



***Federal Railroad Administration  
Office of Railroad Safety  
Accident and Analysis Branch***

***Accident Investigation Report  
HQ-2013-05***

***Providence & Worcester Railroad Company (PW)  
East Haven, CT  
March 17, 2013***

***Note that 49 U.S.C. §20903 provides that no part of an accident or incident report, including this one, made by the Secretary of Transportation/Federal Railroad Administration under 49 U.S.C. §20902 may be used in a civil action for damages resulting from a matter mentioned in the report.***

**TRAIN SUMMARY**

1. Name of Railroad Operating Train #1 Providence & Worcester Railroad Company	1a. Alphabetic Code PW	1b. Railroad Accident/Incident No. 130305
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**GENERAL INFORMATION**

1. Name of Railroad or Other Entity Responsible for Track Maintenance Amtrak (National Railroad Passenger Corporation)	1a. Alphabetic Code ATK	1b. Railroad Accident/Incident No. 127563
2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident 3/17/2013	4. Time of Accident/Incident 1:10 AM
5. Type of Accident/Incident Derailment		
6. Cars Carrying HAZMAT 0	7. HAZMAT Cars Damaged/Derailed 0	8. Cars Releasing HAZMAT 0
		9. People Evacuated 0
10. Subdivision NHB		
11. Nearest City/Town East Haven	12. Milepost (to nearest tenth) 75.3	13. State Abbr. CT
		14. County NEW HAVEN
15. Temperature (F) 23 °F	16. Visibility Dark	17. Weather Clear
18. Type of Track Main		
19. Track Name/Number NHB 1&2	20. FRA Track Class Freight Trains-60, Passenger Trains-80	21. Annual Track Density (gross tons in millions) 2.75
		22. Time Table Direction West

## OPERATING TRAIN #1

1. Type of Equipment Consist: Freight Train				2. Was Equipment Attended? Yes		3. Train Number/Symbol FPCH								
4. Speed (recorded speed, if available) R - Recorded E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 3076		6a. Remotely Controlled Locomotive? 0 = Not a remotely controlled operation 1 = Remote control portable transmitter 2 = Remote control tower operation 3 = Remote control portable transmitter - more than one remote control transmitter			Code 0						
6. Type of Territory Signalization: N/A Method of Operation/Authority for Movement: N/A Supplemental/Adjunct Codes: A, Q, G, N/A														
7. Principal Car/Unit		a. Initial and Number	b. Position in Train	c. Loaded (yes/no)	8. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.		Alcohol	Drugs						
(1) First Involved (derailed, struck, etc.)		TRIX75205	75	no			0	0						
(2) Causing (if mechanical, cause reported)		TRIX75205	75	no	9. Was this consist transporting passengers?		No							
10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)		a. Head End	Mid Train		Rear End		11. Cars (Include EMU, DMU, and Cab Car Locomotives.)		Loaded		Empty			
			b. Manual	c. Remote	d. Manual	e. Remote			a. Freight	b. Pass.	c. Freight	d. Pass.	e. Caboose	
(1) Total in Train		4	0	0	0	0	(1) Total in Equipment Consist		0	0	104	0	0	
(2) Total Derailed		0	0	0	0	0	(2) Total Derailed		0	0	3	0	0	
12. Equipment Damage This Consist 42238			13. Track, Signal, Way & Structure Damage 346484											
14. Primary Cause Code E67C - Damaged flange or tread (build up)														
15. Contributing Cause Code														
Number of Crew Members							Length of Time on Duty							
16. Engineers/Operators		17. Firemen		18. Conductors		19. Brakemen		20. Engineer/Operator			21. Conductor			
1		0		1		0		Hrs: 6 Mins: 10			Hrs: 6 Mins: 10			
Casualties to:		22. Railroad Employees		23. Train Passengers		24. Others		25. EOT Device?			26. Was EOT Device Properly Armed?			
Fatal		0		0		0		Yes			Yes			
Nonfatal		0		0		0		27. Caboose Occupied by Crew?			N/A			
28. Latitude				29. Longitude										

