

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Surface Mine
(Barite and Calcium Carbonate)

Fatal Electrical Accident
November 23, 2020

Houston Plant
Excalibar Minerals LLC
Houston, Harris County, Texas
ID No. 41-04449

Accident Investigators

John Powers
Mine Safety and Health Inspector

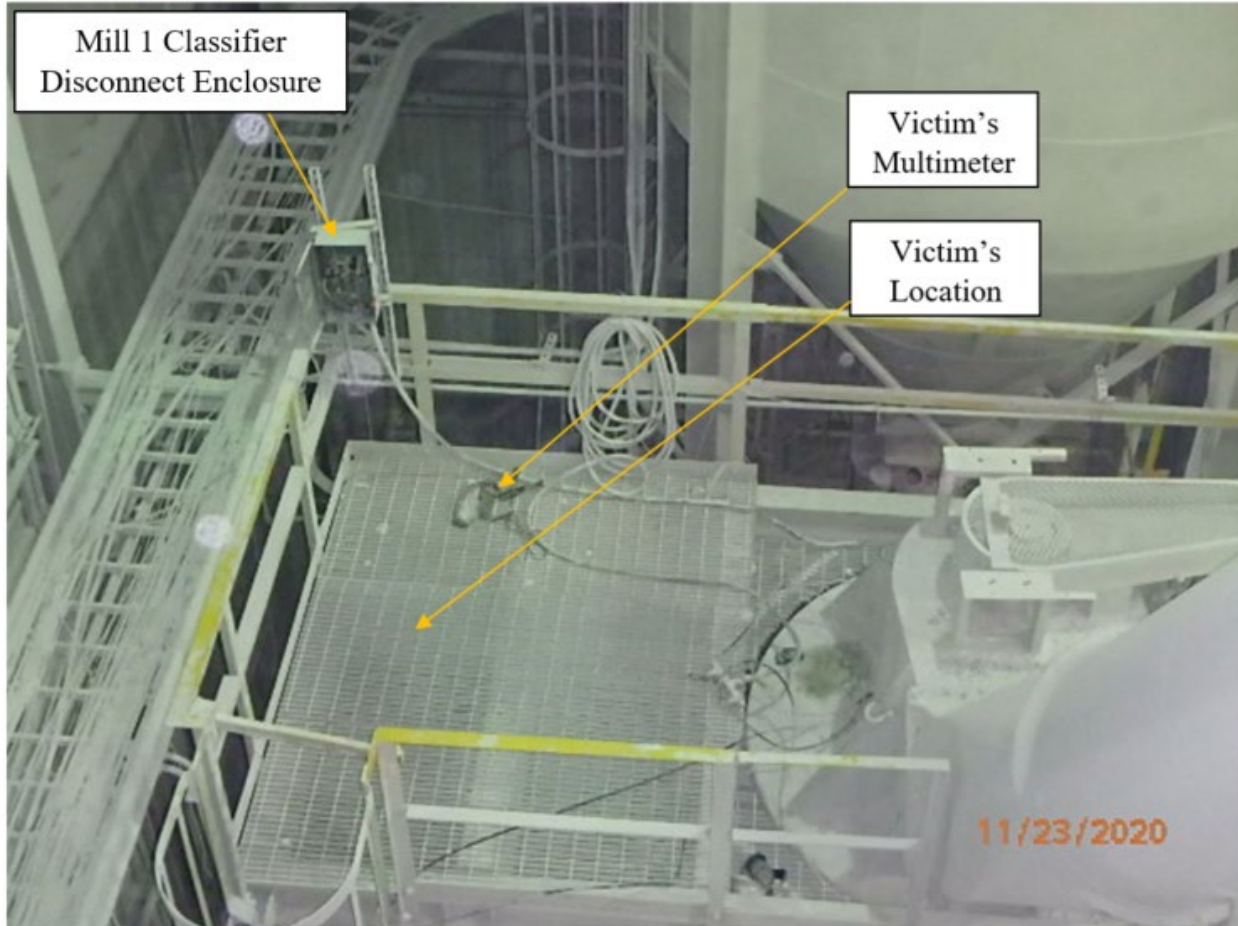
Jason Hoermann
Mine Safety and Health Inspector

