

Seventeen-Year-Old High School Student Working as a Warehouse Laborer in Work-Based Learning Program Dies After Forklift Tips Over and Crushes Him - Tennessee

NIOSH In-house FACE Report 2004-03

July 23, 2004

Summary

On December 26, 2003, a 17-year-old warehouse worker (the victim) was fatally injured when the sit-down type forklift he was operating outside the warehouse tipped over and crushed him. The youth was employed by an agricultural cooperative through a work-based learning program in his high school. At approximately 2:00 p.m., the victim had apparently lost control of the forklift, which was not carrying a load, as he was making a right turn toward the ramp leading to the warehouse entrance.



The forklift tipped over 90 degrees onto its left side. A customer heard a loud noise and saw the victim trapped under the forklift. He ran to get help. While the customer and the victim's coworker ran back to assist the victim, another coworker ran into the company's store to call 911. The customer and coworker were unable to lift the forklift manually. As coworkers lifted the forklift off the victim using a front-end loader, the customer pulled the victim clear. The victim was conscious but was having difficulty breathing. Police and fire department personnel responded at 2:00 p.m. and provided emergency assistance. The victim was transported by an emergency medical services (EMS) ambulance toward a meeting point with a medical helicopter, but en-route the victim's condition deteriorated. EMS personnel transported the victim to a local hospital where he was pronounced dead at 3:16 p.m. in the hospital's emergency room.

NIOSH investigators concluded that, to help prevent similar occurrences, employers should

- ensure, through periodic inspections and reminders, that equipment operators use seat belts provided on equipment they are assigned to operate. Operators should also be reminded that they should never try to jump from an overturning sit-down type forklift.
- ensure that travel routes used by forklift operators are free of obstacles and other unsafe conditions.
- establish work policies that comply with child labor laws prohibiting youths less than 18 years of age from performing hazardous work, including operating power-driven hoisting equipment such as forklifts. Employers should communicate these work policies to all employees.
- develop, implement, and enforce a comprehensive written safety program for all workers which includes training in hazard recognition and the avoidance of unsafe conditions. A written training plan should require training for all forklift operators that includes the equipment manufacturers' recommendations for safe equipment operation.
- identify and label equipment that is not to be operated by young workers less than 18 years and provide keys to only trained and authorized machine users.

Additionally

- equipment manufacturers should consider placing a warning decal on equipment indicating that the equipment is not to be operated by workers less than 18 years, and note this restriction in the operator's manual.
 - school officials and employers participating in work-based learning programs for youth should ensure that work assigned to youth is allowed by law, the work environment is safe and free of recognized hazards, and that youth receive appropriate safety and health training.
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Photo 1. This photo illustrates the forklift used on the day of the incident.

Introduction

On December 26, 2003, a 17-year-old warehouse worker (the victim) was fatally injured when the sit-down type forklift he was operating outside the warehouse tipped over on its side and crushed him. On January 7, 2004, the U.S. Department of Labor, Wage and Hour Division, notified the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR) of the incident. On February 2, 2004, a DSR safety and occupational health specialist met with the Occupational Safety Compliance supervisor, Tennessee Department of Labor and Workforce Development (TDLWD), Division of Occupational Safety and Health; a child labor investigator (TDLWD), and a compliance officer and an Assistant Director of the U.S. Department of Labor, Wage and Hour Division, Southeast Region. Findings from their investigations were reviewed, in addition to the city police report and the death certificate. On February 3, 2004, the DSR safety and occupational health specialist discussed the incident with the employer's local manager, the general manager, and a coworker who assisted in lifting the forklift from the victim. The incident site was examined and photographs were taken. A telephone interview was conducted with the equipment dealer who examined the forklift following the incident. A copy of the manufacturer's operator's manual for the forklift was reviewed. A telephone interview was conducted with the medical director for the responding emergency medical services (EMS).

