

MAI-2014-14

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

REPORT OF INVESTIGATION

**Surface Nonmetal Mine
(Sand and Gravel)**

**Fatal Ignition/Explosion of Gas
June 18, 2014**

**Hanson Aggregates Southeast, LLC
Brewer Sand
Jefferson, Chesterfield County, South Carolina
Mine I.D. No 38-00122**

Investigators

**Curtis Roth
Supervisory Mine Safety and Health Inspector**

**Michael (Shane) Cohen
Mine Safety and Health Inspector**

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

**Originating Office
Mine Safety and Health Administration
Southeastern District
1030 London Drive, Suite 400
Birmingham, Alabama 35211
Samuel K. Pierce, District Manager**



OVERVIEW

Christopher Melton, Production Supervisor, age 41, was killed on June 18, 2014, while he and two contract mechanics were attempting to replace an impeller on a waste water slurry pump. After several failed attempts by the mechanics to loosen the impeller by prying and hammering, one of them used a torch to apply heat to the sealed impeller hub in the center area of the impeller, but the impeller did not loosen. Melton then took the torch and applied heat to try to loosen the impeller hub. The center of the impeller suddenly exploded and metal fragments struck him.

Management failed to ensure that work procedures were established for persons to safely perform maintenance work on waste water slurry pumps. The manufacturer of the pump warned that heat was not to be applied to the impeller hub; however, management failed to establish procedures to prevent persons from doing so.

GENERAL INFORMATION

Brewer Sand, a sand and gravel operation, owned and operated by Hanson Aggregates Southeast, LLC, is located in Jefferson City, Chesterfield County, South Carolina. The principal operating official is Michael Hyer, Vice-President and Secretary. Mike Cool, Plant Manager, is the person in charge of safety and health at the mine. The mine normally operates one 12 hour shift and one 8 hour shift, 5 days per week. Total employment is 13 persons.

Sand is excavated from a single bench using an excavator. The material is hauled by truck to the plant where it is screened, washed, conveyed to stockpiles, and then loaded into trucks using a front-end loader. The finished product is sold for use in construction.

Pageland Machine & Tool is located in Pageland, South Carolina. The principal operating official is Richard Arant, Owner. Hanson Aggregates Southeast, LLC contracted Pageland Machine & Tool to perform various maintenance activities at Brewer Sand and another nearby Hanson mine on an as needed basis.

The Mine Safety and Health Administration (MSHA) completed the last regular inspection at this operation on June 11, 2014.

DESCRIPTION OF THE ACCIDENT

On the day of the accident, June 18, 2014, Christopher Melton (victim) reported for work at 5:00 a.m., his normal starting time. He conducted a safety meeting at the shop and then discussed the work duties for the shift with five miners.

Melton performed routine duties in the morning. He started the plant and turned on the waste water slurry pump. Melton drove his truck to visually check the belt conveyor to ensure it was operating properly. He then drove to the lab building and talked to Owen Deese, Lab Technician, to discuss some samples and then returned to the main office. At approximately 11:00 a.m., Melton left the office and found that the waste water slurry pump was not operating.

Melton asked Gregory Arant, Leadman, and Juan Garcia, Welder, employees of Pageland Machine & Tool who were already at the mine working on the head pulley of the return belt, to immediately begin to repair the waste water slurry pump. Arant and Garcia moved the welding truck and a crane to the vicinity of the waste water slurry pump to begin work. Arant and Garcia removed all of the guards on the pump. Garcia used a pry bar to try to remove the impeller hub. Arant used a pipe wrench and a large hammer but still could not loosen the impeller hub.

Since the attempts to loosen the impeller hub by prying and hammering were unsuccessful, Arant went to the welding truck and got an oxygen/acetylene torch to apply heat to the impeller. Arant stood in front of the impeller and applied heat to the impeller hub for approximately three minutes. Melton came to help with the task and told Arant that he would take over on the torch to apply heat to the impeller for a few more minutes. As Arant was walking behind the pump to turn the shaft, the hub of the impeller exploded and metal struck Melton, causing him to fall to the ground. The accident occurred at approximately 12:35 p.m.

