National Transportation Safety Board

Washington, DC 20594

Safety Recommendation Report

Hazards of Moving Between Transit Railcars

Accident Number:	RRD18FR011
Operator:	Southeastern Pennsylvania Transportation Authority
Accident:	Passenger Fatality
Location:	Philadelphia, Pennsylvania
Date:	September 23, 2018
Recommendation Numbers:	R-19-39 and -40
Adopted:	August 27, 2019

On September 23, 2018, about 5:35 p.m. local time, a Southeastern Pennsylvania Transportation Authority (SEPTA) subway train operator stopped a southbound train between the Allegheny Station and the North Philadelphia Station on the Broad Street Line when a passenger activated an emergency alert.[1] The train dispatcher instructed the train operator to perform a ground level inspection of the train. The operator found, between the running rails about 10 feet south of the Allegheny Station platform, a child that had been struck and killed by the train. According to witness statements provided to SEPTA officials, the child, a 7-year-old boy, was walking through the end-of-railcar doors from car 516 to car 536, when he fell between the railcars as the train moved out of the Allegheny Station. (See figure 1.)

[1] Passenger emergency switches are in the railcar under a breakable plastic cover plate. When a switch is activated, an audible alert sounds in all cab compartments of the train. The door-open signal indicators illuminate red for the railcar in which the emergency switch was activated.

NOTE: This report was reissued on October 7, 2025, with spelling corrections on page 1.

Figure 1. Photograph of the area between SEPTA Broad Street Line subway railcars 516 and 536.

SEPTA and other rail transit operators use railcars with end-of-railcar doors.[2] The doors provide a pathway between two coupled railcars for use in emergency situations. However, because of gaps in the floor area between the coupled railcars, it can be dangerous to transit between railcars when the train is moving. Transit rail operators using railcars with end-of-railcar doors must ensure that passengers are informed about the dangers of walking between the railcars, especially when the train is moving. At the time of the accident, the only warning in SEPTA Broad Street Line subway cars was lettering on the door frame above the end-of-railcar doors stating, "NO PASSING THROUGH." (See figure 2.)

[2] These are also known as closed-end railcars.

Figure 2. End-of-railcar door on a SEPTA subway railcar, with "NO PASSING THROUGH" text above door.

Human factors engineering promotes the deliberate design and placement of warning signs that attract visual attention, are easily understood and interpreted, and provide clear guidance to avoid hazards.[3] The warning over the end-of-railcar door in SEPTA's Broad Street subway railcar does not meet human factors guidelines for effective warning signs. Specifically, the content of the warning fails to provide several essential elements of information, such as the nature of the hazard, what to do if the hazard is encountered, and whom to contact in case of an emergency. The warning lacks internationally recognized symbols, and the contents of the warning are written only

[3] M.S. Wogalter and K.R. Laughery, "WARNING! Sign and Label Effectiveness," *Current Directions in Psychological Science* 5, no. 2 (April 1996): 33-37.

in English without conspicuous letter size, spacing, color, or contrast for readability. Additionally, the warning sign is not placed to attract visual attention.

SEPTA Postaccident Actions

On September 24, 2018, SEPTA began placing new warning signs on the end-of-railcar doors for its subway fleet. (See figure 3.) The new warning signs use yellow and black coloring and state, "WARNING," "Keep Door Closed," and "Do Not Move Between Cars." An internationally recognized symbol on the sign indicates the door should be kept closed. SEPTA also began making station and on-board train announcements to remind passengers that the end-of-railcar doors are for emergency use only.

Figure 3. An enhanced warning sign on a SEPTA subway end-of-railcar door.

Safety Interventions

Safety interventions often remove hazards through engineering efforts. In this accident, the hazard is the unguarded opening in the floor of the passageway. However, removing this hazard by redesigning the fleet of closed-end transit railcars is not practical. Alternative safety interventions are used when the hazard cannot be removed by re-engineering. These include increasing the effectiveness of nonlocking controlling barriers, such as a movable handle cover indicating "emergency use only" or preventing nonemergency access to the area between coupled cars.

A practical means of emergency egress must be maintained with any new safety intervention because passengers and crewmembers need to be able to use the end-of-railcar doors in emergencies. The Massachusetts Bay Transportation Authority (MBTA) uses a locked end-of-railcar door that can be opened during emergency situations, which restricts access to the area between coupled cars while maintaining access during emergencies. (See figure 4.)

Figure 4. End-of-railcar door on an MBTA subway train, the door is locked and includes signage instructing customers how to unlock the door during emergencies.

Alternatively, the hazard can be mitigated through safety education in the form of signage to deter passengers from moving between railcars while a train is moving. Visual signs and auditory messages are the primary methods to warn people about hazards. Safety messages must be properly designed and prominently presented, as discussed in the American National Standards Institute (ANSI) Z535 and Occupational Safety and Health Administration standards.[4] Effective safety messaging uses internationally recognized symbols to convey the nature of the hazard, provides guidance on what to do if the hazard is encountered, and explains whom to contact when help is needed. (See figure 5.)

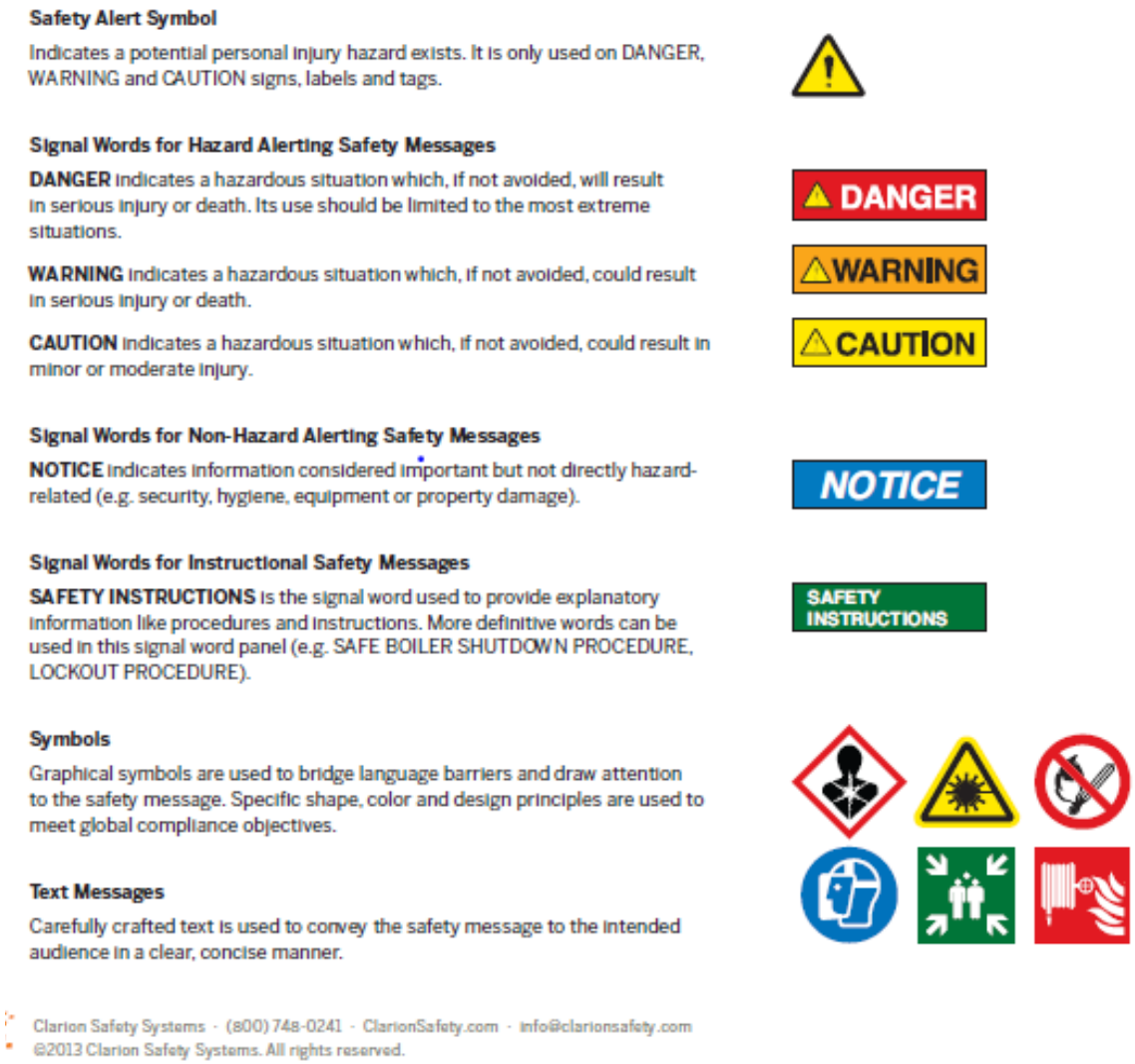

Figure 5. Illustration of safety message components in ANSI Z535 (effective 2013).

