**MAI-2005-05**

# UNITED STATES
# DEPARTMENT OF LABOR
# MINE SAFETY AND HEALTH ADMINISTRATION

## REPORT OF INVESTIGATION

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

**Fatal Machinery Accident**

**March 14, 2005**

**South State, Inc.**
**South State, Inc., Dredge & Plant**
**Mine I.D. No. 28-00639**

**Investigators**

**Victor C. Lescznske**
**Mine Safety and Health Inspector**

**Richard E. Burkley**
**Mine Safety & Health Inspector**

**Terry F. Marshall**
**General Engineer**

**Dale P. Ingold**
**General Engineer**

**Originating Office**
**Mine Safety and Health Administration**
**Northeast District**
**Thorn Hill Industrial Park**
**547 Keystone Drive, Suite 400**
**Warrendale, Pennsylvania 15086-7573**
**James R . Petrie, District Manager**

# OVERVIEW

On March 14, 2005, Elwood Durham, plant operator, age 66, was injured when a workboat capsized. Durham and a coworker were working from a boat attempting to free a dredge anchor from the bottom of a dredge pond. Durham was pulled from the water and revived utilizing Cardio Pulmonary Resuscitation (CPR). He was hospitalized and died of his injuries on March 24, 2005. The other miner was able to rescue himself.

A crane, positioned on shore, and the boat were being used to recover an anchor. The crane cable and boat were simultaneously hooked to the anchor line. The crane operator's view of the boat was obstructed and no communications had been established between the crews. Because there was too much slack in the cable, the crane backed away from the shore, capsizing the boat. Neither of the employees on the boat were wearing the life jackets that were available on the boat.

The accident occurred because the mine operator did not ensure that effective procedures were used to protect persons attempting to recover the dredge anchor. The operator failed to ensure that a method of visual contact or verbal communications was established between the crane operator and the employees on the boat.

## GENERAL INFORMATION

South State Inc. Dredge & Plant, a sand and gravel operation, owned and operated by South State Inc., was located east of Bridgeton, Cumberland County, New Jersey. The principal operating officials were Chester J. Ottinger Jr., president; Shirley T. Chichura, secretary/treasurer; and Roger A. Smith, plant manager/safety director. The mine operated one eight-hour shift a day, five days a week. Total employment was 5 persons.

Sand and gravel was mined from a pond using a dredging machine. The material was pumped to a plant where it was crushed, screened, and stockpiled. The finished products were used in the construction industry.

The last regular inspection conducted by MSHA at this mine was on November 21, 2004.

## DESCRIPTION OF ACCIDENT

On the day of the accident, Elwood Durham (victim) reported to work at approximately 6:00 a.m. His regular duties included operating the plant, loading trucks and conducting maintenance activities as needed. Durham met with David G. Spoltore, quality control technician; Howard E. Gandy, foreman; and Christopher Biscoglio, dredge operator, to discuss the day's activities. At approximately 7:00 a.m. Gandy, Biscoglio and Durham went to the dredge to conduct repairs. At approximately 10:00 a.m., they entered a workboat and traveled to the southeast area of the dredge pond to free and retrieve a dredge anchor that broke away from the dredge last fall. The anchor was located 80 feet from the southeast shore line at a depth of approximately 35 feet. None of the miners were wearing a life jacket.

The employees attached a cable tag line to the anchor and to a pontoon on the surface. They used a 1.5-ton overhead chain hoist, mounted to an A-frame at the front of the workboat, to hook into an eyelet on the anchor tag line to hoist the anchor free. After making several unsuccessful attempts to pull the anchor free, they returned to shore.

At 12:45 p.m., the employees decided to use a 10-ton mobile crane to assist in retrieving the anchor. Durham and Biscoglio boarded the workboat and traveled to the anchor pontoon. Neither person was wearing a life jacket.

At 1:00 p.m., Roger A. Smith, plant manager, arrived at the west side of the dredge pond and observed Durham and Biscoglio 400 feet off shore traveling towards the anchor pontoon. At 1:05 p.m., David G. Spoltore arrived and discussed the day's activities with Smith.

Gandy gathered a 137-foot long cable sling and drove the crane to the southeast shore line of the pond. He placed the crane against a 6-foot high berm on the north side of the road, but could not see the workboat from the crane's operator cab. Durham and Biscoglio attached the chain hoist hook of the workboat to the anchor tag line, causing the bow of the workboat to tilt towards the water. They attached one end of the cable sling to the crane lifting hook and the other end of the cable sling to the same eyelet in the anchor tag line that the workboat's chain hoist hook was attached.

