



National Transportation Safety Board
Office of Railroad, Pipeline and Hazardous Materials Investigations
Railroad Division
Washington, D.C. 20594

Crashworthiness Group Chairman's Factual Report

September 7, 2018

A. Accident Information

Train: CSX Transportation local F77703
Train: Amtrak train 91
Location: Cayce, South Carolina
Date: February 4, 2018
Time: 2:27 am EST¹
Number: RRD18MR003

B. Group Members

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Amtrak

¹ Times in this report are Eastern Standard Time.

C. Synopsis

For a summary of the accident, refer to the *Accident Summary* report, within this docket.

D. Details of the Investigation

1. Train Configuration

1.1 CSX Transportation Train F77703

CSX local train F77703 was led by two GE AC440 CW (numbers 130 and 36) designed to meet AAR S-580 *Locomotive Crashworthiness Requirements*. For additional information about CSX train F77703, see the *Mechanical Group Chairman's Factual Report*.

1.2 Amtrak Train 91

The following table shows the type and placement of the equipment in train 91.

Number	Equipment
47	GE P-42
25037	Amfleet II coach
25072	Amfleet II coach
25020	Amfleet II coach
28002	Amfleet II café/lounge car
62012	Viewliner sleeper car
62008	Viewliner sleeper car
61048	Viewliner II baggage car

Table 1- The consist of Amtrak train 91

The Amfleet II coach cars have seats for 59 passengers, and the Viewliner sleeper cars have 16 rooms. There are six emergency egress windows in each Amfleet II coach car. The Viewliner sleeper cars have an emergency egress window in each room. At one end of the car, the Amfleet II and Viewliner cars have a side door on each side of the vestibule. *Passenger Safety Information* cards are in the coach seat pocket and each sleeper room. Each car has light sticks, a fire extinguisher, pry bar, and a first aid kit.

2. Damage Description

The locomotives from CSX train F77703 were examined at the accident site. The Amtrak train was examined at the site before the train was removed from the tracks and after the cars were moved from the site. For this report, the Amtrak equipment is described with reference to the direction of travel of the southbound train. The west side of the train is referred to as the right side, and the east side of the train is referred to as the left side.

Overview

Amtrak train 91 collided head on with standing CSX train F77703. After impact, the front truck of Amtrak locomotive 47 remained on the ground in front of the leading CSX locomotive (number 130). The body of locomotive 47 continued to move forward and rode up and over onto the front and right side of CSX locomotive 130. The CSX train was pushed rearward about 15 feet.

The deck of the Amtrak locomotive twisted 180 degrees and rotated underneath the body of the locomotive. The body of the Amtrak locomotive came to rest on its left side next to the CSX locomotives and about 150 feet past the point of collision. The Amtrak engineer and conductor who were in the locomotive were killed.

At the time of the collision, the conductor of the CSX train was on the right-side walkway of locomotive 130, and he was thrown from the locomotive onto the tracks. The engineer of the CSX train was not on the locomotive.²



Figure 1- A view of the accident site



Figure 2- The front end of locomotive 130

CSX Locomotive 130³

The front coupler was pushed rearward, and the draft pocket was destroyed. Above this area, the deck was bent upward. The collision posts were sheared at the bottom of the posts. The structures surrounding the cab, the cab control stands, and the crew seats were fully displaced from the deck and destroyed. The entire body of the locomotive was pushed and displaced rearward, and the left side was crushed downward. On the right side of the locomotive behind the cab, there was a buckle in the side sill.

² For additional information about the crew of CSX train F77703, see the *Operations Group Chairman's Factual Report*.

³ CSX locomotive 36 was unoccupied and minimally damaged.



Figure 3- The front of locomotive 130



Figure 4- The rear of locomotive 130

Amtrak Locomotive 47

The platform of the Amtrak locomotive twisted 180 degrees and rotated underneath the body of the locomotive. There were impact marks on the front coupler, and the draft pocket was generally intact. The cab area was separated from the platform and completely crushed. The rear of the locomotive body was crushed forward and inward. On the underside of the locomotive, there was buckling of the underframe and scrape marks on exterior components. The fuel tank ruptured.



Figure 5- The underside of locomotive 47



Figure 6- The rear of locomotive 47

Amtrak Coach 25037⁴

The front truck was separated from the carbody and came to rest partially on top of locomotive 47's front truck (see figure 2). The bolster was recovered from the deck of CSX locomotive 130. There were impact marks on the front coupler, and the draft sill was damaged. The rear draft pocket was buckled. The carbody came to rest raised upward next to locomotive 130. Near the second windows (from the front of the car), the carbody was buckled around the circumference of the car.⁵ On the right side, the second window was pushed inward from the sidewall. The collision posts on both ends of the car appeared intact.

Inside of the car, the floor was buckled upward near seats 45/46, 35/36, and 25/26. In the front of the car near the circumferential body buckle, the ceiling and luggage rack fell downward toward the seat headrest level. Seat pair 59/60 was separated from the floor and wall. The seat wall mounts and the floor track were broken.



Figure 7- The left side of coach 25037



Figure 8- Coach 25037 interior (Credit: FRA)

Amtrak Coach 25072

The exterior carbody structure was generally intact. There was slight impact damage to the diaphragm at the front of the car. During the initial on scene examination, the floor lighting was on, and the side doors were open.⁶ The forward interior center door was open, and the rear door was jammed in its pocket.

Inside of the car, there were slight floor buckles about one-third from each end near seats 35/36 and 15/16. The floor mounts for five seat pairs (5/6, 9/10, 41/42, 51/52, and 57/58) were

⁴ This coach car was not occupied at the time of the accident.

⁵ Inside of the car, this buckle occurred near seats 45/46 and 49/50.

