

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

REPORT OF INVESTIGATION

Underground Metal Mine
(Gold)

Fatal Fall of Back Accident
April 21, 2008

Getchell Mine
Small Mine Development, LLC
Golconda, Humboldt County, Nevada
Mine ID No. 26-02233

Investigators

Bret A. Park
Mine Safety and Health Inspector

Stephen P. Rogers
Mine Safety and Health Inspector

Denis J. Karst
Mine Safety and Health Inspector

Sandin E. Phillipson
Geologist

Joseph N. Rhoades
Mine Safety and Health Specialist

Originating Office
Mine Safety and Health Administration
Western District
2060 Peabody Road, Suite 610
Vacaville, California 95687
Arthur L. Ellis, District Manager

4715-182 Access Drift



Location of victim

OVERVIEW

Kenneth L. Barbosa, mechanic, age 28, was fatally injured on April 21, 2008. Barbosa and two coworkers were repairing a roof bolter 37 feet from the face of a drift when cemented rock fill (CRF) fell from the back covering him. One of the other miners was injured and hospitalized.

The accident occurred because management failed to establish procedures and controls to ensure that the ground was adequately supported where persons worked or traveled.

GENERAL INFORMATION

Getchell Mine, an underground gold mine, operated by Small Mine Development, LLC was located near Golconda, Humboldt County, Nevada. The principal operating official was David Joggerst, mine superintendent. The mine normally operated two 10-hour shifts per day, 7 days a week. Total employment was 43 persons.

Gold ore was drilled, blasted, and transported by load-haul-dump (LHD) loaders and trucks to the surface where it was processed by a milling operation. The finished products were sold to commercial industries.

The last regular inspection at this operation was completed on April 19, 2008.

DESCRIPTION OF THE ACCIDENT

On April 21, 2008, Kenneth Barbosa, (victim), reported to work at 5:30 a.m. for his normal shift which began at 6:00 a.m. Barbosa and Dan Manhire, mechanic, performed maintenance duties on the surface and in the underground shop. About 1:00 p.m., they received a call from John Heimer, miner, stating that the roof bolter he was operating required hose replacement.

Manhire acquired two hoses and traveled to the 4715-182 access drift as Heimer was moving the roof bolter into a cross cut. Manhire inspected the roof bolter, went to the shop to get tools, and returned to the 4715-182 access drift. Manhire and Heimer determined that neither hose was the correct length. Manhire phoned the underground shop and spoke with Barbosa. He asked Barbosa to bring a 1½-foot long hose to use in conjunction with the hose they already had.

About 3:00 p.m., Heimer, Barbosa, and Manhire began repairing the hoses on the right side of the roof bolter boom. Heimer was kneeling in front of Barbosa while Manhire was to the left facing them. A small piece of CRF fell from the back striking Manhire. Manhire told Barbosa that a piece of CRF hit him and that he saw a crack in the CRF. Loose CRF fell, striking Barbosa and Heimer. Barbosa was completely covered but Heimer's head and shoulders were exposed.

Manhire immediately started removing material by hand to uncover Barbosa and Heimer. When Heimer was partially uncovered, Manhire left the scene briefly to use a mine phone to notify Joe Knaack, superintendent, who was on the surface. Emergency medical services were called. Knaack went to the scene and helped Manhire free Heimer.

Manhire and Heimer were transported to the surface. Heimer was transported to a hospital.

While Manhire and Heimer were being transported to the surface, other mine personnel and mine rescue teams arrived. Rescuers removed the fallen material by hand and with shovels and recovered Barbosa at 6:05 p.m. He was pronounced dead at 8:30 p.m. by the Humboldt County deputy coroner. The cause of death was attributed to blunt force trauma.

INVESTIGATION OF THE ACCIDENT

The Mine Safety and Health Administration (MSHA) was notified of the accident at 3:55 p.m., on April 21, 2008, by a telephone call from Paul J. Joggerst, project superintendent, to James R. Fitch, supervisory mine safety and health inspector. An investigation began the same day. An order was issued under the provisions of 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 scene, interviewed employees, and reviewed documents and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management, employees, and the Humboldt County coroner's office.

DISCUSSION

Location of the Accident

The accident occurred in the 4715-182 access drift that had been driven underneath the CRF. The face of the drift was approximately 37 feet from the front of the roof bolter. The drift was approximately 14.9 feet wide and 14.5 feet high.

Geology

Gold ore in the 182 ore body was extracted from extensively altered marble and mudstone near the margin of an igneous dike and followed both structure and replacement of favorable beds. The original host rocks were limestone and carbonate-rich mudstones that were metamorphosed, sheared, and altered prior to mineralization. The host rocks were affected by bedding planes, joints, shears, and chemical alteration that resulted in numerous intersecting planes of weakness in the rock mass as well as a weak rock matrix near the ore zone. This type of ground condition near the Getchell Fault had been difficult to control when it was previously encountered.

