

**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 Falling Material Accident
April 21, 2009**

**Tycon Excavating Contractor, Inc.
Contractor I.D. K973**

at

**Santana Dredging Corporation
Santana Dredging Corporation
Savannah, Hardin County, Tennessee
Mine I.D. No. 40-00827**

Investigators

**Donald L. Ratliff
Supervisory Mine Safety and Health Inspector**

**Timothy S. Schmidt
Mine Safety and Health Inspector**

**Phillip L. McCabe
Mechanical Engineer**

**Jonathan Hall
Mechanical Engineer**

**Deborah Combs
Mine Safety and Health Specialist**

**Originating Office
Mine Safety and Health Administration
Southeastern District
135 Gemini Circle, Suite 212 Birmingham, Alabama 35209
Wyatt S. Andrews, Acting District Manager**



OVERVIEW

Rickey A. Luna, Contractor Laborer, age 51, was fatally injured on April 21, 2009, while helping to place a 5,500 pound concrete catch basin into a drainage ditch. The chain being used to attach the concrete catch basin to the excavator failed. The concrete catch basin fell into the ditch, pinning the victim against the sidewall of the ditch.

The accident occurred because contractor management policies, procedures, and controls were inadequate. A risk assessment to discuss the task with the crew and identify possible hazards was not conducted prior to lifting and moving the concrete catch basin. The chain used to support the concrete catch basin was not rated and would not support the load being lifted and moved. Additionally, the victim was working in an area where he could not stay clear of a suspended load.

GENERAL INFORMATION

Santana Dredging Corporation, a surface sand and gravel operation, owned and operated by Santana Dredging Corporation (Santana), was located in Savannah, Hardin County, Tennessee. The principal operating official was L. Baylis Carnes, Chief Executive Officer. The mine operated one 8-hour shift per day, five days per week. Total employment was nine persons.

Sand and gravel was removed from a river using a dredge. The material was sized, washed, and separated on the dredge and then loaded into barges and transported to the plant. The finished product was unloaded and stockpiled for sale to the construction industry.

Tycon Excavating Contractor, Inc., (Tycon) was an independent contractor located in Pulaski, Giles County, Tennessee. The principal operating official was William P. Tatum, President. Tycon was contracted by Santana to remove overburden and construct a sediment control system for the operation.

The last regular inspection at this operation was completed on March 12, 2009.

DESCRIPTION OF THE ACCIDENT

On the day of the accident, Rickey A. Luna, (victim) reported to work at 6:30 a.m. His normal starting time was 7:00 a.m. Travis Alexander, Superintendent of Field Operations, told him to help set a pump and attach a concrete structure lid (top) to a catch basin that had previously been installed.

Josh Stanford, Excavator Operator, arrived about 7:15 a.m. and met Rickey Luna. They completed setting the pump and attached a top to the catch basin. They then had to move another concrete catch basin for installation. The bucket on an excavator was removed so the excavator could be used to lift and move the concrete catch basin. A sling was connected to the concrete catch basin and a chain was used to connect the sling to the excavator boom. Stanford used the excavator to lift and move the structure. He then went to the previous location to retrieve the excavator bucket.

Steven Luna, GPS Operator and Laborer, (victim's cousin) arrived about 8:30 a.m. He staked the four corners of the hole to be dug for the concrete catch basin.

Stanford returned with the excavator and dug a hole for the concrete catch basin as Steven Luna monitored the elevation. Steven Luna and Rickey Luna got in and out of the hole to ensure it was square and to check the elevations. Gravel was delivered to the hole and placed into the bottom for stability and proper elevation. Stanford again removed the bucket from the excavator to attach the concrete catch basin to the boom. Steven Luna and Rickey Luna entered the hole to level the rock, check the elevation, and mark the corner location of the catch basin. Alexander used a single chain and a quadruple leg sling to connect the concrete catch basin to the excavator boom.

