



National Transportation Safety Board

Washington, D.C. 20594

Railroad Accident Brief

Accident No.: DCA-06-FR-006
Location: Arcola, Louisiana
Date: June 26, 2006
Time: 3:25 p.m. central daylight time¹
Railroad: National Railroad Passenger Corporation and CN railroad
Property Damage: \$2,500
Injuries: 9
Fatalities: None
Type of Accident: Track misalignment leading to train passenger injuries

The Accident

About 3:25 p.m. on June 26, 2006, National Railroad Passenger Corporation (Amtrak) train PO5871-26, en route from New Orleans, Louisiana, to Chicago, Illinois, and operating over CN railroad (CN) main line track, encountered a section of misaligned track near Arcola, Louisiana. (See figure 1.) The train was traveling about 67 mph when the engineer said he saw that the track ahead was misaligned by about 2 feet to the east. He made an immediate full service brake application,² and although the train negotiated the area without derailing, the misaligned track caused passengers to be jostled about in the cars. Nine of the train's 104 passengers reported injuries at the scene, and 4 were transported to a local hospital where they were treated and released. None of the 10 Amtrak employees aboard the train was injured.

Site Inspection

The accident occurred on single north-south main line track of the CN's McComb Subdivision near a recently installed left-hand turnout³ leading to an industrial track. Both the main track and turnout consisted of continuous welded rail⁴ on wooden ties.

¹ All times in this brief are central daylight time.

² A *full service brake application* is the maximum amount of braking available without activating emergency braking.

³ A *turnout* is an arrangement of track work that, through use of a switch, allows a train to be diverted from one track onto another.

⁴ *Continuous welded rail* is rail that has been welded together into lengths exceeding 400 feet.



Figure 1. Looking south along the section of misaligned track encountered by the Amtrak train.

Postaccident inspection revealed that the turnout had “kicked-out”⁵ of alignment before the arrival of the Amtrak train. Measurements taken along the entire length of the turnout revealed that at some points the track was misaligned (deviated from its intended geometry) eastward by more than 25 inches. Crewmembers of a southbound train that had crossed the turnout before the northbound Amtrak train said they did not note anything remarkable as they traversed the turnout while traveling about 60 mph.⁶

Events Preceding the Accident

Installation of the Turnout

The turnout had been installed on April 12, 2006, about 2 1/2 months before the Amtrak accident. The assembly was 124 feet long and consisted of three pre-built sections that had been welded together to form a single unit (track, crossties, and attaching components). Installation of the turnout consisted of cutting out and removing a 124-foot-long section of the main line track and replacing it with the pre-assembled turnout.

⁵ This track *kick out*, or track misalignment, is commonly referred to as a *thermal kink* or *sun kink*.

⁶ Typically, a misalignment will occur under the rear portion of a train and will be encountered by the next train.

The track supervisor responsible for overseeing installation of the turnout stated that when the first cut was made in the main line rail, the rail contracted, opening a 3/4-inch gap at the site of the cut.⁷ When all four cuts had been made, track crews removed the main line track panel as a unit and graded the track roadbed in preparation for installation of the turnout.

The track supervisor said that when the crew attempted to install the turnout in the void left by removal of the main track panel, they found that the turnout track section was about 3/4 inch too long for the void. Measurements confirmed that during the time that had elapsed between the cutting of the main line rail and the attempted installation of the turnout, the main line rail had expanded by the amount (3/4 inch) it had initially contracted. The track crew then made saw cuts to remove an additional 3/4 inch of main line rail, which allowed for the installation of the turnout and the subsequent welding of the turnout rails to the rails of the main line.

When the turnout was put in place, the rail temperature was recorded as 55° F. A little later, at the time the turnout track was welded to the main track, the rail temperature (as marked at the time on both rails) was 72° F.⁸ According to the CN, the company's preferred rail-laying temperature in the United States is 105° F.⁹ In a typical main line continuous welded rail installation, rail that is installed at temperatures below the preferred temperature is "de-stressed" to compensate for the expansion that will occur when the temperature rises.¹⁰ But because CN procedures did not, at that time, permit de-stressing of rail within 200 feet of a turnout, the main track rails were not de-stressed properly at the time the turnout was installed.¹¹

Once the turnout was in place and welded, ballast was applied, and the track and roadbed were resurfaced. The track supervisor said that after the installation was complete, a speed restriction was ordered for that track section. He said that the speed restriction remained in effect for about 2 days, until about 100,000 tons of train weight had traversed the main line across the turnout.¹²

⁷ Railroad rail expands and contracts with changes in ambient temperature and under varying load and traffic conditions. The opening of a gap when the rail was cut indicates that the rail had been under tension (stretched) when the cut was made.

