



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: October 26, 2007

In reply refer to: R-07-14 and -15

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The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendations in this letter. The Safety Board is vitally interested in these recommendations because they are designed to prevent accidents and save lives.

These recommendations address the need for the Regional Transportation Authority (RTA) to ensure that the safety deficiencies that led to the Chicago Transit Authority (CTA) July 11, 2006, subway accident have been corrected and to strengthen its followup action on its system safety reviews of the CTA. The recommendations are derived from the Safety Board's investigation of the July 11, 2006, derailment of CTA train 220 in Chicago, Illinois, and are consistent with the evidence we found and the analysis we performed. As a result of this investigation, the Safety Board has issued 14 safety recommendations, 2 of which are addressed to the RTA. Information supporting these recommendations is discussed below. The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendations.¹

On Tuesday, July 11, 2006, about 5:06 p.m., central daylight time,² the last car of northbound³ CTA Blue Line train number 220 derailed in the subway between the Clark/Lake and Grand/Milwaukee stations in downtown Chicago, Illinois. About 1,000 passengers were on board the eight-car rapid transit train. Following the derailment, the train came to a stop, and

¹ For more information, see <http://www.nts.gov/publicctn/2007/RAR0702.pdf>. National Transportation Safety Board, *Derailment of Chicago Transit Authority Train Number 220 Between Clark/Lake and Grand/Milwaukee Stations, Chicago, Illinois, July 11, 2006*, NTSB/RAR-07/02 (Washington, DC: NTSB 2007).

² All times are central daylight time.

³ The Blue Line track is generally aligned in a geographical north to south direction; however, the track in the area of the derailment was aligned in an east to west direction.

electrical arcing between the last car and the 600-volt direct current third rail generated smoke. The single operator in the lead car received a number of calls on the train intercom. The operator exited the control compartment, stepped onto the catwalk, and walked beside the train to investigate.

Electrical power was removed from the third rail, and most passengers walked to an emergency exit stairway about 350 feet in front of the train that led to the street level. Some passengers had to be assisted in their evacuation by emergency responders. The Chicago Fire Department reported that 152 persons were treated and transported from the scene. There were no fatalities. Total damage exceeded \$1 million.

The National Transportation Safety Board determined that the probable cause of the July 11, 2006, derailment of Chicago Transit Authority train number 220 in the subway in Chicago, Illinois, was the Chicago Transit Authority's ineffective management and oversight of its track inspection and maintenance program and its system safety program, which resulted in unsafe track conditions. Contributing to the accident were the Regional Transportation Authority's failure to require that action be taken by the Chicago Transit Authority to correct unsafe track conditions and the Federal Transit Administration's ineffective oversight of the Regional Transportation Authority. Contributing to the seriousness of the accident was smoke in the tunnel and the delay in removing that smoke.

The Accident

The northbound CTA train number 220 was proceeding normally in a 2° left-hand curve just north of the Clark/Lake station when a blue light alarm indicated a problem as the last car derailed. Postaccident track gage measurements and wheel mark evidence revealed that the left wheel from the last car of the train had dropped from the inner rail of the curve into the gage of the track at CTA station 106+53.

Examination of the derailment site revealed that multiple rail fastener devices (lag screws, rail clip assemblies, and tie plates) for the outer rail in the curve at this location had been corroded, worn, bent, broken, and/or displaced from their associated half-ties and that the rail had moved laterally outward under load. The base of the rail exhibited corrosion in some areas, and the wear pattern on the inner rail of the curve exhibited dark streaks that extended from the center of the railhead outward to the field side (outside) of the railhead surface. This type of dark area indicates that wide gage was present because the wheels were not in full contact with the railhead. The CTA track inspectors responsible for inspecting this area where the derailment occurred had not recorded these wide gage indications. Also, gage measurements on the track near the derailment, but unaffected by the forces of it, showed that the gage was wider than what was allowable for the track speed. In fact, one area of the gage had exceeded 58 inches and, according to CTA Requirement 301, should have been placed out of service.

Abrasion on the tie plates and ties in the area of the derailment showed that before the accident, the rail had been moving laterally as trains passed over that section of the track. Laboratory examination of the broken or displaced rail lag screws and tie plates revealed

significant corrosion. Rubbing of the fracture faces indicated that several lag screws had failed sometime prior to the derailment. Many lag screws showed severe wear in areas where they had contact with the tie plates, and tie plate holes for the fasteners were elongated. In addition, the core samples from the wood half-ties revealed that the wood had degraded and was too soft to adequately hold the lag screws. The CTA's engineering department identified two corrosion mechanisms: corrosion caused by environmental factors, such as water and chlorides found in the track bed, and corrosion caused by the discharge of stray direct current going to ground.

