

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

REPORT OF INVESTIGATION

Surface Nonmetal Mine
Sand and Gravel

Fatal Electrical Accident
April 7, 2009

Hallett Materials
North Des Moines Plant
Des Moines, Polk County, Iowa
Mine ID No. 13-01202

Investigators

Thaddeus J. Sichmeller
Mine Safety and Health Inspector

Alan J. Brandt
Mine Safety and Health Inspector

Stephen B. Dubina, Jr.
Electrical Engineer

Maxwell A. Clark
Electrical Engineer

Originating Office
Mine Safety and Health Administration
North Central District
515 W. First Street, Room 333
Duluth, MN 55802-1302
Steven M. Richetta, District Manager



OVERVIEW

Tadd M. Bainum, Supervisor, age 36, was fatally injured on April 7, 2009, when he contacted an energized 4160-volt electrical circuit and was electrocuted.

The accident occurred because policies, procedures, and training did not ensure that the 4160-volt circuit was de-energized, locked out and tagged out prior to performing work on the individual circuit.

GENERAL INFORMATION

North Des Moines Plant, a surface sand and gravel operation owned and operated by OMG Midwest, Inc., dba Hallett Materials, was located in Des Moines, Polk County, Iowa. The principal operating official was Bert Sewell, President. The mine normally operated one, 10-hour shift a day, five days per week. Total employment was five persons.

Sand and gravel was mined from a water-filled pit with a dredge, then pumped to a screening facility, and stockpiled by size. The finished product was sold for use as construction aggregate.

The last regular inspection at this operation was completed on October 2, 2008.

DESCRIPTION OF THE ACCIDENT

On April 6, 2009, the day prior to the accident, Tadd M. Bainum, Supervisor, reported to work at 6:30 a.m., his normal starting time, and assigned Timothy Renda, Dredge Operator, and Russell Dodson, Plant Operator, to change out a faulty solenoid on the plant classifier. When Renda was accessing the plant classifier, he noticed the walkway leading out to the floating dredge was partially sunken because the pontoons were taking on water. Dodson and Renda contacted Bainum to discuss corrective action.

Bainum, Renda, and Dodson went to the dredge area and began pulling the dredge to the shore with a trackhoe, front-end-loader, and crane. The pontoons were weighted down because the dredge's 4160-volt power cable was routed along the top of them. They decided to take the weight off the pontoons by removing the cable. Bainum locked out the high voltage switch gear, located approximately 25 feet from the shoreline, which disconnected power from the breaker to the dredge. However, this lock-out procedure did not disconnect the incoming power to the high voltage switch gear cabinet.

Bainum then went to the cabinet, removed the bottom cover of the cabinet, and disconnected the power cable from the cabinet without incident. The crew moved the power cable and de-watered the pontoons for the remainder of the shift.

On April 7, 2009, the day of the accident, Bainum, Renda, and Dodson finished draining the pontoons. After the pontoons were empty, Bainum entered the bottom portion of the high voltage switch gear cabinet to reconnect the cable. At approximately 3:53 p.m., Dodson and Renda pushed the cable through the cabinet's exterior fitting and began fastening the holding clamp from the outside when they saw and heard an arc flash from inside the cabinet. Bainum was electrocuted as he came in contact with incoming energized 4160-volt circuit.

Dodson immediately called for emergency medical services. About 4:10 p.m., Saylor Township Ambulance and Fire Department, the Polk County Sheriff's Department, and Mid-America Energy Company responded to the scene.

Bainum was pronounced dead at the scene by the Polk County Medical Examiner. Death was attributed to electrocution.

INVESTIGATION OF THE ACCIDENT

The Mine Safety and Health Administration (MSHA) was notified of the accident on April 7, 2009, at 4:02 p.m., by a telephone call from Randy Zeigler, Safety Coordinator, to the National Call Center. Gerald Holeman, Assistant District Manager, was notified and an investigation was started the next day. An order was issued pursuant to 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 examination of the accident scene, interviewed employees, and reviewed documents and work procedures relative to the accident. MSHA conducted the investigation with the assistance of mine management and employees, miners' representatives, Baker Electrical Inc., and the Polk County Medical Examiner's office.

DISCUSSION

Location of the Accident

The accident occurred along the shoreline, approximately $\frac{1}{4}$ mile from the dredge, on the east side of the mine site. The accident site was located on a peninsula that was created by previous back filling of overburden material.

