MAI-2014-15

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

REPORT OF INVESTIGATION

Surface Nonmetal Mine
(Construction Sand and Gravel)

Fatal Electrical Accident
July 21, 2014

Murray Mines Inc.
Murray Mines Inc.
Ridgeville, Colleton County, South Carolina
Mine ID No. 38-00136

Investigators

Stanley K. Stevenson
Supervisory Mine Safety and Health Inspector

Michael Evans
Mine Safety and Health Specialist

Bryan L. Deaton
Mine Safety and Health Inspector

Maxwell Clark
Electrical Engineer

Originating Office
Mine Safety and Health Administration
Southeastern District
1030 London Drive, Suite 400,
Birmingham, Alabama 35211
Samuel K. Pierce, Southeast District Manager

OVERVIEW

Kyle Martin, Assistant Plant Manager, age 28, was killed on July 21, 2014, when an aluminum boat he was riding in became stuck in shallow water on top of 480 volt energized power conductors.

Martin paddled the boat approximately 300 feet from a dredge operating in a pond to reach the power conductors to move them away from the shoreline. The conductors had been installed from the motor control center along the bank of the pond, in the pond, and then to the dredge. Martin was electrocuted when he got out of the boat and attempted to pull it across the conductors. Sharp edges along the bottom of the aluminum boat penetrated the conductor's insulation.

The accident occurred due to management's failure to ensure that the individual power conductors supplying power to the dredge were provided with an outer jacket to protect them from mechanical damage exposing miners to an electrical hazard. None of the persons at the mine were trained to perform electrical tasks. Martin had not received task training in the health and safety aspects of the task he was assigned, specifically working near energized conductors.

GENERAL INFORMATION

Murray Mines Inc., a common sand and gravel operation owned and operated by Murray Mines Inc. is located in Ridgeville, Colleton County, South Carolina. The principal operating official is James Murray Jr., President. The mine normally operates two 12 hour shifts per day, five days per week. Total employment is 10 persons.

At the time of the accident, sand was mined using a dredging method in a water filled pit (pond). Overburden and vegetation were stripped from the edge of the bank. A cutter head on the dredge removed the sand, and it was then pumped to the processing plant where it was washed and screened to size for use in the construction industry and at golf courses.

The Mine Safety and Health Administration (MSHA) completed the last regular inspection at this operation on November 21, 2013.

DESCRIPTION OF ACCIDENT

On the day of the accident, July 21, 2014, Kyle Martin (victim) arrived at the mine at approximately 8:00 a.m., his normal starting time. His first task was to insert approximately 150 feet of pipe in the existing dredge pump line. Afterwards, he performed general maintenance work at the plant. At 12:00 p.m., Martin left the mine to pick up lunch for the mine employees.

After lunch, a belt conveyor malfunctioned in the plant, blocking the screw auger with sand. The dredge stopped pumping sand. Martin worked on the plant to resolve the problem. At approximately 2:55 p.m., Larry Freeman, Plant Manager, spoke with Martin at the plant.

Shortly thereafter, Martin left the plant and went to the dredge to check the conductors for the upcoming night shift. This is a normal daily activity to ensure that there is a sufficient amount of slack in the 480 volt power conductors to allow the dredge to advance. Mike Datre, Dredge Operator, pushed a boat to the shore from the dredge, where it was tied, for Martin to use. Martin got in the boat and paddled it approximately 300 feet to the area where the power conductors for the dredge exited the water and were laying on the ground.

At approximately 3:30 p.m., Datre tried to call Martin to replace him on the dredge, because Datre needed to leave at 4:00 p.m. Datre was unable to contact Martin so he called Ryan Soard, Loader Operator, using his two-way radio. Datre told Soard he needed someone to replace him on the dredge and also told Soard he saw the boat but did not see Martin.

At approximately 3:45 p.m., Ian Graham, Laborer, drove to the dredge to replace Datre and parked near Martin's truck. Datre told Graham that Martin had taken the boat. Graham saw the boat and walked toward it. As Graham approached the boat, he saw Martin lying on his back, partly submerged in the water in front of the boat, which was on top of the conductors. When Graham stepped in the water, he immediately felt a light shock on his left leg and realized something was wrong. Graham then called Freeman telling him to call 911 and to shut off the power.

Graham called out to Datre who was still on the dredge across the pond. At 3:58 p.m., Datre saw Graham jumping and waving his arms. Datre pulled off his back pack, left it on the dredge, jumped into the water from the left side of the dredge, and swam to shore. He then ran to the area where the accident occurred.