**CROSSING INFORMATION**

<b>Highway User Involved</b>				<b>Rail Equipment Involved</b>			
1. Type				5. Equipment			
2. Vehicle Speed ( <i>est. mph at impact</i> )		3. Direction ( <i>geographical</i> )		6. Position of Car Unit in Train			
4. Position of Involved Highway User				7. Circumstance			
8a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? N/A				8b. Was there a hazardous materials release by N/A			
8c. State here the name and quantity of the hazardous material released, if any.							
9. Type of Crossing Warning 1. Gates      4. Wig wags      7. Crossbucks      10. Flagged by crew 2. Cantilever FLS      5. Hwy. traffic signals      8. Stop signs      11. Other ( <i>spec. in narr.</i> ) 3. Standard FLS      6. Audible      9. Watchman      12. None N/A				10. Signaled Crossing Warning		11. Roadway Conditions N/A	
12. Location of Warning N/A			13. Crossing Warning Interconnected with Highway Signals N/A			14. Crossing Illuminated by Street Lights or Special Lights N/A	
15. Highway User's Age		16. Highway User's Gender	17. Highway User Went Behind or in Front of Train and Struck or was Struck by Second Train			18. Highway User	
19. Driver Passed Standing Highway Vehicle			20. View of Track Obscured by ( <i>primary obstruction</i> )				
Casualties to:		Killed	Injured	21. Driver was		22. Was Driver in the Vehicle?	
23. Highway-Rail Crossing Users			24. Highway Vehicle Property Damage ( <i>est. dollar damage</i> )		25. Total Number of Vehicle Occupants ( <i>including driver</i> )		
26. Locomotive Auxiliary Lights? N/A				27. Locomotive Auxiliary Lights Operational? N/A			
28. Locomotive Headlight Illuminated? N/A				29. Locomotive Audible Warning Sounded? N/A			

10. Signaled Crossing Warning

- 1 - Provided minimum 20-second warning
- 2 - Alleged warning time greater than 60 seconds
- 3 - Alleged warning time less than 20 seconds
- 4 - Alleged no warning
- 5 - Confirmed warning time greater than 60 seconds
- 6 - Confirmed warning time less than 20 seconds
- 7 - Confirmed no warning
- N/A - N/A

Explanation Code

- A - Insulated rail vehicle
- B - Storm/lightning damage
- C - Vandalism
- D - No power/batteries dead
- E - Devices down for repair
- F - Devices out of service
- G - Warning time greater than 60 seconds attributed to accident-involved train stopping short of the crossing, but within track circuit limits, while warning devices remain continuously active with no other in-motion train present
- H - Warning time greater than 60 seconds attributed to track circuit failure (e.g., insulated rail joint or rail bonding failure, track or ballast fouled)
- J - Warning time greater than 60 seconds attributed to other train/equipment within track circuit limits
- K - Warning time less than 20 seconds attributed to signals timing out before train's arrival at the crossing/island circuit
- L - Warning time less than 20 seconds attributed to train operating counter to track circuit design direction
- M - Warning time less than 20 seconds attributed to train speed in excess of track circuit's design speed
- N - Warning time less than 20 seconds attributed to signal system's failure to detect train approach
- O - Warning time less than 20 seconds attributed to violation of special train operating instructions
- P - No warning attributed to signal systems failure to detect the train
- R - Other cause(s). Explain in Narrative Description

**SYNOPSIS**

On March 17, 2013, at 1:10 a.m., EDT, eastbound Providence & Worcester Railway (PW) freight train FPCH, consisting of four locomotive and 104 empty hopper cars, derailed three hopper cars at milepost 75.3 while the Train was backing from the main line through the interlocking into the yard at a recorded speed of 10 mph. The derailment occurred on Amtrak's Shoreline Junction on New Haven Main Line (NHB) in New Haven, Connecticut. Hopper cars 73, 74, and 75 derailed as a result of tread build-up on car TRIX75205's wheels. The tread had built up over the top of the flange of the wheel rendering the flange unable to keep the wheels on the track.

No hazardous materials were involved in the derailment and there were no injuries. PW's equipment damages are estimated at \$42,238 and the track damage was set at \$346,484 by Amtrak. There were significant delays to passenger and freight traffic for several days.

The weather at the time of the derailment was dark and clear. The temperature was 23 degrees F.

The probable cause of the derailment was caused by built-up tread on all four wheels of empty hopper car TRIX75205 as a result of the malfunctioning braking system.

**NARRATIVE**

**Circumstances Prior to the Accident**

The Providence and Worcester (PW) crew for freight train FPCH (the "Train") consisted of an engineer and conductor. Both crew members reported for duty at the yard office at New York & Atlantic Railway's (NYA) Fresh Pond Yard in New York at 7:00 p.m., EDT on March 16, 2013. The Train's destination was Cedar Hill Yard in New Haven, Connecticut, approximately 95 miles away. This was the crew's regular assignment. Both crew members had received the statutorily-required off-duty time in a company-provided hotel. The crew had received 15 hours and 45 minutes rest period prior to reporting to Fresh Pond Yard.

