

National Transportation Safety Board Railroad Accident Brief Derailment of Metro-North Railroad Commuter Train Rye, New York

Accident Summary

On May 18, 2017, about 4:56 pm (eastern daylight time), westbound Metro-North Railroad commuter train 1373 derailed at milepost 24.55 near catenary 215 on main track 3 of the Metro-North Railroad New Haven Line in Rye, New York. Train 1373 originated from Stamford, Connecticut and was destined for Grand Central Terminal in Manhattan, New York when 5 of the 12 cars in the consist derailed. Train 1373 had 185 passengers and 14 passengers suffered minor injuries. Two crewmembers (train engineer and conductor) also reported minor injuries.

At the time of the accident White Plains was reporting wind from the west at 12 knots, visibility unrestricted at 10 statute miles, a few clouds at 4,000 feet agl, temperature of 93° F, dew point 63° F, with a sea level pressure of 1009.6-milibars.¹ No precipitation had been reported during the previous 24 hours, and the high temperature of 94° F, and the low temperature of 71° F. Above normal temperatures were reported on May 17-18, 2017.

¹ The closest NWS weather reporting facility to the accident site was from <u>Westchester County Airport (KHPN</u>), located approximately 6 miles north in White Plains, New York.



Figure 1: Site sketch of derailment area

The Investigation

Description of New Haven Line

The Metro-North Railroad New Haven Line extends between Bronx, New York (catenary bridge B at milepost 12) and New Haven, Connecticut (catenary bridge 1102 at milepost 72.9). The maximum authorized timetable speed on the four main tracks is 70 mph with posted permanent speed restrictions on some curves and other locations identified in the Metro-North timetable.

The New Haven Line is oriented east and west geographically; as well as by timetable. The milepost numbering on this line starts with milepost zero at Grand Central Terminal and increases numerically as the track continues east to New Haven at milepost 72.92; which is the division post and the beginning of Amtrak. The New Haven Line utilizes electrified third rail between Grand Central Terminal and milepost 14.9 in Pelham, New York. From milepost 14.9 to milepost 72.92 the New Haven Line uses an electrified overhead catenary system.

Approximately 85 trains per day are operated over main track 3. However, with main track 1 out of service approximately 104 trains per day are operated of main track 3. The accumulated annual tonnage for main track 3 is 10 million gross tons.

Between milepost 61.1 and milepost 12.4, the New Haven Line has four main tracks with main track 3 being the northern most track, main track 1 is adjacent, main track 2 is adjacent to main track 1, and main track 4 is the furthest south (see Figure 1). The track centers between main track 3 and main Page 2 of 12

track 1 is an average 12 feet – 2 inches. Main track 1 had been out-of-service since April 10, 2017 for overhead bridge work at Central Avenue between CP 223-229 at milepost 23.5. The tracks are bidirectional, with trains having the capability to run in either direction on either track at a maximum authorized speed of 70 mph. Between milepost 23.6 to milepost 24.7 there is a permanent timetable 60-mph speed restriction due to track curvatures on main track 3.

The track configuration on main track 3 between the Port Chester station and the Rye station is as follows. Track milepost numbering decreases in an east to west direction. The Port Chester station is at milepost 25.7 and in tangent track just west of a 3-degree, 4-minute right-hand curve with 3-1/2 inches of superelevation. As train traffic travels westward at milepost 25.68 the track becomes tangent track. The track at this location is listed as level with no ascending or descending grade. From milepost 25.28 to milepost 25.28 there is a 0.45% ascending grade in tangent track. From milepost 25.0 to milepost 25.0 to milepost 24.61 there is a 0.34% ascending grade in tangent track. From milepost 24.61 to milepost 24.61 there is a right-hand curve with 2-degree, 6-minutes curvature and 3 inches of superelevation with 0.55% ascending grade. This curve is 2,615 feet long. The point of derailment was located at milepost 24.55 in the body of the curve. Rye station is located at milepost 24.1 in tangent track with 0.55% ascending grade.

Metro-North Railroad is required to maintain the track structure in the area of the derailment in accordance with Federal Railroad Administration (FRA) Class 3 track standards, which allow for a maximum authorized speed of 60 mph for passenger trains and 40 mph for freight trains. The timetable maximum authorized speed throughout this segment of track was 60 mph for passenger trains. There was a temporary speed restriction of 10 mph in effect at the time of the derailment.

