

WORKPLACE SOLUTIONS

From the National Institute for Occupational Safety and Health

Preventing Struck-by Injuries and Deaths When Working with Refuse Trucks

Summary

Workers who operate or work around refuse trucks are at risk for possible injury and death from being struck by the truck, truck components, and vehicles traveling in the work area. Refuse trucks are identified as trash, garbage, and recycling trucks that transport civilian waste and recyclable materials. The National Institute for Occupational Safety and Health (NIOSH) provides steps for employers and employees to reduce the risk of struck by incidents.

Introduction

Refuse and recyclable material collectors (hereafter referred to as waste collectors) are employed in five industries [BLS 2023]:

- Waste collection
- Local government (excluding schools and hospitals)
- Waste treatment and disposal
- Remediation and other waste management services
- State government (excluding schools and hospitals)

In 2023, more than 135,000 workers were employed as waste collection workers [BLS 2023]. Waste collection workers face unique occupational hazards that increase their risk of fatal and non-fatal occupational injuries [NIOSH 1997, NIOSH 2021, NIOSH 2022, NIOSH 2023a]. Tasks such as standing on refuse collection truck riding steps and moving waste behind and around these vehicles increase the risk of injury and death from transportation incidents and, particularly, struck-by incidents [NIOSH 2021, NIOSH 2022, NIOSH 2023].

Slow Down to Get Around™, a national safety campaign that reminds motorists to drive more carefully when near waste and recycling trucks, is also the name commonly applied to Move Over laws [SWANA 2023a]. These laws require motorists to change lanes and/or slow down when approaching an authorized emergency vehicle that is parked or otherwise stopped on a roadway [DOT 2008]. However, Move Over laws differ by state in defining which types of vehicles are included. As of 2023, thirty U.S. states have expanded their Move Over law to include refuse vehicles [SWANA 2023a]. However, waste collection workers need further safeguards to help protect them from being struck-by passing vehicles.



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Figure 1. National Waste & Recycling Association Slow Down to Get Around Campaign [SWANA 2023a].

Description of Exposure

A NIOSH review of injury and fatality data was conducted to identify fatal and non-fatal refuse truck-related injuries. There were 310 occupational fatalities associated with refuse trucks between 2012 and 2022, with a fatality rate of 22.6 per 100,000 waste collection workers [BLS 2024]. This rate is more than six times the average occupational fatality rate of 3.7 per 100,000 for all industries combined [BLS 2024]. Seventy-four percent of refuse truck-related deaths were related to transportation incidents, which include both struck-by incidents and collisions involving other vehicles [BLS 2024].



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Between 2012–2022, refuse trucks were the primary source for 26,300 (95%CI ± 9,300) occupational injuries treated in U.S. emergency departments, with 44% (95%CI ±8%) of these injuries attributed to transportation incidents. Of the transportation-related injuries, 26% (95%CI ± 9%) resulted from a fall or jump from the refuse truck while it was in normal operation on a roadway [NIOSH 2024b].

Current Best Practices for Employees

Current Occupational Safety and Health Administration (OSHA) regulations do not specifically address refuse trucks. However, standards have been published by the American National Standards Institute (ANSI). NIOSH, the Solid Waste Association of North America (SWANA), and the National Waste and Recycling Association (NWRA) have published best practices [ANSI 2017a,b; NIOSH 1997, 2023; SWANA 2016; NWRA 2013].

ANSI published Safety Standards for Mobile Refuse Collection and Compaction Equipment. Within ANSI Z245.1, section 7.3.2 outlines safe riding positions for those driving or riding in the vehicle while it is traveling. ANSI Z245.1-2017, section 7.4.7.6 provides requirements for operating or working on any vehicle equipped with riding steps. [ANSI 2017a,b]. Consult these ANSI standards [ANSI 2017a,b] for a detailed list of best practices that employees can follow.

NIOSH [1997] developed an Alert focused on preventing worker injuries and deaths associated with moving refuse collection vehicles. The Alert highlights industry standards and procedures for safe riding, safe backing, and safety equipment and technologies. The SWANA Backing Best Management Practices document provides steps to take when there is a need to back up, and safety points to think about before backing [SWANA 2016]. SWANA also released guidelines entitled Five Tips to Stay Alive [SWANA 2023b], which provides basic safety principles for working around moving vehicles. Safe backing procedures for workers are also highlighted in the NWRA Manual of Recommended Safety Practices [NWRA 2013]. A summary of the best practices presented in these materials includes the following:

- Maintain visual contact between the operator and workers on foot when working close to the vehicle and when backing [NIOSH 1997].
- Systematically check both side mirrors when backing [NIOSH 1997].
- Use a reliable spotter positioned to see both the operator and any blind spots behind the vehicle when backing [NIOSH 1997].
- Use standard hand signals when backing [NIOSH 1997].

- Stop the truck if the spotter must change positions [NIOSH 1997].
- Immediately stop the maneuver if visual contact with the spotter is lost [NIOSH 1997].
- Remain clear of the rear of the vehicle when the backup lights are on or the alarm is sounding [NWRA 2013].
- Ensure that no workers are riding the step when operators are backing the truck or when traveling more than 10 mph or 1/5-mile [SWANA 2016, 2023a].
- Use equipment such as a 4-way flasher and back-up alarm, and periodically tap horn before and while backing [SWANA 2016].
- Use technology, including radar and cameras [NIOSH 1997].
- Get out and look [SWANA 2016].
- Never use a cell phone while driving the truck or at a disposal facility [SWANA 2023b].
- Always comply with safety belt rules [SWANA 2023b].
- Do not exceed the speed limit and do not rush [SWANA 2023b].

