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REPORT#: 2021-01 **REPORT DATE:** May 16, 2022

INCIDENT HIGHLIGHTS



DATE:
February 14, 2020



TIME:
8:40 a.m.



VICTIM:
27-year-old sanitation worker



INDUSTRY/NAICS CODE:
Solid waste collection, 562111



EMPLOYER:
City public works division;
57 employees.



SAFETY & TRAINING:
Comprehensive safety and health program



SCENE:
Residential street



LOCATION:
North Carolina



EVENT TYPE:
Struck by



Sanitation Worker Struck by Backing Refuse Truck – North Carolina

SUMMARY

On February 14, 2020, at 8:40 a.m., an employee of a city public works department was engaged in manual garbage pickup on a refuse truck on a residential route. The three-person crew included an operator and two sanitation workers who rode on the outside step of the truck as it moved from one stop to the next. The sanitation worker riding on the outside step of the refuse truck was startled by a pick-up truck backing up from an adjacent residence towards him and the backing refuse truck. The sanitation worker jumped off the refuse truck, ran behind the refuse truck and was fatally struck by the refuse truck. [READ THE FULL REPORT \(p.3\)](#)

CONTRIBUTING FACTORS

Key contributing factors:

- Riding on an outside step of backing refuse equipment
- Lack of situational awareness of driver and sanitation workers
- Lack of written standard operating procedures for driving and riding positions on refuse trucks
- Lack of communication with ground workers

RECOMMENDATIONS

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

- Select refuse equipment that reduce struck-by injury hazards for employees
- Install worker detection and operator notification devices on refuse equipment
- Develop policies and procedures and provide training on safe driving and riding positions on refuse trucks... [LEARN MORE> \(p.10\)](#)

FACE IT: [2021-01 REPORT SLIDES](#)





Fatality Assessment and Control Evaluation (FACE) Program

The National Institute for Occupational Safety and Health (NIOSH), an institute within the Centers for Disease Control and Prevention (CDC), is the federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. In 1982, NIOSH initiated the Fatality Assessment and Control Evaluation (FACE) Program. FACE examines the circumstances of targeted causes of traumatic occupational so that safety professionals, researchers, employers, trainers, and workers can learn from these incidents. The primary goal of these investigations is for NIOSH to make recommendations to prevent similar occurrences. These NIOSH investigations are intended to reduce or prevent occupational deaths and are completely separate from the rule making, enforcement and inspection activities of any other federal or state agency. Under the FACE program, NIOSH investigators interview persons with knowledge of the incident and review available records to develop a description of the conditions and circumstances leading to the deaths in order to provide a context for the agency's recommendations. The NIOSH summary of these conditions and circumstances in its reports is not intended as a legal statement of facts. This summary, as well as the conclusions and recommendations made by NIOSH, should not be used for the purpose of litigation or the adjudication of any claim. For further information, visit the program website at www.cdc.gov/niosh/face/ or call toll free at 1-800-CDC-INFO (1-800-232-4636).



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SUMMARY

On February 14, 2020, at 8:40 a.m., an employee of a city public works department was picking up garbage on a refuse truck on a residential route. The employer was a city public work division that managed six departments including sanitation. The three-person sanitation crew consisted of an operator and two sanitation workers who rode short distances on the back rider step of the truck as it moved through residential areas from one stop to the next. The crew was gathering trash cans on a dead-end residential street near a “T” intersection. The refuse truck drove forward to gather the trash and then backed out of the dead-end road. As the refuse truck was backing down the street, the sanitation worker was riding on the passenger side outside step of the refuse truck when a pick-up truck in an adjoining driveway began backing toward the refuse truck at a rapid rate. The sanitation worker was startled by the backing pick-up truck backing up towards the refuse truck. The sanitation worker jumped off the refuse truck, ran behind the refuse truck, and was fatally struck by the refuse truck. The refuse truck operator contacted 911 and the employer and emergency response personnel were dispatched. The worker was pronounced dead at the scene.

INTRODUCTION

On February 14, 2020, a 27-year-old sanitation worker was fatally injured when he was struck by a backing refuse truck. On February 26, 2021, a health scientist from the NIOSH Division of Safety Research and a safety and occupational health manager from the NIOSH Office of the Director virtually met with a state on North Carolina OSHA compliance officer and reviewed the circumstances of the incident. On April 6, 2021, the same NIOSH staff members virtually met with the city manager and staff from the public works division. Photos from the incident site, witness statements, and the medical examiner’s report were provided to NIOSH.