Employer: The victim's employer was an agricultural cooperative (co-op) that had been in operation for 53 years and employed 22 full-time employees in two locations. The company employed 7 full-time workers and 1 part-time worker (the victim) at the location where the incident occurred. The victim had begun work on September 21, 2003, and was employed under a work-based learning program. The program agreement was signed by the victim, his mother, the high school principal, the work-based learning program's coordinator, and the employing company's local manager. According to the signed agreement, the victim was to work from 12:00 p.m. to 5:00 p.m. six days per week as a warehouse laborer. Specific duties were not written into the agreement.

Victim: The victim worked for the company as a warehouse laborer for three months under a work-based learning agreement administered through his high school. Successful completion of the work-based program, along with successful completion of other school requirements, would allow the victim to earn a graduate equivalency degree (GED) from his high school. According to the local manager, the company had employed young workers through work-based learning agreements in the past. The local manager had contacted the school early in the school year, but the school did not have anyone available. According to the general manager, the victim approached him later personally, and was hired through the school's work-based learning agreement.

Training: The employer's safety policies were unwritten. According to the company's local manager and general manager, training was provided on selected topics using materials sent by the company's insurance company. Safe driving was one of the recent topics presented to employees, but this training covered safe driving of automobiles and trucks. It did not cover equipment operation. The training topic, date of training, and training attendance was documented. The victim had not attended any training sessions. The victim was given on-the-job training in forklift operation by the warehouse supervisor but this training was not documented. The company had no documentation indicating that the supervisor had received forklift operator training. According to the local manager, the warehouse supervisor worked with the victim in the warehouse. The supervisor was terminated a month prior to the incident, and the position had not been refilled.

Equipment: The sit-down type 2-ton propane powered forklift ([Photo 1](#)) had been purchased new by the company. It was approximately 2 years old and was equipped with a seat belt and a rollover protective structure (ROPS). The forklift had pneumatic tires and lifting capacity of approximately 3,000 pounds. The manufacturer's operator's manual was located in a pocket behind the operator's seat. The equipment dealer inspected the forklift following the incident and determined that it was in good working order.

The company had no previous history of employee fatalities.

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Investigation

The agricultural co-op was open for business 6 days per week. The co-op's retail store was connected to the co-op's tire shop and a warehouse. Also on the grounds were an equipment storage shed, a fertilizer shed, and an outdoor storage area where 200 pound molasses animal licks were stored. A large flat concrete parking lot extended in front of the store entrance and around one side of the warehouse where a loading dock and ramp were located. Normally, customers picked up orders at the loading dock. However, when customers purchased heavy items stored outside that required a mechanical lift, a forklift operator exited the warehouse using the ramp, filled the order, and loaded the items. New supplies were also unloaded at the side of the warehouse and large trucks were sometimes temporarily parked there.

On December 26, 2003, at approximately 7:30 a.m., the victim reported for work and began working alone in the warehouse. Two coworkers were working in the tire shop, one coworker was working in the fertilizer shop, and another coworker was working in the store. The local manager was on vacation on the day of the incident.

According to the coworker who was working at the cash register and taking orders, approximately 60 warehouse orders were received on the day of the incident. Four of the day's orders required the use of a forklift. The victim filled many orders that morning. Coworkers could not recall seeing the victim operating the forklift in the morning. At about 12:00 p.m., a coworker from the tire shop went to lunch with the victim. When they returned, the coworker returned to the tire shop and the victim returned to the warehouse. The coworker remembered seeing the victim operating the forklift after lunch. A few minutes before 2:00 p.m., a customer helped the victim as he loaded a molasses lick into another customer's trailer with the forklift. Approximately 5 minutes later, the customer heard a loud crashing sound. He ran over to the area where the victim had been operating the forklift and saw the forklift tipped over on its side. The victim was laying face down with his back pinned under the cage of the forklift and with one leg extended and the other leg doubled up under him. The customer ran to the tire shop to get help. While he and a coworker ran back to assist the victim, another coworker ran into the company's store to call 911. The customer and coworker were unable to lift the forklift manually. They told another coworker to get a front-end loader. As coworkers lifted the forklift off of the victim with a front-end loader, the customer pulled the victim clear. The victim was conscious but was having difficulty breathing. The police report indicates that the city police and fire department responded to the scene at 2:00 p.m. The medical director for EMS reported that the ambulance was dispatched at 2:08 pm. and responded at 2:09 p.m. EMS personnel examined the victim and inserted an endo-tracheal tube at 2:18 p.m. followed by a needle chest decompression immediately after, to help alleviate the victim's breathing difficulty. A medical helicopter was dispatched to transport the victim to a trauma center, but while the EMS ambulance was on its way to meet the medical helicopter, the victim's condition deteriorated and the victim was transported instead to a local hospital. The victim arrived at the hospital at 2:32 p.m. and was pronounced dead at 3:16 p.m. in the hospital's emergency room.

