

## **Drill Operator and Mechanic Electrocuted After Contacting A 7,200 Volt Overhead Power Line With A Drill Rig Boom**

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**DATE:** October 25, 1991

### **SUMMARY**

On July 30, 1991, a 45-year-old male drill operator and a 58-year-old male shop mechanic were electrocuted when their drill rig boom made contact with a 7,200 volt overhead power line. The incident occurred while the two men were moving a drill rig away from the side of a road where they had been drilling test bores. The workers were apparently moving the raised boom of the rig when it contacted the power line, electrocuting the rig operator. The second worker was simultaneously electrocuted while holding a steel-reinforced air hose attached to the drill rig. NJDOH FACE investigators concluded that, in order to prevent similar incidents in the future, the following safety guidelines should be followed:

- *A minimum clearance of 10 feet must be maintained between equipment and energized lines to prevent inadvertent contact.*
- *Employers should ensure that employees are properly trained in the safe operation of equipment and that company safety procedures are followed at all times.*
- *Drilling equipment should be posted with signs warning of contact with overhead power lines.*

### **INTRODUCTION**

On July 31, 1991, NJDOH FACE personnel were notified by the OSHA area supervisor of two work-related fatalities that occurred the previous day. On that same day, a FACE investigator visited the site to examine and photograph the scene. Additional information on the incident was obtained from the OSHA compliance officer, the NJ Department of Labor Office of Safety Compliance, the police and medical examiners reports, the employer, and the electrical utility company.

The employer is a drilling and blasting contractor who has been in business for 7 years. The company employs 8 permanent workers, and hires additional workers from the union hall as needed. One person in the company is responsible for employee training, although workers hired from the union hall get their training primarily from the union. The company has not hired from the union hall recently due to lack of work.

The first victim was a 45 year-old drill operator who had worked for the company for 5 years. He had 12 years of previous experience as a blaster and drill operator. The second victim was a 58 year-old shop mechanic who had worked for the company for 6 years. Although employed primarily as a mechanic, he also worked as a driller and laborer. Both victims were permanent employees of the company.

## INVESTIGATION

The incident occurred alongside a busy two-lane roadway leading into a rural area. The state highway authority was in the process of widening the road, which first required moving the underground gas utility lines running alongside it. The public utility company, owner of the gas lines, contracted the drilling and blasting company to search for and blast any large rocks that were in the path of the new gas lines. The drilling company planned to do this by taking test bores with a drilling rig. If rock was found, the company would drill additional holes for the explosive charges and return later to blast the rock away. Another contractor would then excavate the dirt and blasted rock and lay the new gas lines.

The drilling and blasting contractor uses three pieces of heavy equipment for drilling bores: the drill rig, a large air compressor, and a dump truck (see illustration). The drill rig is a relatively small, self-propelled "caterpillar" (tracked) vehicle that is towed to the site on a trailer. The rig is small enough that the operator does not ride on the vehicle but stands directly behind the rig to operate the controls. The drill boom (augur) is approximately 27 feet high in the vertical position and can be laterally adjusted to drill at an angle. The drill rig is powered by compressed air supplied by a large trailer-mounted diesel air compressor. The compressor, which is towed by the dump truck, is connected to the drill rig with a 4 inch diameter steel-reinforced compressed air hose.

After arriving on site, the drill crew usually positions the compressor ahead of the drill rig and connects the air hose. They then move the drill rig into position and raise the drill boom. The drill rig operates behind the compressor, where it can move as far as the air hose allows. When they need to move the drill, one person stands behind the rig to operate the controls while a second person lifts the air hose to prevent it from dragging on the ground. The dump truck and compressor is moved forward as the operation progresses.

