



# National Transportation Safety Board

## Railroad Accident Brief

### Derailment of Metro-North Railroad Commuter Train

#### Rye, New York

#### May 18, 2017

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## The Accident

On May 18, 2017, at 4:56 p.m. eastern daylight time, westbound Metro-North Railroad (Metro-North) commuter train 1373 derailed at milepost (MP) 24.55 near catenary bridge 215 on main track 3 of the Metro-North New Haven Line in Rye, New York.<sup>1</sup> 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, of which 12 passengers suffered minor injuries. Four crewmembers (one conductor and three assistant conductors) also reported minor injuries.

At the time of the accident, the National Weather Service reported wind from the west at about 17 mph, visibility unrestricted at 10 miles, temperature of 93°F, and dew point 63°F.<sup>2</sup> No precipitation had been reported during the previous 24 hours; the high temperature was 94°F, and the low temperature was 71°F. Above normal temperatures were reported on May 17 and 18, 2017.

## Description of New Haven Line

The Metro-North Railroad New Haven Line extends between Bronx, New York, (catenary bridge B at MP 12) and New Haven, Connecticut (catenary bridge 1102 at MP 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 timetable.

The New Haven Line is oriented east and west geographically as well as by timetable. The MP numbering on this line starts with MP 0 at Grand Central Terminal and increases numerically as the track continues east to New Haven at MP 72.92, where it connects with Amtrak. The New Haven Line uses an electrified third rail between Grand Central Terminal and MP 14.9 in Pelham, New York. From MP 14.9 to MP 72.92, the New Haven Line uses an electrified overhead catenary system.

About 85 trains per day are operated over main track 3. However, with main track 1 out of service, about 104 trains per day are operated over main track 3. Main track 1 had been out of service between control points 223 and 229 at MP 23.5 since April 10, 2017, for overhead bridge

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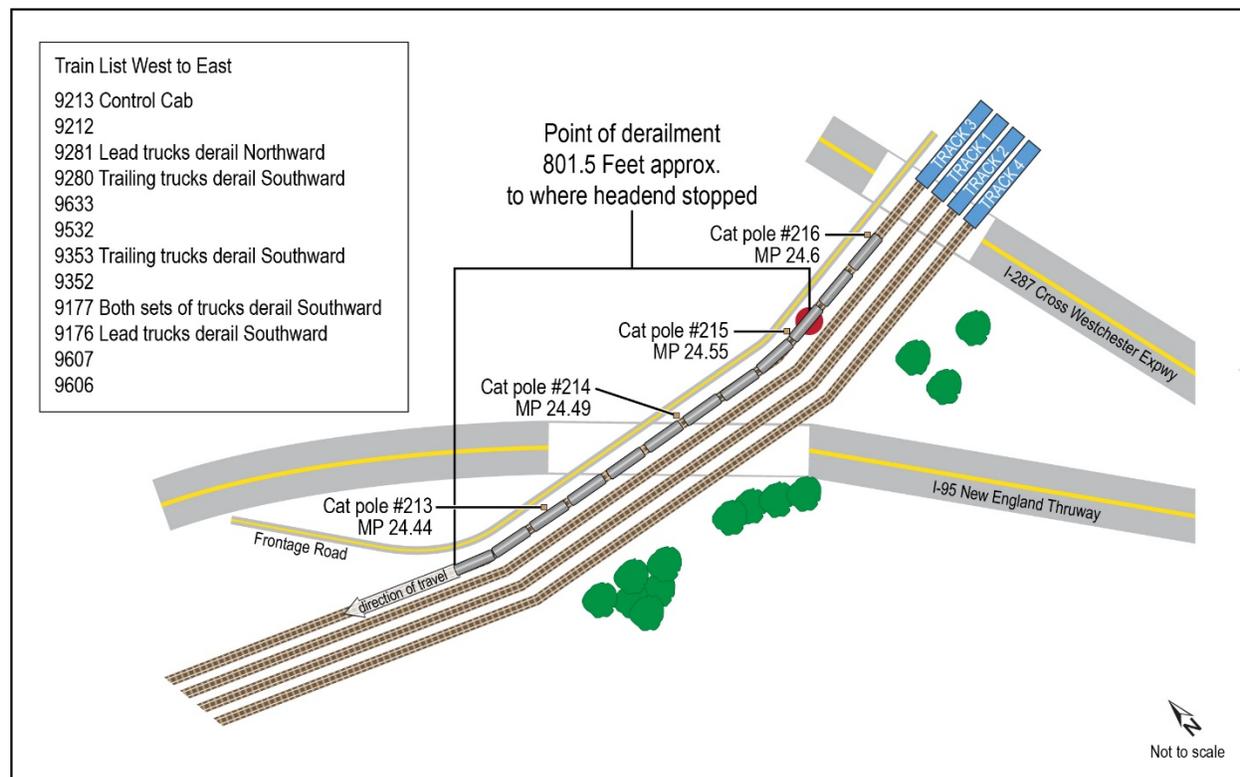
<sup>1</sup> (a) All times in this document are eastern daylight time. (b) On railroads with electrically powered trains, *catenary* describes the overhead conductor, which is contacted by the pantograph or trolley, and its support structure that supplies electricity to propel trains. A *catenary pole* is a single pole used to support the catenary wire, and a *catenary bridge* is made up of two poles with a truss that spans across the railroad tracks to support several catenary wires.

