

Collision of Port Authority Trans-Hudson Train with
Bumping Post at Hoboken Station
Hoboken, New Jersey
May 8, 2011



Accident Report

NTSB/RAR-12/05
PB2012-916305



**National
Transportation
Safety Board**

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PB2012-916305
Notation 8440
Adopted November 5, 2012

Railroad Accident Report

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**National
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Safety Board**

490 L'Enfant Plaza, SW
Washington, DC 20594

National Transportation Safety Board. 2012. *Collision of Port Authority Trans-Hudson Train with Bumping Post at Hoboken Station, Hoboken, New Jersey, May 8, 2011. Railroad Accident Report NTSB/RAR-12/05. Washington, DC.*

Abstract: On May 8, 2011, about 8:32 a.m. eastern daylight time, Port Authority Trans-Hudson Corporation (PATH) train 820, consisting of seven multiple-unit electric locomotives, was routed to platform track 2 to offload passengers at the Hoboken station in Hoboken, New Jersey, when it struck the bumping post at the end of the track. It was estimated that 70 passengers were on board the train. As a result of the collision, 30 passengers, the engineer, and the conductor were transported to local hospitals with non-life-threatening injuries and released the same day. Five injured passengers refused medical attention on scene. PATH estimated total damages to be \$352,617.

This investigation focused on federal regulations and oversight of PATH, and was limited in scope. The safety issues discussed in the report are the Federal Railroad Administration's failure (1) to ensure the process for waiving safety rules is managed as required by Title 49 *Code of Federal Regulations* Part 211, and (2) to ensure the process for regulatory enforcement is managed as required by Title 49 *Code of Federal Regulations* Part 209. As a result of the investigation, the National Transportation Safety Board makes two safety recommendations to the Federal Railroad Administration.

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Acronyms and Abbreviations

<i>CFR</i>	<i>Code of Federal Regulations</i>
FRA	Federal Railroad Administration
NTSB	National Transportation Safety Board
PATH	Port Authority Trans-Hudson Corporation
PTC	positive train control

Executive Summary

On May 8, 2011, about 8:32 a.m. eastern daylight time, Port Authority Trans-Hudson Corporation (PATH) train 820, consisting of seven multiple-unit electric locomotives, was routed to platform track 2 to offload passengers at the Hoboken station in Hoboken, New Jersey, when it struck the bumping post at the end of the track. It was estimated that 70 passengers were on board the train. As a result of the collision, 30 passengers, the engineer, and the conductor were transported to local hospitals with non-life-threatening injuries and released the same day. Five injured passengers refused medical attention on scene. PATH estimated total damages to be \$352,617.

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the engineer to control the speed of the train entering the station. 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.

This investigation focused on federal regulations and oversight of PATH, and was limited in scope. The safety issues discussed in the report are the following:

- The failure of the Federal Railroad Administration to ensure the process for waiving safety rules is managed as required by Title 49 *Code of Federal Regulations* Part 211.
- The failure of the Federal Railroad Administration to ensure the process for regulatory enforcement is managed as required by Title 49 *Code of Federal Regulations* Part 209.

Safety recommendations are being issued to the Federal Railroad Administration.

1. Investigation and Analysis

On May 8, 2011, about 8:32 a.m. eastern daylight time,¹ Port Authority Trans-Hudson Corporation (PATH)² train 820, consisting of seven multiple-unit electric locomotives,³ was routed to platform track 2 to offload passengers at the Hoboken station in Hoboken, New Jersey, when it struck the bumping post at the end of the track. It was estimated that 70 passengers were on board the train. As a result of the collision, 30 passengers, the engineer, and the conductor were transported to local hospitals for non-life-threatening injuries and released the same day. Five injured passengers refused medical attention on scene.

After it struck the bumping post, train 820 came to a stop about 11 feet past the seven-car marker.⁴ (See figure 1.) The front set of wheels derailed on the first car of the train. The lead car's front end and the mechanical coupler sustained minor damage. The other cars in the train had signs of engagement at the anticlimbers.⁵ Additionally, as a result of the impact, the shear bolts⁶ in the couplers in the train broke. The platform bumping post was severely damaged and pushed back 5 feet 2 inches. The concrete station platform also was damaged. PATH estimated total damages to be \$352,617.

