MAI-2013-18

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
Metal and Nonmetal Mine Safety and Health

REPORT OF INVESTIGATION

Surface Nonmetal Mine
(Crushed and Broken Limestone)

Fatal Electrical Accident
November 18, 2013

William E. Groves Construction, Inc.
Contractor ID No. V18
at
Pine Bluff Sand & Gravel Company
Cumberland River Quarry
Salem, Livingston County, Kentucky
Mine ID No. 15-18766

Investigators

Jeffrey L. Phillips
Supervisory Mine Safety and Health Inspector

Ed Jewell
Mine Safety and Health Inspector

Maxwell A. Clark
Electrical Engineer

Stephen Dubina
Electrical Engineer

Joe Fritz
Mine Safety and Health Specialist (Training)

Originating Office
Mine Safety and Health Administration
Southeastern District
135 Gemini Circle, Suite 212, Birmingham, Alabama 35209
Samuel K. Pierce, District Manager


MADE IN U.S.A.
DANGER
DO NOT
OPERATE

OVERVIEW

Robert Crume, Contract Electrician Foreman, age 33, received an electrical shock on November 18, 2013. Crume was working in a motor control building when he contacted an energized conductor inside an electrical enclosure. Crume was transported to a hospital where he died on November 22, 2013, as a result of his injuries.

The accident occurred because the electrical circuit was not deenergized prior to work being performed on it. Additionally, the electrical circuit was not locked out, tagged out, or tested to verify it was de-energized.

GENERAL INFORMATION

Cumberland River Quarry, a surface crushed limestone mine, owned and operated by Pine Bluff Sand and Gravel Company, is located in Salem, Livingston County, Kentucky. The principal operating official is Bryan Tilley, Quarry Operations Manager. The mine operates two 10-hour shifts per day, six days per week. Total employment is 99 persons.

Limestone is mined using a multi-bench method. The material is drilled, blasted, loaded into haul trucks with a front-end loader, and transported to an on-site processing plant. Finished materials are sold for various uses and transported by barge.

William E. Groves Construction, Inc. (Groves) is located in Madisonville, Kentucky. The person in charge of health and safety is Allen Martin, Safety Manager. Groves was contracted to install the Wash Plant Motor Control Center, the River Motor Control Center (MCC), and the wiring to all of the associated pump motors and motor control circuits. Groves had 7 contract employees working at the mine. They work one 10 hour shift, Monday through Thursday and had been working at this site for 12 weeks.

The Mine Safety and Health Administration (MSHA) completed the last regular inspection at this operation on May 7, 2013.

DESCRIPTION OF THE ACCIDENT

On the day of the accident, November 18, 2013, Robert Crume (victim) reported for work at 7:00 a.m., his normal starting time. Crume began the shift by conducting a safety meeting with his crew. During the meeting, Crume told the crew that the newly installed MCC and pump starter circuit would be energized, for the first time, during the shift. After the meeting, Crume told Tim McCay, and James Pool, Contract Electricians, to finish making the power conductor connections to the river pump motors located on the pump barge at the bank of the river. Crume went to the MCC and began connecting the feed transformer located outside.

At approximately 11:40 a.m., McCay and Pool completed the pump motor connections and Crume completed the MCC feed transformer connections and then energized the MCC. At about 12:00 p.m., Crume and the crew started their lunch break.

After lunch, McCay and Pool began wiring the PLC (programmable logic control) unit located inside the MCC building. Around 1:00 p.m., Crume entered the MCC building and started setting the parameters for a pump soft starter unit. Crume asked McCay for a photo of the pump motors they had connected earlier and McCay gave it to him. After looking at the motor identification plates in the photo, Crume stated that this installation required two additional control wires. Crume told McCay and Pool to get two control wires prepared and route them between the PLC unit and the soft starter unit.

McCay and Pool routed the two gray control wires from the PLC's metal enclosure to the soft starter unit's metal enclosure (which are about five foot apart). McCay and Pool were working inside the PLC's enclosure and Crume continued working inside the soft starter unit's enclosure. The door of the enclosure was open, blocking McCay's and Pool's view of Crume's activities.

At about 1:35 p.m., McCay and Pool noticed that Crume had suddenly fallen backward against an adjacent wall and onto the floor. McCay and Pool found him unconscious and unresponsive. McCay noticed the 1,000 amp breaker located inside the soft starter unit's enclosure was in the "on" position. He immediately tripped the breaker to de-energize the exposed conductors. McCay used his cell phone to call 911 and then stepped outside to tell Kirby Hoodenpyle, Contract Electrician, to get help. Hoodenpyle

went to the main office for help. David Lane, Contract Electrician, joined McCay and the two men administered cardiopulmonary resuscitation (CPR) to Crume.

Bryan Tilley, Quarry Operations Manager, and Anthony Cinkovich, Project Manager, arrived from the main office with an Automatic External Defibrillator (AED). Tilley immediately applied the AED process to Crume.

Emergency Medical Services (EMS) arrived at 1:57 p.m. and took charge of the rescue CPR. At about 2:15 p.m., Crume was transported to a hospital in Livingston, Kentucky. At 3:38 p.m. that same day, Crume was life flighted to a hospital in Paducah, Kentucky. Crume was placed on life support and died on November 22, 2013.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 1:54 p.m. on November 18, 2013, by a telephone call from Tonya Salyer, Office Manager, to the National Call Center. The National Call Center notified Doniece Schlick, Assistant District Manager, and an investigation was started the same day.

An order was issued under Section 103(j) of the Mine Act to ensure the safety of the miners. This order was subsequently modified to Section 103(k) of the Mine Act when the first Authorized Representative arrived at the mine.

MSHA's accident investigation team traveled to the mine, conducted a physical inspection of the accident scene, interviewed employees, and reviewed documents and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine and contract management and employees.

DISCUSSION

Location

The accident occurred at the River MCC, located at the plant area next to the river bank adjacent to the barge load out. The River MCC supplies electrical power to the two 450HP pump motors. The pumps supply water from the river to the wash plant.

Weather

The weather conditions on the day of the accident were sunny with a temperature of 45 degrees Fahrenheit. Weather was not considered to be a factor in the accident.

Physical Factors

Two soft start motor starter units were installed in the River MCC, an above ground metal building. The starter units were manufactured by Curtis Wright Flow Control Company. Each starter was capable of starting a 500 HP motor rated at 590 amps and 480 volts while the control voltage was 120 volts. Each starter was contained in its own National Electrical Manufacturers Association (NEMA) type 12 metal enclosure. Each starter operated a 450 HP motor, rated at 486 amps and 480 volts, which controlled a submersible water pump.

Earlier in the day, 480-volt power was installed in each metal cabinet in the MCC. The incoming power to each cabinet was connected to the bottom side of a Siemens 1,000 amp circuit breaker with the magnetic protection set at approximately 6,000 amps.

When the circuit breaker was closed, power was transferred to a class 10 (standard duty) motor starter, rated at 590 amps full load continuous, 3-phase, 600 volts AC, with Curtis Wright Flow Control Company model number RB2-1-S-590A-18C .

Based on the examination of the starter and the persons interviewed who were in the MCC at the time of the accident, the investigators determined Crume was checking the wiring from the PLC enclosure to the soft starter enclosure unit. Two wire connection locations on the starter unit had pencil marks on them and the cover of one of the wire raceways had been removed.

This cover was found inserted behind the starter bus terminal L3. A dielectric test was performed on this cover and the cover was found to be not conductive.

Training and Experience

Robert Crume, victim, had 14 years and 26 weeks of electrical experience and had been at this operation for 12 weeks. A representative of MSHA's Educational Field Services staff conducted an in-depth review of the contractor's training records. Crume's training records provided by the mine operator and the contractor company were examined and found to be in compliance with MSHA training requirements.

