National Transportation Safety Board

Washington, DC 20594

Safety Recommendation

Date: December 30, 2014

In reply refer to: R-14-75 and -76

The Honorable Joseph C. Szabo
Administrator
Federal Railroad Administration
Washington, DC 20590

The National Transportation Safety Board (NTSB) urges the Federal Railroad Administration (FRA) to take action on the safety recommendations issued in this letter. The recommendations address defining specific allowable limits for combinations of track conditions to ensure detection and remediation of measured varying track deviations, which by themselves do not exceed specific track geometry limits, but in combination pose a risk to safe train operations. The recommendations are derived from the NTSB's investigation of the CSX Transportation (CSX) train Q70419 derailment on Metro-North Railroad (Metro-North) track in The Bronx, New York (DCA-13-FR-009). Information supporting this recommendation is discussed below.

Background

On July 18, 2013, at 8:29 p.m. eastern daylight time, northbound CSX Transportation (CSX) train Q70419, derailed on the Metro-North Hudson Line at milepost (MP) 9.99 on main track 2. The train consisted of 2 locomotives and 24 modified flat cars. Each flat car was loaded with 4 containers of municipal refuse. The 11th through 20th cars derailed. At the point of derailment (POD), NTSB investigators identified a number of track conditions that could contribute to a wide gage including center-bound concrete ties, fouled ballast, profile deviations, and displaced insulators.

The NTSB determined that the probable cause of the accident was excessive track gage due to a combination of fouled ballast, deteriorated concrete ties, and profile deviations resulting from Metro-North's decision to defer scheduled track maintenance.

The track in the area of the derailment was classified by Metro-North as Class 2 track. The track was scheduled to be visually inspected twice weekly and the track inspections were performed on foot.[1] The last track inspection prior to the derailment was performed on

[1] Title 49 *Code of Federal Regulations* (CFR) Part 213 defines Class 2 track and specifies the maximum gage and profile deviation.

July 18, 2013, the day of the derailment. The inspection found no reportable track defects in the area.[2] However, the inspection report surface comment section stated in part: "MP 11.4, track 1 has a mud spot, MP 10.1, track 2 has a mud spot and a 1/2 inch profile deviation, MP 10.2, track 2 [has] two broken ties and surfacing [is] needed." The inspection record did not note any exceptions at the POD.

Metro-North engineering services conducted an automated track geometry inspection through the derailment area on October 17 and 18, 2012, and April 23 and 24, 2013. A data review disclosed the widest gage recorded during the October 17, 2012, inspection was 57.598 inches at MP 9.9 for a length of 18 feet. The inspection on April 24, 2013, disclosed a gage of 57.708 inches for 116 feet. While the gage increased from the first inspection on October 17, 2012, the measurement deviations did not exceed the maximum allowable gage of 57.75 inches for Class 2 track.

The Federal Track Safety Standards at 49 CFR Part 213 § 213.53 requires track gage for Class 2 and 3 track to be a minimum of 56 inches (4'8") and a maximum of 57.75 inches (4'9 3/4"). Track profile regulation at 49 CFR § 213.63 requires no more than 2.75 inches (2 3/4") for Class 2 track.

The FRA DOTX220 geometry car was used to inspect the track in the vicinity of the POD on June 4, 2013. The inspection data report disclosed no exceptions to the track geometry in the area. The FRA geometry car takes track measurements every foot with laser beam instrumentation. The FRA geometry car will not flag a defect for inspector validation unless the defect exceed standards over a 3-foot section with gage exceeding 57.85 inches, exceeding the regulation by a minimum of 0.1 inches, or a profile measurement of 2.75 inches or more.[3]

The NTSB investigator's review of the data strip chart from the geometry car in the derailment area revealed a gage measurement of 57.81 inches and a profile measurement of —2 inches (a 2-inch dip) in both rails (see figure 1). Deviations in track geometry are symptoms of underlying track defects that can vary over time.

