

<h1 style="text-align: center;">NURSE REPORT</h1>	<p style="text-align: center;">OCCUPATIONAL HEALTH BRANCH DEPARTMENT OF HEALTH SERVICES STATE OF CALIFORNIA</p>
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NURSE REPORT #4 LIGHTNING STRIKES KILL TWO FIELD WORKERS CDHS(COHP)-FI-92-005-04

Summary

Lightning strikes killed two farm workers who were picking and hoeing lettuce during a thunderstorm. They worked on crews about fifteen miles apart. One crew was leaving the field because of the lightning, when one of the last workers out was struck by a lightning bolt. He died immediately of a heart attack.

The second crew had taken shelter in a bus during the storm, but when the rain stopped they returned to the field. A worker was bent over hoeing lettuce when he was struck. The lightning strikes continued, and paramedics had trouble reaching the worker and getting him to the ambulance. The worker died in the hospital from burns.

How could these deaths have been prevented?

-The foremen should have stopped work during a lightning storm which spread over many miles. Both foremen attempted to work during some part of the storm.

-One person cannot judge dangerous weather conditions. Foremen should use portable weather radios or the cable weather channel.

-Both workers had immediate heart attacks when struck by lightning. Every field work crew should have one person certified in Cardiopulmonary Resuscitation (CPR).

CASES 291-003-01, 291-003-02,

291-009-01, 291-009-02, 291-009-03 May 22, 1992

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. **BACKGROUND**

NURSE staff identified two lightning-related deaths on two different lettuce farms in California through newspaper and weather reports in September, 1991. The two deaths occurred in two separate cloud to ground lightning strikes in locations about 15 miles apart. The strikes happened about 35 minutes apart during a thunderstorm in which over 2,000 strikes to ground, during a 24 hour period, were recorded by the local gas and electric company in the eastern edge of a valley surrounded by low mountains (see attached maps). Lettuce field workers (pickers and hoers) working for two different employers (both farm labor contractors) were involved in these two incidents. A Senior Safety Engineer, a nurse, and an epidemiologist from the NURSE project discussed the incident with one of the farm labor contractors on February 7, 1992. The other farm labor contractor declined to discuss the incident due to pending litigation. The California Occupational Safety and Health Administration (Cal/OSHA) was notified of both deaths by the local emergency medical services who responded. Cal/OSHA conducted investigations of both fatalities.

Farm labor contractors are used by some farm owners and operators of large corporate farms in California to recruit, train and manage workers. Information on one farm labor contractor's safety program (Incident 1) was reviewed by Cal/OSHA on September 9, 1991 and was found to be in compliance with 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. a health and safety program.) This farm labor contractor employs approximately 110 casual workers and 100 seasonal workers.

INCIDENT 1.

On September 6, 1991 at approximately 8:20 a.m., during a period of rain accompanied by occasional lightning, there was a lightning strike in a lettuce field. At this time most of the workers had already left the field at the request of the foreman due to the weather conditions (rain and lightning) and because the field was extremely muddy. However, three workers were still in the process of leaving the field when one worker was struck by lightning; co-workers noted he was unresponsive after being struck. The local emergency medical services responded to the 911 call from the field crew.

Upon arrival (approximately 20 minutes after the injury occurred) they found a 22 year old Hispanic male in cardiac arrest after being struck by a lightning bolt which hit the left side of his head, as indicated by singed hair, second degree burns extending from the top of his head to his ear, and a focal third degree burn which penetrated his top left ear, passed through his body, and exited at the midline of his lower abdomen as indicated by a half inch diameter zone of third degree burns and charring of the skin. The fire department and county EMS paramedics initiated CPR, and transported him (approximately 26 minutes later due to a lengthy extrication) to the local emergency department where he was pronounced dead. Two female workers who were walking beside him were knocked down by the lightning. They were transported by EMS and treated at the local emergency department. They were not admitted, due to the minor nature of their injuries. The cause of death reported by the coroner was cardiac arrest secondary to lightning strike.

