



National Transportation Safety Board

Railroad Accident Brief

Collision of Two Chicago Transit Authority Trains

Accident No.:	DCA13FR014
Location:	Forest Park, Illinois
Date:	September 30, 2013
Time:	7:42 a.m. central daylight time
Train:	Unoccupied equipment and southbound train No. 110
Railroad:	Chicago Transit Authority
Property Damage:	\$6.4 million
Injuries:	34
Fatalities:	0
Type of Accident:	Collision

The Accident

On Monday, September 30, 2013, at 7:42 a.m. central daylight time, a set of unoccupied Chicago Transit Authority (CTA) passenger cars collided with CTA passenger train 110 at the Harlem-Congress passenger station in Forest Park, Illinois (See figure 1.). The unoccupied cars were moving about 24 miles per hour when they struck the stopped train. Thirty-three passengers and the train operator were taken to local hospitals and later released. CTA estimated the property damage to be \$6.4 million.



Figure 1: Arrow points to the damaged lead car of passenger train 110.

The lead cars of both the unoccupied cars and the passenger train were damaged (See figure 2.); the wheel of one car derailed (See figure 3.). As a result of the accident, CTA suspended all passenger operations north of the Harlem-Congress Station.



Figure 2: Crumpled lead car of passenger train 110 and minimally damaged striking car.

Northbound Unoccupied Passenger Cars

On Friday, September 27, 2013, a CTA yard leader asked a switchman to move four cars onto the Forest Park yard's 1 West track—which CTA often uses to store equipment in need of cleaning or repair.¹ While preparing to move them, the switchman noticed that one car—one of the two that subsequently caused the accident—had been flagged for repairs. He finished moving the four cars and applied the brake before going on to his next assignment, completing his shift later in the day. When he returned to work about 4:30 a.m. the following Monday, he noticed the four cars were in the same positions where he had left them on Friday.

Southbound Passenger Train No. 110

On Monday, September 30, 2013, southbound train 110 was traveling from Chicago, Illinois, to its final destination in Forest Park. The eight-car passenger train had an uneventful trip, arriving at the Harlem-Congress Station to pick up passengers at 7:41 a.m.

Uncontrolled Equipment Movement

On Monday September 30, 2013, at 7:38 a.m., four unoccupied CTA cars began an uncontrolled movement out of the yard. The switches that had been aligned to move the cars into the yard the previous Friday were still aligned for movement onto the main track, which facilitated the cars' movement onto the southbound main track of CTA's Blue Line.

CTA Blue Line train operations are controlled by track-side and in-cab signals. Several CTA employees saw the uncontrolled cars pass through the Forest Park passenger station. Not realizing the cars were unoccupied, they tried to radio the cars' control operator. Getting no response, they contacted the Blue Line control operator in downtown Chicago. The control operator immediately issued an emergency radio warning to train 110, which was stopped at the Harlem-Congress passenger station.

The Collision

Train 110's operator received the radio warning from the Blue Line control operator less than 1 minute before the cars came into sight. The operator yelled out that a collision was imminent, but he did not have time to use the intercom. Most of the passengers were unable to get off the train before impact. At 7:42 a.m., the unoccupied cars struck train 110.

¹ The CTA yard leader supervises the movement of cars in the yard; the switchman moves the cars.



Figure 3: Derailed wheel and axle of the lead truck on the lead car.

NTSB Investigation

NTSB investigators determined that track conditions did not affect the operation of either the unoccupied cars or train 110. However, investigators found marks on the rails where the cars had been stored on the 1 West track. The marks showed that at least one of the unoccupied cars had been receiving power—causing the wheels to spin—before the cars rolled out of the Forest Park yard (See figure 4.).



Figure 4: Rail mark on 1 West track.

NTSB investigators examined all of the equipment involved in the accident at the accident scene. The unoccupied cars were then moved to a CTA maintenance facility and examined in more detail. After disassembling the control system, investigators found liquid in the control cables of two cars. (See figure 5.) An analysis determined the liquid to be primarily water with minute traces of other elements.

CTA examined all of its rail cars with the same design as the defective cars, but no evidence of liquid was found in the car control systems.