Stanford tightened the sling and chain so Alexander could check the hooks inside the concrete catch basin to ensure the chains were connected inside the structure. The concrete catch basin was lifted approximately 10 to 12 inches off the ground and rotated toward the hole. Alexander stopped the excavator, checked the bottom of the catch basin, and reached under it to remove some mud. He and Rickey Luna discussed the proper alignment of the catch basin in the hole. Steven Luna then got out of the hole. Alexander walked along side the structure as it was moved to the hole using his hands to keep the catch basin properly aligned.

About 9:35 a.m., the single chain broke when the catch basin was partially over the hole. The catch basin fell striking the top edge of the hole, overturned into the hole, and pinned Rickey Luna against a sidewall of the ditch. Alexander tried to manually move the catch basin but was unsuccessful. He went for first aid supplies and to get help. Stanford then called for emergency medical assistance. Steven Luna jumped into the hole and checked the victim for vital signs but found none. He took one leg of the sling and connected it to the catch basin. Stanford used the excavator to lift the catch basin and move it out of the way. At 9:50 a.m., emergency medical personnel arrived and transported Rickey Luna to the hospital where he was pronounced dead at 12:14 p.m. by the attending physician. The cause of death was attributed to multiple blunt force trauma.

INVESTIGATION OF THE ACCIDENT

The Mine Safety and Health Administration (MSHA) was notified of the accident at 10:04 a.m. CST, on April 21, 2009, by a telephone call from Alesia Scott, Mine Secretary, to the National Call Center. Samuel Pierce, Acting Assistant District Manager, was notified and an investigation was started the same day. A Part 50 citation was issued for untimely reporting. An order was issued under the provisions of Section 103(k) of the Mine Act to ensure the safety of the miners.

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 contractor management and employees, Hardin County Sheriff's Office, Crump Volunteer Fire Department, and Hardin Medical Center.

DISCUSSION

Location

Two settling ditches were to be constructed approximately 400 feet south of a new processing facility that was under construction. Water from this new facility would drain into the first ditch. The first ditch would drain to the southeast and into the catch basin (accident site), discharge into the southeast end of the second settling ditch, and then drain to the northwest. The accident occurred at the location of the discharge catch basin on the southeast end of the first settling ditch. A hole was dug approximately 6 feet 5 inches wide, 8 feet 9 inches long, and 4 feet 3 inches deep to install the concrete catch basin. All of the vegetation had been removed from this site.

Concrete Catch Basin

The Oldcastle Precast concrete catch basin, involved in the accident, was a precast hollow concrete section used to facilitate connecting multiple drainage pipes and a surface drain. The catch basin was approximately 52 inches wide, 64 inches long, and 52 inches high. The concrete structure had a rectangular opening 36 inches long by 24 inches high in the front. A 28-inch diameter hole was located on the back side of the structure. The structure's walls were 8 inches thick. Four lifting eyes were located near each interior corner. The manufacturer listed the weight of the structure as 5,500 pounds. This weight was also marked on the side of the catch basin.

Weather

The weather on the day of the accident was partly cloudy with a temperature of 68 degrees Fahrenheit. Work was cancelled the previous day because 1.05 inches of rain fell.

Excavator

The excavator involved in the accident was a Komatsu, Model No. PC-200-LC. It was a self-propelled, hydraulic driven, crawler mounted excavator. The excavator boom was equipped with a bucket attachment which incorporated a fabricated quick-coupler. This coupler, attached to the end of the boom, was designed with a lift eye for lifting and placing material. The lift eye was a flat plate lug welded to the top of the coupler. At the time of the accident, the bucket was removed to facilitate lifting of the catch basin.

According to the load chart, located in the operator's compartment, and the configuration of the excavator at the time of the accident, the load being lifted with the excavator was within the manufacturer's load rating.

Chains

Quadruple Leg Sling

The Custom Sling LLC four-leg chain sling, involved in the accident, was a Grade 80 QOS/A adjustable quad leg sling with an oblong master link. The chains making up the sling were 3/8-inch links embossed with HA 800 markings. The chains were a high strength heat treated alloy steel primarily used as a sling component for overhead lifting but could be used in rigging and tie applications. The sling WLL (Working Load Limit) was 18,400 pounds as specified on the manufacturer's tag located on the sling.

