

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

REPORT OF INVESTIGATION

**Surface Metal Mine
(Gold)**

**Fatal Powered Haulage Accident
July 30, 2005**

**Ledcor Industries, Inc.
Contractor I.D. No. YOB
at
Barrick Goldstrike Mines, Inc.
Carlin, Eureka County, Nevada
Mine ID No. 26-01089**

Investigators

**Stephen A. Cain
Supervisory Mine Safety and Health Inspector**

**Kevin G. Hirsch
Mine Safety and Health Inspector**

**F. Terry Marshall
Mechanical Engineer**

**Originating Office
Mine Safety and Health Administration
2060 Peabody Road, Suite 610
Vacaville, California 95687
Ronald S. Goldade, Acting District Manager**



OVERVIEW

On July 30, 2005, Jonathan R. McClellan, equipment operator, age 23, was fatally injured when the water truck he was operating left a haul road and drove onto the berm. The truck climbed the berm, causing it to overturn and land back on the haul road. The victim, who was not wearing a seat belt, was ejected from the cab of the truck.

The accident occurred because the water truck driver did not maintain control of the water truck. The failure of the driver to wear the seat belt provided contributed to the severity of the injuries.

GENERAL INFORMATION

Goldstrike Mine, a surface gold ore mine and refining operation, owned and operated by Barrick Goldstrike Mine, Inc. (Barrick), was located 40 miles north of Carlin, Eureka County, Nevada. The principal operating officials were John Carrington, chief executive officer, and Michael Feehan, plant manager. The mine normally operated two 12-hour shifts a day, seven days a week. Total employment was 1,240 persons.

Gold ore was drilled and blasted from an open pit utilizing multiple benches. The ore was hauled to the crushers and transported to the mill for processing. Processed ore was fed into one of two identical roasters that heated the ore to 1,000 degrees Fahrenheit to burn off all impurities. The finished product was sold to commercial industries.

Ledcor Industries, Inc. (Ledcor), located in Reno, Nevada, was contracted by Barrick to provide mined material to the roaster and autoclave processing facilities. Ledcor would load and haul the material to each facility from stockpiles. The principal operating official was John Morand, Superintendent. Ledcor employed 40 persons at this mine who worked two, 12-hour shifts, seven days a week.

The last regular inspection of this operation was completed on December 27, 2004.

DESCRIPTION OF ACCIDENT

On the day of the accident, Jonathan McClellan (victim), reported to work at approximately 7:00 a.m., his normal starting time. McClellan operated the water truck watering roads and stockpile areas until approximately 12:30 p.m., when he took his lunch break. About 1:00 p.m., McClellan returned to the water truck and drove toward the roaster area using the main haul road. About 1:09 p.m., Randy Lakeman (Barrick employee), observed a truck approaching from a distance on the main haul road. He saw a cloud of dust and realized that the truck had left the road and overturned.

Lakeman immediately called dispatch and approached the accident scene on foot. He saw that McClellan had been ejected and was lying on the ground. Lakeman checked McClellan but he was non-responsive. Emergency medical personnel arrived a short time later along with personnel from the Eureka County sheriff's department. McClellan was pronounced dead at the scene by a Eureka County deputy sheriff. Death was attributed to blunt force trauma.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 2:00 p.m. on July 30, 2005, by a telephone call from Daniel H. Stevenson, Barrick's safety manager, to Ronald Goldade, acting district manager. An investigation was started the same day. An order was issued under the provisions of Section 103(k) of the Mine Act to ensure the safety of the miners.

MSHA's accident investigation team traveled to the mine, conducted a physical inspection of the accident site and equipment involved, interviewed persons, and reviewed documents and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management and employees of Barrick and Ledcor. Assistance was also provided by a State of Nevada mine inspector and the Eureka County Sheriff's Office.

DISCUSSION

Location of Accident

The accident occurred on the main haul road to the roaster. The haul road was 82 feet wide (six times the total width of the haul truck) measured berm to berm, with a 0.5% to 1.6% grade. The sun was directly overhead and was not a factor.

Path of Travel

Tire tracks indicated the water truck drifted from the left middle portion of the haul road for 178 feet before impacting the 5 foot 4 inch berm on the left side of the road. After striking the berm, the truck straddled it for approximately 145 feet with the left side tires above the berm and the right side tires digging into the bottom of the berm. The truck rolled over, landed on the left rear top of the water tank, then rolled back onto its wheels facing opposite the original direction of travel. McClellan was ejected from the driver's side window that was rolled down. There were no skid marks to indicate that the brakes were ever applied.

