

**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 Powered Haulage Accident
June 19, 2007**

**Midas Mine
Newmont Midas Operations
Midas, Elko County, Nevada
Mine I.D. No. 26-02314**

Investigators

**Randy L. Cardwell
Supervisory Mine Safety and Health Inspector**

**David J. Small
Mine Safety and Health Inspector**

**Rolland A. Longfellow
Mine Safety and Health Inspector**

**James G. Vadnal
Mining Engineer**

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

Mined out and backfilled below the 5600 level

2-5600 Level

Void from subsidence Red outline

2-5550 Level

LHD loader was initially located here

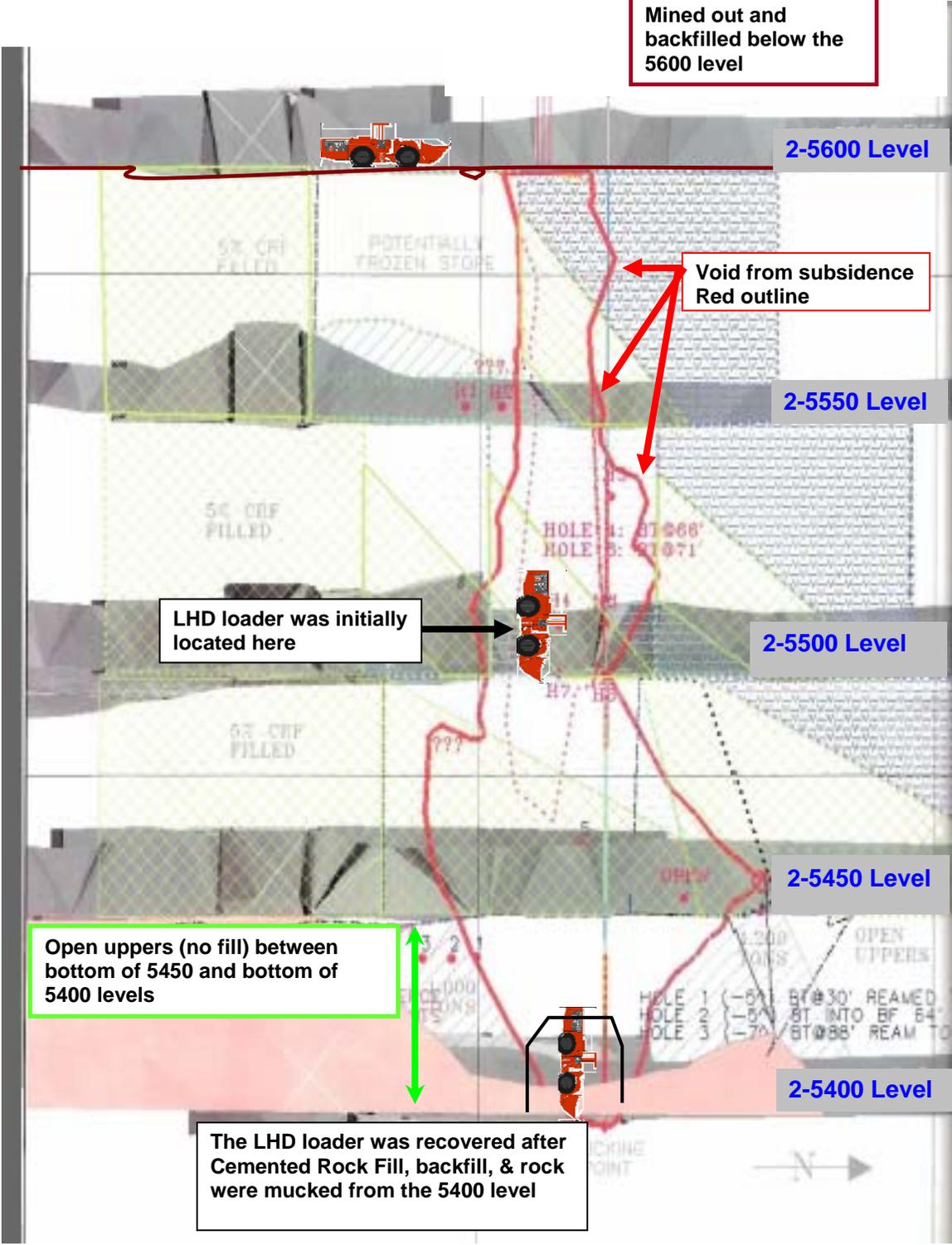
2-5500 Level

2-5450 Level

Open uppers (no fill) between bottom of 5450 and bottom of 5400 levels

2-5400 Level

The LHD loader was recovered after Cemented Rock Fill, backfill, & rock were mucked from the 5400 level



