MAI-2013-03

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

REPORT OF INVESTIGATION

Surface Nonmetal Mine
(Crushed and Broken Limestone)

Fatal Blasting and Explosives Agents Accident
March 27, 2013

Fred Weber, Inc.
North Stone
Maryland Heights, St. Louis County, Missouri
Mine ID No. 23-00220

Investigators

David L. Weaver
Supervisory Mine Safety and Health Inspector

Jeremy D. Kennedy
Mine Safety and Health Inspector

Dean S. Nichols
Physical Scientist

Stephen D. Brill
Mine Safety and Health Specialist

Originating Office
Mine Safety and Health Administration
South Central District
1100 Commerce Street Room 462
Dallas, TX 75242-0499
Fred L. Gatewood, Acting District Manager

OVERVIEW

On March 27, 2013, William R. Sievert, Loader Operator, age 61, was killed after a blast was initiated. Sievert was in a front-end loader about 30 feet from the base of a highwall. After the blast, broken rock struck the front-end loader and covered it. Almost 10 hours after the blast, the rock was removed from the front-end loader and Sievert was recovered.

The accident occurred due to management's failure to follow the mine's blasting plan. Work continued in the blast site after the loading of blast holes began, all unprotected persons did not leave the blast area, and ample warning was not provided for all persons to evacuate the blast area.

GENERAL INFORMATION

North Stone, a surface limestone operation, owned and operated by Fred Weber, Inc., is located in Maryland Heights, Missouri. The principal operating official is Paul E. Robinson, Vice-President of Material Services. The mine operates two 8-hour shifts per day, five days per week. Total employment is 45 persons.

Limestone is drilled, blasted, and loaded into haul trucks which transport the material to an adjacent processing facility. The material is crushed at the primary jaw crusher and transported by belt conveyor to the secondary crushing facility for resizing and stockpiling. A portable plant in the quarry provides additional crushing capacity. Finished products are sold for use in the construction industry.

The Mine Safety and Health Administration (MSHA) completed the last regular inspection at this mine on November 29, 2012.

DESCRIPTION OF THE ACCIDENT

On the day of the accident, March 27, 2013, William Sievert (victim) started work at 5:00 a.m. loading trucks with material from the previous day's blast. He was operating a front-end loader on an area referred to as the 20 ledge. Before 9:00 a.m., Mike Hathaway, Truck Driver, was about to be loaded by Sievert when he heard Kenneth Willerding, Mine Superintendent, tell Sievert three times by radio about two planned production blasts at 2:30 p.m. and 3:30 p.m. When Sievert did not respond to Willerding, Hathaway radioed Sievert, who then acknowledged the message by nodding his head and waving.

Sievert loaded trucks until 1:45 p.m. After the last truck was loaded, Sievert continued working in the area pushing material from the 20 ledge to the next lower level. Typically, Sievert's shift ended at 2:30 p.m. but he was scheduled to assist with the cleanup of a second blast that was planned.

While Sievert loaded out the material, the adjacent highwall was being prepared for the blast scheduled at 2:30 p.m. Two rows of 9 vertical holes were drilled 67 feet deep on a 10-foot by 10-foot pattern to provide a 20-foot by 90-foot shot. After drilling was completed, the blast holes were loaded with explosives and the holes were fully loaded by about 1:00 p.m.

After a 2:00 p.m. meeting in his office, Willerding drove to the pit to prepare for the scheduled 2:30 p.m. blast. Willerding began making contact with the miners involved with the blast on his CB radio. Willerding then checked the area by making his way to the lower end of the pit, checking the various working levels as he drove through them. When interviewed, Willerding stated he checked the 20 ledge about 2:15 p.m. but did not see Sievert or the front-end loader he had been operating. Even though he was not seen, Sievert was not contacted by radio to confirm his position.

Willerding continued checking the pit area and drove to the end of the lower pit haul road. Before positioning himself to block the entrance at the lower road, Willerding checked to be sure that employees of a trash company at an adjacent landfill had not wandered into the blast area. He then gave Daniel Hulsey, Blaster-Driller, the command to shoot the blast.

