



National Transportation Safety Board

Washington, DC 20594

Safety Recommendation

Date: May 19, 2014

In reply refer to: R-14-12

Mr. Joseph Giulietti
President
Metro-North Railroad
347 Madison Avenue
New York, NY 10017

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in other modes of transportation—railroad, highway, marine, and pipeline. The NTSB determines the probable cause of the accidents and issues safety recommendations aimed at preventing future accidents. In addition, the NTSB carries out special studies concerning transportation safety and coordinates the resources of the federal government and other organizations to provide assistance to victims and their family members affected by major transportation disasters. The NTSB urges the Metro-North Railroad (Metro-North) to take action on the safety recommendation issued in this letter.

The recommendation is derived from the NTSB's ongoing investigation of the derailment and subsequent collision of two Metro-North passenger trains in Bridgeport, Connecticut, on May 17, 2013. As a result of our investigation to date, the NTSB is issuing two safety recommendations, one of which is addressed to Metro-North. Information supporting this recommendation is discussed below.

Background

On Friday, May 17, 2013, at 6:01 p.m. eastbound Metro-North passenger train 1548, which had departed Grand Central Terminal, New York, toward New Haven, Connecticut, derailed at milepost (MP) 53.25 from main track 4 of the New Haven Line Subdivision 7 and was struck by westbound Metro-North passenger train 1581, which had departed New Haven bound for Grand Central Terminal. As a result of the collision, 48 passengers, 2 engineers, and 1 conductor were transported to local hospitals. Metro-North estimated that about 250 passengers were on each train at the time of the accident.

The Metro-North New Haven Line Subdivision 7 runs in an approximate geographic northeast-southwest direction between New York City and New Haven. At the site of the accident, four main tracks are typically in operation. However, between MP 48.8 and MP 55.1, a long-term track project on main tracks 1 and 3 (the two adjacent northernmost tracks) required all rail traffic to be routed onto main tracks 2 and 4 (the two adjacent southernmost tracks). Each day, about 49 Metro-North passenger trains and 23 Amtrak trains operate over these tracks. Between the months of April and November, two freight trains operate, three times per week, over these tracks; the estimated annual gross tonnage is 5 million gross tons. The maximum authorized speed on the four main tracks in the vicinity of the accident is 70 mph. There were no posted speed restrictions at the time of the accident.

The Broken Compromise Joint Bars

At the point of derailment, investigators found that a pair of 36-inch-long compromise joint bars on the north rail of track 4 were broken. Compromise joint bars are used to join two rails of different sizes to compensate for the different heights of the rail head running surfaces. (See figure 1.) The compromise joint was made up of two separate bars that were bolted to the webs of the two running rails. In this application, the two rails were 136- and 131-pound rails.¹ The compromise joint bars that were found to be broken had been installed on April 4, 2013.



Figure 1. Photograph of an exemplar compromise joint bar

The broken compromise joint bars were examined at the accident scene by NTSB investigators and subsequently were examined in the NTSB Materials Laboratory in Washington, DC. The examination showed the gage side bar, which is the bar closest to the centerline of the track, exhibited crack arrest marks that are indicative of fatigue cracking. The fatigue crack emanated from multiple origins at the bottom of the bar. The compromise joint bar on the field side, which is the bar opposite the gage side, also contained a fatigue crack that originated at the

¹ References to 136-pound rail and 131-pound rail refer to the rail section weight per yard.

bottom of the bar. (See figure 2.) In the two compromise joint bars, fatigue propagation extended up and partially through the middle portions of the bars.