<sup>2</sup> The closest National Weather Service weather reporting facility to the accident site was Westchester County Airport, located about 6 miles north in White Plains, New York.

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work at Central Avenue. The accumulated annual tonnage for main track 3 is 10 million gross tons.

Between MP 12.4 and MP 61.1, 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 track 1 average 12 feet 2 inches. The tracks are bidirectional. Between MP 23.6 and MP 24.7, there is a permanent timetable 60-mph speed restriction due to track curvatures on main track 3.



**Figure 1:** Site sketch of derailment area.

The Port Chester Station is at MP 25.7 and in tangent track just west of a 3°, 4-minute right-hand curve with 3 1/2 inches of superelevation.<sup>3</sup> As trains travel westward at MP 25.68, the track is tangent track. The Metro-North track charts for this location list the track as level with no ascending or descending grade. From MP 25.54 to MP 25.28, there is a 0.45 percent ascending grade in the tangent track. From MP 25.28 to MP 25.0, there is a 0.53 percent descending grade in the tangent track. From MP 25.0 to MP 24.61, the track has a 0.34 percent ascending grade. From MP 24.61 to MP 24.20, the track has a right-hand curve with 2°, 6-minutes curvature and 3 inches of superelevation with 0.55 percent ascending grade. This curve is 2,615 feet long. The point of derailment was located at MP 24.55 in the curve. Rye Station is at MP 24.1 in tangent track with 0.55 percent ascending grade.

<sup>3</sup> *Tangent* track is straight track with no curve.

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Metro-North maintains the track structure in the area of the derailment in accordance with Federal Railroad Administration (FRA) Class 3 track standards, which limits the maximum authorized speed to 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 due to the reported track deficiencies at the time of the derailment.

Train movements on the New Haven Line are governed by Metro-North operating rules, timetable special instructions, and the signal indications of a traffic control signal system that is supplemented with cab signals.<sup>4</sup> The cab signal system has a four-aspect cab display and three aspect wayside signals in conjunction with phase-selective alternating current track circuits. Wayside signals are arranged for train movements in either direction on each track.

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

### Preaccident Track Conditions

The rail traffic control center chief log indicates that at 1:20 p.m., the engineer of train 1359 reported a possible track condition on main track 3 between catenary bridge 213 and catenary pole 214. Two track inspectors in a hi-rail vehicle conducting a track inspection for potential heat-related track problems near the area.<sup>5</sup> They found a dip in the track profile, made repairs, and gave the track back to the RTC for normal operating speed at 2:02 p.m.<sup>6</sup> At 2:58 p.m., the engineer of train 1365 reported a rough ride on main track 3 between catenary pole 214 and catenary bridge 215.<sup>7</sup> The RTC, 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 p.m., the engineer of train 1367 reported over the radio that “the kink is pretty bad” around catenary bridge 215. As a result, the RTC in coordination with the chief dispatcher lowered the speed restriction to 15 mph, and the speed restriction limits were expanded from catenary poles 214 to 215 (0.06 mile) to catenary bridge 216 (0.11 mile). At 3:51 p.m., a track supervisor arrived at the catenary bridge 215 location and lowered the speed to 10 mph.<sup>8</sup> (See figures 2 and 3 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. The FRA Track Safety Standards (TSS) 213.55

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<sup>4</sup> Metro-North Railroad Operating Rules (effective February 27, 2011), General Order Number 302 (effective May 15, 2016), and Metro-North Railroad Operating Schedule Number 3 (effective April 2, 2017).

<sup>5</sup> Track Safety Standard 213.119 (g) requires railroads to inspect tracks when kinky rail conditions are possible. Metro-North had track inspectors out looking for possible kinky rail because the ambient temperature was in the 90°F range. At the time of the track repair, the temperature was 91°F.

<sup>6</sup> The track repairs included replacing about four Pandrol rail fasteners and raising the track about 1 inch and then tamping.

