

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Surface Nonmetal Mine
(Crushed, Broken Stone)

Fatal Machinery Accident
July 17, 2019

Northeast Aggregate Corporation
Northeast Aggregate Corporation
Swanton, Franklin County, Vermont
ID No. 43-00585

Investigators

Everett G. Kinser
Mine Safety and Health Inspector

Daniel F. Pullen
Mine Safety and Health Inspector

F. Terry Marshall
Mechanical Engineer

Originating Office
Mine Safety and Health Administration
Northeastern District
Thorn Hill Industrial Park
178 Thorn Hill Road, Suite 100
Warrendale, Pennsylvania 15086-7573
Peter J. Montali, District Manager

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OVERVIEW

Ryan I. Charbonneau, a 32-year-old general manager with over 14 years of mining experience, died on July 17, 2019, at 12:13 p.m., when a hydraulic hammer attachment (hammer) fell on him. Charbonneau was preparing to replace the motor on a crusher using an excavator with the hammer attached. Charbonneau stood below the hammer and signaled the excavator operator into position over the old drive motor. The hammer fell from the excavator, struck Charbonneau, and pinned him on the crusher work platform.

The accident occurred because: 1) The operator did not remove the excavator from service to repair damaged hydraulic components; and 2) The installed carrier attachment was incompatible with the Fleco 325B C-linkage quick coupler (quick coupler), rendering the secondary means of latching inoperative when the primary means of latching failed.

GENERAL INFORMATION

Northeast Aggregate Corporation owns and operates the Northeast Aggregate Corporation surface crushed stone quarry (Northeast) operation in Swanton, Franklin County, Vermont. Northeast operates one, ten-hour shift, five days a week and employs five miners. Northeast drills and blasts stone in a multi-bench quarry. Front-end loaders are used to transport the broken stone to the onsite plant for processing where it is crushed, sized, and sold as aggregates

to a variety of commercial users. Theodore S. Gilman, Quarry Manager, is the person in charge of safety and health at the mine.

The principal officers at this mine at the time of the accident were:

Marie A. Charbonneau Director
Ryan I. Charbonneau General Manager

The Mine Safety and Health Administration (MSHA) completed the last regular inspection of this mine on October 2, 2018. The non-fatal days lost (NFDL) incident rate for the Northeast Aggregate Corporation for 2018 was zero, compared to the national average of 1.35.

DESCRIPTION OF ACCIDENT

On July 15, 2019, Ryan Charbonneau attempted to remove the hammer from the excavator before using it to remove the old motor from the portable jaw crusher work platform. He was unable to disengage the hammer from the excavator's quick coupler and decided to leave the hammer attached to the excavator. The excavator was used to break oversize rocks in the quarry up until the time of the accident.

On July 17, 2019, Robert Root, Equipment Operator; Theodore S. Gilman, Quarry Manager; Paul Tipper, Equipment Operator; and Gary L. McAllister, Equipment Operator, arrived at 7:00 a.m. for the morning shift. Tipper began operating the excavator and noticed there was a hydraulic oil leak in the mechanism that latched the hammer to the quick coupler. Tipper notified Gilman of the leak, and Gilman and McAllister examined the equipment. They were unable to find the cause and location of the hydraulic oil leak. To prevent further leakage, Gilman removed the two hydraulic oil hoses connected to the quick coupler latching mechanism and load-locking valve arrangement. Gilman then covered (capped) the two ports on the load-locking valve arrangement of the quick coupler and the two hydraulic supply ports on the excavator boom.

At approximately 10:45 a.m., Charbonneau arrived at the mine site and Gilman and McAllister informed him that the hydraulic ports had been capped. He spoke with Gilman and McAllister about the decision to cap the hydraulic ports. The three men examined the latching mechanism before deciding to proceed. McAllister moved the excavator from the quarry to the crusher and informed Root that the hydraulic ports had been capped. Root then began operating the excavator.

Charbonneau and McAllister walked to the crusher work platform to guide the excavator into position to remove the old motor. Charbonneau was standing next to the crusher booth on the east side of the platform. McAllister was standing on the west side of the platform, just above the crusher flywheel (see Appendix A). Root began to position the excavator's boom and hammer while Charbonneau and McAllister directed him with hand signals. Charbonneau was standing below the hammer, which was approximately 7.5 feet above the work platform. When Root rotated the hammer to the horizontal position, the hammer fell from the quick coupler, striking Charbonneau in the head, knocking him down, and pinning him to the work platform.

