FAI-6882030-1

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Surface Mine
(Sand)

Fatal Machinery Accident
February 29, 2020

Newmark Acquisition, LLC
Newmark Acquisition, LLC
Longville, Beauregard Parish, Louisiana
ID No. 16-01557

Accident Investigators

Laurence Dunlap
Supervisory Mine and Health Inspector

Chad Derouen
Mine Safety and Health Inspector

Russell Stackpole
Mechanical Engineer, Technical Support

Originating Office
Mine Safety and Health Administration
Central Region - Dallas District
1100 Commerce St. Rm 462
Dallas, TX 75242
William O'Dell, District Manager

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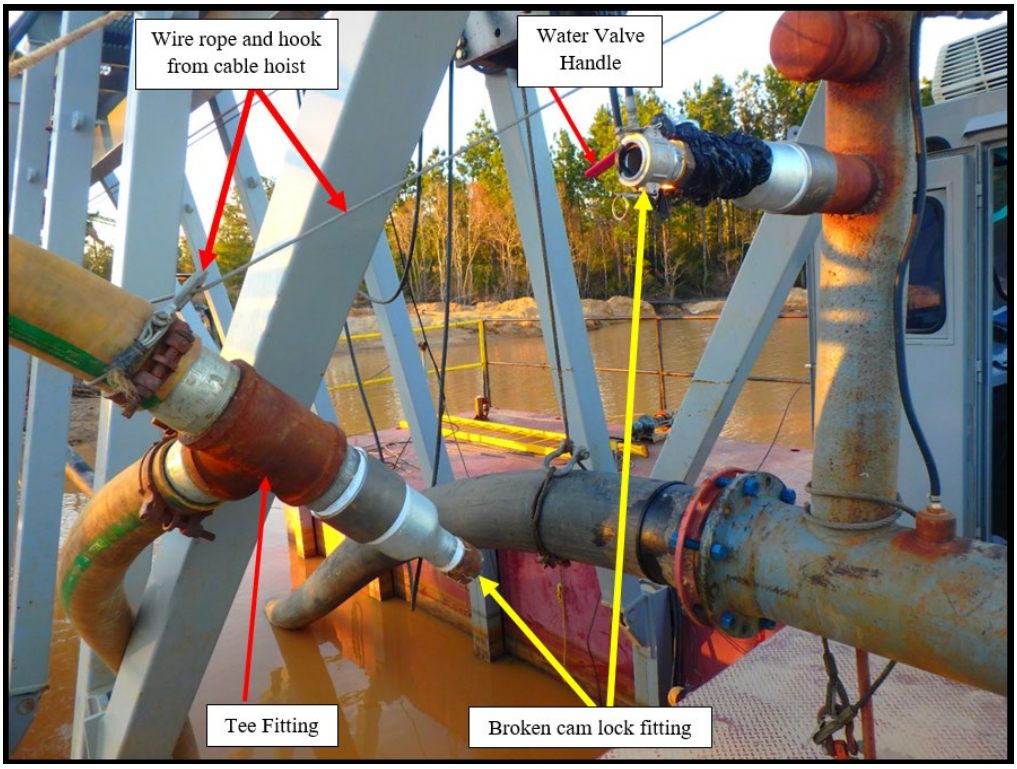


OVERVIEW

Israel J. Spears, Jr., a 28-year-old plant foreman with over four years of total mining experience, died on February 29, 2020. Spears was closing a water valve used to prime the main suction line with the jet pump when a two-inch cam lock fitting (fitting) failed, causing pressurized water to strike him. The pressurized water knocked him into the operator's compartment and then swept him into the dredge pond where he drowned.

The accident occurred because the mine operator redesigned the dredge's water system beyond the manufacturer's design capacity. Mine management did not evaluate the capacity of the new parts used in relation to the stresses in which the parts would be subjected. Furthermore, the mine operator did not ensure that the victim wore a life jacket or belt where there was a danger of falling into the water.

