



# National Transportation Safety Board

Washington, D.C. 20594

## Railroad Accident Brief

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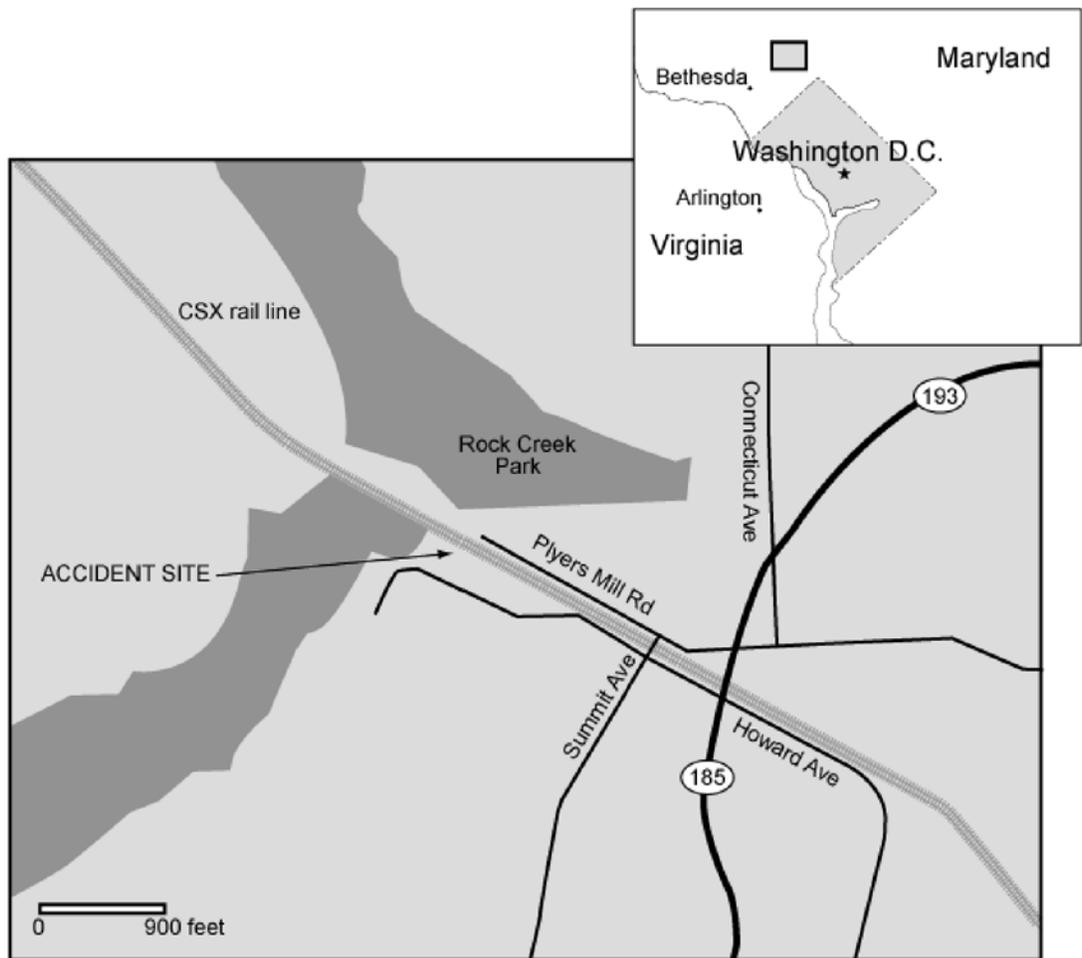
Accident Number: DCA-02-MR-005  
Location: Kensington, Maryland  
Date and Time: July 29, 2002, 1:55 p.m.  
Accident Type: Derailment  
Companies: CSX Transportation  
National Railroad Passenger Corporation (Amtrak)  
Injuries: 95  
Fatalities: None

### Synopsis

About 1:55 p.m., eastern daylight time, on July 29, 2002, eastbound National Railroad Passenger Corporation (Amtrak) train No. 30, the *Capitol Limited*, derailed on CSX Transportation's (CSXT's) Metropolitan Subdivision at milepost 11.78 in Kensington, Maryland. (See figure 1.) The train had originated in Chicago and was en route to Washington, D.C. The train comprised 2 locomotives and 13 cars and was moving at 60 mph on tangent (straight) track in the area of the derailment. Eleven cars derailed. Of the 164 passengers and 13 Amtrak crewmembers on board, 14 passengers and 2 Amtrak crewmembers received serious injuries. An additional 71 passengers and 8 Amtrak crewmembers sustained minor injuries. Estimated damages exceeded \$14.3 million. The weather was clear and sunny, with temperatures reaching a high of 96° F.

