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

REPORT OF INVESTIGATION

Underground Nonmetal Mine
(Limestone)

Fatal Fall of Roof Accident
April 25, 2011

Subtropolis Mine
Subtropolis Mining Co.
Petersburg, Mahoning County, Ohio
MSHA I.D. No. 33-04547

Investigators

Thomas J. Shilling
Mine Safety & Health Inspector

Russell W. West
Mine Safety & Health Inspector

Michael Gauna
Mining Engineer

Rick Swartz
Mine Safety and Health Specialist

Originating Office

Mine Safety and Health Administration
Northeast District
Thorn Hill Industrial Park
547 Keystone Drive, Suite 400
Warrendale, Pennsylvania 15086-7573
Donald J. Foster, Northeast District Manager

OVERVIEW

On April 25, 2011, Jason E Gudat, driller, age 31, was killed when a slab of roof struck him. He was walking through 34 cross cut when a slab of rock approximately 6 feet long by 5 feet wide by 12 inches thick fell.

The accident occurred because management policies, procedures, and controls were inadequate. The area where the rock fell was not examined and tested by an experienced person designated by the mine operator prior to work commencing. Additionally, procedures to ensure that persons scale loose ground and drill and bolt laminated roof areas were not followed.

GENERAL INFORMATION

Subtropolis Mine, an underground limestone mine, owned and operated by Subtropolis Mining Co. is located near Petersburg, Mahoning County, Ohio. The principal operating official is William T. Mackall, president. The mine normally operates two 10-hour shifts per day, 5 days a week. Total employment is 21 persons.

Material is mined using a room and pillar method. The material is drilled and blasted in multiple entries, taken by a Load Haul Dump (LHD) to the primary feeder/ crusher, and then transported to the surface by belt conveyor. The material is stockpiled for further processing at the surface plant where it is sized, screened, and washed. Finished materials are sold for construction aggregate.

The last regular inspection of this operation was completed on January 13, 2011.

DESCRIPTION OF ACCIDENT

On the day of the accident, Jason E. Gudat, (victim) reported to work at 8:30 p.m., which is his normal start time for that day. Timothy Lucas, night shift foreman, assigned the shift's duties to Robert Davis, water truck operator, Robert Foster, scaler operator, and Gudat.

About 9:00 p.m., Gudat moved a drill to the 1 North 5 entry to start drilling the face. The drill became low on water. Gudat attempted to contact Davis via two way radio at approximately 1:00 a.m., but Davis did not respond. Gudat then walked to the water truck that was operating in 1 North 3, two entries to the west. Gudat told Davis that the drill was out of water. Davis told Gudat he would bring the water truck to the drill in a few minutes. As Gudat walked back to the drill, a section of roof in cross cut 34 fell, striking him.

Lucas heard Gudat attempting to contact Davis via 2 way radio. Lucas approached Gudat's work area when he saw a section of roof falling in 34 cross cut. He exited the LHD and immediately began to search for Gudat. Lucas discovered Gudat under rock at approximately 1:20 a.m.

Lucas called for help on the 2 way radio. Davis and Foster responded and were informed that Gudat was under rock. Davis called for Emergency Medical Services (EMS) from a phone nearby. Davis and Foster got a front-end loader to lift the rock from Gudat. Davis left the mine to meet the Springfield Fire Dept. Evacuation and Rescue team.

Foster used the front-end loader to remove the rock from Gudat while Lucas guided the operation. EMS personnel arrived on the scene and provided medical treatment. Courtney Bouchie, coroner's investigator, arrived and pronounced the victim dead at 3:00 a.m. The cause of death was blunt force trauma.

INVESTIGATION OF THE ACCIDENT

The Mine Safety and Health Administration, (MSHA) was notified of the accident on April 25, 2011, at 2:28 a.m. by the National Call Center. Brian P. Goepfert, assistant district manager, was then informed of the accident. An investigation was started the same day. To ensure the safety of all persons, an order was issued pursuant to 103(j) of the Mine Act. This order was later modified to section 103(k) of the Mine Act when the first Authorized Representative arrived at the mine. A Part 50 citation was issued for untimely reporting.

MSHA'S accident investigation team traveled to the mine, conducted a physical inspection of the accident site, interviewed employees, and reviewed conditions and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management and employees and the Ohio Department of Natural Resources.

DISCUSSION

Background / Geology

Vanport Limestone, underlain by a sandy shale/clay, is extracted using the room and pillar mining method. A thin layer of limestone is left above the sandy shale/clay material to form a stable floor horizon. The Vanport Limestone Lower member and Middle member (informally named) are both mined creating an approximate 15 to 16-foot mining height. The Lower and Middle members are separated by shale band(s). The top of the Middle member consists of a transition zone that initially started as a shale material at the mine portal but has changed into a limestone bed (approximately 8 to 12 inches thick) in the current face area. The transition zone at the face area is a marker bed used to control the roof break during blasting.