Train movements on the New Haven Line are governed by Metro-North Railroad operating rules, timetable special instructions, and the signal indications of a traffic control signal system that is supplemented with cab signals.² The cab signal system has a four-aspect cab display and three aspect wayside signals in conjunction with phase selective AC track circuits. Wayside signals are arranged for train movements in either direction on each track.

The Metro-North Railroad rail traffic control center is in New York City and coordinates train movements. Rail traffic controllers use a Traintrack software package to coordinate train movements.

Pre-Accident Track Conditions

² Metro-North Railroad Operating Rules (effective February 27, 2011); General Order Number 302 (effective May 15, 2016) and Metro-North Railroad Operating Schedule #3 (effective April 2, 2017)

The rail traffic control center, chief log indicates that at 1:20 pm, the engineer of train 1359 reported a possible track condition on main track 3 between catenary bridge 213 and 214. Two track inspectors were in their hi-rail vehicle conducting a track inspection for potential heat related track problems near the area.³ They proceeded to the location and found a dip in the track profile. They made repairs and gave the track back to the rail traffic controller for normal operating speed at 2:02 pm.⁴ At 2:58 pm, the engineer of train 1365 reported a rough ride on main track #3 between catenary bridge 214 and 215.⁵ The rail traffic controller in coordination with the chief dispatcher, placed a 30-mph speed restriction on the track at that location until the track could be inspected. At 3:23 pm, the engineer of train 1367 reported over the radio that "the kink is pretty bad" at a location around catenary bridge 215. As a result, the rail traffic controller in coordination with the chief dispatcher lowered the speed restriction to 15 mph, and the speed restriction limits were changed from catenary bridge 214 to 216. At 3:51 pm, a track supervisor arrived at the catenary bridge 215 location and lowered the speed to 10 mph. See figures 1 and 2 for pictures of the track misalignment that the track supervisor saw prior to the derailment. The track supervisor said that he thought that the track was misaligned about 2-inches, but he did not measure the deviation in alignment. Track Safety Standards (TSS) 213.55 allow for 5 inches of deviation of the mid-ordinate from a 62-foot cord for Class 1 track.⁶ He watched about four trains pass over the area, and said the deviation was the same. At 4:30 pm, as he was preparing to leave the area and make arrangements to have it protected with slow boards and make repairs, train 1371 passed through the area of the speed restriction at a high rate of speed which exceeded the 10-mph speed restriction that was in place.⁷ The track supervisor reported the incident to the rail traffic controller and inspected the track again. He said the alignment did not worsen. He departed the area, and about one-half hour later was called again by the rail traffic controller and was told that the area had worsened. As he started to return to the area he was notified that train 1373 derailed at 4:56 pm.

³ TSS 213.119 (g) requires railroads to inspect tracks when kinky rail conditions are likely. Metro-North had track inspectors out looking for possible kinky rail because the ambient temperature was in the 90° Farhenheit range. At this time, the temperature was 91°.

⁴ The track repairs included replacing about four Pandrol rail fasteners and raising the track about one-inch and then tamping.

⁵ The engineer radioed the track condition as "...real nasty kink in the rail, like real bad..."

⁶ Class 1 track speed for passenger trains is 15 mph.

⁷ Event recorder data showed that about 300 feet east of catenary bridge 215 the train was traveling at a nominal speed of 55.7 mph and one second later the master controller (MC) was moved to full service brake application. The MC was moved to coast near catenary bridge 214 at 34.5 mph.



Figure 2: Pre-accident view looking west towards catenary 215 on track 3 towards the rail misalignment.



Figure 3: Pre-accident view looking east towards catenary 215 on track 3 towards the rail misalignment



Figure 4: Postaccident view looking west towards catenary 215 on track 3 towards the rail misalignment

Track Structure

The track through the accident area consisted of steel continuous welded rail on concrete ties secured with Pandrol clips on plastic insulators and pads.⁸ The concrete ties are spaced at 24 inches on center, and were installed in 1993. The continuous welded rail was 140 pound-RE profile rail section made by Bethlehem Steel in August of 1984 and installed at this location in 1984⁹. The rail head profile was ground in 1996. Granite stone was used as ballast with a nominal shoulder width of 12 inches.

During the postaccident interview, the track supervisor said that when he and the foreman did an inspection of the area of the 10-mph slow order area, he thought that the area was a little shy of track ballast. He said that he was going to make provisions to get ballast ordered to add to that location when the alignment was repaired.

