

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

REPORT OF INVESTIGATION

Underground Nonmetal Mine
(Limestone)

Fatal Powered Haulage Accident
May 31, 2005

The Allen Company, Incorporated
Boonesboro Quarry
Richmond, Madison County, Kentucky
Mine ID No. 15-00006

Investigators

Thomas P. Clarkson
Supervisory Mine Safety and Health Inspector

Roger W. Rowe
Mine Safety and Health Inspector

F. Terry Marshall, PE
Mechanical Engineer

Deborah Combs
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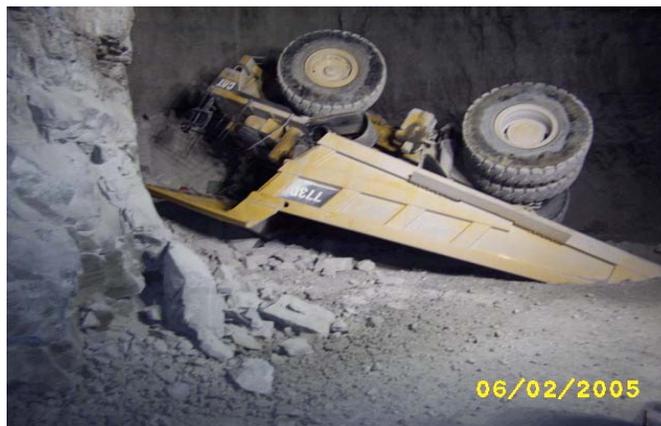
Originating Office
Mine Safety and Health Administration
Southeast District
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Michael A. Davis, District Manager



Aerial view of truck's tracks going over the berm



Inside view of cab



Position of truck after going through berm

OVERVIEW

James E. Woosley, Sr., truck driver, age 55, was fatally injured on May 31, 2005. He was riding in the passenger seat of a haul truck while task training a newly hired miner. The trainee lost control of the truck and traveled through a roadway berm. The truck fell 70 feet to the lower level and landed on its top. The trainee, who was wearing his seat belt, was hospitalized overnight for his injuries. The victim was not wearing his seat belt.

The accident occurred because the task training procedures for the newly hired miner were inadequate and did not ensure that he could safely operate the haul truck. The trainee operator had no previous experience operating heavy equipment. He had not completed his 40 hour new miner training before being assigned work duties. The operator's manual for the haul truck and other written procedures were available but were not used for task training.

GENERAL INFORMATION

Boonesboro Quarry, a crushed limestone operation, owned and operated by The Allen Company, Incorporated was located off Kentucky Highway 627 near Winchester, Madison County, Kentucky. The principal operating officials were Wilgus Fox, mine superintendent; Ralph Little, mine foreman; and Keith Jackson, crusher foreman.

Limestone was drilled and blasted from the underground production areas. Front-end loaders loaded the rock onto dump trucks which hauled the rock to the primary crusher located on the surface. The rock was crushed, screened, and stockpiled. Finished products were sold for use in the construction and fertilizer industry.

The mine normally operated one 10 hour production shift, 5 days a week. A maintenance crew performed work on the night shift. Total employment was 39 persons.

The last regular inspection of the mine was completed on March 24, 2005.

DESCRIPTION OF THE ACCIDENT

On the day of the accident, James E. Woosley, Sr. (victim) reported for work at 7:00 a.m., his normal starting time. His regular job was to operate a haul truck to transport rock from the underground mine to the surface crusher. Woosley operated his haul truck alone most of the morning. Jon Bexley, trainee, operated the truck with Woosley for a few trips. After lunch, Bexley rode in the haul truck with Keith Jackson, crusher foreman, for about two hours. About 2:00 p.m., Bexley again operated the truck with Woosley for two round trips in the mine.

As Bexley was returning to the underground loading area, he lost control of the vehicle when it started sliding and he hit the brakes. The truck hit the left rib near the berm, traveled through the berm, and over the bench to a level 70 feet below.

The victim's son, James Woosley, Jr., was first on the scene and found Bexley walking around outside the truck, stating that he lost control. The victim's son asked where his father was and Bexley pointed toward the truck. James Woosley, Jr. went to the truck and talked with his father. Anthony Tipton, truck driver,

arrived and James Woosley, Jr. left the scene to call an ambulance.

