MAI-2016-13

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

REPORT OF INVESTIGATION

Surface Nonmetal Mine
(Crushed and Broken Limestone)

Fatal Machinery Accident
September 21, 2016

Gilliam & Mundy Drilling Co.
Buchanan, Botetourt County, Virginia
Contractor ID No. X7B
at
Holston River Quarry Inc.
Dublin, Pulaski County, Virginia
Mine ID No. 44-06134

Investigators:

Thomas J. Shilling
Mine Safety and Health Inspector

David Lance Stimmel
Mine Safety and Health Inspector

Ronald Medina
Mechanical Engineer

Mark D. Kvitkovich
Mechanical Engineer

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

OVERVIEW

On September 21, 2016, Donald L. Layton (victim), a 52 year old Contract Drill Operator/Mechanic, was fatally injured at a limestone mine while performing maintenance on a truck-mounted rotary drill. Layton was attempting to remove the spindle cap from the rotary drill using a modified pipe wrench and the machine's drill hydraulics. When he activated the drill lever, the wrench swung in a counterclockwise direction and struck him, piercing his abdomen.

The accident occurred due to the contractor's failure to develop and implement safe procedures for maintenance on the rotary drill.

GENERAL INFORMATION

Holston River Quarry Inc. is a surface limestone mine owned and operated by Salem Stone Corporation, located in Dublin, Pulaski County, Virginia. The principal operating official is Martin J. O'Brien, Jr, President. Danny J. Booth, Mine Manager, is the person in charge of safety and health at the mine. The mine operates one, ten-hour shift five days a week. The operation currently employs twelve miners.

Limestone is drilled and blasted from a multiple-bench quarry. A front-end loader is used to load haul trucks, which transport the broken limestone to the onsite plant for processing. The material is then crushed, sized, and sold as construction aggregates to a wide variety of commercial users.

Gilliam & Mundy Drilling Co. is a commercial drilling firm located in Buchanan, Botetourt County, Virginia. The principal operating officials are Tommy W. Mundy and Tammy M. Ewen, Co-Owners. Holston River Quarry Inc. contracted Gilliam & Mundy Drilling Co. to drill holes for onsite blasting. At the time of the accident, Donald L. Layton was the contractor's sole mechanic/drill operator and their only employee working at the mine site.

The Mine Safety and Health Administration (MSHA) completed the last regular inspection at this operation on April 20, 2016.

DESCRIPTION OF ACCIDENT

For several days prior to the accident, Layton documented in his contractor's drill log that the machine he was operating had a leaking water seal on the top drive power head spindle cap (see Figure 1). Two days before the accident, Layton drilled blast holes in the quarry and moved the drill to the equipment staging area.

On September 21, the day of the accident, Layton reported for work at the mine at 7:50 a.m. and began performing mechanical work on the drill. At approximately 8:20 a.m., he attempted to replace the drill top drive power head spindle cap with one that had a new water seal already installed. Standing on the raised drill platform, Layton tried to loosen the spindle cap with a modified pipe wrench and the machine's drill hydraulics, reaching into the operator's compartment to move the rotation control lever. As Layton activated the lever, the wrench swung in a counterclockwise direction and struck him, piercing his abdomen. The force of the impact pinned Layton against the operator's cab, denting the frame and breaking the side window.

Hunter R. Thomas (Management Trainee) witnessed Layton attempt to climb down from the drill platform step ladder, fall to the ground and strike his head. Thomas was approximately 100 feet away from the drill at the time and immediately ran toward Layton. When Thomas observed the extent of Layton's injuries, he ran to Charles D. Dalton (Miner) and Jason S. Sheets (Foreman), who were outside the shop, for help. At 8:23 a.m., Sheets called 911 and requested emergency medical assistance. Thomas and Dalton ran to Layton to provide assistance and Sheets quickly followed. Dalton

returned to the shop to retrieve first aid supplies and a handful of rags. Justin Shaw (Mechanic) was in the shop talking on his cell phone when he heard a commotion outside. When Shaw left the shop, he saw Layton on the ground with the others surrounding him and ran to the drill. Thomas left Sheets, Dalton and Shaw at the drill and drove a pickup truck into the quarry to notify Danny J. Booth (Mine Manager) who was operating a front-end loader at the time. Thomas and Booth returned to the drill in the pickup truck to assist.