<sup>7</sup> The engineer radioed the track condition as “...real nasty kink in the rail, like real bad...”

<sup>8</sup> This track defect was near the first track defect reported by Train 1359. The first track defect was reported as a “dip,” which is a vertical deviation of the track profile and repaired by the track department. The second defect was reported as a “kink,” which is a horizontal misalignment of the track and rough track. A dip and a kink are two different types of track defects.

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allow for 5 inches of deviation of the mid-ordinate from a 62-foot cord for Class 1 track.<sup>9</sup> He watched about four trains pass over the area, and he said that the deviation was the same. At 4:30 p.m., as he was preparing to leave the area and make arrangements to have the track protected with slow boards and to make repairs, train 1371 passed through the area of the speed restriction at a speed that exceeded the 10-mph speed restriction that was in place.<sup>10</sup> The track supervisor reported the incident to the RTC and inspected the track again. He said that the alignment had not worsened. He departed the area. About 30 minutes later, he was called again by the RTC 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 p.m.



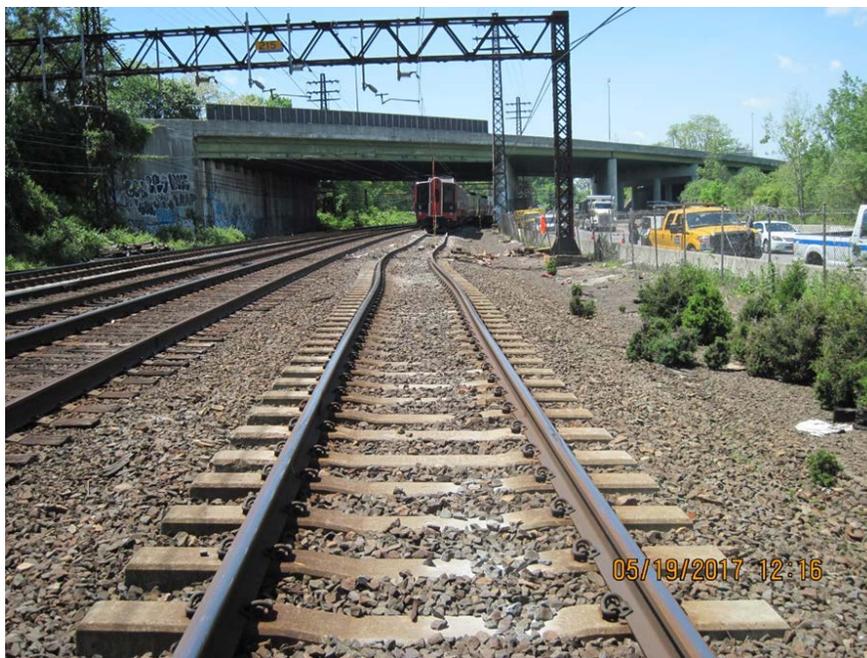
**Figure 2:** Preaccident view looking west toward catenary bridge 215 at the rail misalignment on track 3. (Photograph taken by Metro-North track foreman who responded to the track condition)

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<sup>9</sup> Class 1 track speed for passenger trains is 15 mph.

<sup>10</sup> (a) *Slow boards* are advance warning signs placed along the wayside to notify train engineers of an approaching speed restriction. (b) During the on-scene investigation, event recorder data from train 1371 were reviewed, and the data showed that about 300 feet east of catenary bridge 215 the train was traveling at a nominal speed of 55.7 mph, and 1 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.

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**Figure 3:** Postaccident view looking west toward catenary bridge 215 on track 3 toward 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.<sup>11</sup> The concrete ties, spaced at 24 inches on center, were installed in 1993. The continuous welded rail was a 140 pound-RE profile rail section made by Bethlehem Steel in August 1984 and was installed at this location in 1984.<sup>12</sup> 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 inspected the 10-mph slow order area, he thought that the area had insufficient track ballast. He said that he was going to make provisions to get ballast added to that location when the alignment was repaired.

The FRA reviewed the Metro-North track inspection records for the period of February 1, 2017 to May 18, 2017. There were no exceptions to the required biweekly frequency of inspections according to TSS 213.233.<sup>13</sup> 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 track exceptions were recorded on the report. The last track

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<sup>11</sup> *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.

<sup>12</sup> A 140-pound rail section means 140 pounds per 3 feet of rail. RE is the acronym that is stamped on sections of rail to identify the engineering association that establishes the design specifications for that rail. RE means American Railway Engineering Association or American Railway Engineering and Maintenance-of-Way Association.

<sup>13</sup> Metro-North conducts visual track inspections two times each week.

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inspection on the area was on May 18, 2017, from MP 23.3 to MP 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 performed by Amtrak Track Geometry Car 10003 on April 5, 2017. There were no track geometry exceptions in the derailment area. The geometry car inspected the track from the 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 MP 30.2 to MP 23.54, and no rail defects were found.

## **Federal Track Oversight**

The FRA used its geometry car DOTX 216 as part of its Automated Track Inspection Program to inspect Metro-North main track 3 on November 15, 2016 (about 7 months prior to the derailment). 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 for 57 days. 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 not having the required safety equipment. Seven of the 506 defects were written as violations. NTSB investigators determined that the inspection reports did not include any defects or violations in the area of the derailment.

## **Metro-North Commuter Train 1373**

The train engineer and conductor went on duty at 6:15 a.m. and made a round trip to Grand Central Terminal during the morning rush hour. After their 4-hour interim release, the train crew met at 4:15 p.m. and received the train equipment at Stamford Yard.<sup>14</sup> 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 predeparture 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, and 9606.

The train crew consisted of a train engineer, located in the control compartment of the lead car, and a conductor and three assistant conductors located in the passenger compartments. Cars 8 through 12, on the rear of the train, were not open for passenger use. The train departed Stamford

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<sup>14</sup> Hours of Service of Railroad Employees: Title 49 *Code of Federal Regulations (CFR)* 228.5 (definitions) defines *interim release* as an off-duty period applied to train employees only, of at least 4 hours but less than the required statutory off-duty period at a designated terminal. The off-duty period temporarily suspends the accumulation of time on duty but does not start a new duty tour. A normal duty tour consists of a total 12-hour work tour during a 24-hour period.

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Yard about 4:32 p.m. and arrived at Stamford Station about 4:35 p.m. The crew told investigators that the departure from Stamford Yard and then Stamford Station was uneventful.

After Stamford Station, 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 RTC and received a Line C (speed restrictions received en route) to add to his Daily Train Operations Bulletin Order (DTOBO).<sup>15</sup> 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 bridge 216, which are located between the Port Chester and 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. This action is to aid train engineers so that train conductors can remind them of approaching speed restrictions. The train engineer told investigators that he did not communicate the Line C speed restriction instructions to the train conductor.

Train 1373 departed Old Greenwich, Connecticut, and made three station stops before arriving at the Port Chester Train Station. Train 1373 departed Port Chester, New York, about 4:53 p.m. 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 that he did not have any radio communication with the train conductor after departing from Port Chester. The train engineer told National Transportation Safety Board (NTSB) investigators that he forgot about the speed restriction between the Port Chester Train Station and the Rye Train Station. He said, “When I got to approximately catenary 218, 219, I saw the rail in a funny position. I put the train into the emergency....”

Train 1373 was operating about 56 mph on main track 3 when the engineer initiated an emergency brake application. At 4:55 p.m., train 1373 derailed on main track 3 at MP 24.55 near catenary bridge 215. The train engineer reported the derailment, and emergency responders were requested. The engineer told NTSB investigators in the postaccident interview that he forgot about the speed restriction.

## **Postaccident Inspections**

The FRA track inspector and the FRA rail integrity specialist, in conjunction with the NTSB, inspected and examined main track 3 between catenary bridge 208 and catenary bridge 220. No track exceptions were taken to the undisturbed track conditions. In addition, the FRA took 50-foot incremental photographs through the derailment site. A sketch of the accident site was prepared, indicating the derailed cars, tracks, and other pertinent features. (See figure 1 in this report.) About 900 feet of track were replaced on main track 3. The postaccident inspection of the train equipment for train 1373 did not identify any mechanical defects.

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<sup>15</sup> Special Instruction No. 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 en route.

## **Medical Factors**

An investigation was performed to evaluate the engineer and conductor of Metro-North train 1373 (the train that derailed) and the engineer of Metro-North train 1371 (the earlier train that exceeded the speed restriction through the restricted area and did not derail) for medical conditions, use of medications and illicit drugs, or the presence of toxins (carbon monoxide and cyanide).<sup>16</sup>

The train 1373 engineer's occupational health records, personal medical records, the FRA postaccident toxicology reports, and postaccident medical treatment records were reviewed. Additionally, Metro-North occupational medicine policies and procedures for evaluation and management of obstructive sleep apnea (OSA) and diabetes in safety-sensitive personnel were reviewed. Finally, the occupational health records for the train 1373 conductor and the train 1371 engineer were reviewed.