At 2:57 p.m., emergency medical personnel arrived. Both employees were transported to a hospital where the victim died, at 4:20 p.m., from blunt force trauma. Bexley was hospitalized with minor injuries and released the next day.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 4:30 p.m. on May 31, 2005, by a telephone call from Wilgus Fox, mine superintendent, to Arthur Ellis, assistant district manager. An investigation was started the same day. An order was issued pursuant to Section 103(k) of the Mine Act to ensure the safety of the miners. MSHA's accident investigation team traveled to the mine, made a physical inspection of the accident scene, interviewed employees and emergency medical personnel, and reviewed documents and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management and employees.

DISCUSSION

Location of the Accident

The accident occurred at the number 27 crosscut of 2 West roadway in the underground portion of the mine.

The "A" roadway was the normal route of travel for the haul trucks to access the 1 West trench area for loading out of the lower level. Investigators could not determine why the haul truck Bexley was operating was traveling in 2 West. Although the 2 West roadway was not routinely traveled, it was an accepted route.

2 West Roadway and 27 Crosscut area

The 2 West roadway was 42 feet and 9 inches wide and dipped 3 feet per 500 feet into the mine in the area of the accident. The road was straight, smooth, and wet from dust control watering.

The number 27 crosscut was 45 feet wide. The berm was constructed from fines material and was approximately 10 feet wide at the base, 36 inches high, and extended across the crosscut. There was a scrape mark on the pillar rib 21 feet, extending to the crosscut opening, on the same side of the road as the berm. The scrape mark was eight feet from the bottom and was five feet long. The truck catwalk was eight feet from ground level and was damaged horizontally. The tire tracks through the berm were perpendicular to it and in the center of the crosscut. There were no skid marks through the berming material. The posted speed limit in this area was 15 miles per hour (mph).

Rear Dump Haul Truck

The haul truck was a 2002 model 773D rigid frame rear dump truck manufactured by Caterpillar. The truck was equipped with a dump type bed, a Cat 3412E diesel engine, and a seven speed automatic transmission. Product information indicated that the diesel engine had a gross power rating of 682 horsepower at 2,000 revolutions per minute (RPM). The light weight of the truck was 95,000 pounds and the Gross Vehicle Weight Rating (GVWR) for this truck was 204,000 pounds. Using this information, the payload with the truck at its GVWR would be approximately 54 ½ tons.

The truck's engine could not be operated due to damage from the accident and recovery. The hydraulic lines for the steering and braking systems were intact and only repairs to a few air components that appeared to be damaged in the accident and/or recovery of the truck were required to functionally test the braking systems.

A functional seat belt was present in both the operator's side and passenger's side seating positions.

Braking System

The truck had a dual-circuit air over hydraulic service brake system (one circuit for the steering axle service brakes and one circuit for the drive axle service brakes). It had hydraulic-applied service brakes at all four wheels with dry caliper disc type brakes on the steering axle (front brakes) and enclosed wet disc type brakes on the drive axle (rear brakes). The service brakes were modulated by a foot pedal on the right side of the operator's compartment (right foot brake pedal).

The air portion of the service brake system was damaged in the accident and/or recovery of the truck. The relay valve for the front brake system had structural damage at a few of the air ports. Several fittings and an air line in the general vicinity of the relay valve were also damaged. These items were replaced in order to conduct brake system tests.

The air over hydraulic brake converter for the front brakes did not produce hydraulic pressure when tested. The brake converter was removed from the truck and partially disassembled for visual inspection. The master cylinder (the hydraulic portion of the brake converter) piston was determined to be seizing within the bore near the end of its stroke and the return spring in the rotochamber could not overcome the friction of the piston against the cylinder wall. This prevented the piston from returning to the released position. The investigators determined by visual observations that the piston was seizing within the bore prior to the accident.

Damage to the piston and bore prevented the piston from returning to the fully released position. When the truck was operated, the piston kept working its way to a full stroke position within the bore during cycling of the service brakes. The condition of this brake converter would have caused it to eventually not produce any effective pressure to the front brakes once the piston neared the full stroke position within the cylinder bore. The investigators determined that this defect did not contribute to the cause of the accident. A non-contributory citation was issued for this violation.