William Clark
Mine Safety and Health Inspector

Originating Office
Mine Safety and Health Administration
Central Region - Dallas District
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OVERVIEW

On the morning of November 23, 2020, John Todd Harris, a 39-year-old Maintenance Mechanic with 14 months of mining experience, was electrocuted at the Mill 1 Classifier disconnect enclosure. Harris was troubleshooting an overcurrent fault in the energized Mill 1 Classifier electrical circuit. He was not wearing any special personal protective equipment (PPE) and contacted an energized 480 Volts Alternating Current (VAC) conductor.

The accident occurred because the mine operator did not assure: (1) phase lead connections were adequate; and (2) that miners had proper PPE for troubleshooting energized electrical equipment.

GENERAL INFORMATION

Newpark Resources, Inc. owns Excalibar Minerals LLC, which operates the Houston Plant in Houston, Texas. The mine operates two 12-hour shifts, seven days a week, and employs 12 miners. The mine receives barite/barium ore and calcium carbonate from other mines. Front-end loaders load ore into hoppers and belt conveyors transport the ore to the plant's mills for processing. The mine operator sells the finished material to the construction industry.

The principal officer for Newpark Resources, Inc. at the time of the accident was:

David Henrick

President

The Mine Safety and Health Administration (MSHA) conducted the last regular inspection at this mine on October 15, 2020. The non-fatal days lost (NFDL) incident rate for Excalibar Minerals LLC during 2020 was zero, compared to the national average of 2.11 for mines of this type.

DESCRIPTION OF ACCIDENT

On November 22, 2020, at 11:00 p.m., Shaun McNiel, Night Mill Operator, attempted to start the Mill 1 system (line) for production. During the startup process, the Mill 1 Classifier variable frequency drive (VFD) showed an overcurrent fault and would not start. McNeely called Justin Stein, Production Supervisor, and reported the issue with the Mill 1 line. Stein instructed McNeely to operate another mill for the remainder of the night shift and they would evaluate the electrical issue in the morning.

On November 23, 2020, at 6:59 a.m., John Todd Harris arrived at the mine to begin work. Harris and Albert Garcia, Maintenance Worker, gathered their tools and began routine maintenance checks of each mill. Harris and Garcia locked out the mills before opening the access doors to inspect for wear and other damage. At approximately 8:45 a.m., Harris completed the routine maintenance checks and began loading bulk trucks.

At approximately 10:30 a.m., Jerry Rhea, Superintendent, notified Harris of the Mill 1 Classifier overcurrent electrical issue and instructed Harris to begin troubleshooting the problem. Stein was operating the control room for the mill building and sent Harris a text message on his personal cell phone at 12:18 p.m. to check on his status. When Harris did not respond to the text message, Stein called him at 12:49 p.m., and again, Harris did not respond. At approximately 1:00 p.m., Stein went to the classifier platform and could see Harris's vest and that he was laying down on the platform. Stein climbed the ladder to check on Harris and saw the disconnect enclosure was open. Stein climbed back down the ladder and headed to the motor control center (MCC) 1 cabinet to see if the classifier circuit was locked out. He also called Rhea and Kenny Holland, Plant Manager, at 1:10 p.m. to tell them of the accident. Stein then called 911 at 1:13 p.m. while he locked out the classifier circuit. Holland went to the accident scene and met Stein. Holland stated that Harris had no pulse. Avalon Knighten, Medical Examiner, travelled to the accident scene and confirmed Harris was dead at 1:27 p.m.

INVESTIGATION OF ACCIDENT

On November 23, 2020, at 1:23 p.m., Holland called the Department of Labor National Contact Center (DOLNCC). The DOLNCC contacted Joel Gerhard, Supervisory Special Investigator, to report the accident. Gerhard contacted Brett Barrick, Assistant District Manager, who dispatched Jason Hoermann, Mine Safety and Health Inspector, to the mine site. Hoermann arrived at the mine at 3:00 p.m., and issued an order under the provisions of Section 103(k) of the Mine Act to assure the safety of the miners and preservation of evidence.

