MAI-2013-04

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

REPORT OF INVESTIGATION

Surface Metal Mine
(Copper)

Fatal Fall of Material Accident
April 4, 2013

TIC - The Industrial Company
Contractor ID No. K48

at

Freeport-McMoRan Bagdad Inc.
Freeport-McMoRan Bagdad Inc.
Bagdad, Yavapai County, Arizona
Mine I.D. No. 02-00137

Investigators

David J. Small
Mine Safety and Health Inspector

Larry Lunsford
Mine Safety and Health Inspector

Richard M. O'Hanlon
Electrical Engineer

Larry Palacios
Mine Safety and Health Specialist

Originating Office
Mine Safety and Health Administration
Rocky Mountain District
P.O. Box 25367 DFC
Denver, CO 80225-0367
Richard Laufenberg, District Manager

MAI-2013-04

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

REPORT OF INVESTIGATION

Surface Metal Mine
(Copper)

Fatal Fall of Material Accident
April 4, 2013

TIC - The Industrial Company
Contractor ID No. K48

at

Freeport-McMoRan Bagdad Inc.
Freeport-McMoRan Bagdad Inc.
Bagdad, Yavapai County, Arizona
Mine I.D. No. 02-00137

Investigators

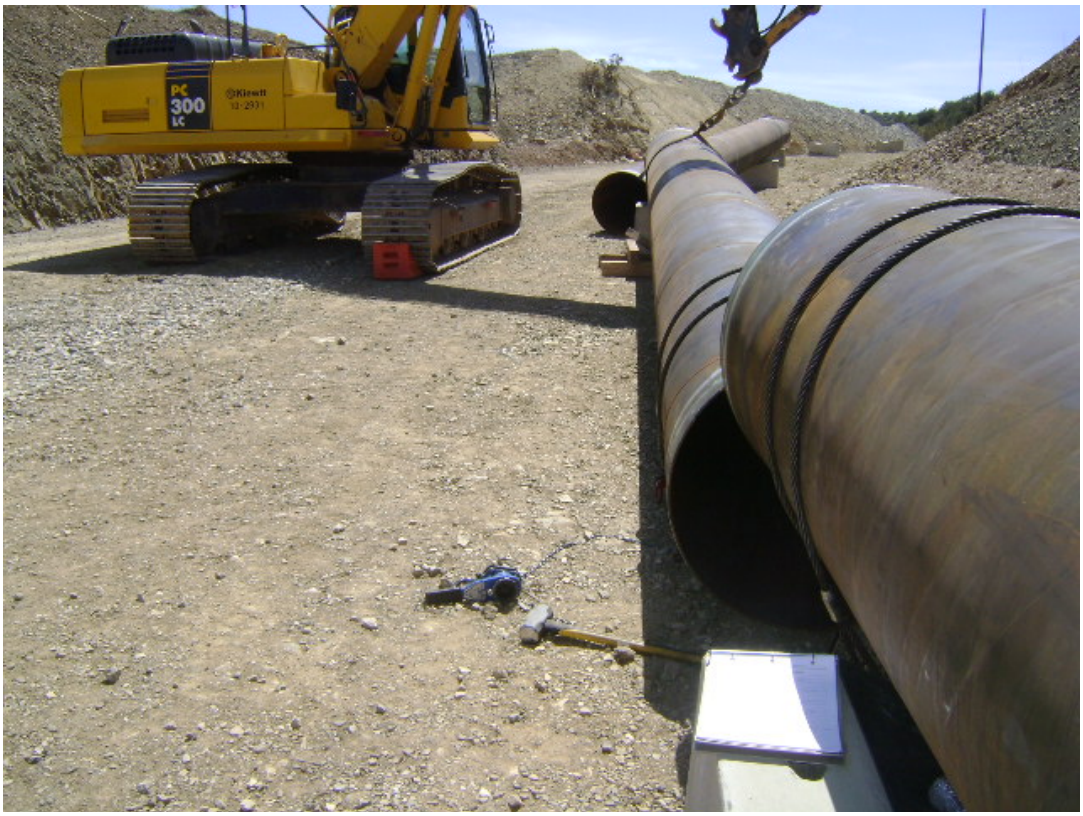
David J. Small
Mine Safety and Health Inspector

Larry Lunsford
Mine Safety and Health Inspector

Richard M. O'Hanlon
Electrical Engineer

Larry Palacios
Mine Safety and Health Specialist

Originating Office
Mine Safety and Health Administration
Rocky Mountain District
P.O. Box 25367 DFC
Denver, CO 80225-0367
Richard Laufenberg, District Manager


PC
300
LC

OVERVIEW

Alvin H. Thomas, Contract General Foreman, age 30, was killed on April 4, 2013, when a suspended 40-foot long section of 36-inch diameter steel pipe fell and struck him. An excavator was being used to position the pipe to connect it to another section of pipe. The pipe, attached to the excavator by a lifting strap, shifted and fell on the victim.

