CAI-2018-09

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Surface Coal Mine

Fatal Fall of Highwall Accident
December 11, 2018

Little Spring Creek Mine
Cedar Lake Mining, Inc.
Walker County, Alabama
I.D. No. 01-03444

Accident Investigators

Jarvis Westery
Coal Mine Safety and Health Inspector

James Pfeifer
Technical Support, Senior Civil Engineer

Rodi Murad
Technical Support, Civil Engineer

Originating Office
Mine Safety and Health Administration
District 7
3837 S U.S. Hwy 25E, Barbourville, Kentucky 40906
Samuel R. Creasy, District Manager

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PHOTOGRAPH OF THE ACCIDENT SCENE

OVERVIEW

On Tuesday, December 11, 2018, at approximately 2:07 p.m., Micky Cook, a 38-year-old surface miner with 14 years of mining experience, was fatally injured when a large portion of a highwall (approximately 7,000 to 8,000 cubic yards) toppled, crushing the operator's cab of his front-end loader. Cook was operating the front-end loader to remove blasted material near the base of a 63-foot highwall.

The accident occurred because the mine operator did not conduct adequate daily examinations to identify hazardous highwall conditions and correct such hazards before allowing miners to work near the base of the highwall. Additionally, the mine operator did not follow safety provisions of the mine's Ground Control Plan (GCP). If implemented, these GCP requirements would have caused several safety measures to be initiated to eliminate hazardous highwall conditions. Furthermore, the mine operator did not adequately train miners regarding the safety provisions of the mine's GCP.

GENERAL INFORMATION

The Cedar Lake Mining, Inc., Little Spring Creek Mine, is a surface mine located in Jasper, Walker County, Alabama. The mine began production on January 18, 2012, and is an open pit surface mine which extracts coal from the 18-inch thick Black Creek coal seam. At the time of the accident, 27 miners worked at the mine. There are two production shifts per day, six days per week. Various pieces of surface mining equipment are used in the mining process, including bulldozers, excavators, front-end loaders, rock trucks, and blast-hole drills. The mine uses blasting to remove the overburden from the coal seam.

The principal officers for Cedar Lake Mining, Inc., at the time of the accident were:

Freddy Hunt.....President/CEO
Michael T. Costello..... Vice President/Secretary/Treasurer
David Peters.....Chief Operating Officer
Jimmy Lawson.....Operations Manager
Chris Rice ..... Safety Manager

A regular (E01) safety and health inspection had been started on the day of the accident. The previous E01 safety and health inspection was completed on May 29, 2018. The non-fatal days lost (NFDL) incident rate for the mine for 2017 was zero (0) compared to a national average of 1.12 for mines of this type.

DESCRIPTION OF ACCIDENT

On Tuesday, December 11, 2018, Micky Cook, Front-End Loader Operator, arrived at the Little Spring Creek Mine to prepare for work on the day shift, which started at 6:00 a.m. Gary McBee, Day Shift Mine Foreman, held a safety meeting with the day shift crew. The day shift crew consisted of two excavator operators, three bulldozer operators, six rock truck operators, one coal hauler truck operator, two front-end loader operators, and two blast-hole drill operators. The day shift crew members proceeded to their respective job locations in the pit after the safety meeting. Cook went to the coal pit to operate a Caterpillar 972G front-end loader and was assigned to load out coal and clean up blasted material. Cook was operating the front-end loader parallel to, and approximately 25 feet from the base of, the 63-foot-high highwall, pushing blasted material toward a Komatsu PC1800 excavator operated by Jordan Self, Excavator Operator. Self then loaded the material into rock trucks which transported the material to the spoil area. This was a continual process during the production shift in this pit.

At approximately 1:55 p.m., Kenneth McGruff, Fuel and Lube Service Truck Operator, was driving his truck into the pit area to grease the bucket of the excavator. McGruff saw a large portion of the highwall fall onto Cook's front-end loader. Gabriel LaShum, Rock Truck Driver, who was returning from the spoil area, also observed a portion of the highwall topple. The failed

highwall material pushed the front-end loader about 10 to 15 feet in a direction away from the highwall and it came to rest approximately 40 feet from the highwall.