The following day, John Powers, Mine Safety and Health Inspector, joined Hoermann to conduct the fatal accident investigation. On November 30, 2020, William Clark, Mine Safety and Health Inspector, arrived to help in the investigation. MSHA's accident investigation team conducted an examination of the accident scene and interviewed miners. See Appendix A for a list of persons who participated in the investigation.

DISCUSSION

Location of Accident

The accident occurred on the Mill 1 Classifier platform at the disconnect enclosure.

Weather

Overcast conditions existed at the time of the accident with temperatures in the upper 40's. Investigators determined that weather was not a factor in the accident.

PPE

The victim was not wearing any special PPE while troubleshooting an overcurrent fault in the energized classifier's electrical system. The mine operator did not possess or provide electrically rated gloves, an arc shield, or arc flash clothing rated for work on energized 480 VAC circuits and equipment, which are special PPE items for working on electrical circuits of this voltage.

Mill 1 Classifier Electrical Circuit

A transformer provides 480 VAC to a bus (common connection to which any number of loads are connected in parallel) in the MCC 1 cabinet. The circuit breaker provides electrical power to a VFD through a #2 American Wire Gauge Thermoplastic High Heat-resistant Nylon (AWG THHN) cable. The VFD provides electrical power to the disconnect switch in the disconnect enclosure through another #2 AWG THHN cable. The disconnect switch provides electrical power to the 75 horsepower motor. The disconnect switch is a 100 amp, 75 horsepower, heavy duty safety switch (Model 10), manufactured by General Electric (see Appendix B).

Heat Damage, Installation, and Maintenance

Investigators found severe heat damage inside the disconnect enclosure. The damage was on the disconnect switch and phase leads for the cable from the VFD (see Appendices C and D). The heat damage was particularly evident on the phase three lead and the location (terminal lug) where this lead was connected to the disconnect switch. MSHA concluded the damage was most likely the result of a poor connection in which the terminal lug was either not sufficiently tightened, or the phase three lead conductor was improperly inserted into the terminal lug. None of the other terminal lugs on the disconnect switch were sufficiently tightened to the torque specified by the manufacturer. The heat damage and improper connections indicated that routine maintenance being performed did not include cleaning, checking connections, and thermal scanning of electrical systems.

The damage was severe enough to cause the phase three conductor to completely detach from the terminal. Investigators concluded the detached end of this energized conductor was likely the component the victim contacted on the day of the accident.

Investigators were not able to determine if the overcurrent condition that caused the fault also contributed to the heat damage. Investigators found four overcurrent fault codes in the VFD's electronic records, which indicated overcurrent conditions occurred the day before the accident. Based on the VFD setting at the time of the accident, the overcurrent fault code was triggered when the current was consistently 136 amps or greater. This amount of current exceeded the full load current rating of the motor of 84.1 amps and the maximum allowable overcurrent protection setting of 105.1 amps. The 136 amps exceeded the allowable ampacities of the cables from the VFD to the motor and the current ratings of the disconnect enclosure, which were 121 amps, 60 amps, and 100 amps, respectively.

The mine operator did not provide overload protection for the Mill 1 Classifier motor circuit. The mine operator did not enable the motor overload protection feature of the VFD and did not provide any external means of overload protection (see Appendix E).

Investigators found a significant amount of electrical tape on the three phase leads on the line side of the disconnect switch. Heat damage was present on part of the electrical tape. All persons interviewed stated they had no knowledge of who applied the electrical tape.

Training and Experience

The victim received New Miner training on October 19, 2020, in accordance with MSHA Part 48 training regulations. Investigators reviewed training records and did not find any training deficiencies that contributed to the accident. The victim's resume indicated he had worked for multiple electrical contractors performing electrical installations, wiring of motors, troubleshooting electrical problems, and working with 480 VAC circuits.

