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UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Surface Mine
(Sand)

Fatal Electrocution
July 9, 2020

Hudson Sand Mine
Atlanta Sand and Supply Co.
Byron, Peach County, Georgia
ID No. 09-01219

Accident Investigators

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Electrical Specialist/Mine Safety and Health Inspector

Rory M. Smith
Supervisory Mine Safety and Health Inspector

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OVERVIEW

On July 9, 2020, at 8:56 a.m., James Wallace Dean, a 60-year-old mine superintendent with 36 years of mining experience, died when he contacted energized high-voltage components in a 4,160 volt (4,160 VAC), three-phase electrical enclosure.

The accident occurred because the mine operator's policies, procedures, and training were inadequate to ensure that the employees properly de-energized, locked out, tagged, and tested the 4,160 VAC enclosure and internal components prior to performing work on the circuits.

GENERAL INFORMATION

Atlanta Sand and Supply Co. owns and operates the Hudson Sand Mine, located in Byron, Peach County, Georgia. The plant operates one eight-hour shift, five days per week. Miners extract sand with an electrically powered dredge and pump it as a slurry to the processing plant 3/10 of a mile away. Miners use front-end loaders to stockpile the sand by-product, and load the final products into trucks and rail cars for shipment.

The principal officers for Atlanta Sand and Supply Co. at the time of the accident were:

Jeff Avant ..... President
Melville A. Jamison ..... Vice-President/Secretary

The Mine Safety and Health Administration (MSHA) completed the last regular safety and health inspection at this mine on April 20, 2020. The 2019 non-fatal days lost (NFDL) incident rate for Hudson Sand Mine was 0, compared to the national average of 2.00 for mines of this type.

DESCRIPTION OF THE ACCIDENT

On July 7, 2020, Billy Dale Mullis, Dredge Operator, reported to Dean that he lost flow on the dredge discharge line (sand line) because the sand line had ruptured. Dean decided to relocate the sand line during the repairs to allow for further dredge advance. Miners brought a bulldozer and a track excavator to the area, and began the relocation and repair work.

On July 8, 2020, miners completed the repairs and relocation of the sand line. Mullis returned to the dredge to start it and check the repair to the sand line. Mullis discovered there was no electrical power on the dredge and informed Dean. Dean investigated and found that the circuit breaker in the bottom of the electrical enclosure was open. Dean tried to close the circuit breaker, but it opened again. Dean discovered that the bulldozer had damaged the trailing cable from the electrical enclosure to the dredge while miners relocated the sand line. The damage was in a section known as surplus trailing cable. Dean began organizing his crew to repair the trailing cable.

On July 9, 2020, at 6:00 a.m., Dean, Mullis, and Josh Sapp, Laborer/Lab Tech, arrived to finish repairing the trailing cable by making a splice. None of these persons were certified electricians. Sapp and Mullis helped strip the internal leads of the trailing cable and prepared them for crimp connection, while Dean directed and participated in the work. Dean selected the leads and held them together as Sapp and Mullis applied the crimp connectors. Due to the different ages of the two cables, the indicating colors of each lead were not clearly distinguishable. After joining the leads, Dean applied insulating tape individually to each lead.

After the splice was completed, Sapp and Mullis gathered the tools and took them to the plant. Sapp stayed at the plant while Mullis returned to the dredge to start it. Mullis discovered the dredge's hydraulic pump motors and winch motors were running in reverse and reported the condition to Dean. Dean determined that they had spliced the trailing cable in a manner that caused the wrong phase rotation, and, at approximately 8:20 a.m., directed Mullis to help him with the repair. He told Mullis to meet him at the electrical enclosure that provides 4,160 VAC electrical power to the trailing cable.

At approximately 8:30 a.m., when Mullis arrived, he observed the door of the electrical enclosure was open and all control lights on the circuit breaker control panel were out, which gave the appearance the electrical power was de-energized. He observed Dean donning his arc protection suit and high-voltage gloves. Once suited, Dean knelt down and leaned into the electrical enclosure to work on the lead terminals at the bottom of the circuit breaker assembly. Mullis handed Dean various sizes of wrenches as Dean attempted to loosen and switch two of the leads.

