FAI-7013315-1

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Underground
(Limestone)

Fatal Fall of Roof or Back Accident
January 7, 2022

1366 Laurel
Laurel Aggregates of Delaware, LLC
Lake Lynn, Fayette County, Pennsylvania
ID No. 36-08891

Accident Investigators

Jan Lyall
Mine Safety and Health Specialist

Ronald Tulanowski
Mine Safety and Health Inspector

Ryan Stephan
Mechanical Engineer

James Vadnal
Mining Engineer

Sandin Phillipson
Senior Geologist

Originating Office
Mine Safety and Health Administration
Morgantown District
604 Cheat Road
Morgantown, WV 26508
Carlos Mosley, District Manager

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OVERVIEW

On January 7, 2022, at approximately 2:45 p.m., David Hayden, Jr., a 49 year-old front-end loader operator with 15 years of mining experience, died when an approximately 170-ton rock fell from the mine roof onto the cab of the front-end loader he was operating. He was loading blasted material from the production area at the time of the roof fall.

The accident occurred because the mine operator did not use ground support or otherwise control the roof where a geologic fault existed.

GENERAL INFORMATION

Laurel Aggregates of Delaware, LLC, a subsidiary of Arcosa, owns and operates the 1366 Laurel mine. Arcosa purchased the mine on April 9, 2021. The mine produces crushed and broken limestone using underground and surface mining methods. The mine employs 66 miners. The underground portion of the mine operates one ten-hour shift, five days per week and the surface portion of the mine operates two ten-hour shifts, five days per week. Limestone is excavated from the Upper Greenbrier, Lower Greenbrier, Loyalhanna, and the Pocono Sandstone formations.

The principal management official at the mine at the time of the accident was:

Brian Cramer	Plant Manager

The Mine Safety and Health Administration (MSHA) completed the last regular safety and health inspection at this mine on December 22, 2021. The 2021 nonfatal days lost (NFDL) incident rate for 1366 Laurel was zero, compared to the national average of 1.35 for mines of this type.

DESCRIPTION OF THE ACCIDENT

On January 7, 2022, at 6:00 a.m., Hayden started his shift. Jason Romito, Foreman, assigned him to load trucks underground with the Caterpillar 988K front-end loader. Hayden loaded material out of two locations and then drove the front-end loader to the intersection of the C19 and M27 headings. Hayden then loaded several trucks from this location before a large rock fell from the mine roof onto the cab of the front-end loader that he was operating. The accident occurred at approximately 2:45 p.m. and there were no eyewitnesses.

Clarence Myers, Haul Truck Driver, was returning to get another load from Hayden and was the first person to arrive at the accident location. He noticed significant dust suspended in the air as he approached the C19 heading. He thought Hayden had moved to a different heading because there was a lot of dust, so he drove past the accident location. When he could not locate Hayden in the other headings, Myers returned to C19. He then saw Hayden's front-end loader under the rock. Myers called for Hayden on the radio and did not receive a response. He then got out of the truck and ran towards the front-end loader yelling for Hayden and again got no response. Myers returned to his truck to call for help and contacted Romito and Brian Cramer, Plant Manager. Romito and Cramer went to the accident location to direct the activities. Glen Smith, Jr., Mobile Equipment Operator, heard the call for help and called 911 at 3:11 p.m. Fayette Emergency Medical Services (EMS) and arrived at the surface of the mine at 4:32 p.m. Smith coordinated the first responder activities from the surface.

Cramer directed the underground rescue activities. The rocks were removed from the top and from around the front-end loader, which required the use of an excavator and additional front-end loaders. This equipment was also used to move the front-end loader to a safe location. At 9:55 p.m., Fayette EMS arrived at the accident site and the local fire department used their rescue tools to remove Hayden from the cab of the front-end loader. Timothy Kimball, M.D., Manager of Special Medical Response Team, examined Hayden at the scene and pronounced him dead at 11:03 p.m.

