

Leg Partly Severed by Forklift Prong¹

California NURSE Project²

SUMMARY : CASE 292-260-01

In a lettuce cooling plant boxes of lettuce are stacked on forklift pallets. A forklift driver moves the stack of boxes to a tilt machine which removes the pallets. In the tilt machine the boxes are turned on their side and the forklift pallets slide free. Then the forklift driver puts his forklift prongs in grooves under the stack, scoops the boxes up and loads them into a truck.

When a tilt machine operator tilted a stack of boxes, two boxes came loose and fell into the grooves under the stack. The operator climbed down to put the boxes back in place. Meanwhile, a forklift driver was driving up to the stack of boxes, ready to scoop them up. The forklift driver drove straight into the tilt machine operator, striking him with a prong behind his left knee. The operator lost a great deal of blood, but alert co-workers gave first aid and quickly called the paramedics.

How could this injury have been prevented?

- Use a stop light or other warning device in the plant to alert forklift drivers when another worker is in the work area.
- Have constant communication between the forklift driver and the tilt machine operator.
- Train workers in safe work methods. This plant did not have a written safety program.

BACKGROUND

On July 28, 1992, NURSE staff identified an injury at a produce cooling plant while reviewing a local newspaper. On July 27, 1992, a 62 year-old male Caucasian worker was bent over a stack of lettuce boxes when a forklift prong struck him behind his left knee and lacerated two major blood vessels. He had been employed as a forklift and tilt machine operator for 35 years at this produce cooling plant, nine years under the current owner.

A cooling plant uses a vacuum process to cool large quantities of lettuce or other fresh vegetables. Lettuce is packed in the field. The boxes are stacked on forklift pallets and transported to a cooling plant. In the plant, forklifts move the pallets of lettuce boxes into vacuum chambers. After the lettuce is cooled in these chambers, the pallets are moved by forklift to a tilt machine, which frees them of the forklift pallets, and then loaded into trucks for shipment.

A nurse from the NURSE project interviewed the injured worker on August 18, 1992. On September 18, 1992, the nurse discussed the incident with the plant manager and safety director and investigated the site where the incident occurred. NURSE Project staff also reviewed the California Occupational Safety and Health Administration (Cal/OSHA) "Accident" report, the emergency medical record, the cooling plant's internal investigation report, and the injured worker's medical chart.

Cal/OSHA was notified by the plant safety director the day following the incident, and then conducted an investigation on August 3, 1992.

1. This document, CDHS(COHP)-FI-92-005-22, 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: December 1992

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

At the time of the NURSE investigation, two months after the incident, the nurse noted that the cooling plant still did not have a complete 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. a health and safety program.)

Although there was no written program at the time of the injury, the plant had begun developing a program by the time of the NURSE investigation. Also, the safety director was conducting hazard evaluations of all plant jobs, as well as conducting safety training for all forklift drivers.

INCIDENT

On July 27, 1992, at approximately 2:17 p.m., a tilt machine operator was struck in the back of his leg by the prong of a forklift. A tilt machine is a large hydraulic machine. Pre-cooled boxes of lettuce, stacked on pallets, are loaded onto the machine. The machine then tilts the stack of lettuce boxes onto its side so that the pallets slide free. The stack of boxes rests on a metal grate with grooves for the forklift prongs to enter underneath the boxes. The forklift then lifts the boxes, without the pallets, and loads them into a waiting truck for transport.

The tilt machine operator had just tilted a load of lettuce boxes. After tilting the lettuce boxes, he noticed that two lettuce boxes had dropped into the grooves where the forklift prongs enter, one in the right-hand groove and one in the left. The tilt machine operator stepped down from his tilt machine to lift the two lettuce boxes out of the grooves. This was standard operating procedure at the cooling plant.

The forklift driver was driving a four-pronged forklift (manufactured in 1976) and had just completed loading a truck with boxed lettuce. The forklift driver was sitting in the stationary forklift, signing paperwork for the waiting truck driver. Without noticing that the tilt machine operator had stepped down to realign the fallen lettuce boxes, the forklift driver maneuvered the prongs off the floor and drove toward the tilt machine to pick up the stack of boxes. (When the prongs are raised

on the forklift, they obscure the driver's vision when looking straight ahead.) The tilt machine operator was in the direct path of the forklift, and one prong struck him behind the left knee.

