



National Transportation Safety Board

Railroad Accident Brief

Collision between Two Freight Trains, Barton County, Missouri, July 21, 2012

Accident No.:	DCA12FR007
Location:	Barton County, Missouri
Date:	July 21, 2012
Time:	3:30 p.m. central daylight time
Trains:	Kansas City Southern Railway Company train QSHKC20 and BNSF Railway train EMHSEBM088
Railroads:	Kansas City Southern Railway Company and BNSF Railway
Property Damage:	\$7.75 million
Injuries:	2
Fatalities:	0
Type of Accident:	Side Collision

On July 21, 2012, about 3:30 p.m. central daylight time, Kansas City Southern Railway Company (KCS) freight train QSHKC20 collided with the side of BNSF Railway (BNSF) freight train EMHSEBM088 at a railroad crossing near Arcadia, Kansas.^{1,2} Figure 1 shows the accident site.



Figure 1. The accident site.

¹ Unless otherwise noted, all times are central daylight time.

² Although the accident was in Barton County, Missouri, the closest municipality to the accident site is Arcadia, Kansas.

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At the time of the collision, the BNSF train was traveling about 35 mph and the KCS train was traveling about 31 mph. The temperature at the time of the accident was 92°F and the weather was clear. Figure 2 shows the wreckage.



Figure 2. The accident wreckage.

Both KCS crew members jumped from the lead locomotive prior to the collision and were injured. One was treated and released from the hospital, the other was kept in the hospital overnight and released the following day. The two BNSF crew members were not injured. Estimated damages were \$7.75 million.

The railroad crossing at Arcadia is an automatic crossing. The system is designed to allow the first train that arrives at the crossing to receive a proceed signal if the other track approach sections are unoccupied. Any train arriving later on the other railroad receives a stop signal until the first train clears the railroad crossing.

The northbound BNSF train departed Springfield, Missouri, at 12:45 p.m. on July 21, 2012. As the train approached the Arcadia railroad crossing, the train crew received an approach diverging signal, indicating that the train would be proceeding into the passing siding track located immediately north of the crossing. The BNSF crew stated they noted nothing unusual as they approached and passed through the railroad crossing.

The northbound KCS train departed Pittsburg, Kansas, at 3:10 p.m. on July 21, 2012. The train crew told NTSB investigators they had an uneventful trip until approaching the wayside signal at the South Mulberry siding switch, located at milepost (MP) 118.4. The KCS train was traveling about 52 mph as it approached the signal at the South Mulberry siding. The KCS train crew received a flashing yellow signal aspect, requiring the train crew to proceed on the main track and to reduce the train speed to 35 mph before reaching the next signal. However, it was determined by NTSB investigators that the train did not reduce speed, but continued north at a speed of about 52 mph.

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About 2 miles farther north, at the North Mulberry siding switch, the KCS train received a continuous yellow signal aspect, requiring the crew to immediately reduce the train speed to 35 mph and prepare to stop at the next signal. NTSB investigators determined that the KCS train was moving about 45 mph when passing the yellow (approach) signal.

About one-half mile farther north, the crew of the KCS train saw that the signal controlling movement over the railroad crossing displayed a red (stop) signal aspect. Immediately after recognizing the red signal, the KCS train crew saw the BNSF train pass through the railroad crossing and the KCS engineer placed the train air brakes into an emergency air brake application. Both KCS crewmembers exited the lead locomotive control cab and jumped from the train prior to the collision, receiving minor injuries. Figure 3 shows the view from the forward-facing video camera of the KCS train immediately prior to impact.



Figure 3. View from forward-facing video camera of KCS train.

NTSB investigators determined that the KCS train was traveling about 42 mph when the emergency air brake application was made, and collided with the BNSF train at a speed of 31 mph.

During the postaccident investigation, NTSB investigators observed the accident site at the same time of day as when the accident occurred, under similar weather conditions. Visual observations were made from all directions approaching the railroad crossing, and exemplar rail equipment was used to conduct sight distance tests on all approaches to involved signals (see table).

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Table. Sight Distance Test Observations.

Signal	Indication or Aspect	Distance Aspect was Identified
South Mulberry	Medium approach (flashing yellow)	Engineer: 1,365 feet Conductor: 1,335 feet
North Mulberry	Approach (yellow)	Engineer: 9,010 feet Conductor: 9,010 feet
Home (at railroad crossing)	Red (stop)	Engineer: 3,140 feet Conductor: 1,939 feet

Signal system tests were also conducted on approaches involving both the BNSF and KCS trains. In all cases, it was found that the signal systems operated as intended. Recorded data on all signal systems were also analyzed, which confirmed that the signal systems operated as intended.

Investigators examined all undamaged rolling equipment, as well as mechanical records for the movement of both trains. No mechanical defects were found.

Both trains were authorized to occupy the main track by the signal indications of a traffic control system. The BNSF traffic control system was controlled by a train dispatcher located in Fort Worth, Texas, and the KCS traffic control system was controlled by a train dispatcher located in Kansas City, Kansas.

Records of the portable electronic devices of the crewmembers of both trains involved in the accident were acquired and reviewed. The records showed that no calls or text messages were sent or received by crewmembers of either train during the times when the trains were being operated.