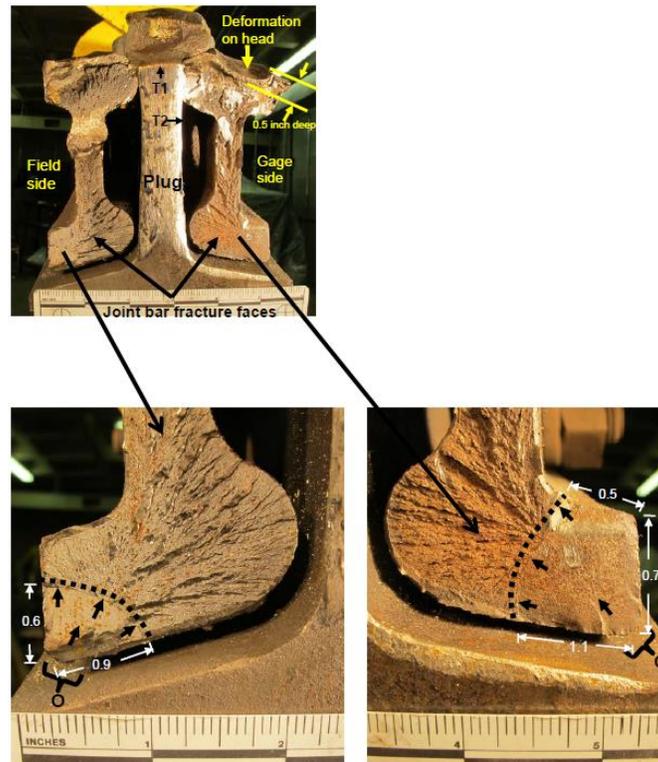


Figure 2. Fractured pair of compromise joint bars and rail showing the east fracture face (top) and close-up photographs of the leg portions of the compromise joint bars (bottom). A fatigue crack emanated from the lower corner of each leg portion of the compromise joint bars in the areas indicated by brackets “O.” (Measurements of the fatigue cracks are shown in inches.)

Investigators measured the exposed portions of the fatigue cracks and determined the gage side bar, which exhibited the largest and oldest fatigue crack, was the first bar to break. The exposed portions of fatigue cracks on the field side bar were smaller, indicating it was the second bar to break. Investigators also measured the joined rails to determine whether the rail head running surfaces were properly matched. By design, the compromise joint bars create a 0.1875-inch difference at the base of the rails by raising up the smaller rail section so the rail head running surfaces can match. However, in this case, the 131-pound rail was worn and was 6.95 inches high, creating a 0.17-inch difference between the rail head heights of the 131- and the 136-pound rails. A mismatch of this magnitude would have been noticeable by sound and feel if traversed in a hi-rail inspection vehicle, and this mismatch would also have been noticeable to a trained inspector walking the track. Title 49, *Code of Federal Regulations* 213.115, titled “Rail End Mismatch,” allows no more than a 0.125-inch mismatch on the tread (head) of the rail end for a class 4 track.

The last track inspection in the area of the derailment had been performed on May 15, 2013, 2 days before the accident, by inspectors in a hi-rail vehicle.² Metro-North records indicate the inspection was most likely performed from track 2. The inspectors documented an “insulated joint with hanging ties” (insufficient ballast support) and “pumping under load” (vertical deflection) at the location of the subsequent derailment on main track 4. No corrective action was documented on the report. During on-scene examination of the derailment area, NTSB investigators found conditions consistent with deflection under the insulated joint. The NTSB investigators determined that the combination of the rail-head mismatch and the vertical deflection under the insulated joint caused the compromise joint bars to fail from fatigue cracking.

Track Inspection Standards

Because Metro-North records indicated the last inspection was most likely performed from track 2, the NTSB notes that the gage side of the rail on track 4, including the gage side of the compromise joint bar, would not have been visible from a hi-rail vehicle that traveled on track 2.

Title 49 *Code of Federal Regulations* 213.233, Track Inspections, requires an inspection frequency for class 4 track of twice weekly with at least 1 calendar day interval between inspections.³ In addition, section 213.233(b) states, in part, the following with respect to an inspection conducted while riding over a track in a vehicle:

- (2) Two inspectors in one vehicle may inspect up to four tracks at a time provided that the inspectors’ visibility remains unobstructed by any cause and that each track being inspected is centered within 39 feet from the track upon which the inspectors are riding;
- (3) Each main track is actually traversed by the vehicle or inspected on foot at least once every two weeks, and each siding is actually traversed by the vehicle or inspected on foot at least once every month. On high density commuter railroad lines where track time does not permit an on track vehicle inspection, and where track centers are 15 foot or less, the requirements of this paragraph (b)(3) will not apply.

