

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

REPORT OF INVESTIGATION

**Surface Nonmetal Mine
Industrial Sand**

**Fatal Falling / Sliding Material Accident
December 13, 2013**

**Brown Brothers Sand Company
Wittichen Stephen Plants
Junction City, Talbot County, Georgia
Mine ID No. 09-00265**

Investigators

**Billy Randolph
Supervisory Mine Safety and Health Inspector**

**Michael LaRue
Mine Safety and Health Inspector**

**Brett Calzaretta
Mine Safety and Health Specialist (Training)**

**Stanley Schaeffer Jr.
Civil Engineer**

**Originating Office
Mine Safety and Health Administration
Southeast District
135 Gemini Circle, Suite 212
Birmingham, Alabama 35209
Samuel Pierce - Southeast District Manager**



OVERVIEW

On December 13, 2013, Paul D. Barnes, Water Cannon Operator, age 53, was killed when the bank of a trench collapsed engulfing him in the falling material. Barnes walked near the edge of a trench, 27 feet in depth, to observe an excavator working below.

The accident occurred because the hydraulic mining system used at the mine did not maintain the wall and bank stability in places where persons work or travel while performing their assigned tasks. The ground conditions that created the hazard to persons was not taken down or supported before other work or travel was permitted in the affected area. The area was not posted with a warning against entry and/or a barrier was not installed to impede unauthorized entry.

Management had not designated anyone at the mine to conduct examinations of ground conditions in the pit area. Miners worked and traveled throughout the pit area and near banks of the trench and the ground conditions changed daily.

Additionally, Barnes was assigned to perform a task in which he had no previous experience. Barnes was not trained in the health and safety aspects and safe work procedures specific to that new task before he began performing work.

GENERAL INFORMATION

Wittichen Stephen Plants, an industrial sand operation owned and operated by Brown Brothers Sand Company, is located in Junction City, Talbot County, Georgia. The principal operating official is Greg Brown, Owner. The mine typically operates one 8-hour shift, five days a week. Total employment is nine persons.

A hydraulic system of mining is used at this operation. Water cannons are used to extract sand while a dozer and an excavator are used at the working face to break up kaolin clay balls as part of the mining process. Hydraulic pressure directed at the face causes the mud and sand/slurry to mix and drain to a sump pump barge (barge). This process creates a bowl shape to the pit. The water cannons are moved clockwise across the perimeter of the pit as needed to reach the face with hydraulic pressure. The barge is located at the lowest elevation of the pit. The barge is used to pump the slurry mix through a pipe line about 1,000 yards to the processing plant where the material is separated and cleaned. The finished product is sold for various uses in the construction industry.

About three months before the accident, management determined the quality of sand product in the north area was better than the material mined in the lower west area of the pit. Management moved the water cannon out of the lower west

area of the pit to the north area. Moving the water cannon to the north area changed the normal mining process and created a step, or second level in the pit floor. When mining began with the water cannon at this new location, the sand/slurry mix would not flow to the barge. To solve the problem, management had a deep trench dug to allow the sand/slurry mix to flow to the barge. When initially dug, the trench was approximately 6 feet wide and varied from 10 feet to 14 feet in depth. This deep trench was used to move the sand/slurry to the barge until the day of the accident.

The Mine Safety and Health Administration (MSHA) completed the last regular inspection at this operation on May 22, 2013.

DESCRIPTION OF THE ACCIDENT

On December 12, 2013, the day before the accident, a section of the east bank of the trench collapsed at the end of the shift and blocked the flow of material to the barge. The section that collapsed was approximately 30 feet long, 27 feet high, and 10 to 15 feet wide. Nathan Bell, Barge Operator, radioed Scott Moulton, Plant Manager, and told him the bank of the trench caved and was blocking the flow of slurry. Moulton told Bell to shut down for the day since it was 3:00 p.m. and they left the mine property.

On December 13, 2013, the day of the accident, Paul Barnes (victim) arrived at the mine at about 7:00 a.m., his normal starting time. About 7:15 a.m., Moulton drove Barnes, Bell, and Ricky Woods, Utility Worker/Equipment Operator, to the pit. Moulton then traveled to the plant and started the screens and the plant's sand pumps. Bell started the barge's slurry pump while Woods started the dozer and excavator. Barnes stayed with Bell on the barge while the pump warmed up. After a few minutes, Barnes walked approximately 200 yards to the water cannon.