McGruff immediately called McBee and Dwight Kitchens, Mine Superintendent, on the citizens band (CB) radio to notify them an emergency situation had occurred. McGruff, Self, and LaShum waited for the dust to settle in the pit to ensure the area was safe and then walked to the front-end loader cab to evaluate Cook's condition. At approximately 2:00 p.m., Kitchens arrived at the accident scene. Shortly afterward, McBee and Garry Murray, Rock Truck Driver and First Responder, arrived at the accident location. Murray checked Cook for a pulse but none was detected.

William Harbin, Coal Mine Safety and Health Inspector (CMI), was at the mine conducting an E01 inspection and was accompanied by Chris Rice, Safety Manager. Harbin was inspecting in an area of the pit away from the accident location. After overhearing the CB communications, Manson Hicks, Bulldozer Operator, notified Harbin and Rice of the accident. While traveling to the accident scene, at approximately 2:00 p.m., Rice called 911. Harbin issued a 103(k) order at 2:07 p.m. Rice and Harbin arrived at the scene of the accident at about 2:15 p.m.

McBee traveled to the mine office to gather first-aid supplies. While he was at the office, the Curry Fire Department arrived on mine property at 2:15 p.m. McBee escorted the fire department truck to the accident site. Upon arrival, additional highwall debris started falling. Harbin ordered everyone to move a safe distance away from the highwall. Harbin and Rice traveled to the coal yard to gather additional equipment and returned to the accident scene.

At approximately 3:15 p.m., the material ceased falling from the highwall. Harbin conducted a visual examination of the highwall and allowed miners to resume efforts to free the front-end loader covered by the fallen highwall. At approximately 4:18 p.m., a Komatsu PC2000 Excavator was used to retrieve the front-end loader and move it out of the pit and to a safe location away from the highwall. While this process was taking place, the Regional Ambulance Service and Joey Vick, Walker County, Alabama Coroner arrived at the accident location. Vick pronounced Cook dead at 5:45 p.m.

INVESTIGATION OF ACCIDENT

Rice called the Department of Labor National Contact Center (DOL-NCC) at 2:10 p.m., to report the accident. The DOL-NCC notified MSHA of the accident at 2:26 p.m. Harbin, who was at the mine conducting an inspection, informed Craig Plumley, Assistant District Manager of Enforcement, of the accident. Plumley contacted Samuel Creasy, District Manager; Edward Boylen, Birmingham Field Office Supervisor; Argus Brock, Roof Control Branch Supervisor; and Jarvis Westery, CMI/Accident Investigator. Westery was dispatched to the mine to begin the accident investigation. While Plumley, Boylen, and Westery were on their way to the mine, Harbin gathered preliminary information from mine personnel, examined the accident site, and

monitored the recovery efforts. While recovery efforts were taking place, additional material began falling from the highwall. As noted earlier, everyone was removed to a safe area until it was safe to resume recovery efforts.

Leon Herren, Chief of Operations; and James R. West, Supervisor, both with the Alabama State Department of Labor (ADOL) were at the site to jointly conduct their accident investigation with MSHA. West arrived at about 3:00 p.m. and Herren arrived at about 4:00 p.m.

Plumley and Boylen arrived at the mine at approximately 4:00 p.m., and Westery arrived at roughly 5:00 p.m. Plumley, Boylen, and Westery traveled to the accident site and were briefed by Harbin. Harbin, Boylen, and Herren remained at the accident site to monitor the recovery operations. Plumley, Westery, and West went to the mine office and conducted informal interviews with miners who might have information relevant to the accident.

On December 12, 2018, Plumley, Westery, Brock, and West along with company officials and engineers continued the investigation. Engineers used a drone to map and evaluate the post-accident geological features of the entire length of the highwall.

On December 13, 2018, formal interviews were conducted at the MSHA Birmingham Field Office in conjunction with ADOL. See Appendix A for a list of those who were interviewed. James Pfeifer, Senior Civil Engineer, and Rodi Murad, Civil Engineer, both with MSHA's Technical Support Mine Waste and Geotechnical Engineering Division (MWGED), arrived at the mine to continue the onsite investigation.

DISCUSSION

Mining Process

The typical mining sequence consists of removing spoil material from the rock strata, drilling into the rock strata, and blasting the overburden to a depth of approximately 4 feet above the coal seam. This leaves a highwall ranging in height from 63 to 80 feet. At the time of the accident, the highwall was approximately 3,000 linear feet long. In August 2018, the mine operator began the mining operations that created this highwall.