Michael D. Greer, Vice President of Operations for Holston River Quarry Inc., was driving by the mine and noticed an unusual amount of vehicles driving very quickly around the shop. Greer called Booth on his cell phone and asked him what was happening at the mine. Booth informed him that there had been an accident and a drill operator was severely injured. Greer called Helena P. Hester, Corporate Safety and HR Coordinator, to notify her of the accident. After notifying Hester, Greer drove to the shop. At that time, Booth had stepped away from the drill to contact Hester and Tammy Ewen, to notify them of the accident.

Emergency medical crews arrived at approximately 8:31 a.m. Layton was transported to a local hospital for treatment and subsequently airlifted by helicopter to another hospital where he underwent surgery. Layton died later that day as a result of his injuries. The cause of death was reported as "penetrating blunt injury to the abdomen."

INVESTIGATION OF THE ACCIDENT

Helena P. Hester called the Department of Labor's National Contact Center (DOLNCC) to notify MSHA of the accident at 8:30 a.m. on September 21, 2016. The DOLNCC notified Kevin H. Abel, Assistant District Manager in the Northeastern District, and an investigation was started the same day. In order to ensure the safety of all persons, MSHA issued a Section 103(k) order when the first Authorized Representative arrived at the mine.

MSHA's accident investigation team traveled to the mine, conducted a physical inspection of the accident site, interviewed employees, and reviewed conditions and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management, mine employees, contractor management, contract employees and the Virginia Department of Mines, Minerals, and Energy.

DISCUSSION

Location of Accident

The accident occurred at an equipment staging area located near the main shop on mine property (see Figure 2). The truck-mounted rotary drill was parked approximately 120 feet from the southwest corner of the shop. The drill truck frame was raised approximately one-foot off the ground and the machine's three outriggers were deployed. Layton was working on the raised drill platform, 54 inches above ground level (See Figure 3).

Equipment Involved in the Accident

Drill Rig: The Ingersoll-Rand/Atlas Copco Model T4BH Drill Rig, the drill involved in the accident, has a rubber-tired, truck-type chassis. The drill has an enclosed cab located at the right-rear corner of the carrier. The drill operator can control the rotational speed and the maximum available drilling torque using controls in the enclosed drilling cab. At the time of the accident, the drilling power pack engine was running and the drill rotate controls were operational.

Following the accident, according to witness statements, the drill engine was shut off while attending to the victim. The investigators observed the drill rotate control lever in the center position (drill rotation stopped). The by-pass rotation control lever, which causes the power head to rotate while pulling a drill string out of a hole using fast feed, was also observed in the center position (stopped). After the engine was restarted, the power head did not rotate and the engine speed was set for 1,200 rpm. The drilling rotation speed control lever was found at the maximum rotation speed setting. When tested, the emergency stop button functioned to immediately stop the drilling power pack engine and this caused the rotating power head spindle to coast to a stop. The drill rotation controls functioned as designed when tested.

Wrench: Layton was using a Ridgid steel, heavy duty straight pipe wrench, which had been modified prior to the accident. The handle of the 60-inch wrench had been cut down to 29 ½ inches, leaving an overall length of 38 inches with an opened jaw (See Figure 4). Some of the teeth in the fixed jaw and moveable jaw were worn and flattened. The weight of the modified pipe wrench was 46.5 pounds.

