

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Underground
(Limestone)

Fatal Machinery Accident
July 24, 2020

Cisco Mine
Carmeuse L&S
Cisco, Murray County, Georgia
ID No. 09-01101

Accident Investigators

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Mine Safety and Health Inspector

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OVERVIEW

On July 24, 2020, at approximately 1:45 p.m., Joshua Clapham, a 24-year-old miner with approximately three days of mining experience, died when he was pinned to the roof, a.k.a. back, and face of the underground mine while performing work from a personnel basket.

The accident occurred because mine management: 1) allowed an untrained miner to work underground; 2) did not properly train miners after making modifications to the personnel basket valve bank; 3) did not develop a maintenance schedule or remove the blasting truck from service after miners reported hydraulic system defects and unintended movement of the crane boom and personnel basket; and 4) did not conduct proper equipment examinations to ensure all safety devices were functioning as designed.

GENERAL INFORMATION

Carmeuse L&S owns and operates the Cisco Mine in Cisco, Murray County, Georgia. The underground mine employs nine miners and operates one ten-hour shift, four days per week. Miners drill and blast the limestone. Equipment operators load the mined material into off-road haul trucks that transport it to a stockpile. Contract truck drivers transport the limestone to an offsite processing facility approximately 15 miles away in Chatsworth, Murray County, Georgia.

The principal officers for Carmeuse Lime Inc. at the time of the accident were:

Yves Willems.....	Chief Executive Officer
Kevin J. White	Vice President & General Counsel
Jonathan Bright	Vice President of Finance

The Mine Safety and Health Administration (MSHA) completed the last regular safety and health inspection at this mine on April 29, 2020. The blasting truck involved in this accident was not on mine property at the time of the inspection. The 2019 non-fatal days lost (NFDL) incident rate for Cisco Mine was 0, compared to the national average of 1.30 for mines of this type.

DESCRIPTION OF THE ACCIDENT

Clapham's first day as a miner was July 22, 2020. On that day, Kelvin Coleman, Production Supervisor, assigned him to watch training videos as part of his required Part 48 training.

During the morning of July 23, 2020, Coleman gave Clapham a tour of the surface portion of the mine to observe the haulage activity. During the afternoon, Clapham went underground to watch Coleman perform drilling activity.

On July 24, 2020, Clapham assisted Adam Childers, Equipment Operator, with blasting preparation. At approximately 12:45 p.m., on level 3 of the North West 2 Face, Clapham and Childers were loading an ammonium nitrate fuel oil (ANFO) mixture into drill holes. Clapham and Childers loaded the bottom two rows of drill holes from the mine floor before accessing the personnel basket of an International Workstar 7500 truck (blasting truck) to load the remaining drill holes above. Childers engaged the boom lever to raise the personnel basket to the top row of drill holes located approximately two feet from the mine roof. As the personnel basket ascended, a sudden jolt caused Childers to lose his balance, release the boom lever, and lose contact with the personnel basket person-in-position foot switch (foot switch). At the same time, the personnel basket tilted and continued to move in an upward and forward direction due to a mechanical failure. Releasing the foot switch should have removed hydraulic power from the circuit, but it did not function as intended because the foot switch stuck closed (see Appendix A).

Childers fell to the floor of the personnel basket and was unable to reach the emergency stop switch located near the hand levers at the top of the personnel basket's front rail. Childers told Clapham to get down on the floor of the personnel basket, but Clapham was unable to get low enough to avoid impact with the mine roof and face. The hand railing of the personnel basket crushed to the point of pinning Clapham between the front and rear railing, while pinning Childers on the floor of the personnel basket (see Appendix B). Childers could not call for help because the two-way radio was on Clapham's mining belt. The hydraulic pump motor continued to operate, trapping the two miners for approximately one hour.

