Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2007-57

CSX Transportation
Painesville, OH
October 10, 2007

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # HQ-2007-57

1.Name of Railroad Operating Train #1: CSX Transportation [CSX]	1a. Alphabetic Code: CSX	1b. Railroad Accident/Incident No.: R000037664
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.: R000037664
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 10 | Day 10 | Year 2007	7. Time of Accident/Incident: 12:01:00 ☐ 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
40	8	5	1400	GREAT LAKES

14. Nearest City/Town	15. Milepost *(to nearest tenth)*	16. State Abbr	16. State Code	17. County
PAINESVILLE	155.62	N/A	OH	LAKE

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	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
51 F	2	2	1	ERIE W./SUBDIVISION	4	124.7	3

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	Q380 09

29. Speed *(recorded speed, if available)* R - Recorded E - Estimated	Code	30. Trailing Tons *(gross tonnage, excluding power units)*	31. Method(s) of Operation *(enter code(s) that apply)*	31a. Remotely Controlled Locomotive?
48 MPH	R	13311	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): a N/A N/A N/A N/A	0 = Not a remotely controlled; 1 = Remote control portable; 2 = Remote control tower; 3 = Remote control transmitter - more than one remote control transmitter: 0

32. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded *(yes/no)*
(1) First involved *(derailed, struck, etc)*	TILX190750	31	yes
(2) Causing *(if mechanical cause reported)*	N/A	0	N/A

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

35. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote	36. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	2	0	0	0	0	(1) Total in Equipment Consist	106	0	6	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	28	0	3	0	0

37. Equipment Damage This Consist	38. Track, Signal, Way, & Structure Damage	39. Primary Cause Code	40. Contributing Cause Code
$1,375,866.00	$200,000.00	T211	N/A

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 2 Mi 2	Hrs 2 Mi 2

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: N/A

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?
N/A 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)* N/A

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)*	N/A	N/A	N/A
(2) Causing *(if mechanical cause reported)*	N/A	N/A	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	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

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

64. Equipment Damage This Consist N/A

65. Track, Signal, Way, & Structure Damage N/A

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
N/A	N/A	N/A	N/A

Length of Time on Duty

72. Engineer/Operator Hrs N/A Mi N/A

73. Conductor Hrs N/A Mi N/A

Casualties to:	74. Railroad Employees	75. Train Passengers	76. Other
Fatal	N/A	N/A	N/A
Nonfatal	N/A	N/A	N/A

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 N/A

84. Trailing Tons *(gross tonnage, excluding power units)* N/A

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)*	N/A	N/A	N/A
(2) Causing *(if mechanical cause reported)*	N/A	N/A	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	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

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

91. Equipment Damage This Consist N/A

92. Track, Signal, Way, & Structure Damage N/A

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
N/A	N/A	N/A	N/A

Length of Time on Duty

99. Engineer/Operator Hrs N/A Mi N/A

100. Conductor Hrs N/A Mi N/A

Casualties to:	101. Railroad Employees	102. Train	103. Other
Fatal	N/A	N/A	N/A
Nonfatal	N/A	N/A	N/A

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. Code N/A
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)*

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

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

Rail Equipment Involved

111. Equipment Code N/A
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)*

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	4.Wig Wags	7.Crossbucks	10.Flagged by crew	116. Signaled Crossing *(See instructions for codes)*	Code	117. Whistle Ban 1. Yes 2. No 3. Unknown	Code
	2.Cantilever FLS	5.Hwy. traffic signals	8.Stop signs	11.Other *(spec. in narr.)*				
	3.Standard FLS	6.Audible	9.Watchman	12.None				
Code(s)	N/A	N/A	N/A	N/A	N/A	N/A	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