Overlying the transition zone is a massive limestone bed, informally named the Upper Member that is referred to as the "Cap Rock" by mine personnel. The "Cap Rock" forms the immediate roof that is approximately 4-foot thick at the current face. The "Cap Rock" was initially 8-foot thick at the mine portal but has diminished in thickness. Overlying the "Cap Rock" is a sequence of shale, sandy shale, and sandstone of the Lower Kittanning Formation. No geologic jointing or faulting was noted.

At the portal, mining started in a westward orientation with the long axis of the pillars oriented east-west. After approximately 1,200 feet of development, pillars were reoriented. The long dimensions were oriented north-south to assist in controlling roof falls that propagated in an east-west orientation. Currently, mining is advancing northward with pillars oriented north-south. Approximately, 2,500 feet of development has been mined northward.

Location of the Accident

The accident occurred in crosscut 34 between the No. 1N4 and No. 1N5 entries. This area is located approximately 3,600 feet northwest (linearly) from the mine portal and is accessed via approximately one mile of travel way.

The mining height in the No. 1N4 to No. 1N5 entries is approximately 16 feet with the base of the "Cap Rock" evident in the roof of both entries. A borehole camera survey immediately west of the accident site revealed that the "Cap Rock" is 4.3 feet thick in this area. No roof bolts were installed in the vicinity of the accident site.

Crosscut 34 is approximately 30 feet wide and was excavated from the No. 1N4 to No. 1N5 entry (already mined). The crosscut depth projected along the inby and outby pillar ribs, measured from No. 1N4 to No. 1N5 entry, is approximately 24 feet. The crosscut depth at the rounded pillar corners is approximately 21 feet. Reportedly, three blast rounds were required to mine the crosscut. The third round was a short round completed on April 21, 2011.

Investigators determined that within the crosscut, prior to the roof fall, the transition zone limestone bed remained against the base of the "Cap Rock" between entries. The transition zone limestone remaining in the roof varied from a few inches to 12 inches thick. The thickest portion was along the No. 1N5 entry in the area above the third blast round. Roof scaling marks were evident along the No. 1N4 side of the transition zone limestone. The accident occurred when the transition zone limestone fell from the "Cap Rock". The roof fall extended from rib-to-rib across the crosscut (see Appendix C). The portion of roof removed from the victim measured 8 to 12 inches thick, 50 to 70 inches wide, and 74 inches long with an estimated weight of 4,200 pounds.

Mining

Mining was being conducted in 15 development entries mined in a north orientation (labeled No. 2 N12 on the west/left to No. 1N10 on the east/right). These entries are projected on 65-foot centers and crosscuts on 100-foot centers with a 40-foot mining width up to crosscut 32. From crosscut 33 and inby, entries are projected on 65-foot centers and crosscuts on 90-foot centers with a 40-foot mining width in the entry and a 30-foot mining width in the crosscut.

The depth of cover at the location of the accident is approximately 170 feet. The depth of cover across the faces inby the feeder-crusher ranges from 160 to 230 feet, deepening to the west. No wet roof conditions were noted in the face area.

The entries mined showed no evidence of unusual pillar or floor stress. Calculations employing National Institute for Occupational Safety and Health (NIOSH) formulas for underground stone mines indicate that the pillar factor of safety for this mine exceeds the minimum recommended NIOSH factor of safety of 1.8 ("Pillar Strength and Design

Methodology for Stone Mines" by Esterhuizen, G.S., Dolinar, D.R. and Ellenberger, J.L., 2008).

Ground Support

Scaling is conducted with two Gradall XL 5110 scaling machines. Roof bolting (spot installation) is conducted with an Oldenburg Cannon roof bolting machine.

The roof bolt installation is intermittent across the fifteen-entry development. Roof bolts consist of 7/8-inch diameter, grade 60, 8-foot fully grouted deformed bar bolts installed with 8 x 8-inch bearing plates. Roof bolts are installed in a 1-3/8 inch drill hole. When installed, bolt spacing is typically two bolts per row along the center of the entries with 8-foot spacing between rows. Locations were noted where additional roof bolts are installed such as in the belt entry where three bolts per row on roughly 4-foot spacing between rows is used along the middle of the entry. Also, where damaged roof (thin slabs breaking away from the cap rock) a high density of bolting was noted across the entire entry or crosscut with bolts on 6 to 8-foot spacing. This situation was observed on the east side of face area in No. 1N7, No. 1N9, and No. 1N10 entries.

Training and Experience

Jason E. Gudat had 6 weeks of mining experience, all at this mine, and had received the required training in accordance with 30 CFR Part 48 except as noted.

Timothy Lucas had 6 years and 3 months of mining experience, and had received the required training in accordance with 30 CFR Part 48 except as noted.

Robert Davis had had 16 years and 2 months of mining experience, and had received the required training in accordance with 30 CFR Part 48 except as noted.

Robert Foster had had 4 weeks of mining experience, all at this mine, and had received the required training in accordance with 30 CFR Part 48 except as noted.

The required training that was provided to these miners was evaluated and the courses were conducted in accordance with 30 CFR Part 48. However, the training was not conducted by a qualified instructor. A non-contributory violation was issued.

Root Cause Analysis

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

Root Cause: Management policies, procedures, and controls failed to ensure that experienced persons examined and tested for loose ground in areas prior to work commencing.

