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PUBLIC HEALTH SERVICE/CDC/NIOSH/DSR
FACE 97-03

TO: **Director, National Institute for Occupational Safety and Health**

FROM: **Division of Safety Research, NIOSH**

SUBJECT: **Mechanic Fatally Injured During Dismantling of Crane Boom at Scrap Metal Yard -- Pennsylvania**

SUMMARY

On March 17, 1997, a 42-year-old master mechanic (the victim) was fatally injured while dismantling a crane boom at a scrap metal yard. The victim and two co-workers were dismantling the crawler-mounted lattice boom crane in preparation for transport. The crane boom had been lowered to 8½ feet off the ground, and was supported by the boom pendants. The victim positioned himself under the pinned connections between the inner (heel or base) section and the center section of the boom. While one co-worker observed, the victim removed the pins from the bottom connections. When the victim removed the last of the two pins, the boom sections fell, striking and pinning the victim underneath. The co-worker immediately contacted the yard manager by radio who then notified 911. Co-workers used a nearby forklift to raise the boom sections off the victim. Emergency medical services responded within 10 minutes and the victim was transported to a local hospital where he was pronounced dead.

NIOSH investigators concluded that to prevent similar incidents, employers should:

- ensure that proper blocking and support procedures to prevent movement of the boom sections are implemented when dismantling cranes

- ensure that all workers assigned to dismantle or assist in dismantling cranes are familiar with correct procedures and can recognize the hazards of improper dismantling.

INTRODUCTION

On March 17, 1997, a 42-year-old master mechanic (the victim) at a scrap metal yard sustained fatal injuries when the crane boom he was dismantling suddenly fell and struck him. On March 18, 1997, the county coroner's office notified the Division of Safety Research of the incident and requested technical assistance. On April 1, 1997, a safety engineer and a statistician visited the

site and reviewed the incident with the general manager and the scrap yard manager.

The scrap yard had been in operation between 30 and 40 years. The present employer was ceasing operations, having been in business at the site since 1985. When in full operation 20 to 25 people had been employed at the 9-acre site, processing about 50,000 tons of scrap metal yearly. However, the work force had been reduced to 10 employees who had been engaged in shut-down operations since December of 1996. At the time of the incident, all scrap had been removed from the site and work consisted of final clean-up and dismantling of equipment for removal and sale.

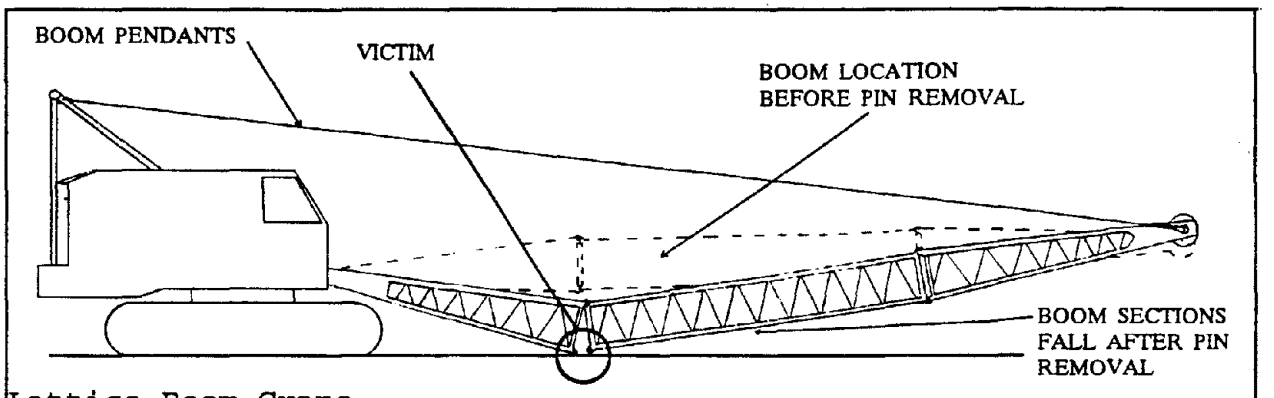
The victim had about 11½ years experience as a heavy equipment mechanic and had worked at the site for 1½ years prior to the incident. The company had adopted a training program including hazard communication, confined space entry, control of hazardous energy, and use of personal protective equipment (PPE), including respirators. The company also had a hearing-conservation plan and conducted blood (lead) monitoring. PPE was provided by the employer.

The crawler-mounted lattice boom crane had been built between 1977 and 1979. The crane had been specifically configured as a magnet crane (i.e., electro-magnet) to be used for lifting and moving ferrous scrap. The crane was equipped with a 60-foot long lattice boom with a 46-inch square cross section. The boom assembly included three sections, an inner (heel), an outer (tip), and one center section.

