

Machine Operator Electrically Shocked in Transplant Nursery¹

California NURSE Project²

SUMMARY: CASE 292-327-01

Some greenhouses grow vegetables from seeds. As the plants grow, they need to be trimmed. A celery cutter came back from his afternoon break to continue cutting celery plants. The cutting machine he used looked like a lawn mower. An extension cord was needed to reach an electrical outlet. The extension cord he used was missing the third prong. Also, puddles of water were on the floor from watering the plants. Shortly after grabbing the cutting machine, he received an electrical shock. He couldn't let go of the handle. He screamed for help.

A co-worker ran over and unplugged the cutting machine. The injured worker fell to the ground, dazed and weak. Their supervisor told the co-worker to drive the injured worker to a walk-in clinic. From there he was driven to a hospital, where he was treated and spent the night.

How could this injury have been prevented?

- Employers should make sure work areas are free of hazards (such as water on the floor).
- Supervisors and workers should call 911 if someone has an electrical shock.
- Employers should use injury prevention programs. These programs can help employers identify and fix hazards.

- Workers should wear electrically insulated gloves and boots when working in wet areas with electric equipment.

BACKGROUND

On August 21, 1992, a nurse from the NURSE Project, while reviewing records at an acute care general hospital, identified an electrical shock injury which occurred at a vegetable transplant nursery. On July 16, 1992, a 23 year-old Hispanic male received an electrical injury while cutting the tops of celery seedlings with an electric cutting machine. He had been employed for 3 years at the transplant nursery, and the last 18 months as a cutter.

The transplant nursery began operations in 1981. It employs 80 full-time workers (working 38+ weeks per year), 40 seasonal workers (working 13-37 weeks per year), 20 casual workers (working 1-12 weeks per year), and 4 family members. The injured cutting machine operator was a full-time worker. Transplant nurseries grow seedlings of celery, lettuce and other vegetables in protected controlled environments called nurseries. They are grown until ready to be planted by either hand or machine in a field.

A bilingual nurse from the NURSE Project interviewed the injured worker by telephone on September 30, 1992. On November 24, 1992, another nurse from the NURSE Project discussed the incident with the current safety director (not the safety director at the time of the injury), the plant engineer, and maintenance workers at the nursery, and conducted an on-site investigation. The nurse learned that the plant

1. This document, CDHS(COHP)-FI-93-005-28, was extracted from a series of the Nurses Using Rural Sentinel Events (NURSE) project, conducted by the California Occupational Health Program of the California Department of Health Services, in conjunction with the National Institute for Occupational Safety and Health. Publication Date: March 1993

2. NURSE Project, California Occupational Health Program, 2151 Berkeley Way, Annex 11, Berkeley, CA 94704

had investigated the incident, but no documentation was available. The NURSE staff also reviewed the injured worker's medical records.

The California Occupational Health and Safety Administration (Cal-OSHA) was not notified and did not investigate this incident.

At the time of the NURSE investigation, the transplant nursery was unable to locate their written injury and illness prevention program, as required by Title 8 California Code of Regulations 3203 -- Injury and Illness Prevention Program. (As of July 1, 1991 the State of California requires all employers to have a written seven point injury prevention program: 1. designated safety person responsible for implementing the program; 2. mode for ensuring employee compliance; 3. hazard communication; 4. hazard evaluation through periodic inspections; 5. injury investigation procedures; 6. intervention process for correcting hazards; and 7. provide safety training and instruction.)

The cutting machine operator said he had received oral safety training in operating the electric cutting machine from his supervisor.

INCIDENT

On July 16, 1992, at approximately 4:10 p.m., a cutting machine operator received an electrical shock while cutting the tops of celery seedlings inside a transplant nursery. Cutting celery seedlings is done to keep them at the same height so they receive the same light exposure. Other cutting machine operators had complained of receiving electrical shocks from this same cutting machine in the past.

The electric cutting machine has a 20-inch rotary cutting blade similar to a standard electric lawn mower. The cutting machine is mounted to a large metal frame which holds the machine above the celery seedlings. This metal frame is secured to the floor of the nursery building. The cutting machine is maneuvered by holding the metal frame. It moves on the metal frame from side to side and front to back, and the height is adjustable. It is powered by 110 voltage, from a long 3 prong extension cord connected to an electrical outlet. The extension cord can be plugged into a ground fault circuit interrupter (GFCI) housed in a five-gallon bucket; or, the GFCI can be bypassed and the extension cord can be plugged directly into the growing shed's electrical system. These five-gallon buckets are stored in a maintenance shed. The GFCI's are used in wet environments to cut the electrical circuit if there is a

ground fault. Ground faults occur when the electrical circuit is broken or leaks and the electrical current travels through the electric machine user to the ground, instead of through the machine to the ground. 110 voltage in contact with wet skin can provide a shock powerful enough to kill someone.

The ground was wet from the indoor sprinkler irrigation system when the cutting machine operator returned from his late afternoon break. He had been using this cutting machine the entire day. He was wearing tennis shoes and his feet were wet. The third (or ground) prong on the cutting machine's extension cord had previously been broken off so that there was no continuous ground to the cutting machine. The GFCI had been bypassed and the extension cord was plugged into an electrical socket.

When approaching the cutting machine, the cutting machine operator grasped the metal frame to continue cutting the tops of celery. After taking about 10 steps forward, he suddenly received an electrical shock. This electrical shock caused his hands to contract on the handle, and he could not let go. He screamed for help, and a co-worker (also a cutting machine operator) who was working about 100 feet from the area heard the scream. He reached the injured worker within seconds, and unplugged the cutting machine. The injured worker fell to the ground.