Roof Bolter

The roof bolter involved in the accident was an electro-hydraulic Tamrock Robot D05-126 XL. The roof bolter had a single boom that incorporated an indexing mechanism. One position was used for drilling and another for roof and rib bolt installation. The machine had a carousel to handle the roof bolts automatically. The roof bolter was designed to install 8-foot long Swellex roof bolts with 6-foot by 9-foot panels of 9 gauge welded wire mesh.

The operator's compartment was equipped with a falling object protective structure (FOPS) canopy.

Mining Method

The mine was accessed by two declines with access drifts driven off the declines. The drifts were typically 14 feet high and 14 feet wide. Access drifts were driven perpendicular to the ore zones. The 4730 level was the drift above the 4715 level. The 4730 level drift had been driven 14 feet high using four parallel production panels to extract the ore the entire length and width of the vein. Each production panel was backfilled sequentially after mining and prior to commencement of the next panel. Reportedly the 4730 level drift had been backfilled with CRF using a 5-6% of cement with aggregate.

Mining resumed in the 4715 level (where the accident occurred) 22 days after the CRF was placed in the overlying 4730 level. Typically 28 days was allotted before mining resumed under CRF. Roof bolts were not installed in the back because the CRF was considered to be the primary ground support system. Roof bolts and wire mesh were installed in the ribs.

Cemented Rock Fill

The CRF was mixed in a pit on the surface of the mine site and taken underground for placement. The CRF used at the mine consisted of a 5-6% cement (by total weight) mixed with aggregate. Cylinder samples were collected at the mixing pit and sent to a laboratory for 7- and 28-day strength testing.

Based on the unconfined compressive strength history, investigators could not characterize the strength of the CRF at any particular time or location. The grab samples taken from the material that had fallen from the entry back indicated that the CRF appeared to have been particularly weak at this location. There were little to no agglomerations of any appreciable size in the material and a large portion of the material was loose aggregate. The paste coating the aggregate pieces was thin and spotty indicating that the paste had not bonded well to the aggregate.

The variability of the aggregate in the aggregate stockpile and the poor distribution of aggregate sizes in the stockpile was most likely the primary cause for the variability of the CRF.

The CRF had not attained an age of 28 days before it was undercut. Typically, cement-based materials will gain strength with time; however, it was unlikely that this was a significant factor given the variability of the CRF.

Ground Support Plan

The ground support plan used at the mine was developed by an engineering consulting firm. Ground support used at the location of the accident consisted of CRF in the back and roof bolts in the ribs. The roof bolts being used were Swellex 39 mm, 8-foot bolts with 6-inch dome plates and 6-foot by 9-foot panels of 9 gauge welded wire mesh.

Training and Experience

Kenneth L. Barbosa had three years nine weeks mining experience. He had 1 ½ years experience operating a roof bolter at this mine and had been trained in accordance with 30 CFR, Part 48.

John Heimer had twenty seven years mining experience. He had 3 years 5 months mining experience at this mine and had been trained in accordance with 30 CFR, Part 48.

Dan Manhire had three months mining experience all at this mine. He had been trained in accordance with 30 CFR, Part 48.

ROOT CAUSE ANALYSIS

A root cause analysis was conducted and the following root cause was identified.

Root Cause: Management policies, procedures, and controls failed to ensure that safe ground conditions were established and maintained where persons work or travel.

Corrective Action: Management should establish policies, procedures, and controls to ensure that CRF backfill is mixed using materials with the appropriate distribution of aggregate sizes and with the correct cement to aggregate ratio. These policies, procedures, and controls must also ensure that the CRF is properly installed and maintained in areas where persons work or travel. Experienced persons should be trained to evaluate, support, and maintain adverse ground conditions.

CONCLUSION

The accident occurred because management failed to provide competent ground where miners worked or traveled. Additionally, procedures and controls to ensure that the back was competent were not established.

ENFORCEMENT ACTIONS

Order No. 6394650 was issued on April 21, 2008, under the provisions of Section 103(k) of the Mine Act:

A fatal accident occurred at this operation on April 21, 2008, when a roof fall occurred in the 4715-182 drift. Two mechanics and the bolter operator were attempting to repair a bolter that had broken down in the drift when the fall of ground occurred. The falling rock injured the bolter operator and struck one of the mechanics, causing fatal injuries. This order is issued to assure the safety of all persons at this operation. It prohibits all activity in the 4715-182 drift 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.

This order was terminated on June 23, 2008. Management barricaded the entrance and prohibited entry into the area.

Citation No. 6437837 was issued on September 2, 2008, under the provisions of Section 104(d)(1) of the Mine Act for a violation of 30 CFR 57.3360:

A fatal accident occurred at this operation on April 21, 2008, when the victim and two other miners were performing maintenance on a roof bolter in the 4715-182 drift when cemented rock fill CRF fell from the back, covering him and another miner. The ground control system was not designed, installed, and maintained in this area. The employees accessed this area on foot and in mobile equipment. Management failed to develop CRF procedures and did not follow recommendations made by their consultants to adequately control the ground. They were not reviewing the backfill summary data prior to entering this area. Management also failed to take any corrective action after repeated backfill hazards were identified by miners. Management engaged in aggravated conduct constituting more than ordinary negligence in that the ground support was not designed, installed, or maintained in a safe manner.

