



National Transportation Safety Board

Washington, D.C. 20594

Railroad Accident Brief

Accident No.: DCA-09-MR-004
Location: Boston, Massachusetts
Date: May 8, 2009
Time: 7:14 p.m., eastern daylight time¹
Railroad: Massachusetts Bay Transportation Authority (MBTA)
Property Damage: \$9.6 million
Injuries: 68
Fatalities: None
Type of Accident: Collision

The Accident

On Friday, May 8, 2009, about 7:14 p.m., westbound Massachusetts Bay Transportation Authority (MBTA) Green Line train 3612 struck the rear of standing westbound MBTA Green Line train 3808 near Government Center Station in Boston, Massachusetts. The accident occurred in the underground tunnel segment on the Green Line of the MBTA subway system. Each train consisted of two light-rail “married-pair” railcar sets². One car from each train derailed upright as a result of the collision. Sixty-eight injured passengers and crewmembers were transported to local hospitals. Monetary damages were estimated to be about \$9.6 million.

Preaccident Events

The pilot operator of train 3808 (the struck train) went on duty at 2:50 p.m. on the day of the accident. She operated several trips before meeting with the trailer operator³ at Cleveland Circle Station⁴ about 6:15 p.m. The two of them reported to the supervisor at Cleveland Circle Station and then took charge of train 3808. After an inspection of the train, they left Cleveland Circle Station about 6:18 p.m. and headed to North Station. They arrived at North Station about 7:05 p.m. and turned the train to return to Cleveland Circle Station. After leaving Government Center Station on the westbound trip, the pilot operator said she encountered restrictive signals, and she stopped the train at red signal 746. She could see trains stopped in front of her, and she

¹ All times in this brief are eastern daylight time.

² In revenue service, pairs of cars are semipermanently coupled together and operate only in “married-pair” railcar sets.

³ The MBTA assigned an operator—the *trailer operator*—to the second car to open and close the doors at station stops, collect fares, and monitor the safety of the passengers.

⁴ The Cleveland Circle Station is the western end of the C branch of the MBTA Green Line.

notified the passengers of a momentary delay because of congestion caused by trains ahead. (See figure 1.)



Figure 1. MBTA system map showing accident location.

The pilot operator of train 3612 (the striking train) went on duty at 4:13 p.m. at Riverside Station⁵ on the day of the accident. The trailer operator on train 3612 went on duty for the second half of his day⁶ at 4:21 p.m. at Riverside Station. The trailer operator stated that he had boarded the trailing portion of train 3612 and had neither seen nor talked with the pilot operator until after the accident. After several trips on the Green Line, train 3612 made an eastward trip to Government Center Station from Riverside Station. The pilot operator turned the train on the

⁵ Riverside Station is the western end of the D branch of the MBTA Green Line.

⁶ The trailer operator of train 3612 had worked earlier in the day from 12:07 p.m. to 2:51 p.m.

loop⁷ at Government Center Station and stopped at the westbound platform. The trailer operator recalled seeing about 20 people board the train. The train then left Government Center Station westbound and accelerated to about 25 mph. The trailer operator said that he felt an impact shortly thereafter.

Investigation

Train 3612 had struck standing train 3808 while it was stopped behind trains waiting to enter Park Street Station. (See figure 2.) The rear of standing train 3808 was about 98 feet beyond a red signal, and the left rear red marker light was visible to the pilot operator of striking train 3612 for 447 feet. (See figure 3.) Both rear red marker lights of the standing train were visible for 216 feet, and the entire rear end of the standing train was visible for 80 feet. (See *Sight-Distance Test* later in this brief.)



Figure 2. Photograph showing damage to front (cab) of striking train 3612.

The MBTA transit police interviewed the pilot operator of the striking train at the hospital after the accident. According to the interview summary, the pilot operator initially said that he was sending a text to his girlfriend while turning the train on the loop at Government Center Station. Later, he explained that he had called his girlfriend while turning the train, but he got no answer so he left a voice message. He then started a text message to his girlfriend—to ask her to call him—when he was leaving Government Center Station. The transit police reviewed the text messages on the pilot operator’s phone and found a draft outbound message that asked a person to contact the pilot operator.

