Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2007-03

CSX Transportation (CSX)
Shepherdsville, Kentucky
January 16, 2007

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-2007-3

1.Name of Railroad Operating Train #1: CSX Transportation [CSX]	1a. Alphabetic Code: CSX	1b. Railroad Accident/Incident No.: 000028241
2.Name of Railroad Operating Train #2: N/A	2a. Alphabetic Code: N/A	2b. Railroad Accident/Incident No.: N/A
3.Name of Railroad Operating Train #3: N/A	3a. Alphabetic Code: N/A	3b. Railroad Accident/Incident No.: N/A
4.Name of Railroad Responsible for Track Maintenance: CSX Transportation [CSX]	4a. Alphabetic Code: CSX	4b. Railroad Accident/Incident No.: 000028241
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 01 | Day 16 | Year 2007	7. Time of Accident/Incident: 08:43: ☑ AM ☐ PM

8. 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)* — Code: 01

9. Cars Carrying HAZMAT	10. HAZMAT Cars Damaged/Derailed	11. Cars Releasing HAZMAT	12. People Evacuated	13. Division
15	12	7	500	Louisville

14. Nearest City/Town	15. Milepost *(to nearest tenth)*	16. State Abbr	16. State Code	17. County
Shepherdsville	015.1	N/A	KY	BULLITT

18. Temperature (F) *(specify if minus)*	19. Visibility *(single entry)* 1. Dawn 2. Day 3.Dusk 4.Dark — Code	20. Weather (single entry) 1. Clear 2. Cloudy 3. Rain 4. Fog 5.Sleet 6.Snow — Code	21. Type of Track 1. Main 2. Yard 3. Siding 4. Industry — Code
28 F	2	2	1

22. Track Name/Number	23. FRA Track Class (1-9, X) — Code	24. Annual Track Density *(gross tons in millions)*	25. Time Table Direction 1. North 2. South 3. East 4. West — Code
Main	4	54	1

OPERATING TRAIN #1

26. 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	27. Was Equipment Attended? 1. Yes 2. No — Code	28. Train Number/Symbol
	1	1	Q50215

29. Speed *(recorded speed, if available)* R - Recorded E - Estimated	Code	31. Method(s) of Operation *(enter code(s) that apply)*	31a. Remotely Controlled Locomotive?
47 MPH	R	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)*	0 = Not a remotely controlled; 1 = Remote control portable; 2 = Remote control tower; 3 = Remote control transmitter - more than one remote control transmitter

30. Trailing Tons *(gross tonnage, excluding power units)*: 6157

Code(s): e | i | m | N/A | N/A — 31a. Code: 0

32. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded *(yes/no)*
(1) First involved *(derailed, struck, etc)*	UTLX644622	19	yes
(2) Causing *(if mechanical cause reported)*	AN5696	22	yes

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

Alcohol	Drugs
0	0

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

35. 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	4	0	0	0	0
(2) Total Derailed	0	0	0	0	0

36. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	41	0	39	0	0
(2) Total Derailed	21	0	5	0	0

37. Equipment Damage This Consist	38. Track, Signal, Way, & Structure Damage	39. Primary Cause Code	40. Contributing Cause Code
$998,589.00	$60,500.00	E4BC	E42C

Number of Crew Members

41. Engineer/ Operators	42. Firemen	43. Conductors	44. Brakemen
1	0	1	0

Length of Time on Duty

45. Engineer/Operator	46. Conductor
Hrs 7 Mi 43	Hrs 7 Mi 43

Casualties to:	47. Railroad Employees	48. Train Passengers	49. Other
Fatal	0	0	0
Nonfatal	0	0	0

50. EOT Device? 1. Yes 2. No: 1

51. Was EOT Device Properly Armed? 1. Yes 2. No: 1

52. Caboose Occupied by Crew? 1. Yes 2. No: 2

OPERATING TRAIN #2

53. 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	54. Was Equipment Attended? 1. Yes 2. No — Code	55. Train Number/Symbol
	N/A	N/A	N/A

56. Speed *(recorded speed, if available)* R - Recorded E - Estimated	Code	58. Method(s) of Operation *(enter code(s) that apply)*	58a. Remotely Controlled Locomotive?
0 MPH	N/A	a. ATCS; b. Auto train control; g. Automatic block; h. Current of traffic; m.Special instructions; n. Other than main track	0 = Not a remotely controlled; 1 = Remote control portable

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57. Trailing Tons *(gross tonnage, excluding power units)*: 0

c. Auto train stop; d. Cab; e. Traffic; f. Interlocking; i. Time table/train orders; j.Track warrant control; k. Direct traffic control; l.Yard limits; o. Positive train control; p. Other *(Specify in narrative)* Code(s): N/A | N/A | N/A | N/A | N/A

2 = Remote control tower
3 = Remote control transmitter - more than one remote control transmitter: N/A

59. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded *(yes/no)*
(1) First involved *(derailed, struck, etc)*	0	0	N/A
(2) Causing *(if mechanical cause reported)*	0	0	N/A

60. 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

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

62. 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	0	0	0	0	0
(2) Total Derailed	0	0	0	0	0

63. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	0	0	0	0	0
(2) Total Derailed	0	0	0	0	0

64. Equipment Damage This Consist: $0.00

65. Track, Signal, Way, & Structure Damage: $0.00

66. Primary Cause Code: N/A

67. Contributing Cause Code: N/A

Number of Crew Members

68. Engineer/ Operators	69. Firemen	70. Conductors	71. Brakemen
0	0	0	0

Length of Time on Duty

72. Engineer/Operator: Hrs 0 Mi 0

73. Conductor: Hrs 0 Mi 0

Casualties to:	74. Railroad Employees	75. Train Passengers	76. Other
Fatal	0	0	0
Nonfatal	0	0	0

77. EOT Device? 1. Yes 2. No: N/A

78. Was EOT Device Properly Armed? 1. Yes 2. No: N/A

79. Caboose Occupied by Crew? 1. Yes 2. No: N/A

OPERATING TRAIN #3

80. 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

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

82. Train Number/Symbol: N/A

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

84. Trailing Tons *(gross tonnage, excluding power units)*: 0

85. 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): N/A | N/A | N/A | N/A | N/A

85a. 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: N/A

86. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded *(yes/no)*
(1) First involved *(derailed, struck, etc)*	0	0	N/A
(2) Causing *(if mechanical cause reported)*	0	0	N/A

87. 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

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

89. 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	0	0	0	0	0
(2) Total Derailed	0	0	0	0	0

90. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	0	0	0	0	0
(2) Total Derailed	0	0	0	0	0

91. Equipment Damage This Consist: $0.00

92. Track, Signal, Way, & Structure Damage: $0.00

93. Primary Cause Code: N/A

94. Contributing Cause Code: N/A

Number of Crew Members

95. Engineer/ Operators	96. Firemen	97. Conductors	98. Brakemen
0	0	0	0

Length of Time on Duty

99. Engineer/Operator: Hrs 0 Mi 0

100. Conductor: Hrs 0 Mi 0

Casualties to:	101. Railroad Employees	102. Train	103. Other
Fatal	0	0	0
Nonfatal	0	0	0

104. EOT 1. Yes 2. No: N/A

105. Was EOT Device Properly 1. Yes 2. No: N/A

106. Caboose Occupied by Crew? 1. Yes 2. No: N/A

Highway User Involved

107. 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)* Code: N/A

108. Vehicle Speed *(est. MPH at impact)*: N/A

109. *geographical)* 1.North 2.South 3.East 4.West Code: N/A

Rail Equipment Involved

111. Equipment 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)* Code: N/A

112. Position of Car Unit in: N/A

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110. Position	Code	113. Circumstance	Code
1.Stalled on Crossing 2.Stopped on Crossing 3.Moving Over Crossing 4. Trapped	N/A	1. Rail Equipment Struck Highway User 2. Rail Equipment Struck by Highway User	N/A
114a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? 1. Highway User 2. Rail Equipment 3. Both 4. Neither	N/A	114b. Was there a hazardous materials release 1. Highway User 2. Rail Equipment 3. Both 4. Neither	N/A

114c. State here the name and quantity of the hazardous materials released, if any.
N/A

115. Type 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					

116. Signaled Crossing *(See instructions for codes)*	Code	117. Whistle Ban 1. Yes 2. No 3. Unknown	Code
	N/A		N/A

118. Location of Warning 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach	Code	119. Crossing Warning with Highway Signals 1. Yes 2. No 3. Unknown	Code	120. Crossing Illuminated by Street Lights or Special Lights 1. Yes 2. No 3. Unknown	Code
	N/A		N/A		N/A

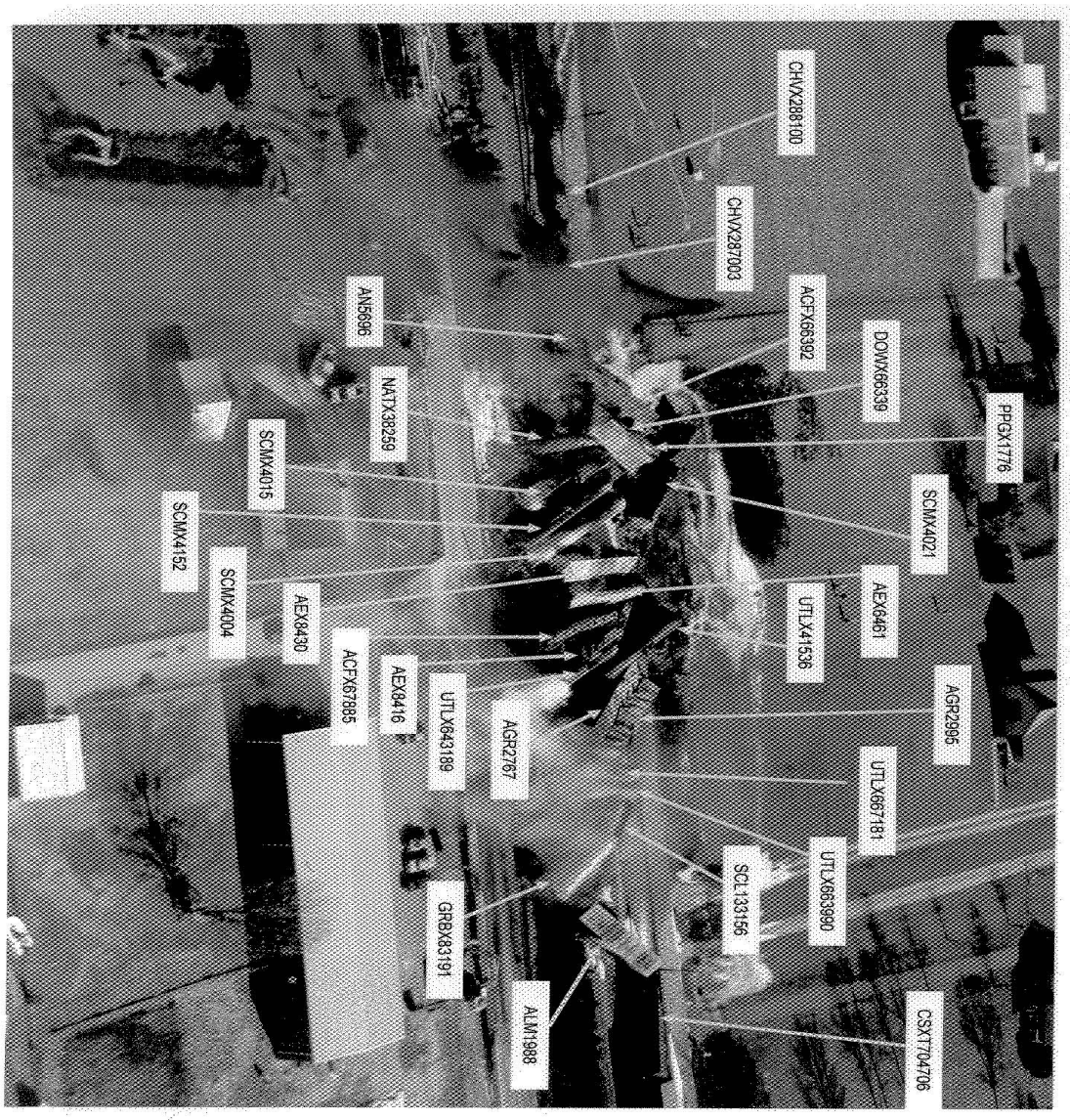
121. Age	122. Driver's Gender 1. Male 2. Female	Code	123. Driver Drove Behind or in Front of and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown	Code	124. Driver 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop 4. Stopped on Crossing 5. Other *(specify in narrative)*	Code
0		N/A		N/A		N/A