Gandy retracted the crane cable until the crane's lifting hook was against the boom. He raised the extended boom to take up the excess slack in the cable. After raising the boom to capacity, Gandy exited the operator's cab and yelled to Durham and Biscoglio that he would have to reposition the crane to take up the additional slack in the cable. Gandy then retracted the boom all the way in and lowered it to just above the berm. While the crane backed up toward the east, the workboat capsized, throwing Durham and Biscoglio into the water.

About 1:30 p.m., Smith and Spoltore, still at the west shore, heard screaming coming from the boat and saw it capsizing. Smith ran to an adjacent sand stockpile, yelled, and motioned for Gandy to stop the crane. Smith and Spoltore traveled to the accident site.

Biscoglio swam to the capsized boat and climbed on top of it. He held Durham's head above the water until the boat suddenly sank. Biscoglio used the cable sling attached to the crane to pull him to shore. Once ashore, he observed Durham floating face down in the frigid water.

Spoltore called for emergency medical assistance while Smith and Gandy went into the water and pulled Durham to the shore. Smith and Gandy assessed Durham's vital signs and started CPR. Smith and Biscoglio were transported to the hospital where they were treated for hypothermia and released. Durham was air-lifted by helicopter to the hospital where he died as a result of his injuries on March 24, 2005.

## INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 8:45 a.m. on March 15, 2005, by a telephone call from Roger A. Smith, plant manager, to Robert L.Carter, supervisory mine inspector. An investigation was started the same 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 mine, conducted a physical investigation of the accident site, interviewed employees and reviewed documents and work procedures relevant to the accident. MSHA conducted the

investigation with the assistance of mine management, employees, New Jersey Department of Labor, and the New Jersey State Police.

## DISCUSSION

### Location of the Accident

The accident occurred on the mine dredge pond, approximately 80 feet from the south east shore line. The manmade fresh water pond was an oval shaped dredging excavation encompassing approximately 17 acres with an average depth of 35 feet. The bank was composed of sedimentary deposits of sand and gravel with a roadway adjacent to the perimeter. The top of the near vertical bank was approximately 32 feet above the narrow shore line. A 6-foot high berm was provided on the north side of the road way.

### Weather Conditions

The weather on the day of the accident was clear with moderate winds and an average air temperature of 40 degrees Fahrenheit. The water was calm with a temperature of approximately 42 degrees Fahrenheit.

### Crane

The rubber-tired mobile crane was a 1979 Broderson Manufacturing Corporation (BCM), model RTR-160-2A, with a maximum rated lifting capacity of 20,000 pounds (10 tons). The crane hook had a maximum vertical lift height of approximately 57 feet and a horizontal extend and retract range of approximately 30 feet. The hoist block was rigged with a 3-part line. The 3-piece boom was not equipped with a jib extension. The top of the operator's cab measured 7 feet 1 ½ inches from ground level. This factor contributed to the crane operator's inability to see the employees and boat at the time of the accident.

### Workboat

The workboat was fabricated locally. It had a flat deck and flat bottom with no keel. The operator's station was located at the stern of the vessel. The boat was equipped with an inboard four-cylinder White-Continental gasoline engine and a mechanically operated rudder for steering. The 12,400-pound boat had an overall length of 23 feet, an overall width of 8 ½ feet, and a hull height of 2 feet. Water marks on the side of the boat indicated that normal freeboard of the boat was approximately 12 inches.

The hull of the boat was enclosed except for an engine compartment opening at the stern. A tripod A-frame hoist mechanism was mounted on the bow portion of the boat. Perimeter hand rails were only provided from amidships aft to the

stern. The vessel had no built-in floatation. Three life jackets were provided on the boat.

## Dredge Anchor

The anchor was fabricated locally with two large flukes and a stock and tripping pan. A large crane was used to recover the anchor and boat. According to a scale on the crane, the anchor weighed approximately 600 pounds. An 18,000-pound force was needed to free the anchor from the bottom of the pond.

## Anchor and Pontoon Rigging

A steel pontoon 8 feet long and 3 feet in diameter was attached to a wire cable and to the anchor to mark the location and provide a connection to the anchor. The wire cable was approximately 40 feet long and had three eyelets spaced at 12 feet, 23 feet and 40 feet from where it was connected to the pontoon. The eyelets provided places to connect a recovery line to pull the anchor out of the water.

## Cable Sling

A wire rope cable sling, 137 feet long and 5/8 inch in diameter, was connected to an eyelet of the anchor recovery line using a shackled connection. The other end was attached to the crane lifting hook.

## Workboat Hoist and Rigging

The apex of the tripod A-frame, located on the bow (front) of the boat, was 9 ½ feet above the deck. A Jet L-90 1.5-ton capacity chain hoist was mounted to the apex of the A-frame structure. The hoist hook was attached and tensioned to the same eyelet of the recovery line that the cable sling from the crane was shackled to.