Investigators also examined the data from the data recorders on the unoccupied cars and found that errant control signals were being sent to the power systems of the two cars that had water in the control cables.² These errant control signals instructed the cars' power systems to apply power, move, and stop.

The NTSB examination of equipment records showed the defective cars were not working properly and were being stored on the 1 West track until they could be moved to a facility for troubleshooting and repair. While on the 1 West track, the cars were powered so their interiors could be cleaned by the night cleaning crew.

While the cars were stored on the 1 West track, errant control signals began to instruct the defective cars to move and stop. The cycling between the brake and power modes allowed the

² Data from the damaged cars indicated the cars were cycling between the brake and power modes.

defective cars to overcome the resistance of the two cars that were coupled to them, causing all four cars to move.



Figure 5: Liquid draining from control system cables of unoccupied car. (CTA)

At the time of the accident, CTA had no formal procedures for securing unattended equipment, whether in service or out of service. In all of these cases, CTA depended on a spring loaded brake system—called a parking brake—as the sole mechanism for preventing the equipment from rolling away while unattended.³

NTSB investigators interviewed all CTA employees who had contact with the unattended cars in the days and hours leading up to the time the cars rolled out of the yard. These interviews and the written records supplied by CTA indicated that CTA did not have clear processes in place to secure unattended rail equipment beyond using each car’s parking brake.

The train passed five train stop mechanisms (or automatic trip stops) between Forest Park Interlocking and Harlem-Congress Station.⁴ Physical strike marks, signal data logs, and video recorders verified the train stop mechanisms were in the raised position as the unoccupied cars

³ CTA passenger equipment is equipped with additional power brake systems, but cars must be receiving power for these car braking systems to operate. Unattended equipment would not normally receive power unless a malfunction occurred, as it did in this accident.

⁴ A *train stop mechanism* is a mechanical device that is affixed to the track structure near the running rail. It is in the raised position when the signal displays a “stop” aspect and in the lowered position when the signal displays a “proceed” aspect. If a train passes the train stop mechanism in the raised position, the mechanism will strike a brake side trip arm lever on the side of the car that will place the train in an emergency brake application.

passed. As the five train-stop mechanisms were engaged by the cars, a penalty brake application was initiated. The cars came to a stop, which was the first requirement to recover after a penalty brake application. The cars were initially left unattended in the Forest Park yard with the master lever in the B3 braking position. This was the second condition that needed to be met before a train could recover from a penalty brake application.

Following every penalty brake application, the unoccupied cars came to a stop, but they recovered and continued to move until they struck the stopped train at the Harlem-Congress Station.

Postaccident Actions

On October 4, 2013, the NTSB issued two urgent safety recommendations to the CTA:

R-13-034

Review your operating and maintenance procedures for stored unoccupied cars to ensure the propulsion and brake systems are left in a condition that would not facilitate unintended movement. (Urgent) (Closed—Acceptable Action)

R-13-035

Immediately implement redundant means of preventing unintended rail car movements, such as wheel chocks or a derail device. (Urgent) (Closed—Acceptable Action)

On October 4, 2013, the NTSB issued an urgent safety recommendation to the Federal Transit Administration:

R-13-036

Issue a safety advisory to all rail transit properties asking them to review their operating and maintenance procedures for stored, unoccupied cars to ensure: (1) the propulsion and brake systems are left in a condition that would not facilitate unintended movement and (2) redundant means of stopping unintended rail car movements, such as wheel chocks and/or derails, are used. (Urgent) (Closed—Acceptable Action)

Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was water in the control cables of two cars, which caused errant control signals to be sent to the cars' power systems. Contributing to the accident was the Chicago Transit Authority's practice of not securing unattended equipment.

For more details about this accident, visit www.nts.gov/investigations/dms.html and search for NTSB accident ID DCA FR014.

Adopted: April 13, 2015

The NTSB has authority to investigate and establish the facts, circumstances, and cause or probable cause of a railroad accident in which there is a fatality or substantial property damage, or that involves a passenger train. (49 U.S. Code § 1131 - *General authority*)

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties . . . and are not conducted for the purpose of determining the rights or liabilities of any person.” 49 *Code of Federal Regulations*, Section 831.4. Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report. 49 *United States Code*, Section 1154(b).