Graham saw Freeman leave the motor control center box where the dredge was energized. He tested the water with his foot and did not feel any shock. Graham then pulled Martin out of the water and started cardiopulmonary resuscitation (CPR).

James Rogers, Safety Director, was operating a dozer clearing an area near the front of the dredge when he received a call from Freeman reporting the accident. Rogers took the dozer to the accident scene and assisted performing CPR.

At 4:17 p.m., Emergency Medical Personnel from the Colleton County Fire-Rescue arrived. The victim was transported by ambulance to a local hospital where he was pronounced dead at 5:25 p.m. The cause of death was attributed to electrocution.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 4:11 p.m. on July 21, 2014, by a telephone call from Barbra Mascarelli to the National Call Center. The National Call Center notified Patrick Sharp, District Health Specialist, and an investigation was started the same day. An order was issued pursuant to Section 103(j) of the Mine Act. This order was later modified to Section 103(k) of the Mine Act after the arrival of an Authorized Representative at the mine site.

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 management and employees.

DISCUSSION

Description of the Pond Area and Dredge

The accident occurred in the pond area of the mine approximately 300 feet behind the 400 HP dredge.

This mine had two motor control centers (MCC), commonly referred to as the Booster Pump Shed and the #2 Shed. At the time of the accident, the 480 volt power for the dredge was supplied from the #2 Shed through approximately 1,500 feet of power conductors that had been laid across the ground and into the water. The conductors were tied to floats, spaced 10 feet apart, to keep the conductors

near the surface of the water. The conductors came into a main disconnect on the dredge. The main disconnect was used for starting the main motor across the line. A soft start for the main motor was on board but it was not used.

The dredge had a 30 HP Baldor fresh water pump, a 25 HP North American Electric hydraulic pump, and a 110V control transformer. The full load current rating of fresh water pump was 36 amps. The pump was protected by 100 amp dual element time delay fuses encased in a fused disconnect. The hydraulic pump had a full load current rating of 28.5 amps and was protected by 60 amp dual element time delay fuses encased in a fused disconnect.

The victim was found near the shore in a shallow end of the pond that was approximately 9-11 inches deep. This is the area where the dredge operators accessed the boat to travel back and forth to the dredge. The dredge operators paddled the boat approximately 300 feet to the dredge using a single paddle.

Weather

The weather on the day of the accident was cloudy with rain in the area and a temperature of approximately 80 degrees Fahrenheit with a light wind. Weather was not considered a contributing factor to the accident.

Physical Factors

The conductors supplied 3 phase 480/277V exclusively to a suction type dredge powered from a 3 phase 500KVA pad mounted transformer with a wye-wye configuration. The transformer primary is 12470/7200V with a secondary of 480/277V and an impedance of 2.2%. The transformer fed a motor control room which exclusively feeds the dredge.

Inside the motor control room, a fused disconnect was used to connect/disconnect power to the dredge. The power could not be disconnected to the line side of the fused disconnect because it was hardwired to the secondary of the 500KVA transformer which only could be accessed by the power company. Based on persons interviewed, investigators determined that the fuses were changed on several occasions while the line side of the fused disconnect was energized. A non-contributory citation was issued.

The load side of the fused disconnect was connected to a jacketed cable of three aluminum conductors. The jacket was worn and scuffed to the point where the

manufacturer's information was no longer legible. Management could not provide any information regarding the cable. The jacketed cable exited the motor control room and was spliced into individual conductors that powered the dredge. There was approximately 1,000 feet of the conductor per phase with an electrical rating for operation of 600V or less in wet or dry locations, including direct burial in the earth, and a maximum allowable ampacity of 500 amps at 90°C.

The boat became energized to the same potential of the conductor; 480V line to line. The victim was exposed to 277V line to ground while standing in shallow water.

Boat

The flat bottom, aluminum boat involved in the accident was 12 feet long and 46.5 inch wide. This boat was the only access boat to the dredge that was provided at the mine.

During the inspection of the boat, investigators noted three ribs located on the bottom of the boat that had been repaired. The right (starboard) side rib was observed with two strips of metal, one on each side of the rib, that had been placed over a strip of rubber and secured by screws into the bottom of the boat. A section of the metal strips, toward the rear of the boat, was observed separated with a thin piece of rubber lodged between the metal strip and the boat bottom.