Maintenance records were examined following the accident. Metro-North did not have a record of any individual track condition that exceeded regulatory limits at the POD, and no repairs of the track were made.

As shown in figure 1 below, the track at the POD (shaded orange) had a gage measurement slightly above the FRA limit in combination with a substantial (but allowable) profile deviation. Whereas the other two fouled ballast zones shown shaded in blue and green had either gage or profile deviation, but not both simultaneously. The combined geometry deviation with fouled ballast presented a risk of derailment.

[2] Metro-North used the Federal Track Safety Standards as the criteria for reportable defects.

[3] The 0.1 inch exceedance is programed to reduce the number of false positive indications for the purpose of inspection and enforcement actions. The geometry car takes measurements every foot with laser beam instrumentation, and the distance of 3 feet allows for signal dropout or spikes.

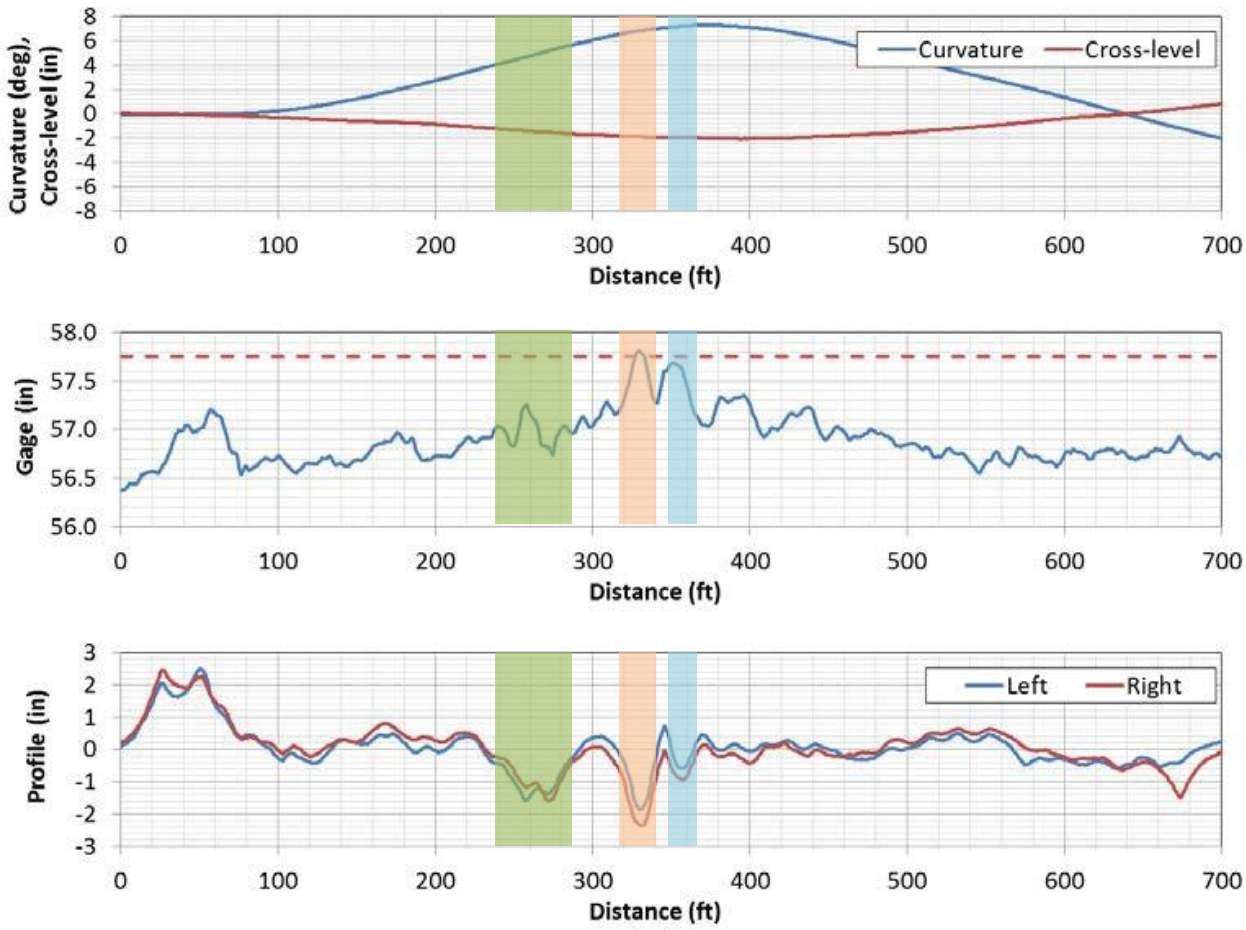

Figure 1. FRA DOTX220 geometry car inspection charts.

Combined track conditions that can lead to unsafe train operations are described in 49 CFR § 213.1 "Scope of part":

> The requirements prescribed in this part apply to specific track conditions existing in isolation. Therefore, a combination of track conditions, none of which individually amounts to a deviation from the requirements in this part, may require remedial action to provide for safe operations over that track. This part does not restrict a railroad from adopting and enforcing additional or more stringent requirements not inconsistent with this part.

It is difficult to comply with this scope because the combinations of individual parameters that form a defective track condition are not defined. Without defined parameters for determining a defective condition, measurement analysis is based on experience and opinion and compliance is inconsistent throughout the industry. As a result, combinations of track conditions that could present risk to safe operations are more likely to be missed. However, track geometry vehicles and other automated track inspection technologies using computer-based algorithms have the ability to identify such combinations if allowable limits for combinations of conditions can be defined.

The consequences of deficient track geometry conditions are clear. A query of the FRA's Office of Safety Analysis Accident Causes database for all railroad operations on main tracks between January 2004 and June 2014 showed 1,032 accidents attributed to track geometry resulting in $283.5 million in reportable damages, 3 fatalities, and 122 injuries.[4]

