National Transportation Safety Board

Washington, DC 20594

Safety Recommendation

Date: February 2, 2015

In reply refer to: R-15-03

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. We determine the probable cause of the accidents and issue safety recommendations aimed at preventing future accidents. In addition, we carry out special studies concerning transportation safety and coordinate the resources of the federal government and other organizations to provide assistance to victims and their family members affected by major transportation disasters. We urge the Metro-North Railroad (Metro-North) to take action on the safety recommendation issued in this letter.

This recommendation addresses the M-8 passenger railcar body mounting bolts (as installed by the passenger railcar manufacturer). The recommendation is derived from our investigation of the derailment and subsequent collision of two Metro-North passenger trains in Bridgeport, Connecticut, on May 17, 2013. As a result of this component of the investigation, we have issued three safety recommendations, of which one is addressed to Metro-North. Information supporting this recommendation is discussed below.

The Accident

On Friday, May 17, 2013, at 6:01 p.m. eastern daylight time, 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 near Bridgeport, Connecticut, and was struck by westbound Metro-North passenger train 1581, which had departed New Haven bound for Grand Central Terminal. (See Figure 1.) As a result of the collision, 62 passengers, 2 engineers, and 1 conductor were injured. Metro-North estimated that about 250 passengers were aboard each passenger train at the time of the accident.

The NTSB determined that the probable cause of the derailment was an undetected broken pair of compromise joint bars on the north rail of track 4 on the Metro-North New Haven

subdivision at MP 53.25 resulting from: (1) the lack of a comprehensive track maintenance program that prioritized the inspection findings to schedule proper corrective maintenance; (2) the regulatory exemption for high-density commuter railroads from the requirement to traverse the tracks they inspect; and (3) Metro-North's decisions to defer scheduled track maintenance.

Figure 1. View of the accident between Metro-North passenger trains 1548 (right) and 1581 (left).

After eastbound passenger train 1548 derailed, it was struck and sideswiped by westbound passenger train 1581. During the accident sequence, the forward end (F-end) of passenger railcar 9193 (the first railcar) of passenger train 1581 struck the back end (B-end) of passenger railcar 9247 (the fourth passenger railcar) of passenger train 1548. NTSB investigators found that the left B-end corner post of passenger railcar 9247 fractured and separated from the passenger railcar; one piece of that corner post was found embedded in the operator compartment of passenger train 1581. Although there was impact damage to the F-end of passenger railcar 9193, its corner post was intact.

Detachment of Railcar Truck Assembly

In the collision, a truck assembly from lead passenger railcar 9193 of striking passenger train 1581 detached from the railcar body. The truck moved laterally, rotated, and protruded from under the passenger railcar. The front left corner of the truck struck and raked passenger railcar 9247, which was the fourth passenger railcar of train 1548. The raking impact created a sidewall intrusion into the occupant space of passenger railcar 9247. (See Figure 2.)

An examination of the detached truck assembly identified that all of the mounting bolts had failed. On M-8 passenger railcars, the truck assembly is attached to the passenger railcar body with eight 1.25-inch diameter Grade 5 bolts at 952 foot-pounds of torque.

Title 49 *Code of Federal Regulations* (CFR) 238.219, which applies to the minimum strength of the truck-to-railcar body attachments, states the following:

> Passenger equipment shall have a truck-to-car-body attachment with an ultimate strength sufficient to resist without failure the following individually applied loads: 2g vertically on the mass of the truck; and 250,000 pounds in any horizontal direction on the truck, along with the resulting vertical reaction to this load. For purposes of this section, the mass of the truck includes axles, wheels, bearings, the truck-mounted brake system, suspension system components, and any other component attached to the truck by design.

The NTSB investigation recognizes that the reliability of bolted joints is determined by mechanical factors that affect clamping force; for example, the torque applied to the bolts and the material of the bolts. If insufficient torque is used (i.e., under-torqued fasteners), the bolts may fail to withstand sheer forces. If the bolt material has insufficient strength, the bolts may stretch under the load and become loose.

Figure 2. Photograph of the detached truck assembly from Metro-North passenger railcar 9193 of the striking passenger train protruding into passenger railcar 9247.

As part of the NTSB's investigation, the FRA commissioned the Volpe National Transportation Systems Center (Volpe) to evaluate the M-8 passenger railcar truck mount. The Volpe evaluation reviewed the finite element analysis provided by the railcar manufacturer to demonstrate compliance with 49 CFR 238.219. Volpe evaluated both the current Grade 5 bolts and the upgraded Grade 8 bolts. The findings indicated that Grade 5 bolts do not appear to support the required 250,000-pound load and that Grade 8 bolts do appear to support the required load.

Ensure Reliability of Truck Assembly Attachment

The NTSB is concerned that the margin of safety in the current design of the M-8 passenger railcar truck-to-railcar body attachment is inadequate. The NTSB believes that the Grade 5 mounting bolts used in M-8 passenger railcars do not ensure that the truck assembly will remain attached to the railcar body during an accident. The truck of passenger railcar 9193 detached from the railcar body during a relatively low-speed accident due to failed mounting bolts. As a result, the detached truck assembly intruded into the occupant space of passenger railcar 9247, increasing the severity of the accident.

Therefore, the NTSB makes the following recommendation to Metro-North:

> Replace the Grade 5 mounting bolts in the M-8 passenger railcar fleet with stronger bolts to ensure that the railcars comply with Title 49 *Code of Federal Regulations* 238.219. (R-15-03)

We also issued two safety recommendations to the FRA.

The NTSB is vitally interested in these recommendations because they are designed to prevent accidents and save lives. We would appreciate receiving a response from you within 90 days, as required by 49 *United States Code* section 1135, detailing the actions you have taken or intend to take to implement them. When replying, please refer to the safety recommendations by number and submit your response electronically to correspondence@ntsb.gov.

[Original Signed]

By: Christopher A. Hart,
Acting Chairman