

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
METAL AND NONMETAL MINE SAFETY AND HEALTH
REPORT OF INVESTIGATION

Surface Nonmetal Mine
(Sand and Gravel)

Fatal Powered Haulage Accident
October 28, 2005

Crusher #3
Tri-City Paving, Inc.
Pine City, Pine County, Minnesota
Mine I.D. No. 21-03129

Investigators

Stephen W. Field
Mine Safety and Health Specialist

George F. Schorr
Supervisory Special Investigator

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Engineer

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Steven M. Richetta, District Manager



OVERVIEW

On October 28, 2005, Mitchel L. Mammenga, foreman, age 32, was fatally injured when the tandem wheels of a radial stacking conveyor struck and rolled over him. Mammenga and a co-worker were towing the conveyor with a steel chain hooked from the loader bucket to the tail end of the conveyor. The conveyor's movement was halted when the hydraulically operated radial wheels contacted the ground. When Mammenga raised the radial wheels, the conveyor moved suddenly and struck him.

The accident occurred because the operating procedures used to tow the conveyor were inadequate. Procedures had not been implemented to ensure that a solid-type hitch (tow bar) or other effective means was used to safely tow the stacking conveyor.

GENERAL INFORMATION

Crusher #3, a portable surface sand and gravel operation, owned and operated by Tri-City Paving, Inc., was located at Pine City, Pine County, Minnesota. The principal operating officials were: John D. Surma, president; and Daniel J. Surma, vice president. The mine normally operated two, 12-hour shifts per day, and five days a week. Total employment was four persons.

Material was mined from the pit with a rubber-tired front-end loader, crushed, screened, and then stockpiled by conveyor. The finished product was used onsite at the company asphalt batch plant and sold for construction aggregate.

The last regular inspection of this operation was completed on November 8, 2004.

DESCRIPTION OF ACCIDENT

On the day of the accident, Mitchel L. Mammenga (victim) reported for work at 3:30 a.m., his normal starting time. Mammenga and Joshua Reith, front-end loader operator, discussed the operation of the plant with two night shift employees, performed some clean-up around the plant, and resumed crushing road gravel for about 1½ hours. After changing screens on the plant, they decided to move the radial stacking conveyor to make a separate road gravel stockpile for a customer.

About 7:30 a.m., Reith was towing the radial stacking conveyor with a steel chain hooked from a rubber-tired front-end loader bucket to the tail end of the conveyor, which was the normal procedure used to move the conveyor. The conveyor's movement was halted when the hydraulically operated, radial wheels contacted the ground. Reith told Mammenga that the conveyor wouldn't move. Mammenga went to the hydraulic controls mounted on the conveyor support structure in front of the left side tandem wheels. While Mammenga was raising the radial wheels, the conveyor moved because the loader still had tension on the chain. Mammenga was unable to get out of the way and the tandem wheels struck and rolled over him.

Reith towed the conveyor for approximately 21 feet, turned the tail end of the conveyor, set it down, and disconnected the chain from the conveyor. He noticed Mammenga lying on the ground and called on the CB radio for help. Vern E. Roden, over-the-road truck driver, arrived and he and Reith began cardiopulmonary resuscitation (CPR). Other employees arrived and continued CPR until emergency medical assistance arrived.

The victim was pronounced dead at the scene by the Pine County deputy sheriff. Death was attributed to multiple trauma.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 9:30 a.m. on October 28, 2005, by a telephone call from John D. Surma, president, to Russell T Jarvi, Jr., supervisory mine safety and health inspector. An investigation began on 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, conducted a physical inspection of the accident site, interviewed employees, and reviewed conditions and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management, employees, the mine operator's safety consultant, and the Pine County Sheriff's Department.

DISCUSSION

Location of the Accident

The accident occurred at the plant area of the portable screening/crushing plant located at the center of the sand and gravel pit. The area was dry and sloped slightly from the stacking conveyor to the front-end loader's position.

Stacking Conveyor

The conveyor involved in the accident, manufactured by Nordberg, did not have any other identifying information. It was 120 feet long, 4 feet wide, and equipped with a 30 inch wide conveyor belt. According to the manufacturer, the conveyor was probably a Model 150 that would have originally weighed approximately 30,000 pounds but was modified by the mine operator by adding two hydraulically controlled outriggers.

One outrigger on each side had a 42-inch-diameter tire mounted on the outrigger structure. When these outriggers were lowered, the tires would contact the ground, raising the conveyor's over-the-road tandem wheels and allowing the conveyor to move in a radial direction. The outriggers were positioned near ground level and served to assist the stability of the conveyor when it was towed in a raised position over uneven ground.