GENERAL INFORMATION

The operator, Newmark Acquisition, LLC owns and operates the Newmark Acquisition, LLC mine in Beauregard Parish, Louisiana. The mine operates one, ten-hour shift, five days per week, and employs six miners. The mine extracts and processes a variety of sand products for the construction industry. Trucks and excavators are used to excavate dry sand products and a dredge is used to mine river sand.

The principal officers for the operator, Newmark Acquisition, LLC, at the time of the accident were:

Mark LaBorde.....Member
Kevin A. Cook.....Member

The Mine Safety and Health Administration (MSHA) conducted the last regular inspection at this mine on October 30, 2019. The non-fatal day's lost (NFDL) incident rate for Newmark Acquisition, LLC mine for 2019 was 0, compared to the national average of 1.22 for mines of this type.

DESCRIPTION OF ACCIDENT

On February 29, 2020, at 7:00 a.m., Spears arrived on the mine site and met with Hunter C. Jones, Loader Operator, to discuss working on a plugged dredge discharge pipe. Jones and Spears were the only miners on the site at the time of the accident. Paul D. Tupper, Dredge Operator, usually operated the dredge but he was not at the site.

From approximately 7:30 a.m. to 9:15 a.m., Spears and Jones worked on the shore and replaced a section of the discharge pipe and then loosened the clamps on the second and third sections of the discharge pipe in an effort to clear the pipe. Spears took a flat-bottom boat out to the dredge, arriving between 9:20 a.m. and 9:25 a.m. Jones left the area in a front-end loader to load a truck.

Based on video captured by a camera installed at the plant, at 9:33 a.m., Spears primed the main suction line on the front of the dredge by opening the ball valve (see Appendix A). Upon completion of priming, the valve was closed, at which time, the two-inch cam lock aluminum fitting snapped in half directly in front of the ball valve (see Appendix B). A blast of water from the broken pipe struck Spears knocking him backward into the operator's compartment of the dredge. The water swept Spears, who was not wearing a life jacket, into the dredge pond.

The Beauregard Parish Sheriff's Office's Dive Team recovered the victim's body. An autopsy determined the victim died from drowning.

INVESTIGATION OF ACCIDENT

On February 29, 2020, at 11:09 a.m., Susan D. Jones, Office Manager for Newmark Acquisition, LLC, called the Department of Labor National Contact Center (DOLNCC). The DOLNCC contacted Joel Gerhard, Supervisory Special Investigator, who contacted Brett Barrick, Assistant District Manager, with the report of the accident. Barrick contacted Laurence Dunlap, Supervisory Mine Safety and Health Inspector, and Chad Derouen, Mine Safety and Health Inspector, and dispatched them to the mine site. Derouen arrived on site at 4:30 p.m., and issued an order under section 103(k) of the Mine Act to secure the accident scene and ensure the safety of miners.

On March 1, 2020, Dunlap and Derouen arrived on the scene to conduct a fatal accident investigation. MSHA's accident investigation team conducted a physical examination of the

accident scene and interviewed miners. See Appendix C for a list of persons who participated in the investigation.

DISCUSSION

Location of Accident

The accident occurred at a pond southeast of the main plant. See Appendix D for an aerial photograph with the approximate location of the equipment involved in the accident.

Weather

The weather at the time of the accident was clear, with temperatures in the low 40 degree range. Weather was not a factor in the accident.

Equipment Involved

Crossworks LLC manufactured the dredge involved in the accident. The operator used a Cornell Pump Company hot oil pump, model 4HH-F16K, to prime the main suction line. This pump was capable of pumping at 100 psi, but was only pumping at 70 psi. The pressure gauge on the pump at the time of the accident was stuck on 65 psi.

Approximately one week before the accident, a four-inch cloth hose ruptured and Tupper replaced it with a four-inch Texcel high-tensile rubber hose. The change from cloth to rubber hose increased the weight applied on the fitting.