INVESTIGATION OF THE ACCIDENT

On January 7, 2022, at 3:15 p.m., Richard Rohrssen, General Manager, called the Department of Labor National Contact Center (DOLNCC) to report a roof fall on a piece of machinery with a worker still inside. The status of the miner was unknown at the time and emergency services had been contacted. Jeff Maxwell, Supervisory Mine Safety and Health Specialist, received the call from the DOLNCC. Rohrssen also notified Carlos Mosley, District Manager, of the accident. Mosley contacted John Hayes, Assistant District Manager, and Michael Stark, Staff Assistant,

who sent Jan Lyall, Mine Safety and Health Specialist, and Ronald Tulanowski, Mine Safety and Health Inspector, to the mine to investigate the accident.

Lyall arrived at the mine at 5:30 p.m. and issued an order under the provisions of Section 103(k) of the Mine Act to insure the safety of the miners and preservation of evidence. Gregory Fetty, Assistant District Manager; Kevin Honeycutt, Supervisory Mine Safety and Health Inspector, arrived shortly after. At 7:45 p.m., Tulanowski arrived at the mine. MSHA's accident investigation team examined the accident scene and reviewed conditions and work practices relevant to the accident. MSHA conducted the investigation in conjunction with the Pennsylvania Department of Environmental Protection - Bureau of Mine Safety.

On January 11 and 12, 2022, members of MSHA Technical Support, Roof Control Division, traveled to the mine to assist in the investigation. On January 18, 2022, the accident investigation team interviewed mine management, miners, and other relevant personnel. See Appendix A for a list of persons who participated in the investigation.

DISCUSSION

Equipment Involved

The Caterpillar 988K front-end loader involved in the accident had a certified rollover protective structure (ROPS), as well as a falling object protective structure (FOPS). The FOPS was designed to withstand an impact energy equivalent to a 500-pound object falling from 17 feet.

Location of the Accident

The accident occurred near the intersection of the C19 and M27 headings (see Appendix B). This area was mined for six months prior to the accident and the roof did not have any additional support installed. The mine's ground control plan requires the use of roof bolts as roof support on an as-needed, where-needed basis. The C19 heading had been advanced three times during the six-month period. The post-accident survey at the location of the fall indicated a mining height of 31 feet. Mining heights near the accident location measured 30 feet and 28 feet, which are consistent with the typical height at this mine.

The mine operator's engineering consultant, Earthtech, Inc., used survey equipment to measure the wedge-shaped fall cavity. The cavity had dimensions of 37 feet long, 16.7 feet wide, and 6.3 feet high at the apex. Investigators calculated the weight of the wedge-shaped rock to be approximately 170-tons based on these dimensions and the rock density (see Appendix C). The rock fell approximately 17 feet onto the cab of the front-end loader.

Geologic Conditions

The rock associated with the fatality fell from beneath a west-dipping fault. The wedge-shaped profile of the rock was defined by the steeply inclined fault plane intersecting the more gently inclined limestone bedding. Mining was following the inclined limestone down-slope. Prior mining encountered east-dipping faults that were easily identified because the faults caused wedge shaped material to fall during mining. After the material fell, the mine operator supported the area around the east-dipping faults with bolts.

No east-dipping faults had been identified within the few crosscuts outby the accident site, however, west-dipping faults had been identified in C17 and C18 headings from material falling because of vibrations from blasting. The mine used eight-foot-long, ⅞-inch-nominal diameter, fully grouted roof bolts to support these faults. No material fell as a result of blasting in the C19 heading, therefore no roof bolts were installed. The cavity from where the rock fell measured 6.3 feet high at its greatest extent. The lack of installation of eight-foot-long roof bolts in and around the fault area, as in the adjacent entries, contributed to the accident.

Examinations

On January 7, 2022, prior to the start of the shift between 4:45 a.m. and 5:10 a.m., Romito conducted an examination of the working places and ground conditions. Examiners also conducted examinations after each blast was detonated during the six months prior to the accident. No hazards were noted in the examination books. Investigators determined that all examinations were conducted in accordance with MSHA safety standards.