FRA reviewed the Metro-North track inspection records for the period beginning February 1, 2017 to May 18, 2017. No exceptions to the required bi-weekly frequency of inspections per TSS 213.233.¹⁰ However, there were four defects recorded by the FRA for missing inspector signatures on the inspection records. The last time main track 3 was traversed and inspected was on May 7, 2017. No

⁸ Insulators are a plastic component between the base of the rail and the Pandrol clip to restrain lateral movement, and the pad is a plastic component that is placed between the base of the rail and the concrete tie to protect against abrasion.

⁹ A 140 pound rail section means 140 pounds per three feet of rail. RE is derived from American Railway Engineering Association (AREA) design specifications for the rail. AREA is now called American Railway Engineering and Maintenance-of-Way Association (AREMA).

¹⁰ Metro-North conducts visual track inspections three times weekly.

track exceptions were recorded on the report. The last track inspection through the area was on May 18, 2017 from milepost 23.3 to milepost 29 and observing main track 3 from main track 2. No track defects were recorded for main track 3.

The last automated track geometry inspection over main track 3 was done by Amtrak Track Geometry Car 10003 on April 5, 2017. There were no track geometry exceptions in the derailment area. The geometry car tested from Amtrak Division Post in New Haven to the Amtrak Hell Gate Line Division Post in New Rochelle, New York.

The last test for internal defects on main track 3 in the derailment area was performed by Sperry car #129 on June 21, 2016. Main track 3 was tested from milepost 30.2 to milepost 23.54 and no rail defects were found within those limits.

Federal Track Oversight

The FRA utilized their geometry car DOTX 216 as part of their Automated Geometry Inspection Program (ATIP) to inspect Metro North main track 3 on November 15, 2016. No track geometry defects were recorded in the area of the derailment.

For the 2016 calendar year, the FRA track inspector conducted inspections on the New Haven Line on 57 days throughout the year. During the 57 days, 506 defects were documented of which 276 were track record defects, 201 were track defects, and 26 were roadway worker protection noncompliant observations and roadway maintenance machines for not having the required safety equipment. Seven of the 506 defects were written as violations.

Metro-North Commuter Train 1373

The train engineer and conductor went on duty at 6:15 am and made a round trip to Grand Central Terminal during the morning rush hour. After their interim release, the train crew met at 4:15 pm and received the train equipment at Stamford Yard. Metro-North Train 1373 originated in Stamford, Connecticut and was destined for Grand Central Terminal in Manhattan, New York. The train crew completed the required pre-departure equipment tests. Train 1373 consisted of 12, M-8 electrically-powered multiple-unit passenger cars that included controlling cab car 9213 in the lead and rail cars 9212, 9281, 9280, 9633, 9532, 9353, 9352, 9177, 9176, 9607, 9606.

The train crew consisted of a locomotive engineer, located in the control compartment of the lead car, and a conductor and 3 assistant conductors located in the passenger compartments of the train consist. Cars 8 through 12, on the rear of the train were not open for passenger use. The train departed Stamford at approximately 4:31 p.m. The crew told investigators they had an uneventful trip departing Stamford.

After Stamford, train 1373 made a station stop on main track 3 at Old Greenwich station. During the station stop, the engineer stated in his postaccident interview that he communicated with the rail traffic controller and received a Line C (speed restrictions received enroute) to add to his Daily Train Operations Bulletin Order (DTOBO)¹¹. The Line C information issued to the train engineer was for a speed restriction of 10 mph that extended from catenary pole 214 to catenary pole 216, which is located between the Port Chester train station and the Rye train stations. Metro-North Operating Rules, section 3, rule A, part 2 required the train engineer to communicate the Line C speed restriction to the train conductor. The train engineer told investigators that he did not communicate the Line C instructions to the train conductor.

Train 1373 departed Old Greenwich, Connecticut and made 3 more stations stops before arriving at the Port Chester train station. Train 1373 departed Port Chester, New York at approximately 4:48 pm on main track 3. After departing, no further radio communications between the rail traffic control center and the train engineer were transmitted. The train engineer also stated he did not have any radio communication with the train conductor after departing from Port Chester. The train engineer told investigators that he forgot about the speed restriction between the Port Chester train station and the Rye train station.

Train 1373 was operating on main track 3 at about 55 mph when the engineer initiated an emergency brake application. At approximately 4:56 pm, train 1373 derailed on main track 3 at milepost 24.55 near catenary pole 215. The train engineer reported the derailment and emergency responders were requested.