According to Metro-North maintenance personnel, the vast majority of track inspections were conducted from one of the two inside tracks (tracks 1 and 2). During those inspections, all four tracks were to be inspected simultaneously by two track inspectors riding in a hi-rail vehicle. Metro-North track inspectors told NTSB investigators that when they had an opportunity to inspect the outside tracks (tracks 3 and 4) while riding in a hi-rail inspection vehicle, they had to rush. This was verified by the Assistant Track Supervisor, who said that the inspectors had brought this issue to his attention and that he had experienced this when he rode with them twice a month.

² The hi-rail vehicle used on the New Haven Line is a two-door pickup truck equipped with hydraulic operated hi-rail wheels and a multichannel bandwidth radio for communication with varying departments.

³ Metro-North normally inspects this track three times each week either on foot or using a hi-rail vehicle. The track was inspected twice during the week of May 12, 2013.

At the NTSB's investigative hearing on November 7, 2013, Metro-North's Assistant Vice President of Maintenance of Way and Chief Engineer was asked when the last walking or hi-rail inspection was conducted on track 4 in the area of the derailment. He stated that, based on his review of records from January 2013 through May 17, 2013, he was unable to determine the last time track 4 was walked or traversed by a hi-rail inspection vehicle.

We have previously expressed our concern about the adequacy of simultaneous inspection of multiple tracks and the importance of riding over the inspected track. In our December 18, 2012, comments on the FRA's notice of proposed rulemaking, "Track Safety Standards; Improving Rail Integrity,"⁴ we explained the basis for this concern as follows:

When inspecting track from a typical hi-rail vehicle, an inspector can see the track structure in front from about 20 feet. In addition to operating the vehicle and looking in the direction of travel for track defects 20 feet in front, an inspector may be expected to inspect an adjacent track up to 30 feet to the side. Furthermore, part of the inspection may include the sound or feel of the track as the inspection vehicle rides over the track. These parts of the inspection are not performed if the inspector is inspecting [from] adjacent track. In addition, most defective track conditions occur after a period of gradual deterioration and are not observed during a single inspection cycle, although some conditions become visible to normal inspection when there is a rapid failure. The most important cause of track structure deterioration is rail traffic; the more severe the traffic conditions—measured by total tonnage, individual loads, car conditions, train handling, and speed—the greater the rate of deterioration will be. The NTSB believes that both gradual deterioration and rapid failures can create serious hazards, and the probability of detecting these hazards is substantially reduced when multiple tracks are being inspected simultaneously.

We remain concerned about the practice of inspecting adjacent track without traversing it, either on foot or with inspection vehicles, on a periodic basis and have issued a recommendation to the FRA urging it to remove the exemption for high-density commuter railroads. However, we recognize that regulatory changes can take many years to complete. Therefore, the National Transportation Safety Board makes the following safety recommendation to Metro-North Railroad:

Revise your track inspection program to include requirements (1) to traverse each main track by vehicle or inspect each main track on foot at least once every 2 weeks, and (2) to traverse and inspect each siding, either by vehicle or on foot, at least once every month. (R-14-12)

The NTSB also issued one safety recommendation to the Federal Railroad Administration.

Acting Chairman HART and Members SUMWALT, ROSEKIND, and WEENER concurred in this recommendation.

⁴ *Federal Register* 77, no. 203 (October 19, 2012): 64249.

The NTSB is vitally interested in this recommendation because it is designed to prevent accidents and save lives. We would appreciate receiving a response from you within 90 days detailing the actions you have taken or intend to take to implement it. When replying, please refer to the safety recommendation by number. We encourage you to submit your response electronically to correspondence@ntsb.gov.

[Original Signed]

By: Christopher A. Hart,
Acting Chairman