Martin was not wearing a life jacket. A newly purchased life jacket was found in his truck parked in the vicinity of the dredge.

TRAINING AND EXPERIENCE

Kyle Martin had 11 years and 8 weeks of mining experience, all at this mine. The investigators reviewed the mine operator's training records and found that Martin received annual refresher training on March 29, 2014. Martin had received task training for front-end loader operator, excavator operator, dredge operator, bulldozer operator, and mine maintenance. However, Martin had not received task training in the health and safety aspects of the task he was assigned. He was not provided training for the hazards associated with working near energized conductors.

ROOT CAUSE ANALYSIS

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

Root Cause: Management failed to ensure that the individual power conductors supplying power to the dredge were provided with an outer jacket to protect them from mechanical damage thereby exposing miners to an electrical hazard.

Corrective Action: Management discontinued using the dredge as a mining method. An open pit excavation system will now be used to mine the material. The dredge and the associated electrical conductors have been removed from service.

Root Cause: Management failed to task train any miners, including the victim, to perform electrical tasks.

Corrective Action: Management established safe operating procedures by hiring an electrical contractor trained and experienced in electrical work. All miners are trained on the new safe operating procedures.

CONCLUSION

The accident occurred due to management's failure to ensure that the individual power conductors supplying power to the dredge were provided with an outer jacket to protect them from mechanical damage exposing miners to an electrical hazard. None of the persons at the mine were trained to perform electrical tasks. Martin had not received task training in the health and safety aspects of the task he was assigned, specifically working near energized conductors.

ENFORCEMENT ACTION

Issued to Murray Mines Inc.

Order No. 8816501 was issued on July 21, 2014, under the provisions of 103(j) of the Mine Act.

An accident occurred at this operation on July 21, 2014, at approximately 1550 hrs. 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 in investigating the cause or causes of the accident. It prohibits all activity at the dredge area and dredge MCC 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 to the mine operator at 1706 and now been reduced to writing.

The order was subsequently modified to a Section 103(k) order and was terminated on August 13, 2014, after conditions that contributed to the accident no longer existed.

Citation No. 8641334 -- issued under the provisions of Section 104(d1) of the Mine Act for a violation of 30 CFR 56.12004:

On July 21, 2014 a fatal accident occurred at this dredge operation. An Assistant Plant Manager was killed when the aluminum boat that he was using contacted one of the 480V energized conductors used to power the dredge. The boat was pulled across the energized conductors in the shallow water of the pit. The sharp edges along the bottom of the boat damaged the insulation and energized the boat. Management was aware that the individual conductors had no outer jacket to protect them from mechanical damage. Management engaged in aggravated conduct constituting more than ordinary negligence by allowing individual conductors to be installed without the protection of an outer jacket. This violation is an unwarrantable failure to comply with a mandatory standard

Order No. 6098287 -- issued under the provisions of Section 104(d)(1) of the Mine Act for a violation of 30 CFR 46.7(a):

An accident occurred at the mine on July 21, 2014 when Assistant plant manager was going to pull slack in the 480 volt energized conductors for the night shift. The victim had not received electrical task training in the health and safety aspects of the task to be assigned, including the safe work procedures of such task, mandatory health and safety standards pertinent to such task, the protective measures a miner can take against

these hazards. The victim was not aware of health and safety aspects of electrical work, pertinent standards requirements, procedures for electrical evaluation and testing, and protective measures. The victim had no formal training or experience in electrical work. The mine operator engaged in aggravated conduct constituting more than ordinary negligence by failing to task train the manager. This violation is an unwarrantable failure to comply with a mandatory standard.

Approved by: _____ Date: 11/19/2014
Samuel K. Pierce for
Southeast District Manager

APPENDIX A

Persons Participating in the Investigation

Murray Mines Inc.

James Murray Jr.	President
Larry Freeman II	Plant Manager
James Rogers	Safety Director
Michael T. Heenan	General Counsel, Ogletree, Deakins,

