



National Transportation Safety Board Washington, D.C. 20594

Railroad Accident Brief

Accident No.: DCA-04-FR-005
Transit System: Chicago Transit Authority
Trains: Train 419 and Train 509
Location: Chicago, Illinois
Accident date and time: February 3, 2004, 5:46 p.m.¹
Type of Accident: Rear-end collision
Fatalities/Injuries: 42 minor injuries
Property Damage: \$62,000

Synopsis

On February 3, 2004, at 5:46 p.m., northbound Chicago Transit Authority (CTA) Purple Line train 509 collided with the rear car of standing Brown Line train 419. The collision occurred just north of the Merchandise Mart passenger platform (MART) during the evening rush hour in Chicago, Illinois. The trains were operating in Automatic Train Control (ATC) cab signal territory.² The collision occurred on track that is elevated about 20 feet from street level on a series of open deck bridges. No cars derailed as a result of the collision, but 42 passengers sustained minor injuries. A third train (Brown Line train 422) neared the striking train but stopped short of a second rear-end collision. Weather conditions were clear and dark; the temperature was 18° Fahrenheit.

The Accident

Train 419 departed the MART, and the motorman stopped her train, as required, for a *stop* indication (red cab signal aspect³) with a flashing R-6.4 cab signal aspect.⁴ The

¹ All times are central standard time.

² ATC displays signal aspects and speed limits to the operator in response to track occupancy and track conditions ahead. In addition, it enforces a maximum speed restriction, effecting an automatic brake application whenever the predetermined maximum speed limit is exceeded.

³ In ATC territory, a red signal aspect requires the motorman to stop the train. If the motorman does not respond within 2.5 seconds, the train brakes will apply automatically.

⁴ In ATC territory, R-6.4 is a designation for Rule 6.4, *Train Operation at Signals Displaying "Stop" Indications*. After the train has stopped, the rule requires that if the reason for the stop is a train ahead that can be expected to proceed shortly, the operator must wait for the signal aspect to change to a *proceed*

head end of train 419 had traveled about 842 feet from the MART when it stopped. Shortly after train 419 departed the MART, train 509 entered the MART to pick up and drop off passengers. Radio transmission records indicated that the motorman of train 509 requested permission from the Communication/Power Control Center⁵ to proceed on a R-6.4, but there was no response. Train 509 then departed the MART without authority, with a *stop* indication, a flashing R-6.4 indication on his cab signal control console, and an audible alarm sounding.

The motorman of train 509 told investigators that as he operated the train northward, he diverted his attention to the street below and was distracted by what he believed was going to be a vehicle accident. The motorman stated that when he looked away from the street and toward his direction of travel, his train was about 10 feet from the rear of the stopped train. He said he immediately applied the emergency brakes, but it was too late to stop his train, and the train collided with the rear car of the stopped train. The motorman estimated that the impact speed was about 6 mph.⁶ Train 509 had traveled about 542 feet from the MART when it struck the stopped train. Postaccident testing showed that the rear marker lights of the stopped train were illuminated and that the rear car had about 138 feet of preview.

The third train, train 422, entered the MART immediately after train 509 and departed shortly thereafter. The motorman of this train also departed the MART with a red signal aspect and with a flashing R-6.4 aspect on his cab signal panel. When interviewed, the motorman told investigators that the audible alarm was sounding. The motorman stated that he did not request permission to proceed on a R-6.4. The head end of train 422 had traveled about 113 feet from the MART and about 125 feet from the rear of train 509 before stopping.

Postaccident signal testing showed that when train 419 was stopped at the accident location, both train 509 and train 422 would have had red aspects and flashing R-6.4 aspects displayed on cab signal panels, requiring the motormen to stay at the MART. Employee interviews, signal test results, and the examination of communication records indicate that the motormen of train 509 and train 422 failed to comply with the CTA's requirements for R-6.4.

The Safety Board investigated a similar accident⁷ on the CTA (within a mile of this accident) on August 3, 2001, in which Brown Line train 416 struck the rear car of Purple Line train 505 when the motorman operated his train on a *stop* signal indication

indication. After the train has been stopped for at least 30 seconds, the train operator shall establish communication with the control operator and ask for instructions.

⁵ The *Communication/Power Control Center* is a dispatching location in which all radio and telephone transmissions are received and information is facilitated to appropriate personnel. In addition, information from an Automatic Train Dispatching and Monitoring System (ATDMS) is monitored. The d.c. current for train propulsion is also controlled from this location.

⁶ The CTA does not have an event-recording device on this type of train.

⁷ National Transportation Safety Board, *Two Rear-End Collisions Involving Chicago Transit Authority Rapid Transit Trains at Chicago, Illinois, June 17 and August 3, 2001*, Special Investigation Report NTSB/SIR-02/01 (Washington, D.C. NTSB, 2002)

and a flashing R-6.4 indication on his ATC panel and without authorization from the Communication/Power Control Center.

As a result of the August 3, 2001, accident investigation, the Safety Board determined that the probable cause of the accident “was the failure of the operator of train 416 to comply with operating rules. Contributing to the accident was the failure of the Chicago Transit Authority’s management to exercise operational safety oversight.”

The Safety Board also issued Recommendation R-02-22, which asked the CTA to:

Develop and implement systematic procedures for performing and documenting frequent management checks to ensure all operating personnel are complying with Chicago Transit Authority operating rules, including speed restrictions and signal rules.