This citation was terminated on September 2, 2008. Management established policies and procedures to ensure that ground support systems are designed and installed to control the ground in places where persons work or travel.

Approved By:

Arthur L. Ellis
District Manager

Date

APPENDICES

Appendix A	Persons Participating in the Investigation
Appendix B	Diagram
Appendix C	Victim Information

APPENDIX A

Persons Participating in the Investigation

Small Mine Development, LLC

Michael Drussel	director of safety
Paul J. Joggerst	project superintendent

Humboldt County Sheriff's Office

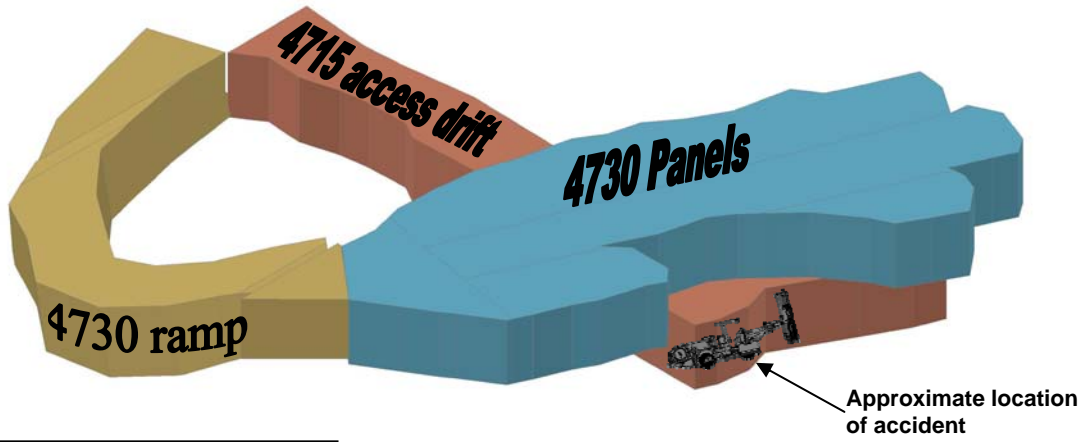
James Loveless	deputy coroner
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Mine Safety and Health Administration

Bret A. Park	mine safety and health inspector
Stephen P. Rogers	mine safety and health inspector
Sandin E. Phillipson	geologist
Denis J. Karst	mine safety and health inspector
Joseph N. Rhoades	mine safety and health specialist

APPENDIX B

Diagram



This diagram is not to scale and is for illustration purposes only

APPENDIX C

Victim Data Sheet

Accident Investigation Data - Victim Information

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



Event Number:

Victim Information:

1. Name of Injured/Ill Employee: <i>Kenneth Barbosa</i>	2. Sex: <i>M</i>	3. Victim's Age: <i>28</i>	4. Degree of Injury: <i>01 Fatal</i>
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5. Date(MM/DD/YY) and Time(24 Hr.) Of Death: <i>a. Date: 04/21/2008 b. Time: 15:15</i>	6. Date and Time Started: <i>a. Date: 04/21/2008 b. Time: 5:30</i>
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7. Regular Job Title: <i>046 Tamarock Roof Bolter operator</i>	8. Work Activity when Injured: <i>098 Conducting maintenance on Bolter</i>	9. Was this work activity part of regular job? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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10. Experience			b. Regular			c. This			d. Total		
Years	Weeks	Days	Years	Weeks	Days	Years	Weeks	Days	Years	Weeks	Days
<i>1</i>	<i>25</i>	<i>0</i>	<i>1</i>	<i>25</i>	<i>0</i>	<i>1</i>	<i>25</i>	<i>0</i>	<i>3</i>	<i>9</i>	<i>0</i>

11. What Directly Inflicted Injury or Illness? <i>112 Cemented Rock Fall</i>	12. Nature of Injury or Illness: <i>390 Blunt force trauma to the head</i>
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13. Training Deficiencies			
Hazard:	<input type="checkbox"/> New/Newly-Employed	<input type="checkbox"/> Experienced Miner:	<input type="checkbox"/> Annual: <input type="checkbox"/> Task: <input type="checkbox"/>

14. Company of Employment: (If different from production operator) <i>Operator</i>	Independent Contractor ID: (if applicable)
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15. On-site Emergency Medical Treatment			
Not Applicable: <input checked="" type="checkbox"/>	First-Aid: <input type="checkbox"/>	CPR: <input type="checkbox"/>	EMT: <input type="checkbox"/> Medical Professional: <input type="checkbox"/> None: <input type="checkbox"/>

16. Part 50 Document Control Number: (form 7000-1)	17. Union Affiliation of Victim: <i>9999 None (No Union Affiliation)</i>
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