The four chains had clevis sling hooks attached to the ends for attaching to the load. The sling hooks were matched to the chain size and grade and were designed for sling use primarily with Grade 80 chain. The sling hook was attached directly to the 3/8-inch chain. The other end of each of the four chains was attached to specialized grab hooks (clevis shortening hooks). These grab hooks were designed with a clevis on one end and an eye on the other end. The specialized grab hooks were an integral component to each of the four sling legs. Conventional grab hooks were designed to be hooked back onto the chain in a choker arrangement and were used to adjust the lengths of the four sling chains. The grab hooks were attached to coupling links that were

constructed of drop forged alloy steel. They were specifically used for connecting the four chain branches to the master link and to the sling hook attachments. The coupling links met the strength of Grade 80 chain.

All four legs of the quadruple leg sling were attached to the oblong master link with sub-assembly links. The master link was approximately 1 inch in diameter, 9 inches long, with a spread of 5 ½ inches. The master link was sized for use with Grade 80 chain.

3/8-Inch Connector Chain

The connector chain involved in the accident was 3/8-inch chain with clevis grab hooks on each end. The grab hooks were designed with a clevis pin and cotter pin combination which was used to attach the hook onto any length of chain. The hooks were also designed to hook and lock onto the chain links on which they were attached. The working portion of the chain was looped through the master link of the chain sling and through the lifting eye on the excavator. The grab hook was used to close the loop. Reportedly, the extra chain on the other end was looped on the chain to keep it out of the way.

This connector chain did not have any identifying marks or discernible manufacturer's identification that is typically found on Grade 80 and Grade 100 alloy chain. Investigators determined that the connector chain exhibited noticeable wear and distortion in several locations. This wear included bent links, i.e. links that were no longer flat, as well as local deformation indicated by flat shiny spots on the chain, rust accumulation, and corrosion pitting in places.

A single link in the working section of the chain failed catastrophically, causing the catch basin to fall. This type of chain was considered "welded" chain. In the manufacturing process, the individual chain links were formed into the oblong shape using round bar stock. The ends were then welded together to form the links. The link of chain broke at the weld along one side. Investigators could not determine the exact position of the broken link when installed between the excavator lifting eye and the chain sling masterlink. One end of the broken link distorted more than the other. The worn and distorted (bent and twisted) condition of this broken link was similar to the condition of several other unbroken links in this chain.

Technical Chain Specifications

The National Association of Chain Manufacturer (NACM) Welded Steel Chain Specifications (September 28, 2005) define properties and grades of welded steel chain for industrial and commercial uses. For overhead lifting applications, the NACM specifications state that only Grade 80 or Grade 100 alloy chains should be used. Grade 80 and Grade 100 alloy chains were required to be identified with periodic embossing which included the manufacturer identification mark or symbol, the traceability or date code, and the grade of the chain, at intervals no greater than three feet. These NACM specifications prohibit overhead lifting with any chain whose grade is less than Grade 80. They also prohibit using damaged chain, including chains that have been bent or twisted.

Training and Experience

Rickey A. Luna, victim, had worked at this operation for two weeks and three days. He had three years, six weeks, and two days of experience with this contractor and had received training in accordance with 30 CFR Part 46.

Travis Alexander, Joshua Stanford, and Steven Luna had worked at this operation for two weeks and three days. They had worked for the contractor for several years and had received training in accordance with 30 CFR Part 46.

ROOT CAUSE ANALYSIS

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

Root Cause: Contractor management did not conduct a risk assessment to determine the potential hazards or to establish safe work procedures prior to lifting the 5,500 pound concrete catch basin. The chain used to support the concrete catch basin was not rated and would not support the load being lifted and moved.

Corrective Action: Contractor management established and implemented procedures that require risk assessments to be conducted that identify and correct potential hazards associated with the task to be performed. Safe lifting and rigging procedures were developed and implemented to ensure the safety of all persons working near the lifting area.

Root Cause: Contractor management policies, procedures, and controls were inadequate and failed to ensure that proper training regarding staying clear of suspended loads was provided to all persons.