EMPLOYER

The city public works division has six departments (Sanitation, Brush/Recycling/Refuse/Leaf Collection, Grounds Maintenance, Building Maintenance, Traffic Control Maintenance, and Streets and Road Maintenance). The public works division has 57 employees and 13 of these employees work in the sanitation department. The sanitation department is responsible for residential refuse and recycling collection. They operate 4 rear load refuse collection vehicles and 1 brush collection vehicle. The sanitation employees work Monday through Friday from 6:30 am to 2:30 pm and are typically off work early on Fridays. Each refuse collection crew picks up 600 to 800 refuse containers per day. The 13 sanitation employees work in crews consisting of one operator and one or two sanitation workers. Operators with a commercial driver’s license in the city public works division start out in recycling and advance to brush operator and then trash operator. The advancement in the city public works division is sanitation worker 1 then sanitation worker 2. Prior to this incident, there had only been minor property damage incidents and one employee close call in which an employee brushed against a phone pole while riding on the rider step.

WRITTEN SAFETY PROGRAMS and TRAINING

The city public works division had a comprehensive safety program including training on cold weather safety, defensive driving, accident investigation, bloodborne pathogens, flagger training, emergency action plan, control of hazardous energy (lock out tag out), confined spaces, hazard communication, hearing conservation, and other safety training. The employer had no written policy for sanitation workers riding on the back of trucks, but there were legible stickers inside the cab of the truck and on both rider positions on the back of the truck at the rider stations which instruct riders not to ride when in reverse, when traveling above 10 miles per hour, or when traveling greater than 2/10 of a mile [\[Photo 1\]](#). The information listed on the stickers was considered by the public works division as the policy for operators and riders on trucks. The workers wore American National Standards Institute (ANSI) class 3 high visibility safety vests.



**Fatality
Assessment
and Control
Evaluation
Program**



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Since the incident occurred, the city has developed and implemented standard operating procedures for refuse collection and a training program to reduce struck by incidents, including training on blind spots of vehicles. Refresher training is offered for workers who are involved in near miss, property damage, or injury incidents. The city created a written policy stating employees are no longer allowed to ride on the steps of the refuse trucks while the vehicle is backing, traveling at speeds of 10 or more miles per hours or traveling continuously for more than 2/10 of a mile. The operators are taught to always know the location of the sanitation workers on the crew. Operators must always establish visual contact with ground workers before moving refuse trucks. Sanitation workers are instructed to load refuse from the sides of the refuse truck and are trained not to walk or stand behind refuse trucks at any time. The sanitation crews have been taught to use standard hand signals to allow sanitation workers on the ground to consistently communicate with operators.



Photo 1. Passenger side rear label with locations on refuse truck. *Photo courtesy of NC OSHA*

WORKER INFORMATION

The sanitation worker was 27-year-old and had worked for the city for a total of six years. This was his primary job. The sanitation worker had worked for the city previously as an operator for three years then left and returned. The other sanitation worker had been working for the city for 20 years. The refuse truck operator had worked for the city for eight years and held a CDL license.

EQUIPMENT

The residential refuse collections are Heil refuse collection units with Hines Specialty Vehicle bodies. The truck was a 2016 Crane Carrier model LETZ-30 truck chassis with a 2016 Heil model PT1000 refuse collection attachment [Photo 2]. Designed with rider steps on both the right back (passenger) and left back (driver) sides [Photo 3]. The refuse truck had manufacturer installed grab handles on the side above the rider steps [Photo 4]. The manufacturer stickers on the



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dashboard of the truck and both sides of the truck at the right and left rider stations state, "DO NOT cross or stand behind vehicle while it is backing," and "Do not use riding step when vehicle is exceeding 10 MPH, operating in reverse or traveling in excess of 0.2 miles" [Photo 1]. At the time of the incident, the refuse truck was equipped with an aftermarket non-recording, wireless camera system with a rearview camera for use by the operator, flashing lights, a back-up alarm, and buzzers on the back right and left sides of the truck that can be used by the sanitation worker to "buzz" the operator and alert the operator of a potential issue. Upon examination, the back-up alarm, lights, and buzzers located on both sides of the rear of the truck were operational and the tires were in good condition. The maintenance department verified that the refuse truck parts were all in working order at the time of the incident. There was a seating capacity of 3 people inside the refuse truck. Refuse trucks for the city typically have a 7-year service life.

