

Crane Operator Killed when Outrigger Sinks into Unstable Soil Causing the Crane to Overturn - Massachusetts

Investigation: # 03-MA-030-01
Release Date: October 31, 2005

SUMMARY

On June 26, 2003, a 28-year-old male crane operator (the victim) was fatally injured when his crane overturned. Upon arrival to the worksite, the victim set up the crane in preparation for the lifting task. The setup included extending the boom approximately 150 feet up and over the rear of the crane with no load attached to the hook. The victim was outside of the crane's cab when he noticed that the crane was moving. In an attempt to stop the crane, the victim started to climb up to the cab. The crane overturned onto its right side, the same side the victim was on, crushing the lower half of his body. Emergency Medical Services (EMS) personnel arrived within minutes of the 911 call and started attending to the victim who was trapped under the crane. A call was also placed to a local towing company to assist in freeing the victim. The towing company arrived with two 60-ton tow trucks and giant air bags to lift the crane enough to free the victim. After 20 minutes of lifting, the victim was freed and was rushed to a hospital where he died of his injuries 12 hours later. The Massachusetts FACE Program concluded that to prevent similar occurrences in the future, employers should:

- **Ensure that ground conditions are inspected by a competent person and/or soil engineer prior to setting up cranes**
- **Ensure that outrigger floats are routinely set onto blocking when deployed**

In addition, **property owners and general contractors** should:

- **Inform crane operators of any unsafe soil conditions located at the sites.**

INTRODUCTION

On June 26, 2003, the local media alerted the Massachusetts FACE Program that on the same day a 28-year-old male crane operator was fatally injured when the crane he was operating overturned. An investigation was immediately initiated. On July 14, 2003, the Massachusetts FACE Program Director traveled to the offices of the company that employed the victim to interview the vice president of the company. During the investigation, the death certificate,

corporate information, police incident report, and the OSHA fatality and catastrophe report were reviewed. During the site visit a demonstration of a smaller crane was observed and photographs were taken.

The employer, a crane rental company, had been in business for approximately 87 years at the time of the incident. The company employed approximately 35 people, 11 of these employees, including the victim, were crane operators. The victim had worked for the crane rental company for approximately two years. The crane rental company reported that they provided employees limited training, for example toolbox talks and hazardous material training.

The victim and all other crane operators were part of the International Union of Operating Engineers Local 4. The victim was a licensed crane operator in the Commonwealth of Massachusetts, licensed through the Massachusetts Department of Public Safety (<http://www.mass.gov/dps/>).

INVESTIGATION

The company's primary business was crane rental services. They owned eight hydraulic cranes ranging from 30 tons to 350 tons. The crane involved in the incident was a 150-ton hydraulic carrier-mounted telescopic boom crane that was manufactured in 1999. The crane was equipped with rubber tires enabling it to be driven over public roadways to travel to job sites.

The crane rental company received a call on June 25, 2003 requesting their services for the job that resulted in the incident. The task was described as a one-day job and entailed offloading a water/oil separator from a flatbed truck and placing it onto a ground level cement pad. The company requesting the crane services was a petroleum product company. The location where the task was to be performed was the company's tank farm, situated on a plot of coastal land.

On the day of the incident, June 26, 2003, the victim and another coworker, an oiler, arrived at the job location at approximately 7:30 a.m. The oiler drove the crane, and the crane operator drove his personal vehicle to the job site. Upon arrival, the crane was parked and the victim and the oiler waited for the arrival of the water/oil separator.

At approximately 12:30 p.m., the water/oil separator was delivered to the tank farm on a flatbed truck. At this time, the victim set up the crane by fully deploying all four outriggers directly onto the ground and leveling the crane. The ground conditions where the crane was positioned to perform the lift appeared, on visual observation, to be level ground with a layer of crushed stone. Once leveled and stabilized, the crane was solely supported on its outriggers. The crane was designed to have its tires up off the ground during the lifting task.