General Machine Information

The front-end loader involved in the accident had 4 forward gears and 4 reverse gears, with a maximum forward speed of 23 miles per hour (mph) and 26 mph in reverse. The loader had an operating weight of 54,963 pounds including the bucket. It was approximately 30 feet long and 12 feet wide. Although the loader frame was damaged by the highwall collapse, its engine was still operating when the machine was recovered from the rock.

Accident Location

The accident occurred near the base of the highwall on the northwestern area of the property. The entire highwall was oriented in a northeast direction. The area that failed was approximately 400 feet south of the northern end of the highwall. The face of the highwall was sloped away from the pit approximately 20 degrees at most locations; however, there was at least one location south of the failure area where the upper portion of the highwall was sloped toward the pit. There were no benches in the highwall.

There was a geologic fault in the rock in the vicinity of the wall failure. The coal bed was 12 inches thinner on the left side of the failure. During the interview process, miners stated the fault had consistently existed in approximately the same location in previous pits. This anomaly provides an indicator of deformities that extended to the highwall.

Accident Site Geology

The strata above the coal seam generally consisted of 65 feet of shale and sandstone covered by about 20 feet of silty clay soil. At the accident area, most of the silty clay soil overlying the rock had been removed before the highwall collapse.

The failed portion of the highwall was triangular in shape, approximately 120 feet wide along the face of the highwall, and extended into the highwall approximately 40 feet. Based on the dimensions of the failed area, investigators estimate that approximately 7,000 to 8,000 cubic yards of material failed. The pile of debris from the failure extended up to the top of the highwall and out from the base of the highwall approximately 100 feet.

Multiple discontinuities (rock joints) were observed in the exposed face of the highwall adjacent to the area that failed (see Appendix B). The bearing of one set of rock joints was N64°E. This is 48° off of the bearing of the highwall (N16°E). This joint set defined one leg of the triangular-shaped failure. The length of the failure area along this set of joints was approximately 90 feet. The spacing of this set of exposed highwall joints, immediately behind the area that failed, ranged from approximately 2 feet to 4.5 feet. The joints, and slabs of rock between the joints, were dipping 84.4° NW such that the rock was leaning toward the pit. Joint openings were up to 3 inches and staining of the exposed faces of the intact rock was present.

Investigators observed a second set of rock joints, with a bearing roughly perpendicular to the first set of joints (N37°W). This joint set defined the second leg of the failure triangle. The length of the failure area along this set of joints was approximately 60 feet. The dip of this set of rock joints was approximately 70° NE such that the rock was leaning away from the pit (see Appendix C).

Investigators observed conditions of the area above the highwall. The vegetation within approximately 150 feet of the crest had been removed and silty clay soils overlying the rock were evident. The soil was sloped down toward the crest of the highwall. Most of the soil in the

vicinity of the failure had been removed by pushing it over the highwall. Less soil had been removed from the highwall in the area directly north and south of the failure. The area to the north of the failure had been drilled and loaded for blasting just prior to the failure.

Several tension cracks were present in the remaining soil at the top of the highwall in the failure area. The tension cracks in the soil were roughly parallel to the highwall failure face and were up to approximately 2 inches wide. The tension crack nearest the crest of the highwall had clean edges and did not appear to be filled with soil. The tension cracks further from the top of the highwall appeared to be partially filled with soil.

Factors in the highwall failure were the location and orientation of the joint sets in the rock mass relative to the orientation of the highwall along with possible weather-related factors discussed below. The rock joints and rock slabs with a bearing of N64°E were leaning slightly toward the pit. The rock joints with a bearing of N37°W provided a release (break) for the rock mass that was leaning toward the pit. The staining on the face of the remaining rock indicated that the openings were preexisting and not due to blast fracturing (see Appendix D).

Ground Control Plan

The mine operator's GCP was acknowledged on October 2, 2015. It detailed the plan to be used to assure that highwalls were safely created and provided provisions to follow when hazardous conditions were found. The following provisions are specifically stated in the mine operator's GCP but were not being followed:

- Benches and Highwalls (page 3) - Minimum Bench Width: 100 feet; Maximum Spacing To and/or between Benches: 50 feet.

- General Precautions (page 5, item 6) - Eliminating hazards from isolated individual rocks falling from a highwall will be accomplished through a combination of four (4) techniques: supporting or controlling the fall path of potentially loose rock, scaling the loose rock, providing rock catching benches or berms or both, and limiting the exposure of workers to areas where loose rock is present on the highwall.