Defining allowable parameters for combined track conditions will give (1) clear guidance on what combinations of conditions can lead to higher risk of derailment and require remediation, (2) consistent and actionable values for inspectors determining combinations of track conditions that comprise a track exception, and (3) specific parameters that can be coded into track geometry vehicles to identify areas with higher potential risk to safe operation.

Automated Track Inspection Program

For more than 30 years, the FRA's Automated Track Inspection Program (ATIP) has provided accurate, track geometry data to assess compliance with 49 CFR Part 213, *Track Safety Standards*. Priorities for ATIP inspections include passenger, major hazardous material and strategic rail corridor routes, and other track, which present a safety concern for the FRA. The track data collected by ATIP is used by FRA, railroad inspectors, and railroads to assist and assure track safety is being maintained by setting priorities for their respective compliance activities. Also, the data is used by FRA to assess track safety trends within the industry. Immediately following ATIP track surveys, the railroads use the data to help locate and correct exceptions found. The FRA and railroads use the ATIP data as a quality assurance check on their track inspection and maintenance programs.

Once allowable limits for combinations of track conditions are developed and incorporated into the FRA regulations, the FRA should begin to test track for combined track deficiencies in order to reduce the number of track geometry accidents. Since track geometry vehicles are computerized, the specific data produced for each geometry parameter should be able to be combined to define areas that are within tolerances, but when combined may be a defective track condition. This improvement will enhance data value and facilitate data usage.

Therefore, the NTSB makes the following safety recommendations to the FRA:

R-14-75

> Revise Title 49 *Code of Federal Regulations* Part 213 to define specific allowable limits for combinations of track conditions, none of which individually amounts to a deviation from Federal Railroad Administration regulations that requires remedial action, but, which when combined, require remedial action.

[4] This database can be found at http://safetydata.fra.dot.gov/officeofsafety/publicsite/Query/inccaus.aspx (accessed October 3, 2014).

R-14-76

Once you have completed the actions specified in Safety Recommendation R-14-75, program your geometry inspection vehicles to detect combinations of conditions that require remedial action.

We are 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 detailing the actions you have taken or intend to take to implement them. 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