MAI-2006-04

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Surface Nonmetal Mine
(Limestone)

Fatal Electrical Accident
April 3, 2006

Clarksville Quarry
Vulcan Construction Materials, L.P.
Clarksville, Montgomery, Tennessee
Mine I.D. No. 40-00090

Investigators

Donald L. Ratliff
Supervisory Mine Safety and Health Inspector

Joe R. Fritz
Mine Safety and Health Inspector

Arlie B. Massey
Electrical Engineer

Frank J. Prebeg
Electrical Engineer

Originating Office
Mine Safety and Health Administration
Southeastern District
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Michael A. Davis, District Manager


04/04/2006

OVERVIEW

On April 3, 2006, Paul E. Harrington, area electrician, age 50, was fatally injured when a truck's boom contacted an energized high-voltage power line. The victim received a fatal electrical shock while pushing against a metal building that was suspended from a boom truck.

The accident occurred because safe operating procedures were not implemented before operating a boom truck near an energized high-voltage power line. The power line was not de-energized and no other precautionary measures were taken. A risk assessment to identify all possible hazards and establish safe procedures was not conducted by the crew before starting the task.

GENERAL INFORMATION

The Clarksville Quarry, a crushed limestone operation, owned and operated by Vulcan Construction Materials, L.P. was located at Clarksville, Montgomery County, Tennessee. The principal operating official was Danny Sisk, plant manager. The mine operated one shift per day, six days per week. Total employment was 25 persons.

Limestone was drilled, blasted, and loaded into haulage trucks by a front-end loader. The material was crushed, screened and washed. Finished products were sold for use in the construction industry.

The last regular inspection at this operation was conducted on October 17, 2005.

DESCRIPTION OF THE ACCIDENT

On the day of the accident, Paul E. Harrington, (victim), reported to work at Vulcan's Wilson County Quarry at approximately 6:00 a.m. Harrington parked his personal vehicle and drove his assigned truck to the Clarksville Quarry to continue work on the new primary crusher project. He was an area electrician for Vulcan Construction and had worked at various Vulcan mining operations.

Harrington arrived at the Clarksville Quarry about 8:30 a.m. He met with Danny Sisk, plant manager, at the inactive pump control building. They discussed removing the pole, conduit, and pump control building. Sisk had already completed a pre-shift examination of the pit area.

A new primary crushing plant was under construction in the active pit. The installation of the high-voltage power line was monitored and overseen by Spate R. Anthony, principal engineer, Vulcan Construction Material, Engineering Department in Knoxville, Tennessee.

Vulcan Construction awarded a contract to Dixon Electric Inc., Lexington, Kentucky to install four power poles and approximately 1,100 feet of high-voltage power line from the main power line on top of the highwall to the new primary crusher plant location. The high-voltage power lines were energized throughout the expansion, in accordance with Vulcan personnel's instructions. Disconnect fuses with 200 amp cutouts were installed on two of the poles for future use but were never incorporated into the system, no wires were connected to the bottom of the disconnect fuses, and the fuses were left in the open position. Work was completed on the high-voltage power lines on April 2, 2006.

Chad McCain, leadman, went to the plant to assist with the start-up. About 7:00 a.m., Sisk and McCain met at the inactive pump control building and old power pole. They talked about removing the pipe, cable, conduit, power pole and control building. They also checked the fuse disconnects on two of the poles and verified the disconnect fuses were in the open position but did not realize they were inoperative. They did not discuss whether the high-voltage power lines

were energized or not. The crane to be used for the pole removal project had to be sent to the plant for other work. The crane returned, and the power pole was removed about 12:00 p.m.

After lunch, the pump conduit and wiring were removed from the old pole and moved to the new location and installed on the new pole. The pump control building was loaded onto the boom truck and transported to the new location by McCain, Harrington, and William Gilbert, laborer. Gilbert backed the truck into position. About 4:25 p.m., McCain began operating the boom and started maneuvering the pump control building into position from the left side boom controls but switched to the right side to obtain a better view of the building and crew.

Harrington and Gilbert were standing on the ground next to the building helping to push the suspended building into position when the boom inadvertently came in contact with the energized high-voltage power lines. Electricity was transmitted through the boom, down the hoisting cables, into the metal building, and through Harrington, causing him to fall down against the energized building. Gilbert jumped away from the building and McCain jumped down from the boom truck that was also energized. The metal building and the outriggers of the boom truck were arcing. McCain ordered everyone to move away from the energized components and the victim. No one at the mine had the capability to de-energize the high-voltage power lines.

McCain called the mine office to request help. Emergency personnel and workers from the Clarksville Department of Electricity were called. The power was disconnected, grounded, and tagged out of service at 5:40 p.m. The victim was pronounced dead at the scene by the Montgomery County Medical Examiner at 4:42 p.m. The cause of death was attributed to electrocution.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident about 4:50 p.m. on April 3, 2006, by a telephone call from William P. Huffman, safety manager, to Wyatt Andrews, assistant district manager. An investigation was started the same day. An order was issued under the provisions of Section 103(k) of the Mine Act to ensure the safety of the miners.

