MAI-2003-02

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

Report of Investigation

Surface Nonmetal Mine
(Limestone Mining, Crushed & Broken)

Slip or Fall of Person

January 13, 2003

Lebec Cement Plant
National Cement Co of California, Inc.
Lebec, Kern County, California
ID No. 04-00213

Investigators

Randy Horn
Mine Safety and Health Inspector

Rick Dance
Mine Safety and Health Inspector

Paul Wildrick
Mine Safety and Health Inspector

Dale Ingold
Mechanical Engineer

Isabel Williams
Mine Safety and Health Specialist

Originating Office
Mine Safety and Health Administration
Western District
2060 Peabody Road, Suite 610
Vacaville, California 95687
Lee D. Ratliff, District Manager

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OVERVIEW

Wallace R. Bingham, maintenance supervisor, age 62, was fatally injured on January 13, 2003, when he fell from an elevated doorway opening 9 feet to a concrete pad.

The accident resulted from the improper design and installation of the chain handrailing system that was installed across the edge of the open access doorway. The use of an open-throat grab hook, the 13-foot-long span of chain, the absence of any mid-span stanchion posts, and the lack of a positive locking device at the attachment end contributed to the accident.

Bingham had a total of 26 years of mining experience and16 of those years with this mine.

GENERAL INFORMATION

Lebec Cement Plant, a quarry and cement plant, owned by National Cement Co. of CA, Inc., was located 8 miles southeast of Lebec, Kern County, California. Principal operating officials were Eric Verbrugghe, vice president of operations, and Byron McMichael, plant manager. The mine and cement plant operated three 8-hour shifts a day, 7 days a week. Total employment was 167 persons.

Limestone was drilled and blasted from multiple benches in the quarry. The blasted limestone was loaded into haul trucks with front-end loaders and transported to the nearby cement plant where it was crushed, dried, heated, and processed into cement. The finished product was stored in silos for bulk shipment to customers.

The last regular inspection of this operation was completed on October 18, 2001. Another inspection was conducted following this investigation.

DESCRIPTION OF ACCIDENT

On the day of the accident, Wallace R. Bingham (victim) arrived at the mine site at approximately 6:30 a.m. He attended a production meeting at 6:40 a.m., when various maintenance and production projects for the day were discussed.

At 9 a.m., the crew took their normally scheduled morning break. Following the break, Bingham met with several contractor employees and Robbie Dixon, maintenance supervisor, in the MCC room at the mill compressor building. Bingham and Dixon provided instructions to the contractors about lock-out/tag-out for the CP1 compressor they were assigned to work on. Dixon left the compressor building while Bingham exited the MCC room and entered the main compressor room. Bingham noticed a water leak on CP1 compressor and called Dixon on the plant radio to discuss the leak. Dixon walked around to the open bay doorway where Dixon and Bingham talked about the water leak.

Bingham was leaning on the upper chain handrailing at the elevated open doorway. Dixon, who was standing on the lower ground level concrete slab, was looking past Bingham at the leak when he noticed Bingham suddenly fall from the elevated doorway opening, 9 feet to the concrete below. Dixon noticed the two barrier chains swinging as he rushed to Bingham. Dixon called for help on the plant radio, several employees responded, and 911 was called. Bingham died at the scene as a result of massive head trauma.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 10:15 a.m. the same day by Blaine MacKay, safety 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 miners. MSHA's accident investigation team traveled to the mine, made a physical inspection of the accident site and equipment involved, interviewed persons, and reviewed necessary

documents. MSHA conducted the investigation with the assistance of mine management and miners.

DISCUSSION

Accident Scene

The accident occurred at the loading dock in the compressor building for the mill. The loading dock was 9 feet above the lower ground level, had a concrete floor, and an open bay doorway. A concrete pad comprised the ground below the loading dock.

The rollup door opening was 156 inches wide. The chain handrail was composed of two strands/rails of ¼ inch welded chain, a middle rail at 23 ½ inches from the floor and a top rail at 34 inches from the floor.

Chain Handrail

The chains were welded in place on the north end. The south end of the chains were removable by use of grab hooks that were welded in the vertical position. The fixed ends of the chains were mounted 27 inches and 43 inches, respectively, from the floor with the removable end fixtures / hooks being mounted 26 5/8 inches and 42 5/8 inches, respectively, from the floor. All measurements were taken from the floor surface to the bottom of the slot in the hook. Since the chain had no markings, the investigators concluded that it was a grade 30 welded chain with a workload limit of 1,250 pounds. The grab hooks were marked “forged,” “1/4,” and “China.” Based on this information, the investigators then concluded that the grab hooks were ¼ inch grade 40 with a workload limit of 2,600 pounds.