Following this incident, the city installed a camera system with a digital video recorder on their refuse trucks. Operators are now instructed to use the cameras in addition to the mirrors and scan in a right to left, then left to right pattern while backing. The new camera system captures the operator of the refuse truck, each side of the truck, and the rear of the truck. The city also installed a light that is attached to a buzzer, to notify the driver to stop. Since the city has replaced the previous wireless camera system, the new hard-wired cameras work better and provide constant video. The previous wireless technology would freeze and drop signals.



Photo 2. 2016 Crane Carrier model LETZ-30 truck chassis with a 2016 Heil model PT1000 refuse collection attachment. *Photo courtesy of NC OSHA*



Photo 3. Rider step of refuse truck. *Photo courtesy of NC OSHA*

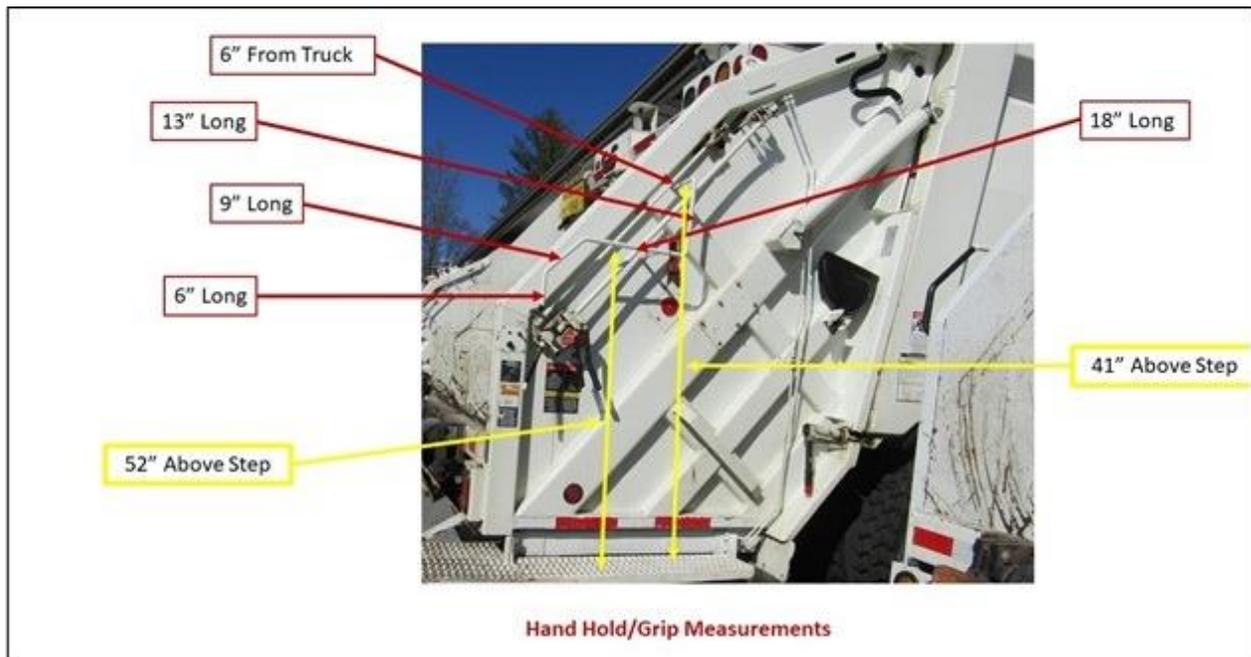


Photo 4. Hand holds of refuse truck. *Photo courtesy of NC OSHA*



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INCIDENT SCENE

The incident occurred in a residential area at a “T” intersection of two streets. One of the arms of the T was a dead-end street [\[Photo 5\]](#). There were three dead-end streets on this specific residential route which required backing. The crew was on the shortest of the three dead-end streets, which was approximately 125 feet. The other dead-end streets were approximately 500 feet and 300 feet. The housing development where the incident occurred was established in the 1970s. The streets were paved with a posted speed limit of 20 mph. There was no room for street parking, no cars parked on the street, and no sidewalks. The street was 20 feet wide, and the sanitation worker was struck 153 feet from the dead end of the street near the “T” intersection [\[Diagram\]](#).



