

United States
Department of Labor
Mine Safety and Health Administration
Metal and Nonmetal Mine Safety and Health

Report of Investigation

Surface Nonmetal Mine
(Clay)

Fatal Other Accident(Steam Burns)

February 11, 2003

Southern Clay Plants & Pits
Southern Clay Prod. Inc.
Gonzales, Gonzales County, Texas
Mine I.D. No. 41-00298

Investigators

Willard Graham
Supervisory Mine Safety and Health Inspector

Jerry Y. Anguiano
Mine Safety and Health Inspector

Michael Hockenberry
Fire Protection Engineer

Laman Lankford
Mine Safety and Health Specialist

David Weaver
Mine Safety and Health Specialist

Originating Office
Mine Safety and Health Administration
South Central District
1100 Commerce Street, Room 462
Dallas, Texas 75242-0499

Edward E. Lopez, District Manager

Overview

On February 11, 2003 Ismael Villagomez, organo press bagger/operator, age 26, was fatally injured while performing a maintenance task. Villagomez was cleaning inside the #1 reaction tank, when steam was released causing burns to his body.

The accident was caused by the failure to close and secure the manual gate valve for the steam line and to place the batch system programmable logic controller (PLC) in the stop mode. A contributing factor was the failure to provide training in the health and safety aspects and safe work procedures specific to the assigned task.

Villagomez had 2 years, 19 weeks, 6 days of mining experience, all at this mine.

GENERAL INFORMATION

Southern Clay Plants & Pits, a surface clay mill, owned and operated by Southern Clay Products, Inc., was located in Gonzales, Gonzales County, Texas. The principal operating official was Vernon S. Sumner, president. The mill operated on two 12-hour shifts, 7 days a week. Total employment was 153 persons.

The company purchased clay that was delivered to the mill site by rail. The clay was blended, refined, dried, milled, and processed into Claytone products primarily used as a viscosity agent in paints, inks, and grease. The finished products were bagged, palletized, and loaded onto trucks for distribution to commercial customers.

The last regular inspection for this operation was completed on May 6, 2002.

DESCRIPTION OF THE ACCIDENT

On the day of the accident, Ismael Villagomez (victim) and a co-worker, Rudy Contreras, bagger press operator, reported to work at 6 a.m., their normal starting time. Villagomez and Contreras met with their supervisor, Paul Riojas, who informed them there was to be a product change in the #1 batch processing system. Riojas assigned them to perform clean up duties on the first and second floor of the chemical batch refining building.

The product change required the unit be shutdown and completely flushed and cleaned. Attempts to clean the #1 reaction tank by filling it with water and agitating it were unsuccessful. At 12:30 p.m., Riojas informed Villagomez and Contreras that the tank had to be scraped clean and assigned the task to them.

Riojas instructed them to lock out the agitator at the organo motor control center and to wear fall protection. He also told Contreras not to leave Villagomez alone in the tank. Riojas informed Alvaro Sanchez, refining chemical batch operator, that he had assigned the two men to clean the tank. Sanchez verified that the system was shut down.

Before cleaning the tank Villagomez and Contreras ate lunch. About 1 p.m., they went to the motor control center and installed their locks and tags on the disconnect box

for the reaction tank agitator. John Vega, gel white operator, met them at the tank and helped them place an extension ladder into the tank. Villagomez put on his body harness and climbed to the bottom of the tank.

After entering the tank, Villagomez told Contreras that there was a lot of material to scrape and he needed help. Villagomez instructed Contreras to obtain fall protection and help with the scraping. As Contreras was donning his fall protection, Villagomez asked if he had a scraper. At that time, Contreras heard a hissing sound and realized that a pneumatic steam valve was opening.

Steam was released into the tank rapidly at 125 pounds per square inch gauge (psig) and 350 degrees (?) Fahrenheit (F). Contreras yelled to Villagomez to get out, but he did not hear a response. The tank was inundated with steam and it escaped out of the top. Contreras ran from the building and yelled to Sanchez that the steam had activated in the tank. Sanchez ran to the refining chemical room and used the system computer to close the steam valve.

Michael Salazar, bagger/press operator, was one of the first to arrive at the tank. He pulled on the safety lanyard and realized Villagomez was still in the tank. As the steam cleared, Salazar saw the victim lying on his back. Salazar climbed down the ladder and with the assistance of other employees removed Villagomez from the tank.

Emergency medical services were called at about 1:15 p.m. Villagomez was transported to the hospital, where he was pronounced dead at 1:57 p.m. by the physician on duty. Death was attributed to steam burns.

INVESTIGATION OF THE ACCIDENT

MSHA was notified at 1:45 p.m. on the day of the accident by a telephone call from Keith Stultz, day shift operations manager, to Ralph Rodriguez, supervisory mine safety and health inspector. An investigation was started the same day. MSHA's accident investigation team traveled to the mill site, conducted a physical inspection of the accident scene and the equipment involved in the accident, interviewed employees, and reviewed training records and work procedures. An order was issued under the provisions of Section 103(k) of the Mine Act of 1977 to ensure the

safety of miners. MSHA conducted the investigation with the assistance of mine management and mine employees.

DISCUSSION

Location of the Accident

The building where the accident occurred contained two completely independent batching systems. The accident occurred in the #1 batch system reaction tank.

#1 Batch System Reaction Tank

The reaction tank was manufactured by the company in 1983. The tank was a free standing cylindrical tank eight feet tall by eight feet in diameter. It was mounted atop four steel I-beam legs. The top of the tank was open to the atmosphere. The bottom of the tank was sloped from the sides to the center to allow the slurry to be pumped out of the discharge line, located at the lowest elevation in the tank.

Metal grating, used as a walkway, covered half of the top of the reaction tank. A 7.5 horsepower motor, connected to a mixing agitator, was mounted on the catwalk. The agitator extended down approximately one foot from the bottom of the tank. The agitator had three mixing paddles connected to the shaft.

A 4-inch diameter slurry feed line entered the top of the tank and extended approximately 12 inches into the tank. This pipe transported slurry from the batching tank to the reaction tank so the slurry could be mixed while being heated. After this process was complete, the material was discharged from the bottom of the tank through a 9-inch diameter discharge line and pumped to the amine tanks.

The reaction tank also contained a 2-inch waterline that extended in the tank approximately 3 feet. This water line was used to thin the batch or to clean the tank before introducing a new product.

A 3-inch steam line entered the top of the reaction tank and extended to near the bottom of the tank. The steam was injected to heat the clay slurry from ambient temperature to approximately 145 °F. Steam supplied by a series of on-site boilers arrived at the tank at approximately 350 °F and 125 psig.

Steam Valves

There were two in-line valves in the batching area that controlled the steam flow before it entered the reaction tank. A manual gate valve was located outside the second floor of the batching building in a remote location. Downstream of the manual valve a butterfly valve (sparge valve) was equipped with an automatic pneumatic actuator. The manual gate valve was in the open position at the time of the accident. If the gate valve had been in the closed position, when the automatic steam sparge valve was activated, the steam could not have entered the reaction tank.

Batch System Controls

The PLC controlled the entire function of the batch system. This computer controlled system received input from numerous system sensors that monitored and controlled the flow of material. Control of the batch system could be accessed from three separate computer locations; the foreman's office, the batching room, and the refining control room. There were six different batch mode functions the system would perform; stopped, start batch, reset batch, slurry hold, reaction hold, and reset reaction mode.

Numerous tests were made by MSHA to determine which mode the system function was in when the accident occurred. It was determined that the system was in the slurry hold mode with the steam sparge valve in the automatic position.

In this position, the PLC received input from a Milltronics Ultrasonic Sensor, Model No. ST-50 level sensor, which was mounted just above the top of the reactor tank. This system was programmed to activate the pneumatic steam valve when the clay slurry level reached 5.5 feet deep in the tank. When this level was reached, the sensor activated the pneumatic steam valve, allowing steam to flow into the tank.

An aluminum extension ladder, that the victim used for access into the tank, was located almost directly under the level sensor. The aluminum ladder was left in this position when the system was tested. The tank level indicator showed the tank at 98% full. At this level, the PLC would signal the pneumatic (sparge) valve to open.

The alarm history of the computer system indicated the steam valve was placed in the automatic position at 11:32

AM, and was never changed back to the manual position until after the accident. The alarm history also indicated the steam valve automatically activated at 1:12:50 p.m., and was placed in the manual/closed position at 1:13:38 p.m. This indicates the valve was open for 48 seconds before it was closed by the batch operator at the refining control room.