Таре	From	То	Message	Actual
Time				Time
13:50	Train 1365	District E	Between Cat. Pole 214 and 215, Track 3 real nasty kink in the rail like real bad.	14:47:55
	District E	1365	Roger. Cat 214, Cat 215.	14:48:11
	Train 1365	District E	Roger. Can't miss it	(before 14:54)
16:05	District E	Foreman Kelly	Please advise your supervisors, we are putting in a speed restriction Cat 215 to 214 till someone gets back there and checks it again.	14:55:32
	Track Foreman	District E	Roger. Supervisor Cooney was notified, so I guess he is heading over there	14:55:44

Table 1. Transcript of radio communications

¹¹ Special instruction #2 (SC2-A): Information pertaining to temporary speed restrictions and working limit stop sign locations will be published in a daily train operations bulletin order. In addition to temporary speed restriction information the DTOBO will include sections to add temporary speed restrictions and bridge strikes enroute.

17:40	District E	Train 1567	Got to give you a Line C for your DTOBO, before CP 229. (ended up getting routed around on different track)	15:01:37
21:50	District E	Train 1367	I've got a Line C for your DTOBO, if you can copy it.	15:09:55
	District E	Train 1367	Today's DTOBO, May 18, 2017 Line C Speed Restriction received in route; Line is New Haven, Track is 3, Catenary 215 to 214, Passenger speed 30 MPH, Signs – No, Effective 1457, RTC ED	15:10:15
	Train 1367	District E	Ok, Roger. We have a DTOBO, May 18, 2017 dropdown to Line C Speed Restriction received in route; Line is New Haven, Track is 3, Catenary 251 to 214, Passenger speed 30, Signs – No, Effective 1457, RTC ED	15:10:38
	District E	Train 1367	That's a roger, 1367. Good read back, and tell me how the ride is through there.	15:11:02
23:10	Train A173	District E	You have a considerable heat kink, Track 3 Cat. 215.	15:15:32
23:35	District E	Train 1367	When you get down to 215, go through there extremely carefully. Reports of a considerable heat kink. Let me know what you see there.	15:15:57
	Train 1367	District E	Roger. When I get to speed restriction, go through carefully and I'll tell you how I feel.	15:16:18
24:00	Train A173	Train 1367	The kink is just east of the catenary pole at 215. You'll see it. It's a pretty good one.	15:16:32

Postaccident Inspections

The FRA track inspector and FRA rail integrity specialist in conjunction with the NTSB inspected/examined main track 3 between catenary 208 and catenary 220. No track exceptions were taken to the undisturbed track conditions. In addition, 50-foot incremental photographs were taken by the FRA through the derailment site. A sketch of the accident site was prepared indicating the derailed cars, tracks, and other pertinent features. See figure 1 for the sketch. About 900 feet of track was replaced on main track 3.

The postaccident inspection of the train equipment for train 1373 did not identify any mechanical defects.

Following the accident, both the train engineer and conductor were taken for toxicological testing as required in Title 49 Code of Federal Regulation, Part 219- Control of Alcohol and Drug Use, Subpart C – Postaccident Toxicological Testing. FRA has indicated that test results for both crewmembers were negative. NTSB Medical Officer has subpoenaed the train engineer's medical records and C-Pap machine, chip data.

Positive Train Control

In the FRA, PTC annual and quarterly reports, Metro North has filed for a 2018 target date for full PTC implementation. The New Haven line is equipped with the Advanced Civil Speed Enforcement System (ACSES). Permanent speed restrictions on the New Haven line are being enforced on trains with ACSES equipped locomotives. On the New Haven line, temporary speed restrictions are not being enforced at this time. Radio spectrum is still being acquired which is required for ACSES to provide temporary speed enforcements. Amtrak trains running on the New Haven Line are ACSES equipped. Metro North does not operate any ACSES equipped trains on the New Haven line.

Train Operation Factors

Speed Restriction Violations

During the investigation, NTSB identified some instances where Metro-North trains were operating through speed restrictions at higher than the allowable maximum authorized speed. Two incidents involved accident train 1373:

- The Daily Train Operations Bulletin Order listed a speed restriction between Riverside station and CP 229. After departing Riverside station, train 1373 was traveling at 37.1 mph within the 30-mph speed restriction. After departing Cos Cob station the train speed increased to 42 mph while still operating within the 30-mph speed restriction. Train 1373 exited the 30-mph speed restriction limit at 36.3 mph.
- The train engineer was issued a Line C (speed restrictions received enroute) to add on his Daily Train Operations Bulletin Order. The Line C information issued to the train engineer was for a speed restriction of 10 mph that extended from catenary bridge 214 to catenary bridge 216. Event recorder data indicated the train was operating at a nominal speed of 55.9 mph at catenary bridge 216. Almost immediately, the engineer placed the master controller in the emergency brake position with the train speed at 55.0 mph. Train 1373 was about 150 feet from catenary bridge 215 when the train speed indicated being reduced to 50.7 mph. The derailment occurred shortly after the emergency brake application.

