

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

REPORT OF INVESTIGATION

Surface Metal Mine
(Copper)

Fatal Electrical Accident
September 14, 2007

Aker Kvaerner Industrial Constructors, Inc.
Contractor ID No. 1PL

at

Freeport-McMoRan Safford Inc.
Freeport-McMoRan Safford Inc.
Safford, Graham County, Arizona
Mine ID No. 02-03131

Investigator

James E. Eubanks
Mine Safety and Health Inspector

Originating Office
Mine Safety and Health Administration
Rocky Mountain District
P.O. Box 25367, DFC
Denver, CO 80225-0367
Richard Laufenberg, District Manager

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5.2 Motor Control Center building

OVERVIEW

Gilbert C. Guerra, contractor assistant electrical superintendent, age 46, was seriously injured on September 14, 2007, when a ground fault occurred in the 5.2 motor control center (MCC). He was troubleshooting an electrical problem in the 5.2 MCC when he contacted an energized fuse and the switch gear handle, resulting in a ground fault condition and arc flash. Guerra was hospitalized and died as a result of his injuries on July 7, 2008.

The accident occurred because management policies and controls were inadequate and failed to ensure that the electrical circuit was locked out, tagged, and tested before work was performed on the circuit.

GENERAL INFORMATION

Freeport-McMoRan Safford Inc., an open pit copper mine, owned and operated by Freeport-McMoRan Safford Inc., was located in Safford, Graham County, Arizona. The principal operating official was Ruben D. Griffin, general manager. The new mine was non-producing and employed 350 employees working two-12 hour shifts, seven days a week.

Aker Kvaerner Industrial Constructors, Inc., located in Tucson, Arizona, was contracted by Freeport-McMoRan Safford Inc., to construct facilities at the mine. The principal operating official was John Berentis, senior resident construction manager. Aker Kvaerner Industrial Constructors, Inc., employed 850 employees at the mine. Construction began in July 2006.

The last regular inspection of this operation was completed on November 14, 2006.

DESCRIPTION OF ACCIDENT

On September 14, 2007, Gilbert C. Guerra (victim) started work at 5:30 a.m., his normal starting time. He went to the MCC to finish installing new electrical equipment for start-up.

About 12:00 p.m., Fernando Madrid, electrical foreman, attempted to energize a switchgear inside the MCC. The circuit would not energize so Madrid asked Guerra to help troubleshoot the problem. Guerra discovered that there was no current going to the 120-volt controller. The controller was used to monitor ground faults, phase-to-phase voltage, and provide other equipment performance information. The controller also allowed the switchgear to be energized if no faults were found. Guerra and Madrid went to the 120/220 AC volt breaker panel and closed the breaker supplying power to the controller.

Guerra and Madrid went back to the switchgear. Guerra looked through the switch gear window that provided visual observation of the main fuses. He noticed the flags, located inside the switch gear, were not coming down on top of the fuses to provide control power, indicating a flag tab linkage problem.

Guerra attempted to lower the flags by moving the switch handle back and forth. The flags still would not come down so he placed the handle down in the open position and opened the panel door. With the door open, he pushed the mechanical interlock on the switch gear handle down and closed the handle energizing the fuses. Guerra then reached inside the energized switchgear to adjust the flag linkage. Guerra's bare left hand contacted the energized left fuse. At the same time, his bare right hand was holding the main handle and he received a phase to ground shock. Madrid saw Guerra fall forward into the switchgear.

Madrid hit the trip button on the controller, called for help, and told everyone in the area to stay back until the power was de-energized. Madrid went to the MCC and verified the power was off. Matthew Wheeler, safety representative, and Michele Herod, electrician, moved Guerra away from the switchgear. Cardio-pulmonary resuscitation (CPR) was administered. Guerra was transported to a local hospital and then transferred to another hospital for advanced treatment.

Guerra never recovered from his injuries and died on July 7, 2008. Death was attributed to complications due to electrical shock.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident on September 14, 2007, at 1:00 p.m., by a telephone call from Stacey Kramer, safety manager for Freeport-McMoRan Safford Inc., to David Brown, supervisory mine safety and health inspector. An investigation began the same day. An order was issued pursuant to Section 103(k) of the Mine Act to ensure the safety of the miners.

MSHA's investigator traveled to the mine, conducted a physical inspection of the accident site, interviewed employees, and reviewed conditions and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine and contractor management and employees.

DISCUSSION

Location of the Accident

The accident occurred at the switchgear located in the new 5.2 MCC building near the secondary crusher.

Electrical Equipment

Electrical power was provided by a sub-station which reduced the voltage from 69,000 to 4,160. Power was conducted to the 5.1 MCC and then to the 5.2 MCC switchgear room into the Cutler Hammer 4160 volt, type 50 VCP-W 350 transformer. The electrical power was distributed to various pieces of equipment.

The switchgear equipment involved in the accident was 4160 volts, 3 phase, dual 450 ampere fuses each rated at 5.5 Max KV that provided power to a 2500 KVA transformer.

Weather Conditions

The weather at the time of the accident was clear with a temperature of approximately 93 degrees Fahrenheit and calm winds. Weather was not considered to be a factor in the accident.

Training and Experience

Gilbert C. Guerra, victim, had approximately 20 years electrical work experience that included 15 years mining experience. Guerra had received training in accordance with 30 CFR; however, his annual refresher training was not current. A non-contributory citation was issued.