Mullis assembled a 9/16 inch socket and ratchet and handed it to Dean. Mullis then turned to retrieve a ratchet extension in case Dean needed it. Mullis heard a sound he described as a metallic "tink" and turned to see Dean's body slumped over and rigid. He saw sparks and fire inside the electrical

enclosure on the right side. Mullis heard the transformer, which was adjacent to the electrical enclosure, hum loudly, realized Dean had come into contact with electricity, and immediately called Sapp on his phone at 8:57 a.m. to report what had happened. Sapp called 911 and Georgia Power, and then he attempted to call Mullis. However, Sapp could not reach Mullis, so he ran to the accident scene. He found Mullis talking on the phone with Eric Barger, Vice President. Sapp remained to prevent emergency medical service personnel and first responders from entering the area until electrical power had been de-energized.

Byron City and Peach County First Responders arrived to assist in rescue efforts. Georgia Power Company de-energized the area's electrical grid at 9:37 a.m. Coroner Kerry E. Rooks arrived on-site at 9:44 a.m. and pronounced the victim dead.

INVESTIGATION OF THE ACCIDENT

On July 9, 2020, at 8:59 a.m., Stephen Andrews, Safety Coordinator/Director, called the Department of Labor National Contact Center (DOLNCC) to report a fatal accident. The DOLNCC contacted Samuel Pierce, Birmingham District Manager, who forwarded the notification to Brian J. Thompson, Assistant District Manager. At 9:20 a.m., Thompson contacted Robert Ashley, Supervisory Mine Safety and Health Inspector, who travelled to the location of the accident to begin the investigation.

At 10:17 a.m., Ashley arrived at the mine site, issued a 103(k) order, and secured the accident scene. At 4:45 p.m., Rory M. Smith, Supervisory Mine Safety and Health Inspector, and Randall E. Dickerson, Electrical Specialist/Mine Safety and Health Inspector, arrived and conducted the investigation in cooperation with mine management and mine employees (See Appendix A).

DISCUSSION

Location of the Accident

The accident occurred at the 4,160 VAC electrical enclosure that provides electrical power to the dredge trailing cable. The electrical enclosure is located on the shore approximately 500 feet from the dredge pond bank (see Appendices B and C).

Equipment Involved

The electrical enclosure was 90 inches high, 36 inches wide and 36 inches deep and was on a concrete pad. A load-break disconnect switch (disconnect switch) was positioned in the upper one-third of the enclosure and had three flicker blades, one for each phase. The make, model, and age of the disconnect switch could not be determined as identifying labels were destroyed in the accident.

The disconnect switch was opened and closed by turning a shaft that protruded through an opening in the door of the electrical enclosure. Miners attached a handle to the shaft to turn it. Miners could not open the door without removing the handle. The handle could be removed regardless of its position, and the door could be opened regardless of the position of the disconnect switch. The original equipment manufacturer did not make the handle used at the time of the accident. Investigators found a bicycle-type long hasp lock and lugs on the door to facilitate locking-out the handle in the open and de-energized position.

In the middle of the electrical enclosure were three fuses. The circuit breaker at the bottom of the enclosure was a three-phase electrically-operated vacuum contactor.

The electrical enclosure received 4,160 VAC electrical power from a transformer that was approximately seven feet away on another concrete pad. The electrical circuit for the dredge was equipped with a 95 ohm grounding resistor. The transformer secondary was properly connected to the grounding resistor, but was incorrectly connected to the frame of the transformer. This increased the amount of electrical current during the accident (see Appendix D).

The transformer received 12,470 VAC high voltage electrical power from Georgia Power Company. The high voltage power enters mine property and passes through three fused disconnects on a power pole located approximately 3/10 of a mile away at the mine entrance.

The Atlanta Sand and Supply Co. provided Dean with an arc-flash suit for thermal protection in case of an electrical arc, however the arc-flash suit was not rated for protection against high voltage electrical power. MSHA regulations define high voltage for this type of mining as 650 VAC or higher. The company also provided a pair of high voltage rated lineman's gloves.

To have performed this work safely, and in compliance with MSHA standards, a miner would have needed proper training to work on high voltage circuits and equipment. A properly trained miner would have had to open the three fused disconnects at the mine entrance to de-energize the incoming electrical power to the transformer and electrical enclosure and remove the fused disconnects from the power pole and lock them prior to beginning work in the electrical enclosure.

Testing, Observations and Conclusions

At the scene of the accident, investigators observed damage in the electrical enclosure that was caused by the accident. The most severe physical damage was on the right side of the electrical enclosure where one phase (phase 3) was located.