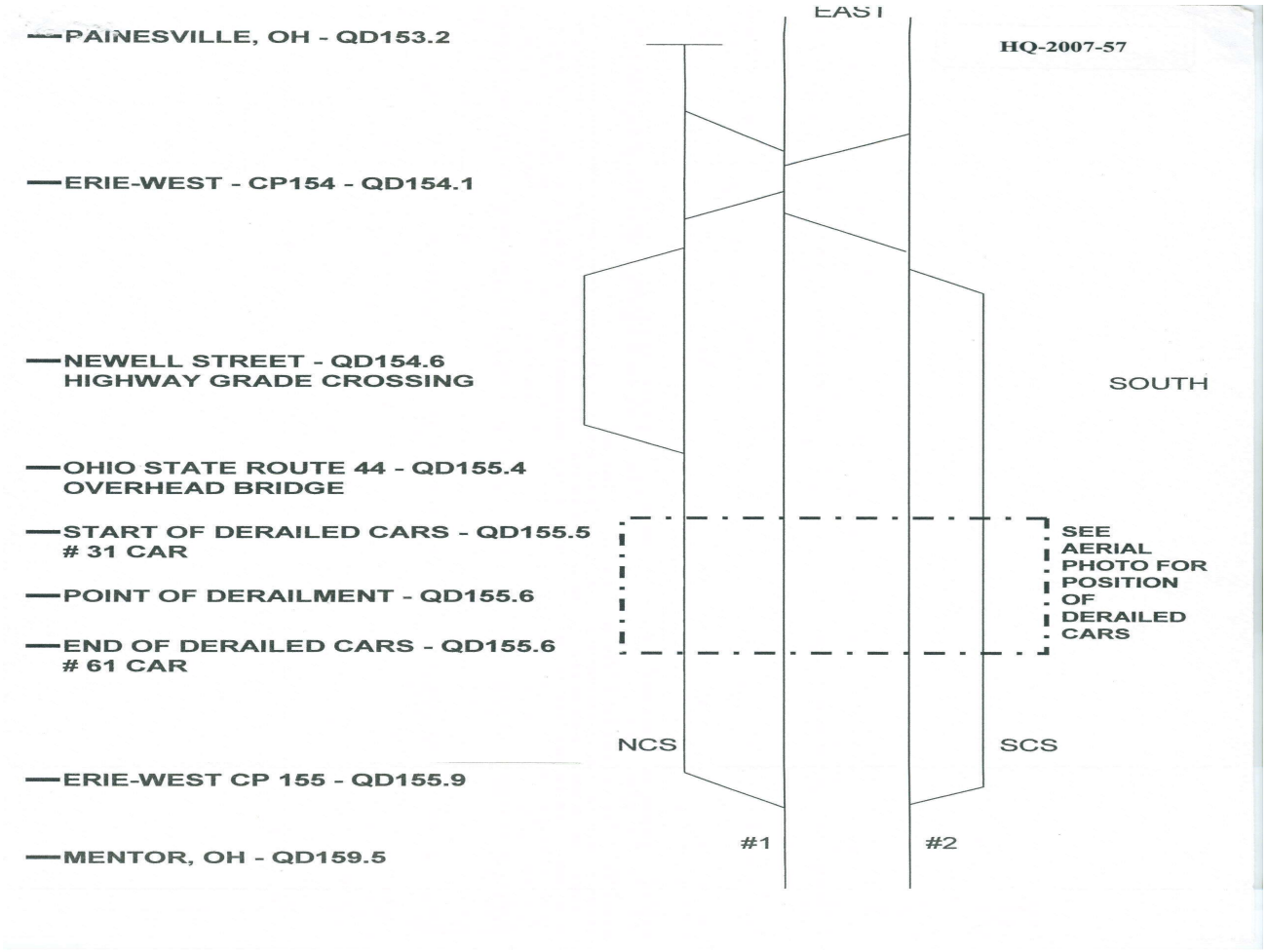
121. Age	122. Driver's Gender 1. Male 2. Female	Code	123. Driver Drove Behind or in Front of and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown	Code	124. Driver 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop 4. Stopped on Crossing 5. Other *(specify in narrative)*	Code
N/A		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	N/A	N/A	130. Highway Vehicle Property Damage *(est. dollar damage)*	N/A	131. Total Number of Highway-Rail Crossing Users *(include driver)*	N/A