## Crane Set up

There were no communication devices to allow employees in the workboat to communicate with the crane operator. The crane operator could not see or talk with the employees from the operator's cab. The position of the right front corner of the crane cab was approximately 14 feet from the top edge of the bank. The berm in front of the crane's operator cab was 5 feet high. The water level was 32 feet below the elevation of the access road and the anchor pontoon was approximately 80 feet from the bank. An estimated line of sight of the crane operator was 20 feet above the boat's A-frame apex. The closest point on the surface of the water that would have been visible to the crane operator would have been at least 570 feet from the bank (see Appendix B).

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**Training and Experience**

Elwood Durham had 2 years, 6 weeks mining experience, all at this mine. He had received 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:** The method used to rig the workboat hoist, the recovery cable, and the cable sling connected to the crane, made it inevitable that tension applied by the crane would cause the boat to capsize. The rigging needed to be disconnected from the workboat to safely complete the task.

**Corrective Action:** Conduct a thorough risk assessment before starting a task to ensure that all hazards are evaluated and eliminated.

**Causal Factor**: Direct communications between the workboat personnel and the crane operator was not maintained to complete a task requiring constant coordination and communication.

**Corrective Action:** Ensure that communications are in place when tasks are performed that require two separate crews. Use a spotter if visual contact cannot be maintained at all times between the crane operator and the workboat crew.

**Causal Factor:** Neither employee on the workboat was wearing the life jackets provided on the workboat at the time of the accident.

**Corrective Action:** Ensure that life jackets are worn at all times where there is a danger of falling into the water.

## CONCLUSION

The accident occurred because the mine operator did not ensure that effective procedures were used to protect persons attempting to recover the dredge anchor. The operator failed to ensure that a method of visual contact or verbal communications was established between the crane operator and the employees on the boat. Neither of the employees on the boat were wearing the life jackets that were available on the boat.

# ENFORCEMENT ACTIONS

**Order No. 6025060** was issued on March 15, 2005, under the provisions of Section 103(k) of the Mine Act:

An accident occurred at this operation on March 14, 2005, when two miners fell into the frigid dredging pond water. This order is issued to assure the safety of persons at this operation and prohibits any work in the affected area and on the rubber-tired Broderson crane until MSHA determines that it is safe to resume normal operations as determined by an authorized representative of the Secretary of Labor. The mine operator shall obtain approval from an authorized representative for all actions to recover and/or restore operations in the affected areas.

This order was terminated on March 23, 2005. Conditions and procedures that contributed to the accident have been corrected. The workboat, Broderson crane, and the work area where the accident occurred, to include the shore line where the accident victims were extricated from the water were allowed to return to normal mining operations.

**Citation No. 6027249** was issued on March 16, 2005, under the provisions of Section 104(d)(1) of the Mine Act for violations of 56.15020:

On March 14, 2005, a 66 year old plant operator was fatally injured when a workboat he and another co-worker were on, capsized. The plant operator died from his injuries on March 24, 2005. Neither employee was wearing a life jacket, although there were life jackets on the boat. The workboat had handrails on three sides, but not in the front where the victim was standing when it capsized. The boat was not equipped with floatation and the water was 42 degrees F. A foreman with South State was on shore directing activities and had observed the employees on the workboat without life jackets. He also was with them on the boat earlier in the day as they worked without wearing life jackets. At the time of the accident, the employees and foreman were trying to raise a 600 pound anchor to the company's dredge. They had attached a chain to the anchor line which was connected to the workboat, and a wire rope from the anchor line to a mobile crane operated by the foreman on the shore. The workboat capsized when the foreman backed up the crane in an attempt to pull the anchor free without disconnecting the chain to the workboat. He could not see the workboat from the crane as he backed up. The company engaged in aggravated conduct constituting more than ordinary negligence in that they were aware of the employees' failure to wear life jackets, while engaged in work tasks that had a high risk of destabilizing or capsizing the boat on which the employees were working. They did so despite the additional danger that the water body was deep and frigid. This violation is an unwarrantable failure to comply with a mandatory standard.

This citation was terminated on March 17, 2005. Standard 56.15020 of the 30 CFR was reviewed with mine management and the miners.