McAllister yelled for help. Gilman, who was returning from parking his truck, grabbed a chain and used it to attach the hammer to the excavator boom. Root used the excavator to lift the hammer off of Charbonneau. Miners were not able to completely remove Charbonneau from under the hammer until additional equipment was brought to the site. The additional equipment was needed because the excavator did not have the lifting capacity due to the loss of hydraulic oil.

At approximately 11:55 a.m., Gilman called 911 and requested medical assistance. At 12:03 p.m., emergency medical crews arrived at the mine site, and at 12:13 p.m., Steven Stryker, AmCare Ambulance Paramedic, pronounced the victim dead do to extensive trauma.

INVESTIGATION OF ACCIDENT

At 12:14 p.m., Gilman called the Department of Labor National Contact Center (DOLNCC). The DOLNCC notified Dennis Yesko, MSHA's Northeastern District Assistant District Manager, who dispatched John Burton, Mine Safety and Health Inspector, to the mine site. Upon arrival, Burton secured the scene and ensured the safety of the miners.

At 5:11 p.m., Everett G. Kinser and Daniel F. Pullen, Mine Safety and Health Inspectors in MSHA's Portsmouth, New Hampshire field office, arrived on the scene to conduct the fatal accident investigation. Upon arrival, Kinser issued a 103(k) order. MSHA's accident investigation team conducted a physical examination of the accident scene, interviewed five mine employees and seven contractor employees, reviewed training documentation, and examined work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management, mine employees, local law enforcement, and rescue agencies. See Appendix B for a list of persons participating in the investigation.

DISCUSSION

Location of Accident

The accident occurred on the west side of the crusher control booth on a Cedarapids portable jaw crusher work platform (see Appendix C).

Weather

The weather at the time of the accident was cloudy with an average temperature of 80° F. Investigators did not consider weather to be a factor in the accident.

Equipment Involved

The equipment involved in the accident was a Caterpillar 325B L excavator, product identification number 2JR02784. At the time of the accident, the excavator was equipped with a Fleco 325B C-linkage quick coupler and a Gorilla GHB150 hydraulic hammer (see Appendix D). This attachment assembly was provided and installed by Perry's Equipment Inc. of Swanton, Vermont several years prior to the accident.

The hammer was secured to the excavator's quick coupler by a latch. The hammer has a carrier on one side that connects to the quick coupler, and the latch holds the hammer's carrier securely. Two systems cause the latch to remain closed and hold the hammer's carrier securely. The two systems are the primary latching system and the secondary latching system.

Primary Latching System

The primary latching system is controlled by a hydraulic cylinder. When the hydraulic cylinder is extended, it closes the latch, and when the hydraulic cylinder is retracted, it opens the latch. The primary latching system is designed so that hydraulic pressure, on the extend side of the hydraulic cylinder, causes the hydraulic cylinder to keep the latch in the closed position at all times when the excavator is operating. The latch will remain closed unless a series of switches inside the cab are used to open the latch. A check valve prevents the latch from opening if hydraulic power to the extend side of the hydraulic cylinder is lost.

Disconnected and Damaged Hydraulic System

As mentioned earlier, Gilman removed the two hydraulic hoses connected to the hydraulic cylinder from the excavator and installed caps on all four fittings. In addition, investigators found that the tube welded to the extend side of the hydraulic cylinder was cracked and the tube welded to the retract side of the hydraulic cylinder was broken into two pieces. This defeated the load locking valve feature for the latch and allowed a constant flow of hydraulic oil to leak (see Appendices F and G).

Secondary Latching System

A secondary latching system used a safety pin arrangement to mechanically keep the latch from opening (see Appendices E and H). The safety pin can be inserted into one of two holes in excavator's quick coupler. The proper hole depends on the amount of separation of the two pins in the hammer's carrier. The operator's manual for the quick coupler indicated that the maximum recommended pin separation for the type of pins in the hammer's carrier, is 475 mm. The separation of the pins in hammer's carrier was 520 mm which circumvented the safety pin as a secondary means of securely holding the hammer's carrier.

Summary

When Root rotated the hammer to the horizontal position, the weight of the hammer on the latch and hydraulic cylinder forced hydraulic oil out of the cracked tube and through a broken weld where the load locking valve arrangement was welded in place. As the hydraulic oil evacuated the tube, the latch opened. The secondary means also failed due to the incompatibility of the quick coupler and hammer's carrier. The hammer fell because the primary and secondary latching systems could not serve their intended function.

Training and Experience

Charbonneau had over 14 years of mining experience, all with Northeast. MSHA determined there were no contributory training deficiencies.

ROOT CAUSE ANALYSIS

The accident investigation team conducted a root cause analysis to identify the underlying cause 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 accident occurred because the operator did not repair the disconnected and damaged hydraulic cylinder assembly for the quick coupler or remove it from service after discovering a hydraulic oil leak.

Corrective Action: The quick coupler involved in the accident was removed from service. Mine management and miners have been reinstructed on the provisions of 30 CFR § 56.14100 including the removal of unsafe equipment that affects the safety of miners.

2. **Root Cause:** The accident occurred because the operator used an incompatible carrier attachment. The mismatched equipment components circumvented the secondary latching system allowing the hammer to disengage from the quick coupler when the primary means of latching failed.

Corrective Action: Management removed the quick coupler from the excavator and adopted a policy eliminating the use of quick coupling devices at this operation. The operator will ensure that all equipment is used within the design capacity of the manufacturer.

CONCLUSION

Ryan I. Charbonneau, a 32-year-old general manager with over 14 years of mining experience, died on July 17, 2019, at 12:13 p.m., when a hydraulic hammer attachment (hammer) fell on him. Charbonneau was preparing to replace the motor on a crusher using an excavator with the hammer attached. Charbonneau stood below the hammer and signaled the excavator operator into position over the old drive motor. The hammer fell from the excavator, struck Charbonneau, and pinned him on the crusher work platform.

The accident occurred because: 1) The operator did not remove the excavator from service to repair damaged hydraulic components; and 2) The installed carrier attachment was incompatible with the Fleco 325B C-linkage quick coupler (quick coupler), rendering the secondary means of latching inoperative when the primary means of latching failed

Approved By:

Peter J. Montali
District Manager

Date

ENFORCEMENT ACTIONS

- 1) A 103(k) Order No. 9463427 was issued to Northeast Aggregate Corporation on July 17, 2019.

A fatal accident occurred at this operation on 07/17/2019 at approximately 11:55 a.m. This order is being issued under section 103(k) of the federal mine safety and health act of 1977, to prevent destruction of any evidence which would assist in investigating the cause or causes of the accident and protection of the miners. It prohibits all activity at the pit where the accident occurred until MSHA deems that it is safe to resume normal mining operations in this area. This order was initially issued orally to the quarry manager at 12:35 p.m. and has now been reduced to writing.

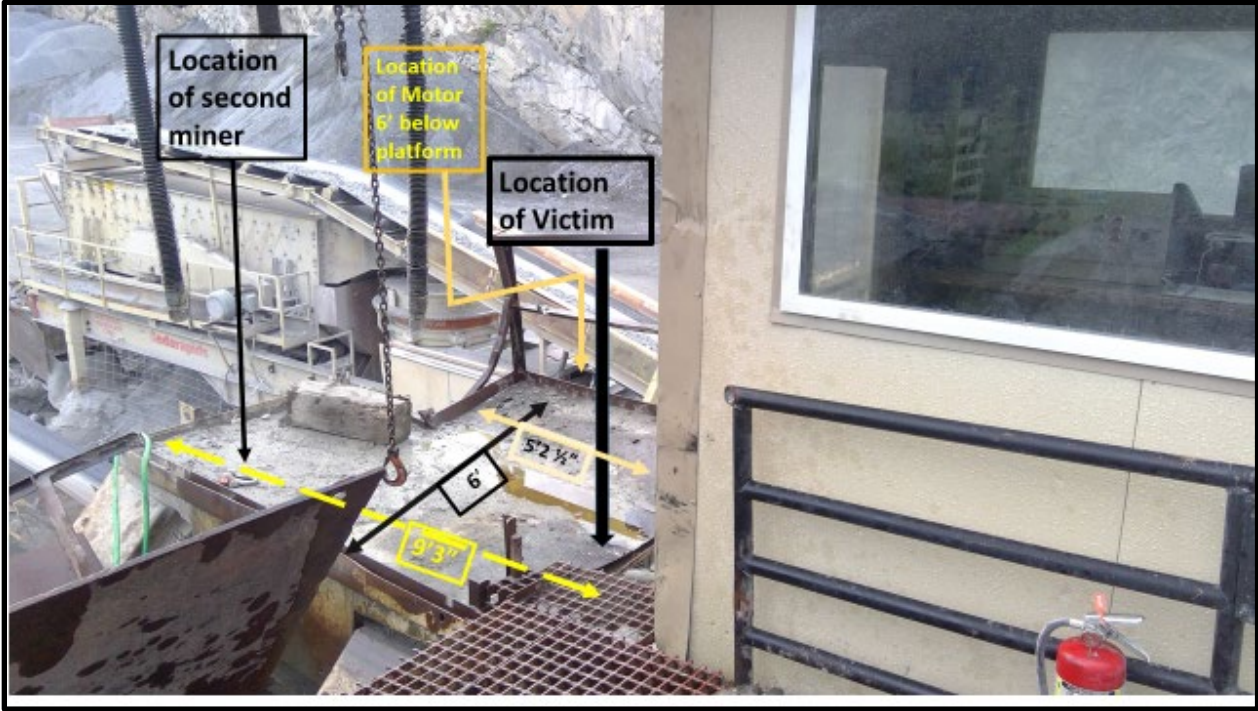
- 2) A 104(d)(1) Citation No. 9463437 was issued to Northeast Aggregate Corporation for violation of 30 CFR § 56.14100(c) on September 24, 2019.