- General Precautions (page 5, item 7) - If stress cracks exist or stability failure occurs in any portion of the highwall, operations in the affected area will be immediately revised. The revision will identify the reason for changes to the plan and will alert MSHA of the conditions resulting in the changes.

- General Precautions (page 6, item 12) - When failure to control the developing highwall occurs, such as the existence of overhangs, loose material, unconsolidated rocks, material falling into the pit, movement in the wall, or blasting practices fail to result in a clean and stable highwall, and corrective action cannot be taken to eliminate the existence of these conditions, the affected area will be barricaded to prevent persons from being exposed to

the conditions and the plan will be revised to safely control the highwall and provide for safe conditions.

Interview testimony indicated that management witnessed hazardous highwall conditions, such as stress cracks and poor stability, in the same general area of the accident in the previously developed highwall. The unsafe conditions served as a warning to management that the same or similar conditions may occur in future highwalls. The previously observed hazardous highwall conditions did occur in the highwall involved in the accident, but management did not utilize appropriate safety measures to abate these hazards or barricade areas off to prevent miners' exposure. These safety methods are clearly spelled out in the mine's GCP, and were not used.

Weather Conditions

Weather can be a factor in highwall stability and may have been a factor in the failure of this highwall.

Water was not observed seeping from the highwall in the area of the failure, however, two days before the accident about 3-inches of rain fell within a 24 hour timeframe. With numerous rock joints in the highwall, it is probable that some of the joints filled with water. On the day before the accident, the temperature was below freezing for about 10 hours. Freezing temperatures may have caused the water that may have been present in the rock joints to freeze and expand. The expanding water in the rock joints would have increased the horizontal forces on the slabs of rock between the rock joints, pushing the rock mass towards the pit. On the day and at the time of the accident, the temperature was 47°F with no rain.

As required by 30 CFR § 77.1004(a), highwalls, banks, benches, and terrain sloping into the working areas shall be examined after every rain, freeze, or thaw before miners work in such areas. These examinations are to be made and recorded in accordance with 30 CFR § 77.1713.

Daily Inspections

The daily inspection record for December 11, 2018, was made after the failure and noted that the highwall had fallen. Records of the daily inspections conducted for eight day shifts before the accident indicated that the highwall was "ok at this time." The eight previous daily inspections conducted for the second shifts indicated the highwall was "stable."

There were multiple noticeable discontinuities (rock joints) observed in the exposed face of the highwall adjacent to the area that failed and tension cracks in the soil roughly parallel to the highwall (see Appendix B). Along its entire 3,000 linear feet of highwall, the highwall was greater than 50 feet high and no safety benches were constructed. The GCP required a minimum 100-foot-wide bench be constructed for every 50 feet in highwall height. For over three months, the mine operator developed the highwall in a manner that violated the provisions of the GCP.

The hazardous conditions in the highwall, and the violations of the GCP, were obvious and widespread. The daily inspections performed by the mine operator were inadequate.

Training and Experience

On December 17, 2018, Brett Calzaretta, MSHA Educational Field and Small Mine Services (EFSMS) Training Specialist, and Westery checked company training records at the mine office.

Cook had 14 years of experience working at this mine. On March 3, 2018, Cook received annual refresher training and experienced miner training, which included hazard training for this mine and other mine sites. Task training was conducted on July 18, 2017 at this mine site for operation of the Caterpillar 972G front-end loader. The training records were completed in accordance with the requirements of 30 CFR Part 48.

In the interview process of the investigation, it became obvious to investigators that the foremen, the safety director, and the interviewed miners were not knowledgeable of key provisions of the GCP. Consequently, training as required by the mine's approved Training Plan was found to be ineffective and/or inadequate.

ROOT CAUSE ANALYSIS

MSHA conducted an analysis to identify the most basic cause or 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 which were implemented to prevent a recurrence.

1. Root Cause: The mine operator did not conduct adequate daily inspections of the mine in that it did not recognize hazardous highwall conditions. Failure to identify and correct the hazardous highwall conditions allowed miners to be assigned to work in close proximity to the hazardous highwall.

   Corrective Action: All mine foremen were trained on February 11, 2019, regarding proper daily inspections and hazard recognition pertaining to surface mining. The mine operator provided documentation of the training and the attendees. MSHA monitored the training.