At approximately 2:42 p.m., the blast was initiated. Immediately following the blast, attention turned to the preparation of a second blast scheduled for 3:30 p.m. that day. Sievert was scheduled to assist with the cleanup of the second blast but could not be found. A search was initiated and about 3:50 p.m., the back end of Sievert's front-end loader was spotted in the pile of blasted material on the 20 ledge.

Emergency personnel were called and responded to the mine and recovery operations began. The victim was removed from the front-end loader about 1:00 a.m. on March 28, 2013. The cause of death was attributed to total body blunt trauma.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 4:02 p.m. by a telephone call to MSHA's National Call Center. The National Call Center notified Michael Franklin, Supervisory Special Investigator, and an investigation was started that same day. To ensure the safety of all persons, an order was issued under provisions of section 103(j) of the Mine Act. This order was later modified to section 103(k) of the Mine Act after the arrival of an Authorized Representative to the mine site.

MSHA's accident investigation team traveled to the mine, made a physical inspection of the accident scene, interviewed employees and reviewed documents and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management and employees.

DISCUSSION

Location of the Accident

The accident occurred on the 20 ledge, in front of the 10-19 highwall of the mine pit.

Front-End Loader

The front-end loader involved in the accident was a Caterpillar 992G front-end loader. The machine was approximately 52 feet long and 18 feet, 4 inches high at the top of the canopy and weighed approximately 210,000 pounds. The front-end loader was not inspected for defects after the accident due to the severity of damage incurred from the blast. At the time of the blast, the machine was located on the 20 ledge, facing the highwall, with the front of the loader bucket about 37 feet from the closest blast hole.

Production Blasting

Production blasting was performed on at least one bench nearly every day. Broken rock from the previous blast was cleared from the bench and then the blaster established a drill pattern with spray paint. After the pattern was established, the driller drilled 3.5-inch holes to depths that varied from 50 to 90 feet depending upon the type of rock. Drilling usually occurred on the second shift so the blast holes could be loaded the next day on the day shift, prior to blasting, which usually occurred about 2:30 p.m. after the day shift ended.

On the day of the accident, the production blast on the 20 ledge consisted of 2 rows of 9 blast holes drilled 67 feet deep on a 10-foot by 10-foot pattern. The blast included 2,500 pounds of prilled ammonium nitrate – fuel oil mixture (ANFO) and 35 cases of plastic wrapped slurry. Each blast hole was primed with a single primer. The blast holes were provided with 4-5 feet of stemming material.

A lead line of shock tube was run from the blast site to a location above the bench and about 300 feet behind it. The shock tube was initiated with a firing gun. The blast resulted in 8,900 tons of broken rock. The vibration levels recorded on a seismic strip were within acceptable limits indicating no burden failure or problems with the blast timing.

No malfunctions of blasting materials, blasting equipment, or blasting technique were observed that would have contributed to the accident.

Blasting Procedures

Blasting procedures at North Stone include clearing the blast area, blocking all entrances to the blast area, verbally contacting all persons that might be in the blast area, sounding an air horn warning, and initiation of the blast. Blasting procedures also included having the designated blaster maintain visual contact with the blast site during the blast initiation.

Either of two supervisors was the designated blaster each day even though a driller/blaster employee initiated the blasts. On the day of the accident, Willerding was

the designated blaster. He was responsible for clearing the blast area, verbally contacting all employees, and authorizing the driller/blaster to initiate the blast. Willerding also assumed the role of guard at the lower entrance to the blast area. He could not see the blast site from that location. The driller/blaster sounded the horn and initiated the blast.

The verbal warning to all persons that might be in the blast area consisted of a radio broadcast of the impending blast. Verbal confirmation was not obtained from all persons in the blast area. Some persons gave a visual confirmation as Willerding drove by. Sievert was not observed and did not reply verbally to a broadcast radio warning.

An air horn served as a general warning to those in or around the quarry that a blast was imminent. On the day of the accident, the air horn was sounded on the 10-19 level approximately 300 feet from the blast site. The driller/blaster that day sounded one long horn blast followed by five short horn blasts. A test of the horn blasts during the accident investigation revealed that the horn blasts could not be heard inside the cab of a loader positioned on the 20 ledge. The elapsed time between the horn sounding and the blast was also insufficient for persons to be able to evacuate the blast area.