¹ All time references are eastern daylight time.

² PATH was established in 1962 as a subsidiary of the Port Authority of New York & New Jersey.

³ *Multiple-unit electric locomotives* are those (1) with one or more propelling motors designed to carry freight or passenger traffic, or both or (2) without propelling motors but with one or more control stands and a means of picking up primary power, such as a pantograph or third rail.

⁴ The *seven-car marker* is a placard visible to the engineer at each PATH station. The marker serves to establish where to stop a seven-car train to ensure it is within the limits of the passenger platform.

⁵ *Anticlimbers* are located at the ends of adjoining cars in a train and are designed to engage when subjected to large compressive (buff) loads to prevent the override of one vehicle by another. When engaged during a collision, they can bend and deform as was the case in this incident.

⁶ *Shear bolts* are devices installed inside mechanical couplers that are designed to break when vehicles are subjected to large buff loads. When the bolts break, an inspector can visually determine that the devices have been released.



Figure 1. Photograph of accident site at Hoboken station.

PATH train movements are governed by the indications of a signal system, timetable instructions, and operating rules. Train 820 was routed past two signals as the train approached the platform on track 2. Both signals were equipped with mechanical trip stops located on the field (outer) sides of the rails. Postaccident inspection found no problems with the operation of the signal system and no visible indications of strike marks on the trip levers.

The track in the platform area was level and straight. PATH representatives reported that lubrication had been used to grease the gage (inner) face of the rail. Postaccident inspection of the train wheels and the running surface of the rails did not show the presence of grease, which could have adversely affected the braking of the train. Slide marks were present on the surface of the rails about 37 feet before the bumping post.

Investigators tested and inspected the mechanical and dynamic brake system⁷ of the train; there were no indications that the brake system had malfunctioned.

⁷ A *dynamic braking system* uses the kinetic energy of a moving train to generate electric current at the traction motors that is dissipated through resistor grids or into the catenary or third rail.

Train 820 consisted of one PA-1 series locomotive, one PA-1A series locomotive, and five PA-4 series locomotives. These series are designed to run as mixed-consist trains.⁸ The PA-1, PA-1A, and PA-4 series locomotives are not equipped with onboard event recorders or onboard diagnostics systems. After the accident, in November 2011, the PA-1, PA-1A, and PA-4 series locomotives were decommissioned and removed from passenger service. PATH now runs all PA-5 series locomotives equipped with event recorders.

Video surveillance cameras are located on the north and south platforms at the Hoboken station. Ten cameras provide different views of trains as they move past the platform. Video recordings made before the accident show that train 820 entered the station travelling about 10 mph, accelerating to about 14 mph. A green light located on the side of each PATH locomotive activates when the brakes are applied.⁹ Video recordings showed that about 2 seconds before the train collided with the bumping post, the brakes were applied. The speed of the train when it collided with the bumping post was estimated to be 13 mph.

The engineer stated she did not experience any braking problems with her train on the day of the accident. The engineer also said that a successful running brake test—a momentary application of the brakes while the train is in motion to verify that the brakes work—was conducted at mid-platform, just before the collision with the bumping post.¹⁰ After an overall evaluation of the brake system, investigators determined that the brake system would have performed as designed if the brakes had been applied in sufficient time before the accident.

The National Transportation Safety Board (NTSB) concludes that the signal system, the track, and the mechanical condition of the train equipment were not factors in this accident.

1.1 Train Crew

Investigators interviewed the crew of train 820. On the day of the accident, the engineer reported for duty at 4:05 a.m. The engineer's work hours for the days leading up to the accident is shown in the table.

Table. Train 820 engineer's work hours.

Date	Tour of duty	Total hours worked
May 6, 2011	5:15 a.m.–1:15 p.m.	8:00
May 7, 2011	11:27 p.m. ^a –5:27 a.m.	6:00
May 8, 2011	4:05 a.m.–10:05 a.m.	4:27 ^b

^a The engineer's shift began on May 6, 2011. PATH operations define this as a May 7 tour of duty.

