

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Surface Nonmetal Mine
(Limestone)

Fatal Machinery Accident
November 18, 2005

Celina Quarry
Rogers Group, Inc
Mine I.D. No. 40-00029

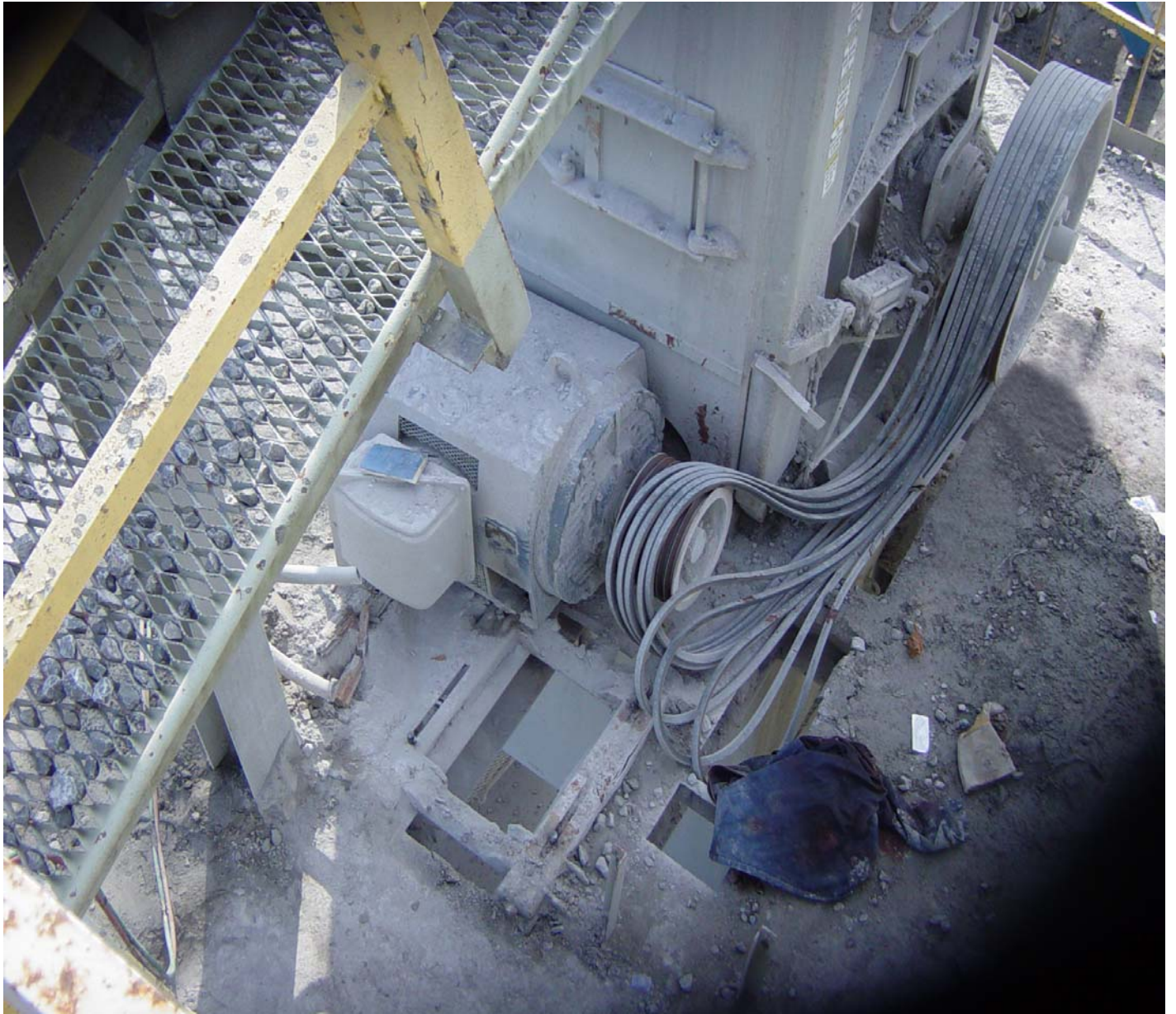
Investigators

Donald B. Craig
Supervisory Mine Safety and Health Inspector

Donald R. Baker
Mine Safety and Health Inspector

William L. Barnwell
General Engineer, P.E.

Originating Office
Mine Safety and Health Administration
Southeast District
135 Gemini Circle, Suite 212, Birmingham, AL 35209
Michael A. Davis, District Manager



OVERVIEW

Woncie Lee Bennett, plant operator/repairman, age 52, was fatally injured on November 18, 2005, when an electric motor suddenly moved as it was being lifted with a truck mounted mobile crane. The victim was standing between the motor and the crusher while a co-worker attempted to pry the motor off its mounting bolts.

The accident occurred because the procedures used to lift the motor were inadequate. The weight of the load exceeded the rated lift capacity of the crane for the angle and boom configuration used at the time of the accident. The victim was not clear of the suspended load when the lift was made.