Corrective Action: Contractor management policies, procedures, and controls were established to ensure that persons were trained regarding staying clear of suspended loads.

Root Cause: Contractor management policies, procedures, and controls were inadequate and failed to ensure that chains and other rigging were examined prior to lifting.

Corrective Action: Contractor management established policies, procedures, and controls requiring chains and other rigging to be examined prior to lifting.

CONCLUSION

The accident occurred because contractor management policies, procedures, and controls were inadequate. A risk assessment to discuss the task with the crew and identify possible hazards was not conducted prior to lifting and moving the concrete catch basin. The chain used to support the concrete catch basin was not rated and would not support the load being lifted and moved. Additionally, the victim was working in an area where he could not stay clear of a suspended load.

Santana Dredging Corporation

Order No. 6512837 was issued on April 21, 2009, under the provisions of Section 103(k) of the Mine Act:

A fatal accident occurred at this operation on April 21, 2009, when three miners were attempting to install a concrete culvert in the new settling pond structure 1 area. This order is issued to assure the safety of all persons at this operation. It prohibits all activity in the settling pond area where structure 1 is being installed until MSHA has determined that it is safe to resume normal mining 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.

The order was terminated on May 6, 2009. The conditions that contributed to the accident have been corrected and normal operations can resume.

Citation No. 6086746 was issued on June 9, 2009, under the provisions of Section 104(a) of the Mine Act for a violation of 30 CFR, 56.16009:

A fatal accident occurred at this mine on April 21, 2009, when a contract laborer was crushed by a precast concrete catch basin weighing approximately 5,500 pounds. The victim was working in an excavation ditch below the concrete catch basin that was suspended by a 3/8-inch chain attached to a track mounted excavator. The 3/8-inch chain attached to the concrete catch basin broke causing the catch basin to fall into the ditch crushing the victim. A violation of this standard occurred when the superintendent of the contractor directed the victim to work under the suspended load.

This citation was terminated on June 22, 2009, after the mine operator ensured that the contractor had established safe operating procedures and trained the miners in those procedures.

Citation No. 6086747 was issued on June 9, 2009, under the provisions of Section 104(a) of the Mine Act for a violation of 30 CFR, 56.16007:

A fatal accident occurred at this mine on April 21, 2009, when a contract laborer was crushed by a precast concrete catch basin weighing approximately 5,500 pounds. The victim was working in an excavation ditch below the concrete catch basin that was suspended by a 3/8-inch chain attached to a track mounted excavator. The 3/8-inch chain attached to the concrete catch basin broke causing the concrete catch basin to fall into the ditch crushing the victim. A violation of this standard occurred when the contractor used the 3/8-inch chain to hoist the concrete catch basin without determining whether it was suitable for the load.

This citation was terminated on June 22, 2009; after the operator ensured that the contractor had established safe operating procedures and trained the miners in those procedures.

Tycon Excavating Contractor, Inc.

Citation No. 6086744 was issued on June 9, 2009, under the provisions of Section 104(d)(1) of the Mine Act for a violation of 30 CFR, 56.16009:

A fatal accident occurred at this mine on April 21, 2009, when a contract laborer was crushed by a precast concrete catch basin weighing approximately 5,500 pounds. The victim was working in an excavation ditch below the concrete catch basin that was suspended by a 3/8-inch chain attached to a track mounted excavator. The 3/8-inch chain attached to the concrete catch basin broke causing it to fall into the ditch crushing the victim. Management engaged in aggravated conduct constituting more than ordinary negligence by directing the victim to work under the suspended load.

This citation was terminated on June 22, 2009, after the contractor established safe operating procedures and trained all miners in those procedures.

Order No. 6086745 was issued on June 9, 2009, under the provisions of Section 104(d)(1) of the Mine Act for a violation of 30 CFR, 56.16007:

A fatal accident occurred at this mine on April 21, 2009, when a contract laborer was crushed by a precast concrete catch basin weighing approximately 5,500 pounds. The victim was working in an excavation ditch below the concrete catch basin that was suspended by a 3/8-inch chain attached to a track mounted excavator. The 3/8-inch chain attached to the concrete catch basin broke causing it to fall into the ditch crushing the victim. Management engaged in aggravated conduct constituting more than ordinary negligence by using a chain to hoist the concrete catch basin without determining whether it was suitable for the load.

