NATIONAL TRANSPORTATION SAFETY BOARD

Office of Railroad, Pipeline and Hazardous Materials Investigations

Washington, DC

New Jersey Transit

Train 1614 Collision with Bumping Post at Hoboken Terminal
Hoboken, New Jersey
September 29, 2016

NTSB Accident Number DCA16MR017

System Safety Group Factual Report

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The Accident

NTSB Accident Number:	DCA16MR017
Date of Accident:	September 29, 2016
Time of Accident:	End of Track Collision with Bumping Post
Type of Train:	Passenger
Railroad:	New Jersey Transit
Train:	Train No. 1614
Fatalities:	1
Injuries	155
Location of Accident:	Hoboken, New Jersey

1 Summary

For a summary of the accident, refer to the *Accident Summary* within the National Transportation Safety Board (NTSB) public docket for this accident.

2 The Accident

On September 29, 2016, about 8:38 a.m. eastern daylight time, New Jersey Transit (NJT) train 1614 did not stop before reaching the end of terminal track 5, overrode the bumping post, and struck a wall at the Hoboken Terminal in Hoboken, New Jersey.[1] (See Figure 1.)

[1] All times referenced in this report are eastern daylight time.

Figure 1. Damaged Cab Control Car. (Photo: NTSB)

Train 1614 traveled in an eastward direction from West Spring Valley on the Pascack Valley Line on main track 3 and through the West End Interlocking at mile post (MP) 2.2 onto main track 3 of the Morristown Line. The train traveled through the Bergen tunnel on main track 3 and the East End interlocking at MP 0.7 on approach to the Hoboken station on the NJT Morristown Line. There were four main tracks leading through the Bergen Tunnels and into Hoboken East End interlocking, designated as

main tracks 1 through 4. There were six main tracks between East End interlocking and Terminal interlocking on this line, designated as tracks 1, 2, 3, 4-main, 6-main, and 122. Figure 2 illustrates the track configuration approaching Hoboken station in an eastward direction. (For additional information, see the *Track & Engineering Group Factual Report* in the public docket for this accident.)

Figure 2. Track configuration eastward into Hoboken station. (Photo: NTSB)

The train was traveling at the speed of 15 miles per hour (MPH) about 100 yards west of the Hoboken station. Train 1614 crossed over to the "M" ladder track and entered terminal track no. 5. Train 1614 moved on main track 3 through a series of crossover switches, destined for terminal track 5 in the station. The train reduced speed to 8 mph, 2 mph below the maximum authorized speed, as it entered terminal track 5; however, the train speed increased to 21 mph prior to colliding with the bumping post. (For more information, see the *Cab Car Event Recorder Group Chairman's Factual Report* in the docket for this accident.) Upon impact with the bumping post, the lead car of train 1614 rode up and over the bumping post and came to a rest about 40 feet beyond the end of the track. (See Figure 3.)

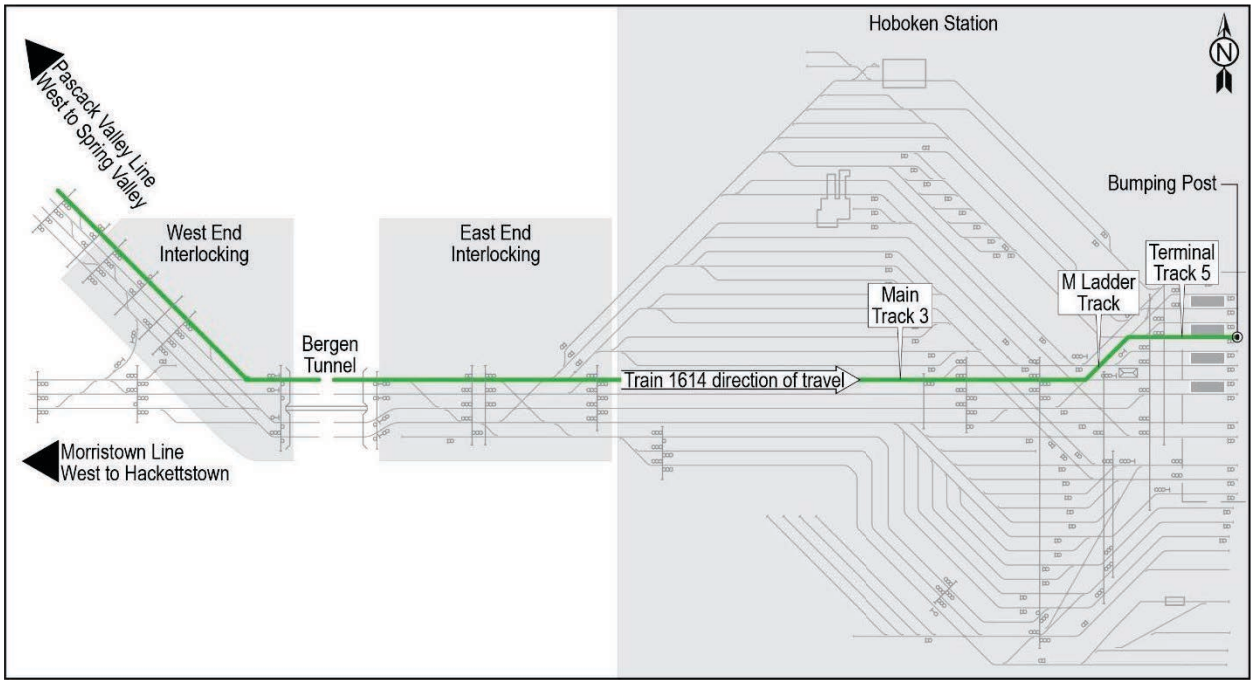

Figure 3. Train 1614 route into Terminal Track 5.