OVERVIEW

Thomas D. Shaw, underground miner, blaster, age 30, was fatally injured on June 19, 2007, while operating a load-haul-dump (LHD) over a backfilled stope. The LHD fell through the floor into a void that had developed due to subsidence in the backfill. The victim was recovered on July 2, 2007.

The accident occurred because management failed to establish procedures to ensure that safe ground conditions were established and maintained. The combination of mining methods, and the materials and process used to backfill stopes did not control subsidence and the subsequent formation of voids. The voids that developed in the backfill created hazards for miners working and traveling in the mine.

Management was aware that subsidence was occurring in the mine, but did not control the hazards and continued to require miners work and travel in hazardous areas. Signs or barricades were not provided to warn persons of known hazards.

GENERAL INFORMATION

Midas Mine, a multi-level underground gold operation, owned and operated by Newmont Midas Operations, was located two miles east of Midas, Elko County, Nevada. The principal operating official was Mark S. Ward, mine manager. The mine normally operated two, 11-hour shifts per day, seven days a week. Total employment was 228 persons.

Gold and silver ore were drilled, blasted, and transported to the surface by haul trucks. The ore was crushed, milled, and refined into a dore (gold & silver bullion) on site. The dore was shipped for further refining and sold for commercial use.

The last regular inspection at this operation was completed on May 17, 2007.

DESCRIPTION OF ACCIDENT

On the day of the accident, Thomas D. Shaw (victim), reported for work at 6:00 a.m., his normal starting time. Shaw attended a meeting with the blasting crew before going underground. Jon Van Engan, general mine foreman, instructed Shaw, Lynne McArthur and Jeramie Drobny, miners, to load and blast panel 7 between the 2-5650 level and the 2-5600 level.

Explosives could not be loaded from the top, at the 2-5650 level, because some of the drill holes had caved in. Therefore the holes had to be loaded from the 2-5600 lower level. Shaw used a 2-yard LHD to transport blasting materials from an explosives magazine located on the 3-5400 level. When Shaw drove through the 2-5600 north sill, he traveled over backfilled material that had been placed in the stope. He and the LHD fell through the floor into a large void that had developed in the backfill.

McArthur and Drobny were nearby and heard the LHD crashing as it fell. They went to the stope and found an opening in the floor approximately 10 feet wide and 10 to 20 feet long and saw a void beneath the opening. They could hear the LHD's engine but could not see Shaw or the machine. McArthur called for emergency assistance and rescue efforts began immediately. Search and rescue efforts were continuously conducted in coordination with company, federal, and state mine safety officials.

The efforts to find and recover Shaw were complicated because he and the LHD were engulfed in the collapsed ground. The Center for Robot-Assisted Search and Rescue assisted in the efforts to locate the victim. Sophisticated robotics, infrared and night vision cameras were lowered into the void and through 18 newly-drilled, 4-inch diameter holes. The location of the LHD was discovered, but the victim could not be found.

Hazardous ground conditions in the backfill near the floor opening on the 2-5600 level prevented persons from safely working at that location. A draw point was established at a lower level of the stope, the 2-5400 level. At this location persons were working on

solid ground. A narrow entryway to the draw point and loose material continuously feeding down the stope limited the type and size of equipment that could be used. A 2-yard, remote-controlled LHD was small enough to maneuver in the area, but the corners of some pillars had to be drilled and shot to improve maneuverability. The progress was slow because the LHD buckets could not be filled to capacity due to tight quarters that limited vision. Material excavated by the LHDs was deposited on the ground, searched for articles belonging to the victim, and then hauled away by larger 6-yard LHDs.