The CTA had not responded to the Safety Board’s recommendation at the time of the February 3, 2004, accident. On February 12, 2004, the CTA submitted a list of safety initiatives to the Safety Board for consideration in response to recommendation R-02-22. The letter listed the safety initiatives undertaken since the 2001 Safety Board investigation and also set forth additional actions it will take in light of the February 3 accident. In an April 15, 2004, letter, the Safety Board informed CTA that it had classified Safety Recommendation R-02-22 “Closed–Acceptable Action.”

Work/Rest History

The motorman of train 509 reported to work overtime duty at 6:28 a.m. and was scheduled to work a split shift.⁸ He had worked from 10:00 p.m. to 6:00 a.m. as a switchman before beginning his overtime shift as a motorman. At the end of the first half of the split shift, the motorman had been on duty for approximately 12 hours. He stated that he took about a 3 1/2 hour nap and returned to work at 2:49 p.m. The CTA has an agreement not to schedule back-to-back shift work, but this assignment was not a scheduled position. Because the assignment was offered as a voluntary overtime position, the motorman of train 509 was able to choose to work the back-to-back shifts.

The railroad industry, unlike rail transit as in this accident, has the Hours of Service Act⁹ to limit the number of hours a member of a train or engine crew can work. Railroad employees are required to have 10 consecutive hours off duty if they work 12 hours, the maximum number of hours allowed in consecutive service. If railroad employees work less than 12 consecutive hours, they must have at least 8 consecutive

⁸ The split shift schedule for the motorman of train 509 was: to operate the train from 6:45 a.m. to 9:57 a.m., no work scheduled between 9:57 a.m. and 2:49 p.m., operate the train from 2:49 p.m. to 6:57 p.m.

⁹ The required work and rest periods as discussed here are an example of the more commonly applied aspects of the law. For a complete description of the requirements of the Act, see *The Hours of Service for Railroad Employees*, contained in *Code of Federal Regulations* Part 228.

hours off duty before they come back on duty. The Hours of Service Act is intended to address work-rest cycle problems and lessen the possibility of fatigue.

The motorman of train 509 had a regular work assignment as a switchman;¹⁰ he was scheduled to work from 10:00 p.m. to 6:00 a.m., with Tuesdays and Wednesdays as rest days. The CTA designates both the switchman and the motorman as safety sensitive positions.

For safety sensitive positions in the railroad industry, the motorman would have been required to have time off duty between shifts and would not have been permitted to remain on duty for so long a period of time. The combined effects of limited time available for sleep and prolonged time on duty have been demonstrated to induce fatigue. Studies have shown that fatigue can lead to poor decision-making as well as distraction from operational tasks.

In 2000, the Safety Board investigated two Maryland Transit Administration (MTA) accidents that involved the failure of MTA trains to stop at the designated stopping point at the Baltimore-Washington International Airport. In both cases the train struck a hydraulic bumping post at the end of the track. To address the safety factors affecting both accidents, the Safety Board issued Recommendation R-01-027, which asked rail transit systems to “ensure that your fatigue educational awareness program includes the risks posed by sleeping disorders, the indicators and symptoms of such disorders, and the available means of detecting and treating them.” The CTA senior manager, System Safety and Environmental Affairs, told investigators that the CTA is addressing Safety Recommendation R-01-027 and is also evaluating other conditions that may cause fatigue.

Train Evacuation

There were approximately 1,000 passengers involved in the collision. Of these passengers, the CTA had the names of 483. Forty-two of these passengers sustained minor injuries and were triaged on scene.

Within minutes of the collision, the Chicago Police and Fire Departments responded to the accident site. The battalion chief was the forward commander on the elevated structure; the incident commander was located in the fire department’s command vehicle at street level. As CTA management and other personnel began arriving at the scene, they identified themselves to the battalion chief and assumed that he was the incident commander. This misunderstanding was not immediately corrected and may have contributed to incomplete communication at the scene.

¹⁰ A CTA transit switchman operates railroad switches in an area where railroad cars are sorted and assembled, prepares trains for passenger service, operates non-revenue trains and maintenance equipment, transfers trains from yard to yard, and moves trains to station platforms prior to scheduled departure times.

The passengers were evacuated from the trains and they walked back to the MART. A CTA manager later stated that he would have preferred to keep the passengers onboard the train and evacuate them at a passenger platform. The fiberglass walkway grating between the accident trains and the MART platform was covered in ice and jeopardized the safe evacuation of the passengers.

CTA managers worked with the forward commander and eventually¹¹ moved the trains forward to the Chicago Avenue passenger platform. About 200 of the remaining passengers stayed onboard the trains as they were moved to the platform. By 8:20 p.m., approximately 2 1/2 hours after the accident, all the passengers had been evacuated from the trains.

After documentation of the activities following the collision identified the need for improvement in evacuation procedures, CTA officials met with the Chicago Fire and Police Departments. At this meeting, the CTA agreed to have the appropriate managers trained in incident command. A train evacuation protocol and a CTA communication protocol also were developed with the fire department. A CTA liaison was appointed, and it was agreed that the two agencies would conduct periodic tabletop simulations and continue to have debriefings after major emergencies.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the operator of train 509 to comply with operating rules. Contributing to the accident was inadequate operational safety oversight by Chicago Transit Authority.

Adopted: July 7, 2004

¹¹ The d.c. current for train propulsion was shut off after the accident. Before it could be restored, all personnel had to be clear of the tracks.