2. Root Cause: The mine operator did not follow several provisions of the mine's GCP. The mine operator did not ensure that the miners were knowledgeable in the provisions of the mine's GCP.

   Corrective Action: The mine operator submitted a revised GCP which was reviewed and acknowledged by the District on January 23, 2019. The revision enhances safety by requiring, at all times, a 60-foot distance between the highwall and mobile equipment operators. Blasting will remove 180 feet from the pit and mobile equipment operators will only excavate 120 feet of blasted material, leaving a 60-foot buffer between them and the highwall. The mine operator trained all employees on the mine's GCP on January 28, 2019, and provided documentation of the training and the attendees.

CONCLUSION

On Tuesday, December 11, 2018, at approximately 2:07 p.m., Micky Cook, a 38-year-old surface miner with 14 years of mining experience was fatally injured when a large portion of a highwall (approximately 7,000 to 8,000 cubic yards) toppled. This caused rock to crush the operator's cab of the front-end loader he was operating. Cook was operating the front-end loader to remove blasted material near the base of a 63-foot highwall.

The accident occurred because the mine operator did not conduct adequate daily examinations to identify hazardous highwall conditions and correct such hazards before allowing miners to work near the base of the highwall. Additionally, the mine operator did not follow safety provisions of the mine's Ground Control Plan (GCP). If implemented, these GCP requirements would have caused several safety measures to be initiated to eliminate hazardous highwall conditions. In addition, the mine operator did not adequately train miners regarding the safety provisions of the mine's GCP.

_____ _____

Samuel R. Creasy Date
District Manager

ENFORCEMENT ACTIONS

1. Order No. 9132943 was issued to Cedar Lake Mining, Inc. on December 11, 2018, under the provisions of Section 103(k) of the Mine Act:

   On December 11, 2018 at approximately 13:55, a fatal accident occurred from a fall of the highwall in the east end of the pit. The victim was operating a model 972G Caterpillar front end loader, serial no. 4WW00619, in the pit pushing up rock to be loaded out of the pit. A part of the highwall collapsed crushing the cab of the front end loader where the victim was located. This order is hereby issued to ensure the safety and health of the miners including those involved in rescue and recovery operations or investigation of the accident. The mine operator shall obtain prior approval from an Authorized Representative of the Secretary for all actions to recover and/restore operations in the affected area. Additionally, the mine operator is reminded of its existing obligations to prevent the destruction of evidence that would aid in investigation the cause of the accident.

2. 104(d)(1) Citation No. 9132944 was issued to Cedar Lake Mining, Inc. for violation of 30 CFR §77.1000:

   On December 11, 2018, a Caterpillar 972G (Serial Number 4WW00619) front-end loader was operating near the base of a 63-foot high highwall to remove blasted material. A large portion of the highwall (approximately 7,000 – 8,000 cubic yards of material) toppled onto the front-end loader, crushing the operator's cab and fatally injuring the miner. As a result of the fatal accident investigation, it is concluded that the mine operator did not comply with the provisions of the Ground Control Plan (GCP), acknowledged October 2, 2015 in the following manner:

   1. The surface mine highwall ranged in height from 63 to 80 feet over a linear distance of approximately 3,000 feet with no safety bench installed. The highwall at the site of the accident was 63 feet in height with no safety bench in place. Page 3 of the GCP requires a minimum 100 feet wide safety bench to be maintained at a maximum spacing to and/or between benches of 50 feet. The highwall at the site of the accident was 63 feet in height with no safety bench in place.

   2. The top of the surface mine highwall had loose, unconsolidated rock and material in numerous and extensive locations over a linear distance of approximately 3,000 feet with no adequate corrective measures implemented to eliminate the hazard. Page 3, Item 6 of the GCP specifies that eliminating hazards from isolated individual rocks falling from a highwall will be accomplished through a combination of four (4) techniques: supporting or controlling the fall path of potentially loose rock, scaling the loose rock, providing rock catching benches or berms or both, and limiting the exposure of workers to areas where loose rock is present on the highwall.

3. Effective measures were not taken to eliminate the hazards of stress cracks which had developed in the highwall at the immediate location of the accident and in multiple locations along the linear distance of 3,000 feet of highwall. Page 5, item 7 of the GCP specifies that if stress cracks exist or stability failure occurs in any portion of the highwall, operations in the affected area will be immediately stopped, the affected area will be barricaded and the GCP will be immediately revised. The revision will identify the reason for changes to the plan and will alert MSHA of the conditions resulting in the changes.