INCIDENT 2.

On September 6, 1991 at approximately 7:20 a.m., during a period of rain accompanied by lightning, there was a lightning strike in a lettuce field where workers were hoeing fields to remove weeds from between the lettuce rows. The hoeing crews had initially been called out of the fields by the foreman until the rain stopped. At this time the crews put on rain gear and went back out and resumed hoeing. The fatally injured worker (who was working for the first time for this farm labor contractor) was bent over hoeing with the crest of his body about four feet above the ground. He was struck by lightning as indicated by extensive first and second degree burns over the right side of his face, neck, front and back chest, front and back legs covering approximately 50-60% of his total body surface. (Another worker was injured when he was struck by the hoe used by the victim which was involuntarily thrown from the victim's hands during the lightning strike. He was transported to the emergency department of a local hospital, treated, and released.) Upon arrival of the county EMS paramedics which responded to a 911 call (within 10 minutes of injury) from the field crew, they noted a 20 year old Hispanic male who was in cardiac arrest. Due to the continuing lightning strikes in the field, the extrication of the injured worker was lengthy. He was initially transported (undergoing CPR enroute) to a local hospital emergency department where he received fluid resuscitation, was stabilized and was subsequently transported via ambulance and admitted to the burn unit of the regional trauma center in the neighboring county. He then went into cardiac arrest but was successfully resuscitated. During an exploratory laparotomy he went into cardiac arrest again, and was successfully resuscitated again. He was then placed in the burn unit of the trauma center where he suffered a third cardiac arrest from which he was not resuscitated successfully.

The cause of death as reported by the coroner was burns over 50-60% of body surface due to lightning strikes accompanied by extensive hemorrhagic myocardial damage, focal intracranial hemorrhage, massive congestion and edema of his lungs and brain, and visceral organ congestion.

PREVENTION STRATEGIES

1. Employers should not permit workers to be exposed to a hazardous work environment. These incidents took place during an extensive thunderstorm with approximately 2,000 lightning strikes recorded. This is a highly unusual occurrence in this geographic location and should have alerted employers that workers were in a dangerous work environment. Both foremen were aware of the lightning -- in one incident the crew was leaving the field and in the other the crew had initially been removed from the field but was subsequently sent back to complete their work. Employers should ensure that there is no lightning in the vicinity of the fields before they allow workers to continue working or allow them back into the field. One farm labor contractor has subsequently initiated the policy that all workers must leave the field whenever it is raining regardless of whether there is lightning in the vicinity. If this policy had been present prior to this incident, the death of the worker would not have occurred.
2. Foremen are responsible for the safety of their work crews and for obtaining information to assess hazards. Because foremen may not have sufficient information based on their observation only, it may be necessary to have additional information from a weather monitoring station to provide information on hazardous weather conditions. At the time of these incidents a special weather statement had been issued which emphasized lightning hazards and to exercise caution. If the farm labor contractors or the foremen had checked the weather forecast by using a portable weather radio or listening to the cable weather channel they would have known there was imminent danger to the farm workers. Employers could also verify that conditions are safe by either calling the National Oceanic Atmospheric Administration or another lightning strike monitoring station (as maintained by the gas and electric company) to verify that the storm has passed.

3. There should always be a person certified in Cardiopulmonary Resuscitation (CPR) on a field work team. Farm workers may be working in remote work sites in which rapid access to emergency medical services may not be possible; therefore, it is important that initial emergency medical care be available on-site. In the first incident the paramedic crews had to use a four wheel drive vehicle to reach the victim due to muddy field conditions. In this first incident the worker died from cardiac arrest; if he had received CPR from other workers at the scene immediately after his heart stopped, the probability for successful resuscitation could have been increased.¹

1. California Code of Regulations T8 3440 (subparagraph b) requires that in a remote work location, 10-15 minutes from medical help, one member of the crew should have First Aid training equivalent to Red Cross certification.