On February 25, 2020, the mine operator discovered that an existing four-inch ball valve that controlled flow in the suction line needed to be replaced. Beau M. Perero, Mine Supervisor, changed the design of the water system at this location by reducing the diameter from four inches to two inches, in order to increase the water pressure in the system. Perero also decided to replace the steel fittings with aluminum fittings. Perero purchased the four-inch to two-inch reducer, the aluminum fitting, and the associated valve and other materials. Perero did not consult an engineer, or the dredge or pump manufacturers to determine whether the modified design was appropriate. Spears installed the four-inch to two-inch reducer and the fitting, and connected the cam lock fitting to a new two-inch ball valve.

On February 26, 2020, the dredge began operating with the modifications in place. Tupper charged the water hose and, within 30 minutes, the two-inch cam lock fitting cracked. Tupper replaced the cam lock fitting. The replacement fitting was leaking, so Tupper added a second rubber gasket to stop the leak. Tupper then installed a rope and an electric-powered cable winch in an attempt to support the additional weight of the new assembly. After placing the dredge back into service, the suction line clogged.

On February 27, 2020, Tupper disconnected the ten-inch suction line to clear the blockage. When he did so, the hose fell and knocked down the cable handrail around the key of the dredge and broke the stanchions (see Appendix E). The mine operator did not replace the handrails prior to the accident.

On February 28, 2020, the mine placed the dredge back into service and operated most of the day until the discharge line going to the plant clogged. The accident occurred on February 29, 2020 as detailed above in "Description of the Accident".

Laboratory Investigation of Water Line Hose to Stand Pipe Connections

The accident investigation team sent the failed cam lock quick-connect fitting and the associated valve, reducers, and connected fittings for analysis by the MSHA Technical Support, Mechanical & Engineering Safety Division. They also sent the cam lock fitting that cracked four days before the accident and a sample of the rubber hose. The Mechanical & Engineering Safety Division identified the following six factors that contributed to the failure of the fitting involved in the fatal accident.

1. The failed fitting was made of aluminum which has significantly less strength than the steel fittings and pipes in the assembly, resulting in a lower factor of safety.
2. The aluminum material in the failed fitting had extensive internal flaws which further decreased its strength.
3. The locking mechanism was compressing two sealing gaskets instead of one which applied additional stress to the body of the failed fitting.
4. The failed fitting was subjected to significant stress from the reaction forces created by water flow through the assembly.
5. The failed fitting was subjected to significant stress from the weight of the assembled fittings and hoses and the water they contained.
6. The supports installed for the assembly did not adequately relieve weight and reaction forces on the aluminum fitting.

X-ray fluorescence examination of both failed fittings showed they were an aluminum alloy casting of strength significantly less than the typical low carbon steel used in the other fittings and pipes used in this circuit. The maximum yield strength and ultimate strength of the aluminum casting alloy when properly manufactured is 24,000 psi and 48,000 psi, respectively. The yield strength and ultimate strength of the low carbon steel is 53,700 psi and 63,800 psi, respectively.

The flow of a fluid through a change in direction of a piping system creates a reaction force, or "thrust load", on the pipe or fitting. At the time of the accident, water was flowing through a 90 degree bend at the tee fitting adjacent to the failed fitting. Opening and closing the valve to feed water to prime the suction line created a significant thrust load on the fitting.

The calculated bending stresses resulting from the lateral thrust load of the assembly is 53,676 psi on the threaded portion of the failed fitting. This load, being unsupported, results in stresses exceeding the ultimate strength of the aluminum alloy. Microscopic examination of the fracture surface, of the failed fitting, showed the fitting had extensive internal flaws commonly associated with casting errors. These flaws were primarily in the form of gas porosity, distributed throughout the observed fracture. The casting flaws, would further reduce the effective material strength, making this thrust-induced bending stress markedly above the strength of the material. A rope and a cable winch were used in an attempt to support the weight acting on the assembly.