A separate incident involved previous Metro-North train 1371:

• On the day of the accident, after a reported rough ride on main track 3 between catenary bridge 214 and 215, a track supervisor arrived at the location and lowered the speed to 10 mph. The track supervisor observed about four trains pass over the area. About 40 minutes later, as the track supervisor was preparing to leave the area and make arrangements to have it protected with slow boards and to make repairs, train 1371 passed through the area of the speed restriction at a high rate of speed which exceeded the 10-mph speed restriction that was in place. Event recorder data indicated that about 300 feet east of catenary bridge 215, train 1371 was traveling at a nominal speed of 55.7 mph and one second later the master controller was moved to full service brake application. The master controller was then moved to coast near the catenary bridge 214 at 34.5 mph. The track supervisor reported the incident to the rail traffic controller.

Protocols for Reported Track Conditions

A postaccident review of the Metro-North radio communication audio files indicated that at 2:58 pm, the engineer of train 1365 reported a "real nasty kink in the rail, like real bad..." on main track 3 between catenary bridge 214 and 215. The rail traffic controller in coordination with the chief dispatcher placed a 30-mph speed restriction on the track at that location until the track could be inspected. The speed restriction was issued in accordance with an rail traffic controller transfer mandate (email dated April 27, 2017) that indicated "Per VP J. Kesich any track condition reported by trains, put a 30 mph speed restriction in effect not 15 mph until inspected by Track Dept". Metro-North could not furnish any document, directive, rule or manual that preceded the April 27, 2017 speed restriction mandate that indicated rail traffic controllers would implement a 15-mph speed restriction for reported track conditions.

Metro-North was in the process of developing a rail traffic controller manual. The rail traffic controller manual was scheduled to be printed on May 18, 2017 with an effective date of May 20, 2017. During the investigation, of the derailment of train 1371 in Rye, Metro-North provided NTSB investigators with a draft copy of the applicable rule regarding reports of track conditions.

RTC Manual Rule 11-A ROUGH RIDE / DIP IN RAIL

Upon report from an engineer of a rough ride or dip in the rail, notify the ACRTC. The RTC will implement a 30MPH temporary speed restriction in the affected area. The ACRTC or CRTC may impose a lower restriction based on recommendation from a qualified track department employee. Once placed in effect, this restriction will remain in place until the track structure is inspected and the qualified employee advises it is ok to lift the restriction.

During the on-scene investigation, FRA and NTSB investigators discussed Rule 11-A with Metro North representatives. Metro North acknowledged the concerns that were discussed regarding the protocols outlined in Rule 11-A and drafted some changes to the protocols. On May 25, 2017, Metro North issued RTC Notice 17-10 to supersede page 40 of the rail traffic controllers manual Rule 11 for Initial Report of Incident, 11A Rough Ride / Dip in Rail. The issued protocols were now as follows:

TRACK DEFECT / RIDE QUALITY CONCERN

If there is a report of a Track Defect (Heat Kink, Broken Rail, etc.) by a train, the OCC will prevent additional trains from entering the affected block; any following trains in the block on that track may be permitted to proceed after receiving a TSR for Restricted Speed through the affected area.

If there is a report of a track ride quality concern (i.e. rough ride) it will be protected by the RTC issuing a 30 MPH Temporary Speed Restriction. When a train operates at 30 MPH over the location and reports that ride quality is still unacceptable the RTC will prevent additional trains from entering the affected block; any following trains in the block on that track may be permitted to proceed after receiving a TSR for Restricted Speed through the affected area.

The above protection will remain in effect until the Track Department inspects the location and notifies the OCC what restriction is applicable.

If the RWIC for the Track Department directs the speed to be less than 30 MPH the RTC will place a BDA on the track until the RWIC shunts the track circuit at that location. The RWIC will notify the RTC when the track circuit is shunted and the then a TSR must be issued for all trains to operate at Restricted Speed through the affected area. The RTC should document the RWIC name and the time the track circuit was verified to be shunted on the train sheet. If the RWIC is unable to shunt the track, no train movements are to be authorized over the restriction until the RWIC increases the speed to 30 MPH or greater.

End of Factual Report