GENERAL INFORMATION

The Celina Quarry, a crushed limestone operation, operated by Rogers Group, Inc., was located at Celina, Clay County, Tennessee. The principal operating official was Jesse Gilliam, area superintendent. The mine had ceased production and sales on November 11, 2005. The plant was being dismantled and the crusher was to be moved to another mine location. Total employment when the mine was operating was seven persons.

Limestone had been mined from benches in the quarry. Limestone was drilled, blasted, and hauled to the primary crusher by truck. It was then screened to various sizes and crushed again to a desired grade. The finished rock was loaded from bins, transported to stock piles, and sold as construction aggregate.

The last regular inspection at this operation was completed on November 2, 2005.

DESCRIPTION OF ACCIDENT

On the day of the accident, Bennett reported to work at 6 a.m. at the Algood Quarry where he was employed as a plant operator/repairman. He conducted the daily safety meeting for the other employees. Bennett drove to the Celina Quarry where he was to help Cameron Howard, maintenance foreman, dismantle an impact crusher.

The dismantling of the crusher required removing some sections of conveyor belt framing, an overhead trolley frame at the crusher, and the feed hopper to the crusher. A truck mounted mobile crane was used to lift the components as they were dismantled. The crane boom had to be extended over and beyond the impact crusher in order to reach the crusher's drive motor. The position of other conveyor belts and structures, as well as overhead power lines, prevented parking the mobile crane so the operator could see the motor while it was being lifted.

About 11:30 a.m., a torch was used to cut off the mounting bolt heads for the crusher drive motor. The v-belts connecting the two drive pulleys were still connected and tight. The motor base adjusting screws were corroded and caked with limestone. Howard stated that they wanted to re-use the v-belts so they did not cut them free of the pulleys.

The decision was made to utilize the mobile crane to lift the motor off the base. Howard operated the crane and was attempting to lift the motor from its base but the motor would not come loose. Howard could feel the front outriggers on the boom truck moving off the ground when he applied lifting pressure. About 1:50 p.m., he set the boom controls to maintain tension on the cables. Howard left the crane controls and found a short piece of triangular shaped metal that he placed over a 4 inch x 4 inch block of wood. Using this as a lever, he tried to pry the motor loose.

Bennett was leaning over the v-belts to determine the reason the motor would not move when it suddenly came loose. The motor swung toward the metal crusher housing and struck him.

Howard placed Bennett on the side of the walkway next to the crusher before he ran to the crane and phoned for emergency medical assistance. Emergency personnel arrived a few minutes later and treated the victim. A helicopter transported Bennett to a medical facility where he was pronounced dead by the attending emergency room physician. Death was attributed to blunt force trauma.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 3:40 p.m. by a telephone call from Ed Elliott, corporate safety director, to Wyatt S. Andrews, acting assistant district manager. An order was issued under the provisions of Section 103(k) of the Mine Act to ensure the safety of the miners. MSHA's investigators made 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 and employees.

DISCUSSION

Location

The accident occurred at the impact crusher located at the secondary plant crusher tower.

Crusher

The impact crusher was a model 130-150 Pettibone Universal. Eight large v-belts connected the crusher drive to the motor. The motor mounting mechanism had a feature that would allow the motor to be adjusted to tighten the belts for operation and loosen the belts for removal. There was no evidence showing that these adjustment bolts had been moved prior to the accident. At the time the motor was being removed, the belts remained in place and were tensioned.

Motor

The 300 horsepower electric motor weighed 3,080 pounds. No other information, including the manufacturer, was legible.

Horizontal Loading

The belts were in tension at the time of the accident, adding to the force being directed to the side of the motor where the victim was located. The pressure applied to the motor by the crane also caused the boom to flex toward the load and caused the outriggers to rise while upward pressure was applied to the motor.

This configuration placed potential energy on the motor, causing it to rise once the obstruction that prevented free movement was removed. One of the generic warnings posted on each side of the crane warned: "Crane load ratings on outriggers are based on freely suspended loads with the machine leveled and standing on a firm uniform supporting surface. No attempt shall be made to move a load horizontally on the ground in any direction."

Rigging-Taglines-Chains

The chain used to secure the motor to the lifting hook of the crane was a 3/8 inch, grade 80 chain that was 12 feet 10 inches long. It was rated at 7,100 pounds on straight pull. No physical damage or stretching of the chain was observed.

The angle to which the chain would have been rigged at the time of the accident was not a pure straight pull. However, this angle still provided load capacity of the chain for the weight of the motor.

The victim was positioned between the motor and the crusher immediately prior to the movement of the motor. No blocking material or taglines were available or in use to secure the motor or prevent it from swinging.

Mobile Crane

The crane involved in the accident was a Manitex Model 1161A mobile crane, mounted on a 1987 Ford F800 truck chassis. The truck was placed in position on the morning of the accident to assist in the dismantling of the crusher installation. The boom truck had not been repositioned after the accident.

The outriggers were in good physical condition and located on a compacted gravel base. There were no leaks observed in the crane's hydraulic system supporting the outriggers or the cable winch.

Evaluation of the Crane Loading

Although the truck had not been moved since the accident, the position of the crane had been changed from the time of the accident and the time of the accident investigation to lower the victim to the ground to assist emergency responders.