The FRA provides advice to railroads on sleep disorders and fatigue but has developed no regulations regarding screening, diagnosis, or treatment of OSA among safety-sensitive rail employees.<sup>17</sup> However, according to communications from the New York Metropolitan Transportation Authority (MTA), Metro-North occupational medicine services has operated as a subsidiary of the MTA since January 2017, and a comprehensive OSA screening and treatment program is in place.<sup>18</sup>

The FRA has no regulations regarding either the diagnosis or the treatment of safety-sensitive rail employees with diabetes. This investigation requested Metro-North provide the current guidelines for the management of individuals with diabetes and was supplied with the Metro-North Railroad Medical Guidelines for Train Engineers, dated February 1995. Section 10 of the document addresses endocrine disorders and states:

- A. The individual must have adequate endocrine functioning to prevent risk of loss or alteration of consciousness or inability to perform essential job functions.
- B. Complications of diabetes such as retinopathy, neuropathy, vascular insufficiency, or foot problems should be evaluated in terms of the organ system affected to determine ability to perform essential job functions.
- C. Potentially disqualifying conditions include uncontrolled thyroid disease and uncontrolled diabetes with significant risk of hypoglycemia or hyperglycemia.

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<sup>16</sup> The Metro-North train 1373 conductor was working with passengers and was not in the cab of the train.

<sup>17</sup> FRA Safety Advisories 2004-04 and 2016-03.

<sup>18</sup> Essentially, the MTA has consolidated what were previously independent agency-level medical programs into a single, coherent program. This important change is bringing greater standardization and will result in a higher degree of medical surveillance for those employees with medical issues that warrant such surveillance. Further, the consolidation permitted MTA/Metro-North to replace physicians who were contractors with employee physicians (that is, insourcing a previously outsourced function). This action provides greater control over the program, while also maintaining a better degree of medical independence (that is, the employees are not patients of the MTA's physicians, and the physicians themselves are subject to medical leadership from the MTA Medical Director, who is not a railroad employee).

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Documentation of treatment and medical history is necessary where any type of diabetes is present.

### **Engineer – Train 1373**

#### **Metro-North Occupational Medicine Records**

The investigation reviewed occupational medical records ranging from March 1988 through May 25, 2017. According to these records, the engineer had fallen asleep while operating a train in February 2014. In August 2014, he was diagnosed with OSA, and treatment with continuous positive airway pressure (CPAP) was initiated.<sup>19</sup> The records also documented a history of diabetes treated with insulin.

The 58-year-old male engineer's most recent annual periodic physical examination was conducted on February 21, 2017. He was medically qualified for duties at the time of the accident.<sup>20</sup> He had severe OSA treated with CPAP and a history of inadequate treatment compliance and intermittent removal from service since diagnosis. He was kept on full duty for about 4 weeks in April and early May 2017 although his CPAP usage had been slightly lower than Metro-North compliance standards.<sup>21</sup> However, the postaccident review of data determined his CPAP usage compliance met Metro-North standards for the 10 days prior to the derailment. Additionally, despite having a known history of diabetes and episodes of elevated blood glucoses during occupational examinations, the Metro-North occupational medicine clinic was unaware the engineer was noncompliant with insulin treatment or of his resultant diagnosis of uncontrolled diabetes.

#### **Postaccident Emergency Treatment Records**

Records (dated May 18, 2017, at 8:28 p.m.) from the treating hospital were reviewed. The engineer reported he had not been injured during the derailment and was at the hospital for blood collection. The records documented he had normal vital signs and was alert; awake; and oriented to person, place, and time, with no abnormalities on physical examination. He reported his history of diabetes, but no laboratory or radiologic examinations were performed. The hospital collected two tubes of blood and a urine specimen at 9:11 p.m., which were given directly to an MTA representative to be sent for mandatory FRA postaccident testing.

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<sup>19</sup> *Continuous positive airway pressure* (CPAP) is a treatment for people who suffer from obstructive sleep apnea. With CPAP, a face mask is worn at night. The mask is attached to a machine that sends pressurized air into the person's airway, keeping it open while they sleep.

<sup>20</sup> Details of the engineer's medical conditions can be found in the medical factual report in docket DCA17FR008.

<sup>21</sup> The engineer's most recent 90-day compliance report documented 66.7 percent compliance. The MTA's minimal acceptable compliance is documented use of a CPAP device for 4 hours per sleep period during 70 percent of sleep periods.

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### **Toxicology**

The FRA postaccident toxicology testing for the engineer was conducted by Quest Diagnostics. Testing did not identify any tested-for drugs in the urine, and no alcohol was detected in the blood.<sup>22</sup>

### **Conductor – Train 1373**

#### **Metro-North Occupational Medical File**

The conductor of train 1373 was working in the passenger compartment not the cab of the train. The NTSB medical officer reviewed occupational medical records ranging from February 2010 through May 25, 2017. The 41-year-old male conductor's most recent medical certification examination was performed on January 22, 2016. No abnormalities were identified on the physical examination, and the conductor was found medically qualified for full duty.