^b Actual train operating hours are represented here because the accident occurred during the engineer's shift.

⁸ *Mixed-consist trains* are those that are operationally compatible and are designed so they can be coupled together in no particular order.

⁹ The activation of the light is governed by brake pressure transducers that energize the circuit when the brakes are applied.

¹⁰ *Mid-platform* at Hoboken station refers to a point about 186 feet from the bumping post on track 2.

When questioned about sleeping habits, the engineer said she napped twice a day for a period of at least 4 hours. When asked about the day before the accident (May 7), the engineer said she had two naps totaling 10 1/2 hours. (See figure 2.)

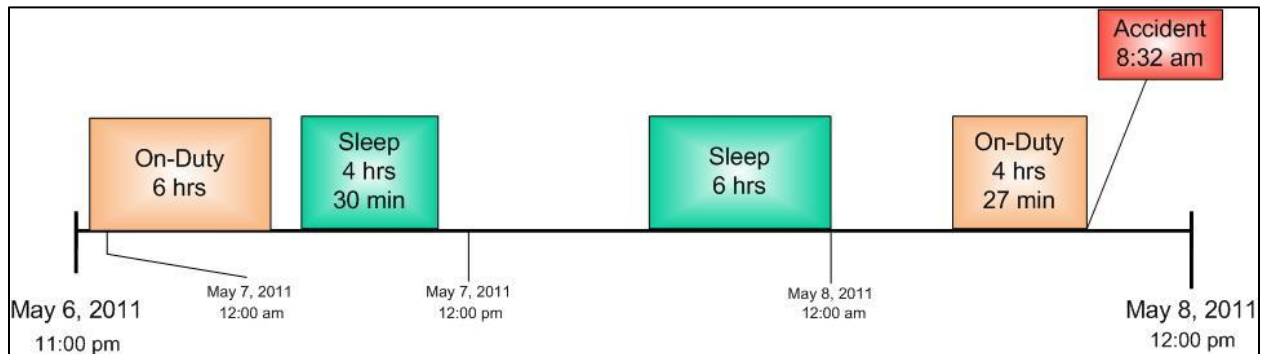


Figure 2. Engineer's work/sleep/wake history.

The engineer awoke at 12:05 a.m. on May 8 in preparation for the 4:05 a.m. shift. The engineer explained that she used this time to get ready for work. This reporting time was consistent with the engineer's regular work schedule. The engineer reported for duty on time.

There was insufficient information available to determine whether the engineer was fatigued at the time of the accident.

After the accident, the engineer and the conductor were tested for alcohol and illegal drugs in accordance with Title 49 *Code of Federal Regulations (CFR)* Part 219, Subpart C, "Post-Accident Toxicological Testing." Test results were negative. The NTSB therefore concludes that illegal drug or alcohol use were not factors in this accident.

1.2 Positive Train Control

The NTSB has investigated many railroad accidents involving train collisions in which crewmembers failed to operate their trains properly for a variety of reasons. The Federal Railroad Administration (FRA) accident database for 2011 attributes human factors issues as causal to most train collision accidents. In 2011 there were 96 head-on, rear-end, and side collision accidents, and 80 of those accidents, or 83 percent, were attributed to human factors causes.

To prevent operational accidents involving human performance failures, the NTSB has for many years recommended that railroads install positive train control (PTC) systems. PTC systems provide safety redundancy by slowing or stopping a train that is not being operated in accordance with signal systems and certain operating rules.

The Rail Safety Improvement Act of 2008 requires the following:

Each Class I railroad carrier and each entity providing regularly scheduled intercity or commuter rail passenger transportation shall develop and submit to

the Secretary of Transportation a plan for implementing a [PTC] system by December 31, 2015, governing operations on -

(A) its main line over which intercity rail passenger transportation or commuter rail passenger transportation . . . is regularly provided;

(B) its main line over which poison- or toxic-by-inhalation hazardous materials . . . are transported¹¹

PATH has submitted its PTC implementation plan to the FRA, and the FRA has approved the plan. The proposed PATH PTC system would enforce an absolute stop for trains approaching the platforms at Hoboken station. The NTSB, therefore, concludes that the PTC system proposed for implementation by PATH would have automatically alerted the engineer to the train's excessive speed; and if the brakes were not applied, while operating in automatic mode or manual mode, the PTC system would have automatically applied the brakes to stop the train and prevent the collision.