The DSR investigator examined the site on February 3, 2004. Based on information obtained from the local manager, photographs taken the day of the incident, and measurements taken at the site, it appeared that the victim was traveling toward the warehouse ramp on a level surface of the parking lot and made a sharp right turn to enter a narrow ramp leading up to the warehouse. It is surmised that this is when the forklift tipped over onto its left side. The forklift was not loaded but its forks were raised approximately 20 inches so the forks would not dig into the ramp. There was a single 12-foot skid mark located on the parking lot where it is surmised that the victim started into a right turn toward the ramp.

The ramp had an 18.6% grade. It measured 7-foot $\frac{1}{4}$ inches wide, 39 $\frac{1}{2}$ inches high at its point of entry into the warehouse, and 18 feet long ([Photos 2](#) and [3](#)). The entrance/exit of the warehouse was narrow, measuring 70 inches in width. However, a post and an abandoned grain feed dispersal bin located inside left just enough room for the forklift to pass through. Old scrape marks on the forklift and on the post and grain bin inside the warehouse in the only area where the forklift could pass through may be indicative of the tight fit. The local manager said that forklift operators had to speed up to make it up the ramp and then had to slow down at the entrance to fit through the narrow passage after passing through the warehouse door. The ramp's surface was patched and rough where the ramp joined the flat. level parking lot. The local manager

informed the DSR investigator that the co-op was being relocated and therefore the rough pavement in the transitional area where the level parking lot met the ramp, and the confined areas in the warehouse, although identified as problematic, had not been changed because of the planned move.

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Cause of Death

The coroner's report indicated that the cause of death was severe chest trauma.

Recommendations/Discussion

Recommendation 1: Employers should ensure, through periodic inspections and reminders, that equipment operators use seat belts provided on equipment they are assigned to operate. Operators should also be reminded that they should never try to jump from an overturning sit-down type forklift.

Discussion: Use of seat belts is important in protecting workers from serious harm, and periodic inspections should be conducted to ensure compliance with seat belt use. Workers should be reminded that a properly secured seat belt keeps the operator inside the protective envelope of the rollover protective structures (ROPS).

In addition, operators should always be reminded what to do if an emergency situation, such as an overturn, occurs. Workers should be reminded that they should not jump from an overturning, sit-down type forklift. They should stay with the truck, holding on firmly and leaning in the opposite direction of the overturn.¹


Recommendation 2: Employers should ensure that travel routes used by forklift operators are free of obstacles and other unsafe conditions.

Discussion: Employers should perform an assessment of the travel routes used by forklift operators, including warehouse access/exits, ramp design, the condition of the concrete at the end of the ramp, and the parking lot over which forklifts must travel. According to Swartz² "Operating environments that include railroad tracks, rough pavement, holes in the roadway, uneven surfaces, ramps, grades, or other less than desirable features can be dangerous."

Improving travel surfaces to make them less rough, making access ways wider, and requiring truck drivers to move trucks after off-loading would improve travel pathways for forklift operators. Employers should also consider marking a route with yellow paint that provides forklift operators with guidance regarding specified pathways and appropriate turn radiuses. Employers should also consider posting signs warning forklift operators to drive at slow speed and to use their seat belts. A sign should also be posted warning truck drivers to park their vehicles away from forklift travel routes.

Recommendations 3: Employers should establish work policies that comply with child labor laws prohibiting youths less than 18 years of age from performing hazardous work, including operating power-driven hoisting equipment such as forklifts. Employers should communicate these work policies to all employees.