These devices were inadequate, because they did not support the assembly sufficiently to mitigate the stresses on the failed fitting.

The failed fitting was designed to use one sealing gasket, but as previously described, had two gaskets. When miners actuated the locking arms on the fitting to make a seal, they compressed two gaskets instead of one, and applied stresses to the fitting greater than those intended by the manufacturer. These stresses were applied to the body of the fitting, the cutouts in the body for the locking arms, and the arm mounting lugs. Investigators observed cracks in the fitting at the corners of the cutouts.

Training and Experience

Israel J. Spears, Jr. was hired by Elite Sand and Aggregates LLC on September 28, 2015, as an experienced miner with previous dredge experience. Spears received Annual Refresher training in October of 2019. On February 1, 2020, the operator Newmark Acquisition, LLC assumed the operation from Elite Sand and Aggregates. On February 1, 2020, Spears received Newly-Hired Experienced Miner Training under Newmark Acquisition, LLC's plan.

ROOT CAUSE

The accident investigation team conducted a root cause analysis to identify the underlying cause of the accident and fatality. 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 redesigned the water system beyond the manufacturer's design capacity without the required evaluations to ensure the modified system was safe to use. Mine management did not evaluate the capacity of the new parts used in light of the stresses to which the parts would be subjected.

   Corrective Action: The mine operator developed and provided training to appropriate personnel on a new written policy that requires any proposed dredge design changes to be designed by a qualified engineer and in accordance with the manufacturer's design capacity. The engineering design and calculations will be provided to MSHA for review prior to the changes being made.

2. Root Cause: Mine management did not ensure that the victim wore a life jacket or belt while working on the dredge.

   Corrective Action: The mine operator developed a new written policy that requires miners to wear life jackets at all times where a danger of falling into water exists. All miners will be trained on this new written policy prior to the dredge being placed back into service.

CONCLUSION

Israel J. Spears, Jr., a 28-year-old plant foreman with over four years of total mining experience, died on February 29, 2020. Spears was closing a water valve used to prime the main suction line with the jet pump when a two-inch cam lock fitting (fitting) failed, causing pressurized water to strike him. The pressurized water knocked him into the operator's compartment and then swept him into the dredge pond where he drowned.

The accident occurred because the mine operator redesigned the dredge's water system beyond the manufacturer's design capacity. Mine management did not evaluate the capacity of the new parts used in relation to the stresses in which the parts would be subjected. Furthermore, the mine operator did not ensure that the victim wore a life jacket or belt where there was a danger of falling into the water.