⁷ A loop of track at Government Center Station allows a train to be turned around so it can continue in the opposite direction.



Figure 3. Photograph showing damage to rear of standing train 3808.

An MBTA supervisor told investigators that he had observed the pilot operator of train 3612 on the day of the accident when he came on duty at Riverside Station. The supervisor recalled that she was standing near him with a group of employees. She said "... [she] talked specifically with the pilot operator of the striking train for a while. He seemed fine to me" The last time she saw the pilot operator, he was advising a new pilot operator about certain tasks to perform on the job.

NTSB investigators examined the signal system and performed postaccident signal testing. The postaccident examination revealed that the signal system was configured to allow for safe operations and to provide adequate stopping distances. The postaccident testing indicated that signal 744A, 80 feet behind the rear of the standing train, was showing the proper red aspect (because of the stopped train ahead) when the striking train left Government Center Station. Investigators also examined the MBTA train equipment and reviewed maintenance records. The equipment that was tested, including the braking systems, worked as intended. The track and structures (other than the lighting in the tunnel⁸) had been maintained within the MBTA standards.

NTSB investigators interviewed the pilot operator of the struck train and the trailer operators of both trains.⁹ All of the crewmembers interviewed stated that the workload up until the time of the accident had been moderate, with nothing abnormal to report. The pilot operator of the striking train had been on duty for about 3 hours before the accident. Toxicological tests of all four crewmembers were negative for alcohol and illegal drugs. A review of employee records indicated that the pilot operators and trailing operators of both trains were properly trained and

⁸ During the postaccident investigation, investigators found several tunnel lights that were not lit. The MBTA replaced bulbs to correct this.

⁹ The pilot operator of the striking train did not agree to be interviewed by investigators based on the advice of his legal counsel.

qualified to perform their duties. Because the accident occurred in a tunnel, weather was not a factor. The pilot operator of the struck train had stopped the train in accordance with MBTA rules. The emergency response to this accident was timely and appropriate.

Sight-Distance Test

On May 9, 2009, investigators conducted sight-distance tests at the accident site. The simulated struck train traveled westward from Government Center Station and stopped at signal 746 where the standing accident train had been held behind the traffic congestion at Park Street Station on the day of the accident. The rear of the train was positioned at the point of the collision west of signal 744A. A second train was started from the Government Center Station platform and advanced toward the standing train. The signals that were visible on the day of the accident were replicated in the site-distance testing. The MBTA test operator of the second train was asked to state aloud when the signals and the rear of the standing train were visible. NTSB investigators and parties to the investigation were present for the testing and verified the visibility and the distances that were measured.

Before the train departed from the platform, the green repeater signal 740 on the left side of the track at Government Center Station was visible from the cab of the train. The next green signal, 742, was also visible from the cab at 112 feet. The train was moved westward where yellow signal 744 was seen from 181 feet. Red signal 744A (the signal closest to the rear of the standing train) was seen from 367 feet. The left red marker light on the rear of the standing train was visible from 447 feet, both red marker lights could be seen from 216 feet, and the entire rear end of the car of the standing train was visible from 80 feet. (Figure 4 shows signal locations and displays at the time of the accident.)

The trailing operator of the striking train said that he felt the train was going approximately 25 mph after leaving Government Center Station. He did not recall anything remarkable, so it is likely that the pilot operator had accelerated the train normally, meaning that the train would have reached 25 mph soon after it left the station. At this speed, while the pilot operator was text messaging on his phone, it would have taken 10 to 12 seconds to reach the standing train.

The pilot operator of train 3612 did not comply with either the yellow signal or the red signal, and he accelerated the train to near the maximum allowed track speed (25 mph) until just before the collision, when the onboard train data log showed that the train was placed in emergency. At the time, the pilot operator was text messaging on his wireless device, and it is likely that this activity caused him to lose his situational awareness and his focus on operating the train.

