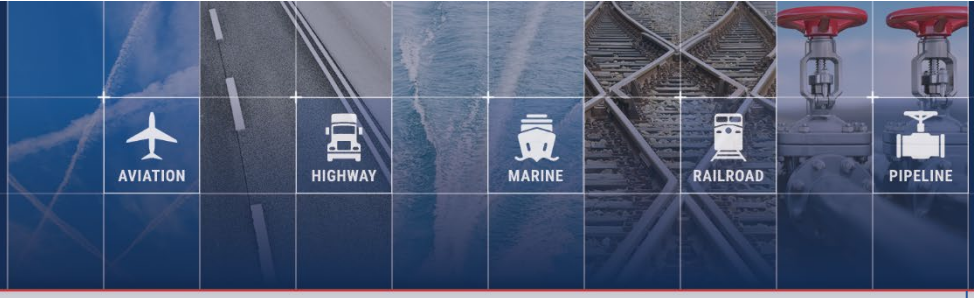

Issued: June 25, 2025 Railroad Investigation Report: RIR-25-09

CSX Transportation Conductor Trainee Fatality

Baltimore, Maryland
June 26, 2023

Abstract: This report discusses the June 26, 2023, fatality of a conductor trainee who was killed when he fell from an intermodal railcar during a shoving movement and was struck by the train at Seagirt Marine Terminal in Baltimore, Maryland. The safety issues identified in this report include: (1) deficient CSX Transportation operating rules for riding equipment, which did not provide adequate protection against the risk of slipping; (2) deficient CSX Transportation training on how to ride intermodal railcars; and (3) the lack of research-based federal standards for the safe use of railcar safety appliances when riding equipment. As a result of this investigation, the National Transportation Safety Board issues new safety recommendations to the Federal Railroad Administration, CSX Transportation, and all Class I railroads.

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Acronyms and Abbreviations

CFR	*Code of Federal Regulations*
CSX	CSX Transportation
FRA	Federal Railroad Administration
NTSB	National Transportation Safety Board

Executive Summary

What Happened

On June 26, 2023, about 8:06 p.m. local time, a CSX Transportation (CSX) conductor trainee in phase II of conductor training was killed when he fell from an intermodal railcar during a shoving movement and was struck by the train he was riding at Seagirt Marine Terminal in Baltimore, Maryland.

What We Found

The National Transportation Safety Board found that the conductor trainee's riding stance was unstable, in part, because he had restricted foot placement, which resulted in him falling from the intermodal railcar when the train experienced slack action. We identified deficiencies in CSX's operating rules, which did not identify railcar safety appliances that could restrict foot placement and result in unstable riding stances and increased risk of slipping, and in CSX's phase I conductor training, which sent conductor trainees into the field without performance-based verification that they could safely ride an intermodal railcar, leaving them unprepared to ride intermodal railcars in phase II training.

We also found that the lack of federal guidelines or industry standards on the use of railcar safety appliances when riding equipment leaves railroad employees vulnerable to preventable injuries and fatalities when they are unable to obtain a stable riding stance. In addition, current railroad operating rules for riding equipment may require railroad employees to assume riding stances that result in restricted foot placement, significantly increasing employees' risk of injury.

The National Transportation Safety Board determined that the probable cause of the Baltimore, Maryland, accident was the conductor trainee, who CSX Transportation sent into the field without performance-based verification that he could safely ride an intermodal railcar, riding the intermodal railcar in an unstable position that left him vulnerable to slipping and falling into the train's path. Contributing to the accident were: (1) deficient CSX Transportation operating rules, which did not provide adequate protection against the risk of slipping; (2) deficient CSX Transportation training, which did not provide sufficient training on how to ride intermodal railcars; and (3) the lack of research-based federal guidance for the safe use of railcar safety appliances when riding equipment.

What We Recommended

As a result of this investigation, we made two safety recommendations to the Federal Railroad Administration, two recommendations to CSX, and one recommendation to all Class I railroads.

We recommended that the Federal Railroad Administration conduct research on the effects of foot and hand placement on all railcar safety appliances, taking into consideration the effects that slack action and other railcar movements have on the human body's center of gravity, to determine where railroad employees can place their feet and hands on these appliances to safely and securely ride equipment. We then recommended that, based on this research, the Federal Railroad Administration issue guidance on the proper use of railcar safety appliances and encourage railroads to review and revise their operating rules and training for riding equipment based on the federal guidance. Because of the risks associated with restricted foot placement, we recommended that Class I railroads prohibit employees from riding railroad equipment with their feet on railcar safety appliances that restrict foot placement.

We also recommended that CSX revise its operating rules to instruct employees on how to safely ride all the types of railcars that it has in various situations that employees might encounter, such as riding across highway-railroad grade crossings, and provide initial and annual recurring training to all employees on the revised operating rules.

1 Factual Information

1.1 The Accident

On June 26, 2023, about 8:06 p.m. local time, a CSX Transportation (CSX) conductor trainee was killed when he fell from the lead intermodal railcar during a shoving movement and was struck by the train as it approached a highway-railroad grade crossing at Seagirt Marine Terminal in Baltimore, Maryland.[1] (See figure 1.) The conductor trainer, a certified conductor who served as the on-the-job instructor for the conductor trainee, was also riding the intermodal railcar; he was not injured. At the time of the accident, visibility conditions were daylight and clear; the weather was 84°F with intermittent rain showers.[2]

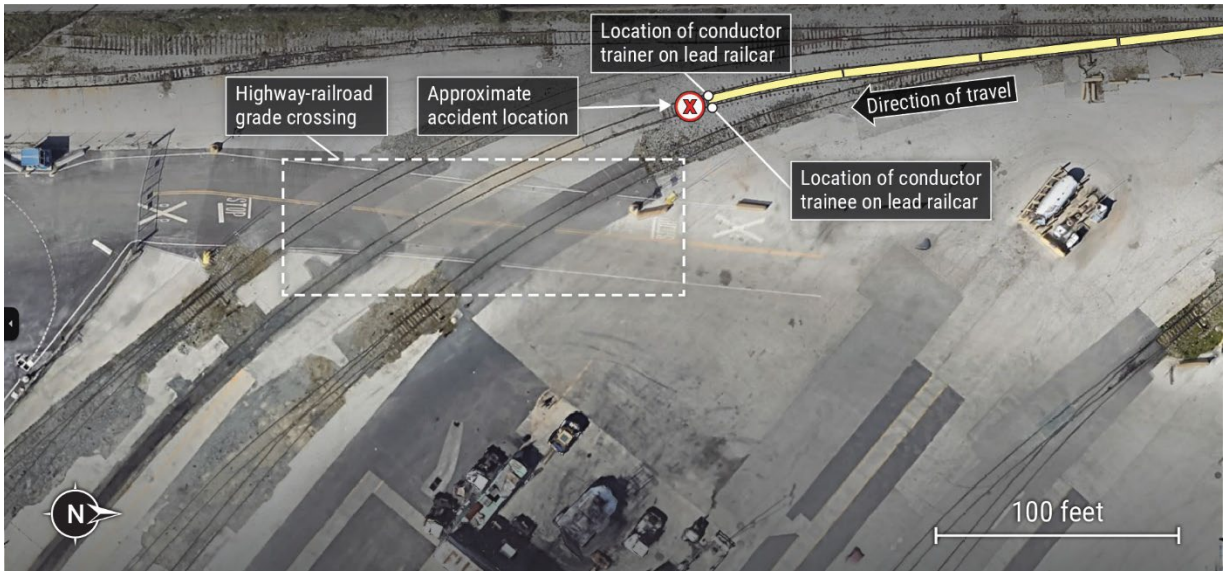

Figure 1. Aerial view of the accident scene. (Courtesy of Google Earth.)