Train 1614 consisted of one controlling passenger car (cab car), three passenger cars, and one diesel electric locomotive at the rear of the train. The train was traveling at about 21 mph at the time of the accident.

3 New Jersey Transit System Safety Program Plan

The NJT currently operates the third largest commuter rail operations in the Unites States. On weekdays it operates nearly 700 trains in three states serving than 150 passenger stations and traveling 2 billion passenger miles over 11 lines and into 12 storage yards. The NJT

established the Office of System Safety (OSS) on October 20, 2014, as an independent and autonomous entity responsible for organization's system safety of bus, light rail, commuter rail and corporate safety. A chief safety officer leads the OSS and reports directly to the NJT executive director.[2] (See Appendix A for an organizational chart of the NJT Office of System Safety.) Prior to October 20, 2014, system safety was the responsibility of each individual operating department. Rail operations housed rail system safety with system safety reporting to the head of that department.

Although NJT is currently exploring the consolidation of its system safety program plans for its commuter rail, light rail, and bus operations, the NJT *Rail System Safety Program Plan* (SSPP), dated October 31, 2011, was in effect at the time of this accident.[3] The NJT voluntarily adopted the guidelines of the American Public Transportation Association (APTA) *Manual for the Development of System Safety Program Plans for Commuter Railroads* (manual) as guidance in developing this plan.[4] (See Section # for more information on the APTA manual). The NJT

[2] The New Jersey Transit executive director is the top-ranking official at New Jersey Transit. The vice president/general manager of the New Jersey Transit Rail Operations is responsible for day-to-day operations and policy development of the rail programs at New Jersey Transit; however, the NJT executive director is ultimately responsible for all New Jersey Transit operations (bus operations, commuter rail, and light rail). The chief safety officer reports to the executive director.

[3] New Jersey Transit Rail *System Safety Program Plan*, October 2011, SAF-997, Rail Safety Department, effective October 31, 2011.

[4] American Public Transportation Association (APTA) *Manual for the Development of System Safety Program Plans for Commuter Railroads*, Revision 2.4, May 15, 2006. (APTA, Washington, D.C.).

took this action in anticipation of federal rulemaking requiring commuter railroads to develop and implement system safety program plans.

The SSPP includes the elements named in the APTA manual. The NJT complied with the industry standard as a good practice. Also, every three years, NJT had APTA audit its SSPP, with the last audit being on April 16 and 17, 2012.[5] An outside consultant conducted an audit in 2015 and NJT postponed the APTA audit.

Investigators during an interview with a system safety manager asked if APTA identified any risk or hazard associated with passengers walking behind stub end tracks as they did at the Hoboken station during its 2012 audit. He responded, "I don't think any kind of recommendations came from that external audit, the same audit that you are talking about." The chief safety officer stated that he was not familiar with APTA conducting those types of audits, audits where they audit the property's physical characteristics. He said that, "Typically, it's on the document itself and those types of things." The NJT later confirmed that APTA did not identify any risk or hazard associated with trains that fail to stop on stub-end tracks.

The NJT defines system safety as the concept of applying operating, technical and management techniques and principles to the safety aspects of a system. The NJT also says that

[5] APTA did not conduct an audit of the NJT in 2015. The NJT engaged an external consultant to conduct an audit of its system in 2015 and cancelled the scheduled APTA. The NJT plans to have the next APTA in 2018.

application of these techniques and principles throughout the system's life reduces hazards to the lowest possible level through the most effective use of available resources. The NJT SSPP states that,

> System Safety is an overall, integrated, coordinated effort on the part of all managers and the rail Safety Department and is designed to:
>
> - Preserve life and property.
> - Control, eliminate or reduce hazards to the lowest possible level.
> - Reduce and prevent accidents.
> - Minimize and control the effects of accidents and incidents.
> - Maintain the safe operation of the system.
> - Ensure that safety is an integral part of all personnel decisions, plans, specifications, designs, tests, procedures and operations.

Section 1D *System Safety Program Plan Objectives* states the one of the NJT objectives is to update its SSP annually. However, at the time of this accident, the last revision to the SSPP was in 2011, five years earlier. During a follow-up statement the chief safety officer reported that the NJT decided to forego a revision at this time pending the effective date on December 4, 2017, of the final rule at 49 *Code of Federal Regulations* Part 270, System Safety Program.[6]

Investigators conducted an interview with a NJT system safety manager to gain insight into the NJT safety processes. When asked if the SSPP addressed redundant safety preventative

[6] The Federal Railroad Administration published it System Safety Program final rule at 49 *Code of Federal Regulations* Part 270 on August 16, 2017, 81 FR 53850. The FRA stayed the final rule final rule on February 10, 2017, 82 FR 10443, March 21, 2017, 82 FR 14476, May 21, 2017, 82 FR 23150. The rule is now effective December 4, 2017, following an additional stay on June 5, 2017, 82 FR 26359.

measures to avoid a single point failure such as an engineer becoming incapacitated and traveling into the station at excessive speed, he responded, "It's not specifically addressed in any sections in our System Safety Program Plan, per se, …" The chief safety officer confirmed this by saying, "No, it doesn't speak specifically to that in the SSPP. That's where our rules come into play." However, when the chief safety officer explained the operating rules that would apply, he said,

> I'm not an expert with regard to our operating rules, but I know that it refers -- . I know that our operating rules do refer to, or special instructions that are directly correlated with the rules do speak to operating a train properly. But the SSPP is more of a guide, more of an umbrella, to instruct an organization to have certain rules in place that will address nearly, if not all, types of operations that it will encounter.

