

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

REPORT OF INVESTIGATION

**Surface Nonmetal Mine
(Granite)**

**Fatal Electrical Accident
October 10, 2010**

**Hertzler Electrical Services LLC
Contractor ID No. R495**

at

**Martin Marietta Materials, Inc.
Snyder Mine
Snyder, Kiowa County, Oklahoma
Mine ID No. 34-01651**

Investigators

**Gary L. Cook
Mine Safety and Health Specialist**

**Dennis E. Robinson
Mine Safety and Health Inspector**

**Maxwell A. Clark
Electrical Engineer**

**Originating Office
Mine Safety and Health Administration
South Central District
1100 Commerce Street, Room 462
Dallas, TX 75242-0499
Edward E. Lopez, District Manager**



OVERVIEW

On October 10, 2010, Michael A. Solomon, contract apprentice electrician, age 42, and two co-workers were seriously injured when an arc flash occurred. They were performing maintenance work on an electrical circuit breaker. The circuit breaker was in the "OFF" position but remained energized on the input side. They were all hospitalized. Solomon died on October 12, 2010, as a result of his injuries.

The accident occurred because contractor management procedures failed to ensure that the electrical circuit breaker was de-energized prior to performing work on it.

GENERAL INFORMATION

Snyder Mine (Snyder), a surface granite mine, owned and operated by Martin Marietta Materials (Martin), is located near Snyder, Kiowa County, Oklahoma. The principal operating official is Joseph Schulte, plant manager. The mine operates one 8-hour shift per day, five days per week. Total employment is 23 persons.

Hertzler Electrical Services (Hertzler), an electrical contracting company, is located in Duncan, Stephens County, Oklahoma. Hertzler performs electrical work at Snyder on an as-needed basis. The principal operating official is Kelly Hertzler, owner. Hertzler employed 26 persons. Michael A. Solomon (victim) and 3 other Hertzler employees were working at Snyder at the time of the accident.

Granite is drilled and blasted from multiple benches in the quarry. Front-end loaders load broken rock into haul trucks. The material is then transported to the plant where it is crushed and stockpiled. Material is sold for use in asphalt and as railroad ballast.

The last regular inspection at this operation was completed on July 28, 2010.

DESCRIPTION OF THE ACCIDENT

On the day of the accident, Michael Solomon, apprentice electrician, reported for work at 5:30 a.m. at Hertzler's office in Duncan, Oklahoma. He and Robert Law, journeyman electrician and supervisor, drove to Snyder while Christopher Bethany, apprentice electrician, and Christopher Fowler, apprentice electrician, drove to Snyder in another vehicle. About 7:00 a.m., the four electricians arrived at Snyder to complete a job they had started on October 8, 2010. They were replacing a junction box and installing new cables for six electric motors.

After completing the planned electrical work, Law asked Kenneth Piper, plant operator, to start the plant so they could check the new installations. Piper energized the plant for 20 minutes then de-energized it after verifying that all new installations were functional.

Hertzler employees frequently worked at Martin plants and they had been asked to install ground fault indicator lights at all plants when it was convenient to do so. With that request in mind, Law decided to install ground fault indicator lights at the main circuit breaker for the primary plant.

At 12:45 p.m., Bethany, Law, and Solomon entered the MCC trailer to install the indicator lights. Fowler remained outside to put away materials and equipment that were not needed. Piper had gone to the plant break room. The main circuit breaker was turned to the "OFF" position prior to working on the indicator lights. However, the fuses at the nearby transformer station were not removed to de-energize the circuit breaker. The input side of the main circuit breaker remained energized.

At 12:55 p.m., Solomon was kneeling in front of the main circuit breaker while Bethany and Law were standing next to him. The indicator lights had been mounted on the inside door of the cabinet which enclosed the main circuit breaker. One end of the ground wire for the indicator lights had been connected and the bottom section of the cover for the main circuit breaker had been removed when the accident occurred.

A fault condition was created while the electricians were working on the energized side of the main circuit breaker and an arc flash occurred. The 480-volt lead wires dropped from the bottom side of the main circuit breaker and one of the phases contacted the cabinet which enclosed the circuit breaker.

The three employees inside the MCC trailer were injured but managed to exit to the outside. Fowler heard the arc flash and ran to the MCC trailer to offer assistance. Piper heard the arc flash and came to the scene before calling for emergency medical services (EMS).

EMS arrived at 1:14 p.m., treated all the injured persons, and transported them to a hospital, where Solomon died on October 12, 2010, as a result of his injuries.

INVESTIGATION OF THE ACCIDENT

On the day of the accident, the Mine Safety and Health Administration (MSHA) was notified at 1:44 p.m. by a telephone call from Joseph Schulte, plant manager, to MSHA's emergency hotline. Lawrence Dunlap, supervisory mine safety and health inspector, was notified and an investigation was started the same day. An order was issued pursuant to section 103(j) of the Mine Act to ensure the safety of miners. This order was later modified to section 103(k) of the Mine Act. A citation was issued for untimely reporting of the accident.

MSHA's investigators traveled to the mine, made 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 management, contractor management, the Oklahoma Construction Industries Board and the Oklahoma Department of Mines.

DISCUSSION

Location of the Accident

The accident occurred in the MCC trailer, which was located at ground level about 30 feet from the primary plant. The MCC trailer was a metal shipping container with a wooden floor.