The day of the incident was a dry, clear, hot summer day. The drilling contractor was in the second day of drilling test bores at this site. Two men were assigned to the crew, one an experienced drill operator and blaster, the second a shop mechanic who occasionally assisted in the field as a driller or laborer. They began the job by driving the dump truck and compressor to the site, where the drill rig was left from the day before. The crew set up the equipment and started drilling the 7 to 9 foot deep bore holes the job required. The job went normally until about 4 p.m., when the crew ended work for the day. Apparently the crew was moving the drill rig off the road when the boom contacted the 7,200 volt overhead power line. The power passed through the drill rig into the steel reinforced air hose, through the compressor, and into the dump truck. The power passed to ground through the steel tracks of the drilling rig, the air hose, and through the wheels of the dump truck which set the truck on fire. A passing motorist saw the fire and notified the fire department, who arrived with the police and EMS. The victims were found one on top of the other on the air hose a few feet behind the drill rig, with electrical sparks flying all around them. Due to the electrical hazard, they could not be moved for approximately 35 minutes until the power line was de-energized. The victims were declared dead at the scene.

There were no witnesses to this incident. The evidence suggests that the victims were moving the drill rig off the road, with one person operating the controls and the second holding the hose. As they moved the rig up an incline beside the road, the raised boom may have made the rig unstable. The operator then stopped the rig and tried to stabilize it by moving the boom laterally to the side. As he did this, the boom contacted the power line (see illustration). Apparently the operator received the shock through his hands and was jolted back, landing on the victim who was holding the hose. From the position of the victims, it appears that the mechanic was operating the rig while the drill operator was holding the hose.

## **CAUSE OF DEATH**

The cause of death for both victims was attributed to electrocution and severe body burns.

## **RECOMMENDATIONS AND DISCUSSION**

***Recommendation #1: A minimum clearance of 10 feet must be maintained between equipment and energized lines to prevent inadvertent contact.***

Discussion: In this case, the incident occurred due to inadequate clearance between the drill rig boom and the power line. This hazard is addressed in the federal OSHA standards 29 CFR 1926.550(a)(15)(i)-(ii) (construction industry) and 29 CFR 1910.181(j)(i)-(ii) (general industry) which require minimum clearances of 10 feet from power lines up to 50 kilovolts and greater distances for lines with greater voltages. In addition, the NJ High-Voltage Proximity Act (N.J.S.A. 34:6-47.1) requires a minimum clearance of 6 feet from power lines exceeding 750 volts. In cases where safe clearance may be difficult to maintain, all of the following precautions should be taken:

- Change the equipment or work practices to maintain the proper clearance. An example in this case would be to use a drill with a shorter boom.
- The contractor should request the utility company to de-energized the power lines before working near them. These lines should also be tested to ensure they are de-energized.
- The contractor should request the utility company to isolate the power lines with insulating hoses and blankets. It should be noted that this may not be adequate to insulate against contacts by heavy equipment.

***Recommendation #2: Employers should ensure that employees are properly trained in the safe operation of equipment and that company safety procedures are followed at all times.***

Discussion: The employees in this incident apparently failed to lower the drill boom before moving the equipment, which is in violation of stated company policy. The drill rig was evidently operated by a shop mechanic, who may not have been familiar with the equipment's operation. It is necessary that all employees are properly trained in the safe operation of equipment and are aware of safety procedures. It is also recommended that all employee training programs should be in writing.

***Recommendation #3: Drilling equipment should be posted with signs warning of contact with overhead power lines.***

Discussion: In this case, the drill rig did not have signs warning against contact with overhead power lines. As a reminder to employees, drilling equipment should be posted with electrical warning signs. This is also a requirement of the NJ High-Voltage Proximity Act which requires signs on all equipment

that is capable of coming into contact with high-voltage lines. It is recommended that the boom height should also be indicated on the sign.

## REFERENCES

1. Code of Federal Regulations 29 CFR 1926, 1989 edition. U.S. Government Printing Office, Office of the Federal Register, Washington DC. pg 204
2. Code of Federal Regulations 29 CFR 1910, 1990 edition. U.S. Government Printing Office, Office of the Federal Register, Washington DC. pg 502
3. New Jersey Statutes Annotated 34:6-47.1 et seq., amended May 20, 1987. Reprinted by the NJ Department of Labor, Division of Workplace Standards, Trenton NJ. pp 1-4

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