125. Driver Passed Highway Vehicle 1. Yes 2. No 3. Unknown	Code	126. View of Track Obscured by *(primary obstruction)* 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	Code
	N/A		N/A

Casualties to:	Killed	Injured	127. Driver 1. Killed 2.Injured 3. Uninjured	Code	128. Was Driver in the Vehicle? 1. Yes 2. No	Code
				N/A		N/A
129. Highway-Rail Crossing Users	0	0	130. Highway Vehicle Property Damage *(est. dollar damage)*	0	131. Total Number of Highway-Rail Crossing Users *(include driver)*	0

132. Locomotive Auxiliary Lights? 1. Yes 2. No	Code	133. Locomotive Auxiliary Lights Operational? 1. Yes 2. No	Code
	N/A		N/A
134. Locomotive Headlight Illuminated? 1. Yes 2. No	Code	135. Locomotive Audible Warning Sounded? 1. Yes 2. No	Code
	N/A		N/A

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



137. SYNOPSIS OF THE ACCIDENT

On January 16, 2007, at 8:43 a.m. Eastern Standard Time (EST), a northbound CSX Transportation, Inc. (CSX) freight Train Q50215, consisting of four locomotives and 80 freight cars, derailed 26 cars. The accident occurred near Shepherdsville, Kentucky (KY) at CSX milepost (MP) 15.12 on the CSX Mainline Subdivision, Louisville Division.

The train was traveling at a recorded speed of 47 miles per hour (mph) when the 15th through the 40th cars from the locomotives derailed while traversing a 0 degree, 49 minute curve to the right, which had a super elevation of 1 inch. Twelve of the 26 derailed cars were tank cars containing hazardous materials. Seven tank cars were punctured or breached releasing Cyclohexane, Methyl Ethyl Ketone, and Butadiene in amounts ranging from small leaks to complete loss of contents. The derailment produced a fire ball, fire, and heavy smoke. Local emergency responders established an emergency evacuation radius of one mile. An estimated 500 area residents were either evacuated or “sheltered-in-place” and a local elementary school with about 400 students was closed. There were 36 people and two emergency responders who reported injuries that were treated and released at local medical facilities. No railroad employee injuries were reported. Track and equipment damages are estimated at $1,059,089.

At the time of the accident, it was daylight with cloudy skies and a northwest wind of 16 mph. The temperature was 28°F.

A contributing factor in the accident is the broken body side bearing bolt at the “BL” position of AN 5696.

The probable cause of the accident is the failure of the “B” truck of the 18th car (AN 5696) in the train consist to properly slew, causing the “R1" wheel to climb the high (west) rail in the curve at MP 15.12 and derail to the field side of the west rail.

138. NARRATIVE

Circumstances Prior to the Accident

The crew of Train Q50215 included a locomotive engineer and a conductor. They went on duty at 1 a.m., Central Standard Time (CST) January 16, 2007, at Kayne Avenue in Nashville, Tennessee (TN). This was the away-from-home terminal for both crew members, and both had received more than the statutory off duty period prior to reporting for duty. They were assigned to operate Train Q50215 from Nashville to Louisville, KY.