Johnny Smith, Truck Driver, was on his normal truck route and did not notice Childers and Clapham as he had on previous trips, so he stopped to check on them. Smith noted that the area was foggy and there was a smell of burnt hydraulic oil. Childers was able to use a cap lamp to draw Smith's attention. Smith stopped the blasting truck's engine and Childers told Smith that Clapham was unresponsive. Smith notified Coleman of the accident at approximately 1:45 p.m., and Coleman proceeded to the scene. Coleman arrived, restarted the blasting truck, and used the ground controls to bring the personnel basket to the mine floor. Smith extricated Childers from his fall protection harness and helped him from the personnel basket. Coleman accompanied Childers to a nearby utility vehicle and drove him to the mine surface. Smith checked Clapham for a pulse, but was unable to detect one.

When Coleman reached the mine surface at 1:59 p.m., he called 911. The Murray County Fire Department arrived on scene at 2:10 p.m., followed by Murray County Emergency Medical Services at 2:18 p.m. The first responders, aided by mine personnel, traveled to the accident

scene, checked Clapham's vital signs, and determined Clapham was deceased. Jason Gibson, Murray County Coroner, traveled to the mine and pronounced Clapham's death at 3:30 p.m.

INVESTIGATION OF THE ACCIDENT

On July 24, 2020, at 2:00 p.m., David Tant, Regional Safety Director, called the Department of Labor National Contact Center (DOLNCC) to report a possible fatal accident. The DOLNCC contacted Brian Thompson, Acting District Manager at the time of the accident, who contacted Robert Ashley, Supervisory Mine Safety and Health Inspector; Scottie Sizemore, Mine Safety and Health Inspector; and Kevin T. Hardester, Mine Safety and Health Inspector.

At 5:58 p.m., Sizemore arrived at the mine site, issued a 103(k) order, and secured the accident scene. At 7:30 p.m., Hardester arrived at the mine site to assist with the investigation. MSHA conducted the investigation with the participation of mine management and miners. See Appendix C for a list of persons participating in the investigation.

DISCUSSION

Location of the Accident

The accident occurred on level 3 of the mine in the face of the North West 2 entry (see Appendix D). The entry measured 41 feet in width and nearly 48 feet in depth. The height at the face where the impact occurred was 22 feet-3 inches.

Equipment Involved

The blasting truck involved in the accident was a 2011 International Workstar 7500 SBA 6x4 truck. The mine operator contracted United Rentals, a construction equipment service company, to modify the truck by installing a Palfinger crane boom, a Genie personnel basket, and Vanair air compressor. Parker Hannifin manufactured the valves for the hydraulic system on the crane.

Testing, Observations and Conclusions

Personnel from MSHA Technical Support, Parker Hannifin, and consulting engineering firm Unified Engineering examined and evaluated the operation of the blasting truck's hydraulic controls. The investigation revealed the following maintenance issues:

- 1) Investigators determined the power takeoff (PTO) for the transmission, which provided hydraulic power to the air compressor, was sticking. When the vehicle was on, the sticking caused the air compressor's hydraulic motor to run continuously. The hydraulic motor heated the fluid in the tank that the air compressor hydraulic system shared with the crane hydraulic system. Activating the crane's hydraulic system caused the hot oil from the air compressor system to interact with the relatively cold crane control valves. This caused the crane valves to remain engaged after they were released, which caused the crane to push the personnel basket into the roof and face.
- 2) During hydraulic testing, fluid temperatures reached 240° F and higher. This temperature exceeded the crane and valve bank manufacturers' specifications and the ISO 3448 specification for the type of hydraulic oil used by the mine.