The air over hydraulic brake converter for the rear brakes functioned properly when tested. The hydraulic pressure for the rear brakes was approximately 600 pounds per square inch gauge (PSIG) with an air application pressure of approximately 90 PSIG. This is approximately equal to the 6.6 to 1 output ratio of the rear brake converter stated in the service manual.

The parking brake system consisted of a spring-applied, hydraulic release system that used the same wet brake disc pack as the service brakes at each of the two rear wheels. A finger operated flip switch mounted on the center console controlled the on/off function of the parking brake. No

problems were detected during testing of the parking brakes. The switch cycled the release pressure for the parking brakes. No significant pressure was lost in the system when the parking brakes were supplied with release pressure using a remote hydraulic pack while checking the wear for the wet brake disc pack.

The retarder system on this truck used the wet disc rear brakes (air over hydraulic rear service brakes) and was controlled by modulating a hand control lever on the right side of the steering column located underneath the steering wheel. The hand lever modulated the brake pressure to the rear service brakes when tested. This truck did not have the Automatic Retarder Control (ARC) option.

The truck also had a secondary brake system that was controlled by modulating a foot pedal on the left side of the operator's compartment (left foot brake pedal). This brake system actuated the air over hydraulic front service brakes and the spring applied parking brakes on the rear wheels. Regardless of the position of the front brake switch, this system would apply the front brakes when the secondary foot pedal was modulated. To test this brake system, an air line that appeared to be severed during the accident was repaired and the emergency towing feature of the secondary steering hydraulic circuit (hydraulic pressure supplied by the electric driven hydraulic pump for the secondary steering) was used to provide release pressure to the parking brakes. The foot pedal modulated the air pressure to the front brakes and the parking brake hydraulic release pressure when tested.

The filters and screens for the hoist and brake hydraulic system were removed from the machine and inspected. No significant debris was visually observed in any of the filters or screens that were removed.

None of the four drive lights appeared to have sustained damage during the accident. All four drive lights illuminated when the dash panel switch was cycled to the on position.

Steering System

The truck had a hydraulic steering system (primary steering system) with an electric secondary steering system that provided hydraulic pressure to the steering controls in the

event of an engine shutdown. The hydraulic steering system was visually inspected and determined to be both mechanically and hydraulically intact. The electric driven hydraulic pump for the secondary steering system provided back-up steering pressure when tested. No problems were identified with the primary or secondary steering systems that would have affected the ability of the operator to control the truck at the time of the accident.

Transmission

The truck had a seven speed automatic transmission with electronic shift control. The transmission selector lever was reportedly found in the 7th gear position. In this position, the transmission would automatically shift up and downshift throughout the entire speed range (1st - 7th gear position), depending on rear wheel speed and engine RPM, without requiring the operator to manually shift the selector lever. The maximum truck speed setting was 39 mph.

Diagnostic tests

Stored information regarding tattletale diagnostic codes, equipment maintenance history, and programmable operating parameters were viewed using Caterpillar's Electronic Technician software. Current or logged codes that were not damaged by the accident were checked. The diagnostic testing did not reveal any conditions that would have affected the ability of the operator to control the truck at the time of the accident.

Work Practice

Experienced miners were usually assigned to provide comprehensive and/or task training to new employees.

Training and Experience

James E. Woosley, Sr. had worked at this mine for one year and 27 weeks. He had received his 40 hours of new miner training in accordance with 30 CFR, Part 48. However, there were no records to indicate that he had received task training on the haul truck that the new miner was operating at the time of the accident.

Jon Bexley had worked at this mine eight days and had completed 32 classroom hours of the required 40 hours of new miner training when the accident occurred. He had no previous mining experience and had no previous experience operating heavy equipment.

ROOT CAUSE ANALYSIS

A root cause analysis was conducted and the following causal factor was identified:

Causal Factor: Management policies, procedures, and controls were inadequate and failed to ensure that employees received training in the health and safety aspects and safe work procedures related to operating mobile equipment. The new miner being trained did not maintain control of the equipment he was operating. Task training at this mine was inadequate because the new miner, who was driving the haul truck, had no previous experience operating mobile equipment. The operator's manual was not part of the task training. There were no records indicating that the miner who was providing the task training had received any task training on the operation of this model haul truck.