Investigators asked the chief operating officer if the operating rules were standalone under the SSPP umbrella he responded, "I don't know if I would term it that way." When asked to explain, he said,

> The SSPP provides a guideline to rail operations for consideration of certain safety-oriented related activities. Its rulebook and special instructions that accompany it or complement it, there is where you would find the specific rule that speak to many, if not all operating environments.

Investigators asked the system safety manager if there was anything in the SSPP that addressed some sort of redundancy if anything were to happen regarding non-compliance of a rule requirements to operate a train at restricted speed and the failure to do so. Investigators also asked if the SSPP identified mitigation for that hazard. The chief safety officer spoke up again, saying,

> I'm going to just interject right there. No, it does not. It's not, it's not designed to do that. It is just purely not designed to address those items. That's where again, either Rule Book or Special Instructions or bulletins that support those rules come in, but not the SSP. It's not – it's definitely, like James indicated earlier, it's more of a high-level document that would encourage the placement of rules that were more specific, as you mentioned.

Investigators pointed out previous bumping post collisions on the NJT system and then asked if those collisions would be identified as hazards in the SSPP. The chief safety officer responded that it is not identified specifically, but that such collisions would fall under that category. That, "a collision with anything, any fixed object or not fixed object, would be considered a hazard."

When asked about evaluation of the previous collisions with bumping posts and something put in place to prevent reoccurrence, the chief safety officer was unable to answer and requested time to review the records. Following that record review, information provided to investigators indicated the only actions taken were disciplinary with no indication of a hazard analysis or risk assessment followed by hazard mitigation.

Section 3 *Hazard Management Process* of the NJT SSPP describes the hazard resolution matrix and the hazard analysis procedure.[7] It is the practice of the NJT to use safety committees to identify safety hazards. The NJT SSPP states that it also identifies hazards through scheduled

[7] The U.S. Department of Defense Military Standard 882C, dated January 1993 serves as the reference document for this section. Note that the current standard version is Military Standard 882E, effective May 11, 2012.

inspections, code compliance, and adherence to various governmental regulations. Lastly, the appropriate departments mitigate customer concerns about safety issues.

Investigators asked the system safety manager if there were hazard categories in the SSPP that were the springboard for the program. He responded,

> In the System Safety Program Plan, as I said, it's a high-level document. And it basically directs, tells what we do to make your system safer. For example, we do safety inspections at the facility stations. And that was ordered to the three elements, how we are doing that business. So it's signal training, the development of programs. And it doesn't specifically say what hazard we are looking into, but we have a section it's called hazard analysis or hazard management where we have a prescribed form which we'll use if in case you need to use that – you know, evaluate the hazard.

When asked if the first step was identifying what could be a hazard, he responded, "Correct". Next, investigators ask him if a collision or a derailment were in categories that would call for a hazard analysis. He said, "As far as the – you know, you are talking about switches and other things –" The investigator clarified the question as the potential for a collision, the potential for a collision to occur between a train entering a stub end track and the bumping block. The system safety manager responded,

> As I said, you know, in this particular collision with the bumper block, it has – it was not an issue like a major issue here before. So that was not in our radar. So we do – other inspections. We have a checklist for the shop inspections. So specifically, you a back talking about this collision between bumper blocks. As I said, it was not a major issued identified with the company, so --

The NJT SSPP describes the mechanism used to formally identify, analyze, and resolve hazards as a critical element in its SSPP. Hazards are identified in terms of severity and probability of occurrence. The NJT performs a hazard analysis when the corrective action of a safety issue or root cause of an accident is not obvious or the designated reviewing committee cannot agree with the determination.

Section 3 of the NJT SSPP states that following identification of a hazard, an analysis determines the potential severity and the probability of its occurrence; however, it does not include the details of who will conduct the analysis.

The NJT defines hazard severity as a, "subjective measure of the worst result possible from an event that can result from personal error, environmental conditions, design inadequacies and/or procedure inefficiencies of the system." The NJT categorizes hazards in one of four categories:

1. Catastrophic – may cause death or system loss
2. Critical – may cause severe injury or illness or major system damage
3. Marginal – may cause minor injury or illness or minor system damage
4. Negligible – will result in less than minor injury, illness or system damage

The NJT defines hazard probability as "the probability that a specific hazard will occur during the life expectancy of the system." The review committee describes the hazard subjectively and reaches consensus for one of five rankings as illustrated in Table 1.

Table 1. NJT Hazard Probability Ranking Table

DESCRIPTION	LEVEL	INDIVIDUAL ITEM	FLEET OR INVENTORY
Frequent	A	Likely to occur frequently	Continuously experienced
Probable	B	Will occur several times in the life of an item	Will occur eventually
Occasional	C	Likely to occur sometime in the life of an item	Will occur occasionally
Remote	D	Unlikely but possible to occur in the life of an item	Unlikely, but may occur
Improbable	E	So unlikely it can be assumed the occurrence may not be experienced	Unlikely to occur

The NJT SSPP states that, "Hazard Analysis allows the committee to understand the amount of risk involved with accepting the hazard relative to what resources are required to reduce it to an acceptable level." The NJT has charged the committee to decide whether to correct the hazard or to accept the risk based on their categorization of the hazard severity and the ranking of the hazard probability. The committee uses the NJT *Hazard Resolution Matrix* to determine the appropriate level of mitigation of the hazard.[8]

[8] Section 3 *Hazard Management Process* of the NJT SSPP contains the *Hazard Resolution Matrix* used by the committee.

A Hazard Analysis Worksheet found as an appendix in the NJT SSPP aids the committee in conducting the hazard analysis. The SSPP documents the hazard analysis procedure.