### The Accident

Amtrak train No. 30 departed Chicago at 7:00 p.m. on July 28, 2002, en route to Washington, D.C. Before departure, the train was given a successful Federal Railroad Administration class 1 brake test and a pre-departure equipment inspection. The train make-up out of Chicago was the same as at the time of the accident except for a material handling car and an express car that were replaced in Toledo, Ohio. The train and engine crews involved in the accident had boarded the train in Pittsburgh, Pennsylvania.



**Figure 1.** Accident Location – Kensington, Maryland (Montgomery County).

The engineer told investigators that as the train exited a curve just west of milepost 11.78, he observed a misalignment<sup>1</sup> in the tangent track ahead. The engineer estimated the track misalignment to be about 18 inches to the right. Although the locomotives passed over the track defect without derailing, 11 of the following cars of the train derailed and departed the roadbed to the north and south. The derailed cars included one baggage car, three sleepers, one diner, four coaches, and two mail-handling cars. Of the derailed cars, two sleepers, one coach, and a diner came to rest on their sides.

According to event recorder data, the engineer made an initial application of the train air brake system about 1,150 feet before the derailment. The engineer briefly increased the service brake application before placing the brake handle in emergency. The event recorder data indicated that a separation in the train line (due to the derailment) had initiated an emergency brake application just before the engineer placed the brake

<sup>1</sup> A *misalignment* occurs when the rails make a relatively abrupt deviation from the track center line either along straight track or in a curve.

handle in emergency. The train's locomotives came to a stop about 400 feet beyond the point of the emergency brake application.



**Figure 2.** View of wreckage looking south.

## Track Description

The derailment occurred on the CSXT Transportation's Metropolitan Subdivision of the Baltimore Service Lane on No. 1 main track in double main track territory at milepost 11.78. The main tracks were parallel, with No. 1 main track on the north side and No. 2 main track on the south side.

Both main tracks were bi-directional. Typical daily train counts were 22 passenger trains<sup>2</sup> per day Monday through Friday and 2 passenger trains per day on weekends. In addition, approximately 15 freight trains operated each day. The train traffic for the 12-month period between July 1, 2001, and June 30, 2002, accounted for an annual gross tonnage of 59.63 million tons.

The tracks were oriented, both geographically and by timetable, in a westward to eastward direction. The milepost numbering decreased in the eastward timetable

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<sup>2</sup> Maryland Transit Administration's Maryland Rail Commuter (MARC) trains also use the CSXT tracks in this area.

direction. The main tracks had a maximum allowable operating timetable speed between milepost 10.6 and milepost 12.2 (which included the point of derailment) of 70 mph for passenger trains and 55 mph for freight trains. The accident train was restricted to 60 mph because of a speed-restricted mail-handling car at the rear of the train.

## Preaccident Events

On July 25, 2002, 4 days before the derailment, a track surfacing team was assigned to smooth the track profile between mileposts 11.8 and 11.5. The track equipment used for this project was a Fairmont Mark IV tamper and a Kershaw ballast regulator, each with an operator. The tamper operator said he had surfaced approximately 400 feet of track with a 1 1/2-inch track increase in elevation when the tamper experienced mechanical difficulties that rendered it unusable. No track foreman was directly assigned to the tamping crew; however a CSXT track inspector<sup>3</sup> who was in the area to help transport the track maintenance equipment responded to assist the surfacing crew.

Before leaving the job site, the surfacing crew had to make a gradual transition of the track from the raised portion down to the level of the undisturbed portion of track. This area of track is referred to as a “run-off.” With the tamper unusable, the track crew had to tamp the track by hand, using track tools to manually force ballast under the ties.