The pipe was being installed as part of a new system to flow wastewater from the flotation tanks back to a new impoundment.

The accident occurred due to contractor management's failure to identify the risks associated with the task of installing the pipe. The contractor had established policies and procedures; however, management failed to follow them. Additionally, the victim had not received task training before installing the pipe. He was working under a suspended load when the load shifted and fell on him.

GENERAL INFORMATION

Freeport-McMoran Bagdad Inc., a surface copper mine, owned and operated by Freeport-McMoran Inc. (FMI), is located in Bagdad, Yavapai County, Arizona. The principal operating official is Terry Rigoni, General Manager. The mine normally operates two 11-hour shifts per day, seven days a week. Total employment is 840 persons. A milling operation is also located on mine property.

Copper ore bearing rock is drilled, blasted in the open pit, and then transported by haul trucks to heap leach pads and overburden deposition areas. The ore is treated with sulfuric acid that creates a pregnant leach solution. Copper is recovered from the solution using a solvent extraction process and then processed into copper rod. The finished products are shipped and sold to commercial industries.

The Industrial Company (TIC) is located in Steamboat Springs, Routt County, Colorado. The principal operating official is Terry Carlsgaard, President. FMI contracted with TIC to install a flow wastewater system from the flotation tanks to a new impoundment. TIC had been at the mine since February 2012, employing 143 persons, working one 10-hour shift a day. The project is scheduled to be completed in July 2013.

The Mine Safety and Health Administration (MSHA) completed the last regular inspection at this operation on March 13, 2013.

DESCRIPTION OF THE ACCIDENT

On the day of the accident, Alvin H. Thomas (victim) began work at 6:30 a.m., his normal starting time. Thomas conducted a safety meeting with his crew. After that, they went to the work site and started installing pipe. The crew installed eight sections of pipe without incident. When the crew began installing the ninth section of pipe, they experienced difficulty connecting it to the adjacent pipe because it began to curve. They moved a concrete sleeper block 36 inches off center of the surveyed line in an attempt to line up the two pipes. The crew used sledge hammers, sleever bars, wire rope choker cables, and come-a-longs to help connect the two pipes but they could not connect them.

An excavator was used to suspend the pipe with a sling positioned in the middle of the pipe. The male end of the pipe being installed had been inserted partially into the bell end of the other pipe. The sling was disconnected and the excavator moved to the far end of the pipe. The sling was reattached, leaving the spigot end of the pipe unsupported. Thomas and Mervin Woody, Carpenter, started to pry the pipe together. The victim went under the spigot end to pry the pipe when it slipped out of the bell end of the adjacent pipe and fell to the ground striking him.

Emergency response teams from FMI and TIC were summoned and both teams responded to the accident site. Personnel from Bagdad Fire and Rescue also responded. The victim was pronounced dead at the site at 2:47 p.m. by Dr. Christopher Lampe of Emergency Medical Physicians in Prescott, Arizona. The cause of death was attributed to blunt force trauma.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 2:48 p.m., on April 4, 2013, by a telephone call from Glen Wyman, Health and Safety Manager, for FMI, to Michael Dennehy, Assistant District Manager. An investigation was started the same day. An order was issued under the provisions of Section 103(j) of the Mine Act. This order was modified to a 103(k) order upon arrival of MSHA personnel.

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 and contractor management and employees and the Arizona State Mine Inspectors' Office.

DISCUSSION

Location of the Accident

The accident occurred at an area referred to as the reclaim corridor near leach pad #9. About 1,800 feet of pipe had been installed leading from the pipe lay

down area to the accident site. The roadway where the pipe was initially placed was level but gradually sloped at a 5 percent grade.

Weather

On the day of the accident, the weather was mild and clear with a slight breeze. Weather was not considered to be a factor in the accident.

Pipe

The pipe involved in the accident was 36-inch outside diameter, 1/3-inch thick, and 40 feet long. The pipe weighed 5,729 pounds and was a spigot and bell design with a clearance of 1/32 inch completely around when connected to the other pipes.

