

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Surface Nonmetal Mine
(Sand & Gravel)

Fatal Falling or Rolling Material Accident
January 5, 2006

Rinker Materials
Rinker Materials 19th Ave.
Phoenix, Maricopa County, Arizona
Mine I.D. No. 02-00988

Investigators

Thomas E. Barrington
Mine Safety and Health Inspector

James E. Eubanks
Mine Safety and Health Inspector

Ronald Medina
Civil Engineer

Hilario S. Palacios
Mine Safety and Health Specialist

Originating Office
Mine Safety and Health Administration
Rocky Mountain District
P.O. Box 25367, DFC
Denver, Colorado 80225-0367
Irvin T. Hooker, District Manager

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02-00988
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Accident Date: 1/5/06

OVERVIEW

Christopher M. Penatzer, heavy equipment mechanic, age 39, was fatality injured on January 5, 2006, while working on a front-end loader in the mine shop. The front and rear sections of the loader had been separated with each section independently supported by jack stands. The victim subsequently removed one of the jack stands and was positioned between the left rear tire and fender well/frame when the frame of the loader tipped forward on the tires and swiveled to the left on the rear axle oscillation trunnion and crushed him.

The accident occurred because procedures to properly block the front-end loader from hazardous motion were not followed.

GENERAL INFORMATION

The Rinker Materials 19th Avenue mine, a surface sand and gravel operation, owned and operated by Rinker Materials, Inc., was located at 3640 South 19th Ave., in Phoenix, Maricopa County, Arizona. The principal operating official was Mike Gendron, mine superintendent. The mine was normally operated two 8-1/2 hour shifts a day, six days a week. Total employment was 39 persons.

Sand and gravel was extracted from the pit with a front-end loader. The material was crushed, screened, and stockpiled. Finished products were sold for use in the construction industry.

The last regular inspection of this mine was completed on April 4, 2005.

DESCRIPTION OF THE ACCIDENT

On the day of the accident, Christopher M. Penatzer (victim) reported for work about 6:00 a.m., his normal starting time. John R. Essig, acting foreman, instructed Penatzer to remove the steering cylinders from the loader. The front-end loader was brought into the shop on January 3, 2006. The next day, Mark E. Dewes and Doug M. Schafer, heavy equipment mechanics, separated the loader and supported the front portion of the rear half on the screw jacks and the rear portion with Caterpillar support stands. Wheel chocks were placed behind the right rear tire and in front of the left rear tire.

Penatzer's duties required performing a work place examination in the mine shop. Prior to removal of the right and left steering rams from their cylinders, he also performed a "Job Hazard Analysis" and started to remove the right cylinder.

Penatzer completed the removal of the right cylinder barrel. Dewes helped Penatzer set the ram onto a used oil cart placed below the loader frame. The used oil cart was moved to the left side of the front end loader to repeat the process on the left steering cylinder.

Penatzer started working on the left cylinder and removed the left jack to give the used oil cart access under the loader frame to catch the leaking oil. Kelly Springerley, heavy equipment mechanic, saw Penatzer pulling the ram from the left cylinder. Springerley helped hold and pull the cylinder and placed it on the used oil cart and removed it from the work area.

Shortly before 11:00 a.m., Essig came to discuss the condition of the cylinders with Penatzer. After Essig left, Schafer was standing by the front-end loader's left side access ladder. He stretched, grabbing the ladder and pulled down. The loader moved and Schafer asked Penatzer if he had also seen the loader move. Penatzer confirmed he had and that he had pulled the left jack out of place to get the used oil cart in under the frame to catch the oil coming from the cylinder as

the ram was extracted. Schafer reminded Penatzer to replace the jack as soon as possible. At 11:00 a.m., both men then went to lunch until 11:30 a.m.