This citation was terminated on June 22, 2009, after the contractor established safe operating procedures and trained all miners in those procedures.

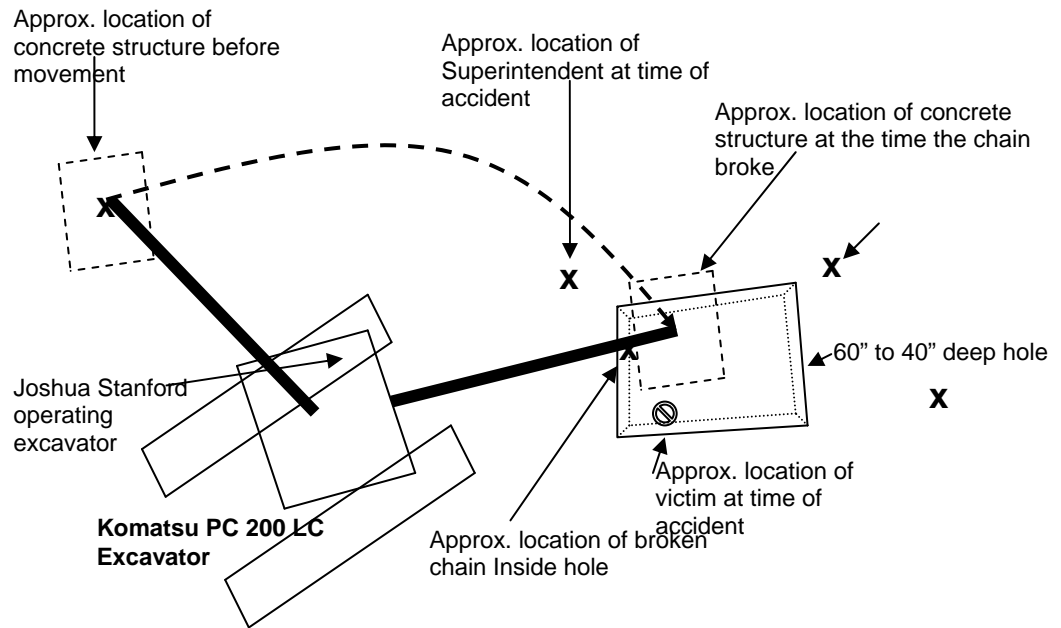
Approved: Date:
Wyatt S. Andrews
District Manager

APPENDICES

- A. Persons Participating in the Investigation
- B. Schematic of Catch Basin being moved into position
- C. Photos and Schematic of hoisting arrangement
- D. Chain, Grab Hooks and Concrete Structure
- E. Victim Data Sheet