[4] (a) National Electrical Manufacturers Association, "ANSI Z535 Safety Alerting Standards," published 2011, revised 2017, (https://www.nema.org/Standards/z535/Pages/default.aspx). Accessed August 19, 2019. (b) Title 29 *Code of Federal Regulations* (*CFR*) 1910.145, "Specifications for accident prevention signs and tags." Occupational Safety and Health Administration, United States Department of Labor (https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.145). Accessed August 19, 2019.

NTSB reviewed end-of-railcar door safety messaging in the railcars of several transit agencies. Most agencies use some form of visual sign on or near the end-of-railcar doors, warning that the door should not be opened. However, NTSB investigators found that these signs are not standardized or uniformly designed across transit properties. NTSB investigators also found that the size, shape, and content of warning signs varied between railcar types and routes even within the same transit agency. Figures 6 and 7 show additional examples of visual signs on end-of-railcar doors.

Figure 6. End-of-railcar door on New York City Transit car with warning sign circled in red.

Figure 7. End-of-railcar door with red octagon universal stop sign on a Washington Metropolitan Area Transit Authority railcar.

The lack of uniformity for warning signs, especially signs used by diverse groups of people, is a hindrance to effective communications. In highway safety, the need for uniform traffic control signs and highway markings has been recognized since the 1920s.[5] Today, the Federal Highway Administration's Manual on Uniform Traffic Control Devices (2009 edition) is required

[5] American Association of State Highway Officials, *Manual and Specifications for the Manufacture, Display, and Erection of U.S. Standard Road Markers and Signs*, (Washington, DC: 1927).

throughout the United States, as codified in Title 23 *Code of Federal Regulations (CFR)* 655.603, to ensure standardization of critical highway safety information.[6]

The Moving Ahead for Progress in the 21st Century Act (MAP-21) granted authority to the Federal Transit Administration (FTA) to develop minimum safety performance standards for public transportation vehicles.[7] The authority was granted to FTA as a direct result of the Washington Metropolitan Area Transit Authority Fort Totten accident in which 9 people died.[8] The MAP-21 Act was specifically intended to enhance safety on transit systems. The Fixing America's Surface Transportation Act (FAST Act) reiterated that authority and also enabled the FTA to issue other safety standards.[9] FTA can use this authority to issue safety messaging standards. The NTSB concludes that transit agencies would benefit from nationally standardized safety warnings to discourage the use of the end-of-railcar doors and the passageway between railcars in nonemergency situations. Therefore, the NTSB recommends that the FTA use its authority under Title 49 *United States Code* Part 5329 to develop standards for safety messaging for end-of-railcar doors, including appropriate sign location, text, and symbols to be placed on rolling stock. Furthermore, the NTSB recommends that once the end-of-railcar door safety messaging standards are developed, FTA use its authority under 49 *CFR* 670.25 to immediately issue a general directive that would require all rail transit agencies to implement those standards on applicable rolling stock.

Safety Recommendations

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

To the Federal Transit Administration:

> Use your authority under Title 49 *United States Code* Part 5329 to develop standards for safety messaging for end-of-railcar doors, including appropriate sign location, text, and symbols to be placed on rolling stock. (R-19-39)
>
> Once the messaging standards are successfully developed, use your authority under Title 49 *Code of Federal Regulations* 670.25 to immediately issue a general directive that would require all rail transit agencies to implement those standards on applicable rolling stock. (R-19-40)

[6] Federal Highway Administration, *Manual on Uniform Traffic Control Devices,* (Washington, DC: US Department of Transportation, Federal Highway Administration, 2009).

[7] Moving Ahead for Progress in the 21st Century Act, Public Law 112-141, July 6, 2012.

[8] National Transportation Safety Board, *Collision of Two Washington Metropolitan Area Transit Authority Metrorail Trains Near Fort Totten Station, Washington, D.C., June 22, 2009*, RAR-10/02 (Washington, DC: National Transportation Safety Board. 2010).

[9] Fixing America's Surface Transportation Act, Public Law 114-94, December 4, 2015.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

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Date: August 28, 2019