Penatzer then returned after lunch to finish removing the left steering cylinder from the frame. The steering cylinder pin was situated behind the left rear tire. Penatzer was talking to Dewes as he stepped onto the bottom rung of the operator's access ladder and grabbed onto the lower handrail attached to the operator's platform to get positioned in the opening over the wheel, below the left rear fender frame. As he slid into the opening, his weight was sufficient to change the center of gravity of the front-end loader causing the right rear tire to roll forward and the left front portion to drop to the floor. The opening between the tire and the fender/frame closed, wedging Penatzer's body between the tire and the fender/frame.

Mechanics working in the area responded and used the over-head crane to extricate Penatzer. Mine personnel administered first aid until local emergency personnel arrived.

Penatzer was transported to a local medical center where he was pronounced dead by the attending physician. The cause of death was multiple blunt force trauma.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 1:35 p.m., on January 5, 2006, by a telephone call from David Chavez, Rinker West Division safety director, to David Brown, supervisory mine safety and health inspector. 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 miners. MSHA's accident investigation team traveled to the mine, conducted a physical inspection of the accident scene, interviewed employees, and reviewed conditions and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management, employees and the Arizona State Mine Inspectors Office.

DISCUSSION

Location of the accident

The accident occurred in the east end heavy equipment bay of the mechanic shop. This shop bay was accessed from the north side of the building. The floor was dry at the time of the accident.

Front-end loader

The front-end loader involved in the accident was a 1981 Caterpillar, model 980C, that weighed approximately 65,000 pounds. The front-end loader had an articulated frame and was powered by a six-cylinder, Caterpillar diesel engine. The bucket unit was on the front half of the loader and the engine unit was on the rear section. The engine unit was 13 feet-2 inches long from the rear bumper to the center line of the articulation pin and 10 feet-2 inches wide over the tires. The axle on the engine unit was attached to the frame with a trunnion assembly that allowed the axle to oscillate +/- 15 degrees as specified by Caterpillar.

After the accident, the rear half of the machine was found with the wheels on the ground. The unit was tilted fully forward with the articulation joint area resting on the shop floor. The machine frame had rotated to the left on the oscillation trunnion. The space between the rear-left tire and fuel tank closed when the frame rotated to the left on the trunnion. The victim was pinned in this area.

The front half was positioned several feet in front of the engine unit and had no effect on the stability of the engine unit.

Support Stands and Jacks

The rear area of the engine unit was supported by two Caterpillar adjustable height support stands. Each support stand was rated at 20 tons for up to a 48-inch height. The support tube had a series of holes in it so a locking pin could be inserted to lock the tube, at selected heights, into the base of the support stand. Two 20-ton screw jacks were used to support the front of the engine unit in the articulation area.

Marks on the underside of the machine indicated that the probable locations of the jacks and support stands at the time of the accident were as follows:

The rear-left Caterpillar support stand was 19 inches from the back end of the machine and 19 inches from the left side of the machine.

The rear-right Caterpillar support stand was 13 inches from the back end and 12 inches from the right side.

The front-right screw type jack was 15 inches to the right of the articulation joint center line, and 17 inches back from the front tip of the frame at the articulation area.

The front-left screw type jack was found standing against the front-left tire on the engine unit. This jack had been removed to provide space for a three feet by four feet oil waste container under the steering cylinder to prevent spillage on the floor.

Both screw type jacks were set at 21 inches total length, the rear-left Caterpillar jack stand was set at 35 inches total length, and the rear-right Caterpillar jack stand was set at 33-1/2 inches total length.

Investigation Tests

Initially, the frame of the machine was lifted to a level position and secured with an overhead crane. The two rear support stands and the two front screw jacks were placed under the machine at the approximate locations they were at the time of the accident. When the overhead crane lowered the machine's frame, the left side of the articulation area also lowered. This caused the machine frame to tilt to the left on the oscillation trunnion as it did when the accident occurred, indicating that the unit was not stable in this configuration.

To more closely duplicate the conditions at the time of the accident, all the jacks were set at the same heights and placed at the probable locations they were at the time of the accident using the marks under the machine. The front-left articulation area was left unsupported as it was reported to be at the time of the accident. The unit was secured in position with an overhead crane.