The hydraulic lever controls were located on the side of the conveyor structure approximately 2 inches from the front wheel nearest the conveyor's material loading end. The hydraulic lever controls operated the outrigger lift cylinders, conveyor boom cylinders, and folding cylinders.

The portable conveyor was equipped with dual axles, tandem wheels, air brakes, and a fifth wheel hitch for over-the-road transportation.

Front-end loader

The Caterpillar 980G wheel loader used to tow the radial stacking conveyor had an articulated frame and was powered by a six-cylinder, Model 3406, Caterpillar diesel engine. It weighed approximately 65,000 pounds and had an electronically controlled transmission with four forward and four reverse speeds and a neutral position.

The loader was equipped with four-wheel, hydraulic, oil-cooled, completely enclosed, multiple-disc, service brakes. The service brakes could be applied using either of two pedals located on either side of the steering column. Pushing the left side pedal also neutralized the transmission.

Service brake and parking brake grade holding tests were conducted with the bucket empty and facing downhill. The service brakes stopped and held the wheel loader on a grade of approximately 12 percent.

The loader parking brake was found to be defective but it was not being used at the time of the accident and was not considered a factor in the accident. A non-contributory citation was issued.

Towing Chain

A ½-inch steel chain approximately 16 feet long was used to tow the conveyor. One end of the chain, approximately 22 inches from the end of the chain, was connected to a grab hook on the loader bucket. The other end of the chain was connected to the ring-type tow hitch mounted on the foot of the conveyor, with a ½ inch clevis-type eye hook. The chain and loader bucket connection method permitted tugging and swaying action to occur when the conveyor was being towed.

Weather Conditions

On the day of the accident, the skies were clear, with a temperature of approximately 40 degrees Fahrenheit.

Training and Experience

Mitchel L. Mammenga had a total of 7 years, 4 weeks, and 3 days of experience at this mining operation and had received 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: Policies, standards, and controls were inadequate. Procedures had not been established to safely tow the conveyor. The conveyor was not towed with a properly sized tow bar or any other effective means of control.

Corrective Action: Management should establish procedures requiring that properly sized tow bars or other effective means of control are used for towing or pushing equipment.

Causal Factor: The miners failed to recognize the hazard associated with using a chain to tow equipment.

Corrective Action: Employees 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 the operating procedures used to tow the conveyor were inadequate. Procedures had not been implemented to ensure that a solid-type hitch (tow bar) or other effective means was used to safely move the stacking conveyor.

ENFORCEMENT ACTIONS

Order No. 6135206 was issued on October 28, 2005, under Section 103(k) of the Mine Act:

A fatal accident occurred at this operation on October 28, 2005, when a miner was fatally injured when attempting to move the radial stacker conveyor with a front-end-loader. This order is issued to assure the safety of all persons at this operation. It prohibits moving either the Nordberg radial stacker conveyor, company number C35, or the Caterpillar 980G front-end loader (S/N 2KR03092) until MSHA has determined it is safe to resume operations in the affected area. The operator shall obtain approval from an authorized representative for all actions to recover and/or restore operations in the affected area.

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

Citation No. 6188227 was issued on November 21, 2005, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 56.14209(a):

A fatal accident occurred at this mining operation on October 28, 2005, when two miners were moving the radial stacking conveyor.

The conveyor was being towed with a rubber-tired front-end loader which had a steel chain hooked from the loader bucket to the tail end of the conveyor. The conveyor's movement was halted when the radial wheels contacted the ground. The conveyor tandem wheels struck and rolled over the foreman while he was raising the hydraulically controlled radial wheels as the loader still had pulling tension on the conveyor. A properly sized tow bar or other effective means were not being used to move this piece of mobile equipment.

This citation was terminated on November 21, 2005, after the conveyor was removed from the mine site. The mine operator indicated that a solid-type hitch will be installed to ensure controlled towing of the conveyor on mine sites. The mine operator was notified that failure to provide an effective means to control towing of this conveyor, prior to moving the conveyor on any mine site, may be considered by MSHA to be aggravated conduct constituting more than ordinary negligence.

Approved by:

Date:

Steven M. Richetta
District Manager
North Central District

APPENDIX A

Persons Participating in the Investigation

Tri-City Paving, Inc.

Daniel Surma	vice president
Daniel H. Dubbin	road foreman

Casey Safety Consultants

Joe Casey	master of industrial safety (MIS)
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Pine County Sheriff's Department

Tom Pitzen	deputy sheriff
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Mine Safety and Health Administration

Stephen W. Field	mine safety and health specialist
George F. Schorr	supervisory special investigator
Michael A. Hockenberry	engineer