

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

REPORT OF INVESTIGATION

Underground Metal Mine
(Zinc)

Fatal Fall of Back Accident

May 31, 2008

Balmat Mine No. 4 & Mill
St. Lawrence Zinc Company, LLC
Gouverneur, St. Lawrence County, New York
Mine I.D. No. 30-01185

Investigators

Rodney L. Rice
Mine Safety and Health Inspector

Lynn D. Allen
Mine Safety and Health Inspector

Paul L. Tyrna
Mining Engineer

Originating Office
Mine Safety and Health Administration
Northeast District
Thorn Hill Industrial Park
547 Keystone Drive, Suite 400
Warrendale, Pennsylvania 15086-7573
James R. Petrie, District Manager

Drill steel



Rock that fell from back and struck the victim pinning him.



OVERVIEW

Willard P. Clewis, Jr., miner-1, age 40, was fatally injured on May 31, 2008, when a large rock fell and struck him. Clewis and a coworker were drilling a round at the face in a vent drift. Clewis was attempting to retrieve a drill bit from a hole at the face when the rock fell from the back. The other miner was on the outby side of the drift and was not injured.

The accident occurred because adverse ground conditions encountered during the mining cycle were not addressed by management. Management provided a ground control plan listing necessary ground support materials to control adverse ground but did not ensure that the plan was implemented in the vent drift.

GENERAL INFORMATION

Balmat No. 4 Mine & Mill, an underground lead-zinc mine owned and operated by St. Lawrence Zinc Company, LLC, was located approximately eight miles south/southwest of Gouverneur, St. Lawrence County, New York. The principal operating official was Michael J. Lawler, president and COO. The mine operated various shifts of eight to ten hours, 24 hours per day, seven days per week. Total employment was 222 persons.

Ore was drilled and blasted from multiple drifts. Material was loaded from the faces using load-haul-dumps (LHDs) and front-end loaders. Haul trucks and LHDs transported the material to a dump station. It was sent through a jaw crusher and stored in skip bins. The material was hoisted to dump bins on the surface and processed in the mill and sold to industry for subsequent use.

The last regular inspection was completed on April 18, 2008.

DESCRIPTION OF THE ACCIDENT

During the three days prior to the accident, Willard P. Clewis, Jr. (victim), miner-1, and Richard R. Aldridge, Jr., general utility-1, started a project to widen a 4-foot by 7-foot vent drift on the 2100 level. They drilled, blasted, and mucked the first round but did not install roof bolts or screen mesh before they drilled three holes for the second round.

On the day of the accident, Clewis and Aldridge reported to work at 6:00 a.m., their normal starting time. They went to the vent drift and Aldridge checked the air and water lines for leaks. Clewis began drilling at the top of the face to finish the row he had started the previous day.

About 10:00 a.m., Clewis told Aldridge that the bit came off the end of the drill steel. He asked Aldridge to get a tamping pole to retrieve the bit. Upon receiving the tamping pole, Clewis used a knife to sharpen the end. Aldridge went to the entrance of the drift and began straightening up hoses and water lines when he heard a loud noise. When Aldridge looked toward the face, he saw a large section of rock had fallen from the back pinning Clewis. Aldridge called Clewis several times but he did not respond.

Aldridge called Scott Zeller, hoist operator, on the mine phone for help. Shortly afterward, miners and mine rescue team members arrived and checked Clewis but he was non-responsive. They used air bags, scaling bars, and timbers to free the victim from the rock. Clewis was transported to the surface and then to a local hospital where he was pronounced dead by the attending physician. The cause of death was attributed to crushing injuries.

INVESTIGATION OF THE ACCIDENT

The Mine Safety and Health Administration (MSHA) was notified of the accident at 11:37 a.m. on May 31, 2008, by a telephone call from Douglas L. Beachard, director of human resources, to James R. Petrie, district manager. MSHA was not notified immediately notified and a non-

contributory citation was issued. An order was issued under the provisions of Section 103(k) of the Mine Act to ensure the safety of miners. An investigation was started the same day.

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, employees, miners' representative, and the New York State Police.

DISCUSSION

Geology

The mine was located within the Balmat-Edwards Zinc mining district. At the time of the accident, the mine had 50 active faces operating at depths up to 3,300 feet within an approximate area of two square miles. Development of the mine began in 1972 with ore extracted from multiple ore bodies.

Regionally, the area encompassing the mine was known as the Adirondack lowlands, an area underlain by a series of complexly folded Precambrian metamorphic (amphibolite facies) rocks near the western edge of the Adirondack Massif. The rocks were part of the Grenville supergroup and consisted primarily of marble and gneiss.