- 3) Investigators determined the low-pressure filter for the hydraulic system was broken. There were no maintenance records indicating the servicing or replacement of the filter.
- 4) Investigators tested the foot switch and found it defective. The foot switch was dirty and corroded from prolonged use in the mine. When the equipment operator removed his foot from the switch, it did not stop the hydraulic power as it should have, allowing the machine to still operate. With the control level diminished by valve swelling/sticking, and the foot switch inoperable, the only method to stop the boom from raising was the emergency stop button, which, when engaged, would stop the engine from operating. Knowing that prolonged use and the harsh mine environment could diminish the effectiveness of the foot switch, the mine operator kept spares on-site. During interviews, MSHA determined the foot switch was installed by the mine operator in March 2020 as a replacement to another foot switch which had become defective. During testing, after the foot switch in use at the time of the accident was found to be defective, it was replaced and testing was repeated. The new foot switch stopped the hydraulic power, even with the hot oil impairing the operation of the boom levers.
- 5) The mine operator's examination and maintenance program did not detect and correct the PTO and air compressor sticking, which caused the oil to heat up, which caused unintended movement of the boom. The mine operator's examination and maintenance program also did not detect and correct the defective foot switch.
- 6) Three days prior to the accident, the mine operator modified the blasting truck hydraulic system by swapping four hydraulic hose lines, altering two personnel basket functions (boom swing and knuckle) on the personnel basket valve bank. The swap caused the personnel basket's lever that would normally operate the swing function to operate the knuckle function instead. United Rentals personnel suggested the swap as a troubleshooting measure. The mine operator was troubleshooting for involuntary movement of the crane boom and personnel basket that had been reported by the miners. The labels on the controls in the personnel basket were not updated to reflect the swap, and the mine operator did not task train equipment operators regarding the modifications.
- 7) The hydraulic system for the blasting truck required considerable maintenance to ensure its proper operation.

Examinations

The pre-operational examination of the blasting truck conducted on the day of the accident was inadequate. During interviews, MSHA determined involuntary movement of the hydraulics on the crane boom had existed for at least three months. The modified defective foot switch and the sticking PTO were not identified during the pre-operational examination that was conducted. Further, the mine operator modified the personnel basket controls by switching four valve bank hydraulic hoses on July 21, 2020 (three days prior to the accident). The mine operator did not properly label the valve bank functionality levers after modifications were made. A thorough and proper examination of the blasting truck's personnel basket would have revealed the foot

switch was not working, and the personnel basket's functionality levers were not properly labeled.

Training and Experience

Joshua Clapham had approximately three days of mining experience. He did not receive the full 40 hours of New Miner Training as required by 30 CFR § 48.5, which would have included the health and safety aspects of the tasks to which the new miner will be assigned.

Three days prior to the accident, the mine operator modified the blasting truck hydraulic system as discussed above. The mine operator did not provide Childers with the required task training pertaining to these modifications and changes to the functionality controls of the personnel basket levers.

ROOT CAUSE ANALYSIS

The accident investigation team conducted an analysis to identify the underlying causes of the accident. The team identified the following root causes, and the mine operator implemented the corresponding corrective actions to prevent a recurrence.

1. Root Cause: Mine management allowed an untrained miner to work underground.

Corrective Action: Mine management developed policies and procedures to ensure that each new miner completes 40 hours of training per 30 CFR § 48.5 prior to working.

2. Root Cause: Mine management did not properly train miners after making modifications to the personnel basket valve bank.

Corrective Action: Mine Management retrained all miners regarding modifications to the personnel basket valve bank.

3. Root Cause: Mine management did not perform adequate maintenance or remove the blasting truck from service after miners reported hydraulic system defects related to involuntary movement of the crane boom and personnel basket.

Corrective Action: Mine management committed to follow all maintenance recommendations from the manufacturers and removed the defective equipment from service until they corrected the hazards.

4. Root Cause: Mine management did not conduct proper equipment examinations to ensure all safety devices were functioning as designed.

Corrective Action: Mine management retrained miners on how to conduct proper equipment examinations before placing equipment in operation.

CONCLUSION

On July 24, 2020, at approximately 1:45 p.m., Joshua Clapham, a 24-year-old miner with approximately three days of mining experience, died when he was pinned to the roof and face of the underground mine while performing work from a personnel basket.

The accident occurred because mine management: 1) allowed an untrained miner to work underground; 2) did not properly train miners after making modifications to the personnel basket valve bank; 3) did not develop a maintenance schedule or remove the blasting truck from service after miners reported hydraulic system defects related to unintended movement of the crane boom and personnel basket; and 4) did not conduct proper equipment examinations to ensure all safety devices were functioning as designed.