Discussion: Employers should ensure that workers less than 18 years old are not assigned to perform prohibited work. If employers do not fully understand the types of work prohibited for workers under the age of 18, they should contact the U.S. Department of Labor, Employment Standards Administration (ESA), Wage and Hour Division. This Division enforces child labor laws under the Fair Labor Standards Act (FLSA).

The Fair Labor Standards Act (FLSA) prohibits employment of workers younger than age 18 in nonagricultural occupations which the Secretary of Labor has declared to be particularly hazardous. Hazardous Order (HO) No. 7 prohibits persons below the age of 18 from operating power-driven hoisting apparatus including high-lift trucks (i.e., forklifts). Information regarding the FLSA can be obtained by visiting the DOL ESA web site at <http://www.dol.gov/whd/> . (Link Updated 1/7/2010) FLSA employment standards for nonagricultural occupations are listed and explained in Child Labor Bulletin 101³ and summarized in DOL Fact Sheet No. 43.⁴ Child labor information can also be obtained by calling or visiting offices of Federal and State child labor departments, located by using the telephone directory government pages.

Employers should meet with their workforce to communicate the company's policies regarding appropriate work assignments for young workers. They should explain that young workers are at increased risk for injury at work and reinforce the importance of assigning youths to appropriate work tasks. They should provide all staff with a description of the youth worker assignments. They should identify the person(s) responsible for supervision of young workers, inform all staff about assigned supervisors, and direct staff to notify supervisors immediately if they see young workers performing hazardous work or working outside their assigned tasks.

Recommendations 4: Employers should develop, implement, and enforce a comprehensive written safety program for all workers which includes training in hazard recognition and the avoidance of unsafe conditions. A written training plan should require training for all forklift operators that includes the equipment manufacturers' recommendations for safe equipment operation.

Discussion: A comprehensive written safety program should be developed for all workers that includes training in hazard recognition and the avoidance of unsafe conditions. It should then be noted in a company's safety program that certain types of training, i.e., training in forklift operation, is limited to workers who are at least 18 years of age. All employees should be instructed that they are not to provide forklift operator training unless they are trained forklift operators and are assigned to this task by their employer.

OSHA requires the employer to certify in writing and identify by name each operator that has been trained, the date of the training, the date of the evaluation, and the identity of the person(s) performing the training or evaluation. This training in forklift operation should be given by a person who has the knowledge, training, and experience necessary to train operators and should consist of a combination of formal instruction (i.e., lecture, discussion, interactive computer learning, videotape, written material), practical training (demonstrations performed by the trainer and practical exercises performed by the trainee), and evaluation of operator performance in the workplace. The requirements for training forklift operators are available at <https://www.osha.gov/>  and stipulated in Part 29 Code of Federal Regulations, 1910.178 (I)(1) operator training.⁵

Additional information useful for training workers about forklift safety can be found in the NIOSH Alert: Preventing Injuries and Deaths of Workers Who Operate or Work Near Forklifts¹ available through the NIOSH web site at <https://www.cdc.gov/niosh> or by calling 1-800-356-4674. The Alert contains a tear-out sheet ([Appendix](#)) that summarizes safety precautions for forklift operators. Posting this tear-out sheet at the worksite may serve as an additional means of communicating safe work procedures to workers. Another source of information on forklift safety is Forklift Safety: A Practical Guide to Preventing Powered Industrial Truck Incidents and Injuries.² With regard to turning forklifts, the author explains that "Operators, especially those that are new, are to be reminded that the turning radius of a forklift is much smaller than that of an automobile. Operators have to be reminded that a car carries its load on the inside center of the vehicle. A forklift carries its load outside of its supporting base. Cars have four point suspensions, forklifts have three. With this in mind the forklift can become unstable rather easily. When a forklift is empty there is a significant weight imbalance. An empty forklift does not imply the forklift is safe. A forklift can turn over much easier than a car and at much lower speeds." The book offers a wide range of guidance for operating forklifts safely that can be incorporated into training programs.

After the incident, the local manager, whose forklift operator training certification had lapsed at the time of the incident, was recertified. He then provided forklift operator training to company employees currently assigned to operate forklifts. The company has hired a consultant to assist in developing their comprehensive written safety plan and training program.