When the tilt machine operator screamed, the forklift driver shut his forklift off and jumped down. He found the tilt machine operator lying on the ground, bleeding and in severe pain. The forklift driver called for help and several other employees came to assist. 911 was immediately called by a co-worker from a phone in an office, just a few feet from the area. Minutes after the incident, a co-worker applied a belt as a tourniquet to the injured worker's upper leg. (This co-worker told the nurse that he was certified in community first aid.) The emergency medical service was enroute at 2:20 p.m., and arrived on the scene at 2:21 p.m.

The tilt machine operator's left leg was severely lacerated behind the knee. Two major blood vessels (the popliteal artery and vein) that supply blood to the leg were completely severed, causing extensive blood loss. His leg also sustained nerve, muscle and skin tissue damage. The paramedics evaluated the worker and found that the belt used as a tourniquet was not stopping the loss of blood. Direct pressure applied to the laceration did not stop the blood flow either, so Military Anti Shock Trousers (MAST) were placed on the injured worker to control the bleeding. MAST pants are inflated and constrict the flow of blood to the legs. The paramedics estimated the blood loss at up to two units (pints) by this time (enough to cause shock). The injured worker was placed on oxygen, and a cardiac monitor and an IV of normal saline was started in each arm. His heart rate was slow, and paramedics were unable to take a blood pressure reading. The ambulance was enroute to a local acute care general hospital at 2:33 p.m., and arrived at 2:41 p.m.

The emergency department removed the MAST pants, now full of blood, and applied direct pressure which appeared to stop the visible bleeding. By this time, the emergency department staff estimated that he had lost more than four units (pints) of blood, or about one-half his total blood. The injured worker was transferred to the operating room for emergency surgery to repair the damage to the popliteal artery and vein.

After eleven days in the hospital, the injured worker was discharged to his home. At the time of the NURSE interview on August 18, 1992 (23 days after the injury), the injured worker was still at home and told the nurse that he was unsure whether the attempt to save his left leg would prove successful. At the time of discharge,

medical records suggest the possibility of permanent damage to the circulation of the injured leg.

PREVENTION STRATEGIES

1. Employers should insure that the work environment is free from hazards. Moving machinery (i.e., forklifts) can create hazards to workers. The environment should be designed to insure the visibility of all workers regardless of worker location. In this incident, the forklift driver could not see the tilt machine operator when the tilt machine operator was directly in his path. Immediately after this incident, the cooling plant installed a large round mirror above and to the left of the tilt machine to give forklift drivers a view of the area directly in front of the tilt machine.
2. Employers should design work environments that protect workers from moving machinery. In this plant the tilt machine operator must frequently step down to realign fallen lettuce boxes. A stop light located above the tilt machine could notify the forklift driver that the tilt machine operator is on the plant floor. Before stepping off the tilt machine, the tilt machine operator could turn the stop light on, notifying the forklift driver to wait until the stop light was off before approaching the tilt machine. If a stop light or alarm had signaled the forklift driver that someone was moving in the area, making it unsafe to operate the forklift, this injury may not have occurred.
3. Equipment should be designed with safety engineering in mind. Employers should consider replacing outdated equipment with equipment with modern safety features. This forklift design did not allow the forklift driver to see straight ahead when the prongs were raised. In this incident, if the forklift had been replaced by a forklift that gave the driver full visibility, the driver may have seen the tilt machine operator and prevented the injury.
4. Employers should use a standard operating procedure where worker safety is the first priority. In this incident, the lettuce boxes fell into the grooves where the forklift prongs are inserted. Stacking the lettuce boxes in a way that places the long side of the boxes perpendicular to the grooves where the forklift prongs are inserted would keep the boxes from falling into the grooves. Stacking the boxes this way is common practice in some cooling plants. Wrapping material around the stack of boxes to strap them together while they are on the pallets

would also keep the boxes in place when they are tilted.

5. Workers who are working as a team need to be sure that there is constant communication and visual contact between themselves. In this incident, the injured worker who was operating the tilt machine should have told the forklift driver that he needed to step down and realign the boxes. If the two workers had paused momentarily at the completion of each step, and checked with each other to make sure they were ready for the next step, this injury may not have occurred.
6. The employer should have a comprehensive written injury prevention program*. Workers should be trained to recognize and avoid hazards associated with specific tasks. In this incident, if a written program had been in place in the plant, and all of its components carried out, this injury may not have occurred. * **Title 8 California Code of Regulations 3202 -- Injury and Illness Prevention Program (see Background)**

FURTHER INFORMATION

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

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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.