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 October 10, 2007, at 12:01 p.m. EDT, CSX Transportation (CSX) Train Q380-09, (Chicago, IL to Selkirk, NY), derailed at milepost (MP) QD 155.62, On the Number 1 Main Track, while preceding east (timetable east)(timetable directions will be used throughout this report) at a recorded speed of 48 miles per hour. The derailment occurred on the CSX Erie West Subdivision of the Great Lakes Division in Painesville, OH, Lake County, just west of State Route (SR) 44 overpass. At the time of derailment, the weather was cloudy, with light rain and a temperature of 51 degrees F.

CSX Train Q380-09 consisted of two locomotives (BNSF 4836 & BNSF 4693), 106 loaded rail cars and 6 empty rail cars of mixed freight, for a total 13,311 trailing tons and a length of 7,157 feet. Of the 112 rail cars in the train, there were 39 loaded and 1 empty residue shipment of hazardous materials. There were 31 cars derailed in the train in positions 31 through 61.

Of the 31 cars derailed, eight contained hazardous materials. Six of the derailed cars contained shipments of alcohols N.O.S. 3 (Ethanol), UN1987, Ill. One tank car contained a shipment of liquefied petroleum gas 2.1 (butane), UN1075, and one tank car contained a shipment of elevated temperature liquid No.5. 9 (PhthalicAnhydride), UN3257, Ill.

Three tank cars containing alcohol, and one tank car containing the elevated temperature liquid, were breached and caught fire. Another tank car containing alcohol was found leaking from the vacuum relief valve and liquid eduction line, but did not catch fire. One tank car containing liquefied petroleum gas (butane), was damaged as a result of the derailment, with no loss of structural integrity. It is estimated that 76,153 gallons of alcohol and 17,100 gallons of elevated temperature liquid, was released in the environment.

As a result of the derailment approximately 1400 people were evacuated from a local school, industry, and residences within a 1/2 mile radius of the derailment location. Several local, state, and US routes were closed to vehicular traffic. There were no reported injuries or fatalities, though the derailment caused a significant hazardous materials release and evacuation. Monetary damages were $1,375,866.00 to equipment and $200,000 to the track structure..

The probable cause of the derailment is a broken rail that occurred in a 20’ 5” long “plug” rail installed in the continuous welded rail (CWR), following a rail defect detected on December 15, 2006, on the south rail of Number 1 Main Track. There was also evidence of multiple fractures and rail end batter at the west end joint of the plug rail.

138. NARRATIVE

CIRCUMSTANCES PRIOR TO THE ACCIDENT

After receiving the required statutory time off rest period, one engineer and one conductor reported for duty at 10:00 am, at their home terminal, Collinwood Yard, Cleveland OH, to operate CSX Train 0380-09.

CSX Train Q380-09 originated in Chicago, IL enroute to Selkirk, NY, changing crews at Garret IN, for continuing movement to Selkirk, NY. These crew-members, reporting to Collinwood Yard, Cleveland OH, were assigned to relieve the inbound crew from Garret, IN and move the train east towards the next crew change at Buffalo, NY.

CSX Train 0380-09 departed Collinwood yard at 11:29 a.m. moving east on the number Two Main Track, with 2 locomotives (BNSF 4836 and BNSF 4693), 106 loaded rail cras and 6 empty rail cars of mixed freight along with End Of Train Device (EOTD) UPRQ 61177.

Departing the yard, CSX Train 0380-09 moved east on the Number Two Main Track, passing the “hotbox” ‘high-wide” detector at milepost 165, Eastlake OH. The detector confirmed a correct axle count and no defects were noted for the passing train. At CP 162, CSX Train 0380-09 switched from the Number Two Main Track to the Number One Main Track, continuing east towards Buffalo, NY.