A fatal accident occurred at this mine site on July 17, 2019, when the General Manager (victim) was struck by a falling GHB150 Gorilla hydraulic hammer attachment during the removal process of a crusher motor. Mine management did not remove the Caterpillar 325B L excavator from service until a known hydraulic oil leak that created a hazard to persons could be corrected.

- 3) A 104(a) Citation No. 9463438 was issued to Northeast Aggregate Corporation for violation of 30 CFR § 56.14205 on September 24, 2019.

A fatal accident occurred at this mine site on July 17, 2019, when the General Manager (victim) was struck by a falling GHB150 Gorilla hydraulic hammer attachment during the removal process of a crusher motor. Perry's Equipment Inc. supplied and installed an incompatible quick coupling device with the hammer's carrier attachment. This circumvented the secondary latching system, and allowed the hammer to disengage from the quick coupler when the primary means of latching failed.

Appendix A
Location of Charbonneau and McAllister at the time of the accident



Appendix B

Persons Participating in the Investigation

(Persons interviewed are indicated by a * next to their name)

Northeast Aggregate Corporation

Theodore S. Gilman* Quarry Manager
Robert Root* Equipment Operator
Gary L. McAllister* Equipment Operator
Chris Duprey* Equipment Operator

Private Contractor

Bill Hathaway Equipment Mechanic

Munson Earth Moving Corp.

Jim Benoit Vice President
Mike Holmes Machinist/Mechanic

Mine Safety and Health Administration

Everett G. Kinser Mine Safety and Health Inspector
Daniel F. Pullen Mine Safety and Health Inspector
F. Terry Marshall Mechanical Engineer
Blane Shrewsberry Mine Safety and Health Specialist (Training)