Section 4 *Accident Investigation and Analysis* describes the process used by the NJT to investigate, document and report accidents/incidents casualties, injuries, occupational illnesses and highway-rail grade crossing accidents. While section 4B *Safety Data Acquisition and Analysis* states that the NJT performs periodic analysis of employee and non-employee injuries to determine injury trends and underlying causes, there is no mention of incorporating the hazard management procedures to determine, categorize, rank, and mitigate any risk associated with these events. The NJT risk management department does analyze and categorize information regarding the cost of accidents/incidents reported by external agencies including the National Transportation Safety Board (NTSB), the FRA, the Federal Transit Administration (FTA), and the Association of American Railroads (AAR).

In addition to the inspections conducted by the NJT safety committees, Section 5 *Inspections and Maintenance*, outlines the overall method used by NJT for inspection and maintenance of its assets; however, this section does not indicate application of the NJT hazard management process to any of these inspections or that any defects noted by these inspections undergo any hazard analysis.

Subsection 5A *Facilities Maintenance and Inspections* of the SSPP outlines other inspections and maintenance, identifying which department is responsible for specific assets. The State of New Jersey also inspects NJT for compliance with the New Jersey Uniform Fire Code at NJT facilities and escalators and elevators for compliance with the New Jersey Uniform Construction Code. The NJT infrastructure engineering department performs periodic inspections, custodial services, and maintenance and repairs of passenger facilities. Facilities inspections are formal scheduled inspections at regular intervals as well as randomly. The rail safety department also conducts comprehensive facility inspections.[9] Ticket vending machines staff and ticket agents frequently inspect and report any defective conditions at passenger facilities. The engineering – Station Management maintains defect/repair records through a "station inventory" process to identify and quantify the overall condition, components and specifications of various station facilities. Finally, the employee safety committees of the Newark and Hoboken division may inspect passenger and employee facilities and provide recommendations to improve safety. This section includes the rail infrastructure engineering department; the track, catenary, signal and communications, and structures groups; and the environmental services unit and outlines the inspection/maintenance responsibilities of each.

[9] At the time of this accident, the rail safety department no longer exists but is encompassed in the office of system safety.

Subsection 5B *Vehicle Maintenance Inspection and Repair* addresses maintenance of NJT rolling equipment, mechanical asset management, and required inspections. Subsection 5C Highway—Rail Grade Crossings identifies those responsible for the safe operation of about 330 highway rail grade crossings on the NJT system.

Section 10B *Workplace Safety Programs* outlines how the rail safety department works to ensure a safe working environment for NJT employees. Section 10 states that the rail safety department is responsible for developing, implementing and auditing safety, health, industrial hygiene and operating programs with the purpose of reducing injuries and ensuring compliance with state and federal regulations. Subsection 10B Safety Department Functions, amongst other activities, outlines inspections that rail safety department is responsible for conducting. The safety department conducts inspections at employee facilities such as shops, offices and yards and on rolling stock and on-track equipment. Additionally, the rail safety department performs inspections at passenger stations and terminals. The safety department uses the hazard management process where beneficial.

During the interview with the system safety manager, he said that there was a routinely used checklist for inspections and audits. Along this line of questioning investigators stated that the SSPP discusses how to identify hazards and asked what the NJT mechanism to identify hazards and get those hazards on the checklist was and asked if there was a group seeking to identify hazards. The system safety manager responded,

> So what is basically you see that the checklist was developed on the non-hazards as well as from our experience. That's why the checklist was developed. So, this particular item [bumping post collision] was not on the checklist because it was not identified as a hazard as the other issues." He went on to clarify that, "For example, platform gap issues, that like ongoing daily issues. So that's something like we consider in our daily inspections. So, this issue about the collision with the bumpers, as I said – it was not a major issue experience-wide by the committee before. And we look – we depend upon the rules for the operations department to discuss that issue. For example, speed restriction, that kind of thing, they look at. You know, that's being left for operations.

He responded when asked if NJT was relying on rules as a mitigation for that risk, he responded, "Correct". The chief safety officer added,

> We also rely on technology. So, there's on-train technology and there's field technology that we rely on, trackway technology, that acts as an interface to the locomotives and to the lead cars, which will under the right circumstances slow and/or stop the train. And it also depends on the territory upon which the train is being run. So, we – there is a combination of reliance's, if you will, that we have that's common throughout the railroad industry. So, we rely on, obviously, the engineer. We rely on the onboard technology. We will, or communicate to the trains, to onboard equipment to slow and/or stop trains. So, we – depending again, upon where the trains are being run, we also rely on that and not just the human being. So, it supplements human performance.

When asked if the SSPP gave an element like a living document, guiding employees to not only find known hazards but to ask, What if? What happens if …the operating rules don't capture this failure? The chief safety officer responded,

> Certainly our team – teams, because we also work together with other departments to resolve and identify hazards. So, yes, the opportunities are taken beyond the checklist. I can honestly say that. The checklists used are comprehensive. The System Safety Program Plan provides a great guidance to those that are out and about and conducting daily inspections. But certainly, I can honestly say that we look beyond – we look at our checklists, we look beyond the,

> and the checklist grows based on new items we see in the field. And so the --- while a hazard analysis, when we look at the total risk in a RAC, that is one tool that can be used to weigh a particular hazard. Some you don't need to do that with. You can identify a hazard and see that immediately it needs to be addressed and/or, if not mitigated, reduced greatly. So, yes, there are teams of us, whether the Office of System Safety acts alone or in partnership with the various departments within rail, we do act on items that we may not have as part of our immediate checklists.