The train crew consisted of an engineer, a conductor trainer, and the conductor trainee; their train consisted of 2 locomotives and 15 empty intermodal

[1] (a) Visit www.ntsb.gov to find additional information in the public docket for this National Transportation Safety Board (NTSB) accident investigation (case number RRD23FR012). Use the CAROL Query to search safety recommendations and investigations. (b) A *shoving movement* is the process of pushing railcars or a train from the rear with a locomotive. (c) An *intermodal railcar* is designed to carry shipping containers used in intermodal freight transportation.

[2] See section 1.7 for more on weather.

railcars.[3] On the day of the accident, the crew reported for duty about 3:59 p.m. at Seagirt Terminal, received instructions, conducted a job briefing, and began switching operations.[4] The National Transportation Safety Board (NTSB) review of Seagirt Terminal surveillance video showed that about 8:04 p.m., the crew was shoving railcars around a curve approaching a highway-railroad grade crossing. The conductor trainer was on the west side of the lead railcar (the right side in the direction of travel). The conductor trainee was controlling the shoving movement from the east side of the lead railcar (the left side in the direction of travel).[5] (See figure 1.)

Surveillance video showed that moments before the accident, the conductor trainer was riding with his feet on the railcar's horizontal handhold and his hands on the railcar's vertical handholds while his body faced the railcar, and he looked in the direction of travel.[6] The surveillance video also showed the conductor trainee was riding with his left foot on the horizontal handhold, his right foot on the end platform, his right hand on a vertical handhold, and his left hand on the lapel microphone attached on the right of his shoulder vest while his body (and head) faced the direction of travel.

Figure 2 shows the accident intermodal railcar, highlighting several of its railcar safety appliances and their locations.[7] Figure 3 shows investigators reenacting the conductor trainer and the conductor trainee's riding stances on the accident railcar. (See section 1.4 for more on the reenactment.)

[3] Several days before the accident, CSX assigned the conductor trainee to the crew as part of its conductor training program.

[4] *Switching operations* involve moving railroad equipment (railcars and locomotives) from one track to another or to different positions on the same track.

[5] A crewmember controls a shoving movement by giving instructions to the engineer (who is in the train's locomotive) while positioned at the lead end of the train.

[6] A *handhold* is a metal bar-shaped appliance attached to the sides of railroad equipment for use as a grip for the rider's hands. The railroad industry often uses the terms "handhold" and "grab iron" interchangeably; however, "handhold" is the Federal Railroad Administration (FRA) term for this appliance. (See section 1.6 for more on railcar safety appliances.)

[7] Gunderson manufactured the 77-foot accident intermodal railcar, DTTX 475890, on September 9, 1997.

Figure 2. Photograph of the accident intermodal railcar and several of its railcar safety appliances. (Courtesy of the Brotherhood of Locomotive Engineers and Trainmen.)

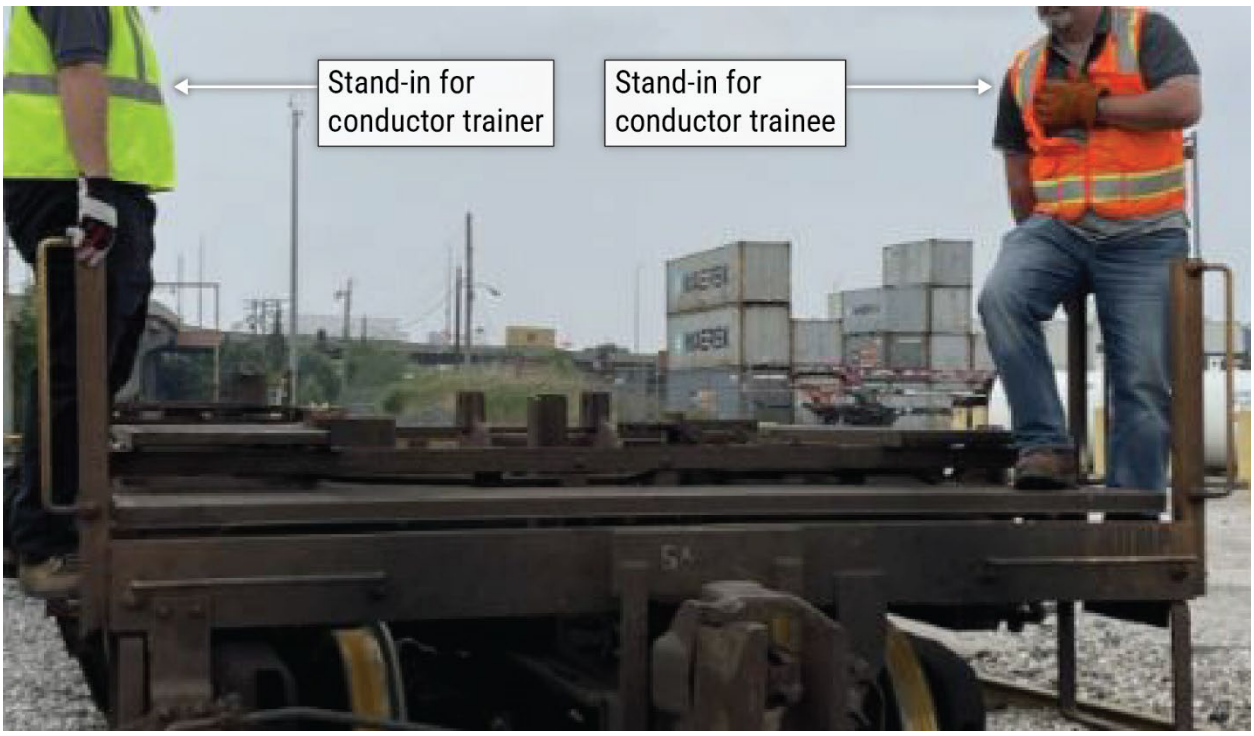

Figure 3. Photograph shows investigators reenacting the crewmembers' riding stances.

Neither the conductor trainer nor the conductor trainee was riding on the bottom sill step (or step) of the railcar.[8] (The railroad industry often uses the terms "sill step," "step," "rung," "stirrup," and "horizontal handhold" interchangeably; however, a "horizontal handhold," is not the same (in design or function) as a "sill step.") In an interview, the conductor trainer told the NTSB that during the time he had trained the conductor trainee, he had instructed the trainee not to ride the bottom step of equipment over grade crossings to comply with a CSX operating rule.[9] (See section 1.5 for more on this rule.). The conductor trainer said that he had encouraged the conductor trainee to follow this rule so that the conductor trainee would not "get dinged" for noncompliance.[10]

In an interview with the NTSB, the conductor trainer said that just before the accident, the conductor trainee radioed the engineer to stop the train within five

[8] A *sill step* is a rectangular railcar safety appliance attached to the lower sides of railroad equipment for use as a step for the rider's feet.

[9] The accident railcar was only equipped with a single sill step.