Approved By:

Mary Jo Bishop
District Manager

Date

ENFORCEMENT ACTIONS

1. A 103(k) Order No. 9496129 was issued to Carmeuse L&S on July 24, 2020:

An accident occurred at this operation on July 24, 2020, at approximately 1:58 PM. As rescue and recovery work is necessary, this order is being issued, under Section 103(j) of the Federal Mine Safety and Health Act of 1977, to assure the safety of all persons at this operation. This order is also being issued to prevent the destruction of any evidence which would assist in investigating the cause or causes of the accident. It prohibits all activity at Level 3 NW 2 until MSHA has determined that it is safe to resume normal mining operations in this area. This order applies to all persons engaged in the rescue and recovery operation and any other persons on-site. This order was initially issued to the mine operator at 3:15 PM and has now been reduced to writing.

2. A 104(d)(1) Citation was issued to Carmeuse L&S for a violation of 30 CFR § 48.5(a).

A fatal accident occurred at this mine on July 24, 2020, when a new miner without prior mining experience received fatal crushing injuries while working from a personnel basket to load explosives. Two miners were working in the underground portion of the mine from the personnel basket of a blasting truck when the hydraulic system failed, causing the personnel basket attached to the truck's boom to elevate uncontrollably and ultimately crushing the personnel basket against the North West 2 roof and face. New miners are required to receive 40 hours of training before working at an underground mine, including instruction in the safety aspects of the tasks to be assigned, including the safe work procedures of such tasks. The new miner had not received the required training, which, among other things, would have provided instruction in the operation of the emergency stop switch located near the hand levers at the top of the personnel basket's front rail that the new miner could have operated to terminate the uncontrolled boom movement. This action by mine management constitutes more than ordinary negligence and is an unwarrantable failure to comply with a mandatory standard.

3. A 104(d)(1) Order was issued to Carmeuse L&S for a violation of 30 CFR § 48.7(a)(3):

A fatal accident occurred at this mine on July 24, 2020, when a new miner without prior mining experience received fatal crushing injuries while working from a personnel basket to load explosives. Two miners were working in the underground portion of the mine from the personnel basket of a blasting truck when the hydraulic system failed, causing the personnel basket attached to the truck's boom to elevate uncontrollably and ultimately crushing the personnel basket against the North West 2 roof and face. Three days before the accident, the mine operator swapped four hydraulic hose lines for the personnel basket's valve bank, which changed the functionality of individual personnel basket levers. Mine management did not provide task training to the personnel basket equipment operator regarding the aforementioned changes. Failure to task train miners after equipment has been modified by changing the functioning of controls that affect the operation of a personnel basket constitutes more than ordinary negligence and is an unwarrantable failure to comply with a mandatory standard.

4. A 104(d)(1) Order was issued to Carmeuse L&S for a violation of 30 CFR § 57.14100(c):

A fatal accident occurred at this mine on July 24, 2020, when a new miner without prior mining experience received fatal crushing injuries while working from a personnel basket to load explosives. Two miners were working in the underground portion of the mine from the personnel basket of a blasting truck (International Workstar 7500) when the hydraulic system failed, causing the personnel basket attached to the truck's boom to elevate uncontrollably and ultimately crushing the personnel basket against the North West 2 roof and face. Hazardous conditions were known to be associated with the blasting truck's boom/personnel basket, including a malfunction associated with the hydraulic system, which contributed to the unintended movement of the boom. The Production Manager was aware of the defective conditions. Failure to remove mobile equipment from service when defects affecting safety are identified/known constitutes more than ordinary negligence and is an unwarrantable failure to comply with a mandatory standard.