Subsection 10B outlines the NJT safety committee roles and responsibilities. These committees apply the hazard management process, with assistance from the rail safety department, and recommend corrective actions.

Lastly, Section 14 Internal Safety Management Assessment Process outlines the process to assess the implementation level of the SSPP program elements. This assessment is a process by which NJT objectively examines evidence to determine its own compliance with the SSPP. The objectives of the internal safety assessment are:

- To verify that the safety programs have been developed and implements per the plan's requirements.
- To assess the effectiveness of the Rail System Safety Program
- To identify program deficiencies
- To identify potential hazards at NJ Transit Rail and to enhance the current safety programs.
- To verify corrective actions are being tracked.
- To recommend improvements to the Rail System Safety Program.
- To provide management with an assessment of the status and the adequacy of the Rail System Safety Program Plan.

4 Previous New Jersey Transit Bumping Post Collisions

New Jersey Transit provided data between January 1, 2007, and December 31, 2016, of collisions with bumping posts, reporting seven previous accidents similar to this accident during this period. Three of the previous collisions happened at the Hoboken station. Four of these collisions involved similar circumstances to this accident, one happened during a reverse movement, and the last involved failure to secure the locomotive before attempting to couple to other equipment. On June 2, 2015, at the Hoboken station, a train passed the stop signal and collided with the bumping post. This incident was that train's engineer second decertification event. NJT categorized and accident on May 31, 2015 as a C3RS event with no disciplinary action when a train failed to comply with restricted speed and struck the bumping post at the Princeton station. On May 14, 2014, at New York Penn station a NJT train stuck the bumping post while making a reverse movement. The engineer's failure to comply with restricted speed on June 8, 2011 resulted in a collision with the bumping post at Princeton station and on January 4, 2010 at the Hoboken station. On July 8, 2007, the engineer did not use proper methods to stop the train and collided with the end of the track at New York Penn station. The failure to secure the locomotive resulted in the locomotive rolling while attempting to couple and struck the end of the track on May 5, 2007, at the Hoboken station, Hill Yard.

The NJT Hoboken has 17 stub ended passenger train tracks. All the stub ended tracks, except terminal track 15, have a bumping post that would likely cause an abrupt stop if a train

struck them. Evidence indicates that most of these bumping posts incurred one or more collisions with equipment in the past.

5 After-Action Activities

Following this accident, the Federal Railroad Administration (FRA) published Safety Advisory 2016-03 on December 5, 2016, urging railroads to, "take more robust action to address human factors that may cause accidents and to enhance protection of railroad employees and the public."[10]

The NJT issued instructions October 28, 2016, for train approaching the Hoboken and Atlantic City stations requiring the conductor to occupy the head end of the train.[11] On January 28, 2017, NJT issued instructions requiring the conductor to occupy the head end of trains approaching Penn Station New York.[12] Following this accident, the NJT reduced the maximum authorized speed at the Hoboken terminal from 10 mph to 5 mph.

The NJT is also researching improved technology or modifications to existing technology to augment the human performance aspect of operating a train into a terminating track.

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[10] Federal Register Vol. 81, NO. 233, December 5, 2016: 887649.

[11] See New Jersey Transit Rail Operations *Supplemental Bulletin Order 8-1005*, effective 4:00 p.m., Wednesday October 5, 2016.

[12] See New Jersey Transit Rail Operations *Supplemental Bulletin Order 8-129*, effective 12:02 a.m., Saturday, January 28, 2017.

Lastly, NJT began a risk assessment of all stub end tracks and a bumping post analysis at the Hoboken terminal. Following this accident, the NJT commissioned an analysis of the existing terminal track bumper blocks (bumping posts) at the Hoboken Terminal and, for any bumpers that are not rated to at least 10 mph, recommendations for new or rehabilitation options. This analysis resulted in a recommendation to replace all existing fixed bumpers with 10-mph sliding friction bumping posts designed for a deceleration rate of 0.15 g. This recommendation is being action upon by the NJT.

The location of the new bumping posts will allow a distance from the end of the tracks to allow stopping of the trains and provide an additional factor of safety. The analysis notes that the use of a bumper with a lower design speed would not protect against trains operating at the normal timetable speed of 10 mph and the use of a higher design speed would result in a significant loss of platform capacity or require use of a deceleration rate above 0.15 g. The analysis further notes that at or below 0.15 g, it is expected that the typical standing passenger can remain standing without holding on to the train and that above 0.15 g, the likelihood of passenger injury increases. Given that the energy of a collision varies with the square of the speed, the analysis determined that it was not feasible to fit bumping posts that would safely absorb the energy of an impact at the 21 mph speed involved in the September 29, 2016 accident.

For more information regarding the NJT policy to detect and treat obstructive sleep apnea, refer to the *Medical Factual Report* in the docket of this investigation.

6 Federal Railroad Administration

The Federal Railroad Administration (FRA) began work on a broad range of actions to enhance the safety of passenger train operations. In September 1994, the DOT Secretary announced that the FRA would develop passenger equipment safety standards in two phases: 1) initial regulations dealing with the most critical issues in three years; and 2) final regulations dealing with all related safety subjects in five years. In November 1994, Congress passed the Federal Railroad Safety Authorization Act of 1994 and section 215 requiring the Secretary to meet a three-year deadline to develop rail passenger equipment safety standards and final regulations within five years.[13]

The FRA began a rulemaking for comprehensive passenger equipment safety standards. The Rail Safety Advisory Committee (RSAC) Passenger Equipment Working Group (Working Group) began work on June 6, 1995, on the proposed rules.[14] An Advanced Notice of Proposed Rulemaking (ANPRM), published on June 17, 1996, sought public comment on the need for particular safety requirements to address the inspection, testing, and maintenance of passenger equipment; equipment design and performance criteria related to passenger and crew

[13] Federal Railroad Safety Authorization Act of 1994, Pub. L. 103-440, 108 Stat. 4619.
[14] Rail Safety Advisory Committee (RSAC) -- see FRA RSAC website: https://rsac.fra.dot.gov/tasks.php

survivability in the event of a train accident; and the safe operation of passenger train service, supplementing existing railroad safety standards.[15]

The Association of American Railroads (AAR) sets industry standards for the design and maintenance of freight equipment that add materially to the safe operation of this equipment. However, the AAR does not develop or maintain passenger equipment standards.