4. Effective measures were not taken to control, correct or barricade adverse areas of the highwall at the immediate location of the accident. Page 6, item 12 of the GCP requires that when failure to control the developing highwall occurs, such as the existence of overhangs, loose material, unconsolidated rocks, material falling into the pit, movement in the wall, or blasting practices fail to result in a clean and stable highwall, and corrective action cannot be taken to eliminate the existence of these conditions, the affected area will be barricaded to prevent persons from being exposed to the conditions and the plan will be revised to safely control the highwall and provided for safe conditions.

For over three months, the mine operator developed the highwall in a manner that violated the provisions of the GCP. Also, management witnessed hazardous highwall conditions, such as stress cracks and poor stability, in the same general area of the accident in the previously developed highwall. The previous unsafe conditions served as a warning but management did not utilize appropriate safety measures to abate these hazards or barricade areas off to prevent miners' exposure. This violation is an unwarrantable failure to comply with a mandatory standard.

3. 104(a) Citation No. 9132945 was issued to Cedar Lake Mining, Inc. for violation of 30 CFR §77.1713(a):

On December 11, 2018, a Caterpillar 972G (Serial Number 4WW00619) front-end loader was operating near the base of a 63-foot high highwall to remove blasted material. A large portion of the highwall (approximately 7,000 – 8,000 cubic yards of material) toppled onto the front-end loader, crushing the operator's cab and fatally injuring the miner. Evidence obtained through the fatal accident investigation revealed the first and second shift mine examiners performed inadequate daily inspections by failing to identify, report and correct the following violations of the Ground Control Plan (GCP) and hazardous highwall conditions:

1. The immediate highwall at the site of the accident was 63 to 80 feet in height with no safety bench in place for approximately 3,000 linear feet.

2. The top of the surface mine highwall had loose, unconsolidated rock and material in numerous and extensive locations over a linear distance of 3,000 feet with no adequate corrective measures implemented to eliminate the hazard.

3. Effective measures were not taken to eliminate the hazards of stress cracks which had developed in the highwall at the immediate location of the accident and in multiple locations along the linear distance of 3,000 feet of highwall.

4. Effective measures were not taken to control, correct or barricade adverse areas of the highwall at the immediate location of the accident.

The hazardous conditions in the highwall, and the violations of the GCP, were obvious and widespread. Also, management witnessed hazardous highwall conditions, such as stress cracks and poor stability, in the same general area of the accident in the previously developed highwall. The previous unsafe conditions served as a warning but management did not utilize appropriate safety measures to abate these hazards or barricade areas off to prevent miners' exposure.

The mine operator has engaged in aggravated conduct constituting more than ordinary negligence by failing to recognize and record these violations and hazardous conditions and take corrective actions. This violation is an unwarrantable failure to comply with a mandatory standard.

4. 104(a) Citation No. 9132946 was issued to Cedar Lake Mining, Inc. for violation of 30 CFR §48.28(b)(4):

On December 11, 2018, a Caterpillar 972G (Serial Number 4WW00619) front-end loader was operating near the base of a 63-foot high highwall to remove blasted material. A large portion of the highwall (approximately 7,000 – 8,000 cubic yards of material) toppled onto the front-end loader, crushing the operator's cab and fatally injuring the miner. During the fatality investigation, formal interview testimony of miners and supervisors revealed that they were not knowledgeable in the provisions of the mine's acknowledged Ground Control Plan.

APPENDIX A

Persons Participating in the Investigation
(Persons interviewed are identified by * next to their name)

Cedar Lake Mining, Inc.