ROOT CAUSE ANALYSIS

The accident investigation team conducted a root cause 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: The mine operator did not install electrical equipment correctly or establish a routine maintenance program of examining electrical systems.

Corrective Action: The mine operator implemented a written plan to have an electrical contractor: 1) install new electrical components with proper ratings and current carrying capacities, 2) assure phase leads are properly connected, and 3) assure motors are provided with proper overload protection. The mine operator implemented a written plan for routine cleaning and maintenance, including checking the torque of the connection lugs, condition of cables, and performing thermal scans of electrically powered equipment at the mine. The mine operator trained all supervisors and miners, who are responsible for electrical equipment, in the provisions of this plan.

2. Root Cause: The mine operator did not provide any special PPE rated for electrical work (gloves, arc shield, or arc flash clothing) for workers to use when performing electrical troubleshooting or work.

Corrective Action: The mine operator revised their written policy and will no longer allow employees to work on energized circuits over 120 VAC. Properly trained electricians will perform electrical troubleshooting and repair work on circuits greater than 120 VAC. Special PPE will be used for electrical troubleshooting and repair work on all circuits. Special PPE will be dependent upon the work being performed and circuit voltage. Licensed contract electricians will provide their own PPE and determine if additional PPE is needed. Electrical troubleshooting on energized circuits and equipment will only be performed when necessary and special PPE will include, but may not be limited to, properly rated and well maintained electrical gloves. The mine operator trained all supervisors and miners, who are responsible for electrical equipment, in the provisions of this plan.

CONCLUSION

On the morning of November 23, 2020, John Todd Harris, a 39-year-old Maintenance Mechanic with 14 months of mining experience, was electrocuted at the Mill 1 Classifier disconnect enclosure. Harris was troubleshooting an overcurrent (excess current) fault in the energized Mill 1 Classifier electrical circuit. He was not wearing any special PPE and contacted an energized 480 VAC conductor.

The accident occurred because the mine operator did not assure: (1) phase lead connections were adequate and (2) that miners had special PPE for troubleshooting energized electrical equipment.

Approved by:

William D. O'Dell
Dallas District Manager

Date: _____

ENFORCEMENT ACTIONS

1. 103(k) Order No. 9640852 was issued to Excalibar Minerals LLC, Houston Plant, ID No. 41-04449 on November 23, 2020.

A fatal accident occurred at this operation on November 23, 2020 at approximately 01:13 p.m. when an electrician was electrocuted while working on the Raymond Mill 1 classifier. This order is issued to assure the safety of all persons at this operation. It prohibits all activity at the mill building and mill electrical room until MSHA has determined that it is safe to resume normal mining operations in the area. The mine operator shall obtain prior approval from an authorized representative for all actions to recover and/or restore operations to the affected area.

2. A 104(a) citation was issued to Excalibar Minerals LLC for a violation of 30 CFR 56.12002.

A fatal accident occurred at this mine site on November 23, 2020, when the mine operator did not properly install and maintain the Mill 1 Classifier disconnect enclosure and switch. The mine operator did not tighten the line and load side terminal lugs according to the manufacturer's specifications or did not properly insert the phase lead conductors in the terminal lugs. This contributed to overheating which melted a terminal lug and caused the associated phase lead to detach. After opening the door to the disconnect enclosure housing the disconnect switch, the miner contacted an energized conductor resulting in a fatal accident.

3. A 104(d)(1) citation was issued to Excalibar Minerals LLC for a violation of 30 CFR 56.15006.

A fatal accident occurred at this mine site on November 23, 2020, when the mine operator did not provide special protective PPE, such as electrically rated insulated gloves and arc flash protection, to maintenance personnel performing electrical testing and work. This mine had maintenance personnel performing electrical testing and work. This practice resulted in a maintenance mechanic contacting an electrical conductor resulting in a fatal accident.