Ridgid, the pipe wrench manufacturer, warns users not to use pipe wrenches on hard, square, or hexagonal material; not to apply high impact loads to the wrench handle; not to use the wrench in conjunction with power drives or any mechanical/hydraulic device; not to modify a pipe wrench; and to replace the jaws of the wrench when the teeth are worn. Investigators concluded that Layton attached the modified pipe wrench to the spindle cap and was supporting it against the drill tower structure while reaching inside of the operator's cab to operate the drill rotation hydraulics.

The accident occurred because a safe procedure for removing the spindle cap was not available to Layton at the time of the accident. The Ingersoll-Rand / Atlas Copco service manuals for the drill rig did not have a procedure for spindle cap removal, nor did the contractor. To prevent a similar accident, the contractor developed and implemented a safe spindle cap removal procedure, which is shown in Appendix D. The procedure utilizes a remotely applied portable hydraulic wrench while the drill engine is off and locked out. All drilling personnel were trained in the new procedure.

Weather

At the time of the accident, weather conditions were clear with an average temperature of 66 degrees Fahrenheit and a relative humidity of 84 percent. The investigators determined that the weather conditions and lighting were not contributing factors in the accident.

TRAINING AND EXPERIENCE

Donald L. Layton had over 4 years of mining experience as a drill operator/mechanic with Gilliam & Mundy Drilling Co. Layton had over 30 years total mining experience. A representative of MSHA's Educational Field and Small Mines Services reviewed the contractor's Part 46 training records for Layton. The records documented that he had received all of the required training.

ROOT CAUSE ANALYSIS

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

Root Cause: The accident occurred because a safe procedure for removing the spindle cap was not available to Layton at the time of the accident. The victim used a pipe wrench that had been modified from the original design and he operated the drill rotation function from outside of the equipment cab, directly in line with the rotating wrench.

Corrective Action: The drill was taken off site to the Noland Drilling Equipment facility and repaired. Afterward, the contractor developed a safe procedure for removing the spindle cap and it is included as Appendix D. The procedure utilizes a portable hydraulic wrench, remotely applied while the drill engine is off and locked out. All drilling personnel were trained in the new procedure.

CONCLUSION

The accident occurred due to the contractor's failure to develop and implement a safe procedure for removal of the drill's top drive power head spindle cap. Layton used a pipe wrench that had been modified from its original design, prior to the accident, and operated the drill rotation function controls from outside of the equipment cab, directly in line with the rotating wrench.

ENFORCEMENT ACTIONS

Issued to Holston River Quarry Inc.:

Order No. 8927279 - Issued on September 21, 2016, under the provisions of Section 103(k) of the Mine Act.

> *An accident occurred at this operation on 09/21/2016 at 08:23 hours. This order is being issued, under section 103(k) of the Federal Mine Safety and Health Act of 1977, to protect the safety of all persons on-site and prevent the destruction of any evidence which would assist in investigating the cause or causes of the accident. It prohibits all activity at the area 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 mine operator at 09:00 hours and has been reduced to writing.*

The order was subsequently terminated on September 29, 2016, after the drill was taken off site to the Noland Drilling Equipment facility and repaired. Afterward, the conditions that contributed to the accident no longer existed.

Issued to Gilliam & Mundy Drilling Co. (Contractor I.D. No. X7B):

Citation No. 9313320 - Issued under the provisions of 104(a) of the Mine Act for violation of 30 CFR § 56.14105:

> *An accident resulting in a fatality occurred at this operation on September 21, 2016, when a contract drill operator / mechanic (victim) was performing maintenance on a truck-mounted Ingersoll-Rand/Atlas Copco Model T4BH Drill Rig. The victim was attempting to remove the spindle cap from the drill top drive power head while standing on the drilling deck. The victim was using a modified pipe wrench in an attempt to loosen the spindle cap while operating the machine's drill rotation hydraulics from outside of the operator's cab. When the victim activated the drill rotation, the wrench swung around towards him and knocked him against the outside of the operator's cab, piercing his abdomen. The victim died later that day as a result of his injuries. The drill's engine had not been turned off and the machine was not blocked against hazardous motion within the swing radius of the rotating wrench.*

Approved: Peter J. Montali Date: 02/03/2017

Peter J. Montali
District Manager

LIST OF APPENDICES

APPENDIX A

PERSONS PARTICIPATING IN THE INVESTIGATION

Gilliam & Mundy Drilling Co.