Equipment

The water truck was a 1981 Caterpillar (Cat) 769C powered by a Cat 3408 direct injection diesel engine and a seven speed automatic transmission. The diesel engine had a power rating of 474 horsepower at 2,000 revolutions per minute (RPM).

The 8,000 gallon water tank installed on the truck was visually estimated to have been approximately $\frac{1}{3}$ full (2,700 gallons of water). Baffles were visibly observed through the fill opening for both longitudinal and lateral water movement. The combined weight of the water truck and load was estimated at 90,000 pounds. Caterpillar information indicated that the gross vehicle weight with the maximum payload (35 tons) of the model 769C was approximately 135,000 pounds.

The 13 $\frac{1}{2}$ feet wide water truck had a rear mid-axle height of 35 $\frac{1}{2}$ inches above the ground, a 12 feet wheelbase, and an 11- $\frac{2}{3}$ feet track width.

Since, all system tests were conducted using remote air and hydraulic pressure sources as required. The right side wheel assembly separated from the truck and deflated during the accident and the right side steering linkage sustained significant damage.

The inner ball stud for the right side steering cylinder and the strut mount for the right side steering linkage broke.

Air System

The air system did not sustain any significant damage during the accident. Tests indicated that the water truck had a leak rate of approximately 2 pounds per square inch (PSI) per minute with the engine off.

The air gage in the dashboard panel functioned with a range of 60-120 PSI when tested. The low air pressure warning functioned because the low air pressure warning light and the buzzer came on when the air pressure in the service brake system fell below 62 PSI and went off when pressure built above 68 PSI.

The air system was designed to have three one-way check valves installed at tank inlets to isolate specific systems in the event of a significant air loss in one of the other systems⁽¹⁾. Two of the three one-way check valve functions in the air system were found to be inoperative; the check valve for the service brake tanks and the check valve for the governor control tank.⁽¹⁾

The check valve for the service brake tanks was disassembled and significant amounts of small, rock-like debris were observed within the check valve. The check valve for the governor control tank was missing from the system. However, the inoperative check valves did not affect the ability of the water truck driver to control the truck since the remainder of the air system was determined to be intact and had a minimal leak rate with the engine off (approximately 2 PSI per minute).

Service Brake System

The water 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). The truck had air over hydraulic-applied service brakes at all four wheels with bladder type drum 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. A finger-operated flip switch was mounted in the dashboard panel to give the driver the option to use the front brakes when the service brakes were applied. The front brake switch was found in the off position.

The right front hydraulic brake line was damaged in the accident; however, the rest of the hydraulic brake system was intact. This line was capped to conduct brake system tests of the other three wheel brakes.

The air over hydraulic brake converter for the front brakes did not produce hydraulic pressure when tested using the service brake foot pedal. The pilot line for the front

⁽¹⁾Caterpillar Form No. SENR7814-02, November 1981, page 8.

brake system, which was the air line from the foot treadle valve to the front brake relay valve, was nonfunctional. This air line was found plugged off at a fitting connection; therefore, no signal was getting to the relay valve when the service brake foot pedal was applied whether the front brake switch was in the on or off position. Investigators determined that this defect did not contribute to the accident and a non-contributory citation was issued.

The air over hydraulic brake converter for the rear brakes functioned properly when tested. The hydraulic pressure for the rear brakes was approximately equal to the 5.5 to 1 output ratio of the rear brake converter stated in the service manual⁽²⁾. The investigators determined that the rear service brakes on this truck were working properly and were adequate to stop and hold the loaded truck on the steepest grades traveled.

Retarder

The retarder system on this water 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 underneath the steering wheel. The hand lever modulated the brake pressure to the rear service brakes when tested and the air over hydraulic retarder converter for the rear brakes functioned properly when tested. The hydraulic pressure for the rear brakes was approximately equal to the 5.5 to 1 output ratio of the retarder converter referred to in the service manual⁽²⁾.

Parking Brake

The parking brake system on this water truck was 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.

Steering Systems

The water 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 hydraulically intact from the steering valve to the hydraulic steering cylinders; however, the steering valve was determined to be damaged during the accident. The valve experienced a severe external leak once it was placed under the load of system pressure.

The electric driven hydraulic pump for the secondary steering system functioned when tested with the manual switch. The automatic function of the supplemental steering system could not be tested due to the electronic control module being damaged during the accident.

⁽²⁾Caterpillar Form No. SENR7814-02, November 1981, page 18.

Compressed air was used to stroke the steering cylinders in both directions to determine if the cylinders were sticking or binding and to visually inspect the rod surfaces for any signs of a possible problem. No problems were identified with either steering cylinder that would have affected the ability of the water truck driver to control the water truck at the time of the accident.