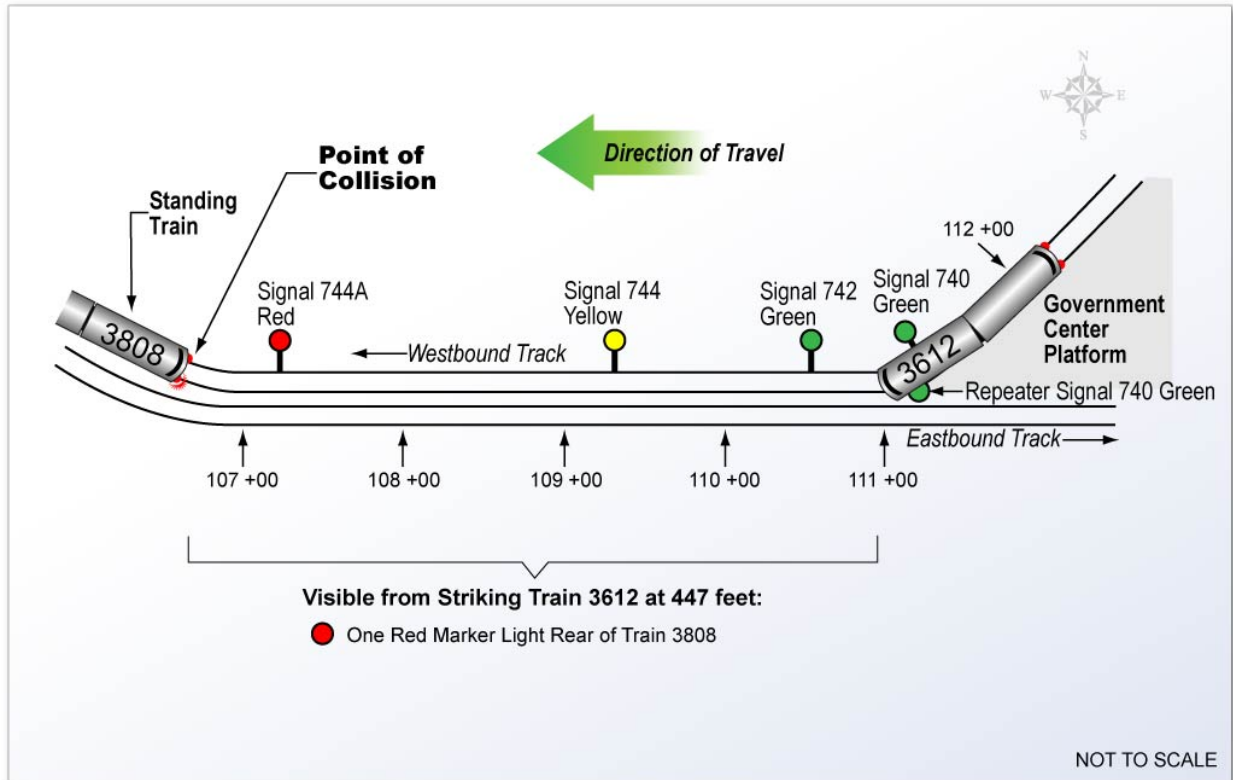


Figure 4. Diagram of track at accident location with signal arrangement and signal displays at time of accident.

Personnel Information

Pilot Operator of Striking Train 3612

The pilot operator of train 3612 was hired by MBTA on July 9, 2007. He successfully completed the pilot operator training program on September 3, 2007. There were no entries in the MBTA personnel records for disciplinary action against the pilot operator of train 3612 for the year before the accident.

According to the MBTA work history records, the pilot operator did not work on Monday or Tuesday the week of the accident. Beginning Wednesday at 4:19 p.m., he worked 8 hours 16 minutes, until 12:35 a.m. on Thursday. He worked 8 hours 17 minutes from 3:41 p.m. on Thursday until 12:58 a.m. on Friday. Later on Friday, the day of the accident, he went on duty at 4:13 p.m. The collision occurred about 7:14 p.m., just over 3 hours later.