Corrective Action: Management amended the written work procedures to ensure that experienced persons examine and test for loose ground in areas prior to work commencing.

Root Cause: Management policies, procedures, and controls failed to assure that loose ground was scaled down or supported in areas where work and travel was being performed.

Corrective Action: The mine operator has re-trained all miners to assure that ground conditions are taken down or supported before travel or work is performed.

CONCLUSION

The accident occurred because management policies, procedures, and controls were inadequate. The area was not examined and tested by an experienced person designated by the mine operator prior to work commencing. Additionally, procedures to ensure that persons scale loose ground and drill and bolt laminated roof areas were not followed.

ENFORCEMENT ACTIONS

Order No. 8647208 was issued on April 25, 2011, under the provisions of section 103(j) of the Mine Act:

On April 25, 2011, a fatal accident occurred at this operation. An employee was struck by a slab of rock that measured approximately 8 inches to 12 inches thick by 50 to 70 inches wide by 74 inches long. The roof fall occurred at the 34 Main, between Xcut 1North4 & Xcut 1North5.

The order was subsequently modified to Section 103(k) after an Authorized Representative arrived at the mine. This order was terminated on May 16, 2011. Conditions that contributed to the accident no longer exist.

Order No. 8647211 was issued on May 16, 2011, under the provisions of Section 104(d) (1) of the Mine Act for a violation of 30 CFR 57.3200:

A fatal accident occurred at this operation on April 25, 2011, when a drill operator was struck by a large rock. He was walking from the 1 North 4 entry to the 1 North 5 entry at crosscut 34. The rock was approximately 6 feet long by 5 feet by 12 inches thick. The loose rock created a hazard to persons and was not taken down or supported before travel was permitted in the affected area.

Management engaged in aggravated conduct constituting more than ordinary negligence. Similar and obvious conditions in the mine had required additional corrective measures including scaling and the use of ground support. This violation is an unwarrantable failure to comply with a mandatory standard

The order was terminated on May 16, 2011. The mine operator has scaled and roof bolted the affected area. All miners have been retrained regarding this standard. The mine has established a written policy requiring that all loose material be taken down or supported.

Order No.8647212 was issued on May 16, 2011, under the provisions of Section 104(D) (1) of the Mine Act for a violation of 30 CFR 57.3401:

A fatal accident occurred at this operation on April 25, 2011, when a drill operator was struck by a large rock while walking from the 1 North 4 entry to the 1 North 5 entry at crosscut 34. Examinations conducted in the area failed to identify loose material on the mine roof and testing was not performed to ensure the area was safe for travel.

Management engaged in aggravated conduct constituting more than ordinary negligence in that similar conditions existed in the mine. The hazardous ground conditions observed were readily visible. This violation is an unwarrantable failure to comply with a mandatory standard.

The order was terminated on May 16, 2011. The mine is being examined and hazardous conditions are being corrected where persons are required to work or travel. All miners have been retrained regarding this standard. The mine has established a written policy requiring that all work areas be examined and tested for loose material.

Approved by, Date:

Donald J. Foster
District Manager

LIST OF APPENDICES

APPENDIX A

Persons Participating in the Investigation

Subtropolis Mining Company
William T. Mackall……President
John P. Jones……..Mine Foreman
Patrick R. Gray……..Mining Engineer
David "Cookie" Holisky……....Petersburg Mine Superintendent

Mahoning County Coroner's Office
Courtney Bouchie …….Coroner's Investigator

Ohio Department of Natural Resources
John Ziants…….Mine Safety Coordinator
Allen C. Withrow……...Mine Safety Inspector
Rudy C. Romshak……..Mine Safety Inspector

Mine Safety and Health Administration
Thomas J. Shilling……..…Mine Safety and Health Inspector
Russell W. West…….Mine Safety and Health Inspector
Rick Swartz……Mine Safety and Health Specialist
Michael Gauna……...Mining Engineer, Technical Support

APPENDIX B

Accident Investigation Data - Victim Information

Event Number: 0 9 0 7 3 6 9

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:
Jason E. Gudat	*M*	*31*	*01 Fatal*

5. Date(MM/DD/YY) and Time(24 Hr.) Of Death:
a. Date: 04/25/2011 b.Time: 3:00

6. Date and Time Started:
a. Date: 04/24/2011 b.Time: 18:00

7. Regular Job Title:
056 Jumbo Drill Operator

8. Work Activity when Injured:
019 drilling faces

9. Was this work activity part of regular job?
Yes | X | No

10. Experience	Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days
a. This Work Activity:	*0*	*6*	*0*	b. Regular Job Title:	*0*	*6*	*0*	c: This Mine:	*0*	*6*	*0*	d. Total Mining:	*0*	*6*	*0*

11. What Directly Inflicted Injury or Illness?
090 Rock fall

12. Nature of Injury or Illness:
370 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: X | CPR: X | EMT: | Medical Professional: | None:

16. Part 50 Document Control Number: (form 7000-1)

17. Union Affiliation of Victim: *9999 None (No Union Affiliation)*

APPENDIX C

Photo view shown below

Photo view shown below