According to witnesses, the chains were normally fixed in such a manner that the center of the span of the top chain was 34 inches from the floor with the center of the lower chain being 23 ½ inches from the floor. Witnesses also commented that, at times, the top chain was stretched tight, which resulted in the center of the span rising to a point 41 inches from the floor. The weld points appeared to be in good condition with no visible defects. The grab hooks were manufactured in what is termed a flat profile with a point on the open end and a 0.400” – 0.365” slot which is designed to provide a secure hold on the chain when pulled along the grab hook’s vertical axis. Measurements indicate the top grab hook mounted 10 degrees off vertical leaning towards the outside.

Stability Tests

The top railing was bounced by slapping it lightly to simulate hitting the chain while passing the shovel or bucket of used oil dry over the chain. This test demonstrated that the removable end of the chain would “walk” up and off the hook. When horizontal force was applied to the top chain at the point where the victim had been standing, the chain came out of the grab hook with an estimated force of less than 20 pounds being applied. The chain dislodged when the center of the chain handrail reached a height of

approximately 43 ½ inches from the floor. The same results were observed while conducting the tests with the chain set at 34 and 41 inches from the floor at mid-span.

Training

Bingham had received all of his required training in accordance to 30 CFR, Part 46.

ROOT CAUSE ANALYSIS

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

Causal Factor: The design and installation of the chain railing did not provide adequate protection. The open hook attachment did not allow a positive locking connection and, when combined with the movement of the chain from the unsupported span of 13 feet, allowed the chain link to "walk" out of the open hook.

Corrective Action Required: The operator should implement a policy that ensures handrails, barricades, and other personnel protective devices are adequate to protect persons. Work areas requiring these devices should first be reviewed through a risk analysis program to identify hazards and to aid in the design of controls that will effectively eliminate them.

CONCLUSION

On January 13, 2003, a mine maintenance supervisor fell 9 feet from an elevated travelway at the overhead doorway opening in the compressor room to the concrete pad below, receiving fatal head injuries.

The accident resulted from the improper design and installation of the chain handrailing system that was installed across the edge of the open access doorway. The use of an open throat grab hook, the 13-foot-long span of chain, the absence of any mid-span stanchion posts and the lack of a positive locking device at the attachment end contributed to the accident.

ENFORCEMENT ACTIONS

Order No. 7999834 was issued on January 13, 2003, under the provisions of Section 103(k) of the Mine Act:

> A fatal accident occurred at this operation on January 13, 2003, when a maintenance supervisor was discussing the project about to be performed in the compressor room by contractors and fell from the elevated overhead access door. This order is issued to assure the safety of all persons at this operation. It prohibits all activity at the air compressor room 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 recover and /or restore operations to the affected area.

The order was terminated on January 16, 2003. The conditions that contributed to the accident have been corrected and normal mining operations can resume.

Citation No. 7999835 was issued on January 15, 2003, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 56.11012:

> A fatal accident occurred at this operation on January 13, 2003, when a mine maintenance supervisor fell 9 feet from an elevated travelway in the mill compressor room to a concrete pad. The opening was not protected in that one end of the chain was not securely fastened in the open hook provided on the door jamb. The chain spanned 13 feet from a welded attachment on one side at a height of 44 inches to an open throat hook welded on the opposite side of the opening at 43 inches in height. The method used to attach the chain to the hook was to place a link of the chain into the open hook. This attachment was not secured in that the chain would slip out of the open hook with minimum outward pressure and become disconnected.

This citation was terminated on January 16, 2003. The mine operator designed, fabricated, and installed a rigid steel pipe handrailing system that was securely mounted in the open doorway, and posted signs warning of the fall hazard.

Approved by:

_____ Date: _____

Lee D. Ratliff
District Manager

APPENDICES

A. Persons Participating in the Investigation
B. Persons Interviewed
C. Pictures of Accident Scene
D. Sketch of No.1 Mill Compressor Room With Location of Victim Shown
E. MSHA Forms 7000-50 (Accident Investigation Data)

APPENDIX A

Persons Participating in the Investigation

Lebec Cement Plant

Blaine Mackay	safety manager
Eric Verbrugghe	vice president operations
Christian Hess	miners representative
Willie Mulliniks	PACE Local 30741
Robert Roginson	attorney

Mine Safety & Health Administration

Randy Horn	mine safety and health inspector
Rick Dance	mine safety and health inspector
Paul Wildrick	mine safety and health inspector
Dale Ingold	mechanical engineer
Isabel Williams	mine safety and health specialist