Once it was discovered that the pilot operator had been text messaging, the local authorities started proceedings to bring criminal charges against him. When investigators attempted to interview the pilot operator, he refused upon advice from his legal counsel. Later, the NTSB received a letter from the pilot operator's legal representative that stated he would be willing to provide an interview "... only under a grant of immunity." Otherwise, the letter continued, the pilot operator would "... invoke his Fifth Amendment right to remain silent in

response to any questions....” The NTSB does not grant immunity when conducting interviews, and therefore, knowing that he would not respond to questions, investigators did not interview the pilot operator of the striking train. Investigators thus were unable to learn specifics about the accident from the pilot operator or information about his personal history, work/rest cycle, fatigue, and any other potentially significant facts.

Operations Information

Riverside Station, the originating station for the operators on the two accident trains, is on the D branch of the MBTA Green Line. Trains originating from Riverside travel east to Government Center, turn around on the loop, and then return west to Riverside. Train movements on the D Branch were governed by signal indications provided by an automatic block signal system. Normal MBTA Green Line train movements are governed by automatic signal indications; the MBTA Operations Control Center is not involved in train operations at this level. Trains operate on two main tracks with a designated direction. Trains operating in the same direction, governed by automatic signal indications, are protected by automatic block signals. The train movements on the day of the accident were made without any intervention by the train dispatcher in the MBTA Operations Control Center. Pilot operators control their trains based on indications displayed by wayside signals. The MBTA system requires pilot operators to observe and comply with the wayside signals to maintain train separation. There was no train control system, like positive train control (PTC), that prevents train collisions.

Operating Rules

The employees operating on the Green Line were governed by the MBTA rule book: *Rules for Trainpersons and Other Employees of the Light Rail Lines*. Rules applicable to this accident include the following:

Rule 19. “Attention to Duty”

All employees have an inherent responsibility to pay attention to their duties at all times.

Rule 56. “Observance of Signals”

Motorpersons will be held to a strict observance of the indication given by automatic block and interlocking signals: also by hand, flag or lantern signals.

The use of automatic block signals in no way relieves Motorpersons from exercising the greatest care and vigilance.

Other instructions for operators were published by Special Orders. MBTA’s Special Order No. 08-93, dated June 13, 2008, stated the following:

Operating personnel must not use cellular telephones and other electronic devices when they are engaged in any work related task, such as performing customer service duties on the platform, flagging, throwing a switch, or any other duty that requires their full attention.

All of the MBTA operating employees that were interviewed were aware of the prohibition against the use of a cell phone while operating a train, and it is likely that the pilot operator of the striking train also knew the prohibition.

Governmental Oversight of MBTA

Federal Transit Administration

Title 49 *United States Code* Section 5334(b) specifically prohibits the Secretary of Transportation from regulating the operation, routes, or schedules of a public transportation system. The primary enforcement mechanism available to the Federal Transit Administration (FTA) was the ability to withhold federal funds from states that do not comply with the terms and conditions of its federal assistance agreement. In response to passage of the Intermodal Surface Transportation Efficiency Act of 1991, the FTA implemented the State Safety Oversight Program, which placed the responsibility for rail transit safety on the states that maintain public transit systems. The FTA has established minimum safety requirements that all states and rail transit agencies must meet in order to receive federal funding. These requirements include the techniques for conducting inspections and testing, the required maintenance audits and inspection programs, and the procedures for employee training and certification.

However, since the June 22, 2009, Fort Totten Station¹⁰ collision on the Washington Metropolitan Area Transit Authority Metrorail system that killed 9 people and injured another 80 passengers, the FTA has sought congressional authority to lift the regulatory restriction in the *United States Code*. Currently, a proposed transit safety reform bill before Congress redefines the authority of the FTA and would allow the FTA to establish regulations for and enforce those regulations on public transportation systems.