As the train was approaching the Point Of Derailment (POD) at milepost 155.62, the engineer was seated on

the south side of locomotive BNSF 4836. The throttle was in position number 6 with the train proceeding at 48 miles per hour. The conductor was seated on the north side of the locomotive. The track structure in the area is tangent and practically level.

Timetable direction is used throughout this report, except where noted.

THE ACCIDENT

CSX TRAIN Q380-09 EAST:

According to the engineer, CSX Train 0380-09 was proceeding east, just passing CP 155, at a recorded speed of 48 miles per hour, when he felt what he described as a hard nudge. The maximum authorized speed, in accordance with CSX Transportation Great Lakes Subdivision Timetable Number 4, effective January 1, 2005, for freight trains operating in an east direction on Number 1 Main Track between milepost QD 171.1 and milepost OD 142.5 is 50 miles per hour.

Immediately after the engineer felt what he described as a hard nudge, a train-line initiated, undesired emergency train air brake application occurred. CSX Train 0380-09 continued east approximately 2200 feet, with the locomotives and 30 head cars stopping at approximately milepost QD 154.6, near Newell Street in Painesville, OH. As the train was coming to stop, the engineer stated he looked in his rear-view mirror and observed a huge fireball. The statements of the engineer were corroborated by the conductor.

According to the engineer, when he observed the fireball, he immediately announced on the radio “emergency " three times, explaining to the dispatcher that there was a huge fireball towards the middle of the train. The Dispatcher advised the crew to evacuate the train, move a safe distance away, and wait for CSX officials to arrive.

According to a statement from the CSX lH Dispatcher, the CSX Asst. Chief Train Dispatcher was notified of the emergency by the lH Dispatcher and requested to notify emergency services for the area. “Blocks” were placed on all tracks and all train traffic was stopped from entering the area..

Subsequent investigation by the CSX officials arriving at the scene revealed that there were 31 derailed cars in the train in positions 31 thru 61. Of those 31 cars, eight cars were loaded with hazardous materials.

As a result of the derailment, release and subsequent fire, the Incident Commander, (the Painesville Fire Chief) ordered the closure of all state routes and local streets within a 1/2 mile radius of the accident area at approximately 12:15 pm on October 10, 2007. This included a local school, residence and industry, and the evacuation of Heisley Industrial Park. The exception was State Route 2, a major east-west highway not directly affected by the derailment or its effects.

There were no reported injuries or fatalities, though the derailment caused a significant hazardous materials release and an evacuation. Monetary damages were estimated to be about $1,375,866.00 to equipment and $200,000 to the track structure.

At 11:00 am on October 12, 2007, the Fire Chief reopened route 44, subsequently suspending the entire evacuation on October 13, 2007 at 1:00 p.m.

ANALYSIS AND CONCLUSIONS:

The investigation was conducted by a team, representing all five of the FRA disciplines.

ANALYSIS: - OPERATING PRACTICES:

Prior to reporting for duty, both crew members had more than the required statutory off duty rest period prior to reporting to duty. The engineer was off from 1:20 p.m. October 7 to 10:00 a.m. October 10th while the conductor was off duty from 5:25 p.m. October 8th to 10:00 a.m. October 10, 2007.

Approaching the accident area, CSX Train 0380-09 was proceeding east on a clear signal indication. The locomotive event recorder of lead locomotive BNSF 4836 indicated that the throttle was in position number 6,

the brakes were released and the End Of Train Device (EOTD) reflected 88 psi at the rear of the train, indicating continuity throughout the train air brake system. The engineer had not applied the automatic or dynamic brakes.

At the point of derailment, CSX Train Q380-09 was moving at a recorded speed of 48 miles per hour in an area where the maximum authorized train speed is 50 miles per hour. The event recorder shows that at the point of derailment, the PCS valve opened, the brake pipe pressure and locomotive amperage were reduced to 0.

The point of derailment was determined to be on number One Main Track at milepost QD 155.62. The railroad is tangent in the vicinity of the derailment with a minimal .05 % descending grade eastward between milepost 155.9 and milepost 155.3. The railroad between Collinwood Yard and Painesville, OH. follows Lake Erie and has minimal curvature and grade.