Tommy W. Mundy	Owner
David Moore	Drill Operator

Mine Safety International LLC.

Lannie D. Hoosier	Safety Consultant for Gilliam & Mundy Drilling Co.

Dinsmore & Shohl LLP

Max L. Corley, III	Attorney, Counsel for Gilliam & Mundy Drilling Co.

Holston River Quarry Inc.

Danny J. Booth	Mine Manager
Charles D. Dalton	Miner
Michael D. Greer	Corporate Vice President of Operations
Helena P. Hester	Corporate Safety & HR Coordinator
Justin Shaw	Mechanic
Jason S. Sheets	Foreman
Hunter R. Thomas	Management Trainee

Virginia Department of Mines Minerals and Energy, Division of Mines

Willie A. Cochran	Inspector

Mine Safety and Health Administration

Thomas J. Shilling	Mine Safety & Health Inspector
David L. Stimmel	Mine Safety & Health Inspector
Ronald Medina	Mechanical Engineer
Mark D. Kvitkovich	Mechanical Engineer
Fred R. Martin	Mine Safety & Health Specialist

APPENDIX B

VICTIM INFORMATION

Accident Investigation Data - Victim Information

Event Number: 6 7 5 3 0 4 9

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
Donald L. Layton	M	52	01 Fatal

5. Date(MM/DD/YY) and Time(24 Hr.) Of Death:
a. Date: 09/21/2016 b.Time: 12:45

6. Date and Time Started:
a. Date: 09/21/2016 b.Time: 7:30

7. Regular Job Title:
004 Mechanic/ drill operator

8. Work Activity when Injured:
030 changing a spindel cap

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

10. Experience	a. This Work Activity: Years	Weeks	Days	b. Regular Job Title: Years	Weeks	Days	c. This Mine: Years	Weeks	Days	d. Total Mining: Years	Weeks	Days
	4	6	1	4	6	1	4	6	1	26	6	1

11. What Directly Inflicted Injury or Illness?
050 60 inch pipe wrench

12. Nature of Injury or Illness:
180 Impalement

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

14. Company of Employment: (If different from production operator)
Gilliam and Mundy drilling company Inc

Independent Contractor ID: (if applicable) X78

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

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

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

APPENDIX C

ACCIDENT SCENE PHOTOS

Figure 1 - Top of Power Head showing Spindle Cap (close-up)

Figure 2 - The Ingersoll-Rand/Atlas Copco Model T4BH Drill Rig (overview)