Arant immediately ran approximately 50 yards to Johnny Helms, Front-End Loader Operator, and told him that Melton was hurt and to call 911. Helms used the CB radio to call the scale house but no one answered so he used his cell phone to call 911. Arant then returned and he and Garcia remained with Melton until Emergency Medical Services arrived at 12:58 p.m. The victim was pronounced dead at the scene by Kip Kiser, Chesterfield County Coroner. The cause of death was attributed to exsanguination and other wounds.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 1:30 p.m. on June 18, 2014, by a telephone call from Allen Hartranft, Plant Manager at Hanson's Jefferson Quarry (a neighboring Hanson mine), to the National Call Center. The Call Center notified Judith Elterer, Staff Assistant, and an investigation started the same day.

An order was issued under Section 103(j) of the Mine Act to ensure the safety of the miners. This order was later modified to Section 103(k) of the Mine Act when the first Authorized Representative arrived at the mine.

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 contract management and employees.

DISCUSSION

Location

The accident occurred at the waste water slurry pump located approximately 50 yards south of the plant between the pond and impoundment. The pump is used daily when the plant is operating.

Weather

The weather on the day of the accident was sunny skies with 90 degree Fahrenheit temperatures. The weather was not considered to be a contributing factor to the accident.

Physical Factors

The waste water slurry pump involved in the accident is a single suction, centrifugal unit that is belt driven. It is powered by a 300 horsepower, 460 volt electric motor that produces 1189 revolutions per minute. The pump is model number LCC-M300-710 manufactured in June 18, 2001, by Georgia Iron Works.

The impeller is made of hardened, cast metal alloy and threaded onto the end of the pump drive shaft. The central part of the inner impeller plate, referred to as the hub, is cone shaped and when installed, completely covers the end of the shaft. When the impeller is threaded into position on the shaft, the cone creates a sealed

cavity between the back side of the cone section and the end of the shaft. The impeller and the shaft are manufactured with right-hand threads. The pump manufacturer's service literature recommends the application of a heavy amount of anti-seize compound on the shaft threads prior to installing an impeller onto the shaft.

The service literature also provides a warning against the application of heat to the impeller because there is an explosion hazard. Additionally, two warning labels are located on the front legs of the pump on opposite sides. The warning labels state "Do not apply heat to the impeller hub or nose due to the sealed cavity at the impeller nose - Danger of Explosion."

The torch used to heat the impeller hub is a Smith Lite Time, model number 1a, equipped with a Rosebud tip. Investigators found the settings on the tank regulators to be in the normal range at 60 psi for the oxygen and 11 psi for the acetylene.

Training and Experience

Christopher Melton (victim) had a total of 19 years mining experience and held his current job for 13 years at this mine.

A representative of MSHA's Educational Field Services staff conducted an in-depth review of Melton's training records provided by the mine operator and the contractor. Melton's Part 46 training was up to date, but he did not receive task training for the task of removing an impeller on slurry pumps. The lack of this task training was directly related to the accident.

ROOT CAUSE ANALYSIS

A root cause analysis was conducted to identify the underlying cause of the accident. Listed below is the root cause identified and the corresponding corrective action implemented to prevent a recurrence of the accident.

Root Cause: Management failed to ensure that work procedures were established for persons to safely perform maintenance work on waste water slurry pumps. The manufacturer of the pump warned that heat was not to be applied to the impeller hub; however no procedures were established to prevent persons from applying heat to the impeller hub. Persons were not task trained on maintenance work for waste water slurry pumps.

Corrective Action: Management established Standard Operating Procedures (SOP) for persons to safely perform maintenance work on waste water slurry pumps. All miners were trained regarding the SOP's to be used when performing maintenance on a slurry pump.

CONCLUSION

Management failed to ensure that work procedures were established for persons to safely perform maintenance work on waste water slurry pumps. The manufacturer of the pump warned that heat was not to be applied to the impeller hub; however, management failed to establish procedures to prevent persons from doing so.