Corrective Action: Procedures should be established to provide adequate training to employees before they operate mobile equipment. Classroom training, that includes a thorough review of the operator's manual, should be provided prior to operating mobile equipment. Written safety rules and requirements should be made a hands-on part of task training. Monitor employees to ensure compliance with safe operating procedures at a location where production is not the primary objective.

CONCLUSION

The accident occurred because the task training procedures for the newly hired miner were inadequate to ensure he could safely operate the haul truck. The trainee operator had no previous experience operating heavy equipment. He had not completed his 40 hour new miner training before being assigned work duties. The operator's manual for the haul truck and other written procedures were available but were not used for task training.

VIOLATIONS

Order No. 6109525 was issued on May 31, 2005, under the provisions of Section 103(k) of the Mine Act:

A fatal accident occurred at this operation on May 31, 2005. A miner was killed when the Cat 773D haul truck #E18, in which he was the trainer passenger, over-traveled a berm on the 2 West road and 27 crosscut and fell approximately 60 feet to the level below. This order is issued to assure the safety of all persons at this operation. This order prohibits all activity in the areas around 27 crosscut on the 2 West road and the 1 West trench lower level until MSHA has determined that it is safe to resume normal operations in this area. The mine operator shall obtain prior approval from an authorized representative for all actions in the affect area.

This order was terminated on June 9, 2005 after conditions that contributed to the accident no longer existed.

Citation No. 6114131 was issued on July 7, 2005, under the provisions of Section 104(a) of the Mine Act for a violation of 30 CFR 48.7:

A fatal accident occurred at this mine on May 31, 2005, when a haul truck traveled through a berm and fell 70 feet to the level below. The victim, who was task training a newly employed inexperienced miner to operate the truck, was a passenger. The task training was inadequate in that the health and safety aspect and safe operating procedures were not addressed. The person assigned by management to conduct the training had not been provided with any specific written information regarding operational safety features. In addition, the miner designated to provide the task training had never received documented task training for this make and model of truck.

The citation was terminated on July 20, 2005. Equipment manufacturers' representatives provided additional training to all truck drivers. The training included operating procedures and instrumentation. Task training procedures for mobile equipment operators will include the use of operator manuals.

Citation No. 6224132 was issued on July 7, 2005, under the provisions of Section 104(a) of the Mine Act for a violation of 30 CFR 57.9101:

A fatal accident occurred at this mine on May 31, 2005, when a haul truck traveled through a berm and fell 70 feet to the level below. The victim, who was task training a newly hired inexperienced miner to operate the truck, was a passenger. The driver failed to maintain control of the truck while operating it on a roadway in the underground mine.

The citation was terminated on July 20, 2005. The mine operator conducted training with all employees who operate mobile equipment throughout the mine. This training addressed grades, berms, the use of seat belts and operating speeds that are consistent with the conditions of the roadways. All employees have been instructed in the procedures to check brakes on mobile equipment on the pre-operational inspection. They were also instructed to take any mobile equipment out of service when any safety defects are found.

Approved by: _____
Michael A. Davis
District Manager

Date: _____

APPENDIX A

Persons Participating in the Investigation

Allen Company, Inc.

Jason Gabbard	assistant vice president
Wilgus Fox	mine superintendent
Keith Jackson	crusher foreman
Ralph Little	mine foreman
Ron Turpin	asphalt plant superintendent
Jon Bexley	new miner
Jeff Culton	water truck operator
James Lucas	mechanic
Anthony Tipton	truck driver
James Woosley, Jr.	truck driver
Tom Azbill	driller

Whayne Supply, Caterpillar Dealer

Allen Lunsford	field service technician
Gary Lee	field service foreman

Madison County Emergency Medical Services

Patrick Worley	paramedic/shift supervisor
Leonard Lauria	paramedic
Mike Brewer	paramedic
Beth Walton	emergency medical technician
Charles Stiles	captain/madison county rescue squad
Al Barrett	lieutenant/madison county rescue squad

Mine Safety and Health Administration

Thomas P. Clarkson	supervisory mine safety and health inspector
Roger W. Rowe	mine safety and health inspector
F. Terry Marshall, PE	mechanical engineer
Deborah B. Combs	mine safety and health specialist