### **Toxicology**

The FRA postaccident toxicology testing for the conductor was conducted by Quest Diagnostics. Testing did not identify any tested-for drugs in the urine, and no alcohol was detected in the blood.

### **Engineer – Train 1371**

#### **Metro-North Occupational Medical File**

The NTSB medical officer reviewed occupational medical records ranging from August 2011 through November 2, 2016. The 66-year-old male engineer's occupational health screening on April 13, 2015, included screening for sleep apnea; the screening found him at risk for sleep apnea. He was referred for a home sleep study. He was found not to have OSA. According to his November 2, 2016, medical certification examination, no disqualifying conditions were identified, and the engineer was found medically qualified for full duty.

### **Toxicology**

According to an e-mail message from Metro-North, the engineer was not subjected to postaccident drug and alcohol testing because his train was not involved in an accident, and it was not required.

### **Summary of Medical Findings**

The engineer of train 1373 was intermittently compliant with OSA treatment, and during the 10 days before the accident he met the minimum requirements for compliance. However, he did not use his CPAP machine the night before the accident, which likely caused some degree of acute sleep deprivation and fatigue. Additionally, although his blood glucose was not measured

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<sup>22</sup> Quest Diagnostics tested urine specimens for amphetamines, barbiturates, benzodiazepines, cannabinoids, cocaine, MDMA/MDA (Molly/Sally), methadone, opiates/opioids, phencyclidine, tramadol, brompheniramine, chlorpheniramine, diphenhydramine, doxylamine, and pheniramine. Blood was tested for alcohol.

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around the time of the accident, his chronic, uncontrolled diabetes increased his risk of cognitive impairment. The combination of fatigue secondary to lack of CPAP use the night prior to the accident and uncontrolled diabetes likely caused some subtle cognitive impairment at the time of the accident.

However, on the day of the accident, the engineer of a preceding train (1371) that did not derail, who had no identified potentially impairing medical conditions, made the same error and did not slow his train in the same restricted speed area of track. This engineer was not interviewed, and it is unknown why he did not comply with the speed restriction. Therefore, whether the effects of fatigue and uncontrolled blood sugar directly contributed to the train 1373 engineer's failure to slow his train in a restricted speed area or contributed to the accident cannot be determined.

Metro-North's occupational medicine department failed to recognize the significance of the engineer's elevated blood glucose levels on multiple occupational medicine clinic visits and did not fully evaluate his fitness for duty. Had Metro-North's occupational medicine clinic followed its 1995 occupational medicine guidelines and obtained documentation of treatment, the engineer's poorly controlled diabetes would have been identified, and Metro-North would have had the opportunity to ensure the engineer's health risk was treated.

### **Postaccident Medical Oversight Changes**

As a result of the investigation, Metro-North acted to correct the identified deficiencies in the OSA and diabetes management programs and implemented improvements in medical staff training and oversight. The Metro-North occupational medicine program improvements should reduce the risk that inadequately treated OSA and poorly controlled diabetes pose to rail safety.<sup>23</sup>

## **Train Operation Factors**

### **Positive Train Control**

Positive train control (PTC) was not fully operational on the line where the accident occurred. In the PTC annual and quarterly reports by the FRA, Metro-North filed for a 2018 target date for its full PTC implementation. On January 28, 2019, Metro-North sent a letter to the FRA, certifying that it would fully implement PTC on or before December 31, 2020. Metro-North's 2018 annual report, and subsequent quarterly reports also indicate a 2020 target date for full PTC implementation. The New Haven line is equipped with the Advanced Civil Speed Enforcement System (ACSES), a PTC system. Permanent speed restrictions on the New Haven line are currently enforced on trains with ACSES-equipped locomotives. Temporary speed restrictions are not currently being enforced but will be when PTC is fully implemented and operational.

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<sup>23</sup> See medical factual report in Docket DCA17FR008 for details of actions.