On the disconnect switch, the metal support for the phase 3 flicker blade arc chute showed signs of arcing damage and was considerably shorter than the other two supports. The three blades and flicker blades of the disconnect switch were intact, but the fiberglass connector links between the blade crank shaft and the blades were destroyed in the accident.

The high voltage fuse installed in phase 3 was completely destroyed. The shell of the vacuum bottle from the vacuum contactor installed in phase 3 was broken to the extent that the internal contacts were visible. The control transformer, mounted inside on the right side of the electrical enclosure, suffered extensive damage as well.

MSHA investigators took the disconnect switch, three high voltage fuses, and three vacuum bottles from the vacuum contactor and conducted testing on July 28, 2020. This testing confirmed that the disconnect switch mechanism was in the open position at the time of the accident, and the mechanism was functional. Testing also showed each vacuum bottle was electrically open as designed, and that the high voltage fuses installed on the left (phase 1) and center (phase 2) were intact and did not blow during the accident.

Based on observations at the mine and analysis of the physical evidence, it is likely that the phase 3 blade or flicker blade failed to open when the victim moved the handle of the disconnect switch to the open position. This failure would have energized circuit elements in phase 3 all the way down to the line side of the vacuum contactor. Connections through the primary winding of the control transformer would have energized the phase 2 line side of the vacuum contactor as well (see Appendix D).

At some point, while performing work inside of the enclosure, the victim contacted energized components.

Weather
On the day of the accident, the weather was calm and sunny, with a high temperature of 95 degrees Fahrenheit. There had been no rain during that day or the day before. Investigators determined that weather was likely not a factor in the accident.

Examinations
At 5:35 a.m. on July 7, 2020, and again at 5:32 a.m. on July 8, 2020, Dean conducted a workplace examination of the plant and noted the ruptured sand line. Dean noted no other hazards. Investigators reviewed workplace examination records before the day of the accident and did not find notes of inspections of the dredge or electrical gear on shore. A competent person did not perform an adequate examination of the high voltage electrical circuit and components in the electrical enclosure before work began.

Training and Experience
James Wallace Dean had over 36 years of mining experience, with 6 years at this mine. MSHA found no record of high-voltage electrical training, electrical certification, or electrical license for Dean, and no records of task training on working with high-voltage electricity were available. MSHA found all other training records reviewed compliant.

ROOT CAUSE ANALYSIS

The accident investigation team conducted an analysis to identify the underlying causes of the accident. The team identified the following root causes, and the mine operator implemented the corresponding corrective actions to prevent a recurrence.

1. Root Cause: Management did not have policies and procedures to de-energize, lock out, tag, and test high-voltage power sources before work was performed on high voltage circuits.

   Corrective Action: Management established policies and procedures to de-energize, locked out, tag, and tested high voltage power sources before work is performed on high voltage circuits.

2. Root Cause: Management did not have policies and procedures that required high voltage work to only be performed by miners trained to work on high-voltage electric equipment and circuits.

   Corrective Action: Management established policies and procedures that require miners to be adequately trained before working on high-voltage electrical circuits.

3. Root Cause: Management did not have policies and procedures to examine high voltage circuits and equipment before work was performed on those circuits.

   Corrective Action: Management established policies and procedures to examine high voltage equipment prior to work being performed on those circuits.

4. Root Cause: Management policies and procedures did not ensure the surplus trailing cable, stored on the shore of the dredge pond, was protected from mechanical damage.

Corrective Action: Management built a four foot berm to block access to the surplus trailing cable. Management also installed a danger sign at the top of the berm to warn mobile equipment operators of the location of the surplus trailing cable behind the berm.

CONCLUSION

On July 9, 2020, at 8:56 a.m., James Wallace Dean, a 60-year-old mine superintendent with 36 years of mining experience, died when he contacted energized high-voltage components in a 4,160 volt (4,160 VAC), three-phase electrical enclosure.

The accident occurred because the mine operator's policies, procedures, and training were inadequate to ensure that the 4,160 VAC enclosure and internal components were properly de-energized, locked out, tagged, and tested by miners prior to performing work on the circuits.