Approved by: _____ Date: _____

William D. O'Dell
Dallas District Manager

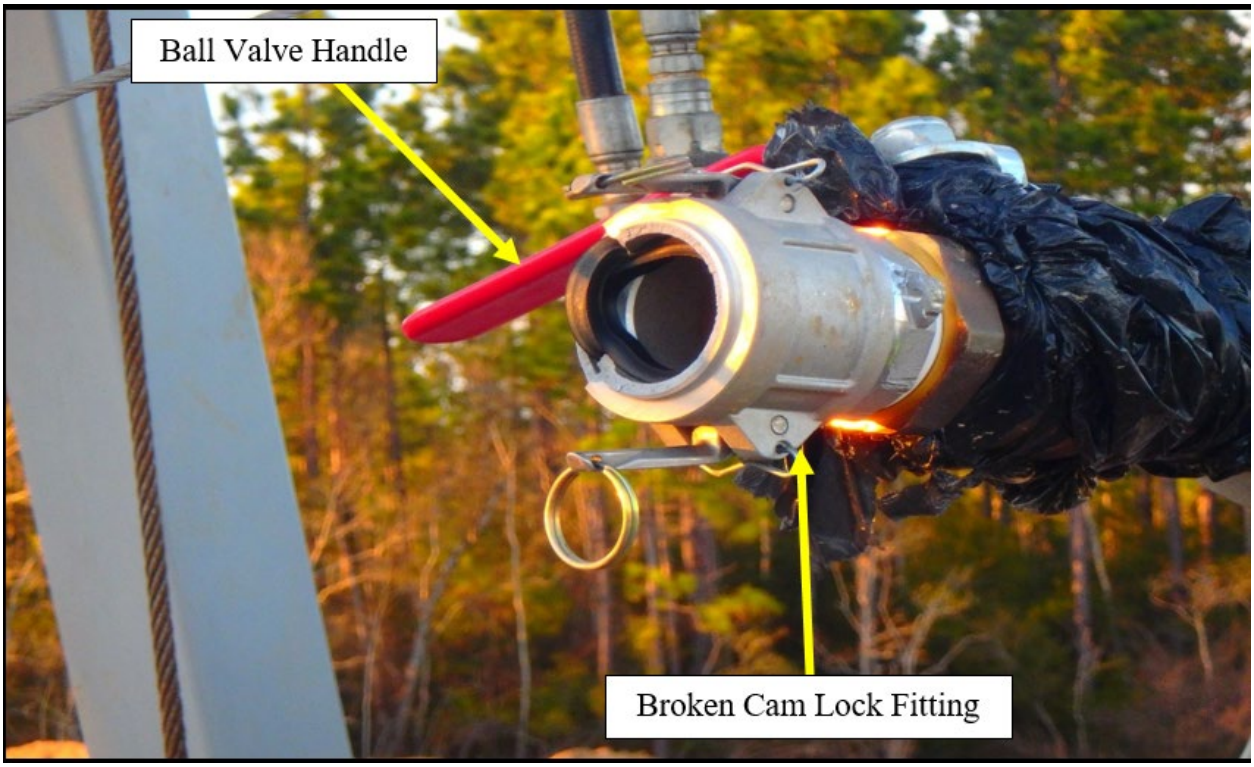
ENFORCEMENT ACTIONS

1. A 103(k) Order No. 9511307 was issued to Newmark Acquisition, LLC mine, ID No. 16-01557 on February 29, 2020, A fatal accident occurred at this operation on February 29, 2020 at approximately 9:35 a.m. c.s.t, when the Plant Foreman was attempting to prime the main suction line on the dredge. This order is issued to assure the safety of all persons at this operation. It prohibits all activity on the Dredge area 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/restore operations to the affected area.

2. Citation No: 8859733 was issued on June 20, 2020, under the provisions of Section 104(a) of the Mine Act, for a violation of 56.15020. A fatal accident occurred at this mine site on February 29, 2020. While attempting to prime the main suction line on a dredge, the mine foreman was positioned in a manner to operate a two inch ball valve to allow water to enter the main suction water line. During the process of opening and closing the valve, the cast aluminum alloy quick connect failed and propelled pressurized water directly at the foreman. The foreman was struck by the release of water and swept into the dredge pond. There was no handrail around the front of the dredge and the foreman was not wearing a life jacket where there was a danger of falling into the water.