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### **Speed Restriction Violations**

During the investigation, the NTSB identified several instances where Metro-North trains were operating through speed restrictions at higher speeds than the allowable maximum authorized speed on the day of the accident. Two incidents involved Metro-North train 1373 (accident train):

- The Daily Train Operations Bulletin Order listed a speed restriction between Riverside Station and control point 229. After departing Riverside Station, train 1373 traveled 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 en route) 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 pole 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 pole 214 and catenary bridge 215, a track supervisor arrived at the location and lowered the speed restriction 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 protect the speed restriction with slow boards and make repairs, train 1371 passed through the area of the speed restriction at a speed that exceeded the 10-mph speed restriction that was in place. During the on-scene investigation, event recorder data from train 1371 was reviewed and indicated that about 300 feet east of catenary bridge 215, train 1371 was traveling at a nominal speed of 55.7 mph, and about 1 second later the master controller was moved to full-service brake application. The master controller was then moved to coast near catenary pole 214 at 34.5 mph. The track supervisor reported the incident to the RTC.

Speed restrictions are an everyday tool used by railroads to notify train crews of track defects, maintenance, or construction. On the day of the accident, nine trains operated through the speed restriction. NTSB investigators found two of the nine trains had violated the speed restriction. Once fully implemented, PTC will enforce permanent and temporary speed restrictions.

### **Metro-North Protocols for Reported Track Conditions**

A postaccident review of the Metro-North radio communication audio files indicated that at 2:58 p.m., the engineer of train 1365 reported a “real nasty kink in the rail, like real bad...” on main track 3 between catenary pole 214 and catenary bridge 215. The RTC in coordination with the chief dispatcher placed a 30-mph speed restriction on the track at that location until the track

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could be inspected. The speed restriction was issued in accordance with a RTC transfer mandate (e-mail message dated April 27, 2017) that indicated “Per VP [name redacted] 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 RTCs would implement a 15-mph speed restriction for reported track conditions.

Metro-North was in the process of developing an RTC manual. The RTC 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 1373 in Rye, Metro-North provided NTSB investigators with a draft copy of the rules regarding reports of track conditions. The investigation determined that the draft RTC manual did not address the circumstances of train engineers forgetting a speed restriction; however, it did address the handling of the reported track conditions that could potentially cause a derailment.

Draft Metro-North RTC Manual Rule 11-A Rough Ride/Dip in Rail states the following:

Upon report from an engineer of a rough ride or dip in the rail, notify the ACRTC [assistant chief rail traffic controller]. The RTC will implement a 30-MPH temporary speed restriction in the affected area. The ACRTC or CRTC [chief rail traffic controller] 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, the FRA and the 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 changes to the protocols. On May 25, 2017, Metro-North issued RTC Notice 17-10 to supersede Rule 11 for Initial Report of Incident, 11-A Rough Ride/Dip in Rail on page 40 of the RTC manual. The issued protocol, Track Defect/Ride Quality Concern, stated the following:

If there is a report of a Track Defect (Heat Kink, Broken Rail, etc.) by a train, the OCC [operations control center] 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 [temporary speed restriction] 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.

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If the RWIC [roadway worker in charge] for the Track Department directs the speed to be less than 30 MPH, the RTC will place a BDA [blocking device applied] on the track until the RWIC shunts [redirects electrical current] the track circuit at that location. The RWIC will notify the RTC when the track circuit is shunted and 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.

On June 16, 2017, Metro-North issued RTC Notice 17-11, which provided further clarification on reports of possible track defects and reports of rough spots or dips in the track. However, the new protocol still allows RTCs to issue a 30-mph speed restriction for trains carrying passengers to operate until qualified track personnel respond and determine an appropriate speed.

### **Safety Issue**

The NTSB has previously investigated accidents where trains were allowed to continue operating on tracks where a track condition had been reported. In a previous investigation of an accident that occurred on January 12, 2015, Washington Metropolitan Area Transit Authority (WMATA), southbound Yellow Line train 302, with about 380 passengers on board, stopped after encountering heavy smoke in the tunnel between the L'Enfant Plaza Station and the Potomac River bridge in Washington, DC.<sup>24</sup> As a result of the accident, one passenger died and 91 people were injured, including passengers, emergency responders, and WMATA employees.

The NTSB investigation concluded that had WMATA followed its standard operating procedures and stopped all trains at the first report of smoke, train 302 would not have been trapped in the smoke-filled tunnel. The investigation also concluded that WMATA put passengers at risk by routinely using trains with revenue passengers to investigate reports of smoke or fire. Therefore, the NTSB issued Safety Recommendation R-16-22, which asked that WMATA revise its standard operating procedures to require that (1) suitably trained, qualified, and properly equipped personnel investigate reports of wayside fire or smoke, and (2) these reports are not investigated using trains with revenue passengers. In response to this recommendation, WMATA updated its emergency standard operating procedures for fire and life safety processes in tunnels and underground stations, clarifying that the rail operations supervisor should investigate fire and smoke occurrences and that no revenue trains with passengers on board will enter a smoke environment to investigate the scene. On February 27, 2018, Safety Recommendation R-16-22 was classified "Closed—Acceptable Action."