Responsibilities of the spotter include the following:

- Remain visible in the operator's mirrors [NIOSH 1997].
- Maintain a clear view of the hazard area (operator's blind spot) behind the vehicle [NIOSH 1997].
- Stay clear of the vehicle's path [NIOSH 1997].
- Avoid walking backward [NIOSH 1997].
- Use agreed upon hand signals to communicate with the operator [NIOSH 1997].
- Be sure that no one is on the riding steps or behind the vehicle before signaling the operator to start backing [NIOSH 1997].
- Immediately signal the operator to stop if any person or object enters the area behind the truck [NIOSH 1997].
- Always maintain visual contact with the driver while the vehicle is backing [OSHA 2024].
- Wear personal protective equipment (PPE), including high visibility apparel [ANSI/ISEA 2020; SWANA 2016, 2023b].

Effective injury prevention programs help identify how work-related injuries may be prevented. Comprehensive programs consider all factors that may contribute to injury, including the environment, workers, management, vehicles, and equipment design. This prevention method is consistent with the Safe System Approach [DOT 2022] which is a best practices approach to improving transportation safety across all industries. Many of the Safe System programs have specific recommendations around improving fleet and worker safety and could be a further resource for employers and manufacturers.

NIOSH FACE Cases

Investigations of work-related deaths are conducted using the Fatality Assessment and Control Evaluation (FACE) model [Higgins et al. 2001]. This model reflects the public health perspective that most injuries and fatalities are preventable. FACE investigators collect information about factors associated with the mode of energy exchange, the worker(s) who died, and the physical and social aspects of the workplace during the pre-event, event, and post-event phases of the fatal incident. This information is gathered through interviews, examination of the incident site, and review of multiple source documents such as medical examiner and police reports.

FACE investigators use this information to develop narrative reports that detail organizational, behavioral, and environmental factors that contributed to the death(s) and suggest prevention recommendations specific to the site and each incident. There are two NIOSH FACE case studies [NIOSH 2021, NIOSH 2022] that involved collection worker struck-by fatalities. Consult the FACE reports [NIOSH 2021, NIOSH 2022] for details about the incidents and recommendations on equipment selection, safe work practices, and training to prevent worker fatalities.

Considerations for Employers

In addition to current standards, best practices, and lessons learned from FACE investigation reports, NIOSH provides the following steps that employers can consider to protect workers from injury while working with and around refuse trucks:

- Consider adopting automated side loader refuse trucks to allow safe operation from the cab [Ross and Law 2023] by using a pickup arm and remote-controlled grapple aided by sensors and cameras to pick up and dump single waste containers.
- Consider installing worker detection and operator notification devices on refuse equipment and ensuring radio communication is available. No technology is a substitute for safe work practices, but it can improve the safety of workers [NIOSH 1997]. Some current technologies available for waste management vehicles include the following [SWANA 2016; Rogoff and Ross 2017; NSC 2021]:
 - Cameras and digital video camera systems to reduce vehicle blind spots
 - Front, rear, and side proximity detection and collision avoidance systems (Proximity detection systems can alert the operator with audio warning)
 - Reversing and audio warning alarms
 - Automatic backup breaking, which can detect objects through infrared, microwave, or ultrasonic detectors
 - Fleet management systems that provide Global Positioning Systems (GPS), vehicle speed, telematics, and location.

- Consider training employees on hazard recognition and mitigation strategies, including job task specific hazards of equipment and blind spots. 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 a website with methods for identifying blind areas of construction vehicles and other pieces of equipment [NIOSH 2019]. Employers may consider providing a comprehensive safety and training program in the workers' primary language and at an appropriate reading level. Trainings may include the following:
 - A focus on high-risk areas, including the areas in front of and behind the vehicle, and the entrance point to access systems where a person might approach [ISO 2017].
 - The operator's visual limits for the specific equipment being used for all employees who work on foot near the equipment [NIOSH 2019].
 - 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].
- Consider conducting a job hazard analysis to systematically evaluate waste collection job tasks by focusing on the relationship between the worker, the task, the tools, and the work environment [OSHA 2002]. Effective job hazard analyses identify hazards and hazardous situations and inform hazard mitigation strategies and occupational safety and health plans.
- Consider training employees on the risks associated with working on roadways with passing motorists and the need to maintain heightened situational awareness to perceive and understand what is happening in the surrounding environment in time to prevent bad outcomes [Gasaway 2019].
- Consider ranking risks from the highest level of protection and reliability to the lowest. This ranking is known as the hierarchy of control measures. Using these control measures to manage risks will ensure the most effective control measures are being applied to reduce or remove exposures to hazards. Regular evaluation can check whether controls are effective in reducing exposures and identify potential improvements [NIOSH 2023b].

Manufacturers Equipment Design Considerations

Manufacturers of refuse equipment may consider designing riding steps and passenger compartments to provide maximal rider and passenger safety during routine vehicle operation. NIOSH recommends "refuse collection vehicles should be equipped with strategically placed guards or extended

bodywork to prevent workers from falling into the path of the wheels” [NIOSH 1997 p. 7]. In addition, 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; and shall not be less than 0.75 inches nor greater than 2 inches with a hand clearance of no less than 3 inches.
- Have a depth of at least 8 inches and provide a minimum of 220 square inches of surface area.
- Be located behind the rearmost axle of the vehicle but shall not extend beyond the rearmost structural portion of the vehicle” [ANSI 2017b].

Suggested Citation

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For More Information

More information about the NIOSH FACE program can be found at <https://www.cdc.gov/niosh/face/default.html>

More information from the NIOSH FACE program about refuse worker safety can be found at https://www.cdc.gov/niosh/face/resources_waste_management.html

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