Approved By:

_____ _____

Brian J. Thompson Date
Acting District Manager

ENFORCEMENT ACTIONS

1. Issued 103(j) Order No. 9496128 on July 9, 2020, at 9:25 a.m., to Atlanta Sand and Supply Co.

   An accident occurred at this operation on July 9, 2020 at approximately 9:00am. MSHA issued this order, under Section 103 (j) of the Federal Mine Safety and Health Act of 1977, 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 immediate area surrounding the 4160 dredge disconnect and ground fault box on shore until MSHA has determined that it is safe to resume normal mining operations in this area. The inspector issued this order orally to the mine operator at 9:25am and reduced it to writing.

2. Order No. 9496128-01 – Modified on July 09, 2020, at 10:17 a.m., under the provision of 103(k) of the Federal Mine Safety and Health Act of 1977 (Mine Act)

   MSHA modified the initial order to reflect that MSHA is now proceeding under the authority of Section 103(k) of the Federal Mine Safety and Health Act of 1977. This Section 103(k) Order is intended to protect the safety of all persons on-site, including those involved in rescue and recovery operations or investigation of the accident. The mine operator shall obtain prior approval from an Authorized Representative of the Secretary for all actions to recover and/or restore operations in the affected area. Additionally, the mine operator is reminded of its existing obligations to prevent the destruction of evidence that would aid in investigating the cause or causes of the accident.

3. 104(d)(1) Citation No. 9490634 was issued to Atlanta Sand and Supply Co. for a violation of 30 CFR 56.12017

   A fatal accident occurred at this mine on July 9, 2020, when a superintendent contacted an energized 4,160 VAC high-voltage electrical circuit. The superintendent leaned into an electrical enclosure that provides electrical power to a dredge trailing cable and dredge and came into contact with energized circuits. The incoming electrical power from the transformer to the electrical enclosure had not been de-energized and locked out prior to the superintendent entering the enclosure. Failure to de-energize and lockout the energized 4,160 VAC high-voltage power source constituted more than ordinary negligence and is an unwarrantable failure to comply with a mandatory standard.

4. 104(d)(1) Order No. 9490635 was issued to Atlanta Sand and Supply Co. for a violation of 30 CFR 46.7

   A fatal accident occurred at this mine on July 9, 2020, when a superintendent contacted an energized high-voltage electrical circuit. The superintendent did not have any specialized training or certification in working with high-voltage electrical circuits or equipment, nor had the mine operator provided him with task training to identify and safely work on high-voltage electric circuits or equipment. The superintendent leaned into an electrical enclosure that provides electrical power to a dredge trailing cable and dredge and came into contact with energized circuits. The incoming electrical power from the transformer to the electrical enclosure had not been de-energized and locked out prior to the superintendent entering the enclosure. Failure to train the superintendent in performing this task constituted more than ordinary negligence and is an unwarrantable failure to comply with a mandatory standard.

5. 104(a) Citation No. 9490636 was issued to Atlanta Sand and Supply Co. for a violation of 30 CFR 56.12039(c)

   The surplus trailing cable that supplied 4,160 VAC to the dredge, was stored openly on the shore of the dredge pond and not protected against mechanical damage. Markings or signage was also not present/in-place to indicate the presence of the location of the surplus trailing cable. Failure to provide a means of protecting the cable exposes miners working with heavy equipment in the area, to contact and potentially damaging the high-voltage inner conductors inside the trailing cable. This condition contributed to a fatal accident that occurred on the mine when the cable became damaged and had to be spliced. The conductors were inadvertently spliced out of phase. To correct the phase issue with the trailing cable, the victim of the accident entered an energized electrical enclosure to switch the leads on the dredge trailing cable.

6. 104(d)(1) Order No. 9490637 was issued to Atlanta Sand and Supply Co. for a violation of 30 CFR 56.18002

   A fatal accident occurred at this mine on July 9, 2020, when a superintendent contacted an energized 4,160 VAC high-voltage electrical circuit inside an electrical enclosure. The superintendent contacted the energized circuit while doing work inside the electrical enclosure. An adequate examination of the high voltage electrical circuit and components was not performed before work began inside the electrical enclosure. Failure to perform an adequate examination of the open electrical enclosure constituted more than ordinary negligence and is an unwarrantable failure to comply with a mandatory standard.

Appendix A
Persons Participating in the Investigation

Atlanta Sand and Supply Co.