On June 21, 2007, the 2-yard LHD that the victim had been operating was recovered. Since the victim's exact location could not be pinpointed, much more material had to be removed. After delays due to equipment breakdowns and material falling into the void from the upper levels of the stope, the victim was recovered at the draw point on July 2, 2007.

INVESTIGATION OF THE ACCIDENT

The Mine Safety and Health Administration (MSHA) was notified of the accident at 8:46 a.m., on June 19, 2007, by a telephone call from Tim Burns, underground health, safety, and loss prevention manager, to MSHA's National Call Center. Rodney D. Gust, mine safety and health specialist, was notified and an investigation was started 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, State of Nevada Mine Safety and Training Section, and the Elko County Sheriff's office.

DISCUSSION

Location of the Accident

The accident occurred in the 2-5600 north sill drift located in the Colorado Grande (105) vein. The subsidence occurred on the North sill approximately 90 feet in from the sill drift access.

Mining and Backfill Procedure

The mine was accessed by a main decline. Sublevel stoping was used to extract the gold and silver ore from a series of near-vertical narrow veins which were hosted by volcanic rocks.

The various levels of mining were referenced to feet above mean sea level (AMSL). The working levels in the area of the accident at that time were 5600 and 5650 feet AMSL.

Spiral ramps allowed access to the ore veins. Crosscuts were driven from each spiral to the ore vein at 50-foot vertical increments, and then sill drifts were driven in the veins from and roughly perpendicular to the crosscuts in both the north and south directions. The sill drifts were advanced by drilling and blasting and averaged about 7 to 9 feet wide and 12 feet high.

The sill drifts outlined the top and bottom of ore stopes that were generally 38 feet high (50-foot vertical spacing minus 12-foot sill drift height). The stopes were mined from the end of the sill drift by extracting a series of panels, typically 60 feet long and 38 feet high, retreating back toward the stope access crosscut. The stope panels were drilled and blasted from the sill drift above with the blasted ore falling to the sill below. The ore was then removed from the sill below by remote-controlled LHDs.

After the ore was mucked out, the mined area was backfilled using a combination of cemented rock fill (CRF) and uncemented mine run waste rock. CRF was used to create a “plug” of unspecified thickness at the bottom of the mined-out stope and then uncemented waste rock was placed above the CRF. The percentage of cement in CRF mixtures reportedly ranged from 3% to 5%. The percentages of waste rock, cement and water were not measured or controlled and the components were not thoroughly mixed. There was no procedure for compacting or consolidating the CRF and no strength or other quality testing of the CRF was performed. After it was mixed, wet CFR was transported to the stope by LHD and dumped from the sill above into the mined-out stope. Once a CRF “plug” was in place, LHDs dumped uncemented waste rock on top of the CRF into the mined-out stope. There was no procedure for compacting or consolidating the waste rock fill. After each 50-foot high panel was extracted and backfilled, the backfilled upper sill drift became the bottom sill drift for subsequent upward-advancing stope work. At the accident location a CRF plug was placed at the lowest sill drift, level 2-5450. Backfill placed in the stope above the plug did not contain any cement.

Ore zones left in place below the levels previously mined were mined later using a different method. In the area of the accident, an open top sill drift no longer existed at the 2-5450 level, so sills were driven at the 2-5400 level and blast holes were drilled upwards from the lower sill drift into the panel stope. The shot panel was mucked by remote-controlled LHDs from the 2-5400 level. Mining in this manner created a void that could not be backfilled from above. These areas, approximately 50 feet high and extending up to the bottom of the 3-5% CRF plug, were left unfilled and therefore remained open voids. Hence they were referred to as “open uppers.” The CRF plugs above were not supported from beneath and relied solely on the binding strength of the cement to hold the plugs and the uncemented waste rock above them in place. If the CRF failed for any reason, the uncemented waste rock fill above could drop down into the open stope below, leaving a void in the backfilled stope above and permitting subsidence to occur.

Subsidence had been previously observed in several locations in the mine, including the areas below the 2-5600 north sills where the accident occurred.