[10] FRA regulations at Title 49 *Code of Federal Regulations* (*CFR)* Part 217.9 require railroads to routinely conduct operational testing by observing employees on the job to determine whether they are following rules and regulations.

railcar lengths.[11] The conductor trainer recalled that as the engineer slowed the train in response to the conductor trainee's communication, he felt slack run out of the railcars.[12] The NTSB review of surveillance video showed that as the slack action occurred, the conductor trainer abruptly slipped toward the train's direction of travel, colliding with one of the two vertical handholds that he was standing between, which, along with his grip on both handholds, stopped him from falling from the equipment. The surveillance video also showed that when the conductor trainee experienced the slack action, his right foot lost contact with the railcar platform, and he slipped forward. The conductor trainer told the NTSB that after the slack action occurred, he saw the conductor trainee lose his balance and fall into the train's path. After seeing the conductor trainee fall, the conductor trainer radioed the engineer to stop the train, hopped off the train, and opened the angle cock, initiating a train-line emergency stop.[13] Event recorder data showed the train came to a stop about 8:06 p.m.[14] About 20 minutes later, emergency medical services arrived on the scene and pronounced the conductor trainee deceased.

1.2 Track Information

Seagirt Terminal is a 284-acre container terminal that handles 97% of container volume at the Port of Baltimore. Ports America operates the Seagirt Terminal, and CSX services it.[15] The nine intermodal railroad tracks at Seagirt Terminal pass over a large concrete pad used to load and unload intermodal containers for tractor-trailer transport and railroad transport.[16] The accident occurred on track 5 at the western end of the Seagirt Terminal intermodal railroad tracks. Trains in the area operate

[11] Crews commonly use railcar lengths to communicate distances.

[12] *Slack* or *slack action* is the amount of free movement of one railcar before it transmits its motion to a connected railcar, and it often results in a sudden change in a railcar's velocity.

[13] (a) A brake pipe *angle cock* is a valve located at each end of railroad equipment and is used to open or close the brake pipe. (b) A *train-line emergency stop* occurs when the air pressure contained within the air brake system is fully released, resulting in the complete application of the train's brakes.

[14] An *event recorder* is a device installed on railroad vehicles to record specific data such as speed, braking commands, automatic train control information, and operator commands.

[15] (a) The Seagirt Terminal intermodal facility is within the CSX Baltimore Terminal Subdivision. (b) Norfolk Southern Railway also services Seagirt Terminal.

[16] Intermodal railcars, such as the accident railcar, were the most common type of railcar used at Seagirt Terminal.

under CSX rules for movement on "track other than main track," which require movements to be made at restricted speed.[17] Event recorder data showed the train did not exceed the CSX maximum operating speed for the area when the accident occurred.

1.3 Operator Information

1.3.1 Personnel

1.3.1.1 Certification and Exams

CSX hired the conductor trainer on September 30, 2013, and had last recertified him on December 31, 2022.[18] CSX hired the conductor trainee on April 3, 2023, and had not yet certified him.

1.3.1.2 Cell Phone Use

The NTSB review of surveillance video did not show the conductor trainer or the conductor trainee using cell phones at the time of the accident.

1.3.1.3 Toxicology

Railroad authorities immediately determined that the conductor trainer and the engineer had no role in the cause or severity of the accident and did not submit either for toxicology testing.[19]

At the request of the NTSB, the Federal Aviation Administration Forensic Sciences Laboratory tested specimens from the conductor trainee.[20] Results were negative for all tested-for substances.

[17] The FRA defines *restricted speed* as operations that occur when a train operates at a speed that will permit stopping within one-half the visual range of the operator, not to exceed 20 mph (49 *CFR* 236.812). CSX authorized a maximum operating speed of 10 mph in the accident area.

[18] Certified conductors are also considered qualified conductors. (See section 1.6 for more on conductor certification and qualification requirements.)

[19] See 49 *CFR* 219.201(c)(2) for testing requirements.

[20] The Federal Aviation Administration Forensic Sciences Laboratory tests specimens for a wide variety of substances including toxins, prescription and over-the-counter medications, and illicit drugs.

1.3.2 Railroad

1.3.2.1 CSX Conductor Training

When the accident conductor trainee entered the CSX conductor training program in April 2023, it consisted of two phases. Phase I training included 4 weeks (20 training days) of in-person classroom instruction and field training at the CSX Railroad Education and Development Institute training facility in Atlanta, Georgia. The classroom instruction was 2 weeks (10 training days) and included multimedia presentations, classroom props, mockups, training simulators, and computer-based training exercises. Classroom training topics included basic railroad operating rules, signal aspects, and rules governing train movement. Field training consisted of 2 weeks (10 training days) of conductor trainees performing specified tasks (such as mounting and dismounting equipment, riding equipment, and performing shoving movements) under the guidance of instructors in the training yard. In an interview, the manager of training programs told the NTSB that during phase I training, CSX instructors informed conductor trainees about slack action, and conductor trainees experienced slack action when riding equipment at the training facility.[21] CSX permitted conductor trainees to advance to phase II of conductor training if they completed the classroom instruction and field training and passed the associated evaluations, which included knowledge-based quizzes and tests and performance-based evaluations on riding various equipment and conducting a Class I air brake inspection and test. (The performance-based riding evaluations did not include tests on intermodal railcars.)

Phase II training consisted of local managers, such as managers of train operations, and certified conductors providing on-the-job training to conductor trainees in each trainee's seniority district.[22] During on-the-job training, managers and certified conductors evaluated a conductor trainee's performance of 24 specified tasks, including radio communication, mounting and dismounting equipment, and shoving movements. Managers determined how long a conductor trainee remained in phase II based on the conductor trainee's ability to perform the 24 tasks and their

[21] The manager of training programs was responsible for managing the course curriculums and schedules for both the CSX engineer and the CSX conductor training programs.

[22] (a) Phase II training at Seagirt Terminal was typically 2.5 to 3 months; the length of CSX phase II training could vary by location. (b) *Seniority districts* are geographical locations established through collective bargaining agreements within companies that have unionized labor organizations.

completion of the required CSX exams.[23] CSX promoted conductor trainees to certified conductors if they successfully completed both phases of the conductor training program.

At the time of the accident, the accident conductor trainee had completed phase I training and had been in phase II training at Seagirt Terminal for about 2 months. He had completed 9 of the 24 required tasks, including radio communications and shoving movements. Three of the certified conductors who trained the accident conductor trainee told the NTSB in interviews that he performed his duties well.[24]

1.3.2.2 Training Equipment

When the accident conductor trainee attended CSX conductor training, the training facility equipment, which supported trainee field instruction, consisted of 3 locomotives and 25 railcars. The 25 railcars were a mix of gondola railcars, hopper railcars, and one tank car.[25] The training facility equipment did not include an intermodal railcar. In an interview, the manager of training programs told the NTSB that although they did not have an intermodal railcar onsite, many of the phase I classroom training presentations included material on intermodal railcars. CSX services intermodal facilities in more than 30 cities in major metropolitan areas across the US (including the intermodal facility at the accident location at Seagirt Terminal in Baltimore, Maryland) where it routinely requires its conductors to ride, mount, and dismount intermodal railcars.

1.3.2.3 Riding Stance Training

According to the conductor training program syllabus and the NTSB interview with the manager of training programs, when the accident conductor trainee

[23] These exams included the new hire conductor phase II final exam, the initial qualifying exam, and the physical characteristics certification exam.

[24] (a) These certified conductors included the accident conductor trainer, the conductor mentor for the Seagirt Terminal, and the manager of train operations for the Baltimore Terminal Subdivision. (b) The conductor mentor for the Seagirt Terminal's primary duty was to train and mentor conductor trainees at that terminal. Other certified conductors, such as the accident conductor trainer, were often tasked with instructing the conductor trainees assigned to their crews. (c) The manager of train operations for the Baltimore Terminal Subdivision was responsible for the safe movement of trains through that terminal.