Train Q50215 consisted of four locomotives, 41 loads, and 39 empty cars of several varieties and an end-of-train telemetry device. The train was 4,611 feet in length and weighed 6,157 tons. Train Q50215 was assembled at Boyles Yard in Birmingham, Alabama (AL), and was scheduled to have two crew changes, one at Kayne Avenue in Nashville and the other at Louisville prior to reaching it’s destination Cincinnati, Ohio (OH). A pre-departure inspection and class I train air brake test had been performed January 15, 2007, on the train at its originating location, Boyles Yard, prior to its 4:50 p.m. departure. At Oakworth, AL, the train set off 33 cars and picked up five cars, departing Oakworth consisting of four locomotives, 80 cars (41 loads and 39 empties) and end-of-train telemetry device. The relief crew took charge of Train Q50215 at Kayne Avenue and departed for Louisville at 1:25 a.m., January 16, 2007.

The trip was uneventful from Nashville to the accident site. Approaching the accident area from the south at Belmont, MP 24.9, Train Q50215 passed over a wayside defect detector which reported no defects. They also passed another train near Bardstown, MP 21.2, whose crew members observed the train pass and reported no defects. The engineer was seated at the controls on the east side of the cab and the conductor was seated on the west side of the compartment. They were operating from the lead locomotive, CSXT 7316, which had the short hood forward. The maximum authorized speed for mixed freight trains is restricted by Special Instructions to 50 mph, as designated in the current CSX Timetable 5 for the Northern Region, Louisville Division, Mainline Subdivision effective on Monday, January 1, 2007.

Approaching the accident area from the south, the single main track of the Mainline Subdivision has a 49

minute right-hand curve located between MP 15.59 and MP 14.94, which has a super elevation of 1 inch. From MP 16.50 to MP 15.75 the grade averages 0.57 percent, descending that changes to a zero grade from MP 15.75 to the point of derailment (POD).

The CSX timetable direction of Train Q50215 was north. The geographic direction was northeast. CSX timetable direction will be used throughout this report.

The Accident

Near MP 16.5, Train Q50215 crested an ascending grade at a speed of 35 mph with the locomotives in throttle 8 position. As the train descended the grade, the engineer noticed the speed increase to 45 mph and he reduced the throttle to number 6 position. The engineer then felt a slight run-in of slack in the train and further reduced the throttle to number 3 position. At 8:43 a.m., with the train traveling at a recorded speed of 47 mph, the engineer felt two simultaneous run-outs of train slack followed by an emergency application of the train air brakes. When the train stopped, the engineer looked rearward and observed a fireball and thick smoke. The engineer announced "emergency" three times over the radio and attempted to contact the CSX train dispatcher without success. Using his personal cell phone, he contacted the CSX trainmaster at Osborn Yard in Louisville and advised him of the situation. The trainmaster called the CSX train dispatcher, then called 911 to advise local emergency services about the derailment.

Within a short period of time, local emergency service and fire department personnel were at the accident scene as a result of being notified of the accident at 8:46 a.m. by a local resident. The conductor left the locomotive cab and met with the emergency responders, providing them with the hazardous material information from the train consist.

Twelve tank cars in the train containing hazardous materials had derailed. One of the cars contained only a residue of Chlorine. One tank car contained Ethoxylate, two contained Cyclohexane, one contained Methyl Ethyl Ketone, four contained Butadiene, one contained hydraulic fluid, and two contained Maleic Anhydride. Three tank cars, the 17th (CHVX 287003), the 22nd (NATX 38259), and the 23rd (SCMX 4021), were breached during the derailment and released full loads of Cyclohexane, Methyl Ethyl Ketone, and Butadiene, respectively. Four other tank cars, the 15th (UTLX 644622), the 16th (CHVX 288100), the 31st (UTLX 643189), and the 35th (UTLX 667181), released varying amounts of their contents.

Cars derailing and breaching produced a fire ball and a fire within the derailed equipment emitting heavy smoke. Local emergency responders established an emergency evacuation radius of one mile from the derailment site. An estimated 500 residents of the area were effected and a local elementary school with about 400 students was closed. Some area residents decided to "shelter-in-place". The evacuation zone included a portion of Interstate 65, which was temporally closed in both directions, and Louisville airport air traffic was diverted to other runways due to the heavy smoke conditions. A total of 36 citizens and two emergency responders were treated and released at local medical facilities. There were no railroad employees injured.

Analysis and Conclusions

Analysis

Signal System Inspections/Testing

The post accident inspection and testing of the signal system found all signal units, switches and signal cases locked and secured with no indications of tampering or vandalism that would interfere with the operation of the signal system. Six spans of pole line were damaged as a result of the derailment, disrupting the code line from Coral Ridge (MP 12.2) to the South End of Cave City (MP 85.4). Logs retrieved from the Belmont Defect Detector located at MP 25.1 show northbound Train Q50215 set off no alarms when it passed over the detector on number two track at 7:32 a.m. Sight distance tests and observations did not identify any physical obstructions that could hinder the preview to any of the signals from Bardstown (MP 21.2) to the derailment site. Ground tests and insulation resistance tests were performed with no exceptions identified. Time, route, and indication locking tests were conducted. Switch correspondence tests and track circuit shunting tests were performed. No exceptions were identified with either the design or operation of the signal system.

As a result of these tests, inspections and observations, the signal system is not considered to be a casual or contributing factor in this accident. Signal damage is estimated at $500.

Hazardous Materials Inspections

FRA conducted an inspection of Train Q50215 shipping documents provided by the train crew at the time of derailment. FRA found the train consist to be complete and accurate. Required hazardous material description for each tank car containing a hazardous material, including an emergency telephone number, was accurately displayed on the consist. Emergency response information was included within the consist for each tank car that contained a hazardous material. Train placement, positioning in train of hazardous materials rail cars, was found to be accurate. There were no exceptions found on consist relating to proper hazardous material documentation and emergency communication.

A post accident inspection of tank cars containing hazardous materials, except for tank cars that had been completely engulfed in fire, found that each tank car had been properly placarded by the shipper. Placards observed affixed to tank cars matched related classifications found on the train consist. Inspection of tank car closures, which were not damaged during the derailment revealed that the tank cars had been properly secured prior to the shippers offering the tank cars into transportation.

Twelve tank cars, each containing a hazardous material, were involved in derailment. It was found that seven of the twelve tank cars had released hazardous materials ranging from small leaks to complete loss of contents. Tank cars that released hazardous materials included flammable liquids (NATX 38259, CHVX 288100, CHVX 287003), flammable gases (SCMX 4021), Class 9 liquid (UTLX 643189, UTLX 644622), and corrosive material (UTLX 667181). Fire and subsequent evacuation of people from the surrounding area were the results of the released hazardous materials.
Three derailed tank cars were breached and released full loads (NATX 38259, CHVX 287003, and SCMX 4021). Released product was allowed to burn off. Three derailed tank cars were emptied by a controlled liquid flaming operation (SCMX 4015, SCMX 4152, and SCMX 4004). The remaining six derailed tank cars were emptied by flaring, burning off product, and load transfer (UTLX 644622, PPGX 1776, CHVX 288100, UTLX 643189, UTLX 667181, and UTLX 663990).

Environmental contractors monitored air quality throughout the derailment cleanup. All environmental concerns, including removal of contaminated soil, water, and materials, are being addressed.

Operating Practices Inspections/Crew Information

Both the engineer and conductor of Train Q50215 were interviewed following the accident. Their hours-of-service records were obtained and reviewed for compliance with federal regulations. No exceptions were noted.

The event recorder from the second locomotive in the locomotive consist, CSXT 8343, was downloaded and this data was compared with the train handling information obtained during the crew member interviews. The event recorder download information and track profile were also loaded onto a CSX Train Dynamics Simulator and several simulations of the operation of the train prior to and at the time of the derailment were conducted and reviewed. These train operation simulations revealed no excessive train dynamic forces were produced during the operation of the train that could have caused or contributed to the cause of the derailment.

FRA Post-Accident Toxicological Testing was performed on the crew members of Train Q50215 with negative results.

Track Investigation/Testing

The track structure through the accident site consisted of 131 pound continuous welded rail (CWR). Colorado Fuel and Iron originally rolled this rail between 1939 and 1946. It was laid in the track in 1984 after having been cropped and welded as CWR. The rail was seated in 14 inch, eight hole, double shoulder tie plates. The tie plates are fastened to 7 x 9 inch x 8 ft. 6 inch timber crossties with 6 x 5/8 inch cut spikes. The spiking pattern consisted of a minimum of two gage side rail and one field side rail spikes on each rail. The rail was box anchored on every other tie. A granite ballast section supported the track.

Beginning at MP 17.8 in a northward direction toward the POD, Train Q50215 encountered an ascending grade of 0.73% to about MP 16.5, followed by a descending grade averaging 0.57% to MP 15.75. At MP 15.12 there is a 0% grade through the derailment area. Regarding the curvature, the train traversed a 1 degree 7 minute right-hand curve between MP16.81 and MP16.65, a 3 degree 15 minute left-hand curve between MP16.32 and MP15.97, and a 49 minute right-hand curve between MP15.59 and 14.94.

FRA was part of the track inspection group which conducted several walking inspections prior to clean-up and track replacement. These activities included inspections of the undisturbed track area from MP 14.8 to 15.6. No FRA defects were noted. During and after accident site clean-up, the track group recovered rail from the derailment site. The total length of the rail that needed to be recovered was determined by measuring the amount of track that had been replaced, which equaled 597 ft., 4 inches. The amount of west rail recovered measured 595 ft., 11 inches. The track group determined that the west rail was entirely recovered based on the continuity of matching rails. The difference in these two amounts would reasonably be equal to the amount of rail removed during the torch cutting of the rail. The amount of the east rail recovered equaled 591 ft., 1 inch. The difference between the recovered east rail and replacement measurements establishes a portion of missing east rail equaling about 6 feet.

The recovered rail was reassembled linearly matching rail ends and using stamping or other identifying characteristics to establish position. The missing portion of the east rail was determined to be from a single section containing shattered pieces of rail located 143 feet south of the POD and 100 feet north from the south end of disturbed track. This area measured 18 feet in length and included both 131 lb. Colorado 1943 rail and 132 lb. Tennessee 1958 replacement section (plug rail). Some fractured rail pieces disclosed the presence of an internal inclusion in the area of the head and web, but with further examination the group concluded the fractures were the result of overstress forces. A consensus was reached that the only indications of initial loss of wheel/rail relationship were in one area at MP 15.12.

FRA reviewed CSX's most recent Geometry Car (TGC #2) inspection. The car last tested this single main track in a southward direction on August 17, 2006. There were no FRA or CSX priority one defects found between MP 15.0 and MP 16.0. The records of internal rail inspections and the service failures between MP 15.0 and MP 16.0 were reviewed for the period from January 16, 2004 to January 16, 2007.

Three Year Rail Defect History (Service and Detected Failures) MP 000 15.0 - 16.0:

Prefix	MP	Track	Side	Type	Size	Found	Car #	C/T	Rolle	Mill	Wgt	Changed
000	15.7	SG	L	TW	60%	12/19/04	SERV	T	1939	CO	131	12/19/04
000	15.3	SG	R	EFBW		09/16/05			S820	H	1945	UC 131 09/19/05
000	15.31	SG	R	TDD	60%	12/06/05	SERV	H	1944	CO	131	12/06/05
000	15.47	SG	R	FH		01/05/06	S832	H	1943	OT	131	01/11/06
000	15.9	SG	R	TDD		12/08/06	SERV	T	1943	UT	131	12/08/06

FRA conducted a records inspection of CSX's track inspection records for this main track area made during the previous 90 days. FRA did not find any defects listed near the area of the derailment, but did find that CSX had not completed five of their reports on the day of the inspection. This failure was not in the area near the derailment and would not have contributed to the probable cause. CSX's FRA Qualified Inspectors List, as required by Part 213.7, was reviewed and it was found that CSX did list all the individuals that were inspecting track on this mainline during the previous 90 days. Track inspections conducted by FRA on January 18 and March 24, 2006, found no defects through the derailment site. CSX engineering personnel estimated the total track structures damages at $60,000.