Weather

The weather on the day of the accident was partly sunny with a slight breeze and a temperature of 44 degrees Fahrenheit. Weather was not considered a contributing factor to the accident.

TRAINING AND EXPERIENCE

William Sievert had 24 years of mining experience, including 10 years at this mine. A representative of MSHA's Educational Field Services reviewed the training records for Sievert and found his training to be in compliance with MSHA requirements.

ROOT CAUSE ANALYSIS

The investigators conducted a root cause analysis and the following root cause was identified.

Root Cause: Management did not ensure the mine's blasting plan was followed. Work continued in the blast site after the loading of blast holes began, the blast area was not cleared prior to initiating the blast, and ample warning was not provided for all persons to evacuate the blast area.

Corrective Actions: The mine operator modified the written blasting procedures to include: after blast hole loading begins, work within the blast site will be restricted to blasting operations; ample warning will be given to allow all persons to be evacuated from the blast area; and prior to connecting an initiating device, all unprotected persons shall leave the blast area; no blast will be initiated until there is positive confirmation of the safety of all persons; and all miners will be trained in the new procedures. The drilling, blasting, and loading crews were all trained in these procedures.

CONCLUSION

The accident occurred due to management's failure to follow the mine's blasting plan. Work continued in the blast site after the loading of blast holes began, all unprotected persons did not leave the blast area, and ample warning was not provided for all persons to evacuate the blast area.

ENFORCEMENT ACTIONS

Issued to Fred Weber, Inc.

Order No. 8683477 - Issued on March 27, 2013, under the provisions of section 103(j) of the Mine Act. An Authorized Representative modified this order to section 103(k) of the Mine Act upon arrival at the mine site:

> *This action is due to a fatal accident that occurred at this operation on March 27, 2013, when a loader operator was trapped in shot rock material on the 10-19 ledge of the South Pit. This order is issued to assure the safety of all persons at this operation. It prohibits all activity on the 10-19 ledge of the South Pit 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 the affected area.*

This order was terminated on March 29, 2013, when the conditions that contributed to the accident no longer existed.

Citation No. 8626609 – Issued under provisions of Section 104(a) of the Mine Act for a violation of 30 CFR 56.6306(c):

> *A fatal accident occurred at this operation on March 27, 2013, when a front-end loader operator was struck by broken rock from a planned blast. The front-end loader was operating within the blast site after loading of the blast holes had begun. The front of the loader was located about 30 feet from the nearest loaded hole at the time of the blast.*

Citation No. 8626611 – Issued under provisions of Section 104(a) of the Mine Act for a violation of 30 CFR 56.6306(e):

> *A fatal accident occurred at this operation on March 27, 2013, when a front-end loader operator was struck by broken rock from a planned blast. The front-end loader operator did not leave the blasting area prior to attaching an initiating device. The loader was only about 30 feet from the highwall that was blasted.*

Citation No. 8626612 – under provisions of Section 104(a) of the Mine Act for a violation of 30 CFR 56.6306(f)(1):

> *A fatal accident occurred at this operation on March 27, 2013, when a front-end loader operator was struck by broken rock from a planned blast. Ample warning was not given to allow all persons to be evacuated. The siren that was sounded could not be heard inside the loader cab and confirmation of the radio warning was not obtained.*

Approved: Fred L. Gatewood Date: 5-29-2013

Fred L. Gatewood
Acting District Manager

APPENDIX A

PERSONS PARTICIPATING IN THE INVESTIGATION

Fred Weber, Inc.