¹¹ Title 49 *United States Code*, subtitle V, part A, chapter 201, subchapter II, section 20157, "Implementation of positive train control systems."

2. Federal Regulations and Oversight

Title 49 *CFR* 229.135 requires the installation of event recorders on all lead locomotives that operate faster than 30 mph. According to information obtained by NTSB investigators, PATH petitioned the FRA in March 1994 for a waiver from the requirement to install and maintain event recorders on PATH's PA-1 through PA-4 series locomotives; however, the waiver request was not acted upon. The investigation revealed there were no records of action taken by the FRA on the waiver request or of enforcement action for PATH's noncompliance with the event recorder requirement.

2.1 Waivers

The FRA's Railroad Safety Board reviews and approves or denies waiver petitions, block-signal applications, and requests for special approval submitted by railroads and other parties subject to FRA regulations. Title 49 *CFR* Part 211, Subpart C prescribes rules of practice that apply to waiver proceedings.

When the FRA receives a petition for a waiver of safety rules pursuant to 49 *CFR* 211.41(a), it takes two actions. First, the FRA publishes a summary of the request in the *Federal Register*, inviting public comment. Second, the FRA region involved develops facts relevant to the request, verifies representations made by the petitioner, and often requests additional information.

In certain cases, the FRA conducts a public hearing to develop additional information. However, the majority of proceedings conclude without a public hearing. When the decision on a petition for waiver is made, the FRA sends a letter informing the petitioner of its decision. According to section 211.41, a petition "is referred to the Railroad Safety Board for decision and decided not later than 9 months after receipt."

In the case of PATH's 1994 request, the FRA published a summary of the request in the *Federal Register* inviting public comment; however, no additional documentation of actions related to this request was provided by either PATH or the FRA during the investigation.¹² NTSB investigators searched FRA records available through the U.S. Department of Transportation Docket Office in Washington, D.C., as described in 49 *CFR* 211.5. No information related to either approval or denial of PATH's waiver request was found.

NTSB investigators asked the FRA and PATH about the lack of an approved event recorder waiver. The FRA responded that in November 1995, it was engaged in a jurisdictional dispute and litigation with PATH and any waiver petitions or other business with PATH would have been held in abeyance pending the final outcome of the litigation. An April 2012 e-mail from the FRA to the NTSB stated, "When the litigation was finally resolved in late 1998, the

¹² *Federal Register* vol. 60, no. 83 (May 1, 1995), p. 21234.

waiver petitions from early 1994 were stale, and, according to FRA, possibly moot.”¹³ The FRA stated that the burden of compliance with regulatory requirements is on regulated parties.

PATH officials stated that information related to the original waiver predated their current leadership. They also said that all files associated with the history of the original request were destroyed in the World Trade Center attacks on September 11, 2001.¹⁴ PATH officials further explained that they thought that a waiver had been granted for the PA-1, PA-1A, and PA-4 series equipment. PATH also informed the NTSB that in 1994 it had installed three prototype event recorder systems on PA-4 series cars but did not maintain the equipment, and when it ceased to function, it was not repaired.

The NTSB concludes that from 1994 until 2011, PATH operated the PA-1 through PA-4 series trains without event recorders and without the required waiver from the FRA. The NTSB further concludes that the FRA did not approve or deny PATH’s request for a waiver of the event recorder requirement in 49 *CFR* 211.41. Therefore, the NTSB recommends that the FRA audit the waiver process to verify it is being managed as required by 49 *CFR* Part 211.