Crew members said they felt a nudge/jerk just prior to the train going into emergency. They did not see or feel any irregularities in the track and they indicated there was no problem with their equipment.

The engineer said he did not use the bail down feature of the independent brake {engine brake} or position the automatic brake while the train was in emergency. The head end of the train continued approximately 2200 feet before coming to a complete stop. The engineer said he placed the independent brake in the “fully applied” position after stopping.

The engineer said he did not check the event {speed} recorder at the measured mile (milepost QD159 to milepost OD 160) but he believed the event recorder was accurate. The EOTD was working and displayed rear of train air pressure prior to emergency and zero air pressure following the derailment. Engineer certification and crew training was current.

The crew members were tested as required by post accident guidelines established by 49CFR 219. Toxicological test results were negative.

CONCLUSION:

FRA Operating Practices personnel determined no human factors contributed to cause the derailment

ANALYSIS: - MOTIVE POWER & EQUIPMENT:

CSX Train 0380-09 originated in Chicago, Illinois with 112 mixed freight cars. Records indicate that a pre¬departure mechanical inspection and Class 1 air brake test was performed and completed by mechanical personnel assigned to the Car Department at Barr Yard in Chicago, Illinois on 10-9-07 at 7:55 a.m. The train departed Barr Yard, Chicago, IL with no exception taken by CSX mechanical forces to the condition of the trains equipment or brakes.

As previously noted, the train continued without incident, changing crews en route, until the train derailed at Painesville, OH, releasing hazardous materials and causing the evacuation of the local populous. Post accident inspection and testing of the mechanical components at the derailment site showed the following:

The Painesville derailment sight was thoroughly inspected by FRA MP&E personnel and the CSX Director of Incident Investigation & Train Accident Prevention. Prior to the accident scene being disturbed by wreck clearing operations, all major truck components of the first three cars involved in the derailment were located. A detailed mechanical inspection of the first three derailed freight cars’ trucks, wheels/axles & roller bearings showed no signs off mechanical failure. The one broken wheel, buried deep in the middle of the wreckage, was determined to be caused as a result of the derailment forces.

Tank car NATX 300991 showed rail burns on the inside, outside and bottom of the trailing truck sideframe and tank car GATX 1436 was found with a section of rail lodged into the bottom portion of the sideframe. Again, it was determined that the issues with the truck sideframe on these two cars were caused as a result of the derailment rather than a contributing cause of the derailment.

Further, a prudent visual inspection of the rail, wood ties and tie plates showed no damaging marks in the

roadbed leading to the point of derailment, which would have been indicative of a failed or broken freight car component, such as a journal bearing, wheel or axle. In addition to the physical investigation of the derailment site, MP&E personnel also inspected, tested or investigated the following at the derailment site. Inspection of FR.A F 6180-49A ("Blue Card(s"), for the locomotive consist, BNSF 4836 and BNSF 4693 showed the necessary locomotive data and all the scheduled PM maintenance records were found to be in date. A "Daily Inspection" of locomotive consist, BNSF 4836 & BNSF 4693 was recorded on form "Mech 229.21" and inspected by the 0380-09 train crew prior to departure from Cleveland, Ohio on 10-10..O7at 11:00a.m. All basic operational functions of lead locomotive BNSF 4836 on CSX Train Q380-09, such as headlights, auxiliary lights, bell, horn, sanders, window wipers, cab lights, air brake function and event recorder, were operating as intended. There was no evidence of exhaust or battery gases entering the cab compartment.

The head end device (HED) on the locomotive, BNSF 4836, was checked for continuity with the EOTD, UPRQ 61177 which had an annual calibration date of 6-7-07.

The Wheel Impact Load Detector (WILD) report from Grafton, Ohio was reviewed for CSX Train 0380-09 on 10-10-07 at 08:36. This detector is designed to detect freight car wheelS with an out-of-round condition that delivers an impact force to the rail of ninety thousand pounds or more. The unit of measure used in the impact report is a "kip".