Drilling and blasting of the panels between the 2-5600 and 2-5650 levels was performed from the 2-5650 level, with the exception of panel 7, the panel in which the drill holes had caved and which was to be loaded from below. The 2-5600 north sill that had once been closed for safety concerns was traveled by LHDs mucking ore that had been shot down from the panels above. This area was used for travel on the day of the accident to transport blasting materials to panel 7. For several days prior to the accident subsidence at the 2-5600 north sill was filled with material placed by LHDs. Three days prior to the accident, approximately 1,000 gallons of water disappeared suddenly from a low spot in the drift in the vicinity of the accident area. The need to repeatedly fill the subsidence and the sudden disappearance of the water indicated that voids existed in the backfill.

Loader

The LHD involved in the accident was a Sandvik 2-yard LHD, Model No. EJC 65. The loader was equipped with rubber tires and a falling object protection structure (FOPS) over the operator's compartment. It was powered by a diesel engine that drove a hydraulic pump to operate the unit.

Training and Experience

Thomas D. Shaw had 4 years and 28 weeks mining experience, all at this mine. He had received training in accordance with 30 CFR, Part 48.

ROOT CAUSE ANALYSIS

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

Causal Factor: Management policies and procedures failed to ensure that the combination of mining methods and ground control measures employed were adequate to protect persons and safely support equipment. Controls were not in place to ensure the quality of the procedures and materials used in the backfill process, permitting voids to be created in the backfill. The inadequate backfill was used for ground support and travelways, creating hazards to persons working or traveling in these areas. There were no procedures to report voids found in the backfill material.

Corrective Action: Management should establish procedures to ensure that the quality, amount, and placement of backfill to prevent voids from occurring during the backfill process. Procedures should be established to ensure that backfill material is of adequate strength and properly installed to prevent voids and to safely support persons and equipment. Procedures should be established for persons to report voids that are suspected or found so these hazards can be corrected.

CONCLUSION

The accident occurred because management failed to establish procedures to ensure that safe ground conditions were established and maintained. Materials used for backfill were not tested. The backfill placement left voids creating hazards for miners working and traveling in the areas.

Management was aware that voids developed in the backfill in the area of the accident. Management had investigated these occurrences but still required persons to travel and work in this area without addressing the hazards. No warning signs or barricades were placed in these areas to notify persons of the hazards that were identified.

ENFORCEMENT ACTIONS

Order No. 6338487 was issued on July 1, 2007, under the provisions of Section 103(k) of the Mine Act.

An accident occurred at this operation on June 19, 2007, when a miner was traveling on the 5600 north level in a loader and the ground gave way. On July 1, this has become a fatal investigation. This order is issued to assure the safety of all persons at this operation. It prohibits all activity in the mine, until MSHA has determined that it is safe to resume normal mining operations. The mine operator shall obtain prior approval from an authorized representative prior to restoring operation to the affected area.

This order is being issued in conjunction with the 103k order, 6394601, issued on June 19, 2007.

This order was terminated on October 11, 2007, after the hazards and conditions which contributed to the fatal accident were identified and addressed. The operator had established and was following a plan to prevent miners from being exposed to similar hazards and conditions in other areas of the mine. Therefore order number 6338487 was terminated.

Order No. 6437820 was issued on July 2, 2008, under provisions of Section 104(d)1 of the Mine Act for violation of 30 CFR 57.3360:

A fatal accident occurred at this operation on June 19, 2007, when a front-end loader, being operated by a miner fell into a major subsidence (sinkhole) on the 2-5600 level of the mine, engulfing the loader and operator. A ground control system was not designed, installed, and maintained to control the ground in this area. The employees accessed this area on foot and in mobile equipment. Prior to the accident, the company had experienced major subsidence problems in the 2-5600 sill drift, and in other areas of the mine, which endangered employees. Ground support was not used where ground conditions, or mining experience in similar ground conditions in the mine, indicated that ground support was necessary. Prior to the accident, management failed to follow repeated recommendations by their own consultants and experts for installing and maintaining an effective ground control system to alleviate subsidence issues in the mine.

Management engaged in aggravated conduct constituting more than ordinary negligence in that it was aware of previous subsidence in Spiral 2, and in other areas of the mine, and failed to correct mining practices and hazardous conditions. This violation is an unwarrantable failure to comply with a mandatory standard.

This order was terminated on July 2, 2008, after the mine operator established procedures to ensure that safe ground conditions are established and maintained. Miners will not be permitted to work over open voids in the mine.