Jeff Avant.....President

Eric Barger..... Vice President

Stephen Andrews.....Safety Coordinator/Director

Josh Sapp .....Laborer/Lab Tech

Billy Dale Mullis .....Dredge Operator

Peach County Sheriff's Department

Captain John Edwards .....Deputy

Greer Co Electrical, LLC

Shane Greer ..... Electrician/Owner

Mine Safety and Health Administration

Randall E. Dickerson.....Electrical Specialist/Mine Safety and Health Inspector

Rory M. Smith ..... Supervisory Mine Safety and Health Inspector

Robert Bates, Electrical Engineer..... Technical Support

Jordan Rose, Electrical Engineer……..Technical Support

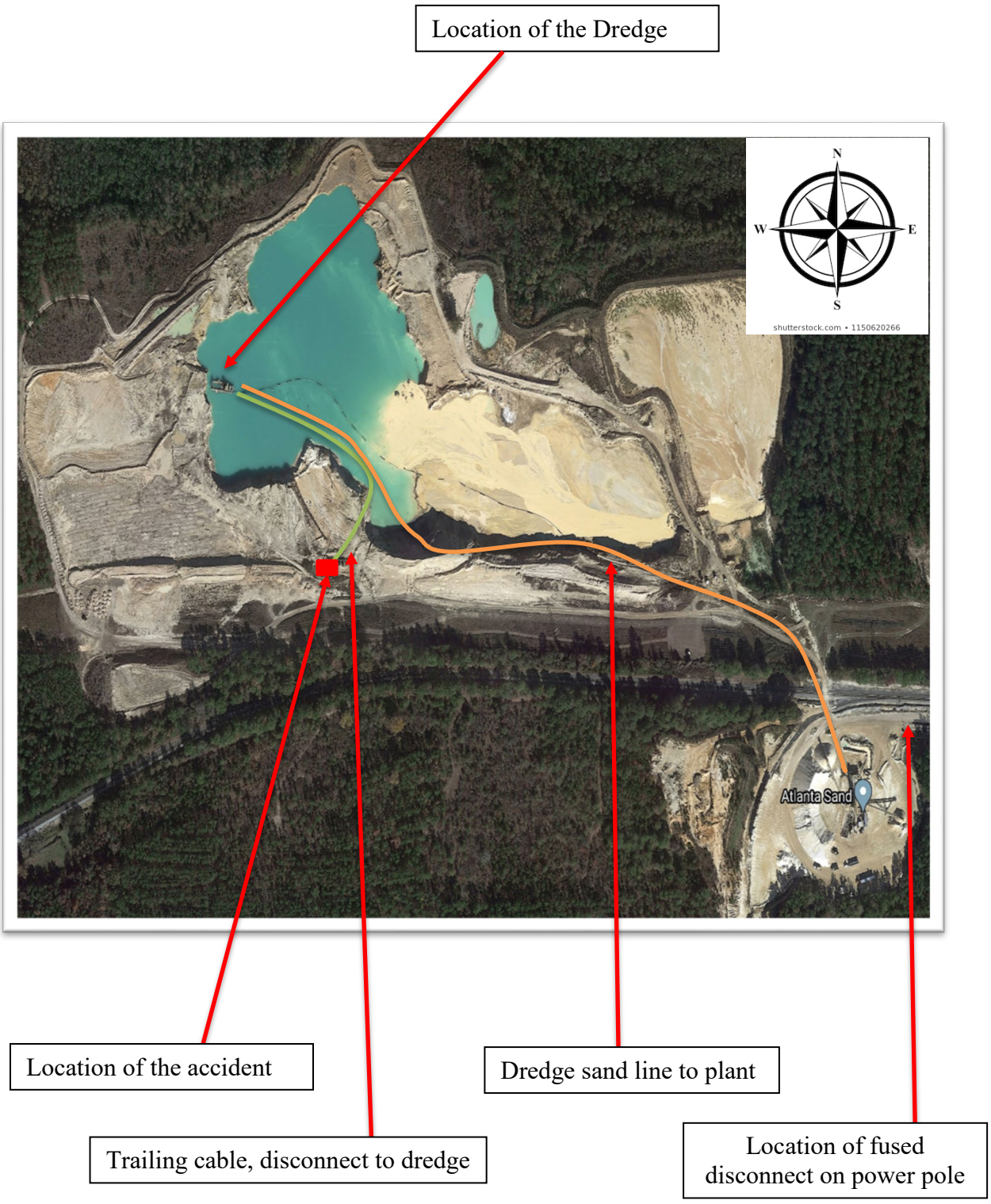
Robert Ashley ..... Supervisory Mine Safety and Health Inspector