2.2 Enforcement

Title 49 *CFR* Part 209 describes the procedures used by the FRA in its enforcement of federal statutes and regulations related to railroad safety. According to appendix A to Part 209, those statutes include the Federal Railroad Safety Act of 1970 and a group of statutes enacted before 1970 referred to as the “older safety statutes.” Appendix A also references the Rail Safety Improvement Act of 1988, which raised the maximum civil penalties available under railroad safety laws and made individuals liable for willful violations of those laws.

The FRA enforces the federal rail safety regulations and laws with about 400 federal safety inspectors, whose efforts are supplemented by about 165 state inspectors. When an inspection or investigation reveals noncompliance with a law, each noncompliant condition or action is listed on an inspection report. When an inspector determines that the best method of promoting compliance is to assess a civil penalty, he or she prepares a violation report, which is a recommendation to the FRA Office of Chief Counsel to assess a penalty based on the evidence provided in the report.

NTSB investigators asked the FRA and PATH about enforcement activity for the requirement to install and maintain event recorders on PATH’s PA-1 through PA-4 series locomotives. The FRA stated it was not aware of citations for the lack of event recorders on the PA-1 through PA-4 equipment. Similarly, PATH stated it was not aware of any enforcement actions by the FRA for this requirement. The NTSB concludes that the FRA did not enforce PATH’s obligation to install and maintain event recorders on its PA-1 through PA-4 series locomotives as required in 49 *CFR* Part 209. Therefore, the NTSB recommends that the FRA audit the inspection and enforcement program in all regions for compliance with statutes and

¹³ R. Hynes, FRA, e-mail (“DCA-11-FR-003 Hoboken Collision - Follow Up Action Needed”) to M. Hiller, NTSB, April 9, 2012.

¹⁴ PATH’s legal offices were located at the World Trade Center until September 11, 2001.

regulations related to railroad safety, and correct any deficiencies as required by 49 *CFR* Part 209.

3. Conclusions

3.1 Findings

1. The signal system, the track, and the mechanical condition of the train equipment were not factors in this accident.
2. Illegal drug or alcohol use were not factors in this accident.
3. The positive train control system proposed for implementation by the Port Authority Trans-Hudson Corporation would have automatically alerted the engineer to the train's excessive speed, and if the brakes were not applied, while operating in automatic mode or manual mode, the positive train control system would have automatically applied the brakes to stop the train and prevent the collision.
4. From 1994 until 2011, the Port Authority Trans-Hudson Corporation operated the PA-1 through PA-4 series trains without event recorders and without the required waiver from the Federal Railroad Administration.
5. The Federal Railroad Administration did not approve or deny the Port Authority Trans-Hudson Corporation's request for a waiver of the event recorder requirement in Title 49 *Code of Federal Regulations* 211.41.
6. The Federal Railroad Administration did not enforce the Port Authority Trans-Hudson Corporation's obligation to install and maintain event recorders on its PA-1 through PA-4 series locomotives as required in Title 49 *Code of Federal Regulations* Part 209.

3.2 Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the engineer to control the speed of the train entering the station. 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.

4. Recommendations

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

To the Federal Railroad Administration:

Audit the waiver process to verify it is being managed as required by Title 49 *Code of Federal Regulations* Part 211. (R-12-37)

Audit the inspection and enforcement program in all regions for compliance with statutes and regulations related to railroad safety, and correct any deficiencies as required by Title 49 *Code of Federal Regulations* Part 209. (R-12-38)

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Adopted: November 5, 2012

5. Appendix A: Investigation

The NTSB was notified of the collision of a PATH train at the Hoboken station in Hoboken, New Jersey, on the morning of May 8, 2011. Two investigators were launched from Washington, D.C., and arrived on scene later that day. This investigation focused on federal regulations and oversight of PATH and was limited in scope. There was no Board Member on scene. Investigative groups were formed to study mechanical equipment, signals, operations, and data recorders.

Parties to the investigation were the FRA, the Federal Transit Administration, PATH, the Port Authority of New York & New Jersey,¹⁵ the Brotherhood of Locomotive Engineers and Trainmen, and the United Transportation Union.

¹⁵ The Port Authority of New York & New Jersey provides oversight of PATH.