Photo 5. Incident scene. *Photo courtesy of NC OSHA*



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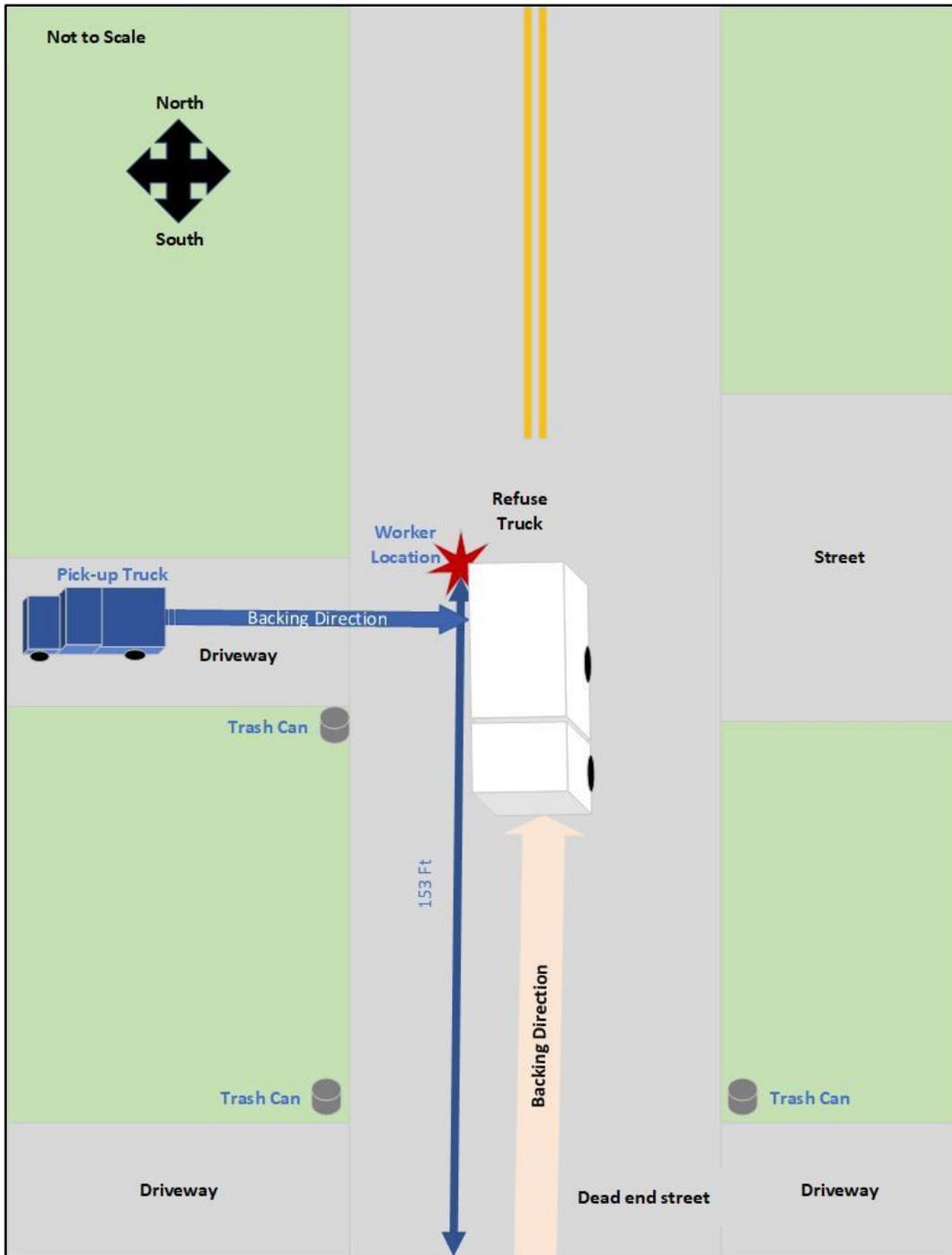


Diagram. Incident scene



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WEATHER

At the time of the incident, the temperature was 32 degrees Fahrenheit. The day was bright, clear, dry, and sunny with a low of 29 and a high 43 degrees Fahrenheit. The roads were dry, and sunrise was at 7:19 am [[Weather Underground 2021](#)].