ENFORCEMENT ACTIONS

Issued to Hanson Aggregates Southeast, LLC

Order No. 8813059--issued on June 18, 2014, under the provision of Section 103(j) of the Mine Act:

An accident occurred at this operation on June 18, 2014 at approximately 12:40 p.m. 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 causes of this accident. It prohibits all activity at the Waste Slurry Pump, 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 2:00 p.m. and has now been reduced in writing.

The order was subsequently modified to Section 103(k) after an Authorized Representative arrived at the mine. The order was terminated on June 27, 2014, after conditions that contributed to the accident no longer existed.

Citation No. 8638723--issued under the provisions of Section 104(d)(1) citation of the Mine Act for a violation of 30 CFR 56.14205:

On June 18, 2014 a fatal accident occurred when a miner was struck by metal fragments of an impeller hub. The victim, a production supervisor, and two contract miners were working to remove an impeller from slurry pump. The impeller was seized onto the threaded shaft. While performing maintenance on the machine, the victim and two contract miners applied heat from a torch to the impeller hub, and it exploded. Management engaged in aggravated conduct constituting more than ordinary negligence by disregarding the manufacturer's warnings not to apply heat to the impeller hub. This

Approved by: Sam Pierce Date: 8/29/14
Samuel K. Pierce
Southeast District Manager

APPENDIX A

Persons Participating in the Investigation

Hanson Aggregates Southeast, LLC

Mike Cool	Plant Manager
Bill Owens	Safety & Health Manager
Margaret Lopez	Attorney at Law, Ogletree Deakins Law Firm

First Health EMS Chesterfield County

Douglas Rorie	EMT
Justin Threat	EMT

Chesterfield County Sheriff's Office

Wayne Jordan	Staff Sergeant
Tim Perry	Investigator

Coroner

Kip Kiser	Coroner
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Mine Safety and Health Administration

Curtis Roth	Supervisory Mine Safety and Health Inspector
Michael (Shane) Cohen	Mine Safety and Health Inspector
Brett Calzaretta	Mine Safety and Health Specialist (Training)

APPENDIX B

Victim Information

Accident Investigation Data - Victim Information

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



Event Number: 0 8 7 1 2 6 1

Victim Information: 1																			
1. Name of Injured Employee Christopher Miller				2. Sex M		3. Victim's Age 41		4. Degree of Injury: Cr. Fatal											
5. Date(MM/DD/YY) and Time(24 Hr.) Of Death: a. Date 08/18/2014 b. Time: 12:30								Date and Time Started: a. Date 08/18/2014 b. Time: 12:30											
7. Regular Job Title: DB: Production Supervisor				8. Work Activity when Injured: 038 Attempting to remove impeller				9. Was this work activity part of regular job? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>											
10. Experience a. This		Years	Weeks	Days	b. Regular Job Title:		Years	Weeks	Days	c. This Mine:		Years	Weeks	Days	d. Total Mining		Years	Weeks	Days
Work Activity		12	32	5			12	32	5			19	11	1	19		11	1	
11. What Directly Inflicted Injury or Illness? 127 heat applied to impeller								12. Nature of Injury or Illness: 180 fragment struck within 6" upper leg											
13. Training Deficiencies: Hazard: <input type="checkbox"/> Newly Employed <input type="checkbox"/> Experienced Miner: <input type="checkbox"/> Annual: <input type="checkbox"/> Task: <input checked="" type="checkbox"/>																			
14. Company of Employment: (If different from production operator) Operator										Independent Contractor ID: (If applicable)									
15. On-site Emergency Medical Treatment: Not Applicable: <input type="checkbox"/> First-Aid: <input type="checkbox"/> CPR: <input type="checkbox"/> EMT: <input checked="" type="checkbox"/> Medical Professional: <input type="checkbox"/> None: <input type="checkbox"/>																			
16. Part 50 Document Control Number (Form 7000-1) 220141840005						17. Union Affiliation of Victim 9998		None (No Union Affiliation)											

Victim Information: