
# *Federal Railroad Administration*
# *Office of Safety*
# *Headquarters Assigned*
# *Accident Investigation Report*
# *HQ-2006-24*

## *CSX Transportation (CSX)*
## *Richmond, Virginia*
## *April 22, 2006*

***Note that 49 U.S.C. §20903 provides that no part of an accident or incident report made by the Secretary of Transportation/Federal Railroad Administration under 49 U.S.C. §20902 may be used in a civil action for damages resulting from a matter mentioned in the report.***

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

# FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # HQ-2006-24

| | | |
|---|---|---|
| 1.Name of Railroad Operating Train #1: CSX Transportation [CSX ] | 1a. Alphabetic Code: CSX | 1b. Railroad Accident/Incident No.: R000022015 |
| 2.Name of Railroad Operating Train #2: N/A | 2a. Alphabetic Code: N/A | 2b. Railroad Accident/Incident: N/A |
| 3.Name of Railroad Responsible for Track Maintenance: CSX Transportation [CSX ] | 3a. Alphabetic Code: CSX | 3b. Railroad Accident/Incident No.: N/A |
| 4. U.S. DOT_AAR Grade Crossing Identification Number: | 5. Date of Accident/Incident: Month 04 / Day 22 / Year 2006 | 6. Time of Accident/Incident: 05:19:00 ☑ AM ☐ PM |

7. Type of Accident/Indicent (single entry in code box): 1. Derailment; 2. Head on collision; 3. Rear end collision; 4. Side collision; 5. Raking collision; 6. Broken Train collision; 7. Hwy-rail crossing; 8. RR grade crossing; 9. Obstruction; 10. Explosion-detonation; 11. Fire/violent rupture; 12. Other impacts; 13. Other (describe in narrative): 01

| 8. Cars Carrying HAZMAT | 9. HAZMAT Cars Damaged/Derailed | 10. Cars Releasing HAZMAT | 11. People Evacuated | 12. Division |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | FLORENCE |

| 13. Nearest City/Town | 14. Milepost (to nearest tenth) | 15. State Abbr | 15. State Code | 16. County |
|---|---|---|---|---|
| RICHMOND | SO.1 | N/A | VA | RICHMOND |

| 17. Temperature (F) (specify if minus) | 18. Visibility (single entry) 1. Dawn 2. Day 3.Dusk 4.Dark | Code | 19. Weather (single entry) 1. Clear 2. Cloudy 3. Rain 4. Fog 5.Sleet 6.Snow | Code | 20. Type of Track 1. Main 2. Yard 3. Siding 4. Industry | Code |
|---|---|---|---|---|---|---|
| 70 F | | 4 | | 3 | | 1 |

| 21. Track Name/Number | 22. FRA Track Class (1-9, X) | Code | 23. Annual Track Density (gross tons in millions) | 24. Time Table Direction 1. North 3. East | Code |
|---|---|---|---|---|---|
| SINGLE MAIN TRACK | | 1 | 26 | | 2 |

## OPERATING TRAIN #1

25. Type of Equipment Consist (single entry): 1. Freight train; 2. Passenger train; 3. Commuter train; 4. Work train; 5. Single car; 6. Cut of cars; 7. Yard/switching; 8. Light loco(s).; 9. Maint./inspect.car; A. Spec. MoW Equip. — Code: 1

26. Was Equipment Attended? 1. Yes 2. No — Code: 1

27. Train Number/Symbol: N68113

28. Speed (recorded speed, if available) R - Recorded E - Estimated: 8 MPH — Code: R

29. Trailing Tons (gross tonnage, excluding power units): 12848

30. Method(s) of Operation (enter code(s) that apply): a. ATCS; b. Auto train control; c. Auto train stop; d. Cab; e. Traffic; f. Interlocking; g. Automatic block; h. Current of traffic; i. Time table/train orders; j.Track warrant control; k. Direct traffic control; l.Yard limits; m.Special instructions; n. Other than main track; o. Positive train control; p. Other (Specify in narrative)

| Code(s) | | | | |
|---|---|---|---|---|
| e | N/A | N/A | N/A | N/A |

30a. Remotely Controlled Locomotive? 0 = Not a remotely controlled; 1 = Remote control portable; 2 = Remote control tower; 3 = Remote control transmitter - more than one remote control transmitter: 0

| 31. Principal Car/Unit | a. Initial and Number | b. Position in Train | c. Loaded (yes/no) |
|---|---|---|---|
| (1) First involved (derailed, struck, etc) | N/A | 47 | yes |
| (2) Causing (if mechanical cause reported) | N/A | N/A | N/A |

32. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.

| Alcohol | Drugs |
|---|---|
| N/A | N/A |

33. Was this consist transporting passengers? (Y/N): N/A

| 34. Locomotive Units | a. Head End | Mid Train b. Manual | Mid Train c. Remote | Rear End d. Manual | Rear End c. Remote |
|---|---|---|---|---|---|
| (1) Total in Train | 2 | 0 | 0 | 0 | 0 |
| (2) Total Derailed | 0 | 0 | 0 | 0 | 0 |

| 35. Cars | Loade a. Freight | Loade b. Pass. | Empty c. Freight | Empty d. Pass. | e. Caboose |
|---|---|---|---|---|---|
| (1) Total in Equipment Consist | 97 | 0 | 0 | 0 | 0 |
| (2) Total Derailed | 11 | 0 | 0 | 0 | 0 |

36. Equipment Damage — This Consist: 260853

37. Track, Signal, Way, & Structure Damage: 200000

38. Primary Cause Code: T111

39. Contributing Cause Code: N/A

Number of Crew Members

| 40. Engineer/ Operators | 41. Firemen | 42. Conductors | 43. Brakemen |
|---|---|---|---|
| N/A | N/A | 1 | 1 |

Length of Time on Duty

44. Engineer/Operator: Hrs 5 Mi 49

45. Conductor: Hrs 5 Mi 49

| Casualties to: | 46. Railroad Employees | 47. Train Passengers | 48. Other |
|---|---|---|---|
| Fatal | 0 | 0 | 0 |
| Nonfatal | N/A | 0 | 0 |

49. EOT Device? 1. Yes 2. No — 1

50. Was EOT Device Properly Armed? 1. Yes 2. No — 1

51. Caboose Occupied by Crew? 1. Yes 2. No — N/A

## OPERATING TRAIN #2

52. Type of Equipment Consist (single entry): 1. Freight train; 2. Passenger train; 3. Commuter train; 4. Work train; 5. Single car; 6. Cut of cars; 7. Yard/switching; 8. Light loco(s).; 9. Maint./inspect.car; A. Spec. MoW Equip. — Code: N/A

53. Was Equipment Attended? 1. Yes 2. No — Code: N/A

54. Train Number/Symbol: N/A

55. Speed (recorded speed, if available) R - Recorded E - Estimated: 0 MPH — Code: N/A

57. Method(s) of Operation (enter code(s) that apply): a. ATCS; b. Auto train control; g. Automatic block; h. Current of traffic; m.Special instructions; n. Other than main track

57a. Remotely Controlled Locomotive? 0 = Not a remotely controlled; 1 = Remote control portable

DEPARTMENT OF TRANSPORTATION
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# FRA FACTUAL RAILROAD ACCIDENT REPORT

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| 56. Trailing Tons (gross tonnage, excluding power units) | c. Auto train stop<br>d. Cab<br>e. Traffic<br>f. Interlocking | i. Time table/train orders<br>j.Track warrant control<br>k. Direct traffic control<br>l.Yard limits | o. Positive train control<br>p. Other (Specify in narrative)<br>Code(s) | 2 = Remote control tower<br>3 = Remote control transmitter - more than one remote control transmitter |
|---|---|---|---|---|
| N/A | | | N/A N/A N/A N/A N/A | N/A |

| 58. Principal Car/Unit | a. Initial and Number | b. Position in Train | c. Loaded (yes/no) | 59. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box. | Alcohol | Drugs |
|---|---|---|---|---|---|---|
| (1) First involved (derailed, struck, etc) | 0 | N/A | N/A | | N/A | N/A |
| (2) Causing (if mechanical cause reported) | 0 | N/A | N/A | 60. Was this consist transporting passengers? (Y/N) | N/A | |

| 61. Locomotive Units | a. Head End | Mid Train b. Manual | Mid Train c. Remote | Rear End d. Manual | Rear End c. Remote | 62. Cars | Loade a. Freight | Loade b. Pass. | Empty c. Freight | Empty d. Pass. | e. Caboose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) Total in Train | 0 | 0 | 0 | 0 | 0 | (1) Total in Equipment Consist | 0 | 0 | 0 | 0 | 0 |
| (2) Total Derailed | 0 | 0 | 0 | 0 | 0 | (2) Total Derailed | 0 | 0 | 0 | 0 | 0 |

| 63. Equipment Damage This Consist | 64. Track, Signal, Way, & Structure Damage | 65. Primary Cause Code | 66. Contributing Cause Code |
|---|---|---|---|
| 0 | 0 | N/A | N/A |

| Number of Crew Members | | | | Length of Time on Duty | |
|---|---|---|---|---|---|
| 67. Engineer/ Operators | 68. Firemen | 69. Conductors | 70. Brakemen | 71. Engineer/Operator | 72. Conductor |
| N/A | N/A | N/A | N/A | Hrs 0 Mi 0 | Hrs 0 Mi 0 |

| Casualties to: | 73. Railroad Employees | 74. Train Passengers | 75. Other |
|---|---|---|---|
| Fatal | 0 | 0 | 0 |
| Nonfatal | 0 | 0 | 0 |

| 76. EOT Device? | 77. Was EOT Device Properly Armed? | 78. Caboose Occupied by Crew? |
|---|---|---|
| 1. Yes 2. No N/A | 1. Yes 2. No N/A | 1. Yes 2. No N/A |

## Highway User Involved

| 79. Type | Code |
|---|---|
| A. Auto B. Truck C. Truck-Trailer. D. Pick-Up Truck E. Van F. Bus G. School Bus H. Motorcycle J. Other Motor Vehicle K. Pedestrian M. Other (spec. in narrative) | N/A |

| 80. Vehicle Speed (est. MPH at impact) | 81. Direction geographical) 1.North 2.South 3.East 4.West | Code |
|---|---|---|
| N/A | | N/A |

| 82. Position | Code |
|---|---|
| 1.Stalled on Crossing 2.Stopped on Crossing 3.Moving Over Crossing 4. Trapped | N/A |

| 86a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? | Code |
|---|---|
| 1. Highway User 2. Rail Equipment 3. Both 4. Neither | N/A |

## Rail Equipment Involved

| 83. Equipment | Code |
|---|---|
| 1.Train(units pulling) 2.Train(units pushing) 3.Train (standing) 4.Car(s) (moving) 5.Car(s) (standing) 6.Light Loco(s) (moving) 7.Light(s) (standing) 8.Other (specify in narrative) | N/A |

| 84. Position of Car Unit in Train |
|---|
| N/A |

| 85. Circumstance | Code |
|---|---|
| 1. Rail Equipment Struck Highway User 2. Rail Equipment Struck by Highway User | N/A |

| 86b. Was there a hazardous materials release by | Code |
|---|---|
| 1. Highway User 2. Rail Equipment 3. Both 4. Neither | N/A |

86c. State here the name and quantity of the hazardous materials released, if any.
N/A

| 87. Type of Crossing Warning | 1.Gates | 2.Cantilever FLS | 3.Standard FLS | 4.Wig Wags | 5.Hwy. traffic signals | 6.Audible | 7.Crossbucks | 8.Stop signs | 9.Watchman | 10.Flagged by crew | 11.Other (spec. in narr.) | 12.None |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code(s) | N/A | N/A | | N/A | N/A | | N/A | N/A | | N/A | N/A | |

| 88. Signaled Crossing Warning (See instructions for codes) | Code |
|---|---|
| N/A | |

| 89. Whistle Ban | Code |
|---|---|
| 1. Yes 2. No 3. Unknown | N/A |

| 90. Location of Warning | Code |
|---|---|
| 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach | N/A |

| 91. Crossing Warning Interconnected with Highway Signals | Code |
|---|---|
| 1. Yes 2. No 3. Unknown | N/A |

| 92. Crossing Illuminated by Street Lights or Special Lights | Code |
|---|---|
| 1. Yes 2. No 3. Unknown | N/A |

| 93. Driver's Age | 94. Driver's Gender | Code |
|---|---|---|
| 0 | 1. Male 2. Female | N/A |

| 95. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train | Code |
|---|---|
| 1. Yes 2. No 3. Unknown | N/A |

| 96. Driver | Code |
|---|---|
| 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop 4. Stopped on Crossing 5. Other (specify in narrative) | N/A |

| 97. Driver Passed Standing Highway Vehicle | Code |
|---|---|
| 1. Yes 2. No 3. Unknown | N/A |

| 98. View of Track Obscured by (primary obstruction) | Code |
|---|---|
| 1. Permanent Structure 2. Standing Railroad Equipment 3. Passing Train 4. Topography 5. Vegetation 6. Highway Vehicle 7. Other (specify in narrative) 8. Not obstructed | N/A |

| 101. Casulties to Highway-Rail Crossing Users | Killed | Injured |
|---|---|---|
| | 0 | 0 |

| 99. Driver Was | Code |
|---|---|
| 1. Killed 2.Injured 3. Uninjured | N/A |

| 100. Was Driver in the Vehicle? | Code |
|---|---|
| 1. Yes 2. No | N/A |

| 102. Highway Vehicle Property Damage (est. dollar damage) | 103. Total Number of Highway-Rail Crossing Users (include driver) |
|---|---|
| 0 | 0 |

| 104. Locomotive Auxiliary Lights? | Code |
|---|---|
| 1. Yes 2. No | N/A |

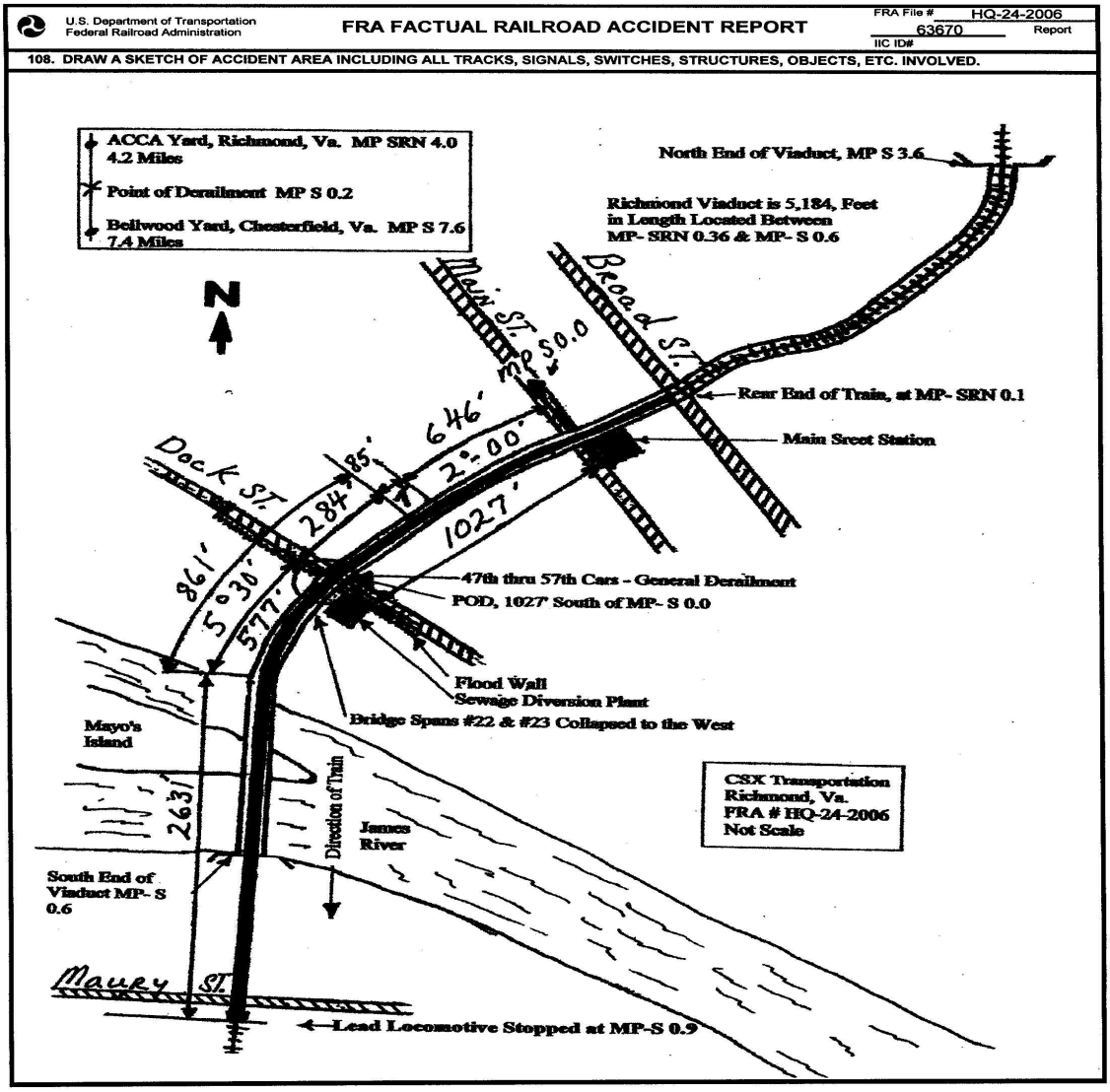
| 105. Locomotive Auxiliary Lights Operational? | Code |
|---|---|
| 1. Yes 2. No | N/A |

| 106. Locomotive Headlight Illuminated? | Code |
|---|---|
| 1. Yes 2. No | N/A |

| 107. Locomotive Audible Warning Sounded? | Code |
|---|---|
| 1. Yes 2. No | N/A |

108. DRAW A SKETCH OF ACCIDENT AREA INCLUDING ALL TRACKS, SIGNALS, SWITCHES, STRUCTURES, OBJECTS, ETC., INVOLVED.

HQ-2006-24 SKETCH.jpg



109. SYNOPSIS OF THE ACCIDENT

On April 22, 2006, at 5:19 a.m., EST, CSX Transportation (CSX) freight train N68113, with two locomotives and 97 loaded coal cars, was traveling south on the Florence Division, Bellwood Subdivision, en route on single main track from Fulton Yard in Richmond, Virginia to the Chesterfield Power Plant (Railroad Location Wheelwright), in Chester, Virginia. The recorded speed was 4 miles per hour, when the train received an undesired emergency brake application and stopped with the head end of the train at Milepost S 0.9. Most of the trailing train was located on the bridge crossing the James River. The head end of the train was blocking the Maury Street crossing on Richmond's south side. The crew was initially unable to complete an inspection of the train past the first 15-20 cars because the cars were on the bridge. It was raining and still dark so walking conditions were not safe. A passing CSX Trainmaster noticed the derailment and saw that the bridge had collapsed under the weight of several overturned coal cars, that had spilled their contents on the ground 10-12 feet below at the Richmond Sewage Diversion Plant on 14th Street. Further investigation revealed 11 cars derailed, positioned from the 47th through the 57th head cars. Three cars had piled up by the city's flood wall at the sewage diversion plant where the bridge collapsed. The derailment fouled the single main track between Brown Street Interlocking and South Yard in Richmond, Va. A Norfolk Southern rail grade crossing is located in the vicinity, but was not affected by the derailment.

There were no injuries and no hazardous materials were involved in the derailment.

Visibility at the time of the derailment was limited by darkness and drizzling rain with a temperature of about 70 degrees Fahrenheit. The derailment occurred at the south end of a curve in the general area of Shockoe Bottom. Initial evidence indicated that the derailment was caused by a rail fastener failure causing a wide track gage condition just north of the flood wall located at CSX milepost S 0.2.

The event recorder downloads were carefully reviewed and failed to indicate any train handling issues so train handling was not considered a causal factor. The train was traveling 8 mph, (the maximum allowable speed at this location is 10 mph) when the train speed dropped to 6 mph, with the undesired emergency brake application occurring at 4 mph. The engineer did not notice any type of jerking or buff forces; the train simply came to a stop.

The crew, consisting of an engineer, conductor and brakeman, were not required to be tested, after it was determined that the damages would be under $1,000,000 and no train handling issues or rules infractions were revealed.

The damages incurred from the derailment were $260,853 for equipment and $200,000 for track and bridge structural damages.

The last car was removed from the main track at approximately 10:30 a.m. on April 25. The track and bridge structure were restored to service on April 27, at 8:00 p.m.

The Bellwood Subdivision of the Florence Division is a track freight line extending from ACCA Yard, in Richmond, Virginia (milepost SRN 4.0) south to the Centralia Interlocking (milepost S 10.9) on the North End Subdivision in Chesterfield, Virginia. Both ends of this subdivision connect with CSX's primary north-south corridor on the east coast. The Hopewell Subdivision connects with the Bellwood Subdivision at milepost S 7.6 and extends to Hopewell, Va. The majority of traffic is local mixed freight although CSX also uses it as necessary as an alternate route for the north-south corridor as traffic volumes and conditions require.

There are no passenger trains, but placarded hazardous materials are handled.

The maximum authorized speed is 25 mph (FRA Class 2) with a permanent speed restriction across the Richmond Viaduct of 10 mph (FRA Class 1) between milepost SRN 0.5 and S 1.0 as indicated in the CSX's Florence Division Timetable No. 4, dated January 1, 2005.

110. NARRATIVE

Circumstances Prior to the Accident

The crew of train CSX Transportation (CSX) Train N68113, a locomotive engineer, a conductor and a brakeman, went on duty at 11:30 a.m., EST, April 21, 2006, at Acca Yard in Richmond, Virginia. This was the home terminal for all of the crew members and all had received more than the statutory off duty period prior to reporting for duty. The crew members were called from the "extra board," meaning they had no regular assignments. The locomotive engineer had been off duty 75 hours and 25 minutes, the conductor, 14 hours and 54 minutes, and the brakeman, 18 hours. The crew was taxied to Fulton Yard in Richmond, Va., where they received their work orders and discovered that their train had the wrong locomotive consist. The train had been on air with locomotives running and connected prior to the crew's arrival and remained on air during the time the locomotives were switched out.

Their assigned freight train consisted of two locomotives (CSX #428 & CSX #317), 97 loaded coal cars and no empties, was 5,278 feet long, and weighted 12,848 tons. The train was scheduled to travel from Fulton Yard to the Chesterfield Power Plant (Railroad Location Wheelwright) in Chester, Va. Prior to departure a Class III brake test-trainline continuity inspection was successfully conducted. Train N68113 originated in Dante, Va. where a Class 1 Air Brake Test and Inspection was conducted. Around 4:50 a.m., two helper locomotives attached to the rear of Train N68113 and assisted it in moving from the west end of Fulton Yard to a point north of Amtrak Junction Interlocking at CSX milepost SRN 0.8, where they detached with the head end of Train N68113, facing the southbound signal at Amtrak Junction. After the helper locomotives were detached, the helper crew rehung the end-of-train telemetry device (EOT) and it was tested again. When Train N68113 received a clear signal at Amtrak Junction, it continued south toward the Chesterfield Power plant. There were no pick-ups or set-offs en route.

As the southbound train approached the accident area, the locomotive engineer was seated at the controls on the west side of the leading locomotive. The conductor was seated on the east side, of the leading locomotive. The brakeman was seated on the east side of the second locomotive.

In this area of the railroad starting at the north end of the Richmond Viaduct there are, in succession, an 8-degree curve to the right of about 462 feet, a tangent of 358 feet, a 1-degree 30-minute curve to the right of about 325 feet, a 1-degree 30-minute curve to the left of about 325 feet, a tangent of 433 feet, a 2-degree curve to the left of about 646 feet, a tangent of 85 feet, followed by a 5-degree 30-minute curve to the left of about 861 feet with a 0.92-percent descending grade. The point of derailment (POD) occurred approximately 284 feet into this last curve.

The railroad timetable direction of the train was south. The geographic direction was southwest. Timetable directions are used throughout this report.

The Accident

The train was being operated at 8 mph approaching the accident area. At the time of the accident the train speed had dropped to 6 mph. Both speeds were recorded by the event recorder of the controlling locomotive. The maximum authorized speed for this single main track is 10 mph, as designated in the current CSX Timetable No. 4, dated January 1, 2005.

The CSX Train N68113 crew stated that they were calling out signals as they approached them. The first signal south of the viaduct is Rockets which was clear. As they proceeded, the engineer stated he was operating his train in # 1 dynamic braking, around 8 mph, when the train lost 2 mph, dropping down to 6 mph, which was not normal. The engineer stated that the weight of the train would typically be pushing the train down the light grade. The speed continued to drop quickly and the train went into an undesired emergency brake application at 4 mph. They came to a fairly smooth stop, with the head end of the train blocking Maury Street highway-rail grade crossing.

The engineer stated that he called "Emergency" three times on the radio at the time the train went into emergency. He then contacted the AE dispatcher to inform

her that the train had experienced an undesired emergency brake application and the rest of the crew was inspecting the train.

The conductor and brakeman got off the locomotive to walk the train. It was dark outside with a drizzling rain. Most of the train was standing on the Richmond Viaduct. They inspected the first 15 - 20 cars and found problems, at which point it was determined that the walking conditions on the viaduct were unsafe and returned to the lead locomotive. This information and a request for assistance was transmitted to the train dispatcher. At the same time, the crew became aware of traffic backing up at the Maury Street highway-rail grade crossing, and made a cut between the first and second cars pulling the locomotives and car south to clear the crossing to clear traffic.

Between the time train N68113 came to an emergency stop blocking Maury St. and the time the crew was able to clear the crossing for traffic, a CSX Trainmaster reporting for duty at Fulton Yard, was traveling north on 14th St. and noticed a train stop blocking Maury St. which was unusual. As he continued north on 14th St. he glanced over at the viaduct and saw that the train had separated, derailed and that a section of the bridge had collapsed The trainmaster reported the derailment to the CSX Director of Train Operations and Acca Yard. The trainmaster then proceeded to Maury Street to inform the train crew of the situation. Train N68113 was just clearing Maury St. crossing for traffic when the trainmaster arrived. After a job briefing the trainmaster drove the conductor and brakeman to flag traffic at Dock St. which passes under the viaduct adjacent to the collapsed bridge spans. The conductor and brakeman put out fusees and detoured traffic around the area until Richmond City Police Department arrived and took over securing the derailment site.

The first responders were the Richmond City Fire Department and the Richmond City Police Department. Also responding were the City of Richmond Department of Public Utilities and CSX engineering and transportation personnel. CSX called in Cranemaster Equipment Services to assist with the derailment clearing and repair.

Three coal cars were overturned and two bridge spans had collapsed to the ground at the south face of the north flood wall along the James River. There were no injuries and no hazardous materials involved in the derailment.

The damages incurred from the derailment were $260,853 for equipment and $200,000 for track and bridge structural damages.

The last car was removed from the main track at approximately 10:30 a.m. on April 25. The track and bridge structure were restored to service on April 27, at 8:00 p.m. Repairs continued for several weeks under traffic.

Analysis

Post - Accident Inspection - Track
Inspection of the site found 11 coal cars derailed with 2 bridge spans of the Richmond Viaduct collapsed. The 47th car in the train was the first car derailed followed by 6 more south of the collapse all upright and in line. The next three were overturned and resting on top of the collapsed bridge spans. The final car was still north of the collapsed sections, upright and inline. The derailment destroyed 462 feet of track and disturbed another 115 feet of track

The accident investigation found that the POD was 19 feet north of the Richmond City Flood Wall where the CSX single main track crosses through the flood wall on the Richmond Viaduct, and 1,027 feet south of CSX milepost S 0.0. The track structure at the POD is in a 5-degree 30-minute left hand curve with 2 ½ inches of elevation. The bridge structure was through plate girder bridges. The rail through this area was 115-pound jointed rail manufactured by US Steel Tennessee in 1963. The rail was seated on flat plates with pandrol clip housings welded on to hold the pandrol rail fasteners. The flat plates were bolted through the deck and lateral I beams.

After the cars and coal were removed from the POD, it was discovered that the welds applied to the inside of the pandrol housing were cracked or had completely broken. Further investigation of the housing revealed very poor welding in the area with little adhesion to the flat plates. The welds broke against the field side base of the low rail, allowing the base of the rail under load, to push under the housing creating wide gage. Wheel marks on the gage side of the low rail followed by flange marks in the web of the low rail is evidence of gage widening which would have allowed car wheels to slip off the head of the rail between the gage. The plates did not show any wear beyond the housing clips indicating that this was a sudden failure. As one clip failed it put additional lateral forces on the adjacent clips causing them to fail which allowed the rail to push under the clip housing.

The track north of the POD site was inspected jointly by the FRA and CSX personnel. Track notes were taken, and no exceptions were noted for the Federal Railroad Administration (FRA) Track Safety Standards (TSS) for Class 1 track. The track was tested by Sperry Rail Service on April 17, 2006, with no defects found. The last track inspection was performed on April 17, 2006, with no exceptions noted in the area of the derailment. The last track geometry survey was conducted by CSX on June 7, 2005, with no critical defects noted. CSX had conducted an ultrasonic rail test on April 17, 2006, with on defects noted.

Post - Accident Inspection - Equipment
The FRA and CSX inspected all hopper cars involved and found no exceptions. On April 29, 2006, at Richmond Bryant Park Terminal CSX conducted a thorough inspection of the hopper car VAPX 98015 which is believed to be the first to derail. The car was found to comply with all safety standards. The FRA also conducted a review of the mechanical records and no exceptions were noted.

Post - Accident Inspection - Bridge
The FRA and CSX inspected the bridge structure and found that the affected bridge spans, numbered #22 and #23 north to south, were each approximately 50-feet in length and were knocked westward from their common resting pier by the lateral forces of the derailing coal cars No evidence of concrete bridge pier or steel spans contributing to the cause of the derailment was observed.

Post - Accident Inspection - Operating
The FRA and CSX carefully reviewed the event recorder downloads and found it to be consistent with good train handling practices

The crew, consisting of an engineer, conductor and brakeman, were not required to be tested, after it was determined that the damages would be under $1,000,000 and no train handling issues or rules infractions were revealed.

Conclusion
CSX has temporarily reinstalled the pandrol rail fastening system back on the flat rail plates with an emphasis on the welding adhesion of pandrol clip housing. To help support this system against lateral forces steel blocks have been welded on the flat rail plates on the field side of the rail base. CSX has ordered new milled pandrol plates and fasteners to replace all the excising flat plates and fasteners on the through plate girder bridges in the area of the derailment.

FRA's investigation determined that this was a wide gage derailment caused by the failure of the rail fastening system.