During the accident investigation, the crane boom was repositioned to reconstruct its approximate location at the time of the accident. This enabled investigators to read boom angle and boom extension length, both critical to proper load capacity

calculations. At the time of the accident, the boom was extended out at least 51 feet but investigators could not determine the exact length.

A Load Ratings Chart was mounted on each side of the operator's compartment on the mobile crane.

Operating Radius - 38.5 feet (measured), Boom Length - 52 feet. The chart was specific to this crane and was accompanied with other instructions that are generic to all cranes. The position of the crane, at the time of the accident, resulted in an operating radius of 38.5 feet, for lifting the subject motor, as measured during the accident investigation. This was the horizontal distance from the crane center to the center of the load to be lifted as measured during the accident investigation. Using the chart provided on the crane, the 38.5 feet operating radius was between the numbers 35 and 40. The boom length was then charted for an extended length of 52 feet (approximate). The crane was observed to be at a 45 degree boom angle. Using these numbers, the load rating resulted in a safe lifting capacity of 2,700 pounds. The motor weighed 3,080 pounds; therefore, the safe lifting range of the crane was exceeded.

Training and Experience:

Woncie Lee Bennett had 33 years and 4 weeks total mining experience. He had worked for this company for 10 years and had received annual refresher training in accordance with 30 CFR, Part 46.

ROOT CAUSE ANALYSIS

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

Causal Factor: A risk assessment to determine all possible hazards and to establish safe work procedures was not conducted prior to attempting to lift the motor. No procedures were in place to ensure persons were clear of suspended loads. The motor was not being lifted in a manner that protected persons from the hazard of the suspended load.

Corrective Action: Procedures should be established that require a risk assessment be conducted to identify and correct potential hazards associated with the task to be performed. Develop and implement safe crane operating procedures that ensure persons are protected from the hazards of working around suspended loads.

Causal Factor: Standards and controls were inadequate and failed to ensure the crane was utilized properly. Instructions in the operator's manual were not followed prior to making the lift with the crane. The weight of the load being lifted was not within the manufacturer's specified lift capacity based on the angle and position of the boom.

Corrective Action: Procedures should be established that require personnel to be familiar with and use the manufacturer's load charts when loads are being lifted and moved.

CONCLUSION

The accident occurred because the procedures used to lift the motor were inadequate. The weight of the load exceeded the rated lift capacity of the crane for the angle and boom configuration used at the time of the accident. The victim was not clear of the suspended load when the lift was made.

VIOLATIONS

Order No. 6101540 was issued on November 18, 2005 under the provisions of Section 103(k) of the Mine Act:

A fatal accident occurred at this mine on November 18, 2005, when the maintenance crew was attempting to remove an electric motor at the secondary plant's impact crusher. This order is issued to assure the safety of all persons at this operation. It prohibits activity at the area where the motor was being removed until MSHA has determined 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 restore operation to the affected area. This order was verbally issued to the mine operator on November 18, 2005 at 1540 hours (CST).

This order was terminated on November 20, 2005. Conditions that contributed to the accident no longer exist and normal mining operations can resume.

Citation No. 6101542 was issued on December 30, 2005, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 56.16009.

A fatal accident occurred at this mine on November 18, 2005, when a motor, suspended from the load line of a crane, swung free from its mounting location and struck a maintenance worker. The task proceeded although the victim was not clear of the suspended load.

This citation was terminated on January 11, 2006. All employees were instructed in the proper procedures to be practiced while working around suspended loads. Additional training was conducted with persons who operate cranes on mine property.

Order No. 6101543 was issued on December 30, 2005, under the provisions of Section 104(d)(1) of the Mine Act for violation of 30 CFR 56.14205.

A fatal accident occurred at this mine on November 18, 2005, when a motor, suspended from the load line of a crane, swung free from its mounting location and struck a maintenance worker. The crane was used beyond the design capacity intended by the manufacturer in that the weight of the load exceeded the rated lift capacity for the angle of the boom at the length it had been extended. Due to the crane's lifting capacity being exceeded it was unable to freely lift the motor. The victim was attempting to assist in freeing the motor from its location. Failure to utilize the load limits on the load chart which sets forth the safe lifting capacity of the motor constituted more than ordinary negligence and is an unwarrantable failure to comply with a mandatory safety standard.

This order was terminated on January 05, 2006. All employees were instructed in requirements for utilizing load charts while performing lifts using cranes. Additional training was conducted with persons who operate cranes on mine property.

Approved by: _____

Date: _____

Michael A. Davis

Southeast District Manager

APPENDIX A

Persons Participating in the Investigation

Celina Quarry

Jesse Gilliam	area superintendent
Cameron Howard	area maintenance foreman

Rogers Group, Inc.

Ed Elliott	corporate safety director
Adam Gregor	area safety officer
Jesse Gilliam	area superintendent
Cameron Howard	area maintenance foreman

Clay County Coroner's Office

Dr. Kenneth Beaty	coroner
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Mine Safety and Health Administration

Donald B. Craig	supervisory mine safety and health inspector
Donald R. Baker	mine safety and health inspector
William L. Barnwell	general engineer, P.E.