Electrical System

Power was supplied to the mine by Mid America Energy at 13200 volts. Protection was provided by pole mounted fuses; 140 amp on the primary side of Mid America Energy metering and 65 amp on the secondary side, which protected the entire mine. Power circuits were then buried underground and went to the wash plant, stacking belts, and dredge.

At the accident location, incoming power was stepped down from 13200 volts to 4160 volts through a 1500 KVA transformer. The primary and secondary windings of this transformer were both connected wye. The neutrals of each side connected together and then fed through a 15 amp grounding resistor, rated at 2400 volts, to a ground field under the transformer.

The load side of this transformer was connected to a high voltage switch gear manufactured by Line Power Manufacturing Corporation, model SHLP-1, and rated for an input of 4160 volts. The power cable, a General Cable Anaconda Brand 4/0 AWG, 3 conductor, type SHD-GC fed the dredge from the output of the high voltage switch gear.

The high voltage switch gear cabinet had a manual 3 phase disconnect with an internal 600 amp vacuum circuit breaker to open the load side if a fault occurred. All over currents were sensed by a General Electric type FPR feeder protection relay. Ground faults were sensed by a ground monitor.

The high voltage switch gear cabinet stood approximately 78 inches high, 52 inches wide, and 46 inches deep, and was divided into two sections. The top section consisted of the control circuitry and vacuum circuit breaker with a panel door access cover over it. The panel door permitted persons access to the manual disconnect handle and protection devices without contacting the internal power. The lower section of the cabinet had an opening approximately 18 inches high by 46 inches wide with a bolted panel door to prevent access. Inside the lower section were 4160-volt high voltage connections. Both the incoming and outgoing power conductors were connected to individual standoff insulators. The incoming power was connected to the insulators on the right side of the enclosure which was approximately 10 inches from the outside metal shell. The outgoing power insulators were approximately 22 inches from the incoming insulators.

Weather Conditions

The weather on the day of the accident was clear skies, with an ambient air temperature about 48 degrees Fahrenheit and no precipitation. Weather was not considered to be a factor in the accident.

Training and Experience

Tadd M. Bainum (victim) had 14 years and 48 weeks of mining experience. He had been a supervisor for approximately 5 years, 14 weeks, all with this company. He had worked at this mine for 1 year and 29 weeks, of which 1 year and 25 weeks were as the supervisor. He previously was a supervisor at the company's portable wash plant operation. Bainum had not been trained to perform electrical tasks in accordance with 30 CFR Part 46.

Russell Dodson had 5 years of mining experience, all with this company, and had worked at this site for the last 3½ years.

Timothy Renda had 5 years and 10 months mining experience, all with this company and at this site.

ROOT CAUSE ANALYSIS

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

Root Cause: Management policies and procedures failed to ensure that adequate training was provided to the victim to identify high voltage electrical sources.

Corrective Action: Management established policies and procedures to train persons to identify high voltage electrical sources.

Root Cause: Management policies and procedures failed to ensure that all high voltage electrical sources were locked out, tagged out, and tested to ensure power was de-energized before work began.

Corrective Action: Management established policies and procedures to ensure that all persons are trained in the established lock out and tag out procedures. Persons were also trained that only qualified and authorized electricians will conduct work on electrical circuits exceeding 480 volts.

CONCLUSION

The accident occurred because policies, procedures, and training did not ensure that the 4160-volt circuit was de-energized, locked out and tagged out prior to performing work on the individual circuit.

ENFORCEMENT ACTIONS

Order No. 6413543 was issued on April 8, 2009, under the provisions of Section 103(k) of the Mine Act:

A fatal accident occurred at this operation on April 7, 2009, when a miner was trying to re-connect the high voltage cable (4160 volts) that supplies power to the dredge to the high voltage vacuum circuit breaker on shore. This order is issued to ensure the safety of all persons at this operation. It prohibits all activity at the high voltage installation area for the dredge until MSHA has determined that it is safe to resume operation in this area. The mine operator shall obtain approval from an authorized representative for all action to recover and/or restore operations in the affected area.

The order was terminated on April 10, 2009, after conditions that contributed to the accident no longer existed.

Citation No. 6492230 was issued May 11, 2009, under the provisions of 104(d)(1) of the Mine Act for a violation of 56.12017:

A fatal accident occurred at this mine on April 7, 2009, when a supervisor contacted an energized 4160-volt electrical circuit. The supervisor accessed the electrical circuit through the access panel on the bottom of the cabinet. He came into contact with the energized circuits when attempting to reconnect the power cable for the mine's dredge. The incoming power circuits, from the transformer to the electrical circuit breaker, had not been de-energized prior to the supervisor entering the cabinet. Failure to lock out the energized 4160 power source constituted more than ordinary negligence and is an unwarrantable failure to comply with a mandatory standard.