Equipment

The excavator being used at the time of the accident was a Komatsu model #PC300 (LC)-7. According to the manufacturer, it had a maximum side load lifting capacity of 6,600 pounds when the boom was fully extended and 33,000 pounds when the boom was extended ten feet from the machine. The excavator was inspected and no defects were found.

The pipe was lifted using a single nylon lifting strap. The strap was inspected and no defects were observed.

The sleever bar used was a 30-inch long steel bar with a chiseled end and a tapered, pointed end, generally used for lining up bolt holes in flanges and positioning steel members in construction.

Other Physical Factors

- The excavator was moved from the center of the suspended pipe to a position 107 inches from the bell end of the 40-foot pipe. This left the spigot end of pipe without any support.
- Although the written task plan for the installation of the pipe included the requirement that the pipes be tack welded, there were 14 joints of pipe behind the pipe being installed that had not been tack welded. One of the joints was calculated to have only 0.019 inch engagement between the bell and the spigot. The minimum engagement between the bell and the spigot specified in the task plan was 1 inch. The investigators noted that the pipes with unsecured joints moved back and forth. This movement was noted by sharp noises caused by fluctuating temperatures throughout the day. The loose joints could have been a factor in the pipe becoming dislodged as it was being moved into the bell.

- The manufacturer's installation recommendations and the TIC task plan instructions were not to exceed a 1.5º radius at a joint. During the last attempt, the pipe was being installed at a 3.66º angle. The pipe had already been dislodged 3 times while trying to install it at larger angles, as noted by the movement of sleeper 149. Sleeper 149 had been moved 33 inches toward the center of the roadway. Sleepers are concrete blocks used to support the pipe.
- Fittings to make sharp angle turns were included in the design and layout of the pipe and had been fabricated but were not at the mine site.
- From persons interviewed, investigators found the engineered layout was ignored when contractor management decided to angle the pipe without the required fittings.
- The fittings specified in the design had not been used in the pipe installed to date. This resulted in the pipe, installed at the time of the accident, being outside the surveyed layout.

Training and Experience

Alvin H. Thomas (victim) had 6 years of experience. A representative of MSHA's Educational Field Services staff conducted an in-depth review of TIC and FMI's training records. The victim had received the required annual refresher training provided by TIC and hazard training given by FMI. However, he had not received the required task training prior to starting work on this project. Specifically, Thomas was not task trained regarding the procedures required to safely install the pipe.

ROOT CAUSE ANALYSIS

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

Root Cause: Contractor management failed to follow the policies and procedures that had been established to install the pipe. The problems installing the pipe were not properly addressed. Contractor management also failed to ensure that all persons working on the pipe project had received the proper task training prior to starting work on this project.

Corrective Action: Contractor management developed a Master Task Plan to ensure all safety items regarding the pipe installation have been addressed. This plan requires that trained and qualified personnel will install the remaining pipe. Engineered metal supports will be used to hold up the spigot end of a pipe while it is inserted into the bell end of the adjacent pipe and all the pipe joints will be tack welded prior to moving to the next section of pipe to be installed.

Contractor management had a pipe support designed and engineered to prevent persons from working under a suspended load when putting together spigot and

bell end 36 inch pipe. This pipe support will prevent the pipe from falling or rolling side to side.

A task training program regarding these new procedures for handling 36-inch spigot and bell pipe design was established. All persons assigned to work on the pipe project have received the task training. Any new persons assigned to work on the pipe project will receive this training.

CONCLUSION

The accident occurred due to contractor management's failure to identify the risks associated with the task of installing the pipe. The contractor had established policies and procedures; however, management failed to follow them. Additionally, the victim had not received task training before installing the pipe. He was working under a suspended load when the load shifted and fell on him.

ENFORCEMENT ACTIONS

Issued to Freeport-McMoRan Bagdad Inc.

Order No. 8596107 -- issued under the provisions of Section 103(j) of the Mine Act.

> *An accident occurred at this operation on April 4, 2013, at approximately 1351 hours. This order is being issued, under Section 103(j) of the Federal Mine Safety and Health Act of 1977, to prevent the destruction of any evidence which would assist in the investigating the cause or causes of the accident. It prohibits all activity at the reclaim corridor near Leach Pad #9 until MSHA has determined that it is safe to resume normal mining operations in this area. This order was initially issued orally to the mine operator at approximately 1505 hours and has been reduced to writing.*

Citation No. 8757719 -- issued under the provisions of Section 104(d) of the Mine Act for a violation of 30 CFR Part 48.27(c):

> *A fatal accident occurred on April 4, 2013, when a General Foreman was struck and crushed by a suspended section of pipe. Alvin H. Thomas, General Foreman, (victim) was assigned a new task of installing 36-inch diameter by 40 foot long, spigot and bell design, steel pipe. Thomas was not instructed in the safety and health aspects and safe work procedures of the task of installing the large pipe. The Federal Mine Safety and Health Act of 1977 declares an untrained miner is a hazard to himself and to others. The mine operator and the contractor were aware of the Part 48 training requirements. The mine operator engaged in aggravated conduct constituting more than ordinary negligence in that they were aware of the training requirements and directed the installation of the steel pipe, yet*

failed to provide the required training prior to having the task performed. This violation is an unwarrantable failure to comply with a mandatory safety standard.