Colleton County Coroner

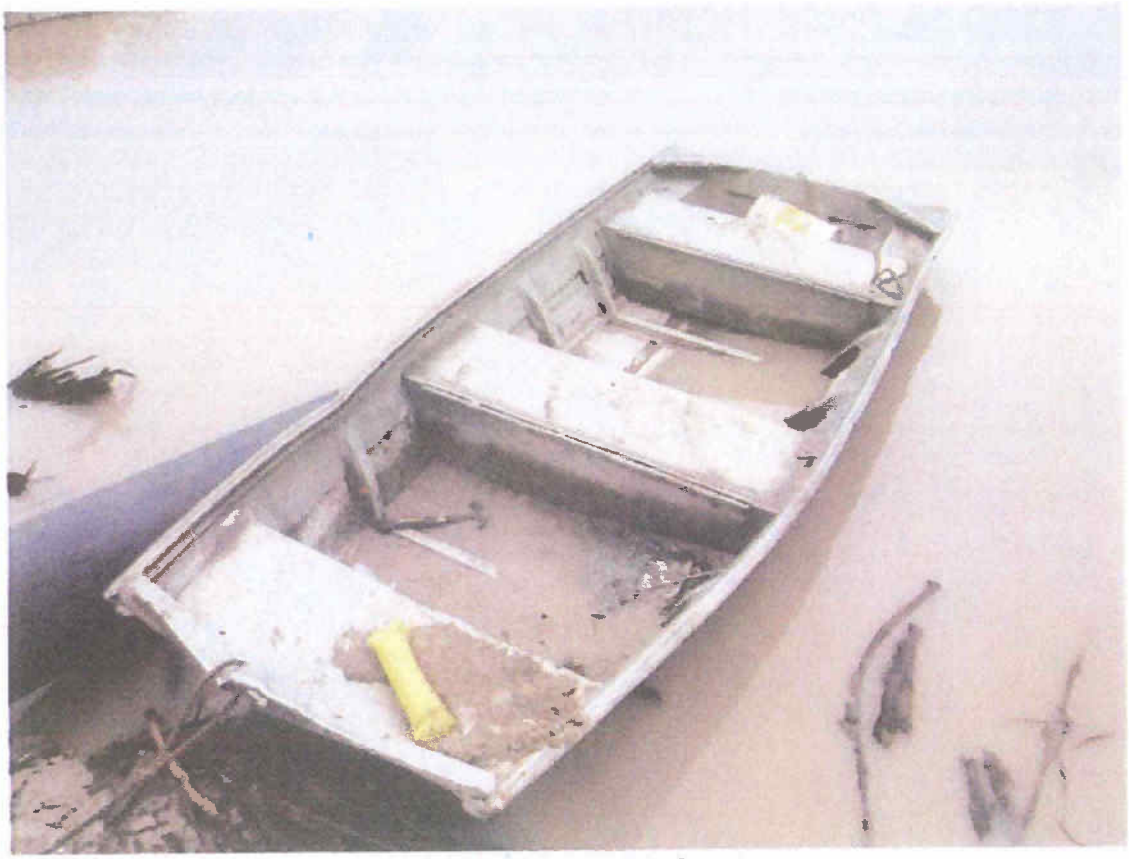
Richard M. Harvey	Coroner

Mine Safety and Health Administration

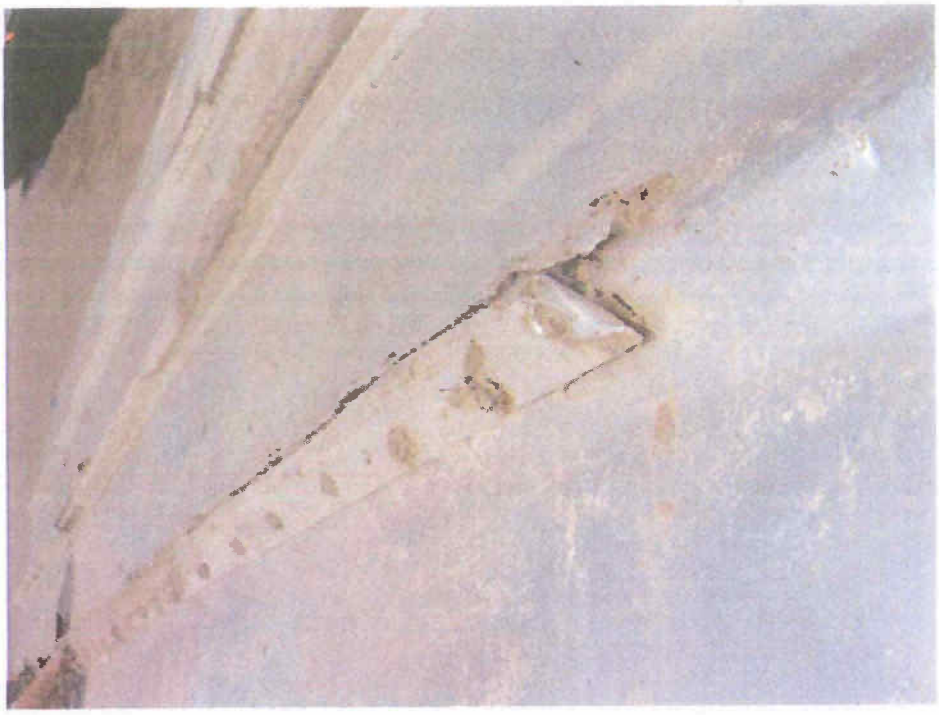
Stanley K. Stevenson	Mine Safety and Health Supervisory Inspector
Michael A. Evans	Mine Safety and Health Inspector
Bryan L. Deaton	Mine Safety and Health Inspector
Maxwell Clark	Electrical Engineer