The track inspector said he was uncertain as to the amount of run-off to be tamped and relied on the tamper operator’s discretion and experience. Investigators learned that the tamper operator was not qualified to inspect track or supervise certain renewals/repairs as a track foreman under 49 *Code of Federal Regulations* (CFR) 213.7. The track inspector was listed as qualified under 49 CFR 213.7, but investigators found that he was not familiar with the regulations governing the required minimum length of run-off. He was also unfamiliar with CSXT *Engineering Department Field Manual Standards* in regard to their required length of run-off. The minimum run-off distance for a 1 1/2-inch change in track elevation is 31 feet by Federal regulations and 150 feet by CSXT engineering standards.

The crew hand-tamped one side of the portion of the tie that extended beyond both rails for a distance of approximately 15 crossties, providing a run-off of about 25 feet. This runoff was 6 feet short by minimum Federal requirements and 125 feet short by CSXT standards.

In hand-tamping the run-off, the tamping crew and the track inspector did not measure the length of track for the run-off and did not use a string line, the required method of ensuring a correct and consistent taper to the existing track. They placed a jack under each rail of the track then raised the track and “eyeballed it” for a smooth run-off.

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<sup>3</sup> This track inspector was also a track foreman.

After the track was raised with a track jack, they tamped one side of the tie on the outside of the rail. When the track was raised 1 1/2-inches, there would be a void in the ballast under the tie. The ballast void exists for the entire length of the tie, but maintenance practices primarily focus on the areas nearest the rails. Because the greatest tie loading occurs under the rails, tamping must be done in the rail support area from the end of the tie to a point 13 inches inside the rail. During Safety Board interviews, the CSXT track inspector stated that, in the area of the track jack, the crew cross-tamped the tie on the inside of the rail. CSXT maintenance practices stipulate that the proper method for tamping run-off is “cross-ramming.”<sup>4</sup>

The surfacing team that was responsible for the track maintenance worked with a local section foreman who was responsible for coordinating communications between the surfacing team, a tie replacement team that was working farther east, and approaching train traffic. The section foreman had positioned himself on a bridge half way between the two work sites so that he could communicate with both work teams and with approaching trains. Because the section foreman was not actually at the work sites at the time the work was being accomplished, he had little knowledge of how the work was being done.

The section foreman inspected the track after the track inspector and the surfacing team had made the run-off. Both he and the tamper operator told investigators that the track condition was good for only 25 mph and that their intention had been to return the following day to complete the surfacing operation. The section foreman placed a 25 mph slow order, code 141 (“Ballast Compacting After Surfacing”<sup>5</sup>), which denoted that the track work was complete and that only compaction by train traffic was needed for the slow order to be removed. The slow order should have been code 140 (“Surfacing Team”), indicating that the surfacing job was not complete. Although the crew was scheduled to return to the site the next day to complete the resurfacing, they did not do so because they had to deal with the effects of a landslide at another location.

The track inspector said he understood that the tamping machine was scheduled to return the following day to finish tamping the track, and he was subsequently aware that it did not return to complete the job. The track inspector did not work on July 27, which was a Saturday. Because of high ambient temperatures, the track inspector did go to work at about 11:00 a.m. on Sunday, July 28, to conduct a special track inspection for buckled track due to heat expansion. During this track inspection, he inspected the run-off area by checking the crosslevel (the distance one rail is higher or lower than the other), dimensions, and alignment. The track inspector told investigators that when he inspected

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<sup>4</sup> *Cross-ramming* is a railroad term for the proper method of hand-tamping. To secure the utmost in compaction and interlocking of the ballast particles under the ties, eight-point tamping is required; that is, each side of the tie outside and inside the rail is tamped by persons working opposite each other in pairs.

<sup>5</sup> *Ballast Compacting After Surfacing* means that, on high-tonnage tracks, speed shall not exceed 25 mph until at least 6:00 p.m. on the day that 10 tonnage trains (a train of at least 5,000 gross tons) have passed over the track after the ballast section has been returned to standard.

the track in the area of milepost 11.78, the surface appeared to be without problems and was essentially the same as it had been on the day it was surfaced.