About 7:30 a.m., Barnes began operating the water cannon directing water spray to the working face while Woods operated the dozer. Barnes and Woods swapped jobs between the water cannon and the dozer. At 9:30 a.m. Moulton, who was still at the plant, noticed only mud being pumped to the plant from the pit. Moulton radioed Barnes and Bell to inform them that no sand was being pumped to the plant but they did not respond.

At approximately 10:30 a.m., Woods began operating the excavator in the trench to remove the material that fell the previous day. This material was blocking the flow of sand through the trench.

About 10:50 a.m., Bell noticed that Barnes was walking toward the edge of the trench on the west side. When Barnes reached the edge of the bank where Woods was clearing material in the trench below, the trench wall collapsed. Woods was splashed with mud that came through the open cab door of the excavator. He immediately backed the excavator away from the collapse and observed Barnes falling into the trench. Within seconds, additional material fell from the trench wall covering Barnes.

Woods exited the excavator and yelled for Barnes. Bell heard Woods calling for Barnes and ran from the sump pump barge to help Woods locate Barnes. Woods used Bell's CB radio to notify Greg Brown, Owner, and Moulton that Barnes fell in the trench and told them to call 911. Brown told Barbara Currington, Scale Clerk, to contact 911.

Flint Hill Fire Department arrived at 11:21 a.m., but lacked the equipment to remove the material covering the victim. An excavator was brought to the site to remove the material from the trench. Columbus Fire and Rescue arrived at 1:15 p.m. and helped to remove material in the recovery operations. Barnes was located at 3:45 p.m. and was recovered at 4:10 p.m. Barnes was pronounced dead at the scene by Clinton Cosby, Talbot County Coroner. The cause of death was attributed to asphyxiation due to crushing injuries.

INVESTIGATION OF THE ACCIDENT

Greg Brown called MSHA at 11:01 a.m. and reported the accident to Judith Etterer, District Staff Assistant. Brown then called MSHA's National Call Center. An investigation was started the same day. An order was issued under provisions of Section 103(j) of the Mine Act. This order was later modified to Section 103(k) of the Mine Act after the arrival of an Authorized Representative at the mine site.

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 management, employees, and local law enforcement and rescue personnel.

DISCUSSION

Location of the Accident

The accident occurred in the open pit area of the mine. A trench was constructed

to provide a path for material to flow hydraulically from the upper reaches of the active pit. The accident occurred at the southern reach of the trench.

Trench

An excavator was used to dig the trench about three months prior to the accident. At the time of the accident, the trench was approximately 900 feet long and extended generally northeast to southwest in the active pit. After mining was initiated, the material flow from the hydraulic mining system eroded the trench to a depth of approximately 27 to 30 feet.

The depth of material flow at the time of the accident was approximately 18 inches. The trench was approximately 15 feet wide with near vertical walls on both sides of the trench. The trench walls were not supported with shoring at the time of the accident. As noted, the sides of the trench were generally vertical.

Soil Composition

The soil in the area of the trench was stratified in several distinct layers, a surface layer and two sub-surface layers. The surface layer was approximately 1-foot thick and was primarily composed of red clay and red silty clay material with trace amounts of sand. The next lower soil layer extended approximately 1-foot below the ground surface to the bottom of the trench. This layer was predominantly kaolin clay mixed with sand. The upper portion of this layer appeared to be purple and the lower portion appeared to be white in color. The side walls of the trench were dry with no seepage observed. Additionally, several small areas of pooled water were observed in the bottom of the trench.

Trench Collapse

On the day prior to the accident, a slope failure occurred on the southeast side of the trench. Material sloughed from the southeast wall into the bottom of the trench. The material blocked the flow of water from the active mining area. An operator was using an excavator to clear the material blockage at the time of the accident on December 13, 2013.

On the day of the accident, the collapse occurred along the northwest side of the nearly vertical trench, approximately 45 feet upstream from the lower reach of the trench. An approximately 30 foot length of the trench wall failed. This material broke off approximately 5 feet back from the face of the pre-failure trench. The failure extended from the top to the bottom of the trench. Persons interviewed stated the failed material broke off in three distinct sections along the alignment of the trench. The southernmost portion of the failure area broke off first, followed by the middle, and then the northernmost section.

The entire failure occurred in seconds. Investigators estimated the mass of the failed material to be approximately 170 cubic yards. A soil mass of this type and volume was estimated to weigh approximately 230 tons. The remaining scarp in the location of the accident was well defined and fairly clean with no loose material evident post-failure. No secondary sloughing or cracking was observed. No tension cracks were observed at the top of the trench in the location of the failure. The failed material completely covered the victim at the base of the trench in the location of the failure. Undercutting of the trench walls was observed in the area adjacent to the failure due the flow of water through the trench during hydraulic mining operations.