⁸ The reported ambient temperature at the time of the Amtrak accident was 94° F. Rail temperatures recorded the following day ranged from 76° F at 8:30 a.m. to 136° F at 3:24 p.m.

⁹ The *preferred rail laying temperature* (also referred to as the *rail neutral temperature*) is the temperature at which a rail is neither in tension nor compression.

¹⁰ *De-stressing*, in this instance, usually involves removing the anchors from a section of rail, cutting and removing a small rail section; heating or "pulling" one of the rail ends to introduce tension if necessary; welding the cut rail ends together; and reinstalling the anchors.

¹¹ This restriction was based on a concern that the use of a hydraulic rail puller to "stretch" the rail (introduce tension) too close to a turnout could damage or cause a misalignment of the turnout switch components.

¹² Between the time the turnout was installed in April and the time of the Amtrak accident, the industry track at the site had not been placed in service, and no trains had been diverted onto it through the turnout.

Previous Reports of Track Misalignment at the Turnout

Misaligned track at the turnout was reported twice in the weeks preceding the Amtrak accident, first on May 24, 2006, and again on May 29, 2006. The track supervisor stated that the misalignment reported on May 24 started at the head block switch ties¹³ and continued approximately 19 feet south of the switch points. He said that the misalignment was between 1 1/2 and 2 inches. He stated that the turnout was realigned with a backhoe and tamped; the ballast shoulder was moved back against the tie ends; and the rail was de-stressed. The de-stressing consisted of removing 1 inch from the east rail at a point 882 feet south of the turnout switch points and 1 inch from the west rail at a point 878 feet south of the turnout switch points.

On May 29, the track supervisor received the second report of a track misalignment at the same location. He said it was in the late afternoon when he received the report, and by the time he arrived at the site it was dark and the rail had cooled. He said he had a backhoe operator make the alignment adjustments and placed a temporary speed restriction of 25 mph on the turnout. The switch was not tamped, but the ballast was moved back against the tie ends.

The following morning, May 30, the track supervisor sent out a track maintenance team to de-stress the rail again. The crew removed an additional 1/2 inch of rail at the site of the previous de-stressing cuts (more than 800 feet south of the turnout) and welded the rail.

The track supervisor said that after the crew completed the cuts and welds south of the turnout, he determined that rail also needed to be removed from the track north of the turnout. The crew removed 1 3/4 inch of rail from the east rail at a location 372 feet 7 inches north of the point of the turnout switch and then welded the rail back together. The next day, May 31, the crew removed 1 1/8 inch of rail from the west rail at a location 379 feet 11 inches north of the point of the turnout switch and then welded the rail.

The track supervisor was asked why, if the rail misalignment was presumed to be occurring because of the added turnout, the de-stressing took place so far from it. He answered that he decided to go farther south because of the need to stay at least 200 feet from the turnout as well as because the track south of the turnout also needed de-stressing. He said he did not realize that the distance between the turnout and the de-stressing location exceeded 800 feet, which was too far away to prevent alignment deviations at the turnout when heat caused the rail to expand.

Postaccident Actions

During the investigation of this accident, the CN regional chief engineer reviewed the CN's procedures for de-stressing continuous welded rail. As a result of that review, the CN modified its procedures to require that specific actions be taken to de-stress rail for a distance of 200 feet on either side of a newly installed or rebuilt turnout or grade crossing.

¹³ The *head block switch ties* are the two long switch ties on which the switch stand is mounted.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the June 26, 2006, accident near Arcola, Louisiana, involving Amtrak train PO5871-26 was a heat-induced track misalignment that resulted because CN railroad's continuous welded rail procedures failed to ensure that rail was adequately de-stressed during or after the installation of a turnout.

Adopted: December 21, 2006