INVESTIGATION

On February 14, 2020, a three-person residential refuse collection crew started their shift at 6:30 am. When the employees arrived at work, they checked the truck, collected trash bags and gloves, and departed at 7:00 am. The section of route where the incident occurred had a total of 3 dead-end roads that required long backing distances to collect refuse. The refuse truck drove forward to the dead-end of the road then backed out of the dead-end road. During the collection process, the sanitation workers ride on the back of the truck and stand on the right or left rider step. At each collection stop, the sanitation worker exits the step, retrieves the refuse collection container, places it on the lift of the back of the truck, dumps the refuse, returns the container, then either walks or rides on the back step of the truck to the next stop.

With both sanitation workers riding on the back rider step following the stop at the “T” intersection [[Diagram](#)], the operator drove the refuse truck forward into the dead-end near the end of the pavement and stopped. One sanitation worker exited the right passenger side of the refuse truck to get the container on the right and the second sanitation worker exited on the left (driver’s side of the truck) to get the container on the left. At approximately 8:40 am, after dumping the containers, the two sanitation workers got back on their rider steps, and the operator began backing the refuse truck out of the dead-end. At some point the sanitation worker on the right got off the step and was walking along the right passenger side of the refuse truck getting trash cans. As the refuse truck backed up, the sanitation worker on the right observed a pick-up truck from a residence backing out of the driveway on the driver’s side of the truck at a rapid rate and thought it would hit the truck. The sanitation worker on the right yelled at the sanitation worker on the left and pointed to the backing vehicle. The sanitation worker on the left was startled by the backing pick-up truck and jumped from the rider step and landed on the road behind the moving refuse truck. The sanitation worker on the right hit the buzzer to notify the operator to stop. The refuse truck operator did not hear the buzzer notification and might have had the windows up with heat running. The refuse truck operator applied the brakes but was not able to stop the truck before it ran over the victim. The sanitation worker on the right reported the pick-up truck stopped on the road and only missed the refuse truck by about six inches. Following the incident, the operator placed a call to 911 then to the employer. Emergency response personnel were dispatched by 911 and pronounced the worker dead at the scene.

CONTRIBUTING FACTORS

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. NIOSH investigators identified the following hazards as key contributing factors in this incident:

- *Riding on an outside step of backing refuse equipment*
- *Lack of situational awareness of driver and sanitation workers*
- *Lack of written standard operating procedures for driving and riding positions on refuse trucks*
- *Lack of communication with ground workers*



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CAUSE OF DEATH

The medical examiner listed the cause of death as crushing injuries.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should select refuse equipment that reduces struck-by injury hazards for employees.

Discussion: At the time of the incident the operator and a sanitation worker were working outside the vehicle manually collecting trash containers. Manufacturers have developed automated side loader refuse trucks that keep employees safe by limiting exposure outside the truck, equipment blind spots, lifting hazards, contact with waste, contact with vehicles, and exposure to chemical and biological hazards [Druley 2018]. Automated side load refuse trucks can be operated by one employee on most routes safely from the operator cab using a pickup arm and grapple controlled remotely and aided by sensors and cameras to pick up and dump single waste container. This technology is an adaptation from the fork system currently used with commercial dumpster waste management routes. Several metropolitan areas have purchased and integrated these refuse trucks into their routes [Nemo 2020]. Employers typically replace refuse trucks every three to five years. Purchasing and integrating side loader trucks has the potential of eliminating or substantially reducing the need for manual collection.

Recommendation #2: Employers should install worker detection and operator notification devices on refuse equipment.