Order No. 6437821 was issued on July 2, 2008, under provisions of Section 104(d)1 of the Mine Act for violation of 30 CFR 57.20011:

Subsidence on the 2-5600 level of the mine was reported to mine management on June 15, and 17, 2007, but no warning sign or barricade was installed to alert employees of the subsidence hazard in the area. The hazardous condition was not immediately obvious to the employees. On June 19, 2007, a fatal accident occurred when a miner operating a front end loader in the 2-5600 level of the mine, fell into the above-mentioned subsidence, engulfing the front end loader and operator. Management engaged in aggravated conduct constituting more than ordinary negligence in that it was aware of the subsidence and failed to barricade or post a warning sign at all approaches to alert employees of the hazard. This violation is an unwarrantable failure to comply with a mandatory standard.

This citation was terminated on July 2, 2008, after the mine operator established procedures to ensure that adequate barricades and/or warning signs were installed to notify persons of the hazards identified.

Approved By:

Arthur L. Ellis
District Manager

Date

APPENDICES

- A. Persons Participating in the Investigation
- B. Accident Data – Victim Information
- C. General Mine Illustration

APPENDIX A

Persons Participating in the Investigation

Newmont Midas Operations

Richard F. Tucker	safety relations senior manager
Steven A. Zimmerman	shift supervisor, crew 3
Doug I. Nelson	safety specialist for Deep Post mine
Peter S. Gould	Patton Boggs attorney
Mark N. Savit	Patton Boggs attorney
Cole A. Wist	Patton Boggs attorney
Lee C. Morrison	health, safety, loss, prevention specialist
Jon Van Engan	mine general foreman
James R. Hamilton	shift foreman
Michael J. Dunn	geotech
Monica S. Dodd	engineer
Mark S. Ward	mine manager
David L. Williams	investigator for Patton Boggs attorney's
Tim J. Burns	underground health, safety, and loss prevention manager

Elko County Sheriff's Department

Mike Otterstrom	sergeant
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State of Nevada Mine Safety and Training Section

Jerry Murphy	district inspector
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Mine Safety and Health Administration

Randy L. Cardwell	supervisory mine safety and health inspector
David J. Small	mine safety and health inspector
Rolland A. Longfellow	mine safety and health inspector
James G. Vadnal	mining engineer
Timothy S. Williams	attorney
Susan Gillett-Kumli	attorney

APPENDIX B

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>Thomas D. Shaw</i>		2. Sex: <i>M</i>	3. Victim's Age: <i>30</i>	4. Last Four Digits of SSN: <i>0000</i>	5. Degree of Injury: <i>01 Fatal</i>			
6. Date(MM/DD/YY) and Time(24 Hr.) Of Death: <i>a. Date: 07/02/2007 b. Time: 1:15</i>				7. Date and Time Started: <i>a. Date: 06/19/2007 b. Time: 6:00</i>				
8. Regular Job Title: <i>128 Miner, LHD operator</i>			9. Work Activity when Injured: <i>058 Operating LHD</i>		10. Was this work activity part of regular job? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>			
11. Experience		b. Regular		c. This		d. Total		
Years	Weeks	Days	Years	Weeks	Days	Years	Weeks	
<i>1</i>	<i>22</i>	<i>3</i>	<i>1</i>	<i>22</i>	<i>3</i>	<i>4</i>	<i>28</i>	
12. What Directly Inflicted Injury or Illness? <i>123 Sill or Floor gave way</i>			13. Nature of Injury or Illness: <i>390 Blunt trauma & asphyxiation</i>				Mining: <i>4</i> <i>28</i> <i>0</i>	
14. Training Deficiencies:								
Hazard:		New/Newly-Employed Experienced Miner:		Annual:		Task:		
15. Company of Employment: (If different from production operator) <i>Operator</i>				Independent Contractor ID: (if applicable)				
16. On-site Emergency Medical Treatment:								
Not Applicable:		First-Aid:		CPR:		EMT: <input checked="" type="checkbox"/>		
						Medical Professional: <input type="checkbox"/>		
						None: <input type="checkbox"/>		
17. Part 50 Document Control Number: (form 7000-1)				18. Union Affiliation of Victim: <i>9999 None (No Union Affiliation)</i>				

APPENDIX C