Massachusetts Department of Public Utilities

The MBTA was subject to oversight by the FTA through the offices of the Massachusetts Department of Public Utilities, Transportation Oversight Division. The Department reviewed and approved the MBTA's System Safety Program Plan comprising 21 safety elements defined in Title 49 *Code of Federal Regulations* Part 659. Under the System Safety Program Plan, the MBTA's safety department was responsible for an annual audit of the MBTA's compliance with about one-third of the safety elements so that over a 3-year period, compliance with all 21 elements was audited. The MBTA communicated the results of these audits to the Department of Public Utilities in an annual report.

Management Oversight

MBTA management told investigators that supervisors monitor their employees for rules compliance. When a supervisor observed a rules violation, and based on the criteria for being fit for duty within the MBTA Drug and Alcohol Policy, the operator may be sent for drug and

¹⁰ *Collision of Two Washington Metropolitan Area Transit Authority Metrorail Trains Near Fort Totten Station, Washington, D.C., June 22, 2009*, Railroad Accident Report RAR-10-02 (Washington, DC: National Transportation Safety Board, 2010) <<http://www.nts.gov/publictn/2010/RAR1002.pdf>>.

alcohol testing under specific circumstances. A supervisor-observed violation or a substantiated publicly reported violation would have resulted in a disciplinary hearing. If necessary, the appropriate level of discipline would be assessed, and the employee would be retrained on the violated rules.

Between July 2008 and January 2009, the MBTA conducted a pilot program on both bus and subway operations to document the number of rules compliance observations. During this time, 48,217 tests were conducted. There were 52 rule violations which resulted in a compliance of 99.89 percent.

On February 14, 2009, (4 months before the accident) the pilot program was formalized, and the MBTA issued a standard operating procedure for conducting unannounced operational testing, inspections, and observations. On the subway operations, 8975 tests had been performed by May 2010, with 128 violations resulting in a compliance of 98.57 percent.

Actions Taken Since Accident

Massachusetts Department of Public Utilities

On May 18, 2009, the Massachusetts Department of Public Utilities issued order No. DPU 09-45 that adopted an emergency regulation amending 220 Code of Massachusetts Regulations 151.00 and 155.00 to prohibit the possession or use of cellular telephones and other electronic devices by the operator of an MBTA bus, train, or streetcar.

MBTA

Cell Phones - Concurrently with the emergency regulation from the Department of Public Utilities, on May 18, 2009, the MBTA issued Special Order No. 09-56, *Possession and Use of Cellular Phones and other Electronic Devices Prohibited*. The order was applicable to operators of buses, trains, and trolleys. This order changed the cell phone usage prohibition so that an operator was not allowed to possess a cell phone while in passenger service. The order also specified a 10-day suspension if an operator was found in possession of a cell phone while in passenger service and a 30-day suspension if an operator was found using a cell phone while in passenger service.

Between May 2009 and June 2010, MBTA discharged nine operators for using an electronic device while in passenger service and suspended eight operators for possession of an electronic device while in passenger service.

Positive Train Control - The *PTC Alternatives Study & Technology Selection* contract to install PTC technology on the Green Line was prepared by HNTB Corporation and has been approved by the MBTA Board of Directors. Phase I, which involves the Mattapan High Speed Line Collision Avoidance System Project, has begun. Phase II will include the Green Line baseline modeling, initial simulation, and infrastructure analysis with a conditions assessment, along with initial review of PTC technologies. Phase III will include use of the baseline model and simulation employing different technologies and/or infrastructure modifications to determine the most efficient and dependable approach to deploying PTC technology on the Green Line.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the May 8, 2009, collision of two Massachusetts Bay Transportation Authority Green Line Trains in Boston, Massachusetts, was the failure of the pilot operator of the striking train to observe and appropriately respond to the red signal aspect at 744A because he was engaged in the prohibited use of a wireless device, specifically text messaging, that distracted him from his duties. Contributing to the accident was the lack of a positive train control system that would have intervened to stop the train and prevent the collision.

Adopted: April 13, 2011