MSHA's accident investigation team traveled to the mine, conducted a physical inspection of the accident scene, interviewed employees and contractors, and reviewed documents and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management, employees, Clarksville City Police Department, Montgomery County Medical Examiner, and Montgomery County Emergency Medical Services.

DISCUSSION

Location of Accident

The accident occurred under the energized high-voltage power lines where the pit pump control building was being located, approximately 140 feet above the pit floor. The 140 feet x 100 feet graded area was to house a pump control building, MCC room, transfer tower, and tail section of the main conveyor out of the pit.

Equipment

The boom truck involved in the accident was a Ford "F Series" flat bed. The truck was equipped with a Terex Stringer telescoping boom mounted on the bed of the truck with four hydraulic out rigger jacks (two on each side). The boom was equipped with a 250 feet long 9/16 inch hoisting cable and four lifting cables.

High-Voltage Power Lines

The four overhead high-voltage distribution lines were three phase, 1/0 ACSR, 12470 volt AC nominal, with a solid Wye ground. Three sets of 200 amp cutouts were installed with lightning arrestors and fed with 2/0 ACSR conductors. Four, 45 feet class II wooden poles were installed with ten feet double cross arms. One Vulcan supplied Capacitor bank was to be installed upon arrival.

Training

Paul E. Harrington had 21 years experience as an electrician, 10 years 37 weeks of mining experience, and 9 months, 6 days, experience with Vulcan Construction Materials (not all at this mine). He had received training in accordance with 30 CFR, Part 46.

ROOT CAUSE ANALYSIS

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

Root Cause: Management policies and controls were inadequate and failed to require that steps were taken to determine if the overhead power line was deenergized before starting the task. There were no safe work procedures implemented to ensure that persons were protected while operating equipment near energized high-voltage power lines.

Corrective Action: A risk assessment should be jointly conducted by all miners to identify and correct all possible hazards and establish safe procedures before beginning any task that involves operating equipment near energized power lines.

Root Cause: Policies and controls were inadequate. Management failed to communicate and document the recent actions that resulted in power being connected to the newly installed overhead high-voltage lines.

Corrective Action: Site permits should be utilized. Prior to starting repair or maintenance tasks, management and employees should jointly discuss all of the possible hazards that may be encountered. Documentation should be completed to ensure that procedures used to complete the work protect everyone from possible hazards. The entire project should be monitored to ensure compliance with safe operating procedures.

CONCLUSION

The accident occurred because management failed to inform the employees that the power lines had been energized the prior day. The power lines were not de-energized and no other precautionary measures were taken before employees were assigned to operate equipment nearby.

Management did not ensure that a risk assessment was conducted with the crew before starting the task to identify all possible hazards and establish safe procedures.

ENFORCEMENT ACTIONS

Order No. 6125302 was issued on April 3, 2006, under the provisions of Section 103(k) of the Mine Act:

> A fatal accident occurred at this operation on April 3, 2006, when an electrician and two other miners were setting a switch house into place with a boom truck. The boom contacted an energized 13,000 Volt nominal phase wire, causing fatal injuries to the electrician. This order is issued to assure the safety of all persons at this operation. It prohibits all activity at the affected area until MSHA has determined that it is safe to resume normal mining operations in the area. The mine operator shall obtain prior approval from an authorized representative for all actions to restore operations in the affected area.

The order was terminated on April 6, 2006. Conditions that contributed to the accident had been corrected.

Citation No. 6111109 was issued on May 9, 2006, under the provisions of Section 104d1 of the Mine Act:

> A fatal accident occurred at this mine on April 3, 2006, when a crane boom was positioned within 10 feet of an energized high voltage power line. The victim was standing on the ground touching a metal building suspended from the crane hoist cable and was electrocuted. Failure to de-energize the power line or take other precautionary measures prior to performing this task constituted more than ordinary negligence and was an unwarrantable failure to comply with a mandatory safety standard.

The citation was terminated on June 13, 2006. The company has instituted a new policy and trained all affected miners in the proper procedures for working around High voltage lines.

Approved by: _____ Date: _____
Michael A. Davis
Southeastern District Manager

APPENDIX A

Persons Participating in the Investigation

Vulcan Construction

William P. Huffman	manager, safety and health, midsouth division
Richard L. Seago	manager, safety services, corporate – construction materials Group
Spate R. Anthony	principal engineer, midsouth division
Danny Sisk	plant manager, midsouth division
Wayne Robertson	sr. safety & health representative, midsouth division
William Gilbert	laborer
Chad McCain	leadman / boom truck operator

Clarksville Department of Electricity

Ronald M. Camp	vice president operations

Dixon Electric, Inc

Doug Dixon	president

GW Systems

Ed Maloney	site supervisor
Jeffery N. Smith	foreman
Reuben Tripp	man lift operator
Roy Clouse	laborer
James David	crane operator
Robert Hayes	laborer

Mine Safety and Health Administration

Donald Ratliff	supervisory mine safety and health inspector
Joe Fritz	mine safety and health inspector
Arlie Massey	electrical engineer
Frank Prebeg	electrical engineer