The Train consisted of 4 PW locomotives (3905; 4001; 3906; 3909) and 104 empty stone hopper cars. The Train was 4,933 feet long and weighed 3,076 tons. The Train was assembled by NYA at Fresh Pond Yard. Train FPCH was required to have a Class 1 brake test as mandated by Title 49 Code of Federal Regulations (CFR) Section 232.205 for initial terminal trains, and an "Appendix D" mechanical inspection as required by 49 CFR § 215.13, Freight Car Safety Standards. A brake-test record confirmed the Class 1 test had been performed on March 16, 2013, at 7:56 p.m. and is included in this report. The crew was also required to perform a calendar day inspection of all locomotives under 49 CFR § 229.21. The paperwork was properly executed indicating the Engineer had performed this requirement. The locomotives also required air brake testing under 49 CFR § 229.46, which the Engineer failed to perform. The crew was also responsible for performing an emergency brake application of the end-of-train device (EOT) under 49 CFR § 232.409 and failed to perform that test as well. The final test was the LSL/Cab Signal test in accordance with 49 CFR § 236.587. The engineer failed to perform this testing prior to leaving Fresh Pond Yard. He completed the LSL/Cab Signal testing 1-hour after the derailment had occurred. The crew performance deficiencies were discovered in the course of Federal Railroad Administration's (FRA) investigation. PW and Amtrak both failed to report the accident to FRA's National Response Center in the required time frame contained in 49 CFR § 225.9(a)(2)(iv).

The locomotives were located on Number 6 Main Track in the yard and the empty stone hopper cars were on track Number 1 with some of the cars in the tunnel. According to the Conductor and Engineer, and verified by the locomotive event recorder, the Conductor coupled the locomotives to the hopper cars and released the hand brakes on the four head cars. He then had the Engineer pull the Train out of the tunnel so he could apply the EOT. After the Conductor applied the EOT, he observed the pressure at the gage of the EOT at 79 pounds of air pressure. He then had the Engineer make a 20 pound automatic reduction, thus applying the Train's air brakes. The Conductor walked from the rear of the Train to the front to check brake application on the cars. Once at the front, he continued to walk the opposite side of the Train, again to check brake application on the cars. Once he arrived at the rear, he had the Engineer release the brakes and walked the Train to check that the brakes had released. Train FPCH departed Fresh Pond Yard shortly after the Conductor completed his brake test.

The Conductor stated in an interview with FRA that prior to New Haven, he called Amtrak's Shoreline Train Dispatcher on the company phone and requested to take the Train to Shoreline Junction and crossover into the High-Grade Yard. The Dispatcher replied he would allow him to go to Shoreline Track Number 2, crossover to Track Number 1, then to Track Number 5. And finally into the yard once they passed the interlocking. The crew had a job briefing in the cab of the locomotive as to what they would do at Shoreline Junction.

During the trip, the Conductor said he checked the Train many times while going around curves and claims he went by people working along the right-of-way and noticed nothing unusual and did not receive any reports there was anything wrong with the Train.

As the eastbound Train approached the derailment area at a recorded speed of 10 mph, the Engineer was seated at the controls on the south side of the locomotive and the Conductor was seated on the north side of the locomotive. The maximum authorized speed in this area is 60 mph.

The railroad Timetable direction was west. The geographical direction was west. Timetable direction will be used throughout this report.

**The Accident**

At Shoreline Junction, the Conductor dismounted the head-end of the Train at the east-end interlocking signal while the Train was still in motion. The Conductor had the Train pull east to clear the interlocking signal. When the Train cleared, the Conductor stopped the Train. Once he got a restricting signal, he told the Engineer to begin backing the Train up 20 cars and he would give count at the 10-car mark. The Conductor let the Engineer know the cars were on the move and to continue another 20 cars until there were approximately 20 cars on the high-grade track. The Train was traveling at a recorded speed of 10 mph when the Train went into emergency. The Conductor asked the Engineer if he had a kicker in the Train. The Engineer replied he did not. The Conductor began to walk to the rear-end and then noticed three derailed cars. The Conductor notified the Engineer and the Engineer notified the Shoreline Junction Dispatcher that cars had derailed in the Train while making the reverse movement. When asked, both crew members admitted they had not broadcast an emergency notification as required by 49 CFR § 220.47. The Conductor notified the Shoreline Dispatcher and PW officials after the derailment.

Amtrak, PW, and Metro-North Railroad responded to the derailment site. At the derailment site, mechanical personnel and FRA personnel noticed tread buildup over the wheel flanges on all wheels of hopper car TRIX75205. The buildup was so bad that layers had to be removed so when the re-railing crews put the wheels back under the car, it wouldn't derail again. Photos of the buildup are attached to this report.