Approved: _____ Date: _____

James R. Petrie
District Manager

# APPENDICES

A. Persons Participating in the Investigation
B. Sketch of Crane and Workboat Set Up

## APPENDIX A

## Persons Participating in the Investigation:

### SOUTH STATE, INC.

Roger A. Smith…….plant manager

### NEW JERSEY DEPARTMENT OF LABOR

Charles P. Kears……construction code inspector II (mining)
Kenneth E. Heintz……..mine safety education technician

### NEW JERSEY STATE POLICE

Stanley W. Symanski……state trooper

### GARTON'S RIGGING

Henry A. Garton IV……..vice president

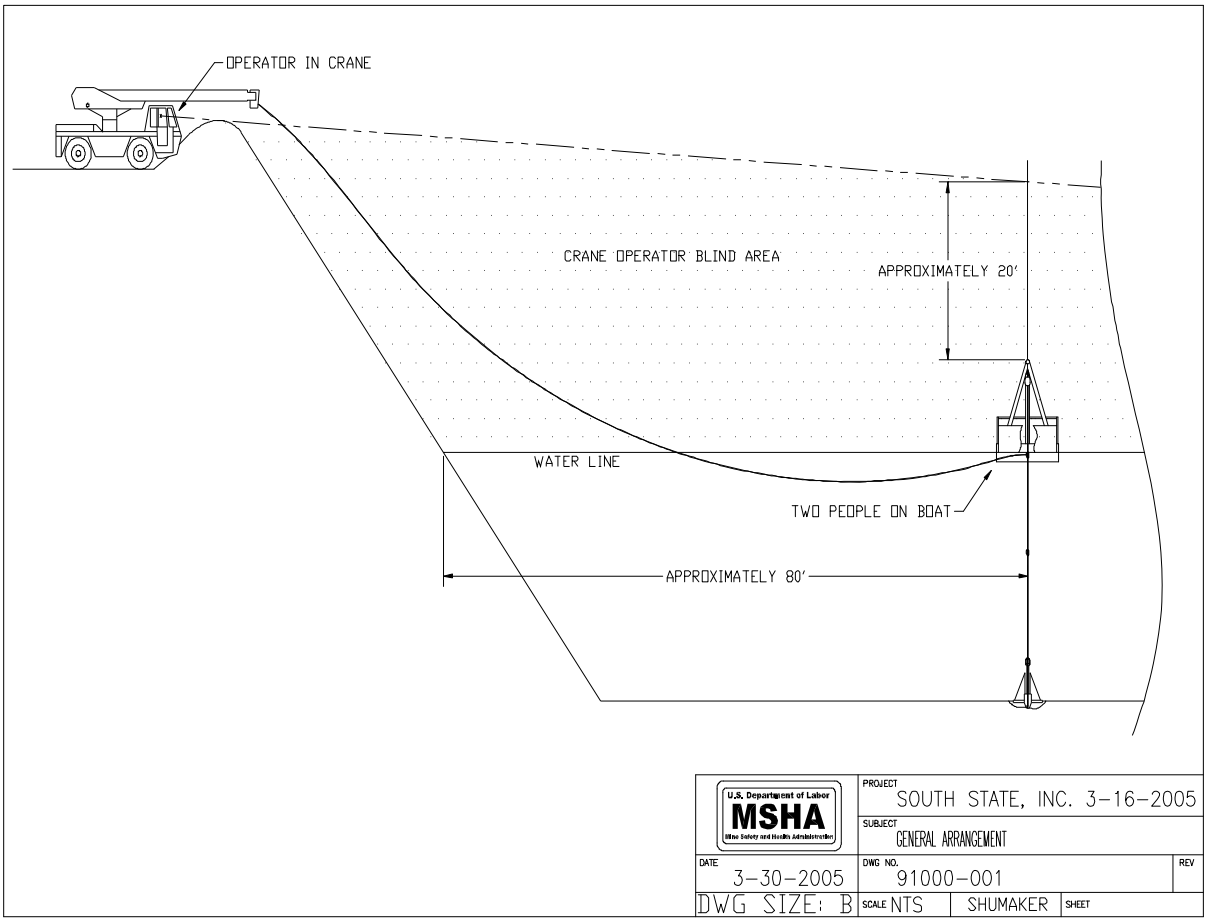
### ARBOR-TECH TREE SERVICE

Nicholas Kuhar……...tree technician

### MINE SAFETY AND HEALTH ADMINISTRATION

Victor C. Lesczнske……..mine safety and health inspector
Richard E. Burkley…….mine safety and health inspector
Kenneth R. Jacobs……mine safety and health inspector
Terry F. Marshall……mechanical engineer
Dale P. Ingold…….general engineer

# APPENDIX B


OPERATOR IN CRANE
CRANE OPERATOR BLIND AREA
APPROXIMATELY 20'
WATER LINE
TWO PEOPLE ON BOAT
APPROXIMATELY 80'
U.S. Department of Labor
MSHA
Mine Safety and Health Administration
PROJECT
SOUTH STATE, INC. 3-16-2005
SUBJECT
GENERAL ARRANGEMENT
DATE
3-30-2005
DWG NO.
91000-001
REV
DWG SIZE: B
SCALE NTS
SHUMAKER
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