The first 30 cars of CSX Train 0380-09, that did not derail, were reviewed for high impact reading. Five out of six of the highest "kip" readings for the 30 head end freight cars of CSX Train 0390-09, that did not derail, ran on the south side rail of CSX # I main. Each one of these freight cars, with an elevated kip reading had 36 inch wheels, meaning that the impact of each wheel would occur every 9.423 feet (36 x 3.141 (pi) = 113.076 inches or 9.423 feet). Only wheel impact readings measuring 140 kips or greater would trigger an alarm in the Dispatcher's office, requiring inspection and action to remove the car from the train. Since no wheel was identified that has a reading beyond the threshold outlined in detail in CSX Wheel Impact Procedures, CMR 16-2001, dated 1/19/07, revision C the train would have continued towards its destination.

Prior to departure of the head 30 cars of CSX Train 0380-09 which did not derail, MP&E personnel conducted a mechanical inspection and class I air brake test, which included locomotives BNSF 4836 and BNSF 4693. The Class I air brake test was initiated from the lead locomotive BNSF 4836 by the CSX Road Foreman on duty. The air brake system was fully charged as is customary. The brake pipe air leakage test was performed by the Air Flow Method (AFM) and leakage did not exceed 60 cubic feet per minute (CFM). The actual CFM leakage rate was zero.

FRA MP&E personnel also reviewed the "readout" of the locomotive event recorder from locomotive BNSF 4693. The data collected from the event recorder on the lead locomotive BNSF 4836 and the second locomotive BNSF 4693 indicated that a train-line initiated emergency brake application occurred, which is consistent with the evidence collected at the derailment sight of Painesville, Ohio.

CONCLUSION:

Inspection of both sides of the train revealed two safety appliance defects, which were repaired prior to departure. There were no defects discovered with the train's air brake system. FRA Motive Power & Equipment personnel found no contributing cause to the derailment

ANALYSIS:

SIGNAL & TRAIN CONTROL:

The railroad in the vicinity of the derailment is a double main track railroad, with two sidings identified as a North Controlled Siding and a South Controlled Siding. CSX Control Point Signal Rules (Rule 261) and Automatic Block Signal Rules (Rule 261) are in effect. General Signal Rule 220 through Rule 288 are also in effect. For movement between Control Point (CP) 155 and CP 154, CSX Transportation uses a Traffic Control System (TCS), controlled by a Computer Aided Train Dispatching Facility, under the direction of a CSX train dispatcher at Indianapolis, IN.

The signal system at CP 155 consists of a mix of GRS color position, color light, and SA mechanism signals,

with GRS Model 50 power switch machines. There are two main tracks, two side tracks, and trains on these tracks are are detected by direct current, low voltage track circuits. Signals are controlled by a GRS rack mounted relay signal system and signal block status is repeated from block to block by means of an underground express cable.

Computer Aided Dispatch (CAD) records from the CSX Indianapolis Control Center, for October 10, 2007, from 11:00 a.m. through 1:00 p.m., indicates the following:

The IH Dispatcher lined the route for the 0380-09 to proceed eastward between CP 155 and CP 154 on Main Track # 1 at 11:27:46. The 2E signal at CP 155 cleared at 11:27:53 and the dispatcher then fleeted the signal to clear east at 11:48:42.

At 11:55:15 the CTC indicates that CSX Train 0380-09 is occupying the track circuit between the OD 159 automatic signal and the QD 158 automatic signal. At 11:57:42 CSX Train 0380-09 indicates occupying the track circuit between the QD 158 automatic signal and CP 155, located at QD 155.8. At 12:00:12, CSX Train Q380-09 indicates entering CP 155 and occupies the track circuit between the signals on Main Track # 1. The 2E signal at CP 155 changes to stop indication. At 12:00:22, CSX Train 0380-09 occupies the # 1 Main Track east of CP 155 proceeding towards the point of derailment. At 12:01:14, the # 2 Main Track at 12:01:16 the South Siding and at 12:01:22 the North Siding all indicate occupancy as the train derailed and was strewn across the right of way and on the other tracks.