Topics covered in the ANPRM included system safety programs and plans, along with passenger equipment crashworthiness; inspection, testing and maintenance requirements; training and qualification requirements for mechanical personnel and train crews; excursion, tourist and private equipment; commuter equipment and operations; train make-up and operating speed; tiered design standards based on a system safety approach; fire safety; and operating practices and procedures.

Among the Working Group's scope of effort was: 1) determine and prioritize safety risks; 2) determine steps or corrective actions to reduce risks; and 3) optimize safety benefits. The expected outcome from the Working Group Two was two rulemakings; the first NPRM being in response to the ANPRM mentioned above and the second being and an NPRM for passenger equipment power brake standards. The FRA also established an additional RSAC working group, the Emergency Preparedness Working Group for rail passenger service, at this same time.

[15] Federal Register Vol. 61, No. 117, June 17, 1996: 30672

The FRA published Emergency Order No. 20, Notice No. 1, on February 22, 1996, with added clarification published in Notice No. 2, on March 5, 1996, following train accidents in Secaucus, New Jersey on February 9, 1996, and in Silver Spring, Maryland on February 16, 1996, claiming fourteen lives, to compel steps to reduce the risks to passengers and crews.[16] Prior accidents investigated by the National Transportation Safety Board (NTSB) to Secaucus and Silver Spring also illustrated potential risk. On August 1, 1981, in Beverly, Massachusetts, a commuter train engineer died and 28 passengers were injured when a commuter train collided head-on with a freight train due to dispatcher error.[17] On November 12, 1987, in Boston, Massachusetts, a commuter rail train struck the locomotive at the end of a preceding train traveling in the same direction on the same track, causing injuries to three crew members and 220 passengers.[18] In Gary, Indiana, on January 18, 1993, two EMU consists struck in a cornering

[16] Federal Register Vol. 61 No. 36, February 22, 1996: 6876. Federal Register Vol. 61 No. 44, March 5, 1996: 8703. National Transportation Safety Board, Near Head-on Collision and Derailment of Two New Jersey Transit Commuter Trains Near Secaucus, New Jersey, February 9, 1996, RAR-97-01, (Washington, DC: National Transportation Safety Board, 1997). National Transportation Safety Board, Collision and Derailment of Maryland Rail Commuter MARC Train 286 and National Railroad Passenger Corporation Amtrak Train 29 near Silver Spring, Maryland on February 16, 1996, RAR-07-02, (Washington, DC: National Transportation Safety Board: 1997).

[17] National Transportation Safety Board, *Head On Collision of Boston & Main Corp Extra 1731 East & MBTA Train No. 570 on Former Boston & Main Corp. Tracks,* August 1, 1981, RAR-82/01, (Washington, DC: National Transportation Safety Board, 1982).

[18] National Transportation Safety Board*, Rear-end Collision of Amtrak/Massachusetts Bay Transportation Authority Commuter Trains, Boston, Massachusetts,* November 12, 1987, RAR-88/05, (Washington, DC: National Transportation Safety Board, 1988).

collision at the approach to a gauntlet bridge, resulting in seven fatalities and injuries to 95 persons, due to the failure of one of the engineers to observe signal indications.[19]

Emergency Order No. 20 required interim safety plans and required commuter railroads to evaluate their passenger operations with a view toward enhancing the safety of those operations in developing those interim plans. The order required all railroads operating scheduled intercity or commuter rail service to conduct an analysis of their operations and file an interim safety plan with the FRA. The FRA encouraged these railroads to implement identified opportunities for risk reduction immediately.

The FRA required that the interim safety plans included train-to-train collisions, the hazard of impact with fixed structures, and collisions with heavy vehicles at highway rail grade crossings and the following minimum opportunities for risk reduction:

a) Use of cab car/MU car
b) Operating rules
c) Adverse Conditions
d) Short-term technology enhancements
e) Crew management
f) Highway-rail grade crossings
g) Emergency exit notification

[19] National Transportation Safety Board, *Collision Between Northern Indiana Commuter Transportation District Eastbound Train 7 and Westbound Train 12, Gary, Indiana,* January 18, 1993, RAR-93/03 (Washington, DC: National Transportation Safety Board, 1993).

The FRA issued two regulations as part of a broad effort to promote the safety of passenger rail travel. The *Passenger Train Emergency Preparedness* regulations, 49 CFR Part 239, published on May 4, 1998, and the *Passenger Equipment Safety Standards*, 49 CFR Part 238, published on May 12, 1999, having requirements for emergency systems on passenger trains, in addition to other requirements such as for structural design and fire safety.[20] These regulations were elements of a comprehensive effort by the FRA to improve the safety of rail passenger service. The intent was incorporation of these requirements into the individual railroad overall system safety planning process previously agreed upon by the commuter authorities.

The FRA presented Task Statement: *Review of Passenger Safety Issues*, to the Rail Safety Advisory Committee (RSAC) on May 20, 2003.[21] The RSAC established the Passenger Safety Working Group to further address passenger train safety issues.