The train stops on each car and the test data from the signal system indicate that the train was traveling at or below the posted speed limit of 25 mph and that excess speed was not a factor. The evidence indicates that lateral forces generated as the accident train moved through the curve forced the outer curve rail outward and fractured or bent the few remaining intact lag screws. The Safety Board concludes that the tie plates and fastener system failed to maintain the track gage because of the effects of corrosion and/or wear on the rails and rail fastener system and degraded half-ties.

CTA Track Inspections

The corrosion and/or wear found on the rails and the fastener system and the degraded (rotten) wood in the half-ties occurred over a long period of time. The investigation focused on why these problems were not identified and repaired before the derailment. Factors examined in detail included the general condition of the system, the inspection environment, the length of territories, training, and oversight.

Condition of the System

The CTA Blue Line was placed into service about 55 years before the derailment, and many of the track components had not been replaced since then. The CTA was aware of the corrosion and wear problems and the degraded half-ties. There was evidence that some maintenance repairs had been performed by the track inspectors north and south of the derailment, but not specifically in the area of the derailment. According to the CTA, the priorities for track maintenance on the Dearborn Subway are to replace the wood half-ties with concrete slabs and replace the rail as necessary; and these maintenance repairs had been made about 1 mile north of the point of derailment. The CTA reports that since the accident larger tie plates and new fasteners have been installed in the area of the derailment; however, no further track work is scheduled. Therefore, the Safety Board believes that the RTA should determine if track safety deficiencies on the CTA's Dearborn Subway in the area of the derailment have been adequately repaired.

Government Oversight

The RTA hired a contractor to conduct the Triennial On-Site Safety Review of the CTA's System Safety Program Plan. The report from the triennial review performed in 2004 listed numerous track maintenance and inspection safety issues that did not prompt any corrective actions, including the following: skewed or twisted track plates (on the

Dearborn Subway) indicating ineffective fasteners that often indicate the existence of wide gage problems; deteriorated half-ties and areas of mud and excessive water on the track structure on the Red and Blue lines; a large number of gage rods indicating large-scale track issues on the Red line; lean levels of track inspection personnel as compared to those of <http://www.snopes.com/photos/animals/polardog.asp> other similar transit systems; and inadequate training of track inspection personnel.

The CTA was aware of these track maintenance and inspection deficiencies; however, most of the track deficiencies identified in the triennial review were still present when the accident occurred, about 18 months after the final report had been issued. The Safety Board is concerned that when asked why the RTA did not follow up on all the track safety issues identified in the triennial review, the RTA representative said that the RTA only follows up on findings in the triennial review and it did not consider these observations to be findings that would warrant further action.

Although the system safety reviews were an important step in identifying dangerous conditions on the CTA transit system, the RTA did not fully utilize its oversight authority. The RTA did not require the CTA to prepare corrective action plans to address all safety conditions identified in its review. Further, the RTA report highlighted positive findings that were inconsistent with the additional observations of serious safety conditions. The Safety Board concludes that because the RTA failed to follow up with the CTA and prompt action to correct safety deficiencies identified in the triennial report, unsafe track conditions continued to exist that should have been corrected. Therefore, the Safety Board believes that the RTA should strengthen its followup action on CTA system safety reviews to ensure that the CTA corrects all identified safety deficiencies, regardless of whether those deficiencies are labeled as “findings,” “observations,” or some other term.

Therefore, the National Transportation Safety Board makes the following recommendations to the Regional Transportation Authority:

Determine if track safety deficiencies on the Chicago Transit Authority’s Dearborn Subway in the area of the derailment have been adequately repaired. (R-07-14)

Strengthen your followup action on Chicago Transit Authority system safety reviews to ensure that the Chicago Transit Authority corrects all identified safety deficiencies, regardless of whether those deficiencies are labeled as “findings,” “observations,” or some other term. (R-07-15)

The Safety Board also issued safety recommendations to the Federal Transit Administration, the State of Illinois, the Chicago Transit Board, and the Chicago Transit Authority. In your response to the recommendations in this letter, please refer to Safety Recommendations R-07-14 and -15. If you need additional information, you may call (202) 314-6177.

Chairman ROSENKER, Vice Chairman SUMWALT, and Members HERSMAN, HIGGINS, and CHEALANDER concurred in these recommendations. Vice Chairman SUMWALT and Member HIGGINS filed concurring statements, which are attached to the Railroad Accident Report for this accident.

[Original Signed]

By: Mark V. Rosenker
Chairman