APPENDIX B

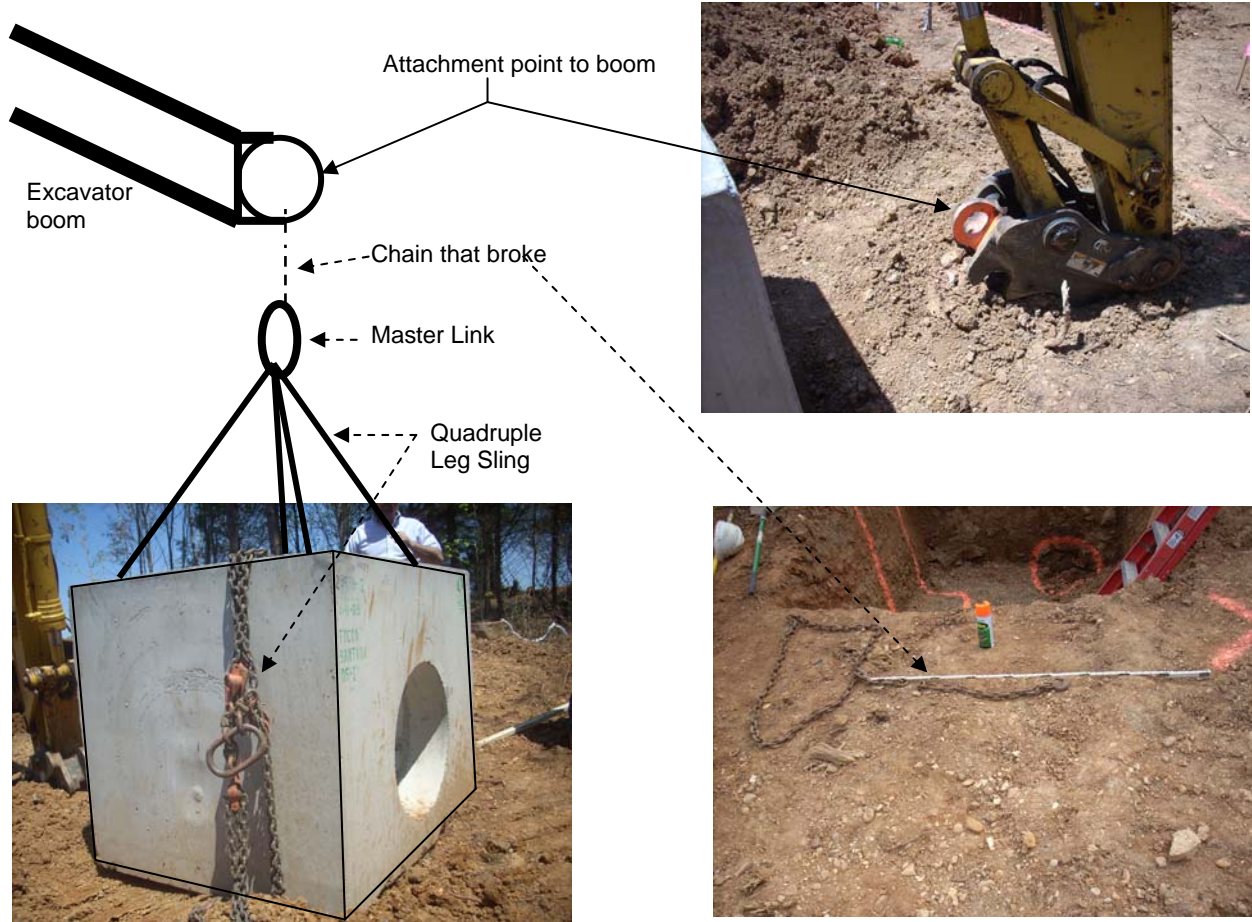
**Tycon Excavating Corporation
Contractor ID # K973**



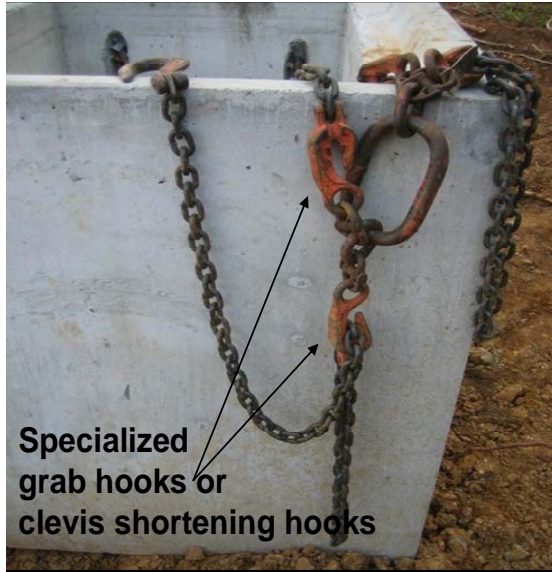
Fatal Accident
Santana Dredging Corporation
Santana Dredging Corporation
ID 40-00827
Tycon Excavating Corporation
Contractor ID # K973
April 21, 2009

X
Approx. excavator
bucket

APPENDIX C



APPENDIX D



Specialized grab hooks or clevis shortening hooks



Concrete structure's connecting grab bars



Identification tag



Unrated chain, clevis grab hooks and broken link