

Safe in the saddle

A study in electrocution

By John Chamberlin

As an equipment safety instructor, I am constantly looking for ways to illustrate hazards to people working with cranes. While doing some unrelated research, I read about two horses that unwittingly provided such an illustration.

On March 1, 1997, a police officer was riding his horse through downtown Orlando, Fla., when the horse collapsed, dying of an apparent heart attack. The following Saturday, a second officer was riding across the same grassy area and his horse also collapsed and died of a heart attack. Neither officer sustained injury. An investigation concluded the cause of the horses' death was not attributed to their food and no poisons were found in the area where they died.

The local utility company joined the investigation and found that a buried 277-volt power line was below the area. The line had previously powered a street light that had been removed several years before. Each night the line was energized and had deteriorated to the point that the power was energizing the surrounding ground.

Why were the horses affected and not people walking across the same area? Before answering this intriguing question, let's examine how riggers and crane operators are affected by electrocution.

Contact with power lines is the largest single cause of death involving mobile cranes. These contacts commonly produce more than one injury. The second injury commonly stems from an incorrect response by the second victim, often due to a misunderstanding of electrical energy.

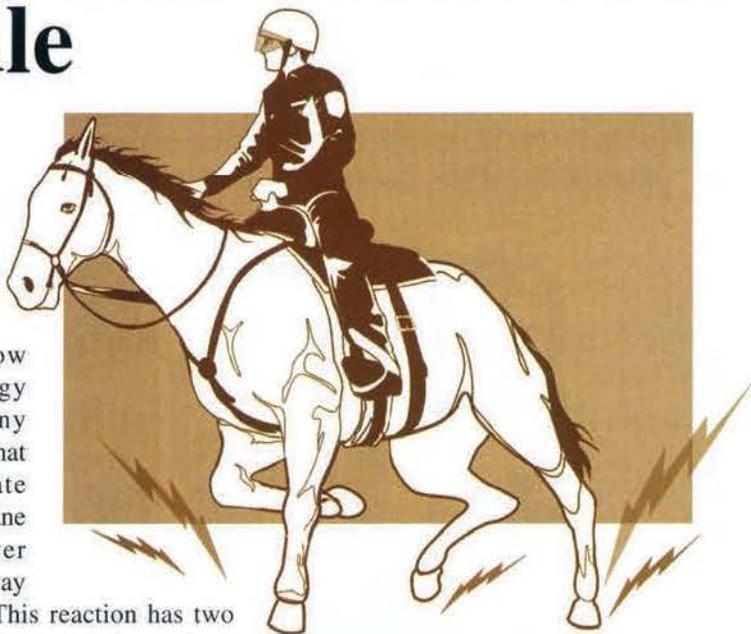
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To prevent these injuries, workers need to know the nature of how electrical energy behaves. Many people believe that an appropriate response to a crane hitting a power line is to run away from the area. This reaction has two flaws: 1) Electricity travels at about 186,000 miles per second and the reaction time for the average person is about 1/2 of a second. By the time a person reacts, the electrical power has traveled over 90,000 miles. 2) When a crane becomes energized, the ground surrounding the crane also becomes energized. If there is a large enough difference in potential (voltage differential) between one part of a person's body and another, such as the distance between one's feet while running, current flows through and electrocutes that person.

Most crane crews recognize the danger of having contact with the load or the crane and the ground when a power line contact occurs. Few, however, realize that the ground around the crane can also be an electrical hazard.

The story of the horses illustrates this second hidden hazard. Horses have a much longer stride than a person, thus creating a much larger difference in potential. They also have more conductive "feet" that lowers the internal resistance they have to conducting electricity. Both of these features increased the likelihood of their electrocution.

The story also illustrates why neither of the police officers were injured. This is because there is no difference in potential between one part



of their bodies and another. The same holds true with a bird on a power line or a crane operator who remains in the crane cab after a power line contact.

If you witness a power line contact, stay where you are. If you were going to be electrocuted, it would already have happened. Treat the ground as energized. If you must leave the area or the crane, never contact the crane or load and the ground at the same time. Minimize the difference in potential between one foot and the other either by hopping feet together or shuffling feet together.

The voltage will decrease as the distance from the crane increases. However, the decrease is not consistent and the ground may conduct lethal levels of electricity well away from the crane, depending on soil condition and buried utilities. Safety cannot be ensured until the utility company indicates the power line is de-energized.

We can all learn from the horses' example. The preference is stay out of the power line in the first place, but when working around them, follow OSHA and ANSI B30.5 procedures. Never lose focus, look up and live. ■

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