[25] *Gondola railcars* and *hopper railcars* are designed to carry bulk commodities. *Tank cars* are designed to carry liquid and gaseous commodities.

attended CSX phase I conductor training, instructors taught and evaluated conductor trainees on two stances for riding railcars. The first riding stance, the "ladder hang stance," was a standard position for use on most railcars, including intermodal railcars, and required the rider to place both feet on the step and hands (one or both, depending on whether the rider was also operating a radio or other approved device) on handholds while positioning the body to face the equipment and looking in the direction of travel. (See figure 4.) As discussed in section 1.1, the accident conductor trainer was riding with his feet on the horizontal handhold (which he used as a step) and his hands on the vertical handholds while his body faced the equipment, and he looked in the direction of travel.

Figure 4. Photograph of trainees at the CSX training facility performing the ladder hang stance. (Courtesy of CSX.)

The second riding stance that CSX taught conductor trainees was that required for riding a tank car equipped with a single vertical handhold, which this report calls the "tank car stance."[26] (CSX operating rules state that employees must use this

[26] Although this report refers to the stance for riding a tank car equipped with a single vertical handhold as the "tank car stance," CSX has other approved stances for riding tank cars depending on the tank car's safety appliance configuration and environmental factors; however, these are not relevant to this report given the safety appliances available on intermodal railcars, including the accident intermodal railcar, which can be similar to the appliances on tank cars equipped with a single vertical handhold.

position "when riding tank cars" that only have one handhold.)[27] The manager of training programs told the NTSB that for the tank car stance, CSX taught conductor trainees to place one foot on the step, the other foot on the outer edge of the end platform, and a hand on the one handhold, which he said required the rider to face the direction of travel. As discussed in section 1.1, the accident conductor trainee was riding the intermodal railcar with one foot on the horizontal handhold (which he used as a step), the other foot on the end platform, one hand on a vertical handhold, and the other hand on the lapel microphone attached to his vest while his body (and head) faced the direction of travel.

1.4 Tests and Research

1.4.1 On-Site Observations

The NTSB conducted a reenactment of the accident train's movement without personnel on the lead railcar about 11:00 a.m. on June 28, 2023, at the accident location. The NTSB saw that the train's slack action was typical for the type of railcars involved in the shoving movement.

The NTSB also conducted a static reenactment of the accident crewmembers' riding stances. Based on the surveillance video, investigators took the same stances on the accident railcar as the conductor trainer and the conductor trainee to observe the stability the crewmembers likely had during the accident movement. Both crewmember stand-ins reported that they experienced restricted foot placement when reproducing the crewmembers' riding stances. (In an interview, the accident conductor trainer told the NTSB that he could not get his toes across the horizontal handhold rung, so he had to angle his feet on the railcar safety appliance). (See figure 5.) Restricted foot placement occurs when a rider or climber is unable to place their foot perpendicular to and fully centered on a ladder rung or appliance rung.[28] (See figure 6.) As discussed below, restricted foot placement tends to reduce the stability of a rider's or climber's stance.

[27] CSX operating rule 2102.3.

[28] For unrestricted foot placement to be present, both conditions must be met: the rider's foot must be placed perpendicular to the appliance rung and be fully centered on it. For example, a rider with a foot placed lengthwise across an appliance rung cannot have unrestricted foot placement because their foot is not perpendicular to the rung.

Figure 5. Reenactment photograph shows the crewmembers' restricted foot placement.

Figure 6. Photographs of restricted foot placement (left) and unrestricted foot placement (right). (Courtesy of *Ergonomics* with NTSB annotations.)

1.4.2 Existing Research on Foot Placement

A 2014 study found that ladder climbers with restricted foot placement were six times more likely to experience a slip than climbers with unrestricted foot placement (Pliner, Kyureghyan, and Beschorner 2014).[29] The study noted that the US Mining Safety and Health Administration required ladders to be placed at least 3 inches away from other surfaces, and the Occupational Safety and Health Administration required a 7-inch clearance.[30] The authors suggested that, based on their research, the Occupational Safety and Health Administration rule exposed workers to significantly less slip risk than the US Mining Safety and Health Administration rule because, unlike the US mining rule, it allowed sufficient space for foot placement on the rung (Pliner, Kyureghyan, and Beschorner 2014).

The Federal Railroad Administration (FRA) requires that horizontal handholds, which railroad employees often use as ladder rungs (or footholds), be placed at least 2 inches (50.8 mm), preferably 2.5 inches (63.5 mm), from the railcar body (Title 49 *Code of Federal Regulations* (*CFR*) 231.1(i)(2)(iii)). When railroad employees use the handholds as footholds, the FRA minimum clearance requirement is up to 1 inch less than the federal requirement for miners and up to 5 inches less than the federal requirement for occupational workers. Publicly available photos of CSX and other Class I railroad employees show them standing on railcar safety appliances, including horizontal handholds, that do not allow them to place their foot perpendicular to and fully centered on the appliance rung. (See figure 7 and figure 8.)

[29] Pliner, Kyureghyan, and Beschorner's study uses the terms "toe clearance" and "foot placement" interchangeably.

[30] The Occupational Safety and Health Administration ladder clearance requirement does not apply to ladders on railroad equipment. The FRA is responsible for establishing clearance requirements for appliances on railroad equipment.

Figure 7. Photographs show CSX employees displaying restricted foot placement (left) and unrestricted foot placement (right). (Courtesy of CSX with NTSB annotations.)

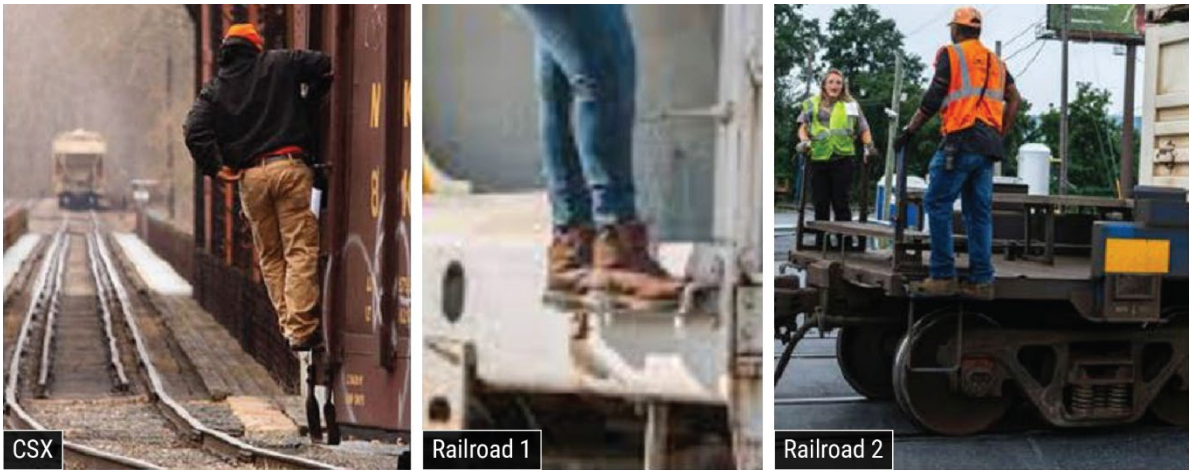

Figure 8. Photographs show CSX and other Class I railroad employees angling their feet to stand on various railcar safety appliances. (Courtesy of *Trains*, Union Pacific Railroad, and *The Patriot-News*.)