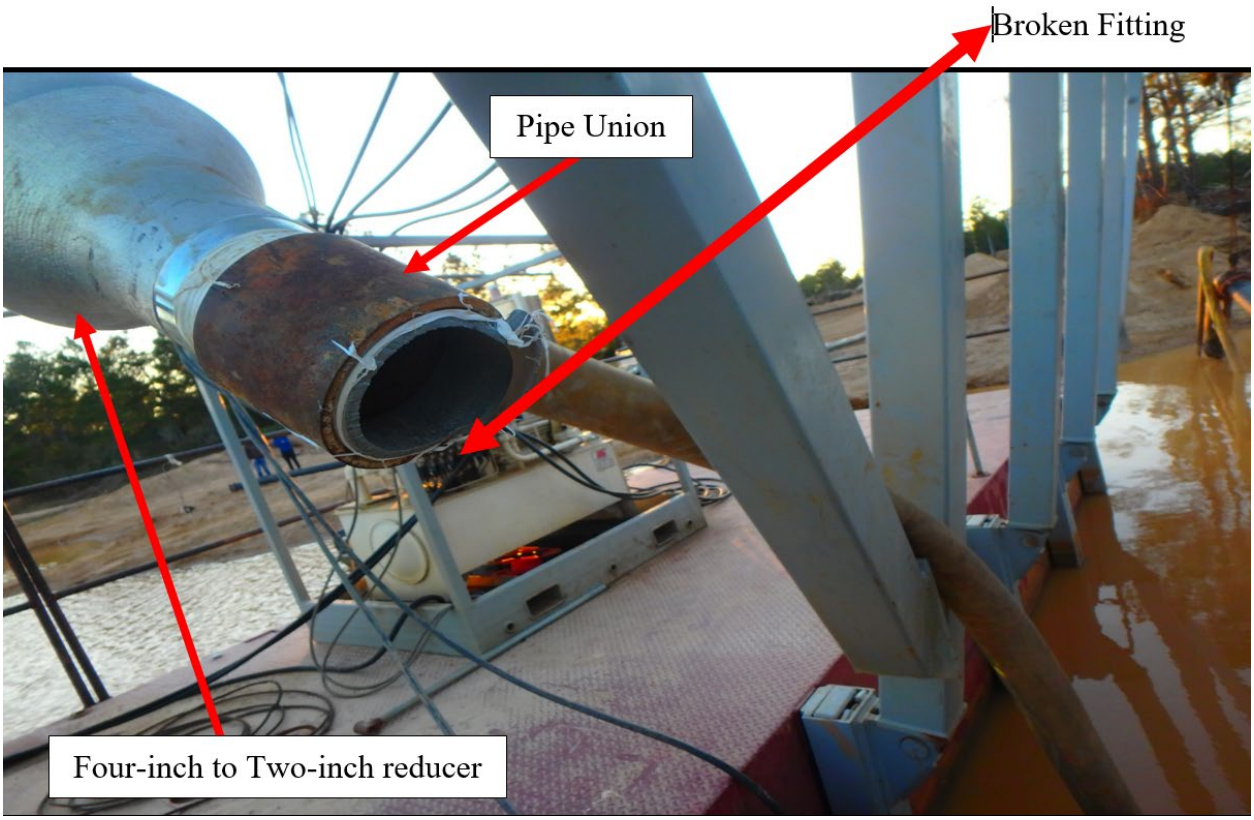
3. Citation No: 8859734 was issued on June 20, 2020, under the provisions of Section 104(a) of the Mine Act, for a violation of 56.14205. A fatal accident occurred at this mine site on February 29, 2020. While attempting to prime the main suction line on the dredge, the mine foreman was positioned in direct line with the jet pump water line and manual ball valve used to open and close the water line. During the process, as the valve was closed, an aluminum quick connect failed and propelled pressurized water directly at the foreman. Prior to the accident, the ball valve and water line were modified by reducing the diameter of the water line from four inches to two inches. The cast aluminum camlock fitting in this configuration was used beyond the manufacturer's design capacity resulting in a catastrophic failure of the fitting. The aluminum camlock fitting was not designed to be attached to the water line with two gaskets, to bear the weight of the physical assembly, or to support the dynamic loads from the hoses and other water line components. The mine operator redesigned the water system without having the knowledge needed to ensure the modified system was safe to use. Mine management did not evaluate the capacity of the new parts used and the stresses to which the parts would be subjected.

Appendix A
Photograph of Broken Cam Lock Fitting



Failed cam lock and quick connect fitting.

Appendix B
Photograph of Broken Fitting



View of portion of fractured quick connect fitting protruding from pipe union and reducer.