The injured cutting machine operator was conscious, but dazed and weak. The same co-worker took him to the lunchroom. He called their supervisor, who arrived in a few minutes. The supervisor instructed the co-worker to take the injured machine operator, by car, to a local walk-in medical clinic which handles minor injuries. The injured worker arrived at the clinic at approximately 4:45 p.m., and was seen by a doctor at 4:52 p.m. He told the doctor that his hands, arms and legs muscles were cramping. Also, he was experiencing blurred vision. After examining him, the doctor referred him to a local acute care general hospital emergency department for further evaluation. The co-worker placed the injured worker back into his car and drove him to the local acute care general hospital emergency department. They arrived at the emergency department at 6:19 p.m. The injured machine operator now said he had chest pain and was very tired. At 6:30 p.m., an IV was started and blood was drawn to assess the damage to his heart. The injured worker was placed on a heart monitor.

The injured cutting machine operator was admitted to the intensive care unit for observation, laboratory testing, heart monitoring and neurological evaluation for

subsequent effects of his electrical shock. After extensive testing, heart damage was ruled out and the next day, the injured worker was discharged with instructions to return if his headache, fatigue or general condition worsened.

At the time of the interview, one month after the incident, the worker told the bilingual nurse that he still felt weak from the injury and was still out of work.

PREVENTION STRATEGIES

1. Employers should ensure that the work environment is free from hazards. In this incident, the floor of the shed was usually wet due to the indoor sprinkler system, allowing water to puddle. In a conversation with the safety engineer, he explained that after this incident drainage systems had been installed in all of the nursery buildings to prevent water from pooling. This injury could have been prevented if the lack of drainage of water had been identified as a potential hazard.
2. In the past workers had received electrical shocks from using this cutting machine. At the time of the incident, the nursery could not locate their written injury and illness prevention program. On February 4, 1993, however, the nurse from the NURSE Project revisited the nursery and was able to review their written injury and illness prevention program with the safety director. It did address all seven points as required by Title 8 California Code of Regulations 3203 (Title 8 California Code of Regulations 3023: Illness and Injury Prevention Program). Nonetheless, if the employer had an intervention process for correcting hazards, and had corrected this hazard of workers receiving electrical shocks, this injury may have been prevented.
3. Employers should train workers to inspect equipment before beginning their work tasks. In this incident, the extension cord used between the cutting machine and the electrical power source was missing its ground prong (it had been broken off). If the injured cutting machine operator had been trained to care for and inspect the equipment being used, he may have realized that the extension cord needed to be replaced, and the injury may have been prevented. Also, in this incident, if periodic monitoring of the cutting machine and frame was conducted to test for electrical grounding deficits, this injury might have been prevented. After the incident, the employer began monitoring all of the cutting machines.
4. Employers should have an appropriate emergency response plan (Title 8 California Code of Regulations 3400(b): "In the absence of an infirmary, clinic, or hospital, in or near proximity to the workplace... a person or persons shall be adequately trained to render first aid." Title 8 California Code of Regulations 3439(b): "There shall be at least 1 employee for every 2 employees at any remote locations with training for the administering of first aid.") This includes having supervisors trained in first aid and cardiopulmonary resuscitation (CPR) and workers trained to call 911 when someone is injured. In this incident, the supervisor instructed the co-worker to take the injured machine operator to a medical clinic. If the supervisor had been trained in first aid and CPR, he would have known to call 911 and allow paramedics to transport the injured worker to a hospital emergency department.
5. Employers should consider safety when building or modifying equipment. In this incident, the frame of the cutting machine should have been equipped with an electrically insulated plastic handle for the cutting machine operator to hold and guide the cutting machine. If the cutting machine had been equipped with a plastic handle, the worker would have been protected from electrical shock because plastic will not conduct low voltage (110 volts) electricity. In addition, the ground fault circuit interrupters (GFCI) should be installed as part of the electrical system for the nursery, instead of being in mobile five-gallon buckets.
6. Employers should have written standard operating procedures. In this incident, the standard operating procedure for using GFCI buckets was unwritten, and not enforced. The GFCI buckets were supposed to be picked up from a maintenance shed and taken to the nursery. In this incident, although the worker may have received some training, clearly he did not understand the importance of using the GFCI. If he did understand, he might not have bypassed it. Also, if this standard operating procedure had been enforced, the injured cutting machine operator would not have been able to bypass the GFCI.
7. Workers should be provided with and required to use personal protective equipment. When working with energized equipment in a wet environment, workers should wear electrically insulated gloves and boots. In this incident, if the worker had been wearing insulated gloves and boots, the electrical current may not have established a path to ground

through his body and he may not have received an electrical shock.

FURTHER INFORMATION

For further information concerning this incident or other agriculture-related injuries, please contact:

NURSE Project
California Occupational Health Program

Berkeley office:
2151 Berkeley Way, Annex 11
Berkeley, California 94704
(510) 849-5150

Fresno office:
1111 Fulton Mall, Suite 215
Fresno, California 93721
(209) 233-1267

Salinas office:
955D Blanco Circle
Salinas, California 93901
(408) 757-2892

The NURSE (Nurses Using Rural Sentinel Events) project is conducted by the California Occupational Health Program of the California Department of Health Services, in conjunction with the National Institute for Occupational Safety and Health. The program's goal is to prevent occupational injuries associated with agriculture. Injuries are reported by hospitals, emergency medical services, clinics, medical examiners, and coroners. Selected cases are followed up by conducting interviews of injured workers, co-workers, employers, and others involved in the incident. An on-site safety investigation is also conducted. These investigations provide detailed information on the worker, the work environment, and the potential risk factors resulting in the injury. Each investigation concludes with specific recommendations designed to prevent injuries, for the use of employers, workers, and others concerned about health and safety in agriculture.