1.4.3 NTSB Foot Placement Study

The NTSB conducted a foot placement study on September 5, 2024, on a slack action simulator at the Canadian National (CN) Homewood training facility in

Homewood, Illinois.[31] In one scenario, the NTSB had the CN demonstrator, who had 14 years of railroad experience, stand on a railcar safety appliance rung and place the first 2 inches of his boots past the rung. This position did not allow the CN demonstrator to place his foot perpendicular to and fully centered on the ladder rung, modeling restricted foot placement. In another scenario, investigators had the CN demonstrator place one foot lengthwise across the ladder rung (the other foot was placed perpendicular to the rung and both the demonstrator's hands were on a handhold). This position did not allow the CN demonstrator to place his foot perpendicular to and fully centered on the ladder rung, modeling another variant of restricted foot placement. Finally, investigators had the CN demonstrator stand on a ladder rung that simulated a sill step that allowed him to place his feet perpendicular to and fully centered on the ladder rung, modeling unrestricted foot placement. During the slack action simulations, the CN demonstrator slipped from the simulator when his foot placement was restricted; he did not slip when his foot placement was unrestricted.[32]

1.5 Policies and Procedures

1.5.1 Riding Stance Rules

The first three parts of CSX operating rule 2102.1 included riding stance guidelines. Under this operating rule, employees riding equipment must (1) position their body to face the equipment and look in the direction of travel; (2) maintain at least three points of contact, keeping secure handholds and footing; and (3) be prepared for unexpected movements and slack action.[33]

[31] (a) CSX did not have a slack action simulator, so the NTSB contacted CN and used the slack action simulator at its Homewood training facility. (b) The CN Homewood training facility provides initial training for CN employees, including conductors.

[32] CN conducted the demonstrations at 4 mph, the slack action simulator's lowest setting.

[33] (a) A person riding equipment has *three points of contact* when they are using three limbs to maintain their position, such as having both feet in a sill step and a hand gripping a handhold. (b) See the public docket for this accident investigation (case number RRD23FR012) for all parts of CSX operating rule 2102.1.

The NTSB review of the six freight Class I railroads' operating rules for riding equipment found that while all the railroads included the riding stance rules, no railroad, to include CSX, prohibited employees from using handholds as footholds.[34]

1.5.2 Grade Crossing Rule

Under CSX operating rule 2102.2(e)(d), employees must not ride the bottom step of equipment when traversing highway-railroad grade crossings.[35] (In correspondence, CSX told the NTSB that it required employees to ride above the bottom step when traversing grade crossings because the position allowed employees to be above the area where a vehicle might impact them.) When the NTSB asked the manager of train operations for the Baltimore Terminal Subdivision how employees should ride an intermodal railcar across a grade crossing, he described the stance the accident conductor trainer took, the ladder hang stance—feet above the bottom step and two hands holding on [to handholds].

The NTSB review of the six freight Class I railroads' operating rules for riding equipment found that three, including CSX, prohibited employees from standing on the bottom step of equipment while traversing grade crossings.

1.6 Regulatory Requirements

1.6.1 Railcar Safety Appliances

Federal regulations at 49 *CFR* Part 231 describe the number, dimensions, location, and manner of application for railcar safety appliances, such as ladders and handholds, on the various railcar types, such as box and other house cars (which include intermodal railcars) and tank cars. These regulations require horizontal-end handholds on box and other house cars built or placed in service before October 1, 1966 (such as the accident intermodal railcar), to meet the following standards, in part:

[34] The review also noted that no railroad outlined the proper use of each railcar safety appliance.

[35] (a) CSX Safe Way, effective June 1, 2023. (b) After the accident, in March 2024, CSX updated several rules associated with its required methods for riding railcars, publishing the updated Safe Way rulebook in August 2024. The updated operating rules continued to prohibit employees from riding the bottom step of equipment when traversing highway-railroad grade crossings.

(1) Number. Eight or more, four on each end of car.

(2) Dimensions. Minimum clearance, 2, preferably 2.5, inches.

(3) Location. One near each side on each end of car, not less than 24 nor more than 30 inches above center line of coupler (with a certain exception).

(4) Manner of application. Horizontal end handholds shall be securely fastened with not less than 0.5-inch bolts with nuts outside (when possible) and riveted over, or with not less than 0.5-inch rivets.
(49 *CFR* 231.1(i))

Figure 9 shows the accident intermodal railcar's horizontal handholds.

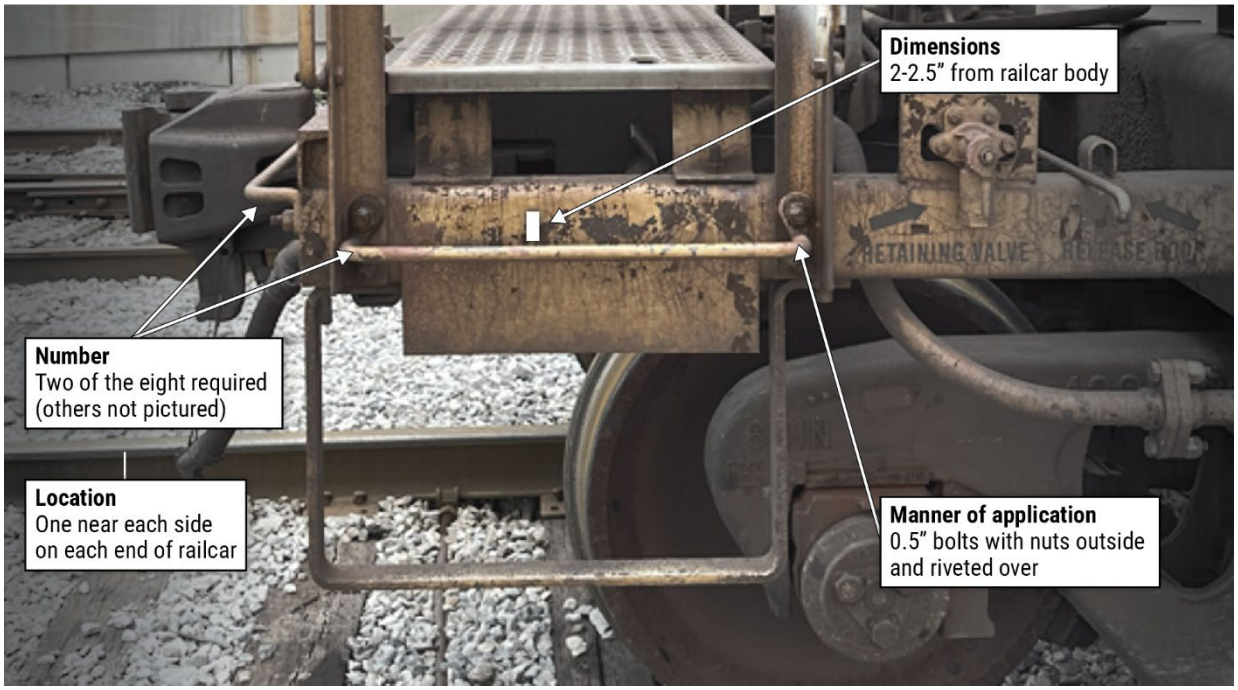

Figure 9. Photograph of the accident intermodal railcar's horizontal handholds as described in the regulation. (Courtesy of the Brotherhood of Locomotive Engineers and Trainmen.)

1.6.2 Conductor Training

Federal regulations at 49 *CFR* Part 242 provide minimum safety standards related to conductor qualification and certification. These regulations require Class I railroads to submit a conductor certification program plan to the FRA that meets federal requirements, which include procedures for training, knowledge testing, and monitoring operational performance that comply with established

criteria. In addition, these regulations state that before the initial issuance of a conductor certificate to any person, the railroad must determine that the person has, in accordance with the requirements of the section, the knowledge to safely perform as a conductor in each type of service that they will be permitted to perform (49 *CFR* 242.119(b)).