The ore bodies of the mine were associated with the Sylvia Lake syncline, a doubly plunging recumbent fold with a highly complex structure resulting from at least four phases of deformation. Fourteen rock units were differentiated within the syncline, five of which were associated with the ore bodies. The Sylvia Lake and lower Fowler ore bodies were contained in unit 11 which was composed of calcitic and dolomitic marble, quartz, and diopside. The upper Fowler was contained in units 7, 8, 9 and a small portion of unit 10. The Mud Pond was contained in units 6, 7, and 8 with unit 6 being composed of a complicated silicated marble that had been subdivided into about 12 subunits.

In general, the ore bodies were lenticular in shape with cross-sectional dimensions of tens of feet by hundreds of feet and lengths of up to 6,000 feet along the direction of the plunge of the folds. The ore tended to be located within faulted tectonic extension joints formed within the axial plane of the folds. The ore itself consisted of nearly pure sphalerite with varying amounts of pyrite and minor galena.

A series of inclined spiral ramps were developed to access the successively deeper horizontal drift levels. Designed dimensions of the drifts and haulage ways generally ranged from 10 feet by 12 feet to 14 feet by 15 feet. Actual dimensions were sometimes greater in order to accommodate large equipment or in production drifts to maximize the extraction of the non-uniformly shaped ore body.

Location of the Accident

The accident occurred in a vent drift on the 2100 level approximately 614 feet from the No. 4 Shaft and approximately 1,380 feet below the surface (Figure 1). The vent drift comprised one leg of a triangular development configuration and connected an old raised bore station and the access drift to the old No. 2 Mine. The access drift served as the secondary escapeway for the No. 4 Mine.

The ground fell in a single slab that broke into three large pieces and several smaller pieces upon impact. The individual slabs measured 8.5 feet by 4.0 feet by 14 inches thick; 7.0 feet by 1.6 feet by 9 inches thick; and 9.0 feet by 4.0 feet by 10 inches thick. The combined weight of the material was estimated to be roughly 3.3 tons.

The ground, ribs, and floor at this drift were composed of bright white, coarsely crystalline dolomitic marble referred to as “Bed 12.” According to mine geologists, this rock unit was highly susceptible to spalling.

Ground Support

Primary ground support used in development drifts consisted of 5-foot, 39-mm split sets installed in conjunction with 6-inch by 6-inch bearing plates, through 5-foot by 9-foot mats of 6-gauge galvanized welded wire mesh oriented transversely to the drift. For each mat, the installed bolt pattern was three split sets along the front and side edges with two split sets in the middle. Each successive mat was overlapped with the trailing edge pinned by driving 2-foot long split sets into the last row of 5-foot long split sets. Supplemental supports used were 7/8-inch diameter, grade 75 fully grouted Dywidag threadbar cut to length (typically 12-foot) from 24-foot stock.

Primary support in production drifts was the same as that used in development drifts with the exception of small drifts (8 feet high) where 5-foot long Swellex[®] bolts were used. Supplemental support in production areas included 8-foot long Swellex[®] bolts and up to 20 feet long, 0.6-inch diameter cement grouted cable bolts (typically double cased).

The evaluation of the 2100 level vent drift revealed that no action had been taken to support the loose, drummy sounding, material in the back of the drift. There were separations or cracks present over the entrance into the drift but no support was installed.

Ground Support Policy

On May 21, 2007, mine management issued Policy BMP-067 “Ground Support Using Hand Held Pneumatic Drills.” The policy outlined the ground support procedures and materials to be used and installed in areas with conditions similar to the vent drift on the 2100 level.

In accordance with the policy, miners were instructed to safely scale down material before the ground was bolted or screened. Miners were to start from the last row of permanent supports and fasten wire mesh in place by inserting 2-foot split sets into the existing 5-foot split sets. Holes

were to be drilled one at a time perpendicular to the ground to be supported. Wire mesh was to be applied from the sidewall arch or shoulder completely across the drift to the opposing sidewall arch or shoulder. The policy required voids between the mesh and the back to be minimized and bolts spaced accordingly. The sidewalls were to be bolted if necessary.

This ground support policy was not followed in the vent drift on the 2100 level where the accident occurred. Miners worked in this area for four days but management did not ensure that adequate ground support was installed.

Equipment

At the time of the accident, the victim was using a Midwestern Machine Model PHQ250 Jackleg drill with a 51” retractable air leg. He was standing atop a 2 ½ feet high pre-fabricated drill platform to access the upper row of holes in the face.

Training and Experience

Willard P. Clewis, Jr., victim, had two years, two months, two days mining experience. Richard P. Aldridge had three weeks mining experience and had worked underground for four days. Clewis and Aldridge had received training in accordance with 30 CFR, Part 48.