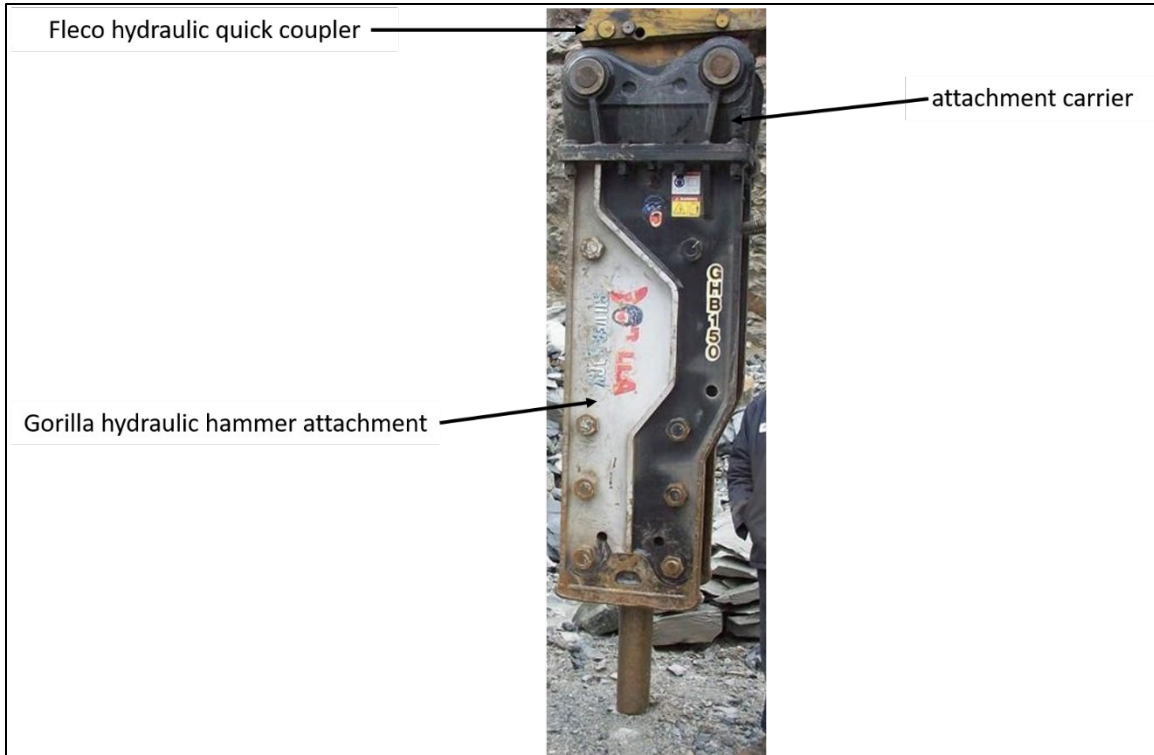
Appendix C

Cedarapids Portable Jaw Crusher Work Platform



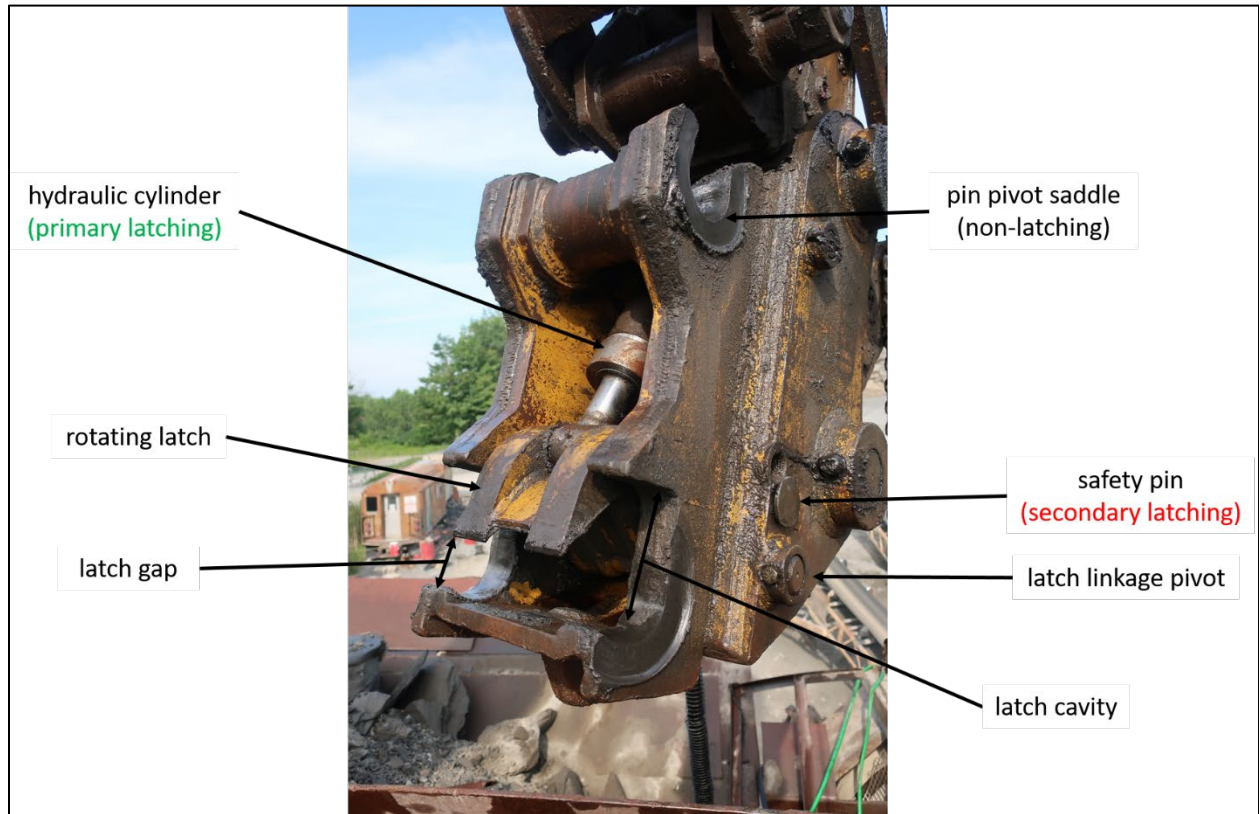
Appendix D

Arrangement and Identification of Components



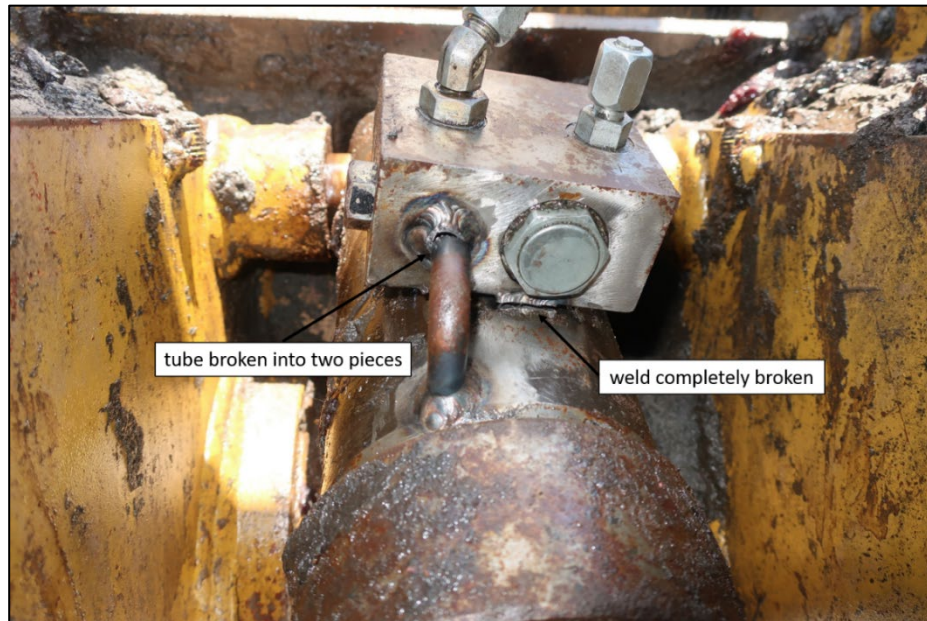
Appendix E

Quick Coupler Arrangement



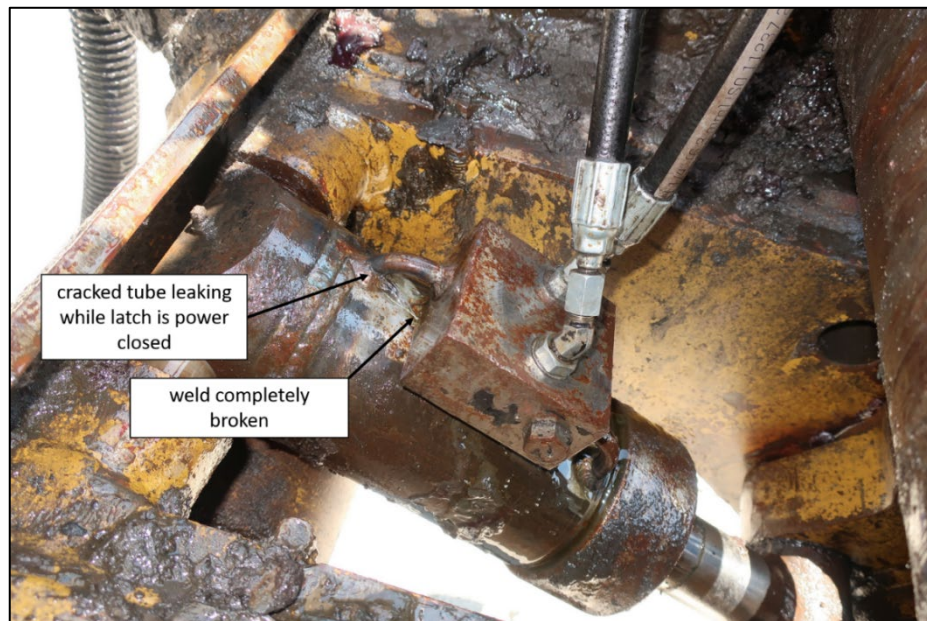
Appendix F

Condition of Tube to Retract Side of Hydraulic cylinder and Broken Attachment Weld (one of two) for the Load Locking Manifold Block



Appendix G

Hydraulic Leak at Tube to Extend Side of Hydraulic Cylinder during Excavator's Normal Operating Mode and Broken Attachment Weld (two of two) for the Load Locking Manifold Block



Appendix H

Safety Pin Arrangement and Pin Location (hole 1)at Time of Accident

