

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Surface
(Copper Ore)

Fatal Confined Space Accident
September 15, 2021

PVB Fabrications, Inc. (U314)
Tucson, Arizona

at

Freeport-McMoRan Morenci Inc.
Freeport-McMoRan Morenci Inc.
Morenci, Greenlee County, Arizona
ID No. 02-00024

Accident Investigators

Clayton Johnson
Mine Safety and Health Inspector

Steven Polgar
Supervisory Mine Safety and Health Inspector

Originating Office
Mine Safety and Health Administration
Denver District
P.O. Box 25367, DFC
Denver, CO 80225-0367
Dustan Crelly, District Manager

TABLE OF CONTENTS

OVERVIEW	1
GENERAL INFORMATION	1
DESCRIPTION OF THE ACCIDENT	2
INVESTIGATION OF THE ACCIDENT	3
DISCUSSION	3
Location of the Accident	3
Weather	3
Workplace Examinations	3
Work Practices	4
Training and Experience	4
ROOT CAUSE ANALYSIS	4
CONCLUSION	6
ENFORCEMENT ACTIONS	7
APPENDIX A – PERSONS PARTICIPATING IN THE INVESTIGATION	8
APPENDIX B – AERIAL VIEW OF THE ACCIDENT SCENE	9



OVERVIEW

On September 15, 2021, at approximately 9:15 a.m., Cleveland Sloan, a 33 year-old contract welder with over ten years of mining experience, crawled into the confined space inside the stainless steel pipe he was welding. Sloan died of asphyxiation due to the argon gas used in the welding process.

The accident occurred because the contractor did not have proper safety procedures for miners entering confined spaces. Specifically, the contractor did not: 1) train the contract miners on the hazards and proper safety precautions concerning argon gas; 2) verify a respirable atmosphere before a contract miner entered a confined space; 3) confirm that contract miners entering confined spaces were wearing safety belts and lines, and were monitored by an additional miner to adjust their lines, as necessary; and 4) have a written program to require miners to erect barricades or warning signs to prevent or warn miners from entering confined spaces.

GENERAL INFORMATION

Freeport-McMoRan Morenci Inc. (FMI) owns and operates the Freeport-McMoRan Morenci Inc. mine. This mine is a surface copper operation located in Morenci, Greenlee County, Arizona. FMI employs 3,500 miners and operates two 12-hour shifts, seven days per week. The mine drills and blasts rock containing copper ore in an open pit and transports the rock by haul truck

and conveyors to an on-site processing facility where copper and other metals are extracted and sold.

The principal management officials at the Freeport-McMoRan Morenci Inc. at the time of the accident were:

Ricardo Milheiro
Joeseeph Edwards

Area Construction Manager
Safety Manager

PVB Fabrications, Inc. (PVB) is a contract fabrication service, located in the city of Tucson, Pima County, Arizona. FMI contracted PVB Fabrications, Inc. to install stainless steel pipes for the Lower Shannon Booster pipe project. PVB has been doing work in the mining industry for the past 13 years.

The Mine Safety and Health Administration (MSHA) completed the last regular safety and health inspection at this mine on August 6, 2021. The 2020 nonfatal days lost incident rate for FMI was 2.28, compared to the national average of 1.21 for mines of this type.

DESCRIPTION OF THE ACCIDENT

At approximately 6:00 a.m., the PVB welding crew traveled to the Shannon yard to work on the Lower Shannon Booster pipe project. All crew members attended a general safety meeting, as well as a Job Risk Assessment (JRA), which is a pre-work meeting about potential safety hazards and mitigation methods.

Sloan and Laroy Smith, Welder, began welding the 30-inch pipe that had been set up the previous day. Sloan and Smith sealed the area to be welded by placing a dam inside the pipe on each side of the joint. These two dams were less than five feet apart. Sloan and Smith then filled the space between the two dams with argon gas to purge the ambient air. Sloan and Smith purged the pipe with argon gas and began the “root weld,” which is the first pass on the pipe, meant to seal the joint. At this point, welders usually take additional passes to strengthen the connection. However, as Sloan and Smith were creating the root weld, they immediately noticed “sugar” on the weld, which is a contamination indicating the argon gas did not fully purge the ambient air. Sloan exchanged the argon gas bottle with a new, full argon gas bottle.