Recommendation 5: Employers should identify and label equipment that is not to be operated by young workers less than 18 years and provide keys to only trained and authorized machine users.

Discussion: Employers can obtain a sticker that alerts employees that young workers are not to operate forklifts. Employers can obtain stickers in English and Spanish that indicate "NO OPERATORS UNDER 18 YEARS OF AGE. IT'S THE LAW," from the local Wage and Hour Office of the U.S. Department of Labor ([Photo 4](#)). These stickers can be downloaded from the internet and should be affixed in a conspicuous place on forklifts. As an additional safety precaution, employers should ensure that keys used to operate forklifts are in the possession of only selected workers whom they have authorized and trained to operate forklifts. A supervisor should be assigned to ensure, through periodic inspections, that only authorized and trained operators are operating forklifts.

Recommendation 6: Equipment manufacturers should consider placing a warning decal on equipment indicating that the equipment is not to be operated by workers less than 18 years old, and note this restriction in the operator's manual.

Discussion: Manufacturers can obtain assistance in identifying forklifts and other types of equipment that are prohibited for use by workers less than 18 years old by calling their local DOL Wage and Hour Division office. These offices can be located by using the telephone directory government pages. The manufacturer should ensure that the operator's manual includes a statement indicating age restrictions for operating and/or cleaning equipment.

Recommendation 7: School officials and employers participating in work-based learning programs for youth should ensure that work assigned to youth is allowed by law, the work environment is safe and free of recognized hazards, and that youth receive appropriate safety and health training.

Discussion: When special employment arrangements exist, such as employment of a student-learner through a work-based learning program, school officials and employers entering into an agreement for employment of a student-learner should evaluate the tasks to which student learners will be assigned, identify safety training required, determine who will provide safety training and supervision, and ensure that workers are trained before work is assigned. Resources for training young workers can be found in the NIOSH Alert: Preventing Deaths, Injuries and Illnesses of Young Workers,⁶ available through the NIOSH web site at <https://www.cdc.gov/niosh> or by calling 1-800-356-4674.

All parties signing a work-based learning agreement (school officials, employer, parent, student-learner) should review the work to which youth less than 18 years old are assigned to ensure that the assigned work does not include hazardous occupations, such as operating a forklift. Exemptions from some hazardous occupations are allowed (but never operation of a forklift) for student learners in approved programs under a written agreement³ which provides "(i) That the work of the student learner in the occupations declared particularly hazardous is incidental to the training; (ii) That such work shall be intermittent and for short periods of time, and under the direct and close supervision of a qualified and experienced person; (iii) That safety instruction shall be given by the school and correlated by the employer with on-the-job training; and (iv) That a schedule of organized and progressive work processes to be performed on the job shall have been prepared."

It would be helpful to list on the agreement, occupations which can **never be exempted** and have all parties initial this part of the form showing that they understand that student-learners are never to perform occupations which include: manufacturing or storage involving explosives; motor vehicle occupations; coal mining; logging and sawmilling; occupations involving exposure to radioactive substances and to ionizing radiation; power-driven hoisting apparatus (a forklift is a power-driven hoisting apparatus); occupations in connection with mining other than coal; power-driven bakery machine occupations; occupations involved in the manufacture of brick, tile and kindred products; and occupations involved in wrecking, demolition, and ship breaking operations. The work-based learning agreement signed in this incident did not include a list of prohibited activities. The signed agreement included a list of the hazardous occupations that can be exempted. These exemptions are to be checked when they apply to the student-learner (none were checked for the victim).

All tasks to which a student-learner will be assigned should be listed and attached to agreements before agreements are signed by any of the parties. If there is any change in these tasks, the parties should meet to ensure that new assignments are not in violation of child labor laws before the student begins performing the added tasks, and that appropriate training and supervision is provided to ensure youth safety.

The employer should ensure that the person(s) assigned to supervise the student-learner at work understand the tasks to which the student learner can be assigned and those to which they cannot be assigned. A list of accepted tasks and a list of prohibited tasks should be provided to each supervisor.