The NTSB is concerned that Metro-North trains carrying passengers can continue to operate over a reported track condition at 30 mph to determine if the track condition still exists. This investigation determined that the speed restriction put in place by the RTCs was lowered by the responding track personnel on both occasions after they arrived on scene and assessed the track

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<sup>24</sup> National Transportation Safety Board, *Washington Metropolitan Area Transit Authority L'Enfant Plaza Station Electrical Arcing and Smoke Accident, Washington, D.C., January 12, 2015*, RAR-16/01. Washington, DC: National Transportation Safety Board, 2016).

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conditions. This demonstrated that RTCs and train crews were not qualified to evaluate reported track conditions and allow trains to operate at 30 mph.

Metro-North is depending on train crews with limited training on identification of track defects to identify possible track conditions and classify the conditions as a track defect or a rough spot/dip in the track while they are busy operating the train at speeds up to 30 mph. Furthermore, Metro-North RTC, located at Grand Central Terminal, can authorize train movements based on train crew reports without any visual confirmation or training to identify possible track conditions. The NTSB believes that the use of Metro-North trains carrying passengers at 30 mph after a reported track condition to determine if the track condition still exists is an unnecessary risk. The NTSB recommends that following a report of a track condition, RTCs should issue a speed restriction through the vicinity of a reported track condition that would require all trains to operate at a slow speed that will afford a train crew the ability to stop the train if the encountered track condition is determined to be severe enough. The speed restriction should remain until a qualified Metro-North Railroad track inspector can respond and issue an appropriate speed restriction for trains to safely operate.

Metro-North Operating Rules required the train engineer to communicate to the conductor the Line C speed restrictions that were issued to the engineer of train 1373. Conductors are required to be aware of their train's location at all times during operations so that they can announce upcoming stations, keep track of station departure times, know which side of the train the platforms will be on, and other duties. All of these actions require the conductors to be aware of their location and, in tandem with the engineer, ensure their train is operating within all permanent and temporary speed restrictions. Despite this requirement, the train engineer did not communicate the Line C speed restriction instructions to the train conductor who could have provided the engineer an advanced warning via the portable radio all crewmembers carry to remind him of the upcoming speed restriction. Therefore, the NTSB recommends that, until PTC is fully implemented on Metro-North Railroad tracks, Metro-North Railroad should communicate to all train engineers and conductors the circumstances of this accident and the importance of the train engineer informing the conductor of any speed restrictions.

## **Probable Cause**

The National Transportation Safety Board determines that the probable cause of this derailment was the engineer of Metro-North Railroad commuter train 1373 failing to remember the 10-mph temporary speed restriction and operating his train at 55.9 mph into a 10-mph speed-restricted area. Contributing to the accident was the engineer's failure to communicate the temporary speed restriction to the conductor who could have reminded the train engineer of the upcoming speed restriction. Also contributing to the accident was the lack of a fully operational positive train control system, which would have stopped the train in advance of the speed-restricted area.

## **Safety Recommendations**

The National Transportation Safety Board makes the following safety recommendations:

### **To the Metro-North Railroad:**

Following a report of a track condition, rail traffic controllers should issue a speed restriction through the vicinity of a reported track condition that would require all trains to operate at a slow speed that will afford a train crew the ability to stop the train if the encountered track condition is determined to be severe enough. The speed restriction should remain until a qualified Metro-North Railroad track inspector can respond and issue an appropriate speed restriction for trains to safely operate. (R-19-44)

Until positive train control is fully implemented on Metro-North Railroad tracks, Metro-North Railroad should communicate to all train engineers and conductors the circumstances of this accident and the importance of the train engineer informing the conductor of any speed restrictions. (R-19-45)

For more details about this accident, visit <https://www.nts.gov/investigations/SitePages/dms.aspx> and search for NTSB accident identification number DCA17FR008.

## **BY THE NATIONAL TRANSPORTATION SAFETY BOARD**

**ROBERT L. SUMWALT, III**  
Chairman

**JENNIFER HOMENDY**  
Member

**BRUCE LANDSBERG**  
Vice Chairman

**Date: October 8, 2019**

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The NTSB has authority to investigate and establish the facts, circumstances, and cause or probable cause of a railroad accident in which there is a fatality or substantial property damage, or that involves a passenger train. (Title 49 *United States Code (USC)* Section 1131 – *General authority*).

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties . . . and are not conducted for the purpose of determining the rights or liabilities of any person.” Title 49 *Code of Federal Regulations*, Section 831.4. Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report. 49 *USC* 1154(b).

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