1.7 Weather

Weather station METAR Pier 7 Heliport – 4MD (K4MD) reported intermittent showers in the Baltimore/Washington International Airport area about 7:20 p.m. on the day of the accident. NTSB interviews with the accident conductor trainer did not indicate that residual moisture from the rainfall, which occurred about 40 minutes before the accident, affected the accident crewmembers' ability to ride the equipment or caused the accident train's railcar safety appliances to be slippery.

1.8 Postaccident Actions

1.8.1 Federal Railroad Administration

In response to the accident, on July 6, 2023, the FRA issued Safety Bulletin 2023-04 to railroads and encouraged them to identify location-specific safety issues to cover during safety briefings and to train or retrain their employees to increase awareness of the dangers of riding moving equipment.[36] The bulletin also instructed railroads to review their training programs to ensure they are adequate for employees who oversee trainees and that trainees are familiar with their duties, have received proper instruction, and are continuously monitored for compliance and safety (FRA 2023).

In July 2023, the FRA Switching Operations Fatality Analysis (SOFA) Working Group published an alert to railroad employees that highlighted the accident and encouraged them to remain vigilant during switching operations and to ensure shoving movements are performed safely and properly (SOFA 2023b).[37] The next

[36] *Location-specific safety issues* are the safety issues unique to a particular location and the type of work being performed there.

[37] The SOFA Working Group looks for commonalities among the fatalities that occur during switching operations and develops findings and recommendations that will aid in preventing railroad employee deaths; it includes representatives from the Brotherhood of Locomotive Engineers and Trainmen, the United Transportation Union, the Association of American Railroads, the American Short Line and Regional Railroad Association, and the FRA.

month, SOFA highlighted the accident in another alert and encouraged employees to remain vigilant while mentoring inexperienced employees (SOFA 2023a).

On August 21, 2023, 2 months after the accident, the FRA sent letters to the chief executive officers of all Class I railroads noting recent safety incidents involving conductors and conductor trainees riding moving equipment and calling on railroads to address "related underlying deficiencies in their training, qualification, and operational testing programs."[38]

1.8.2 CSX Transportation

1.8.2.1 Safety Alert

In response to the accident, on June 27, 2023, CSX issued a safety alert to its employees that reminded them of operating rules 104.5, 2102.1, 2102.2, and 2102.3, which apply to employee trainer responsibilities and riding equipment. The alert provided photographs of employees riding several kinds of railcars (although not an intermodal railcar) in compliance with CSX operating rules and a photograph of a noncompliant method for riding an intermodal railcar. (See figure 10 and figure 11.)

[38] For a copy of this letter, see the public docket for this accident investigation (case number RRD23FR012).

Figure 10. Photograph from the CSX safety alert of an employee modeling a compliant method for riding a railcar. (Courtesy of CSX.)

Figure 11. Photograph from the CSX safety alert of an employee modeling a noncompliant method for riding an intermodal railcar. (Courtesy of CSX.)

1.8.2.2 Changes to Conductor Training Program

On July 31, 2023, CSX and the International Association of Sheet Metal, Air, Rail and Transportation Workers—Transportation Division announced they had partnered to extend the CSX conductor training program from 4 weeks to 5 weeks to provide new hires with more hands-on experience before beginning on-the-job training.[39] In the announcement, CSX stated the extra week of training would focus on performing tasks in a field setting to increase trainees' exposure to railcar switching scenarios, radio communication, securement of equipment, brake tests, and other fundamentals of the conductor's role.

In addition, CSX reported new requirements for its conductor training program that included requirements for conductor trainees to: (1) perform a minimum 3-hour train ride facilitated by a manager or conductor mentor, (2) demonstrate proficiency riding each type of railcar, and (3) score 100% on a switching operations proficiency test.[40] CSX also reported it had created a management team to oversee the conductor mentor program and had increased its conductor mentor staffing.[41]

Finally, after the accident, in October 2023, the NTSB visited the CSX conductor training facility in Atlanta, Georgia, and saw that CSX had added an intermodal railcar to its training facility equipment and was using it during phase I field training.

[39] The International Association of Sheet Metal, Air, Rail and Transportation Workers – Transportation Division, also known as SMART-TD, is a labor union representing railroad, bus, mass transit, and airline workers in the US.

[40] On the 3-hour train ride, a manager rides with the conductor trainee to observe whether the trainee complies with applicable operating rules. Managers can conduct the rides in railyards, main tracks, or industry tracks.

[41] Nearly 2 years later, in February 2025, the International Association of Sheet Metal, Air, Rail and Transportation Workers reported that CSX had cut funding to its conductor mentor program and reduced conductor mentor staffing. The NTSB contacted CSX to confirm this reporting, and CSX said that it adjusts its conductor mentor roster as necessary as the number of newly hired conductors fluctuate.

2 Analysis

2.1 Introduction

On June 26, 2023, about 8:06 p.m. local time, a CSX conductor trainee was killed when he fell from an intermodal railcar during a shoving movement and was struck by the train at Seagirt Terminal in Baltimore, Maryland.

This analysis discusses the following safety issues:

- Deficient CSX Transportation operating rules for riding equipment, which did not provide adequate protection against the risk of slipping. (Section 2.2.)
- Deficient CSX Transportation training on how to ride intermodal railcars. (Section 2.3.)
- The lack of research-based federal standards for the safe use of railcar safety appliances when riding equipment. (Section 2.4.)

The NTSB established that the following factors did not contribute to the accident:

- *Conductor trainer or conductor trainee distraction because of cell phone use*: surveillance video indicates that the conductor trainer and the conductor trainee were not using cell phones during the accident.
- *Engineer performance*: event recorder data and NTSB on-site observations showed that the engineer operated the train in a manner consistent with normal train handling methods.
- *Weather*: NTSB interviews with the accident conductor trainer did not indicate that the weather affected the accident crewmembers' ability to ride the equipment or that the railcar safety appliances were slippery.

Therefore, the NTSB concludes that none of the following contributed to the accident: (1) conductor trainer or conductor trainee distraction because of cell phone use, (2) engineer performance, and (3) weather.

2.2 Deficient Operating Rules

2.2.1 Restricted Foot Placement and the Grade Crossing Rule

The NTSB reenactment noted that the conductor trainer and the conductor trainee were unable to place their feet perpendicular to and fully centered on the

ladder rung and therefore had restricted foot placement. A 2014 study found that ladder climbers with restricted foot placement were six times more likely to experience a slip than climbers with unrestricted foot placement (Pliner, Kyureghyan, and Beschorner 2014). During the NTSB foot placement study at the CN Homewood training facility, the demonstrator slipped from the simulator (which replicated railcar movement during slack action) when his foot placement was restricted, similar to the accident crewmembers. The demonstrator did not slip when his foot placement was unrestricted, similar to the findings in Pliner, Kyureghyan, and Beschorner's 2014 study. Thus, restricted foot placement reduced the stability of the accident crewmembers' riding stances.