Following the derailment and before the FRA S&TC Inspector was notified, CSX Signal Department personnel arrived at the derailment site and made a remote, visual inspection of the signal components at CP 155. There was no damage to any of the components inspected. Since the area near the derailment was under an evacuation order, S&TC personnel were not allowed to seal the signal cases for evidence preservation. In the interim, data logs from the Computer Aided Dispatching system in Indianapolis IN, Hot Box detector records, and wheel impact detector records (WID), for the CSX Train 0380-09 were requested. Inspection and testing would be conducted when the area was safe for entry.

On Thursday, October 11, 2007, Signal & Train Control personnel from FRA and CSX Transportaion arrived at CP 155 for field testing and entered the derailment area. Preliminary observation showed that the track circuits east of control point 155 (CPI 55) were down, due to the derailment and all signals displayed their most restrictive aspect (STOP). All switches in the area were in the normal position for main line moves.

Site distance checks were done from the ground. The # 1 Main Track eastbound signal at CP 155 was readable from 2,800 feet for clear and 4,800 feet for stop. The # 2 Main Track eastbound signal was readable from in excess of a mile. This was due to the different types of signal heads. The signals on # 2 Main Track were recently renewed with a much brighter and easier to see Color Light signal aspects.

There are six signals and two switches within the limits of CP 155. The route taken by CSX Train 0380-09 was an eastward move on the # 1 Main Track, over the Number One switch, which was lined in in the normal position. The Number One switch was fully tested and no exceptions were noted with the functioning of the switch. Signal testing at CP 155 was also done on October 11 and October 12, with no exceptions taken.

An inspection of signal test records of the signal system at CP 155 revealed that testing for the system was in compliance with federal regulations with no exceptions noted. Hot box detector reports were received from the following hot box detectors:

Eastlake, MP QD 165
Marcy MP QDS 10.0
Columbia MP QI 19.0
La Grange MP 01 32.2
New London MP 01 50.5.

Records show no alarms for CSX Train 0380-09 on any of these five hot box detectors.
The Eastlake Hot Box detector was the last detector that CSX Train 0380-09 went over prior to the derailment. It was last calibrated on October 3, 2007 and last inspected on October 12, 2007. No exceptions were noted as the detector was in calibration and proper working order.

Data obtained from the Grafton Wheel Impact Detector (WID) indicates a non critical alarm, with a peak reading of 120.2 on axle LI, south side. Records on the unit at the site indicate that the last time the Grafton WID was calibrated was on August 24, 2004. The WID is on a 3 year calibration cycle and was due to be calibrated as soon as the calibration standard was returned to CSX from a repair facility. The FRA Signal and Train Control Inspector observed a follow-up calibration test at the Wheel Impact Detector in Grafton on October 15, 2007. The calibration test was performed by the vendor, Salient Systems, Inc., that manufactures the equipment, along with a CSX
Communications Technician. Calibration data indicates that for the load cell, #25V, that provided the 120.2 kps peak reading to be out of calibration by a negative 0.4%. That would translate to the 120.2 kps reading changing to 119.9 kps. (kps readings indicate thousands of pounds of pressure.) This indicated that the Ll south rail wheel exerted 119,900 pounds of force at 42.2 miles per hour. The factory representatives said that the force would increase as train speed increased. He commented that if the train had made it to the next WID at MP OD 108.6 and was traveling at maximum authorized speed of 50 mph, it may have been a sufficient impact to alarm.

Signal incident logs were also reviewed the signal system between CP 155 and CP 154 inclusive from December 15, 2006 to October 10, 2007. There were two incidents of the # 1 Main Track circuit failing; one on August 5, 2007 due to a broken angle bar on the south rail at QD 155.6 and the other on July 3, 2007, due to a broken rail 500 feet west of CP 154. All repairs were made to rectify these problems and none of the issues identified above were a contributing cause to the derailment.