APPENDIX B
Photograph of the Accident Scene

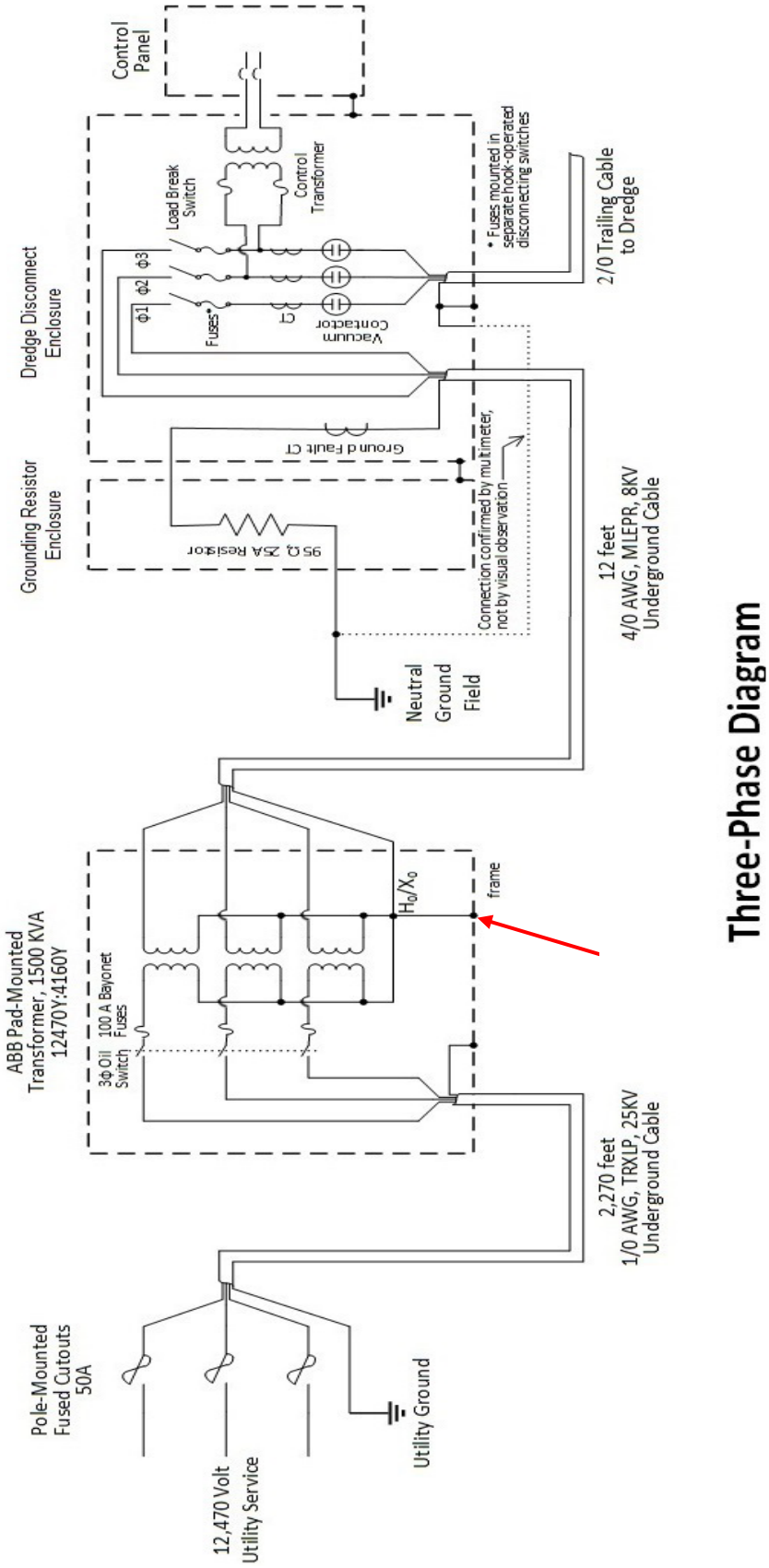
Electrical Enclosure

Transformer supplying power to the electrical enclosure

APPENDIX C
Aerial View of Mine



Appendix D
Electrical Schematic of the Dredge Circuit



Three-Phase Diagram