Appendix C
Persons Participating in the Investigation

Newmark Acquisition, LLC

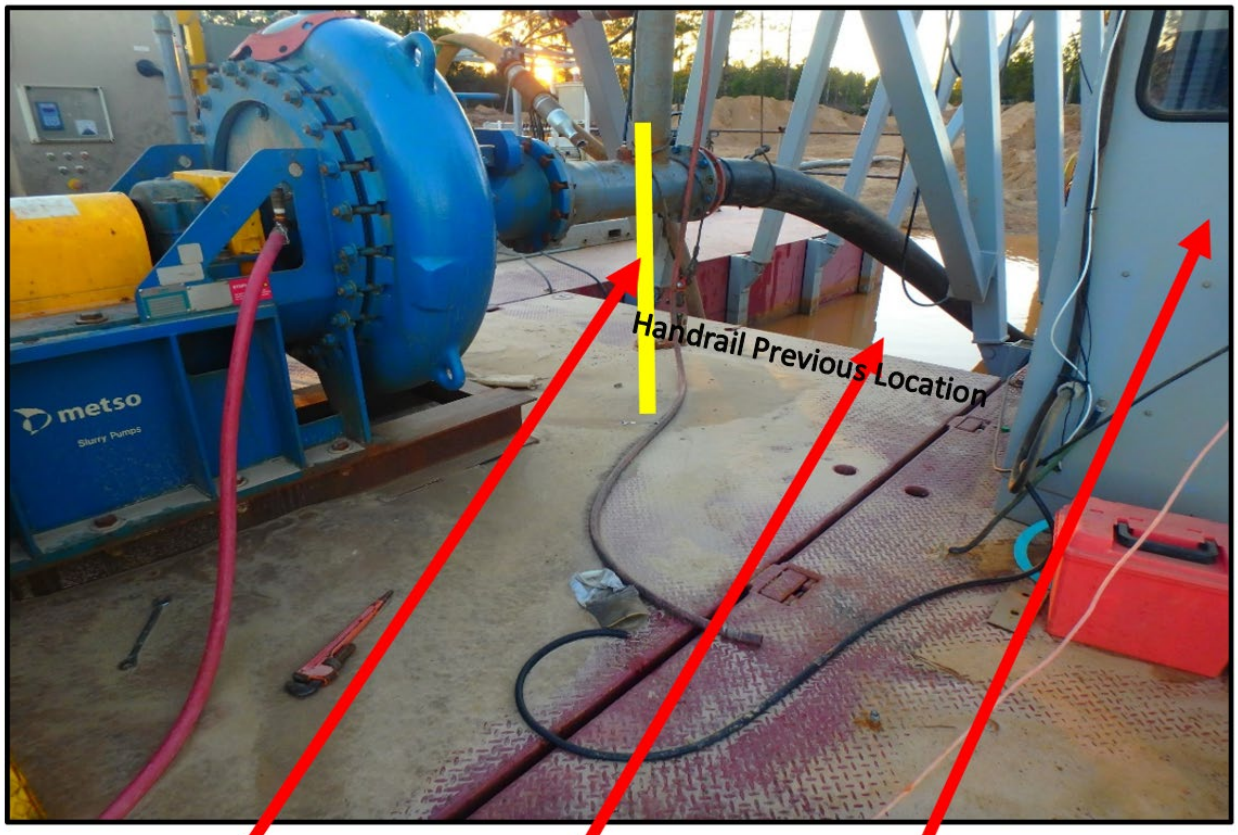
Kevin A. Cook	Member
Preston L Dartez	Equipment Operator
Hunter C. Jones	Loader Operator
Susan D. Jones	Office Manager
Beau M. Perero	Mine Supervisor
Timothy J. Spears	Equipment Operator
Paul D. Tupper	Dredge Operator

Mine Safety and Health Administration

Chad Derouen	Mine Safety and Health Inspector
Laurence Dunlap	Supervisory Mine Safety and Health Inspector
Russell Stackpole	Mechanical Engineer, Technical Support

Appendix D
Aerial Photograph Showing Location of Dredge

Appendix E
Photograph of Accident Scene



Location of victim prior to accident. Key in the dredge where victim entered water. Operator's station.