Jason Bish	Vice-President of Safety
Terry Croxford	General Manager
Kenneth Harmon	Mine Safety Specialist
Dale Lickenbrock	Safety Director
Eric Waterkotte	Assistant Safety Director

Operating Engineers Local 513

Mark Meyers	Miners' Representative

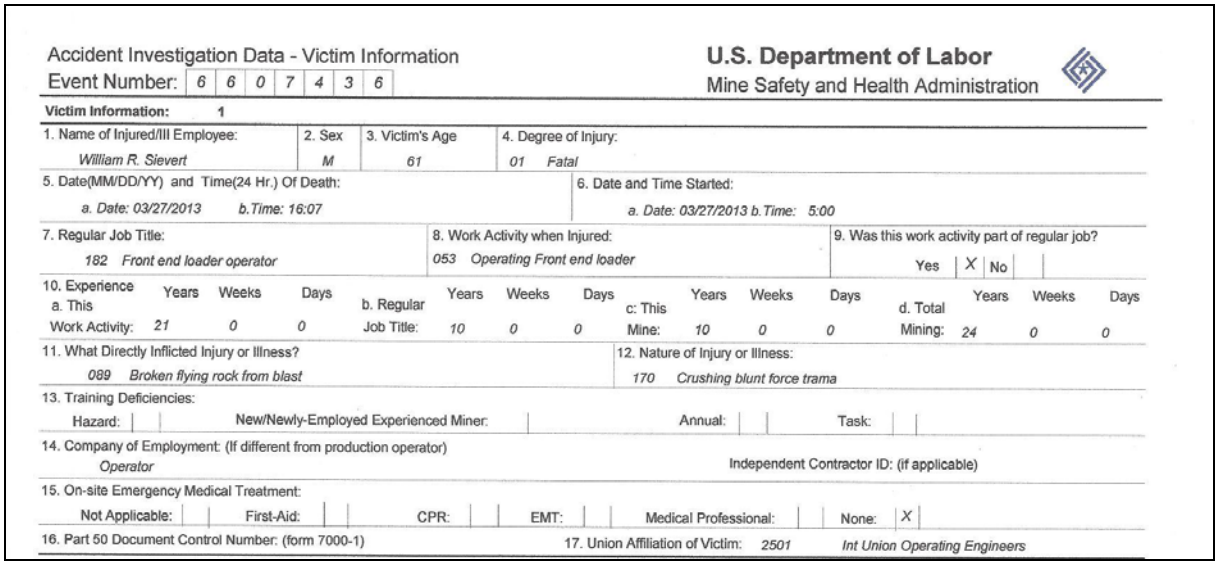
Patton Boggs, LLP

Donna Vetrano Pryor	Associate Attorney

Mine Safety and Health Administration

Stephen D. Brill	Mine Safety and Health Specialist
Jeremy D. Kennedy	Mine Safety and Health Inspector
Dean S. Nichols	Physical Scientist
David L. Weaver	Supervisory Mine Safety and Health Inspector

APPENDIX B



Accident Investigation Data - Victim Information

Event Number: 6 6 0 7 4 3 6

U.S. Department of Labor
Mine Safety and Health Administration

Victim Information: 1

1. Name of Injured/Ill Employee:	2. Sex	3. Victim's Age	4. Degree of Injury:
William R. Sievert	*M*	*61*	*01 Fatal*

5. Date(MM/DD/YY) and Time(24 Hr.) Of Death:	6. Date and Time Started:
a. Date: 03/27/2013 b.Time: 16:07	*a. Date: 03/27/2013 b.Time: 5:00*

7. Regular Job Title:	8. Work Activity when Injured:	9. Was this work activity part of regular job?
182 Front end loader operator	*053 Operating Front end loader*	Yes X No

10. Experience	Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days
a. This Work Activity:	*21*	*0*	*0*	b. Regular Job Title:	*10*	*0*	*0*	c: This Mine:	*10*	*0*	*0*	d. Total Mining:	*24*	*0*	*0*

11. What Directly Inflicted Injury or Illness?	12. Nature of Injury or Illness:
089 Broken flying rock from blast	*170 Crushing blunt force trama*

13. Training Deficiencies:
Hazard: | New/Newly-Employed Experienced Miner: | Annual: | Task:

14. Company of Employment: (If different from production operator)
Operator
Independent Contractor ID: (if applicable)

15. On-site Emergency Medical Treatment:
Not Applicable: | First-Aid: | CPR: | EMT: | Medical Professional: | None: X

16. Part 50 Document Control Number: (form 7000-1)
17. Union Affiliation of Victim: *2501 Int Union Operating Engineers*