Fernando Madrid had 17 years mining experience and 7 years electrical work experience. He had received training in accordance with 30 CFR, Part 48.

ROOT CAUSE ANALYSIS

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

Root Cause: Management policies and controls were inadequate and failed to ensure that the electrical circuit was de-energized, locked out, tagged, and tested before work was performed on the circuit.

Corrective Action: Management should establish policies and controls to ensure that electrical circuits are de-energized, locked out, and tagged when work is performed on electrical circuits and equipment.

CONCLUSION

The accident occurred because management policies and controls were inadequate and failed to ensure that the electrical circuit was locked out, tagged, and tested before work was performed on the circuit.

ENFORCEMENT ACTIONS

Order No. 6417027 was issued on September 14, 2007, under provisions of Section 103(k) of the Mine Act:

An accident occurred at a substation on Freeport-McMoRan Safford Inc. property September 14, 2007, when a miner, working for Aker Kvaerner (contractor), was electrocuted. This order is issued to ensure the safety of all persons at this operation. It prohibits all activity at this substation until MSHA has determined that it is safe to resume normal operations in this area. The mine operator shall obtain prior approval from an Authorized Representative for all actions to restore operations to the affected area.

The order was terminated on September 18, 2007. Conditions that contributed to the accident no longer exist.

Citation No. 6330837 was issued on September 19, 2007, under provisions of Section 104(d)(1) of the Mine Act for violation of 30 CFR 56.12017:

The company had an electrical accident occur on September 14, 2007. The electrical accident occurred in the 5.2 MCC building located at the secondary crusher. The assistant electrical superintendent was troubleshooting switch gear #1-8153MCC006 that was energized with 4160 volts. The switch gear supplied power to the west side transformer. The assistant electrical superintendent opened the 4160 switch gear door and bypassed the mechanical interlock and engaged the knife switch supplying power to the 4160/900 amp fuses. The assistant electrical superintendent reached inside and tried to get the flag linkage to come down and contacted one of the energized fuses and received a serious electrical shock and burns. Electrical power shall be de-energized before work is done on such circuits unless hot-line tools are used. This violation is an unwarrantable failure to comply with a mandatory standard.

The citation was terminated on September 19, 2007. Management stopped work for two days and conducted electrical safety and first-aid training for all persons performing electrical work. The training stressed the importance of lock-out and tag-out procedures when working on electrical circuits before work is performed.

Approved by,

Date: August 12, 2008

Richard Laufenberg
District Manager

APPENDIX A

Persons Participating in the Investigation:

Freeport-McMoRan Safford Inc.

Stacey Kramer.....safety manager
Patrick Brycesenior safety representative
Jeffrey Mooresafety representative

Aker Kvaerner Industrial Constructors, Inc.

Thomas Brittsafety manager
Rory Wilson.....safety

Mine Safety and Health Administration

James E. Eubanks.....mine safety and health inspector

APPENDIX B

Accident Investigation Data - Victim Information												U.S. Department of Labor							
Event Number: 1 1 0 1 9 5 9												Mine Safety and Health Administration							
Victim Information: 1																			
1. Name of Injured/Ill Employee: <i>Gilbert C. Guerra</i>				2. Sex: <i>M</i>		3. Victim's Age: <i>46</i>		4. Degree of Injury: <i>01 Fatal</i>											
5. Date(MM/DD/YY) and Time(24 Hr.) Of Death: <i>a. Date: 07/07/2008 b. Time: 10:04</i>								6. Date and Time Started: <i>a. Date: 09/14/2007 b. Time: 5:30</i>											
7. Regular Job Title: <i>102 Assistant Electrical Superintendent</i>						8. Work Activity when Injured: <i>020 Troubleshooting 4160 Volt Switch Gear</i>						9. Was this work activity part of regular job? <div style="display: flex; justify-content: space-around;">YesXNo</div>							
10. Experience		Years	Weeks	Days	b. Regular		Years	Weeks	Days	c. This		Years	Weeks	Days	d. Total		Years	Weeks	Days
a. This					Job Title:					Mine:					Mining:				
Work Activity:		<i>20</i>	<i>5</i>	<i>5</i>			<i>10</i>	<i>5</i>	<i>5</i>			<i>0</i>	<i>45</i>	<i>0</i>			<i>15</i>	<i>10</i>	<i>0</i>
11. What Directly Inflicted Injury or Illness? <i>042 Phase to ground contact</i>								12. Nature of Injury or Illness: <i>210 Burn Injuries</i>											
13. Training Deficiencies: <div style="display: flex; justify-content: space-between;">Hazard: <i>New/Newly-Employed Experienced Miner.</i>Annual: <input checked="" type="checkbox"/>Task: </div>																			
14. Company of Employment: (If different from production operator) <i>Aker Kvaerner Industrial Const Inc.</i>												Independent Contractor ID: (if applicable) <i>1PL</i>							
15. On-site Emergency Medical Treatment: <div style="display: flex; justify-content: space-between;">Not Applicable: <input type="checkbox"/>First-Aid: <input checked="" type="checkbox"/>CPR: <input checked="" type="checkbox"/>EMT: <input checked="" type="checkbox"/>Medical Professional: <input checked="" type="checkbox"/>None: <input type="checkbox"/></div>																			
16. Part 50 Document Control Number: (form 7000-1)								17. Union Affiliation of Victim: <i>9999</i>				<i>None (No Union Affiliation)</i>							