Freddy Hunt ..... President/CEO
David Peters ..... Chief Operating Officer
Jimmy Lawson ..... Operations Manager
*Chris Rice ..... Safety Manager
*Dwight Kitchens ..... Mine Superintendent
*Gary McBee ..... Day Shift Mine Foreman
*Ricky Brunner ..... Evening Shift Mine Foreman
*Garry Murray ..... Rock Truck Driver and First Responder
*Gabriel LaShum ..... Rock Truck Driver
*Kenneth McGruff ..... Fuel and Lube Service Truck Operator
*Jordan Self ..... Excavator Operator
*Chris Price ..... Excavator Operator

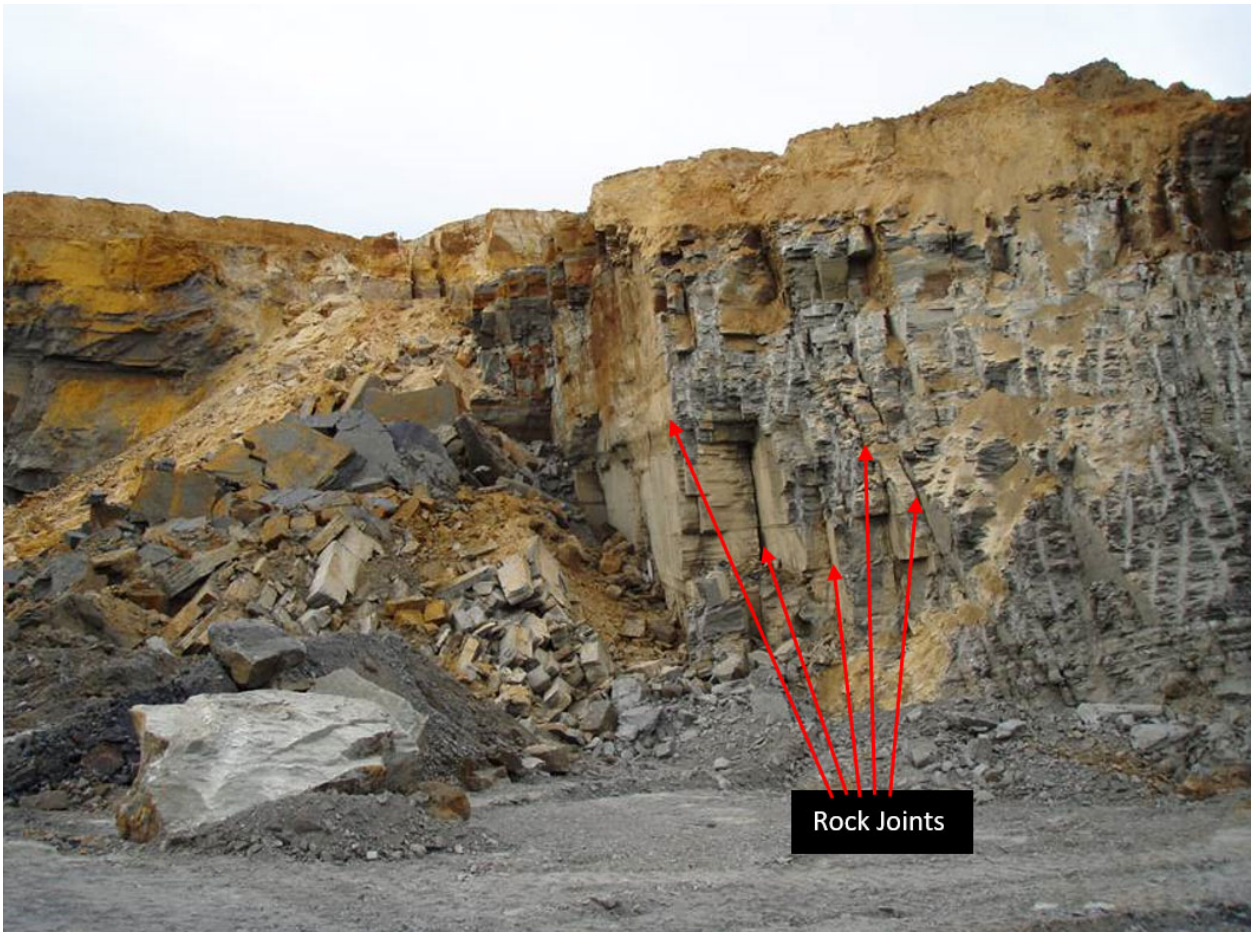
Alabama State Department of Labor

Leon Herren ..... Chief of Operations
James R. West ..... Supervisor