The Rail Safety Improvement Act of 2008 (RSIA) in section 109 mandated system safety programs (SSP) for all intercity and commuter railroads.[22] The SSP is a structured program with proactive processes and procedures developed and implemented by commuter and intercity passenger railroads to identify and mitigate or eliminate hazards and the resulting risks on the

[20] Federal Register Vol. 63, No. 85, May 4, 1998, 24630. Federal Register Vol. 64, No. 91, May 12, 1999, 25540.

[21] The FRA established the RSAC pursuant to Section 10(a)(2) of the Federal Advisory Committee Act (Pub. L. 92-463) to provide advice and recommendations to the FRA on railroad safety matters in March 1996. Rail Safety Advisory Committee (RSAC) Task Number 2003-01, *Review of Passenger Safety Issues*. See FRA RSAC website: https://rsac.fra.dot.gov/tasks.php

[22] Pub. L. 110-432, Division A, 122 Stat. 4848; 49 U.S.C. 20156, and 201189-20119.

railroad's system. An effective SSP encourages a railroad and its employees to work together to proactively identify hazards and to jointly determine what, if any, action to take to mitigate or eliminate the resulting risks.

The FRA published its SSP in an NPRM on September 7, 2012.[23] The FRA said in the NPRM although it has, "issued safety regulations and guidance that address many aspect of railroad operations, gaps in safety exist, and hazards and risks may arise from these gaps." They further expressed the belief that railroads are better positioned to identify some of the gaps and take the necessary action to mitigate or eliminate the arising hazards and resulting risks. The FRA reopened the comment period on November 26, 2012 and extended it until December 7, 2012.[24]

On August 12, 2016, the FRA published its final rule at 49 *Code of Federal Regulations* (CFR), Part 270, *System Safety Program*.[25] The FRA said that "A SSP provides a railroad with the tools to systematically and continuously evaluate its system to identify hazards and the resulting risks gaps in safety and to mitigate or eliminate these hazards and risks."

[23] Federal Register Vol. 77, No. 174, September 7, 2012: 55372.
[24] Federal Register Vol. 77, No. 227, November 26, 2012: 70409.
[25] Federal Register Vol. 81, No. 156, August 12, 2016: 53850

The FRA published a stay of regulation on February 10, 2017 delaying the effective date of 49 CFR Part 270 until March 21, 2017.[26] On March 20, 2017, the FRA published another stay of regulation until May 22, 2017.[27] Effective May 18, 2017, the FRA again stayed the regulation until June 5, 2017.[28] Most recently, the FRA published a stay of regulation effective June 2, 2017 until December 4, 2017.[29] The FRA provided supplementary information in the latest stay of regulation saying that "the stay was consistent with the new Administration's guidance issued January 20, 2017, intended to provide the Administration and adequate opportunity to review new and pending regulations". This review includes petitions for reconsideration of the SSP final rule.[30] Additionally, the FRA said that it planned outreach with interested parties to help inform its decisions raised in the Petitions. The FRA has announced its intent to hold a meeting of the RSAC General Passenger Safety Task Force, Passenger Safety Working Group, and state partners in October 2017.

[26] Federal Register Vol. 82, No. 28, February 13, 2017: 10443.
[27] Federal Register Vol. 82, NO. 53, March 21, 2017: 14476.
[28] Federal Register Vol. 82, No. 97, May 22, 2017: 23150.
[29] Federal Register Vol. 82., No 108, June 7, 2017: 26359

[30] See SSP rulemaking docket for these petitions at: https://www.regulations.gov/docket?D-FRA-2011-0060

7 The American Public Transportation Association

The American Public Transportation Association (APTA) members are public organizations that engage in the areas of bus, paratransit, light rail, commuter rail, subways, waterborne passenger services, and high-speed rail. Its members also include companies who plan, design, construct, finance, supply, and operate bus and rail services worldwide. Government agencies, metropolitan planning organizations, state departments of transportation, academic institutions, and trade publications are also part of APTA's membership.

The APTA standards program publishes documents using a consensus based process with industry volunteers serving on working committees that develop those standards. These standards are an importation program that supports the public transportation industry. Existing APTA standards include Standard for *Row-to-Row Seating in Commuter Rail Cars*, *Recommended Practice for Fire Safety Analysis of Existing Passenger Rail Equipment, Standard for Attachment Strength of Interior Fittings for Passenger Railroad Equipment, Recommended Practice for Passenger Equipment Roof Emergency Access, Standard for the Inspection and Testing of Roller Bearings on Passenger Equipment After a Derailment, Recommended Practice for Diesel Electric Passenger Locomotive Dynamic Brake Control, Standard for Period Inspection and Maintenance of Passenger Coaches,* and many more standards addressing safety,

security, and maintenance issues.[31] One such document is the APTA *Manual for the Development of System Safety Program Plans for Commuter Railroads,* initially adopted in 1998.

The commuter rail industry, jointly with the FRA and the DOT, developed the APTA 1998 edition of the its *Manual for the Development of System Safety Program Plans for Commuter Railroads* (manual) to improve the overall safety of commuter railroads by building upon comparable efforts used in rail transit. At the time of this accident, the 2006 edition of the APTA *Manual for the Development of System Safety Program Plans for Commuter Railroads* was the APTA standard to guide commuter railroads in develop their system safety plans.