CAL-OSHA

Dan Ford	associate engineer
Matthew Switzer	industrial hygienist

Kern County Sheriff's Department

Ken Noack	coroner investigator

APPENDIX B

Persons Interviewed

Lebec Cement Plant

Robbie Dixon	maintenance supervisor
John Montgomery	maintenance supervisor
John Sims	maintenance supervisor
Ernest Oliver	maintenance – lubrication man
Thomas Holt	maintenance – lubrication man
Jason Turner	electrician

CMF – Contractor

Steve Langley	millwright
Jeremy Anderson	millwright

APPENDIX C

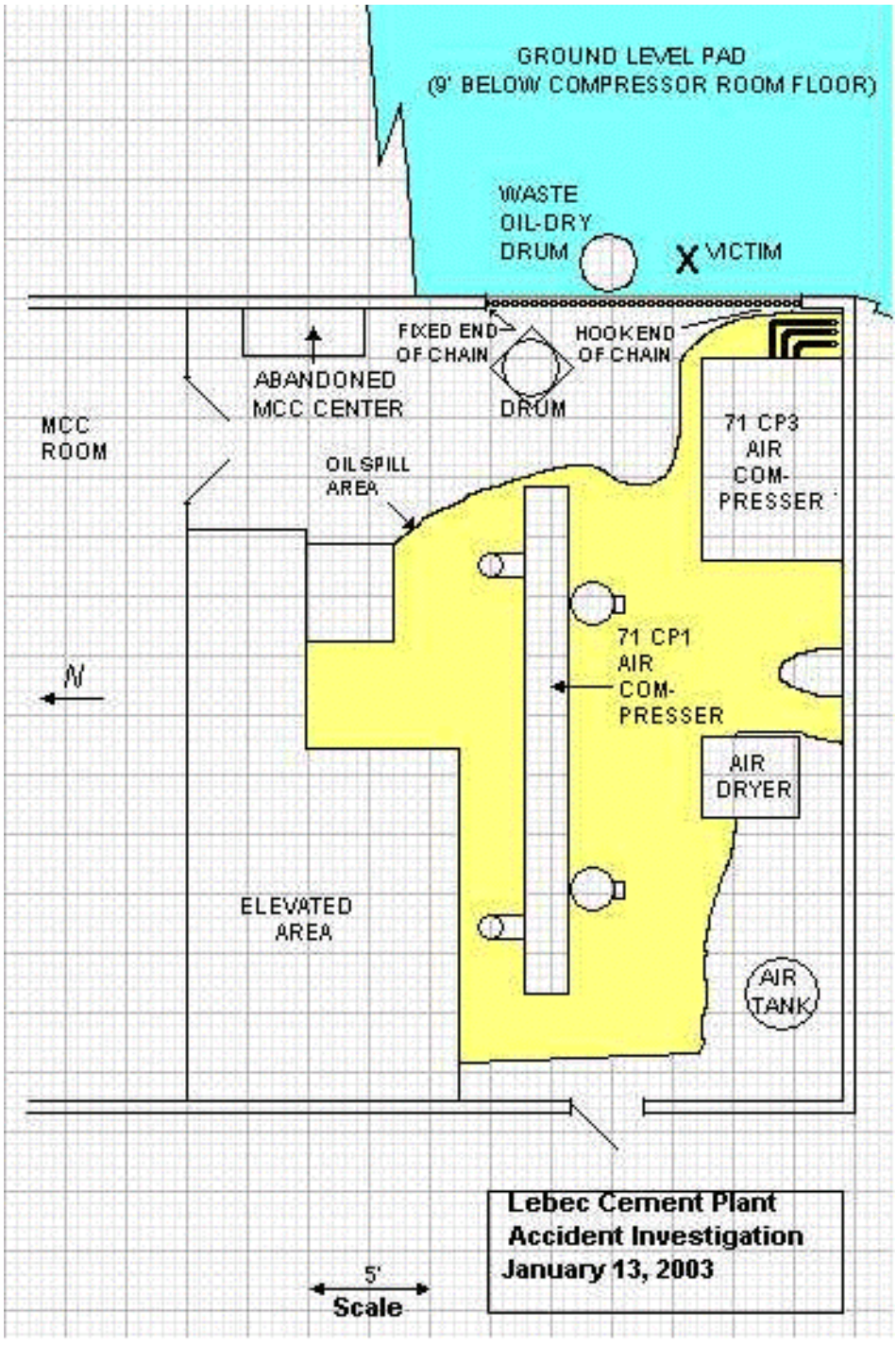
Pictures of Accident Scene

Fixed End of Chain Handrails

Removable End of Chain Handrails

Push Test of Chain Handrail

APPENDIX D



No.1 Mill Compressor Room