The sides of the trench had not been sloped or supported. The nearly vertical angle of the sides of the trench allowed significant shear stresses to develop within the soil. These shear stresses exceeded the internal shear strength of the soil and created a failure plane along which the failure occurred. The trench wall failure was primarily caused by the undercutting of the trench wall due to material flow in the trench. The apparent cohesive strength of the material allowed the trench wall to temporarily maintain an angle greater than the angle of repose (25 to 30 degrees). The trench wall was able to stand for a relatively short period of time before failing.

Weather

The weather on the day of the accident was dry with temperatures near 60 degrees Fahrenheit. Weather did not appear to be a contributing factor to the accident.

TRAINING AND EXPERIENCE

Paul D. Barnes (victim) was hired on October 27, 1994, and had 19 years of experience as a water cannon operator, all at this mine.

A representative of MSHA's Educational Field Services reviewed the training records for Barnes. These records documented that Barnes had received all required annual refresher training. Barnes, Woods, and Bell all were experienced miners; however, the recent changes regarding mining using deep trenches, resulted in potential hazards that none of the miners in the pit had previous experience with. Task training was not provided regarding these changes and the associated potential hazards. No persons in the pit were experienced in the examination of ground conditions.

ROOT CAUSE ANALYSIS

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

Root Cause: Management failed to ensure that the hydraulic mining system used maintained the wall and bank stability in places where persons work or travel in performing their assigned tasks. The ground conditions that created the hazard to persons were not taken down or supported before other work or travel was permitted in the affected area. The area was not posted with a warning against entry and/or a barrier was not installed to impede unauthorized entry. Management had not designated anyone at the mine to conduct examinations of ground conditions in the pit area. Miners worked and traveled throughout the pit area and near banks of the trench and the ground conditions changed daily.

Corrective Action: Management established a new mining method that eliminates the use of deep trenches. Persons experienced in examining and testing for loose ground have been designated to conduct examinations at the pit.

Root Cause: Management failed to ensure that miners were trained regarding the changes that occurred regarding their tasks in the pit when a new mining system was established. Barnes was not trained to recognize the unstable, hazardous ground condition and was killed when he was exposed to the hazard.

Corrective Action: Management established a new mining method that eliminates the use of deep trenches. All miners were task trained regarding the health and safety aspects of the new mining method.

CONCLUSION

The accident occurred because the hydraulic mining system used at the mine did not maintain the wall and bank stability in places where persons work or travel while performing their assigned tasks. The ground conditions that created the hazard to persons was not taken down or supported before other work or travel was permitted in the affected area. The area was not posted with a warning against entry and/or a barrier was not installed to impede unauthorized entry.

Management had not designated anyone at the mine to conduct examinations of ground conditions in the pit area. Miners worked and traveled throughout the pit area and near banks of the trench and the ground conditions changed daily.

Additionally, Barnes was assigned to perform a task in which he had no previous experience. Barnes was not trained in the health and safety aspects and safe work procedures specific to that new task before he began performing work.

ENFORCEMENT ACTIONS

Issued to Brown Brothers Sand Company

Order No. 8723998 – issued on December 13, 2013, under provisions of Section 103(j) of the Mine Act:

A fatal accident occurred at this operation on 12/13/2013 at approximately 10:50 a.m. when the victim was engulfed by material when working in the pit a.k.a. "the hole". 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 could assist in investigating the cause or cause of the accident. It prohibits all activity at the mine until MSHA has determined that it is safe to resume normal mining operation in this area. This order was initial issued orally to Greg Brown, Vice President, at 11:05 a.m. and has now been reduced to writing.

Citation No. 8809876 – issued under provisions of Section 104(d)(1) of the Mine Act for a violation of 30 CFR 56.3130 :

On December 13, 2013, a fatal accident occurred at this hydraulic mining facility. A water cannon operator walked to the edge of a 27 foot deep trench when the bank of the trench collapsed engulfing him. The trench was located in the primary pit and used daily to direct slurry from the working face to the pump barge. The trench walls were not maintained to ensure stability. The trench walls were vertical and were not benched or sloped. The mine owner was aware of the trench and was a part of day to day operations in the pit. The mine owner engaged in aggravated conduct constituting more than ordinary negligence in that he was aware of the condition of the trench and failed to take corrective action. This violation is an unwarrantable failure to comply with a mandatory standard.