ROOT CAUSE ANALYSIS

A root cause analysis was performed and the following root causes were identified:

Root Cause: Ground support was not installed in the vent drift on the 2100 level.

Corrective Action: Ground support should be used where conditions or mining experience in similar ground conditions in the mine indicate that it is necessary.

Root Cause: Management policies, procedures, and controls were not being followed. Specifically, the ground was not supported in the vent drift on the 2100 level as specified by the company’s ground support policy to protect persons where they worked or traveled.

Corrective Action: Management should ensure that established policies, procedures, and controls are followed. Miners should be trained to install ground support in adverse conditions as required.

CONCLUSION

The accident occurred because management failed to ensure that adverse ground conditions encountered during the mining cycle were addressed. Management provided a ground control plan listing ground support materials to control adverse ground but did not ensure that the plan was implemented in the vent drift.

ENFORCEMENT ACTIONS

Order No. 6054408 was issued on June 1, 2008, under the provisions of Section 103(k) of the Mine Act:

A verbal 103(k) order was issued on 5/31/2008 at 12:08 p.m. by James Petrie, District Manager. A fatal accident occurred at this operation on May 31, 2008 when two miners were attempting to drill and blast to enlarge the opening at the 2100 vent drift. The drift is currently four feet by seven feet. The miners were developing the drift to eight feet by eight feet. During the development work the jackleg drill steel bit came free and was stuck in the rear of the left top hole. The driller attempted to remove the drill bit from the hole via use of a tamping pole that he had sharpened to try and jam it into the eleven degree tapered bit. It was at that time the second miners heard something and turned to see the jackleg drill operator under a section of loose material that had fallen from the roof. This order is issued to assure the safety of all persons at this operation. It prohibits all activity at the 2100 vent 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.

The order was terminated on June 6, 2008. Conditions that contributed to the accident no longer exist and normal operations can resume.

Citation No. 6054415 was issued on July 7, 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 mine on May 31, 2008. A miner was struck by falling material in the 2100 Level Vent Drift, while working under unsupported ground. The miner and a coworker had been drilling and were performing other duties when the accident occurred. Ground support was recognized as necessary based on the Company's Policy BMP-067 (Ground Support Using Hand-Held Pneumatic Drills), which requires the roof to be scaled, bolted, and screened completely to the face prior to work commencing. Ground support was not installed in the 2100 Level Vent Drift when the accident occurred. Management engaged in aggravated conduct constituting more than ordinary negligence in that it was aware of the unsupported ground but did not require the ground to be supported. This violation is an unwarrantable failure to comply with a mandatory standard.

The citation was terminated on July 7, 2008. The area was scaled and additional ground support was installed. In addition, safety meetings were held with all underground miners to review the company's scaling and ground support policy and procedures.

Approved: _____

James R. Petrie
District Manager

Date: _____

APPENDICES

- A. Persons Participating in the Investigation
- B. Victim Data Sheet
- C. Schematic of the Accident Area

APPENDIX A

Persons Participating in the Investigation

Hudson Bay Mining and Smelting Co., Limited (parent company)

Brad W. Lantz	vice president, mining
Ian Cooper	safety & health director

St. Lawrence Zinc Co., LLC

Douglas L. Beachard	director of human resources
Danny Weldon	senior safety engineer
Gary Walton	electrical superintendent
Marty Spilman	safety trainer
Mike Ellis	mine trainer
Ted Parsons	senior internal auditor
Robert Baderman	miners' representative

New York State Police

Brian J. Langtry	investigator, SP Canton
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Mine Safety and Health Administration

Rodney L. Rice	mine safety and health inspector
Lynn D. Allen	mine safety and health inspector
Paul L. Tyrna	mining engineer