Appendix A

Persons Participating in the Investigation

Excalibar Minerals LLC

Jerry Rhea	Superintendent
Kenny Holland	Plant Manager
Justin Stein	Production Supervisor
Ellis Schouest	Supervisor
Dean Myers	Senior Health, Safety, and Environmental Specialist
Shaun McNiel	Night Mill Operator
Albert Garcia	Maintenance Worker

Contractors

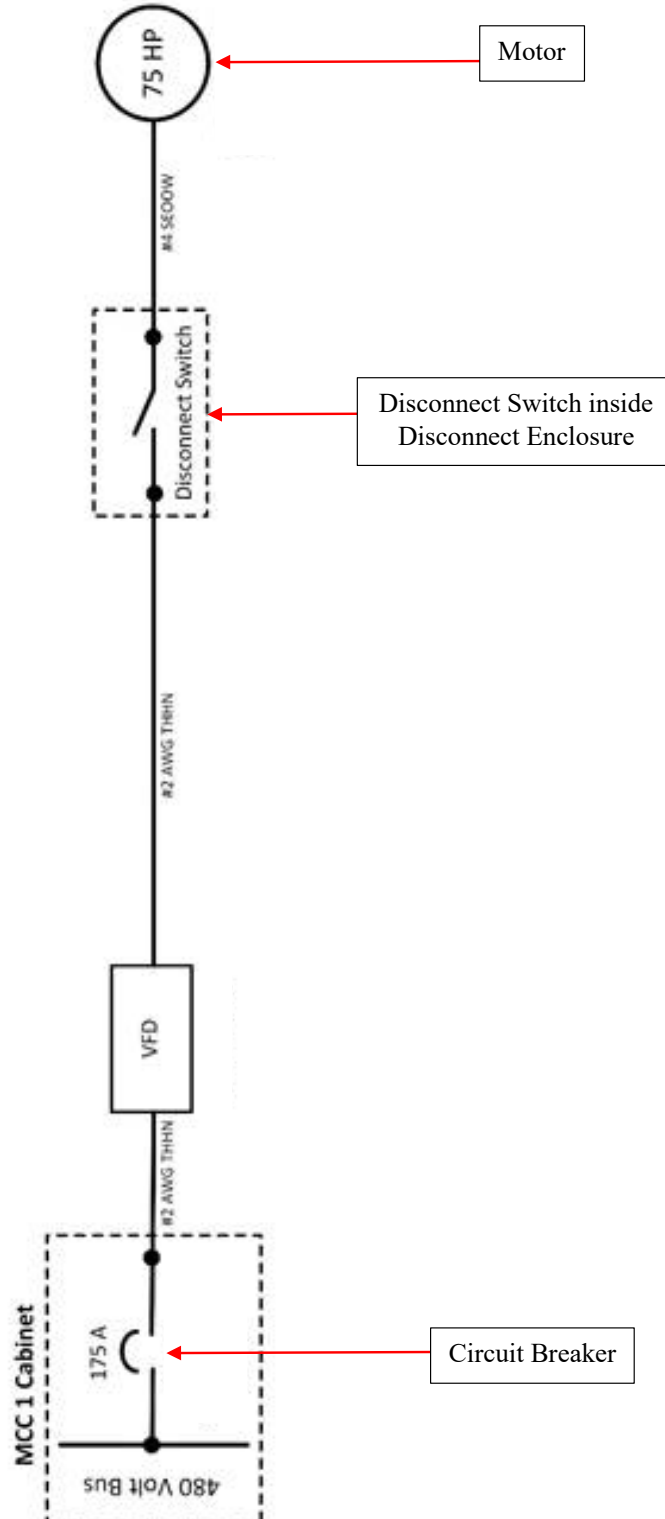
Sidney Bell	VERTIV Senior Technician
Trung Chau	VERTIV Senior Technician
Darryl Riggs	VERTIV Senior Technician
Barry Duckworth	Control Concepts Inc.