Order No. 8809877 – issued under provisions of Section 104(d)(1) of the Mine Act for a violation of 30 CFR Section 56.3200:

On December 13, 2013, a fatal accident occurred at this hydraulic mining facility. A water cannon operator walked to the edge of a 27 foot deep trench when the bank of the trench collapsed engulfing him. Management was aware that the 27 foot high trench banks created hazardous ground conditions. However, management did not take action to take down or support the loose, unconsolidated

bank that created a hazard before work or travel was permitted in the affected area. The area was not posted with a warning sign and no barrier was installed to impede entry into the affected area. The mine owner engaged in aggravated conduct constituting more than ordinary negligence in that he was aware of the hazardous condition of the trench and failed to take any corrective action. This violation is an unwarrantable failure to comply with a mandatory standard.

Order No. 8809878 – issued under provisions of Section 104(d)(1) of the Mine Act for a violation of 30 CFR Section 56.3401:

On December 13, 2013, a fatal accident occurred at this hydraulic mining facility. A water cannon operator walked to the edge of a 27 foot deep trench when the bank of the trench collapsed engulfing him. The excavator operator was working in the trench and his equipment was struck by falling material. The mine owner had not designated anyone at the mine to conduct examinations of ground conditions in the pit area. Miners worked and traveled throughout the pit area and near banks of the trench. The mine owner was aware that the trench ground conditions changed daily. The mine owner engaged in aggravated conduct constituting more than ordinary negligence in that he was aware of the changing condition of the trench and failed to designate a person to inspect the ground condition. This violation is an unwarrantable failure to comply with a mandatory standard.

Order No. 8809879 – issued under provisions of Section 104(g)(1) of the Mine Act for a violation of 30 CFR Section 46.7(b):

On December 13, 2013, a fatal accident occurred at this hydraulic mining facility. A water cannon operator walked to the edge of a 27 foot deep trench when the bank of the trench collapsed engulfing him. Three months prior to the accident; conditions at the mine and the associated tasks had changed. The mine owner dug trenches to facilitate the flow of slurry material from the working face to the pump barge. The miners in the pit had no previous experience with trenches at the mine or the hazards associated with them. The mine owner engaged in aggravated conduct constituting more than ordinary negligence in that he was aware of the task training requirements and failed to train the miners in the pit to the new hazards.

Approved: _____

Samuel Pierce

Southeast District Manager

Date

3/13/14

APPENDIX A

Persons Participating in the Investigation

Brown Brothers Sand Company

Greg Brown.....Owner
Ricky WoodsExcavator Operator
Nathan BellBarge Pump Operator
Scott Moulton.....Plant Manager
Ed Carrington..... Job Maintenance
Anthony Devito.....Maintenance
Barbara Currington.....Scale Clerk

Columbus Fire and Emergency Medical Services

Riley Land.....Deputy Director Emergency Management

Flint Hill Fire Department

Russ Erenheim.....Assistant Chief

Talbot County Coroner

Clinton Cosby.....Coroner

Talbot County Sheriff's Department

Guy Grimsley.....Investigator

Mine Safety and Health Administration

Billy Randolph.....Supervisory Mine Safety and Health Inspector
Michael LaRue.....Mine Safety and Health Inspector
Stanley Schaeffer Jr.....Civil Engineer
Brett Calzaretta.....Mine Safety and Health Specialist (Training)