Transmission

The water truck had a seven speed automatic transmission with electronic shift control. The transmission selector lever was found in the 5th gear position. In this position and with the maximum gear setting at 7th gear, the transmission would automatically upshift and downshift throughout this speed range (1st – 5th), depending on rear wheel speed and engine RPM, without requiring the operator to manually shift the selector lever. Product literature indicated that the maximum machine speed in 5th gear was approximately 25 miles per hour and the maximum machine speed in 7th gear was about 45 miles per hour.

Engine Throttle and Shutdown Controls

The foot operated throttle pedal modulated the air operated mechanical throttle linkage on the engine was tested. No binding or sticking was observed.

No problems were identified with the engine throttle and shutdown controls that would have affected the ability of the operator to control the truck at the time of the accident.

Seat Belts

A functional seat belt was present in both the operator's side and passenger's side seating positions. All four sections of the two seat belts had labels that indicated compliance with SAE J386 performance requirements.

Training and Experience: Jonathan McClellan worked at this mine for 15 months. He had received training in accordance with 30 CFR, Part 48.

Medical Analysis and Findings: A sample of the victim's blood was analyzed for alcohol and controlled substances by an independent forensic laboratory. Methamphetamine levels were determined to be 68 ng/ml. No independent observations of the victim's behavior could support that he was impaired due to the drug.

ROOT CAUSE ANALYSIS

A root cause analysis was performed and the following causal factors were identified:

Causal Factor: The driver failed to maintain control of the water truck while it was in motion. Although the levels of the methamphetamine could not be established as impairing the victim, it is a medical fact that fatigue occurs as the user withdraws from the substance.

Corrective Action: Management should continue to focus attention toward substance abuse and educate miners regarding the symptoms and behavior exhibited by persons who may be abusing controlled substances.

Causal Factor: The driver of the water truck failed to wear his seat belt while operating the truck.

Corrective Action: Management should strengthen their mandatory seat belt requirement by checking mobile equipment operators more frequently.

CONCLUSION

The accident occurred because the water truck driver did not maintain control of the water truck. The failure of the driver to wear the seat belt provided contributed to the severity of the injuries.

ENFORCEMENT ACTIONS

Ledcor Industries, Inc.

Order No. 6377806 was issued on July 30, 2005, under the provisions of Section 103(k) of the Mine Act:

A fatal accident occurred at this operation on July 30, 2005, when a miner was operating a Cat 769C 35 ton water truck, Company # 8206, on the north perimeter haul road. The water truck rolled and the victim was ejected. This order was issued to ensure the safety of all persons at this operation. It prohibits all activity in and around the scene of the Cat 769C water truck, Company # 8206, until MSHA determines 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 and/or restore operations in the affected area.

This order was terminated on August 5, 2005. The conditions that contributed to the accident no longer exist and normal operations can resume.

Citation No. 6350585 was issued on August 7, 2005, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 56.14131(a):

A fatal accident occurred at this mine on July 30, 2005, when a water truck left the haul road, struck a berm, and overturned. The operator of the truck was not wearing the seat belt provided and was ejected from the cab.

The citation was terminated on September 8, 2005. Management established a new seat belt monitoring system where supervisors are required to conduct random spot checks regarding seat belt usage. All equipment operators were provided additional training on seat belt usage. Management established a new discipline policy dealing with seat belt usage.

Citation No. 6350586 was issued on August 7, 2005, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 56.9101:

A fatal accident occurred at this mine on July 30, 2005, when a water truck left the haul road, struck a berm, and overturned. The operator of the self propelled equipment failed to maintain control of the equipment while it was in motion.

The citation was terminated on September 8, 2005. Management now requires that all supervisors visually meet with employees prior to the start of a shift. Management permits employees to take sleep breaks in designated areas upon approval of supervisors.

Approved By:

Ronald S. Goldade

Acting District Manager

Date

APPENDIX

Persons Participating in the Investigation

Ledcor Industries Inc.

Dwight Brissette	director of safety and health
John Morand	project superintendent
Michael Barrett	manager of safety and health
Sam Bankson	maintenance foreman

Barrick Goldstrike Inc.

Daniel H. Stevenson	superintendent of safety and health services
Jerry Hagy	safety director
Stephen K. Lambert	safety coordinator
Hardy Seay	surveyor

Eureka County Sheriff

Anthony Francone	deputy sheriff
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Cashman Caterpillar

Thomas Shrecengost	technical communicator
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Nevada Division of Industrial Relations

Jerry Murphy	mine inspector
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Mine Safety & Health Administration

Stephen A. Cain	supervisory mine safety and health inspector
Kevin G. Hirsch	mine safety and health inspector
F. Terry Marshall	mechanical engineer