Weather conditions at the mine were clear skies with an air temperature of 82 degrees Fahrenheit. The weather conditions were not considered to be a factor in the accident.

Electrical Equipment

A local power company provided 12,470-volt service to the primary plant at three 500-kva transformers. The transformers were mounted on elevated bracing between two power poles located about 15 feet from the MCC trailer. The transformers were protected by 65-amp fuses located at the top of one of the poles.

The secondary side of the transformers supplied 480-volt power to the main circuit breaker, located in the MCC trailer for the primary plant. Two parallel conductors per phase were routed from the output side of the transformers through a weatherhead in the top of the MCC trailer to the bottom side of the main circuit breaker.

The main circuit breaker for the primary plant was a “bottom feed” breaker located in a Type 4 cabinet in the MCC trailer. The main breaker specifications were unverifiable since the breaker was severely damaged as a result of the accident. The power conductors from the transformers entered the main circuit breaker from the bottom side rather than the top side as is typical with most electrical circuit breakers. This arrangement made it necessary to route the incoming power cables from the top of the MCC trailer down to the inside floor then bend them back up 180 degrees into the lugs of the main circuit breaker.

Training and Experience

Michael A. Solomon (victim) had 5 years, 10 months of experience, including 4 months at this mine. He had received all training required by 30 CFR Part 46.

Christopher C. Bethany had 2 years, 5 months of experience, including 4 months at this mine. He had received all training required by 30 CFR Part 46.

Christopher L. Fowler had 12 days of experience, including 2 days experience at this mine. He had not received all the training required by 30 CFR Part 46. A non-contributory citation was issued.

Robert E. Law had 13 years, 6 months of experience, including 6 months at this mine. He had received all training required by 30 CFR Part 46.

ROOT CAUSE ANALYSIS

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

Root Cause: Contractor management procedures failed to ensure that the electrical circuit breaker was de-energized prior to performing work on it.

Corrective Action: Mine management conducted training classes for all employees at the mine regarding lock-out and tag-out policies and procedures. All electrical contractors will be trained in the future regarding proper lock-out and tag-out and “bottom feed”

circuit breakers. The main electrical circuit breaker was replaced with a “top feed” circuit breaker. Management verified that Snyder did not have any additional “bottom feed” circuit breakers at Snyder.

CONCLUSION

The accident occurred because contractor management procedures failed to ensure that the electrical circuit breaker was de-energized prior to performing work on it.

ENFORCEMENT ACTIONS

Issued to Martin Marietta Materials

ORDER No. 6576706 was issued October 10, 2010, under the provisions of Section 103(j) of the Mine Act:

An accident occurred at this location on October 10, 2010, at 12:55 p.m. This order is being issued to prevent the destruction of any evidence which would assist in the investigation of the cause or causes of the accident. It prohibits all activity at the MCC for the crusher plant and the pole-mounted transformer providing power to the MCC, except to the extent necessary to prevent or eliminate an imminent danger, until MSHA has determined that it is safe to resume normal mining operations in this area. This order was issued verbally to the mine operator at 2:06 p.m. on October 10, 2010, and is now being reduced to writing.

This order was modified to a 103(k) order when investigators arrived at the mine. It was terminated on October 25, 2010, after conditions that contributed to the accident no longer existed.

CITATION No. 6576715 was issued October 21, 2010, under the provisions of Section 104(a) of the Mine Act for a violation of 30 CFR 56.12017:

An accident occurred at this operation on October 10, 2010, when three contractor employees worked on an energized 480-volt electrical circuit. All three employees were hospitalized and one died on October 12, 2010.

This citation was terminated on October 25, 2010, after all persons at this mine were retrained on lock-out and tag-out and de-energizing electrical circuits prior to performing work on them.

Issued to Hertzler Electrical Services

CITATION No. 6576716 was issued October 21, 2010, under the provisions of Section 104(d)(1) of the Mine Act for a violation of 30 CFR 56.12017:

An accident occurred at this operation on October 10, 2010, when three contractor employees worked on an energized 480-volt electrical circuit. All three employees were hospitalized and one died on October 12, 2010. Contractor management engaged in aggravated conduct constituting more than ordinary negligence in that one of the employees was a supervisor and he did not ensure that the electrical circuit was de-energized before working on it. This violation is an unwarrantable failure to comply with a mandatory standard.

This citation was terminated on October 25, 2010, after all persons at this contractor were retrained on lock-out and tag-out and de-energizing electrical circuits prior to performing work on them.

Approved: _____

Edward E. Lopez
District Manager

Date: _____

Appendix A

Persons Participating in the Investigation

Hertzler Electrical Services LLC

Kelly Hertzler Owner

Martin Marietta Materials, Inc.

Trent Armstrong District Electrical Manager
M. Estela Cantu District Human Resources/Safety Manager
Joseph L. Schulte Plant Manager
Tom Turpen Division Controls Engineer

Neuhalfen Engineering

Andrew J. Neuhalfen President

Oklahoma Construction Industries Board

Terry Calloway Electrical Investigator
Gary Williamson Electrical Investigator

Oklahoma Department of Mines

Richard Shore Mine Inspector
Albert Smith Mine Inspector

Patton Boggs LLP

Marci M. Fulton Attorney

Mine Safety and Health Administration

Maxwell A. Clark Electrical Engineer
Gary L. Cook Mine Safety and Health Specialist
Dennis E. Robinson Mine Safety and Health Inspector