In an interview, the conductor trainer told the NTSB that he had advised the conductor trainee of the CSX grade crossing rule that prohibited employees from riding the bottom step of equipment across grade crossings. Because the conductor trainer and the conductor trainee were approaching the accident grade crossing with awareness of the grade crossing rule, they were positioned on the railcar's horizontal handholds, railcar safety appliances that the NTSB foot placement study showed restricted their foot placement (and therefore increased their slip risk), instead of its bottom sill steps, appliances that would not have restricted their foot placement. CSX told the NTSB that its grade crossing rule is intended to protect employees from being struck by vehicles at grade crossings. However, in its attempt to protect employees from getting hit by vehicles at grade crossings, CSX increased employees' exposure to slips and falls from moving equipment in cases where the next step of equipment restricts foot placement. Thus, CSX operating rules prohibited use of the bottom step over grade crossings when one of the most stable ways to ride equipment that only has a single sill step across a crossing requires use of the bottom sill step. Therefore, the NTSB concludes that CSX operating rules were deficient because they did not identify railcar safety appliances that could restrict foot placement and therefore result in unstable riding stances and increased risk of slipping. Therefore, the NTSB recommends that CSX revise its operating rules to instruct employees on how to safely ride all the types of railcars that it has in various situations that employees might encounter, such as riding across highway-railroad grade crossings. The NTSB also recommends that CSX, after completing the action described in R-25-4, provide initial and annual recurring training to all employees on the revised operating rules.

2.2.2 Crewmember Riding Stances

At the time of the accident, the conductor trainer and the conductor trainee were riding the same type of railcar and were subject to the same CSX operating

rules. The conductor trainer was positioned in the "ladder hang stance." In addition, he was aligned with CSX riding stance rules because: (1) his body was positioned to face the equipment, and he was looking in the direction of travel; (2) he was maintaining at least three points of contact (he had four) and keeping secure handholds and footing; and (3) he was prepared for slack action.

The conductor trainee was positioned in a stance similar to a stance this report calls the "tank car stance." While the tank car stance was one of the two stances that CSX taught conductor trainees in phase I conductor training (the other was the ladder hang stance), CSX could not adequately instruct trainees on the proper stance to use when riding intermodal railcars because it did not have an intermodal railcar at its training facility. (See section 2.3 for more on this topic.) In addition to being positioned in a stance similar to the tank car stance (although he was riding an intermodal railcar), the conductor trainee was not aligned with CSX riding stance rules because: (1) his body was positioned to face the direction of travel, not the equipment and (2) although he was maintaining at least three points of contact, he was unprepared for slack action because he did not keep secure handholds and footing.

This accident investigation indicates that the grade crossing rule reduced the riders' stability because it resulted in riding stances that restricted foot placement. The accident conductor trainer was aligned with the stability-promoting riding stance rules; the conductor trainee was not. Therefore, while the stability of the conductor trainer's and the conductor trainee's riding stances was reduced because of restricted foot placement, which resulted from the grade crossing rule, the conductor trainer's riding stance was more stable than the conductor trainee's stance.

The NTSB review of surveillance video showed that during the accident movement, when the slack action occurred, the conductor trainee slipped and fell from the equipment, sustaining fatal injuries. While the conductor trainer nearly slipped from the equipment after the slack action occurred, he did not fall because he collided with a vertical handhold, and both his feet and hands were in contact with the railcar. The NTSB concludes that the conductor trainee's riding stance was unstable because: (1) he had restricted foot placement, (2) his body was positioned to face the direction of travel, and (3) he did not have secure handholds, all of which resulted in him falling from the intermodal railcar when the train experienced slack action.

2.3 Deficient Training

Although CSX discussed intermodal railcars in its classroom presentation materials, the CSX training facility did not have an intermodal railcar for conductor

trainees to practice riding during phase I field training. Intermodal railcars are a prominent piece of equipment in CSX's US operations, which service more than 30 intermodal railyards. The lack of an intermodal railcar at the CSX training facility was therefore a training shortfall.

Performance-based validation of the conductor trainee's ability to ride an intermodal railcar would have included evaluations that confirmed the trainee had the knowledge, skills, and abilities to safely ride the railcar. In phase I training, CSX instructed and evaluated conductor trainees on riding the three types of railcars available at the training facility (gondola railcars, hopper railcars, and a tank car). CSX could not evaluate its conductor trainees on riding intermodal railcars because there were none at the training facility.

The accident conductor trainee began phase II on-the-job training at Seagirt Terminal without CSX adequately preparing him to perform tasks on an intermodal railcar, such as riding on an intermodal railcar or controlling a shoving movement on an intermodal railcar, things he was doing during the accident, or verifying that he could safely perform those tasks. Further, had CSX included an intermodal railcar in its training facility equipment, the conductor trainee would have had the appropriate knowledge to ride the accident intermodal railcar in a more stable riding stance. The NTSB concludes that CSX phase I conductor training was deficient because it sent conductor trainees into the field without performance-based verification that they could safely ride an intermodal railcar, which left them unprepared to ride intermodal railcars in phase II training. Following this accident, CSX added an intermodal railcar to its training facility equipment and used it during conductor training.

2.4 Lack of Standards for the Safe Use of Railcar Safety Appliances

Class I railroad employees often use horizontal handholds as steps (or footholds), which the FRA does not prohibit. The FRA requires horizontal handholds to be placed at least 2 inches from the railcar body. This clearance requirement is about 1 inch less than the federal ladder clearance requirement for miners, which Pliner, Kyureghyan, and Beschorner's study found restricted foot placement (Pliner, Kyureghyan, and Beschorner 2014). Publicly available photographs of Class I railroad employees show them standing on horizontal handholds and other railcar safety appliances that do not allow them to place their feet perpendicular to and fully centered on the appliance rung, displaying restricted foot placement. (The photographs show that there is not enough clearance between the appliance and the railcar body to allow the foot to be placed perpendicular to the appliance, to allow the foot to advance and center on the appliance, or both.) Restricted foot placement

exposes railroad employees to significantly increased risk of slipping because it does not allow stable footing on the appliance rung.

The NTSB review of FRA casualty data suggests that in 2023, the year this accident occurred, railroad workers riding the sides of a railcar, such as the accident crewmembers, comprised 29% of all railroad worker fatalities.[42] This investigation found that to prevent railroad employee slips and falls from moving equipment, the railroad industry needs safety guidelines or industry standards that describe the proper use of each railcar safety appliance. Therefore, the NTSB concludes that the lack of federal guidelines or industry standards on the use of railcar safety appliances when riding equipment leaves railroad employees vulnerable to preventable injuries and fatalities when they are unable to obtain a stable riding stance.

Developing standards for the proper use of railcar safety appliances requires an awareness of how foot and hand placement (which together are major components of the riding stance) on the various appliances affects railroad employee safety. While there are studies on occupational appliances (such as ladders) that may be applicable to the railroad industry, the NTSB was unable to identify public research specifically focused on railcar safety appliances. Therefore, the NTSB recommends that the FRA conduct research on the effects of foot and hand placement on all railcar safety appliances, taking into consideration the effects that slack action and other railcar movements have on the human body's center of gravity, to determine where railroad employees can place their feet and hands on these appliances to safely and securely ride equipment, and make the research publicly available. The NTSB also recommends that the FRA issue guidance on the proper use of railcar safety appliances based on the results of the research described in R-25-1, and encourage railroads to review and revise their operating rules and training for riding equipment based on the federal guidance.