Mine Safety and Health Administration

William Clark	Mine Safety and Health Inspector
Jason Hoermann	Mine Safety and Health Inspector
John Powers	Mine Safety and Health Inspector
Robert Bates	Electrical Engineer, Technical Support
Jordan Rose	Electrical Engineer, Technical Support

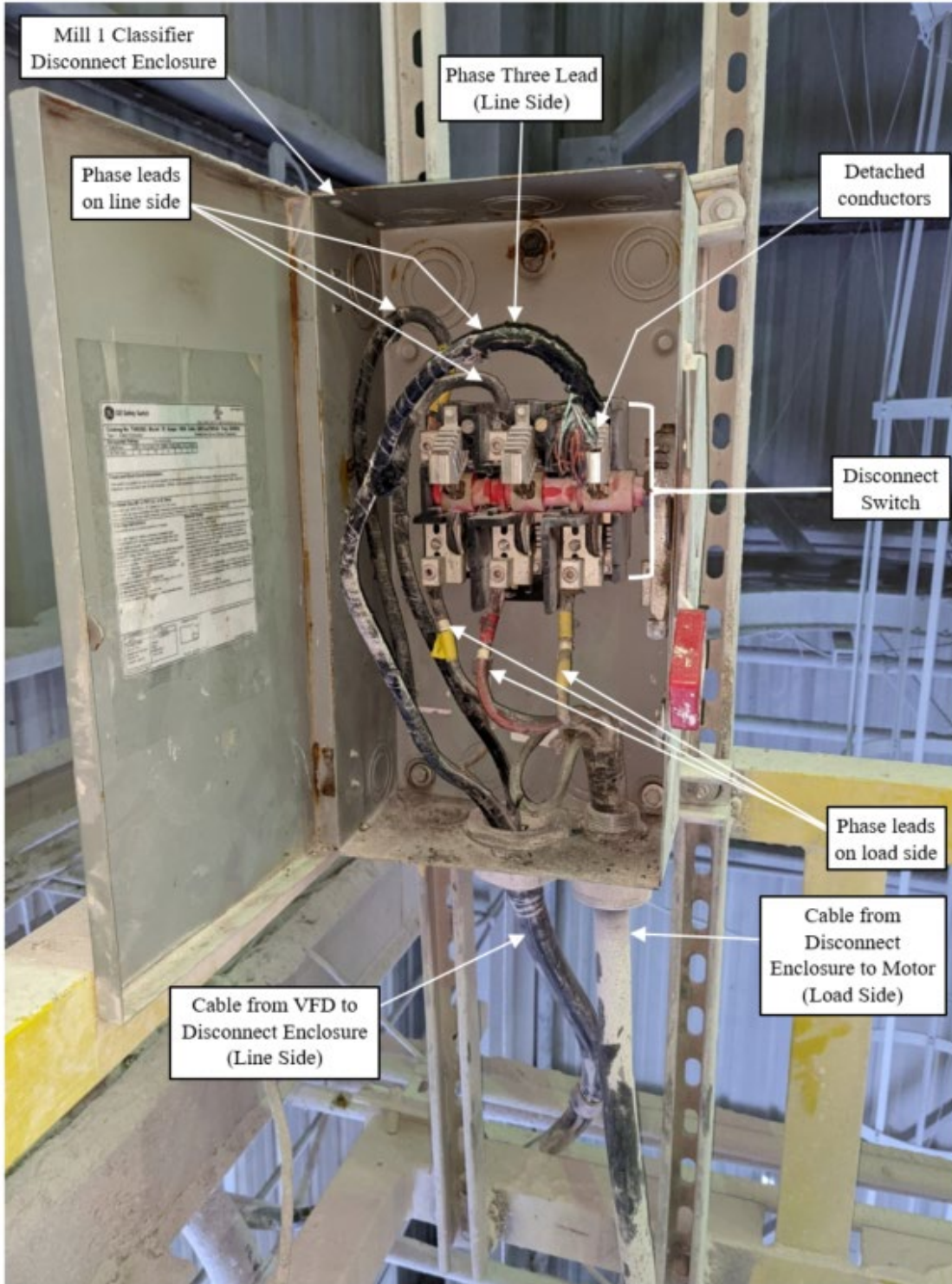