After the accident, toxicological tests were performed on the crewmembers of both trains. The tests for alcohol and illegal drugs were conducted in accordance with Title 49 *Code of Federal Regulations* (CFR) Part 219, Subpart C. All of the test results were negative.

The KCS engineer and conductor had been on duty for less than 2 hours and both indicated they felt very alert at the start of their shift. They said they had received the amount of sleep they needed to feel rested during the 3 days leading up to the accident. Neither crewmember had been diagnosed with a sleep disorder.

Positive Train Control

Had a positive train control (PTC) system been installed on the involved tracks, the collision would have been prevented. The system would have intervened by activating an audible warning in the lead locomotive cab, alerting the train crew of the over-speed condition. The PTC system could also have initiated an automatic brake application to stop the train before the point of collision.

Previous NTSB Investigations

Goodwell, Oklahoma

On June 24, 2012, at 10:02 a.m., two Union Pacific Railroad (UP) freight trains collided head on while operating on straight track on the UP Pratt subdivision near Goodwell, Oklahoma.³ The collision derailed 3 locomotives and 24 cars of the eastbound train and 2 locomotives and 8 cars of the westbound train. The engineer and the conductor of the eastbound train and the engineer of the westbound train died. The conductor of the westbound train jumped to safety. During the collision and derailment several fuel tanks from the derailed locomotives ruptured, releasing diesel fuel that ignited and burned. Damage was estimated at \$14.8 million.

The NTSB determined that the probable cause of this accident was the eastbound UP train crew's lack of response to wayside signals because of the engineer's inability to see and correctly interpret the signals; the conductor's disengagement from his duties; and the lack of positive train control (PTC), which would have stopped the train and prevented the collision regardless of the crew's inaction. Contributing to the accident was a medical examination process that failed to decertify the engineer before his deteriorating vision adversely affected his ability to operate a train safely.

Mineral Springs, North Carolina

On May 24, 2011, about 3:35 a.m. eastern daylight time, a northbound CSX Transportation (CSX) freight train was traveling about 48 mph on a single main track when it struck the rear of another northbound CSX freight train, which was stopped on the main track near Mineral Springs, North Carolina.⁴ The struck train was stopped at a red signal, located at milepost (MP) 313.7 near Mineral Springs, waiting for yet another northbound train on the track ahead to proceed. In this accident, two locomotives and the first nine cars of the striking train and the last four cars of the struck train derailed. The two crewmembers of the striking train died, and the two crewmembers of the struck train were treated for minor injuries. Property damage was estimated to be \$1.6 million.

The NTSB determined that the probable cause of this accident was the failure of the striking train crew to comply with the speed restriction required when they encountered a dark signal. Contributing to the accident was the lack of a PTC system that could have prevented the accident.

³ National Transportation Safety Board, *Head-On Collision of Two Union Pacific Railroad Freight Trains Near Goodwell, Oklahoma, June 24, 2012*, RAR-13/02 (Washington, DC: National Transportation Safety Board, 2013).

⁴ National Transportation Safety Board, *Collision of Two CSX Transportation Freight Trains, Mineral Springs, North Carolina, May 24, 2011*, RAB-13/01 (Washington, DC: National Transportation Safety Board, 2013).

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Westville, Indiana

On January 6, 2012, at 1:18 p.m., westbound CSX freight train Q39506 struck the rear of standing westbound CSX freight train K68303 on track 2 at MP 224.5 near Westville, Indiana. The crew of train Q39506 had just escaped the locomotive, which had derailed on its side onto track 1, when CSX westbound freight train Q16105, operating on track 1, struck the derailed locomotive. The derailed equipment from both collisions included the last 7 cars of train K68303, both locomotives and 6 cars of train Q39506, and all 3 locomotives and 12 cars of train Q16105. Spilled diesel fuel from the locomotives caught fire. The engineer and conductor of train Q39506 were injured and transported to a local hospital. The estimated damage was \$5 million.

The NTSB determined that the probable cause of this accident was the failure of the crew of train Q39506 to maintain vigilant attention to wayside signals, communicate effectively, avoid distractions from prohibited text messaging, and comply with the speed restrictions required by the railroad signal system. Contributing to the accident was the lack of a PTC system that would have stopped the train and prevented the collision, regardless of the crew's inaction.

All of these accidents are similar to the accident at Barton County, Missouri. In each case, train crews failed to comply with signal indications that restricted the operation of their train. More significantly, there was a failure on the part of the train crews to maintain vigilance. In all cases, there was no system to automatically reduce the speed of the train as it encountered less-than-clear signal indications. Additionally, the crews failed to provide redundant safety measures which could have prevented the accident, despite each crew consisting of two people.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the train crew of Kansas City Southern Railway Company freight train QSHKC20 to comply with trackside signal indications. Contributing to the accident was the lack of a positive train control system that could have stopped the train, thereby preventing the accident.

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For more details about this accident, visit www.nts.gov/investigations/dms.html and search for NTSB accident ID DCA12FR007.

Adopted: July 3, 2014

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*)