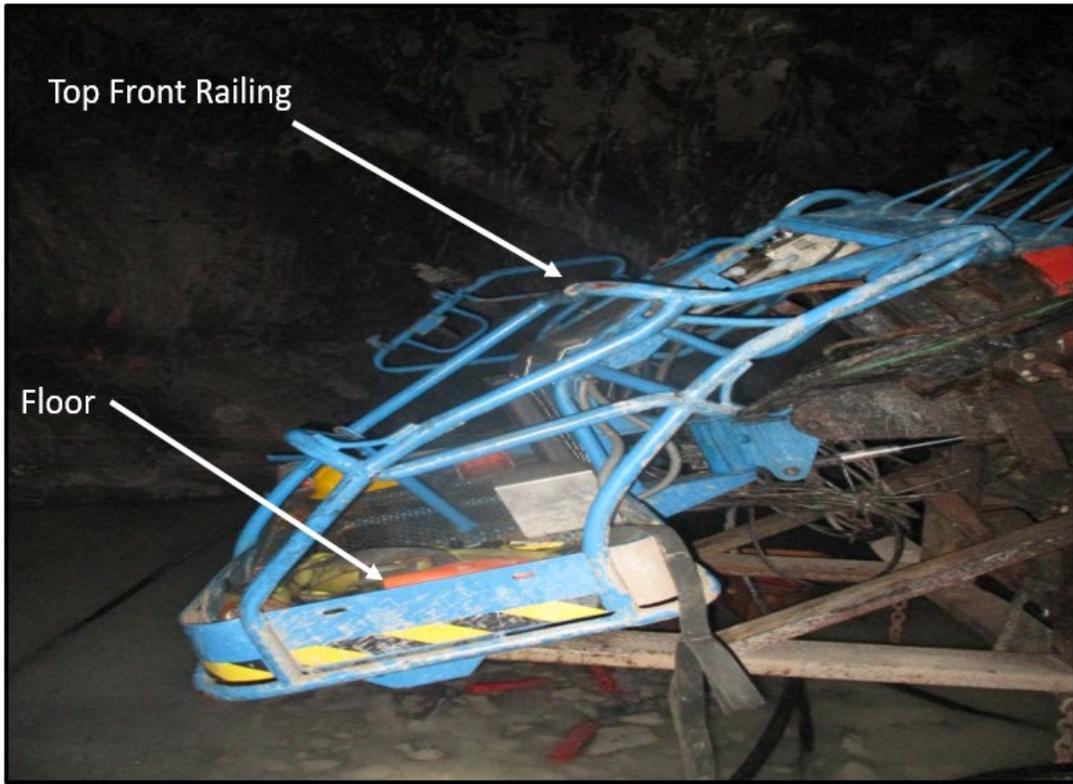
5. A 104(d)(1) Order was issued to Carmeuse L&S for a violation of 30 CFR § 57.14100(a):

A fatal accident occurred at this mine on July 24, 2020, when a new miner without prior mining experience received fatal crushing injuries while working from a personnel basket to load explosives. Two miners were working in the underground portion of the mine from the personnel basket of a blasting truck (International Workstar 7500) when the hydraulic system failed, causing the personnel basket attached to the truck's boom to elevate uncontrollably and ultimately crushing the personnel basket against the North West 2 roof and face. Hazardous conditions affecting the safe operation of the blasting truck's boom/personnel basket, including swapped hydraulic hose lines for the personnel basket's valve bank, which changed the functionality of individual personnel basket levers, and a malfunctioning personnel basket foot switch, existed prior to the accident. An adequate inspection by the equipment operator prior to placing the blasting truck into operation would have disclosed existing defects. Failure to perform an examination of equipment prior to placing it into service constitutes more than ordinary negligence and is an unwarrantable failure to comply with a mandatory standard.

Appendix A - Foot Switch Stuck in Closed Position
(Note the rust in the droplets of water and along the edges)



Appendix B - Personnel Basket of the Blasting Truck



Appendix C
Persons Participating in the Investigation

Carmeuse Cisco Mine

Ian Karkaria Director of Operations - East
David Tant Regional Safety Director
Joey Weaver..... Site Operations Manager
Joe Grounds Production Manager
Adam Childers Equipment Operator

Murray County Sheriff's Department

Jimmy Davenport..... Chief Deputy

Unified Engineering, LP

John E. Myers..... Mechanical Engineer

United Rentals

John Zeiggig..... Technician

Parker Hannifin

Dennis C. Allen..... Global Mobile Manager
Jim Janecke Application Engineer

Mine Safety and Health Administration

Scottie W. Sizemore..... Mine Safety and Health Inspector
Kevin T. Hardester..... Mine Safety and Health Inspector
Jonathan Hall Mechanical Engineer/Technical Support
Gary Rethage Mechanical Engineer/Technical Support
Robert Ashley Supervisory Mine Safety and Health Inspector

APPENDIX D - Photograph of the Accident Scene



International Prostar
7500 Blasting Truck

Area on Level 3 of the North West
2 Face where accident occurred