

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

REPORT OF INVESTIGATION

**Surface Metal Mill
(Alumina)**

Fatal Machinery Accident

December 9, 2004

Onyx Industrial Services Inc. (XNW)

at

**Sherwin Alumina Company
Sherwin Alumina Company
Gregory, San Patricio County, Texas
Mine ID No. 41-00906**

Investigators

**Arthur L. Ellis
Supervisory Mine Safety and Health Inspector**

**Jerry Y. Anguiano
Mine Safety and Health Inspector**

**Michael P. Snyder
Mining Engineer**

**Laman J. Lankford
Mine Safety and Health Specialist**

**Originating Office
Mine Safety and Health Administration
South Central District
1100 Commerce Street, Room 462
Dallas, TX 75242-0499
Edward E. Lopez, District Manager**

OVERVIEW

On December 9, 2004, Ronald Benavidez, technician, age 46, was fatally injured when he was engulfed by lime slurry. The victim was standing outside an open access door attempting to flush material from a slaked lime surge tank. The lime slurry rushed from the tank as the victim was hydro-blasting through crusted material just inside the open door.

The accident occurred because the mine operator did not ensure that effective procedures were utilized to protect persons from entrapment by materials from within the surge tank. The amount and consistency of material in the surge tank were not determined before the tank access door was removed and the hydro-blasting work began.

GENERAL INFORMATION

Sherwin Alumina Company, a surface alumina mill, owned and operated by Sherwin Alumina Company, a division of BPU Reynolds Inc., was located in Gregory, San Patricio County, Texas. The principal operating official was Frank Newchurch, plant manager. The mill operated two 12-hour shifts per day, seven days per week. Total employment was 750 persons.

Bauxite ore was shipped to the mill from several foreign sources. The ore was conveyed to the mill where alumina was extracted from the bauxite by the Bayer process. The finished product was used to produce aluminum metal for a variety of industrial uses.

Onyx Industrial Services Inc. (Onyx), an independent contractor, was a division of Onyx North America. Their primary businesses were hydro-blasting, tank cleaning, and vacuum services. The principal operating official was Randy Kruger, chief executive officer.

The last regular inspection at this operation was completed on March 31, 2004.

DESCRIPTION OF ACCIDENT

On November 13, 2004, the mixer shaft in the 30-T-30 slaked lime surge tank broke. Sherwin maintenance employees repaired the shaft but recommended shutting down the tank after they were unable to turn the mixer manually. Slaked lime was settling out of the slurry in the tank.

The surge tank was not shut down but was returned to use without further repair. Two air lancers were used to agitate the material inside the tank. However, the lancers were not very effective and the level indicator in the tank became unreliable because the lime at the bottom of the tank was not sufficiently agitated. Without accurate level indications, material was overflowing from the tank.

The surge tank was shut down on December 2, 2004, for draining and repairs. Sherwin personnel pumped material from the tank for several days by introducing air and water into it. On December 7, 2004, Eric Commander, area superintendent, and Mike Faust, field coordinator, made level checks of the remaining material by visually checking the 20-inch diameter inspection port on top of the tank. Commander tried to check the level on December 8, 2004, but could not determine the amount of material remaining in the tank due to dust and steam. Later that day, management decided to have maintenance personnel unbolt and remove the cover from the 3-foot by 5-foot access door located at the base of the tank.

On the day of the accident, Ronald Benavidez (victim), reported for work at 6:30 a.m., his normal starting time. About 7:00 a.m., Faust informed Joseph Longwell, Onyx supervisor, the material in the 30-T-30 slaked lime surge tank needed to be removed. Faust told Longwell the tank contained a small amount of liquid and the cover had been removed from the access door.

About 7:15 a.m., Longwell assigned George Vogel, crew leader, Santana Perez, technician, and Benavidez to clean out the tank. At 7:30 a.m., Vogel completed a job safety analysis (JSA), reviewed it with the crew, and posted the JSA on the tank.

About 8:05 a.m., Benavidez started hydro-blasting. He stood outside the access door and directed a water stream toward the crusted lime inside the doorway. After about 5 minutes, Benavidez asked Vogal to look into the 8-inch diameter hole that had been created in the crust at the lower left corner of the access door. Vogal said that he could see about two feet of the tank bottom just inside the door and told Benavidez to continue hydro-blasting through the crust.

Vogal walked away while Benavidez resumed hydro-blasting. A few seconds later, Vogal heard a noise behind him and turned to see lime slurry rushing out the access door of the tank. The slurry struck Benavidez and he was knocked to the ground where he was engulfed by slurry three to four feet deep. Onyx and Sherwin employees immediately attempted to rescue Benavidez. However, the depth of the slurry prevented them from reaching him.

Will Bonneau, Onyx environmental health and safety manager, was notified at 8:15 a.m. He arrived at 8:30 a.m. and donned personal protective equipment, but could not rescue or recover Benavidez. The victim was pulled from the slaked lime slurry and pronounced dead at the scene at 11:37 a.m. by Judge Charlotte Griffin. Death was attributed to asphyxiation.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 8:30 a.m. on December 9, 2004, by a telephone call from Arlon Boatman, manager of health and safety for Sherwin, to Ralph Rodriguez, supervisory mine safety and health inspector. An investigation was started that day. An order was issued pursuant to Section 103 (k) of the Mine Act to ensure the safety of the miners. MSHA's accident investigation team traveled to the mill, made 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 the miners' representative.