Training and Experience

Hayden had 15 years of mining experience, including ten years of experience as a front-end loader operator. He had operated a front-end loader at this mine for eight years. All training was completed in accordance with MSHA Part 48 training regulations.

ROOT CAUSE ANALYSIS

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

Root Cause: The accident occurred because the mine operator did not use ground support or otherwise control the roof where a geologic fault existed.

Corrective Action: The mine operator revised the mine's ground control plan by including a written procedure for the installation of roof bolts. The plan requires eight-foot-long, ⅞-inch-nominal diameter, fully grouted roof bolts to be installed mine-wide on a five-foot by five-foot pattern to within ten feet of a mining face. The mine operator trained all miners on this procedure.

CONCLUSION

On January 7, 2022, at approximately 2:45 p.m., David Hayden, Jr., a 49 year-old front-end loader operator with 15 years of mining experience, died when an approximately 170-ton rock fell from the mine roof onto the cab of the front-end loader he was operating. He was loading blasted material from the production area at the time of the roof fall.

The accident occurred because the mine operator did not use ground support or otherwise control the roof where a geologic fault existed.

Approved By:

_____ _____

Carlos Mosley Date
District Manager

ENFORCEMENT ACTIONS

1. A 103(k) order was issued to Laurel Aggregates of Delaware, LLC.

   An accident occurred at this operation on January 7, 2022, at approximately 2:45 p.m. This order is being issued under the authority of the Federal Mine Safety and Health Act of 1977, under Section 103(k) to insure the safety of all persons at the mine, and requires the operator to obtain the approval of an authorized representative of MSHA of any plan to recover any person in the mine or to recover the mine or affected area. This order prohibits any activity in the affected area. The operator is reminded of the obligation to preserve all evidence that would aid in investigating the cause or causes of the accident in accordance with 30 CFR 50.12.

2. A 104(a) citation was issued to Laurel Aggregates of Delaware, LLC for a violation of 30 CFR 57.3360.

   On Friday January 7, 2022, at 2:45 p.m. a 49 year-old front-end loader operator died when an approximately 170-ton rock fell from the mine roof onto the cab of the loader. The rock fell from a fault located near the intersection of the C19 and M27 headings. No roof bolts were present in or adjacent to the area of the rock fall that struck the front-end loader. In adjacent headings and other areas of the mine, eight-foot-long, ⅞-inch-nominal diameter, fully grouted roof bolts are used as roof support where geologic faults were detected.

APPENDIX A – Persons Participating in the Investigation

Laurel Aggregates of Delaware, LLC

Brian Cramer	Plant Manager
George Jones	Foreman
Barry Rittenour	Foreman
Jason Romito	Foreman
Glen Smith, Jr.	Mobile Equipment Operator
Clarence Myers	Haul Truck Driver
Todd Shawley	Drill Operator
Darrell Gibson	Scaler Operator
Coty Liston	Roof Bolter

Pennsylvania Department of Environmental Protection - Bureau of Mine Safety

Scott Schilling	Program Manager, Industrial Mineral Division
William Hudak, Jr., P.E.	Mine Safety Engineer Manager
Richard Murphy	Program Manager 2 Bituminous Coal
Heather Campbell, P.G.	Licensed Professional Geologist
Tom Goodwin	Industrial Mineral Underground Mine Inspector
Shan Walsh	Industrial Mineral Underground Mine Inspector
Greg Barclay, P.E.	Mining Engineer Consultant
Joshua Chlopek, P.E.	Mining Engineer Consultant

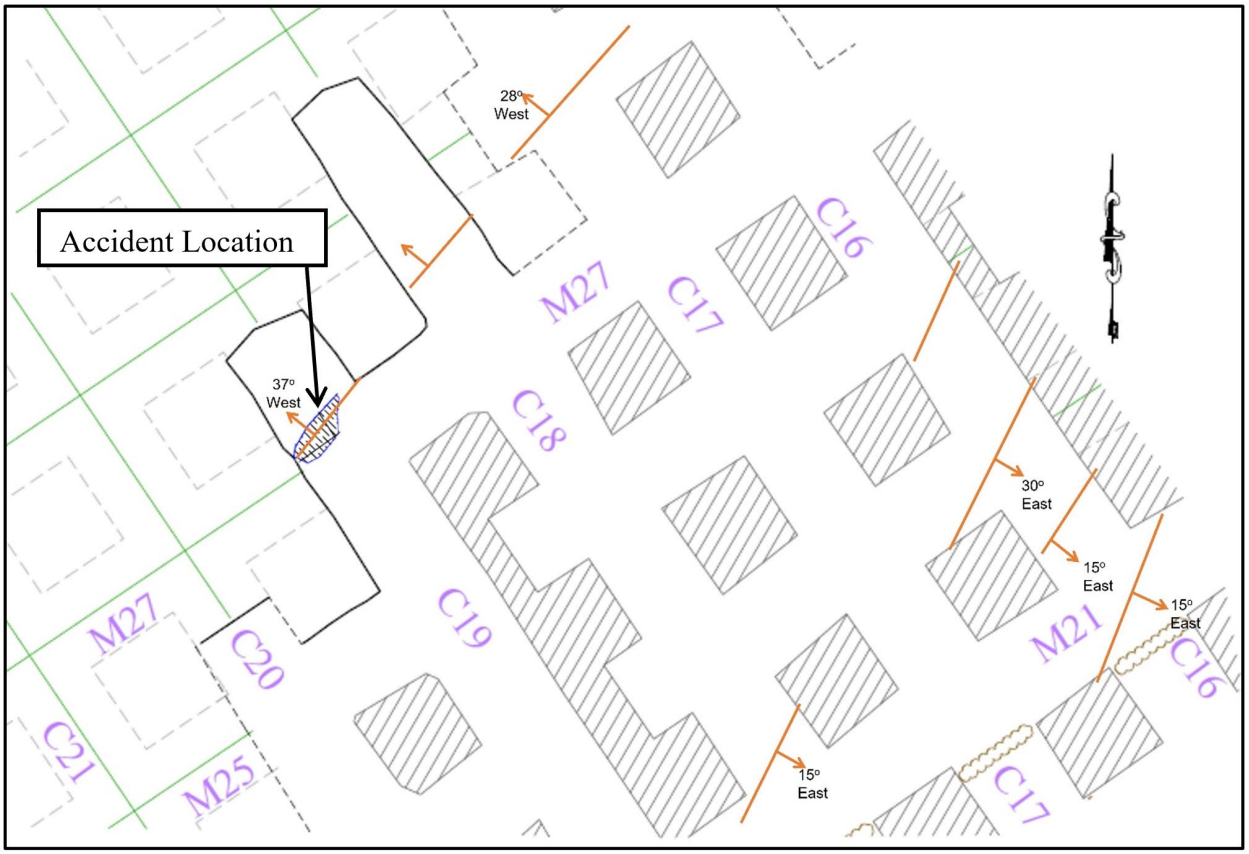
Special Medical Response Team

Timothy Kimball, M.D.	Manager

Mine Safety and Health Administration

Gregory Fetty	Assistant District Manager
Kevin Honeycutt	Supervisory Mine Safety and Health Inspector
Jan Lyall	Mine Safety and Health Specialist
Ronald Tulanowski	Mine Safety and Health Inspector
Ryan Stephan	Mechanical Engineer
James Vadnal	Mining Engineer
Sandin Phillipson	Senior Geologist
Emily Muto	Geologist

APPENDIX B – Accident Location



Local map showing accident location in the intersection of C19 and M27 Headings. Orange lines denote identified faults along with dip direction and angle. All identified faults on the map were supported by roof bolts with the exception of the accident location.

APPENDIX C – Rock Fall

View of rock fall from Crosscut M27 looking Southwest into Heading C19. The red outline indicates the wedge-shaped fall cavity.

View of rock fall from Heading C19 looking Northwest into face. The red outline indicates the wedge-shaped fall cavity.