Appendix B

One Line Diagram of the Mill 1 Classifier Motor Circuit



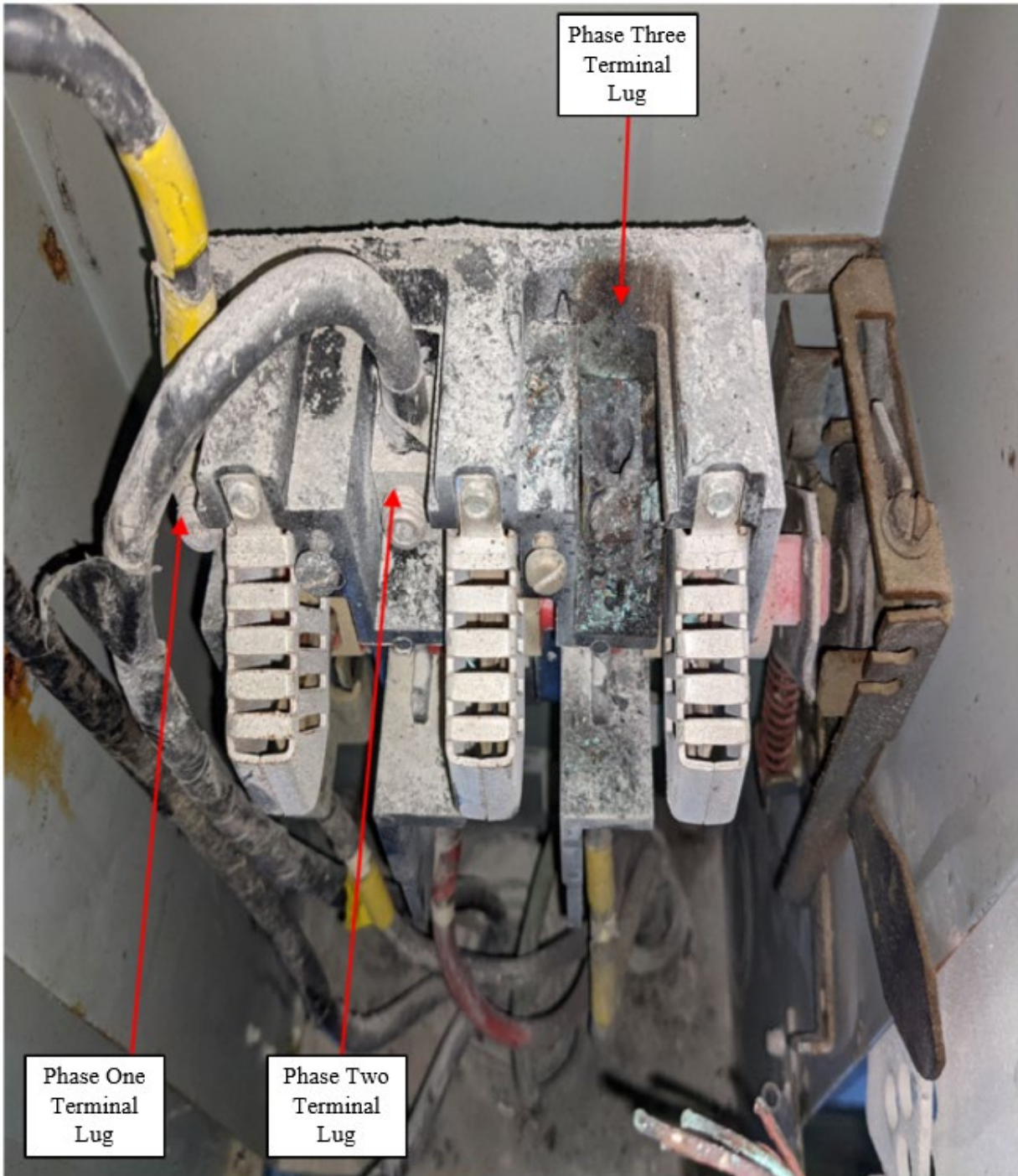
Appendix C

Photograph of the Disconnect Enclosure and Switch



Appendix D

Photograph of Damage to the Phase Three Line Side Connection Lug



Appendix E

Photograph of the VFD for the Mill 1 Classifier Motor