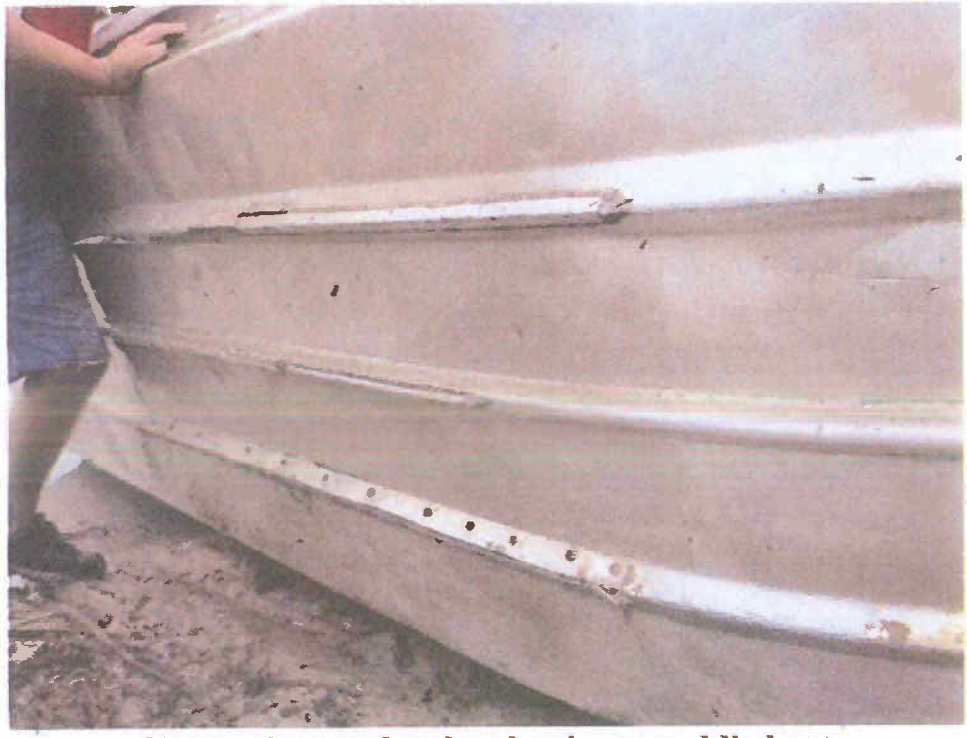
Appendix B

Additional Photos



Aluminum paddle boat





Sharp edges under the aluminum paddle boat

Cut on conductor

Appendix C

Victim Information

Accident Investigation Data - Victim Information
Event Number: 092648 2

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
Kyle R. Martin	M	29	01 Fatal

5. Date(MM/DD/YY) and Time(24 Hr.) Of Death
a. Date: 07/21/2014 b. Time: 17:21

6. Date and Time Started
a. Date: 07/21/2011 b. Time: 8:00

7. Regular Job Title
049 Assistant Plant Manager

8. Work Activity when Injured
040 preparing for pull slack on power conduc

9. Was this work activity part of regular job?
Yes X No

10. Experience	Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days
a. This Work Activity	11	8	0	b. Regular Job Title	11	8	0	c. This Mine	11	8	0	d. Total Mining	11	8	0

11. What Directly Inflicted Injury or Illness?
042 contact with energized conductor

12. Nature of Injury or Illness
210 electrocution

13. Training Deficiencies
Hazard X New/Newly Employed Experienced Miner | Annual | Task X

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

Independent Contractor ID (if applicable)

15. On-site Emergency Medical Treatment
Not Applicable | First-Aid | CPR X | EMT X | Medical Professional | None

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

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