INVESTIGATION

On March 17, 1997, workers at the scrap yard began work at 7:00 a.m. The victim and two co-workers, both crane operators, had been assigned to dismantle the crane into transportable sections, roughly 40 feet in length. The boom had been lowered until the tip was about 8½ feet from the ground, suspended by the boom pendants (see figure). The victim had discussed the intended dismantling procedure with the yard manager at the start of the shift. According to the yard manager, the intended procedure was to use another crane to support the crane's boom at the tip while the pendants were disconnected. Then the tip would be lowered to the ground. The support crane would then be attached to the inner boom section while the bottom pins were removed from the inner-to-center boom section joint. The boom would then be lowered to the ground and the top pins removed. Once this was done, the crane could be loaded for transport in two sections. The victim was to be assisted in the task by two crane operators, one of whom had 30 years of operating experience.

After this discussion, the victim and crew began dismantling the crane. The more experienced crane operator left the immediate area around the crane and went to get the support crane. The victim and the other crane operator began dismantling the boom at the joint between the inner section and the center section. While the second crane operator observed, the victim removed the bottom pin from the right side of the joint. He then went under the boom and struck the left side bottom pin twice with a hammer. The pin flew out of the joint and the boom sections fell, striking and pinning the victim to the ground. The second crane operator called the yard manager by radio to notify him of the



Lattice Boom Crane

occurrence and the yard manager called 911. Co-workers got a nearby forklift, raised the fallen sections, and pulled the victim from under the boom. The emergency medical service arrived approximately 10 minutes after being called and transported the victim to a local hospital emergency room where he was pronounced dead.

CAUSE OF DEATH

The county coroner determined the cause of death to be multiple blunt force trauma.

RECOMMENDATIONS

Recommendation No. 1: Employers should ensure that proper blocking and support procedures to prevent movement of the boom sections are implemented when dismantling cranes.

Discussion: While the method discussed with the victim prior to the incident may have provided support at the proper points to prevent the boom from collapsing, it does not follow accepted industry practice. During dismantling, booms should be supported and blocked against motion by cribbing. After the load line and

attachments had been removed, the boom in this incident could have been dismantled using the method recommended by the Construction Safety Association of Ontario, Mobile Crane Manual:

- Lower the boom tip section onto solid blocking until the boom pendants are slack
- Remove the boom pendants and reattach them to the boom inner section
- Lift the boom up slightly, engage the boom hoist pawl (e.g., brake) and remove the bottom pins only
- Lower the boom onto solid blocking until the pendants are slack and remove the top pins from the boom sections.

According to the employer, it had been necessary to remove and replace crane booms at the facility on other occasions. However, on these occasions, the booms had been lowered to blocks, and disconnected at the base connection with the upper works. The crane had then been trammed back from the boom. Reportedly, the victim had been involved in these operations, but the cranes had not been dismantled for transport before. With the boom supported by the pendants, when the victim removed the pins from the bottom connections, there was no support for the tip end of the inner section and the base end of the center section. The sections rotated about their respective supports, the base of the inner section, and the tip attachment to the boom pendants. Had the upper pins been removed, the boom sections may have rotated in the opposite direction with similar results. Following a procedure in which the boom is supported by stable blocking before removing connection pins ensures that unexpected movement will not take place.

Recommendation No. 2: Employers should ensure that all workers assigned to dismantle or assist in dismantling cranes are familiar with correct procedures and can recognize the hazards of improper dismantling.

Discussion: The victim was observed by a co-worker as he removed the bottom pins using a hammer. The victim was the recognized expert regarding maintenance procedures and the co-worker did not question him about the procedures or his position under the boom. This incident underscores the importance of ensuring that more than one member of the crew has a basic understanding of the correct procedures involved in operations such as dismantling cranes. Additionally, if the co-worker and victim had fully appreciated the potential for uncontrolled movement, the victim may have positioned himself to the side of the boom rather than underneath, minimizing the danger of being struck by the falling boom sections.

References:

Dickie, Donald E., P.E. *Mobile Crane Manual*, Toronto, Construction Safety Association of Ontario, 1982.

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Fatality Assessment and Control Evaluation (FACE) Project

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatality Assessment and Control Evaluation (FACE) investigations when a participating State reports an occupational fatality and requests technical assistance. The goal of these evaluations is to prevent fatal work injuries in the future by studying the working environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

States participating in this study: North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia.

Additional information regarding this report is available from:

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