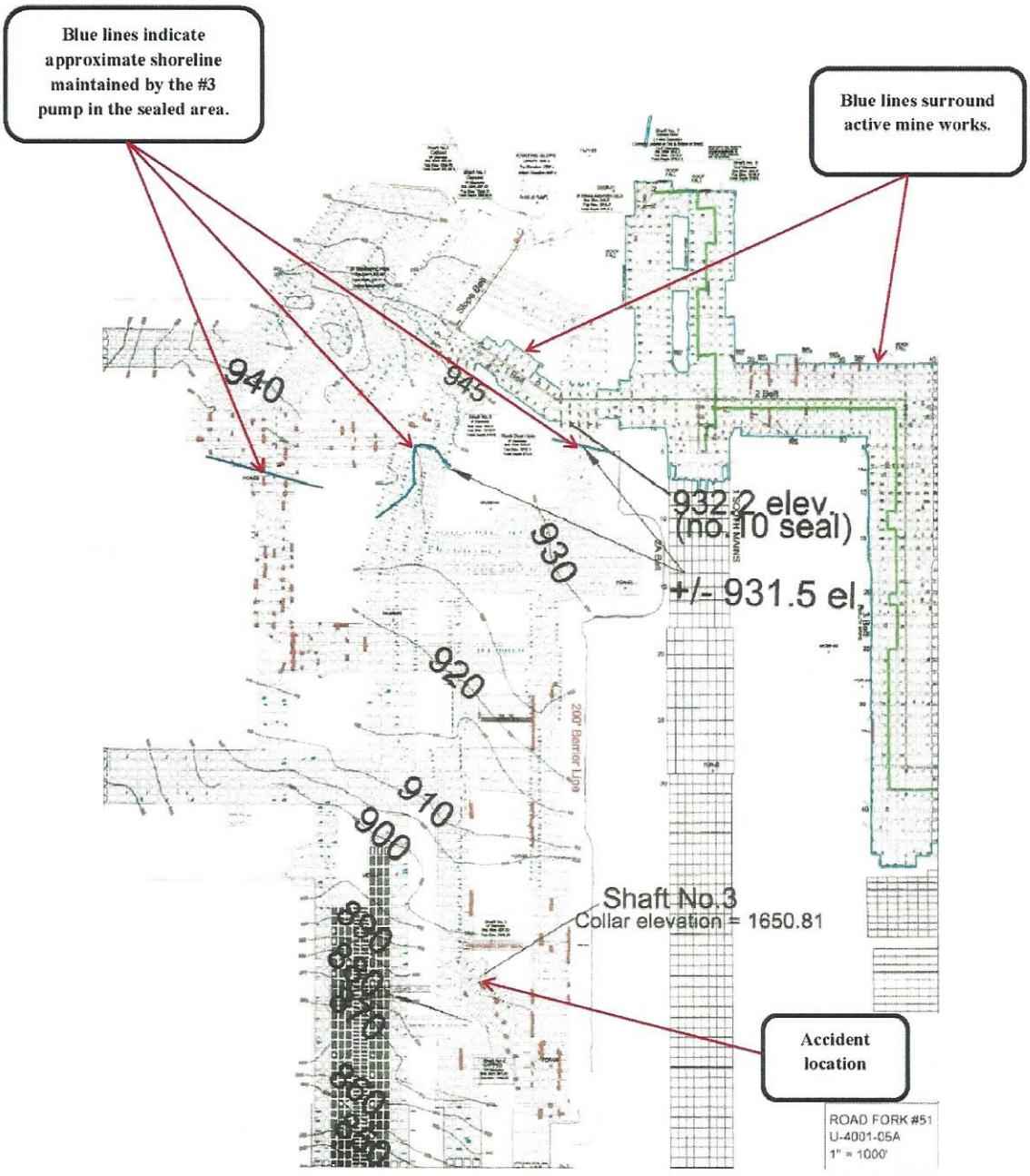
APPENDIX F

Photograph of Accident Scene

APPENDIX G

Mine Map of Sealed Area

(Not to scale)



APPENDIX H

Victim information

Accident Investigation Data - Victim Information
Event Number: 6 3 0 7 8 1 1

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. Degree of Injury:
Donald E. Workman	*M*	*58*	*01 Fatal*

5. Date(MM/DD/YY) and Time(24 Hr.) Of Death:	6. Date and Time Started:
a. Date: 08/04/2016 b.Time: 8:41	*a. Date: 07/29/2016 b.Time: 7:00*

7. Regular Job Title:	8. Work Activity when Injured:	9. Was this work activity part of regular job?
049 Maintenance Foreman	*093 Welding over mine shaft on surface of UG*	Yes X No

10. Experience	Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days
a. This Work Activity:	*0*	*0*	*1*	b. Regular Job Title:	*0*	*14*	*0*	c: This Mine:	*0*	*14*	*0*	d. Total Mining:	*40*	*0*	*0*

11. What Directly Inflicted Injury or Illness?	12. Nature of Injury or Illness:
032 Methane gas ignition in shaft	*120 Severe burns*

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

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

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

16. Part 50 Document Control Number: (form 7000-1) *220162210040* 17. Union Affiliation of Victim: *9999* *None (No Union Affiliation)*