The intent of the APTA manual was to:

- To provide a primer for both new-start and established commuter railroad systems with regard to the definition of the elements recommended for inclusion in a commuter railroad System Safety Program Plan;
- To establish a recommended format for a System Safety Program Plan;

[31] See the American Public Transportation Association webpage for these publications at: http://www.apta.com/resources/standards/press/Pages/default.aspx

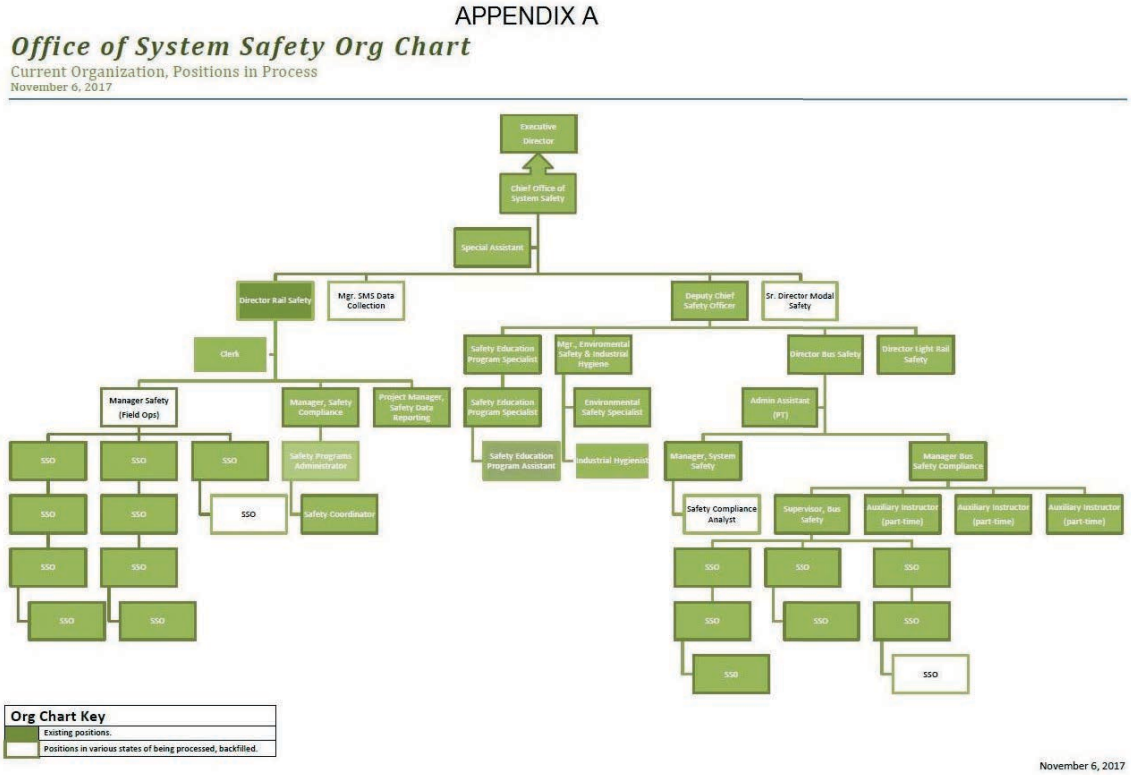
- To assist commuter railroad systems with established System Safety Program Plans in the continuing development and definition of their respective programs;
- And to provide tangible evidence to passengers, public, and governmental oversight agencies that the commuter railroad industry possesses the means and expertise required to develop sound, effective, pro-active safety programs designed to further reduce accident potential and increase the efficiency of commuter railroad operations.

This manual was the creation of the APTA Commuter Rail Committee to implement guidelines for system safety program plans identified in the FRA Emergency Order 20. The manual incorporates by reference applicable FRA regulations and other applicable APTA standards. APTA said that a, "well-written SSPP will provide the basis for identifying all hazards that might interfere with customer and employee safety, as well as the public at large." The methodology called for safety reviews of capital improvements, changes in equipment, and changes in operating practices and the inclusion or reference to concrete methods for eliminating, minimizing, and otherwise mitigating hazards.

Section 5.1 of the manual discusses the hazard management process, referring to the hazard identification/resolution process as the heart of the system safety program. The section refers to the hazard management process as a formalized procedure for risk acceptance by the commuter railroad management staff. This section calls for a systematic hazard identification process and a coordinate hazard effects minimization process.

END OF REPORT

APPENDIX A


Office of System Safety Org Chart
Current Organization, Positions in Process
November 6, 2017
Executive Director
Chief Office of System Safety
Special Assistant
Director Rail Safety
Mgr. SMS Data Collection
Deputy Chief Safety Officer
Sr. Director Modal Safety
Clerk
Safety Education Program Specialist
Mgr., Enviromental Safety & Industrial Hygiene
Director Bus Safety
Director Light Rail Safety
Manager Safety (Field Ops)
Manager, Safety Compliance
Project Manager, Safety Data Reporting
Safety Education Program Specialist
Environmental Safety Specialist
Admin Assistant (PT)
SSO
Safety Programs Administrator
Safety Education Program Assistant
Industrial Hygienist
Manager, System Safety
Manager Bus Safety Compliance
Safety Coordinator
Safety Compliance Analyst
Supervisor, Bus Safety
Auxiliary Instructor (part-time)
Org Chart Key
Existing positions.
Positions in various states of being processed, backfilled.
November 6, 2017

1

Group Member to the Investigation – Acknowledgment Signatures

The undersigned designated *Group Member to the Investigation* representatives attest that the information contained in this report is a factually accurate representation of the information collected during the on-scene phase of this investigation, to the extent of their best knowledge and contribution in this investigation.

_____ Date _____
Georgetta Gregory, NTSB

_____ Date _____
Joe Gordon, NTSB

_____ Date _____
Peter Lapré, FRA

_____ Date _____
Gardner Tabon, NJT