APPENDIX B

Victim Data Sheet

Accident Investigation Data - Victim Information

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



Event Number: 0 8 9 8 4 4 9

Victim Information: 1															
1. Name of Injured/Ill Employee: <i>Willard P. Clewis Jr.</i>			2. Sex <i>M</i>	3. Victim's Age <i>40</i>		4. Degree of Injury: <i>01 Fatal</i>									
5. Date(MM/DD/YY) and Time(24 Hr.) Of Death: <i>a. Date: 05/31/2008 b. Time: 12:05</i>						6. Date and Time Started: <i>a. Date: 05/31/2008 b. Time: 6:00</i>									
7. Regular Job Title: <i>063 Miner 1</i>				8. Work Activity when Injured: <i>019 Drilling with a jackleg drill</i>				9. Was this work activity part of regular job? <i>Yes X No</i>							
10. Experience															
a. This	Years	Weeks	Days	b. Regular	Years	Weeks	Days	c. This	Years	Weeks	Days	d. Total	Years	Weeks	Days
Work Activity:	<i>0</i>	<i>24</i>	<i>5</i>	Job Title:	<i>1</i>	<i>39</i>	<i>3</i>	Mine:	<i>2</i>	<i>4</i>	<i>0</i>	Mining:	<i>2</i>	<i>4</i>	<i>0</i>
11. What Directly Inflicted Injury or Illness? <i>117 Fall of back</i>						12. Nature of Injury or Illness: <i>170 Pinned under slab of rock</i>									
13. Training Deficiencies:															
Hazard:		New/Newly-Employed	Experienced Miner:		Annual:		Task:								
14. Company of Employment: (If different from production operator) <i>Operator</i>						Independent Contractor ID: (if applicable)									
15. On-site Emergency Medical Treatment:															
Not Applicable:		First-Aid:		CPR:		EMT:		Medical Professional:		None:	<i>X</i>				
16. Part 50 Document Control Number: (form 7000-1)						17. Union Affiliation of Victim:									

APPENDIX C

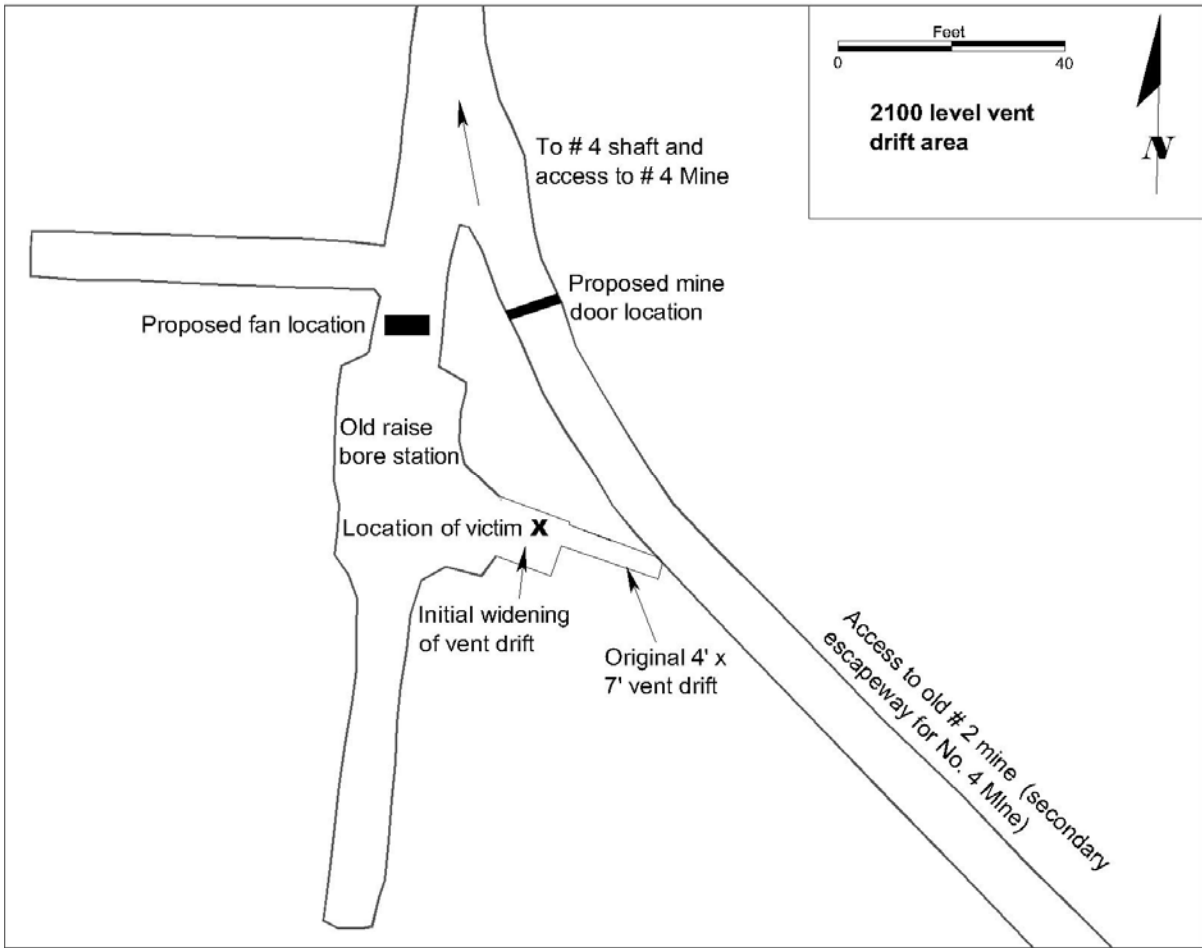


Figure 1 – Schematic of the Accident Scene (2100 Level Vent Drift)