Issued to TIC - The Industrial Company

Citation No. 8757717 -- issued under the provisions of Section 104(d) of the Mine Act for a violation of 30 CFR Part 48.27(c):

A fatal accident occurred on April 4, 2013, when a General Foreman was struck and crushed by a suspended section of pipe. Alvin H. Thomas, General Foreman, (victim) was assigned a new task of installing 36-inch diameter by 40 foot long, spigot and bell design, steel pipe. Thomas was not instructed in the safety and health aspects and safe work procedures of the task of installing the large pipe. The Federal Mine Safety and Health Act of 1977 declares an untrained miner is a hazard to himself and to others. The mine operator and the contractor were aware of the Part 48 training requirements. The superintendent engaged in aggravated conduct constituting more than ordinary negligence in that he was aware of the training requirements and directed the victim to install the steel pipe, yet failed to provide the required training prior to having him perform the task. This violation is an unwarrantable failure to comply with a mandatory safety standard.

Citation No. 8757718 -- issued under the provisions of Section 104(d) of the Mine Act for a violation of 30 CFR Part 56.16009:

A fatal accident occurred on April 4, 2013, when a General Foreman was struck and crushed by a suspended section of pipe. The pipe is of a spigot and bell design. The victim and co-workers were installing the spigot end of the pipe into the bell end of another pipe and they did not stay clear of a suspended load. The victim was positioned under the pipe to pry using a bar to connect the two ends of pipe together. The Superintendent engaged in aggravated conduct constituting more than ordinary negligence in that he was directly supervising and participating in this task. This is an unwarrantable failure to comply with a mandatory safety standard.

Approved by: Date: June 10, 2013

Richard Laufenberg
District Manager

List of Appendices

APPENDIX A

Persons Participating in the Investigation

Freeport-McMoRan Bagdad Inc.

Glen Wyman	Health and Safety Manager
Michael Love	Health and Safety Specialist II

Arizona State Mine Inspectors' Office

John Stanford	Sr. Deputy Mine Inspector
Bill Schifferns	Deputy Mine Inspector

TIC - The Industrial Company

Wayne Brazier	Sponsor
Emmett Black	Construction Manager
Jody McGee	Corporate Paralegal
Michael Brueggemann	District Manager
Earl Hyatt	Southwest District Area Safety Manager
Steve Karp	Area Manager
Terry Carlsgaard	President
Keith Nye	Superintendent

Kiewit Infrastructure Group

Wade Tinant	Area Manager

Yavapai County Sheriff's Office

Craig Bollen	Deputy Southwest Area Command

Mine Safety and Health Administration

David J. Small	Mine Safety and Health Inspector
Larry Lunsford	Mine Safety and Health Inspector
Richard O'Hanlon	Electrical Engineer
Larry Palacios	Mine Safety and Health Specialist

APPENDIX B

Accident Investigation Data - Victim Information

Event Number: 6 6 1 3 8 6 1

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:
ALVIN H. THOMAS	M	30	01 Fatal

5. Date(MM/DD/YY) and Time(24 Hr.) Of Death:	6. Date and Time Started:
a. Date: 04/04/2013 b.Time: 14:47	a. Date: 04/04/2013 b.Time: 6:30

7. Regular Job Title:	8. Work Activity when Injured:	9. Was this work activity part of regular job?
149 GENERAL FOREMAN	032 INSTALLING STEEL PIPE	Yes X No

10. Experience	Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days
a. This Work Activity:	0	2	6	b. Regular Job Title:	0	12	4	c: This Mine:	0	15	4	d. Total Mining:	6	2	0

11. What Directly Inflicted Injury or Illness?	12. Nature of Injury or Illness:
088 PIPE	390 BLUNT FORCE TRUMA

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

14. Company of Employment: (If different from production operator)
T-I-C THE INDUSTERIAL COMPANY
Independent Contractor ID: (if applicable) K48

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

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

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