⁶ The initial examination began in the early afternoon on February 4.

fractured. An interior emergency window on the left side of the car was removed. There were blood stains on and around seat pairs 59/60, 57/58, 55/56, 53/54, 49/50, and 15/16.



Figure 9- The exterior of coach 25072



Figure 10- Coach 25072 interior

In the vestibule, signage for manual door lock on the side doors was non-luminescent; door release signage was luminescent.

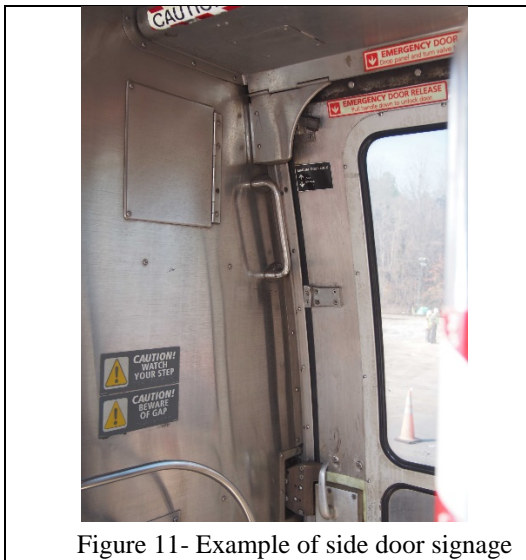


Figure 11- Example of side door signage

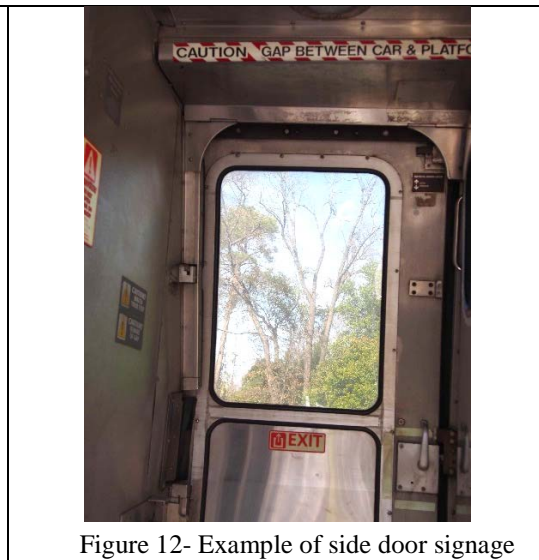


Figure 12- Example of side door signage

Amtrak Coach 25020

The exterior carbody structure was generally intact. There was slight impact damage to the right rear corner of the car. At the time of the initial examination, the right side door was closed, and the left side door was open. The floor lighting was on. Both center interior doors were open.

In the vestibule, signage for manual door lock on the side doors was non-luminescent. Door release signage was luminescent. Inside of the car, there were blood stains on and around seat pairs 23/24 and 43/44.

The floor mounts for seat four pairs (25/26, 51/52, 57/58, and 59/60) were fractured. For seat pairs 37/38 and 41/42, the connections between the seats and tracks were loose. The floor and wall mounts for seat pairs 1/2 and 53/54 were broken.



Figure 13- The exterior of coach 25020



Figure 14 Coach 25020 interior

Amtrak Café 28002⁷

The car came to rest with the carbody bent and separated into two parts. In this position, the distance between couplers was 35 feet. On the right side of the car at the bend, the sidewall was torn fully open. Inside of the car, this opening corresponds to the rear of the service area and front of a seating area. In this area, the loss of occupant space was estimated to be 30% of the car interior.

In the separated area, the center sill collapsed, and the side sills were completely fractured and separated. At the separation, the center sill was bent laterally, and there was longitudinal tearing in the vertical web extending from the separation. Near the front of the car, a repair patch was noted at this location. On the left side of the car, there was slight buckling of the side sill at both ends of the car. No repair patches were noted at these locations.

On the right side of the car, one window was removed, and the pull handle and torn rubber strip were found inside of the car. In the center of the car, the floor was deformed upward near the café service area. At the separation, the seats, tables, overhead lighting, and wall coverings were

⁷ At the time of the accident, the assistant conductor was in this car.

all severely damaged. At the rear of the car, a table support leg was broken from the floor, and the table was connected to its wall support.



Figure 15- The exterior of car 28002



Figure 16- The rear section of car 28002 post recovery (Credit: FRA)

Amtrak Coach 62012

The exterior carbody structure was generally intact. There was slight impact damage to the front left corner of the car. The front coupler shank was fractured behind the coupler head. Outside of Room B, a ceiling panel was dropped down, and its release mechanism was broken. A mirror in Room B was broken. Outside of Room H, three ceiling panels were dropped down, and the release mechanism was broken on one panel. In the rooms, cushions and linens were tossed around, and there was no evidence of injury (such as blood) found.



Figure 17- The exterior of sleeper 62012



Figure 18- An example of dropped ceiling panels

Amtrak Coach 62008

The exterior carbody structure was generally intact. Inside of the car in a walkway, a segment of low level lighting strip was dislodged and upside down. In the center aisle, two overhead panels were dropped downward, and one panel did not have its safety strap connected. In the service area, the coffee pot and coffee grounds were found on the floor. In the rooms, cushions and linens were tossed around, and there was no evidence of injury (such as blood) found.

Investigators tested three emergency windows in this car. Inside of Room A, the rubber pull strip separated from the handle next to the securement cable. Two windows outside of Room B were tested. For one window, the rubber pull strip separated from the handle next to the securement cable. For a second window, the rubber pull strip did not separate.



Figure 19- The exterior of car 62008 and the baggage car



Figure 20- An example of an emergency window test

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