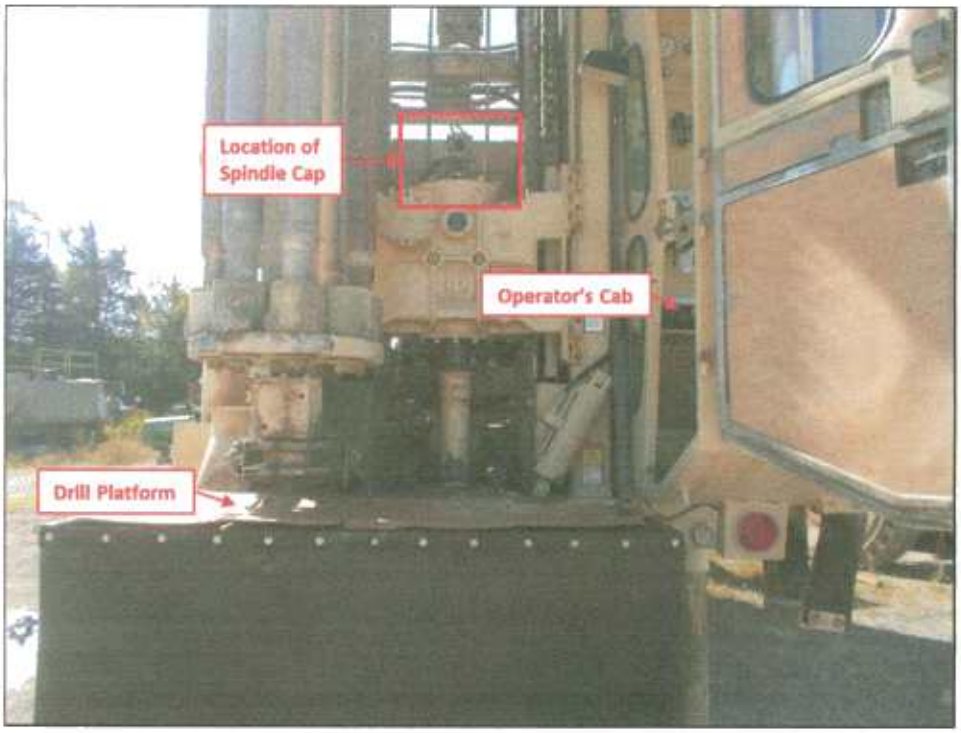

Figure 3 – Accident Site, showing Location of Spindle Cap.

Figure 4 - Modified Pipe Wrench

APPENDIX D

SPINDLE CAP REMOVAL PROCEDURE

GILLIAM & MUNDY DRILLING CO. INC

Procedure for Removing Top Head Spindle Cap on the 1995 T4BH Drill Rig, Serial #7065

Using a Scorpion Hydraulic Breakout Wrench Model 800ST, or equivalent in the event this equipment has to be upgraded, the drill operator will attach the rod wrench of the drill to the bottom of the spindle to restrict its movement during the breakout process from within the operator's cab. The drill rig will then be shut off and locked out. The mechanic will put the breakout wrench in place on the level of the top head spindle cap using a fork lift. The fork lift will be blocked against movement. The mechanic will place the breakout wrench on the spindle nut while standing on the drill table. He will then get down from the drill table and stand on a 6-foot ladder to engage the unit to loosen the spindle cap. The Scorpion breakout wrench will then be removed and the mechanic will finish loosening the spindle cap by hand using a chain wrench while standing on the drill table.

Tommy W. Mundy, President

Date: 12/15/2016

Page 1 of the plan

P.O. Box 800 Buchanan, VA [illegible] • [illegible]

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Scorpion Oil Tools
Hydraulic Wrench Model 800-ST
Serial No. 300

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Scorpion Oil Tools
Hydraulic Wrench Model 800-ST
Serial No. 300

Scorpion OIL TOOLS

HOME ABOUT PRODUCTS SHOWS MEDI

800-ST

O.D. Range - Base Package: 5-1/2" to 11"
O.D. Range - Overall Capacity: 2-3/8" to 16"
Torque Range - Make-Up: 45,000 ft-lbs
Torque Range - Break-Out: 50,000 ft-lbs
Arm Spacing Adjustment: N/A
Dimensions: 58"W x 36"H x 32"D
Weight: 900 lbs

All of our machines feature the following:

- Safe and Easy to Operate
- Compact and Portable
- Instantly Converts between Make-Up and Break-Out Operation
- Built in Backup Arm
- Accurate Torque Control
- Easy Torque Adjustments
- Operates in Horizontal or Vertical Position
- Multiple Power Pack Options
  - Diesel
  - Electric
  - Gasoline
  - Pneumatic/Air
  - Rig's hydraulic system
- Optional Accessories
  - TorqueShark™ Torque Recording System (Click to learn more)
  - Reducer Package
  - Bit Breaker
  - Additional Links
  - Jaws for larger O.Ds
  - DPT – Drill pipe package

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