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References

1. NIOSH [2001]. NIOSH Alert: Preventing injuries and deaths of workers who operate or work near forklifts. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2001-109.
2. Swartz G [1999]. Forklift safety: A practical guide to preventing powered industrial truck incidents and injuries. Rockville, MD: Government Institutes, ISBN: 0-86587-663-0.
3. DOL (U.S. Department of Labor)[2001]. Child labor requirements in nonagricultural occupations under the Fair Labor Standards Act. Washington, DC: U.S. Department of Labor, Employment Standards Administration, Wage and Hour Division, WH-1330. Child labor Bulletin No. 101.

4. DOL[2002a]. Fact Sheet no. #43: Child labor provisions of the Fair Labor Standards Act (FLSA) for non-agricultural occupations. [<http://www.dol.gov/whd/regs/compliance/whdfs43.htm>] (Link updated 1/7/2010)]. Accessed May, 2004.
5. Code of Federal Regulations [2003]. 29 CFR 1910.178 (1)(1). Powered industrial truck operator training. Washington, DC: U.S. Government Printing Office, Office of Federal Register.
6. NIOSH [2003]. Alert: Preventing deaths, injuries, and illnesses of young workers. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2003-128.

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Investigator Information

This investigation was conducted by Doloris N. Higgins, Occupational Safety and Health Specialist, Fatality Investigations Team, Surveillance and Field Investigations Branch, Division of Safety Research.

Photographs



Photo 2. This photo illustrates a close-up of the ramp to the warehouse.



Photo 3. This photograph illustrates the parking lot, warehouse and ramp, and other co-op buildings. Lines on the photo approximate the travel path of the forklift on the day of the incident. An “X” marks the approximate location of the forklift that had tipped over. Photograph courtesy of the Tennessee Department of Labor and Workforce Development, Division of Occupational Safety and Health.



Photo 4. This photo illustrates the sticker “ NO OPERATORS UNDER 18 YEARS OF AGE. IT’S THE LAW,” which is available from the local Wage and Hour office of the U.S. Department of Labor or from the DOL web site <http://www.youthrules.dol.gov/news/posters-stickers-bookmarks/index.htm> (Link Updated 3/14/2013)

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Appendix

Source: NIOSH [2001]. **NIOSH Alert: Preventing Injuries and Deaths of Workers Who Operate or Work Near Forklifts.** U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2001–109. Fax: 513–533–8573 or visit the NIOSH Web site at <https://www.cdc.gov/niosh> for a copy.

Preventing Injuries and Deaths of Workers Who Operate or Work Near Forklifts

WARNING!

Workers who operate or work near forklifts may be struck or crushed by the machine or the load being handled.

Workers: If you operate or work near forklifts, take these steps to protect yourself.

- Do not operate a forklift unless you have been trained and licensed
- Use seatbelts if they are available
- Report to your supervisor any damage or problems that occur to a forklift during your shift
- Do not jump from an overturning, sit-down type forklift. Stay with the truck, holding on firmly and leaning in the opposite direction of the overturn
- Exit from a stand-up type forklift with rear-entry access by stepping backward if a lateral tip over occurs
- Use extreme caution on grades or ramps
- On grades. tilt the load back and raise it only as far as needed to clear the road surface

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- Do not raise or lower the forks while the forklift is moving
 - Do not handle loads that are heavier than the weight capacity of the forklift
 - Operate the forklift at a speed that will permit it to be stopped safely
 - Slow down and sound the horn at cross aisles and other locations where vision is obstructed
 - Look toward the travel path and keep a clear view of it
 - Do not allow passengers to ride on forklift trucks unless a seat is provided
 - When dismounting from a forklift, set the parking brake, lower the forks or lifting carriage, and neutralize the controls
 - Do not drive up to anyone standing in front of a bench or other fixed object
 - Do not use a forklift to elevate workers who are standing on the forks
 - Elevate a worker on a platform only when the vehicle is directly below the work area
 - Whenever a truck is used to elevate personnel, secure the elevating platform to the lifting carriage or forks of the forklift
 - Use a restraining means such as rails, chains, or a body belt with a lanyard or deceleration device for the worker(s) on the platform
 - Do not drive to another location with the work platform elevated

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