Mechanical Inspections/Testing

Post accident inspection of brake testing records and other related information disclosed that Train Q50215 was assembled in Boyles Yard at Birmingham on January 15, 2007. The train consisted of 109 cars and functionally tested two-way end-of-train telemetry device CSXE 16973. The train had been given a pre-departure inspection and class I air brake test using ground air supply by CSX car inspectors stationed at Boyles Yard. One car was found defective and set out of the train because of a shifted load. The inspection

and brake testing was completed at 3:30 p.m., January 15, 2007. Four locomotives from inbound Train Q680 were added to the cars and a class III brake test was completed at 4:25 p.m..

The 15th through the 40th cars in the train consist, 26 cars total, had derailed in various positions with the main track. The train had separated between the 14th and 15th cars from the locomotives and the front section of the train had continued northward about 1,632 feet before coming to a stop.

On January 17, 2007, at the accident scene, an inspection and brake test was performed on both the north and south portions of Train Q50215 containing those cars that were not derailed in the accident. Some deficiencies were disclosed during these inspections and tests, however, no conditions were discovered that would have caused or contributed to the cause of this accident.

The 15th car in the train consist, UTLX 644622 tank car, came to rest on its side in a ditch along the east side of the main track. This tank car was separated from the 16th car by 150 feet. The 16th and 17th cars came to rest on their side in a ditch along the east side of the main track. The 18th car had derailed in an upright position, parallel with the main track. The 19th through 40th cars had came to rest in various zig-zag positions.

Inspections were made of the derailed equipment and components recovered from the derailment area. None of the derailed cars were equipped with truck side frame keys, which are designed to prevent wheel sets from becoming separated from trucks during a derailment. As a result, wheel sets became scattered during the derailment and identification with specific cars was made by wheel size, journal size, stenciling, and other identifying markings. Exact wheel position and right or left orientation could not be determined.

Rail burn markings were found on the truck side frames from the 18th car in the train consist (AN 5696 box car) that indicate this car was the first to derail. There were rail burn markings on the inside of the lead truck's east side frame, indicating the east wheels had dropped inside the gauge of the rail and traveled in that position. The rear truck had rail burn markings on the inside of both the east and west side frames indicating the truck had traveled and derailed between the rails. The bottom of the east side frame had been sliced open along its entire length. A body side bearing bolt was found broken at the "BL" location, which was positioned over the east rail on the leading truck in the direction of movement and the body side bearing was found swung out of position. The broken bolt was determined to be an existing condition prior to the derailment by the NTSB metallurgist. In addition, the wheel at the "L1" location was gauged and found to have flange wear conditions that were not condemnable, but approaching a high and vertical state. The "L1" wheel tread was also found to exceed the Association of American Railroads (AAR) tread worn hollow condemning limits. Inspections of the "B" end (leading end) body and truck center plates revealed a ridged wear pattern existed on the body center plate, indicating chafing between the two components and also affected the engagement depth of the body center plate.

Equipment damage estimates were estimated at $998,589.

Conclusion

The accident investigation disclosed no operational characteristics or track conditions identified as having caused or contributed to the cause of the accident. Wheel flange markings, consistent with loss of wheel and rail relationship, were found on the west rail of the curve near MP 15.12. The 18th car in the train consist, AN 5696 box car, displayed truck side frame markings on the "B" truck leading in the direction of train movement and providing indications of being the first car to derail.

Fatigue Analysis:

FRA obtained fatigue related information, for the 10-day period preceding this incident including the 10-day work history (on duty/off duty cycles) for all of the employees involved.

Conclusion:

Upon analysis of that information FRA concluded that one or more of the employees may have been working at a diminished level of safety (effectiveness) due to mental and/or physical attributes associated with fatigue,

which may have contributed to the cause of the accident.

Probable Cause and Contributing Factor

An investigation by the Federal Railroad Administration found the contributing factor in this accident to be a broken body side bearing bolt at the “BL” position of AN 5696.

The FRA found the probable cause to be the failure of the “B” truck of the 18th car (AN 5696) in the train consist to properly slew, causing the “R1" wheel to climb the high (west) rail in the curve at MP 15.12 and derail to the field side of the west rail.