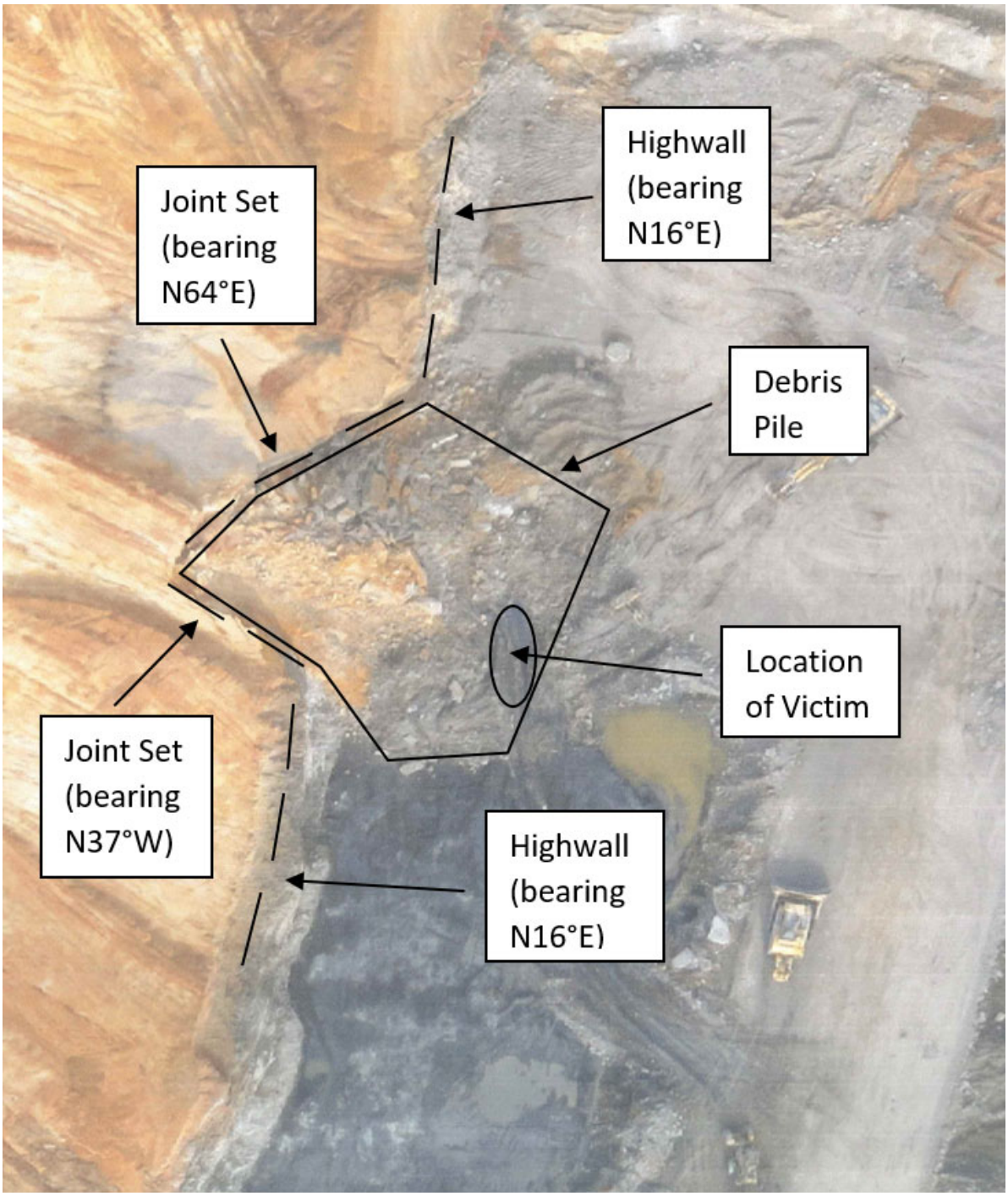
Mine Safety and Health Administration

Jarvis Westery ..... CMI/Accident Investigator
James Pfeifer ..... Senior Civil Engineer, Technical Support
Rodi Murad ..... Civil Engineer, Technical Support
Craig Plumley ..... Assistant District Manager Enforcement
Argus Brock ..... Roof Control Branch Supervisor
Edward Boylen ..... Birmingham Field Office Supervisor
William Harbin ..... Coal Mine Safety and Health Inspector
Brett Calzaretta ..... Educational Field and Small Mine Services Training Specialist

APPENDIX B
Multiple Discontinuities (Rock Joints)



APPENDIX C
Aerial View of Accident Scene
(Not to Scale)



APPENDIX D
Staining of Rock Joints