While waiting for the argon gas to purge ambient air from the pipe, Smith noticed Sloan’s hard hat on the end of the pipe. Smith went to the location of Sloan’s hard hat to see what Sloan was doing. Smith could not locate Sloan so he called out and received no response. Smith instructed Rose Isaac, Helper III, to go get Smith’s flashlight. When Isaac returned with the flashlight, Smith and Isaac saw Sloan, approximately 40 feet inside the pipe. Smith then yelled to Francisco Lucero, Superintendent, to come help. Smith, Isaac, and Lucero yelled for Sloan and hit the side of the pipe to rouse him, but received no response.

At 9:15 a.m., Lucero called Ernesto Bojorquez, Construction Manager. Bojorquez was in a meeting with Ricardo Milheiro, Area Construction Manager, who called for the mine’s Emergency Response Team. Shortly after the call, Duane Turner, Fire Chief/First Responder,

arrived and donned his Self-Contained Breathing Apparatus and went into the pipe to retrieve Sloan. Turner could not pull Sloan out by himself, so he tied a rope to Sloan's ankle. Turner, with the help of Sheridan Laughter, Helper II, and Lucero, pulled Sloan out of the pipe.

Daniel Leyvas, Emergency Response Team Member, examined Sloan, and found no pulse or breathing, so Leyvas began cardiopulmonary resuscitation. Amanda Layton, Emergency Medical Technician, and Joseph Castaneda, Paramedic, arrived, administered oxygen, and readied an Automated External Defibrillator (AED). Since there was no pulse, the AED was not used.

The ambulance transported Sloan to the Gila Health Resources Urgent Care in Morenci, Arizona. Charles Kertay, M.D., Supervisor, pronounced Sloan dead at 10:02 a.m.

INVESTIGATION OF THE ACCIDENT

On September 15, 2021, at 9:55 a.m., Daniel Warter, Safety Manager, called the Department of Labor National Contact Center (DOLNCC). The DOLNCC contacted Thomas Stefansky, Supervisor of Technical Safety. Stefansky contacted Dustan Crelly, District Manager, who then contacted Alijerardo Bennett, Supervisory Mine Safety and Health Inspector. Bennett sent Kyle Griffith, Mine Safety and Health Inspector, to the mine. At 12:45 p.m., Griffith issued an order under the provisions of Section 103(k) of the Mine Act to assure the safety of the miners and preservation of evidence.

On September 16, 2021, at 2:10 p.m., Clayton Johnson, Mine Safety and Health Inspector, and Steven Polgar, Supervisory Mine Safety and Health Inspector, arrived at the scene to continue the investigation. MSHA's accident investigation team, in conjunction with Arizona State Mine Inspector personnel, conducted an examination of the accident scene, interviewed management and miners, and reviewed conditions and work procedures relevant to the accident. See Appendix A for a list of persons who participated in the investigation.

DISCUSSION

Location of the Accident

The accident occurred inside a 30-inch diameter pipe at the Lower Shannon Booster pipe project area. There, three different runs of pipes were being lengthened with sections of stainless steel pipes welded together (see Appendix B).

Weather

On the day of the accident, the weather was calm and sunny, with a high temperature of 94 degrees Fahrenheit. Investigators determined that weather was not a contributing factor for the accident.

Workplace Examinations

The contractor records workplace examinations in the form of JRAs that the contract miners complete on a daily basis prior to commencing work in the area. Investigators determined that a

workplace examination was completed on the day of the accident and was not a contributing factor to the accident.

Work Practices

The welding machines used by the PVB welders purged ambient air from the pipes using argon gas. There were no signs posted with a warning similar to, “Danger - Confined Space Inside Pipe - Oxygen-Deficient Atmosphere.” Also, there was no physical barrier in place to prevent a miner from entering the pipe. Based on Sloan’s normal duties and information gathered during the investigation, investigators concluded that Sloan entered the confined space inside the pipe to either check or reposition the argon gas dam.

PVB welders did not enter pipes on a regular basis. However, when pipe entry was required, PVB and FMI had established the following confined space entry procedure: 1) the PVB welder must notify his/her PVB supervisor; 2) the PVB supervisor must obtain a confined space entry permit; 3) the PVB supervisor must request and obtain ambient gas detection equipment from FMI; and 4) the PVB welder must wear safety belts and lines, which an additional miner can monitor and make adjustments, as necessary. In this case, they did not get a permit and did not obtain ambient gas detection equipment.

Training and Experience

Sloan had over ten years of mining experience, seven weeks of which was with PVB at this mine. Oscar Montano, Mine Safety and Health Training Specialist, examined the mine’s training plan, including Sloan’s training records, and found that Sloan received experienced miner training and some training on confined spaces under MSHA Part 48 training regulations. The task training on confined spaces included FMI’s policy for contacting a supervisor, obtaining a confined space entry permit, and using ambient gas detection equipment.

The contractor’s hazard communication program did not include the physical and health hazards of argon gas present during welding. Investigators also found that PVB did not adequately train welding crews, including supervisors, in the hazards associated with, and safe use of argon gas, which contributed to the accident. PVB provided inadequate training to the contract miners regarding the hazards argon gas creates in confined spaces.

ROOT CAUSE ANALYSIS

The accident investigation team conducted an analysis to identify the underlying causes of the accident. The team identified the following root causes, and the contractor implemented the corresponding corrective actions to prevent a recurrence.

1. Root Cause: The contractor did not train the contract miners on the hazards and proper safety precautions concerning argon gas.

Corrective Action: The contractor updated their hazard communication training to include argon gas and related hazards and safety precautions. The contractor trained all contract miners in the updated material and will institute updated hazard communication training for all future contract miners.

2. Root Cause: The contractor did not verify a respirable atmosphere before a contract miner entered a confined space.

Corrective Action: The contractor developed a program to verify a respirable atmosphere before contract miners enter confined spaces. The contractor trained all contract miners on this program.

3. Root Cause: The contractor did not confirm that contract miners entering confined spaces were wearing safety belts and lines, and have an additional miner to monitor and to adjust their lines, as necessary.

Corrective Action: The contractor trained all the contract miners on the proper procedures for entering a confined space including wearing safety belts and lines, and have an additional miner to monitor and to adjust their lines, as necessary

4. Root Cause: The contractor did not erect barricades or warning signs to prevent or warn miners from entering confined spaces.

Corrective Action: The contractor developed a written program to provide warning signs and barricades for miners entering confined spaces. All contract miners were trained in the program.

CONCLUSION

On September 15, 2021, at approximately 9:15 a.m., Cleveland Sloan, a 33 year-old contract welder with over ten years of mining experience, crawled into the confined space inside the stainless steel pipe he was welding. Sloan died of asphyxiation due to the argon gas used in the welding process.

The accident occurred because the contractor did not have proper safety procedures for miners entering confined spaces. Specifically, the contractor did not: 1) train the contract miners on the hazards and proper safety precautions concerning argon gas; 2) verify a respirable atmosphere before a contract miner entered a confined space; 3) confirm that contract miners entering confined spaces were wearing safety belts and lines, and were monitored by an additional miner to adjust their lines, as necessary; and 4) have a written program to require miners to erect barricades or warning signs to prevent or warn miners from entering confined spaces.

Approved By:

Dustan Crelly
District Manager

Date

ENFORCEMENT ACTIONS

1. A 103(k) order was issued to Freeport-McMoRan Morenci Inc.

A fatal accident occurred on September 15, 2021 at approximately 9:15 a.m. This order is being issued under the authority of the Federal Mine Safety and Health Act of 1977, under Section 103(k) to insure the safety of all persons at the mine, and requires the operator to obtain the approval of an authorized representative of MSHA of any plan to recover any person in the mine or to recover the mine or affected area. This order prohibits any activity in the affected area. The operator is reminded of the obligation to preserve all evidence that would aid in investigating the cause or causes of the accident in accordance with 30 CFR 50.12.

2. A 104(d)(1) citation was issued to PVB Fabrications, Inc. for a violation of 47.2(b).

A fatal accident occurred at the Freeport-McMoRan Morenci Inc. mine at the Lower Shannon Booster pipe project, when a contract miner entered a 30 inch pipe. The miner was found unresponsive when he was located approximately 40 feet inside the confined space of the pipe. The contractor used irrespirable argon gas in the welding process and did not provide the contract miners with training about the dangers of exposure to this gas, including oxygen displacement.

3. A 104(d)(1) order was issued to PVB Fabrications, Inc. for a violation of 56.5002.

A fatal accident occurred at the Freeport-McMoRan Morenci Inc. mine at the Lower Shannon Booster pipe project, when a contract miner entered a 30 inch pipe. The miner was found unresponsive when he was located approximately 40 feet inside the confined space of the pipe. The contractor was using irrespirable argon gas in the pipe as part of the welding process and did not monitor the suitability of the air before the miner entered the confined space.

4. A 104(a) citation was issued to PVB Fabrications, Inc. for a violation of 56.15005.

A fatal accident occurred at the Freeport-McMoRan Morenci Inc. mine at the Lower Shannon Booster pipe project, when a contract miner entered a 30 inch pipe. The miner was found unresponsive when he was located approximately 40 feet inside the confined space of the pipe. The miner entered the confined space without a safety belt and an additional person to monitor and adjust the line as necessary.

5. A 104(a) citation was issued to PVB Fabrications, Inc. for a violation of 56.20011.

A fatal accident occurred at the Freeport-McMoRan Morenci Inc. mine at the Lower Shannon Booster pipe project, when a contract miner entered a 30 inch pipe. The miner was found unresponsive when he was located approximately 40 feet inside the confined space of the pipe. No physical barrier or warning signs were provided to prevent or warn a person from entering the confined space.

APPENDIX A – Persons Participating in the Investigation

Freeport-McMoRan Morenci Inc.

Ricardo Milheiro	Area Construction Manager
Joeseeph Edwards	Safety Manager
Jun Montes	Safety Manager
Rachel Adams	Root Cause Analysis Specialist
Daniel Leyvas	Emergency Response Team Member
Duane Turner	Fire Chief/First Responder
Joseph Castaneda	Paramedic
Amanda Layton	Emergency Medical Technician

PVB Fabrications, Inc.

Shawn Reeder	Director of Business Services
Francisco Lucero	Superintendent
Daniel Warter	Safety Manager
Ernesto Bojorquez	Construction Manager
Ricardo Herera	General Foreman
Vincente Salinas	Rigger
Laroy Smith	Welder
Rose Isaac	Helper III
Sheridan Laughter	Helper II
Joshua Knott	Excavator Operator

Arizona State Mine Inspector

Karen Johnson	Deputy State Mine Inspector
William Schifferns	Deputy State Mine Inspector

Pima County Coroner's Office

Katherine Cochrane, M.D.	Medical Examiner
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Gila Health Resources Urgent Care

Charles Kertay, M.D.	Supervisor
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Mine Safety and Health Administration

Dustan Crelly	District Manager
Alijerardo Bennett	Supervisory Mine Safety and Health Inspector
Steven Polgar	Supervisory Mine Safety and Health Inspector
Thomas Stefansky	Supervisor of Technical Safety
Kyle Griffith	Mine Safety and Health Inspector
Clayton Johnson	Mine Safety and Health Inspector
Oscar Montano	Mine Safety and Health Training Specialist

APPENDIX B – Aerial View of the Accident Scene