Discussion: Current technologies available for waste management vehicles include cameras and digital video camera systems to reduce vehicle blind spots; front, rear and side proximity detection and collision avoidance systems; reversing and warning alarms; automatic backup breaking which can detect objects through infrared, microwave, or ultrasonic detectors; and fleet management systems that provide Global Positioning Systems (GPS), vehicle speed, telematics and location, [Brigade 2021; Hull 2016; Renna 2019]. Proximity detection systems alert the operator with audio warnings, and cameras allow the operator to visually verify the object detected [NSC 2021; Renna 2019]. The three types of proximity detection systems are radar systems, ultrasonic systems, and tag-based system. Radar and ultrasonic systems are available on many passenger vehicles and work by transmitting signals which are bounced off an object then notify the operator of an object without the need for the operator to first look and see the object. An ultrasonic system emits bursts of ultrasonic waves in a frequency above the hearing threshold of humans. Tag-based systems consist of electromagnetic field generators and field detecting devices. These systems use electromagnetic field generators installed on a vehicle and electronic sensing devices (tags) worn by persons working near the vehicle. Electromagnetic field-based systems can be programmed to warn workers and operators to stop the vehicle when workers get within the predefined danger zone of the vehicle. Cameras, which are available on many passenger vehicles, are also available from equipment manufacturers. Aftermarket sensors and cameras are available for employers to install on refuse collection equipment. Employers should consider the operating environment for the equipment and safety implications of installation locations such as blind area reduction and coverage when purchasing and installing sensors and cameras.

Recommendation #3: Employer should develop policies and procedures and provide training on safe driving and riding positions on refuse trucks.

Discussion: Waste management and refuse employers should develop policies and procedures for safe driving and riding positions using manufacturer recommendations, industry standards, and best practices, and train employees accordingly. American National Standards Institute (ANSI) Z245.1-2017 is a standard for businesses engaged in the manufacture, reconstruction, modification, operation, cleaning, maintenance, service, or repair of mobile collecting, transporting, and



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compacting equipment [[ANSI 2017a](#)]. The ANSI published Safety Standards for Mobile Refuse Collection and Compaction Equipment that includes recommendations for operators and riders for pedestrian and rider safety. The standard outlines safe riding positions while the equipment is traveling. ANSI Z245.1, section 7. 3.2 provides the following requirements for operating and riding positions.

“When driving or riding in the vehicle, occupants shall:

- *Follow the employer’s instructions regarding driving and riding positions*
- *Ride only in the cab, except where riding steps are provided, and not anywhere else on the vehicle*
- *Keep all cab doors closed and latched during transit*
- *Remain in driving or riding position(s) during collection activities until the vehicle has come to a complete stop and the brakes are set*
- *Wear seat belts at all times when the vehicle is in transit, except as necessary during collection*
- *Ensure that the area behind the vehicle is clear when operating a vehicle in reverse*
- *Not cross or stand behind a vehicle operating, or about to operate, in reverse*
- *Ensure the locations of all co-workers are known before operating the vehicle in reverse*
- *Place and keep the side arm or lifting device in the transit position during transit, and*
- *Be aware of the maximum overall height of the equipment as posted in the cab”* [[ANSI 2017](#)].

ANSI Z245.1, section 7.4.7.6 provides the following requirements for riding steps.

“When operating or working on any vehicle equipped with riding steps, users shall:

- *Ensure that no persons ride on steps when the vehicle is exceeding 10 mph (16 kph), nor when the distance traveled exceeds 0.2 mi (0.3 km)*
- *Ensure that no persons ride on the steps when operating in reverse*
- *Ensure that no person(s) ride on the loading sill, the loading platform, or in the hopper of a compactor equipped vehicle*
- *Ensure that no person mounts or dismounts riding steps unless the vehicle is completely stopped*
- *Ensure that no person attempts to collect refuse while riding on the step*
- *Ensure that backup alarms are operational and*
- *Ride facing the side of the vehicle with both hands on the handholds”* [[ANSI 2017](#)].

The Solid Waste Association of North America released a set of guidelines for waste and recycling collection workers titled “Five Tips to Stay Alive.” These tips are:

- *Always wear personal protective equipment (PPE), especially high visibility vests or outerwear*
- *Never use your cell phone while driving the truck or at a disposal facility*



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- *Don't ride on the step if the truck is backing or traveling more than 10 mph or 1/5-mile*
- *Always comply with safety belt rules*
- *Don't exceed the speed limit and don't rush* [[SWANA 2016](#)]

Employees should be trained on safe driving and riding positions on refuse trucks when hired, yearly, as standards or equipment changes, and when an incident happens. Employers should ensure employees follow instructions on warning labels. The manufacturer stickers on the refuse truck instruct riders not to ride steps when in truck is operating in reverse, when traveling above 10 miles per hours, or when traveling continuously for 2/10 of a mile or more [Photo 1] [[ANSI 2017](#)].