ROOT CAUSE ANALYSIS

A root cause analysis was conducted and the following root cause was identified:

Root Cause: The electrical circuit was not de-energized prior to work being performed on it. Additionally, the electrical circuit was not locked out, tagged out, or tested to verify it was de-energized.

Corrective Action: The contractor re-instructed all persons regarding the procedures to be followed when performing work on electrical equipment.

CONCLUSION

The accident occurred because the electrical circuit was not deenergized prior to work being performed on it. Additionally, the electrical circuit was not locked out, tagged out, or tested to verify it was de-energized.

ENFORCEMENT ACTIONS

Issued to Pine Bluff Sand & Gravel Company

Order No. 8733221 -- issued on November 18, 2013, under the provisions of Section 103(j) of the Mine Act:

> *An accident occurred at this operation on 11/18/2013 at approximately 1335 hours. 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 investigating the cause or causes of the accident. It prohibits all activity at the (River Motor Control Center / MCC Building) 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 orally to the mine operator at 1416 hours and has now been reduced to writing.*

The order was terminated on November 26, 2013, after conditions that contributed to the accident no longer existed.

Issued to William E. Groves Construction, Inc.

Citation No. 6091470 -- issued under the provisions of Section 104(d)(1) of the Mine Act for a violation of 30 CFR 56.12017:

> *On November 18, 2013, a fatal accident occurred at this operation when a contract electrician (foreman) came in contact with the energized 460 volt conductor while installing new wires from the PLC to the Benshaw soft start system. The electrician had failed to de-energize and lockout the power circuit. The electrical foreman acted with aggravated conduct constituting more than ordinary negligence by knowing that the system was energized and failed to take the necessary steps to de-energize or use proper PPE for hot work applications. This violation is an unwarrantable failure to comply with a mandatory standard.*

Approved: _____ Date 2/13/14
Samuel Pierce
Southeast District Manager

APPENDIX A

Persons Participating in the Investigation

Pine Bluff Sand & Gravel Company

Bryan Tilley	Quarry Operations Manager
Anthony Cinkovich	Senior Project Manager
Tonya Salyer	Office Manager

William E. Groves Construction, Inc.

Tim McCay	Electrician
James Pool	Electrician

Mine Safety and Health Administration

Jeffrey L Phillips	Supervisory Mine Safety and Health Inspector
Ed Jewell	Mine Safety and Health Inspector
Maxwell Clark	Electrical Engineer
Steve Dubina	Electrical Engineer
Joe Fritiz	Mine Safety and Health Specialist (Training)

APPENDIX B

Accident Investigation Data - Victim Information

Event Number: 6 6 4 3 3 7 0

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:
Robert Crume	*M*	*33*	*01 Fatal*

5. Date(MM/DD/YY) and Time(24 Hr.) Of Death:	6. Date and Time Started:
a. Date: 11/22/2013 b.Time: 3:45	*a. Date: 11/18/2013 b.Time: 13:35*

7. Regular Job Title:	8. Work Activity when Injured:	9. Was this work activity part of regular job?
149 Electrician Foreman	*020 Installing a soft starter unit*	Yes X No

10. Experience	a. This Work Activity:	b. Regular Job Title:	c: This Mine:	d. Total Mining:
Years	*0*	*14*	*0*	*14*
Weeks	*12*	*26*	*12*	*26*
Days	*0*	*0*	*0*	*0*

11. What Directly Inflicted Injury or Illness?	12. Nature of Injury or Illness:
042 contact with energized condutors	*210 Electrocution*

13. Training Deficiencies

Hazard: | New/Newly-Employed Experienced Miner: | Annual: | Task:

14. Company of Employment: (If different from production operator)

William E. Groves Construction

Independent Contractor ID: (if applicable) *V18*

15. On-site Emergency Medical Treatment

Not Applicable: | First-Aid: X | CPR: X | EMT: X | Medical Professional: X | None:

16. Part 50 Document Control Number: (form 7000-1) *220133310045*

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