However, this segment of track was unstable because the efforts to surface this area of track involved raising the track. Raising the track from the roadbed breaks the restraining bond of the ties and the ballast, which allows the rail to expand or contract due to the lack of ballast compaction, the location of the track segment,<sup>6</sup> the length of run-off, and high rail temperature.<sup>7</sup> Failure to properly adjust rail that has been disturbed may result in a track buckle when rail temperature becomes high enough that thermal expansion and movement of the rail are so great that the track structure cannot be restrained.

The track inspector estimated that by that time, 10 tonnage trains had traversed the area in compliance with code 141, since the run-off was made on July 25. He therefore, at 6:00 p.m. on July 28, removed the slow order, thus allowing a maximum speed of 55 mph for freight trains and 70 mph for passenger trains. CSXT officials told Safety Board investigators that if the section foreman had placed a 25-mph speed restriction with a slow order code of 140, the track inspector would probably have realized that more work was required and would not have removed the slow order.

## **Actions Taken Since the Accident**

In conjunction with CSXT's response to the April 18, 2002, Amtrak Auto Train derailment in Crescent City, Florida,<sup>8</sup> and to prevent a reoccurrence of failures, CSXT has, since this accident, implemented a number of revisions to its track surfacing policies, procedures, and training. Such revisions include the following:

- Specific employees have been designated to inspect track as a way of establishing additional checks and controls on surfacing work. An officer of at least roadmaster grade will immediately inspect every area that has been surfaced by a surfacing team since April 1, 2002. These inspections will assess quality of the work, completeness of the work, and compliance with CSXT policies. If any track is found not to be in compliance, action will be taken to bring it into compliance.

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<sup>6</sup> The area of the run-off was near the bottom of a grade section that is a vertical curve. With milepost numbering decreasing in the eastward direction, between milepost 12.2 and milepost 11.79, the track descended 0.74 percent, and between milepost 11.79 and milepost 11.3, the track grade ascended 0.83 percent. The P.O.D. was located at milepost 11.78.

<sup>7</sup> The rail temperature is a combination of the ambient temperature and the warming of the rail due to direct sunlight. The rail temperature was measured as 124 degrees Fahrenheit at 2:00 p.m. at Kensington.

<sup>8</sup> National Transportation Safety Board, *Derailment of Amtrak Auto Train on the CSXT Railroad Near Crescent City, Florida, April 18, 2002*, Railroad Accident Report NTSB/RAR-03/02 (Washington, D.C.: NTSB, 2003).

- Track foreman are required to make periodic inspections during ballast regulation operations. All surfacing teams will consist of a minimum of one foreman and two machine operators
- Foreman and machine operators must make inspections daily, or when the rail height changes, to ensure that tamping tools are maintained and adjusted. If a tamper malfunctions during surfacing operations in a manner that adversely affects the quality of the raising, aligning, or ballast compaction, the following actions are required:
  1. A temporary run-off of super-elevation or track raise appropriate to the temporary speed restriction will be made.
  2. The track will be protected by a temporary speed restriction not exceeding 25 mph. Use Reason Code 140 (“ Surfacing Team”).
  3. Before this temporary speed restriction is removed, the entire limits of the affected area (including the entire curve) must be checked and, if necessary, reworked using a fully functioning tamper to ensure that the quality of the line and surface is consistent with CSXT standards. Some examples of applicable malfunctions are ineffective tamping tools, lifting, lining or slewing component problems, as well as measurement and data system component problems.
- Roadmasters are responsible for monitoring any track movement, using monument dimensions, periodically for up to 15 days after track surface work has been completed.
- Surfacing team supervisors are to ensure that various reports, including track disturbance reports, are completed and submitted by established deadlines.
- New surfacing team training has been developed and presented to include additional information regarding speed restrictions, super-elevation, track alignment, graphing curves, neutral rail temperature control, and maintenance equipment utilization.

## **Probable Cause**

The National Transportation Safety Board determines that the probable cause of the July 29, 2002, derailment of Amtrak train No. 30, the *Capital Limited*, in Kensington, Maryland, was (1) the failure of the track surfacing crew to adequately tamp the ballast and accomplish a proper run-off, leading to an unstable condition and buckled track, (2) an incorrect slow order code indicating that the work was complete when it was not, and (3) inadequate CSX Transportation oversight of track maintenance work on this section of track.

**Adopted: May 28, 2004**