DISCUSSION

Location of the Accident

The accident occurred at the 30-T-30 slaked lime surge tank in area 30 of the mill. The 30-foot diameter and 38 feet high steel tank had a 20-inch inspection port, a 3-foot by 5-foot access door, and an outside ladder. The inspection port was on top, in the northwest portion of the tank. The access door was on the east side at ground level and had a 1-inch-thick fabricated mild steel cover that was attached with 52 threaded bolts. The ladder consisted of two sections with one intermediate landing and rose to the top of the tank, near the inspection port. The tank was last cleaned in September, 1999.

Slaked Lime

Every 24 hours, about 300 tons of quicklime was mixed with water and the slurry was pumped into the 30-T-30 slaked lime surge tank through 6-inch piping. The slaked lime slurry was kept in suspension inside the tank by constant mixing. The slaked lime was eventually introduced into digesters in area 33 of the plant as part of the alumina processing operations. The temperature of the material ranged from 167-208 degrees Fahrenheit with an optimal temperature of 194 degrees Fahrenheit. A grab sample of slurry taken near the tank after the accident had a

temperature of 108 degrees Fahrenheit, a pH of 12, and a density of 1.24 g/ml.

Mixer

The 30-T-30 slaked lime surge tank was equipped with a Lightnin model 78-Q-20 mixer installed at the top center of the tank. It was driven by a 20-hp electric motor powering a 5.5-inch diameter shaft that was 40.5 feet long. The impeller for the mixer had 4 blades, was 10 feet in diameter, and operated about 3 feet off the bottom of the tank. Under normal operation, the impeller blades mixed the slurry, forcing it downward and up the sides of the tank.

Hydro-blasting Equipment

Onyx personnel utilized a hydro-blasting system to flush material from the tank and a vacuum truck to remove it from the floor around the tank. The hydro-blasting equipment included a trailer-mounted Jet-stream pump, set at 6,000 pounds per square inch of pressure, with about 100 feet of hose extending to a wand-type actuator. The trailer was parked southwest of the 30-T-30 slaked lime surge tank.

Training and Experience

Benavidez had 2 years and 24 weeks experience hydro-blasting for Onyx at this mill. He had an additional 24 years experience doing similar work for other companies. Benavidez had received training in accordance with 30 CFR, Part 48.

ROOT CAUSE ANALYSIS

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

Causal Factor: Management policies and controls were inadequate and failed to implement safe work procedures to ensure miners were not exposed to entrapment hazards created by material remaining in the slaked lime surge tank.

Corrective Action: Procedures should be established that will ensure liquid or other unconsolidated materials are removed from tanks prior to opening access doors. A risk assessment should be conducted to identify all possible hazards and establish safe procedures prior to assigning persons to remove material from inside any tank.

CONCLUSION

The accident occurred because the mine operator did not implement procedures to ensure that sufficient liquid had been removed from the slaked lime surge tank before the access door was opened. The amount and consistency of material in the surge tank were not determined before the tank access door was removed and the hydro-blasting work began. Controls were not implemented to mitigate the risks involved with removing material from the surge tank.

ENFORCEMENT ACTIONS

Order No. 6256561 was issued on December 9, 2004, under the provisions of Section 103(k) of the Mine Act:

A fatal accident occurred at this operation on December 9, 2004, when a miner was buried with slaked lime slurry. This order is issued to assure the safety of all persons at this operation. It prohibits all activity at the slaked lime surge tank until MSHA has determined that it is safe to resume normal operations in the area. The 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 December 27, 2004, after conditions that contributed to the accident no longer existed.

Sherwin Alumina Company

Citation No. 6230113 was issued on December 22, 2004, under the provisions of Section 104(a) of the Mine Act for a violation of 56.16002(a)(1):

A fatal accident occurred at this operation on December 9, 2004, when a contractor employee was engulfed by slaked lime slurry. The victim was attempting to break up crusted material inside the area 30 lime surge tank. He stood outside the tank, hydro-blasting through an open 3-foot by 5-foot clean-out door at ground level. The material inside the tank broke loose, flowed out the clean-out door, and engulfed the victim. An effective means of handling materials was not utilized to ensure miners were not exposed to entrapment by caving or sliding materials.

This citation was terminated on January 25, 2005. The operator has adopted a new lime surge tank cleaning procedure to ensure that persons are not exposed to entrapment by caving or sliding materials. Employees involved in such cleaning will be trained in the new procedure before taking part in cleaning activities.

Onyx Industrial Services

Citation No. 6230114 was issued on December 22, 2004, under the provisions of Section 104(a) of the Mine Act for a violation of 56.16002(a)(1):

A fatal accident occurred at this operation on December 9, 2004, when a contractor employee was engulfed by slaked lime slurry. The victim was attempting to break up crusted material inside the area 30 lime surge tank. He stood outside the tank, hydro-blasting through an open 3-foot by 5-foot clean-out door at ground level. The material inside the tank broke loose, flowed out the clean-out door, and engulfed the victim. An effective means of handling materials was not utilized to ensure miners were not exposed to entrapment by caving or sliding materials.

This citation was terminated on January 25, 2005. The contractor has adopted a new lime surge tank cleaning procedure to ensure that persons are not exposed to entrapment by caving or

sliding materials. Employees involved in such cleaning will be trained in the new procedure before taking part in cleaning activities.

Approved: _____
Edward E. Lopez
District Manager

Date: _____

APPENDIX A

Persons Participating in the Investigation

Sherwin Alumina Company

Sandra Bailey	production senior engineer
Chester Engersoll	production manager
A.C. Rodriguez	plant safety coordinator
Robert Walls	instrument technician

United Steel Workers of America

Douglas Edwards	miners' representative
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Mine Safety and Health Administration

Jerry Y. Anguiano	mine safety and health inspector
Arthur L. Ellis	supervisory mine safety and health inspector
Laman J. Lankford	mine safety and health specialist
Michael P. Snyder	mining engineer