Training

The victim had not received task training regarding the health and safety aspects and safe work procedures specific to the task of cleaning inside the reaction tank. He had received annual refresher training in accordance with 30 CFR, Part 46.

ROOT CAUSE ANALYSIS

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

Causal Factor: A risk assessment that would have identified possible hazards was not conducted prior to performing the task.

Corrective Action: Risk assessments should be conducted to identify potential hazardous conditions. Any potential hazards identified should be corrected prior to performing the task.

Causal Factor: No shutdown and lockout procedures for all PLC controlled functions were in place. The gate valve for the steam line was not in the closed position when the automatic steam sparge valve activated. The batch system PLC was not in the stop mode.

Corrective Action: Shut Down and lockout procedures, that address the hazards associated with the work to be performed, should be developed.

Causal Factor: The victim and his supervisor were not properly trained in safe work procedures and the hazards associated with the task being performed.

Corrective Action: All equipment operators and their supervisors should be trained in the health and safety aspects and safe work procedures specific to new task before that work is performed.

CONCLUSION

The accident was caused by the failure to close and secure the manual steam gate valve and to place the batch system PLC in the stop mode. A contributing factor was the failure to provide training in the health and safety aspects and safe work procedures specific to the assigned task.

ENFORCEMENT ACTIONS

Order No. 6226284 was issued on February 11, 2003, under the provisions of Section 103(k) of the Mine Act:

A fatal accident occurred at this operation on February 11, 2003, when an employee was cleaning the inside of the Reactor tank located at the # 1 system. This order is issued to assure the safety of all persons at this operation. It prohibits all activity at reactor tank and #1 system area until MSHA has determined that it is safe to resume normal 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.

This order was terminated on February 14, 2003. The conditions that contributed to the accident no longer exist.

Citation No. 7894039 was issued on May 14, 2003, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 56.16002(c).

A press operator was fatally injured at this mine on February 11, 2003, when he was burned by a release of steam. The victim had entered the reaction tank to perform assigned cleaning. The controls for the steam supply to the reaction tank were not locked out.

This citation was terminated on May 19, 2003, after the company moved the shutoff valve for the reaction tank steam line to the inside of the building. Additionally, all employees have been retrained in the proper lock out

procedures including steam valves and bleeding line prior to entering tanks or similar vessels.

Citation No. 7894040 was issued on May 14, 2003, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 46.7(a).

A press operator was fatally injured at this mine on February 11, 2003, when he was burned by a release of steam. The victim had entered the reaction tank to perform assigned cleaning. The victim had no previous experience performing work in this tank. The mine operator failed to provide the victim with training in the health and safety aspects and safe work procedures specific to performing cleaning inside the reaction tank.

This citation was terminated on May 19, 2003, after the company modified their training plan and implemented a policy requiring all miners, who are assigned new tasks, be trained in the new task prior to performing the work. All supervisors have been instructed in the new policy.

Approved by:

Date:

Edward E. Lopez
District Manager

APPENDICES

A. Persons Participating in the Investigation

B. Persons Interviewed

C. MSHA forms 7000-50a.and 7000-50b.

APPENDIX A

Persons Participating in the Investigation

Southern Clay Products

Keith Stultz	operations manager
Rick Holmes	safety health environmental
Clyde Bates	engineering/maintenance manager
Terry Mesecke	plant electrical manager
John Stefinsky	maintenance supervisor
Michael Piacentino	director of environmental
Gary L. Hendersot	safety specialist

Mine Safety and Health Administration

Willard Graham	supervisory mine and safety health inspector
Jerry Y. Anguiano	mine safety and health inspector
David Weaver	mine safety and health specialist
Laman Lankford	mine safety and health specialist
Michael Hockenberry	fire protection engineer

APPENDIX B

Persons Interviewed During the Investigation

Southern Clay Products

Keith Stultz	operations manager
Paul Riojas	plant supervisor
Doug Weaver	plant supervisor
Gary Hendershot	safety specialist
Tony Ramirez	refining chemical batch operator
Rudy Contreras	bagger press operator
Michael Salazar	bagger press operator
John Vega	gel white operator (lead man)
Leon Banda	refining chemical operator
Alvaro Sanchez	refining chemical batch operator