The citation was terminated on May 18, 2009. All persons were provided training for the mine's electrical system. The training stressed the importance of lock-out and tag-out procedures when working on electrical circuits. Persons were also trained that only qualified and authorized electricians are to conduct work on electrical circuits exceeding 480 volts.

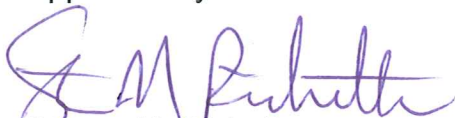
Order No. 6492231 was issued May 11, 2009, under the provisions of 104(d)(1) of the Mine Act for a violation 46.7(a):

A fatal accident occurred at this mine on April 7, 2009, when a supervisor contacted an energized 4160-volt electrical circuit. The supervisor accessed the electrical circuit through the access panel on the bottom of the cabinet. He came into contact with the energized circuits when attempting to reconnect the power cable for the mine's dredge. The supervisor had not been trained to perform this task. Failure to train the supervisor in performing the task constituted more than ordinary negligence and is an unwarrantable failure to comply with a mandatory standard.

The citation was terminated on May 18, 2009. The mine operator established a new policy requiring that only authorized and qualified electricians conduct electrical work where voltages exceed 480 volts. All persons were trained regarding the new policy.

Approved By:

Date: JUL 13 2009



Steven M. Richetta
District Manager
North Central District

APPENDIX A

Persons Participating in the Investigation

HALLET MATERIALS

Randy Zeigler	Safety Coordinator
Tod Richardson	Claims Manager
Kyle Jackson	Council

Operating Engineers, Local 230

Mark Lucas	Miners' Representative
------------	------------------------

Polk County Medical Examiner's Office

Gregory A. Schmunk	Medical Examiner
Jackie Fry	Medical Examiner Investigator

Mine Safety and Health Administration

Thaddeus Sichmeller	Mine Safety and Health Inspector
Alan Brandt	Mine Safety and Health Inspector
Stephen Dubina, Jr.	Electrical Engineer
Maxwell Clark	Electrical Engineer

APPENDIX B

Accident Investigation Data - Victim Information

U.S. Department of Labor
Mine Safety and Health Administration



Event Number:

6	5	1	0	4	3	4
---	---	---	---	---	---	---

Victim Information: 1																		
1. Name of Injured/Ill Employee: <i>Tadd M. Bainum</i>				2. Sex: <i>M</i>		3. Victim's Age: <i>36</i>		4. Degree of Injury: <i>01 Fatal</i>										
5. Date(MM/DD/YY) and Time(24 Hr.) Of Death: <i>a. Date: 04/07/2009 b. Time: 17:15</i>								6. Date and Time Started: <i>a. Date: 04/07/2009 b. Time: 6:30</i>										
7. Regular Job Title: <i>149 supervisor/foreman</i>						8. Work Activity when Injured: <i>020 reconnecting electrical cable</i>						9. Was this work activity part of regular job? <table style="width: 100%;"><tr><td style="text-align: center;">Yes</td><td style="text-align: center;">No</td><td style="text-align: center;"><input checked="" type="checkbox"/></td></tr></table>				Yes	No	<input checked="" type="checkbox"/>
Yes	No	<input checked="" type="checkbox"/>																
10. Experience a. This				b. Regular				c. This				d. Total						
Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days				
Work Activity: <i>0</i>	<i>0</i>	<i>0</i>		Job Title: <i>5</i>	<i>14</i>	<i>0</i>		Mine: <i>1</i>	<i>29</i>	<i>0</i>		Mining: <i>14</i>	<i>48</i>	<i>0</i>				
11. What Directly Inflicted Injury or Illness? <i>042 electrical conductors</i>								12. Nature of Injury or Illness: <i>210 electric shock/electrocution</i>										
13. Training Deficiencies: Hazard: New/Newly-Employed Experienced Miner: Annual: Task: <input checked="" type="checkbox"/>																		
14. Company of Employment: (If different from production operator) <i>Operator</i> Independent Contractor ID: (if applicable)																		
15. On-site Emergency Medical Treatment: Not Applicable: <input checked="" type="checkbox"/> First-Aid: CPR: EMT: Medical Professional: None:																		
16. Part 50 Document Control Number: (form 7000-1)								17. Union Affiliation of Victim: <i>9999 None (No Union Affiliation)</i>										