APPENDIX B

Accident Investigation Data - Victim Information

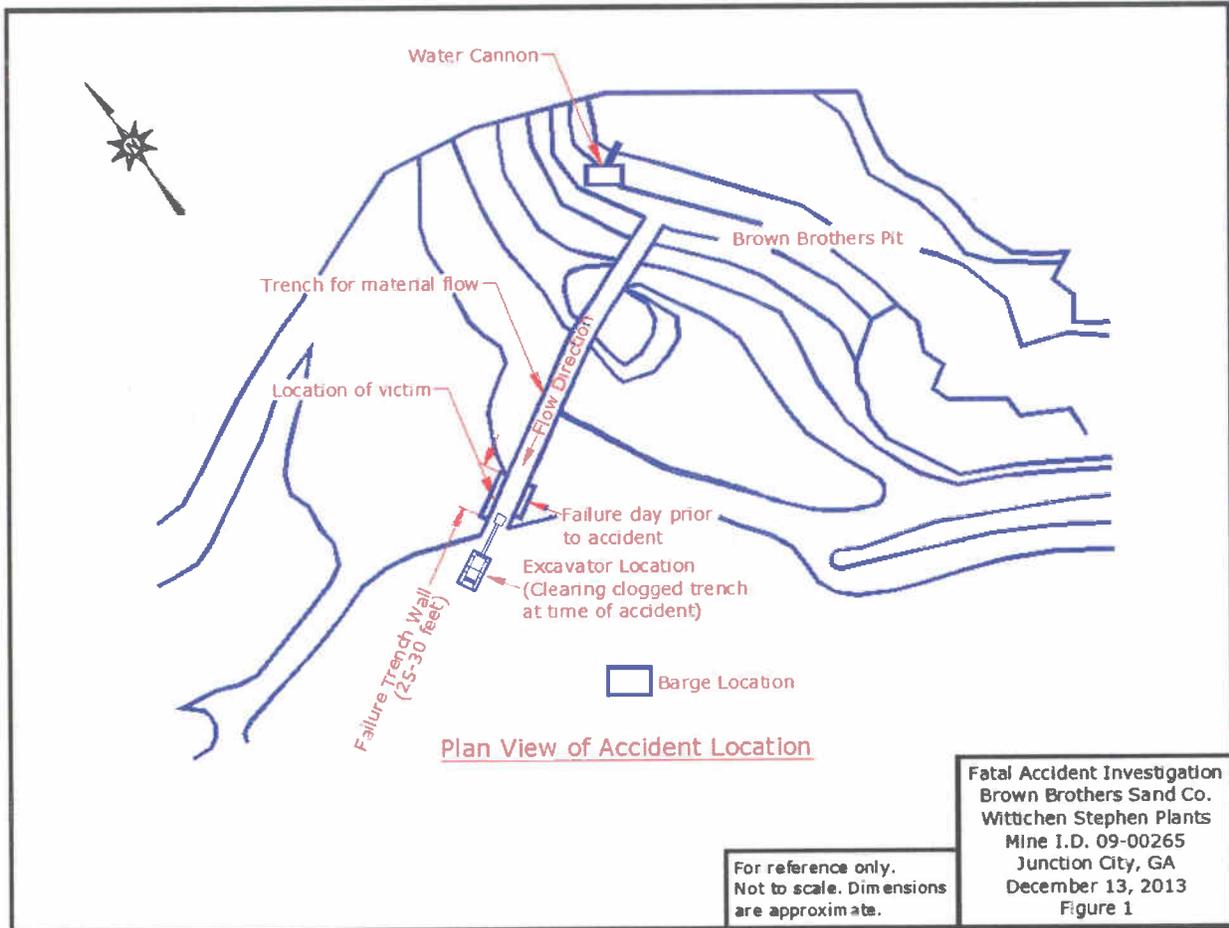
U.S. Department of Labor
Mine Safety and Health Administration



Event Number: 6 6 4 4 7 8 5

Victim Information: 1																															
1. Name of Injured/Employee: <i>Pedro Barnes</i>				2. Sex: <i>M</i>		3. Victim's Age: <i>53</i>			4. Degree of Injury: <i>01 Fatal</i>																						
5. Date(MM/DD/YY) and Time(24 Hr.) Of Death: a. Date: <i>12/13/2013</i> b. Time: <i>19:50</i>								6. Date and Time Started: a. Date: <i>12/13/2013</i> b. Time: <i>7:00</i>																							
7. Regular Job Title: <i>116 Hydraulic cannon operator</i>						8. Work Activity when Injured: <i>042 victim was observing excavator operation</i>						9. Was this work activity part of regular job? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>																			
10. Experience		Years		Weeks		Days		b. Regular		Years		Weeks		Days		c. This		Years		Weeks		Days		d. Total		Years		Weeks		Days	
a. This		19		7		0		Job Title:		19		7		0		Mining:		19		7		0									
11. What Directly Inflicted Injury or Illness? <i>091 Crushing injuries / buried under slide</i>										12. Nature of injury or illness: <i>110 asphyxia due to crushing</i>																					
13. Training Deficiencies:																															
Hazard:		<input checked="" type="checkbox"/>		New/Recently-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:		<input checked="" type="checkbox"/>									
16. Part 50 Document Control Number: (form 7000-1) <i>220133640016</i>										17. Union Affiliation of Victim:																					

LOCATION OF ACCIDENT



PROFILE OF FAILURE AREA