Recommendation #4: Waste and refuse management companies should follow and train employees on industry safety standards for operating refuse equipment in reverse.

Discussion: Waste and refuse management employers should develop policies and procedures using industry standards and guidance and train employees on safe practices and hazards recognition, while operating refuse equipment in reverse. In 1997 NIOSH developed an alert focused on preventing worker injuries and deaths associated with moving refuse collection vehicles [[NIOSH 1997](#)]. The alert highlighted industry standards and procedures for safe riding, safe backing and safety equipment and technologies. Safe backing procedures highlighted are from the National Waste & Recycling Association (NWRA) Manual of Recommended Safety Practices [[NW&RA 2013](#)]. The procedures outline what operators should do before backing and while backing, using a spotter and crew members' roles and responsibilities. Spotters are a second set of eyes and ears for the operator and are trained to use hand signal communication with the operator so the equipment can safely navigate in areas where the operator has limited visibility or hazards might be present. The manual also outlines ways workers can protect themselves while working near refuse trucks, including the following:

- *Maintaining visual contact between the operator and workers on foot when working close to the vehicle and when backing*
- *Systematically checking both side mirrors when backing*
- *Using a reliable spotter positioned to see both the operator and any blind spots behind the vehicle when backing*
- *Using standard hand signals when backing*
- *Stopping the truck if the spotter must change positions*
- *Immediately stopping the maneuver if visual contact with the spotter is lost*
- *Remaining clear of the rear of the vehicle when the backup lights are on or the alarm is sounding.* [[NW&RA 2013](#)]
- *Additionally, operators should assure no workers are riding the step before operators back the truck.*
- *Use equipment, including 4-way flasher and back-up alarm, and periodically tap your horn prior to backing and as you continue backing*
- *Use technology, including radar and cameras*
- *Get out and look (GOAL)* [[SWANA 2016](#)]

The responsibilities of the spotter include:

- *Remain visible in the operator's mirrors*



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- *Maintain a clear view of the hazard area (operator’s blind spot) behind the vehicle*
- *Stay clear of the vehicle’s path*
- *Avoid walking backward*
- *Use agreed upon hand signals to communicate with the operator*
- *Be sure that no one is on the riding steps or behind the vehicle before signaling the operator to start backing*
- *Immediately signal the operator to stop if any person or object enters the area behind the truck*
- *Signal the operator to stop if the spotter must change positions when the vehicle is backing, and the spotter should then move to the new position and signal the operator to continue [[NW&RA 2013](#)].*
- *Additionally, spotters should wear personal protective equipment including high visibility apparel*
- *Maintain good mental and personal fitness [[Recycling Today 2016](#)]*

The American Road & Transportation Builders Association (ARTBA) hosts the national work zone information safety clearinghouse website that provides information and training on reducing run-overs and back-overs [[ARTBA 2021](#)]. Employees should be trained on backing safety and hazard recognition when hired, yearly, a standard or equipment change and when an incident happens. Training should be reoccurring and consist of classroom instruction followed by hands on vehicle operations, safety functions and a driving skills course.

Recommendation #5: Employers should provide training on hazard recognition and mitigation strategies for equipment blind spots/zones.

Discussion: Employers should train employees on hazard recognition, mitigation strategies and job task specific hazards of equipment blind areas. A blind spot is the area around a vehicle that is not visible to operators, either by direct line-of sight or indirectly by use of internal and external mirrors [[Michigan FACE 2011](#)]. NIOSH developed equipment blind area diagrams for a variety of construction equipment. NIOSH also developed a website with methods for identifying blind areas of other pieces of equipment [[NIOSH 2019](#)]. NIOSH developed a Workplace Solutions document which outlines safety measures for workers on foot including:

- *“Always wear high visibility apparel that is appropriate for your job task and work environment compliant with [ANSI/ISEA 107](#) [[ANS/ISEA 2020](#)]*
- *Be aware of equipment and vehicle blind areas and avoid being near these areas*
- *Confirm communications signals with an operator and do not approach until the operator gives acknowledgment*
- *Be aware of equipment travel paths and avoid standing or walking in these areas*
- *LISTEN for reverse signal alarms in the area*
- *Do not rely solely on one safety practice, always be aware of your surroundings and ensure that workers are aware of you“ [[NIOSH 2014](#)]*

The employer should, “Develop, implement, and enforce a comprehensive safety and training program in the workers’ primary language and at the appropriate literacy level, that includes the following information”:



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- Targeted training on the operator’s visual limits of the specific equipment being used on the site, and provided to both equipment operators, and workers required to work on foot near the equipment blind areas [[NIOSH 2019](#); [ISO 2017](#)].
- Standard operating procedures that minimize exposure of workers on foot to moving vehicles and equipment.
- Daily pre-work safety meetings to discuss the work to be performed, safety hazards, safe work procedures, and the method of communicating changes in the work plan” [[NIOSH 2014](#)].

The OSHAcademy developed a blind spot training module that helps employees understand blind spot hazards, the hazards of equipment operating in reverse, backing safety solutions for spotters, and proximity sensing devices [[OSHAcademy n.d.](#)]. The Solid Waste Association of North America developed a mirror and camera adjustment exercise [[SWANA 2016](#)]. The American National Standards Institute (ANSI) published Safety Standards for Mobile Refuse Collection and Compaction Equipment which includes recommendations for rider and pedestrian safety. ANSI Z245.1, section 6.6.7 provides guidance on apparel, “requiring the appropriate high-visibility apparel for employees that experience struck-by hazards as prescribed in [ANSI/ISEA 107](#)” [[ANSI 2017](#); [ANSI 2020](#)]. ANSI Z245.1, section 7. 3.4 provides guidance on working near other mobile equipment “maintaining appropriate separation from mobile equipment which may be operating near the employee’s work area.” [[ANSI 2017](#)] Employees should be trained on hazard recognition and mitigation strategies for equipment blind areas when hired, yearly, a standard or equipment changes and when an incident happens.

Recommendation #6: Manufacturers of refuse equipment should design riding steps and passenger compartments that ensure rider and passenger safety during all times of routine vehicle operation.

Discussion: Manufacturers of refuse equipment should design riding steps and passenger compartments that ensure rider and passenger safety during all times of routine vehicle operation. OSHA citations have recommendations for manufacturers’ to “equip refuse collection vehicles with extended fenders or additional body panels to eliminate or reduce the likelihood of workers landing in the path of the vehicle’s wheels in the event of a fall” [[OSHA 2011](#); [OSHA 2015](#)]. The American National Standards Institute (ANSI) published Safety Standards for Mobile Refuse Collection and Compaction Equipment which includes recommendations for riding step design. ANSI Z245.1 9.9 provides the following requirements for riding steps design.

If provided, riding steps shall:

- Have a self-cleaning slip-resistant surface
- Be capable of supporting a vertical static load of 500 lbs. at the point furthest from its attachment point
- Be mounted not more than 24 inches above the road surface
- Have handhold(s), placed so that a rider who is positioned on the step, facing the side of the body, shall be able to attain four-point contact with the vehicle, using both hands and both feet at approximately shoulder width. Each handhold shall be capable of withstanding a horizontal static load of at least 500 lbs
- Handhold grip dimension shall not be less than 0.75 inches nor greater than 2 inches. Hand clearance shall not be less than 3 inches
- Have a depth of at least 8 inches and provide a minimum of 220 inches of surface area and
- Be located behind the rearmost axle of the vehicle but shall not extend beyond the rearmost structural portion of the vehicle [[ANSI 2017](#)]



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ADDITIONAL RESOURCES

There are numerous trade associations where employers can network with industry leaders, and stay apprised of the latest technologies, standard development, regulation guidance, education opportunities and safety measures in waste management. Several of those trade associations are:

[*National Waste & Recycling Association \(NWRA\)*](#)

[*Solid Waste Association of North America \(SWANA\)*](#)

[*American Public Works Association \(APWA\)*](#)

[*International Solid Waste Association \(ISWA\)*](#)

INVESTIGATOR INFORMATION

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