FRA required PW to preserve, remove, and record all the air brake equipment, as well as the hand brake and slack adjuster on hopper car TRIX75205 for tear down and analysis by independent parties. PW catalogued and sent the ABD air brake portions to the Quality Assurance Manager at Multi-Services in Leetsdale, Pennsylvania. The EL-60 empty load device was sent to New York Air Brake Corp in Watertown, New York, for testing. The hand brake was sent to Cardwell Westinghouse in Pennsylvania, and the SAB Type DRV2USA-DJ brake slack adjuster to Griffin Technology in Ohatchee, Alabama.

Multi-Services tested the ABD service portion and the ABD emergency portion as well as the FB-3 retainer valve removed from hopper car TRIX75205. All 3 air brake portions failed a single car test. The empty load device, EL-60, was tested and found in working order. Further, on April 25, 2013, FRA, Amtrak, and PW officials met in East Haven, Connecticut, to disassemble the ABD service and emergency portions, as well as to inspect the derailed cars before they were moved for repairs. The main diaphragms inside both the service and emergency portions had holes in the rubber parts and were in generally bad shape. Photos of these torn diaphragms are included with this report.

In addition to the air portions, the hand brake was tested by Cardwell Westinghouse and found to be in working order. The slack adjuster was disassembled by Griffin Technology and visual inspection showed the adjuster spindle rod was bent and bench testing confirmed there was no travel in the rod to take up brake slack. Further inspection revealed incorrect assembly of the traction sleeve and the spring collar. The spring collar was installed on top of the take-up spring. The spring collar should have been installed on top of the adjuster nut bearing set below the take up spring. The incorrect assembly caused the slack adjuster spindle rod to lock up and fail the bench test. Diagrams of the slack adjuster are included in this report.

**Analysis and Conclusions**

Analysis: Amtrak performed toxicological testing on the Engineer and Conductor under FRA authority. Both tests results were negative.

Conclusion: Intoxication was not a factor in this accident.

Analysis: FRA obtained fatigue-related information for the 10-day period preceding this accident including a 10-day work history for the Engineer and Conductor.

Conclusion: Upon analysis of that information, FRA concluded fatigue was not probable for any of the employees involved in this accident.

Analysis: Locomotive Safety Devices - The leading locomotive was equipped with headlights, auxiliary lights and safety devices required by FRA according to the paperwork in the cab of the locomotive. However, the Engineer failed to test the locomotive's air brake system before taking charge of the Train consist as required by Federal regulation. He also did not test the cab signal equipment or test the EOT to verify it would propagate an emergency brake application from the rear of the Train as required by Federal regulation.

Conclusion: The locomotive safety devices that were tested operated as intended and were in compliance with Federal requirements. The safety devices the Engineer failed to test did not cause or contribute to the accident.

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Analysis: Engineer Operating Performance -The leading locomotive was equipped with a speed indicator and a working event recorder as required by Federal regulation. However, when the event recorder was downloaded, the time stamp was approximately 2 ½ hours off. PW attributed this to the mechanical department not resetting the clock for daylight savings time over the years. The relevant data was downloaded by the Road Foreman of Engines and analyzed at PW headquarters in Worcester, Massachusetts, by PW and FRA. PW also noticed the Conductor alighted from the locomotive while the Train continued movement at Shoreline Junction in noncompliance with PW operating rules. PW and Amtrak both noticed that the Engineer slowed the Train with just the independent brakes on the locomotives at Shoreline Junction, East Haven.

Conclusion: The Locomotive Engineer was not in compliance with all PW train handling and operating rules. FRA's investigation concluded these acts did not cause or contribute to the derailment.

Analysis: FRA required PW to remove, preserve, and record all the brake equipment on hopper car TRIX75205 to be tested by independent parties. This included the brake slack adjuster and the hand brake identified above.

Conclusions: Rack testing and visual testing confirmed there were multiple defective parts of the brake system causing the braking system of hopper car TRIX75205 not to function as intended resulting in the built-up tread on all the wheels and causing this accident.

#### Overall Conclusions

Although the Engineer did not test the cab signals before departure, the braking system when taking charge of a consist of locomotives, or the EOT to ensure it would initiate an emergency application from the rear of the Train, and stopped the Train with the independent brake of the locomotives as well as not complying with the Federally required "emergency" notification over the radio, this did not cause or contribute to the derailment. The derailment was the result of a malfunctioning air brake system. The sticking brake on hopper car TRIX725205 built up track material on all four sets of wheels until the buildup exceeded the wheel flange height. When the Train was backing into the yard from the main track through the interlocking, the car derailed and pulled two other cars off with it.

#### Probable Cause

FRA has concluded that this derailment was caused by built-up tread on all four wheels of empty hopper car TRIX75205 as a result of the malfunctioning braking system.