When the overhead crane was lowered to allow slack in the support cable, the front-end of the unit did not visibly drop; however, the rear-right portion of the engine unit lifted one-half-inch away from the rear-right jack stand, indicating marginal stability. The front-right jack and the rear-left support stand remained in contact with the frame of the machine.

For comparison, when this test was repeated with the front-right screw jack adjusted to be 1-1/2 inches more than it was at the time of the accident (22-1/2 inches in length), both rear support stands as well as the front-right jack remained in contact with the machine frame without the overhead crane support.

These tests showed that a small amount of force would be needed to tilt the front-end loader forward or rearward from a balanced position. As the amount of tilt increased, the amount of force needed to push the unit back would increase as the center of gravity shifted.

Caterpillar Instructions

The Caterpillar Disassembly and Assembly Instructions for Separation of Loader Main Frames described the method to support the engine unit when it was separated from the bucket unit. This method required wood-blocking to be placed under the front of the main frame of the engine unit and two support stands to be placed under the rear portion of the engine unit. The Caterpillar instructions also required wood blocks to be placed between the rear main frame

and the axle housing on both sides of the machine to prevent side-to-side (oscillating) movement of the machine.

Training and Experience

Christopher M. Penatzer had 12-1/2 years mining experience, all at this mine. He had received training in accordance with 30 CFR, Part 46.

ROOT CAUSE ANALYSIS

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

Root Cause: The victim failed to recognize the hazard associated with working on an improperly blocked front-end loader.

Corrective Actions: Follow the manufacturer's procedures to block the front-end loader to ensure that persons performing the work are adequately protected.

Root Cause: Management failed to use oversight to ensure the job safety analysis procedure to safely block the front-end loader was followed.

Corrective Action: Employees and management should be trained to Stop, Look, Analyze, and Manage (SLAM) each task to evaluate possible hazards and ensure steps are taken to safely perform the task.

CONCLUSION

The accident occurred because procedures to properly block the front-end loader from hazardous motion were not followed.

ENFORCEMENT ACTIONS

Order No. 6313635 was issued on January 5, 2006, under the provisions of Section 103(k) of the Mine Act:

A fatal accident occurred at this operation on January 5, 2006, when a front-end loader fell on a mechanic working in the mine shop. An oral 103(k) order was issued to the company at 1:50 p.m., on January 5, 2006. This order is issued to ensure the safety of all persons at this operation. It prohibits all activity at the mine shop until MSHA has determined that it is safe to resume normal 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 January 9, 2006. Conditions that contributed to the accident no longer exist and normal operations can resume.

Citation No. 6318499 was issued on February 15, 2006, under the provisions of Section 104(a) of the Mine Act for violation of 56.14105:

A mechanic was fatally injured on January 5, 2006, during repair and maintenance to the rear section of an articulating front-end loader. The mechanic was positioned between the left rear tire and the loader's fuel tank when the loader tipped forward and to the left, pinning the mechanic.

The loader was not properly blocked against hazardous motion in that, one of the two jacks supporting the front of the loader's rear main frame had been removed. Also blocks had not been placed between the rear main frame and the axle housing on both sides of the machine to prevent side-to-side (oscillation) movement of the machine.

This citation has not been terminated.

Approved by,

Date: March 13, 2006

Irvin T. Hooker
District Manager

APPENDIX A
Persons Participating in the Investigation

Rinker Materials

Tom Hethmonvice-president safety and health
David G. Chavezdirector safety and health western division
John R. Essig acting shop lead man
Dan Speck..... senior vice-president west division

Arizona State Mine Inspectors Office

Tim Evans, CMSP deputy mine inspector

Robbins & Green, P.A.

Dwayne Ross attorney

Exponent

Darrin Richardssenior engineer

Mine Safety and Health Administration

Thomas E. Barringtonmine safety and health inspector
James E. Eubanksmine safety and health inspector
Ronald Medina mechanical engineer
Hilario S. Palaciosmine safety and health specialist