Prior to exiting the crane's operating area to talk with the flatbed truck driver about the lift to be performed, the victim extended the boom approximately 150 feet up and over the rear of the crane with no load on the hook. The coworker (the oiler) at this same time went to the victim's

vehicle to fill out paperwork. While talking to the flatbed truck driver, the victim noticed that the crane was moving. In an attempt to try and stop the crane from moving, the victim ran towards the crane and started to climb up to the cab. The crane's right rear outrigger had sunk approximately nine feet into the ground causing the crane to overturn onto its right side, the same side the victim was on. The crane landed on the victim crushing the lower half of his body.

Emergency Medical Services (EMS) personnel arrived within minutes of the 911 call and started attending to the victim who was trapped underneath the crane. A call was also placed to a local towing company to assist in freeing of the victim. Within minutes of the call, the towing company had arrived with two 60-ton tow trucks and giant air bags to lift the crane enough to free the victim. The victim was freed and was rushed to a hospital where he died of his injuries 12 hours later.

The soil where the crane had been positioned consisted of clay and sandy gravel. After the incident, OSHA discovered that the soil had been saturated by ground water from the ocean tides, heavy rains, and onsite surface runoff. This excessive water caused pooling and muddy conditions prior to the incident. The oil company had placed the crushed rock at the site several weeks prior to the incident to try and alleviate the water and mud problems.

CAUSE OF DEATH

The medical examiner listed the cause of death as exsanguination due to crush injury.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure that ground conditions are inspected by a competent person and/or soil engineer prior to setting up cranes.

Discussion: A crane will not be able to support a load if the ground conditions will not support the crane. In this case, it was reported that prior to setting up the crane, the crane operator performed a visual inspection of the ground area around the crane. In this case, a visual inspection was not adequate to determine the poor soil condition resulting from the soil being saturated with ground water from ocean tides, recent heavy rains, and area surface runoff.

A competent person and/or soil engineer should be designated by employers to review the ground conditions prior to setting up cranes. The crane manufacturer's specifications and limitations applicable to the operation of the crane should be reviewed by the competent person and/or soil engineer and adhered to. These specifications and limitations are located in the manufacturer's user/owner's manual and should include a section on how to inspect ground conditions prior to setup. This will include, but not be limited to, determining bearing capacities for different soil conditions and comparing them to the pressure that will be applied to the outrigger pads from the weight of the crane and the attached load.

Recommendation #2: Employers should ensure that outrigger floats are routinely set onto blocking when deployed.

Discussion: In this case, all four of the crane's outriggers had been fully deployed at the time of the incident, but the ground conditions were not sufficient to support the crane. Outriggers cannot function at their maximum capacity if the ground conditions are less than ideal. During a lift, the ground bearing pressure generated by a crane's outriggers is very high due to the relatively small surface area of an outrigger float (pad) located at the end of the outrigger. Outrigger floats provided with most cranes are designed to be used with blocking. Therefore, to help ensure that the ground bearing capacity is not exceeded, outriggers should always be deployed onto blocking to distribute the cranes load over an area as large as possible. Some examples of blocking are steel plates and timber pads. The blocking should always be level, three times the size of the outrigger's float area, rigid, and completely supporting the outrigger float.

Recommendation #3: Property owners and general contractors should inform crane operators of any unsafe soil conditions located at the sites.

Discussion: It is the property owner's and/or the general contractor's responsibility to notify crane operators of any unsafe conditions on site that might not be apparent. In this case, the unstable ground condition could not have been determined by performing just a visual inspection. The property owner, who was also acting as the general contractor for this project, knew that the area had a high water table and that the area was prone to underlying mud. This is the reason why the property owner placed crushed rock at the site a few weeks prior to the incident. If this information had been communicated to the crane rental company and/or the crane operator, the crane operator would have known he needed to counteract the poor soil conditions when setting up the crane. In addition, if it was not possible to adequately compensate for the poor soil conditions, such that it was safe to operate the crane, another way of offloading the water/oil separator could have been implemented.

REFERENCES

Code of Federal Regulations, 29 CFR 1926.550, Cranes and derricks, Government Printing Office

Code of Federal Regulations, 29 CFR 1926.550, Steel Erection, Hoisting and rigging, Government Printing Office

Construction Safety Association of Ontario, Mobile Crane Manual, Toronto, Ontario, Canada, 1993