The NTSB review of the six freight Class I railroads' operating rules for riding equipment found that none prohibited employees from using handholds as footholds. The review also showed that half of Class I railroads prohibited employees from riding the bottom step of equipment over grade crossings, which, when riding a railcar that is only equipped with a single sill step, such as the accident intermodal railcar, requires employees to stand on a handhold, which may result in restricted foot placement. Allowing railroad employees to use handholds as footholds is unsafe when it results in restricted foot placement. Therefore, the NTSB concludes that

[42] (a) Casualty data includes both injuries and fatalities. (b) In 2023, riding on the side of a railcar accounted for 29% of all on-duty fatalities, despite representing just 1% of worker casualties, highlighting the activity's significantly higher risk of death compared to other railroad tasks.

current railroad operating rules for riding equipment may require railroad employees to assume riding stances that result in restricted foot placement, significantly increasing employees' risk of injury. It will take time for the FRA to research the effects of foot and hand placement on all railcar safety appliances, as recommended in R-25-1, and issue guidance on the proper use of appliances based on the results of that research, as recommended in R-25-2. Therefore, the NTSB recommends that the Class I railroads prohibit employees from riding railroad equipment with their feet on railcar safety appliances that restrict foot placement.[43]

[43] The NTSB may revisit this recommendation after the FRA issues the guidance recommended in R-25-2.

3 Conclusions

3.1 Findings

1. None of the following contributed to the accident: (1) conductor trainer or conductor trainee distraction because of cell phone use, (2) engineer performance, and (3) weather.

2. CSX Transportation operating rules were deficient because they did not identify railcar safety appliances that could restrict foot placement and therefore result in unstable riding stances and increased risk of slipping.

3. The conductor trainee's riding stance was unstable because: (1) he had restricted foot placement, (2) his body was positioned to face the direction of travel, and (3) he did not have secure handholds, all of which resulted in him falling from the intermodal railcar when the train experienced slack action.

4. CSX Transportation phase I conductor training was deficient because it sent conductor trainees into the field without performance-based verification that they could safely ride an intermodal railcar, which left them unprepared to ride intermodal railcars in phase II training.

5. The lack of federal guidelines or industry standards on the use of railcar safety appliances when riding equipment leaves railroad employees vulnerable to preventable injuries and fatalities when they are unable to obtain a stable riding stance.

6. Current railroad operating rules for riding equipment may require railroad employees to assume riding stances that result in restricted foot placement, significantly increasing employees' risk of injury.

3.2 Probable Cause

The National Transportation Safety Board determines that the probable cause of the Baltimore, Maryland, accident was the conductor trainee, who CSX Transportation sent into the field without performance-based verification that he could safely ride an intermodal railcar, riding the intermodal railcar in an unstable position that left him vulnerable to slipping and falling into the train's path. Contributing to the accident were: (1) deficient CSX Transportation operating rules, which did not provide adequate protection against the risk of slipping; (2) deficient CSX Transportation training, which did not provide sufficient training on how to ride

intermodal railcars; and (3) the lack of research-based federal guidance for the safe use of railcar safety appliances when riding equipment.

4 Recommendations

New Recommendations

As a result of this investigation, the National Transportation Safety Board makes the following new safety recommendations:

To the Federal Railroad Administration:

Conduct research on the effects of foot and hand placement on all railcar safety appliances, taking into consideration the effects that slack action and other railcar movements have on the human body's center of gravity, to determine where railroad employees can place their feet and hands on these appliances to safely and securely ride equipment, and make the research publicly available. (R-25-1)

Issue guidance on the proper use of railcar safety appliances based on the results of the research described in R-25-1, and encourage railroads to review and revise their operating rules and training for riding equipment based on the federal guidance. (R-25-2)

To the Class I Railroads:

Prohibit employees from riding railroad equipment with their feet on railcar safety appliances that restrict foot placement. (R-25-3)

To CSX Transportation:

Revise your operating rules to instruct employees on how to safely ride all the types of railcars that you have in various situations that employees might encounter, such as riding across highway-railroad grade crossings. (R-25-4)

After completing the action described in R-25-4, provide initial and annual recurring training to all employees on the revised operating rules. (R-25-5)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

JENNIFER L. HOMENDY
Chairwoman

MICHAEL GRAHAM
Member

THOMAS CHAPMAN
Member

J. TODD INMAN
Member

Report Date: June 25, 2025

Appendix A: Investigation

The National Transportation Safety Board learned about this accident on June 27, 2023. The investigative team arrived on scene on June 27, 2023. The National Transportation Safety Board team consisted of an investigator-in-charge. The Federal Railroad Administration; CSX; the Brotherhood of Locomotive Engineers and Trainmen; and the International Association of Sheet Metal, Air, Rail and Transportation Workers were parties to the investigation.

Appendix B: Consolidated Recommendation Information

Title 49 United States Code (U.S.C.) 1117(b) requires the following information on the recommendations in this report.

For each recommendation—

(1) a brief summary of the NTSB's collection and analysis of the specific accident investigation information most relevant to the recommendation;

(2) a description of the NTSB's use of external information, including studies, reports, and experts, other than the findings of a specific accident investigation, if any were used to inform or support the recommendation, including a brief summary of the specific safety benefits and other effects identified by each study, report, or expert; and

(3) a brief summary of any examples of actions taken by regulated entities before the publication of the safety recommendation, to the extent such actions are known to the Board, that were consistent with the recommendation.

To the Federal Railroad Administration:

R-25-1

Conduct research on the effects of foot and hand placement on all railcar safety appliances, taking into consideration the effects that slack action and other railcar movements have on the human body's center of gravity, to determine where railroad employees can place their feet and hands on these appliances to safely and securely ride equipment, and make the research publicly available.

Information that addresses the requirements of 49 U.S.C. 1117(b), as applicable, can be found in section 2.4, Lack of Standards for the Safe Use of Railcar Safety Appliances. Information supporting (b)(1) can be found on pages 31-33; (b)(2) can be found on page 31; and (b)(3) is not applicable.

R-25-2

Issue guidance on the proper use of railcar safety appliances based on the results of the research described in R-25-1, and encourage railroads to review and revise their operating rules and training for riding equipment based on the federal guidance.

Information that addresses the requirements of 49 U.S.C. 1117(b), as applicable, can be found in section 2.4, Lack of Standards for the Safe Use of Railcar Safety Appliances. Information supporting (b)(1) can be found on pages 31-33; (b)(2) can be found on page 31; and (b)(3) is not applicable.

To the Class I Railroads:

R-25-3

Prohibit employees from riding railroad equipment with their feet on railcar safety appliances that restrict foot placement.

Information that addresses the requirements of 49 U.S.C. 1117(b), as applicable, can be found in section 2.4, Lack of Standards for the Safe Use of Railcar Safety Appliances. Information supporting (b)(1) can be found on pages 31-33; (b)(2) can be found on page 31; and (b)(3) is not applicable.

To CSX Transportation:

R-25-4

Revise your operating rules to instruct employees on how to safely ride all the types of railcars that you have in various situations that employees might encounter, such as riding across highway-railroad grade crossings.

Information that addresses the requirements of 49 U.S.C. 1117(b), as applicable, can be found in section 2.2, Deficient Operating Rules. Information supporting (b)(1) can be found on pages 28-29; (b)(2) can be found on pages 28-29; and (b)(3) is not applicable.

R-25-5

After completing the action described in R-25-4, provide initial and annual recurring training to all employees on the revised operating rules.

Information that addresses the requirements of 49 U.S.C. 1117(b), as applicable, can be found in section 2.2, Deficient Operating Rules. Information supporting (b)(1) can be found on pages 28-29; (b)(2) can be found on pages 28-29; and (b)(3) is not applicable.

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Switching Operations Fatality Analysis (SOFA). 2023a. Safety Alert. August 2023. Washington, DC: SOFA.

SOFA. 2023b. Safety Alert. July 2023. Washington, DC: SOFA.

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For more detailed background information on this report, visit the NTSB Case Analysis and Reporting Online (CAROL) website and search for NTSB accident ID RRD23FR012. Recent publications are available in their entirety on the NTSB website. Other information about available publications also may be obtained from the website or by contacting –

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