CONCLUSION:

FRA S&TC personnel found no contributing cause to the derailment.

ANALYSIS:

HAZARDOUS MATERIALS:

As previously noted, eight (8) cars containing hazardous materials derailed as follows:

TILX 190750, a DOT Specification 11 1A100W1 tank car, built April 2004, with a water capacity of 30,130 gallons was the 31st car in the train. This car was loaded with Alcohols NOS, 3, UN 1987, PG II. The car was observed on its side at a 90 degree angle

NATX 300991, a DOT Specification 11 1A100W1 tank car, built March 2004, with a water capacity of 30,061 gallons was the 32~ car in the train. The car was loaded with Alcohols NOS, 3, UN 1987, PG II. This car was initially observed on its side at a 90 degree angle shortly after the derailment and not leaking.

On the morning of October 11, 2007, tank car NATX 300991 was observed again in a non-leaking condition but at approximately 1:00 pm on the same date, the car was observed leaking at the rate of approximately one gallon per minute from the vacuum relief valve. When the car was re-railed it was determined that approximately 200 gallons of product was lost from the tank car.

A forensic evaluation of the 0-ring in the vacuum relief device by an impartial 3"' party vendor, found that the o -ring failed due to chemical incompatibility with the product being transported inside of the tank car.

GATX 1436, a DOT Specification 11 1A100W1 tank car, built July 2000, with a water capacity of 30,500 gallons was the 33"' car in the train. The car was loaded with Alcohols NOS, 3, UN 1987, PG II. The car was observed on its side at a 90 degree angle.

UTLX 650750, a DOT Specification 11 1A100W1 tank car, built January 1980, with a water capacity of 17,510 gallons was the 43"' car in the train. The car was loaded with Phthalic Anhydride, 9, UN 3257, III. This car was leaking and the contents were burning from both the liquid and vapor, which were valves sheared off as a result of the derailment forces.

TILX 190503, a DOT Specification 11 1A100W1 tank car, built December 2003, with a water capacity of 30,130 gallons was the 515t car in the train. The car was loaded with Alcohols NOS, 3, UN 1987, PG II. This

car was leaking as a result of the liquid valve being sheared off as a result of the derailment forces.

NATX 303685, a DOT Specification 11 1AIOOW1 tank car, built March 2007, with a water capacity of 30,190 gallons was the 52'~" car in the train. The car was loaded with Alcohols NOS, 3, UN 1987, PG II. This car was leaking from a 14 inch gash above the BL tank saddle, which occurred as a result of the derailment forces.

NATX 302127, a DOT Specification 11 IA100W1 tank car, built September 2006, with a water capacity of 30,210 was the 53"' car in the train. The car was loaded with Alcohols NOS, 3, UN 1987, PG II. The car was observed on its side at a 90 degree angle.

GATX 59202, a DOT Specification 1 12J340W tank car, built September 1998, with a water capacity of 33,713 gallons was the ~ car in the train The car was loaded with Liquefied Petroleum Gas, 2.1, UN 1075. The car was observed upright with one truck derailed.

CONCLUSION:

FRA HM personnel found no contributing cause to the derailment. A follow-up investigation of tank car NATX 300991 showed that the car was offered for transportation with an incompatible o¬ring material in the vacuum relief device. As a result, evidence for a civil prosecution will be submitted to the office of Chief Counsel, against the shipper of this tank car.

ANALYSIS:

TRACK:

The track in the derailment area is constructed with 132-lb continuous welded rail (CWR), with a 3 spike pattern (2 gage-field) with 24" tie centers. The manufacturer brand marking on the rail was 132.25 Tennessee USS, September 1978, RE CC that was installed in 1979. A CSX HBD-HWD defective equipment detector {ten miles proir to the derailment} tested the track at at Eastlake, OH. at MP QD 165 and showed no defects for the train. Defective equipment detectors at Newlond and LaGrange, Illinois also indicated no defects to CSX Train 0380-09 prior to arrival of the train at Collinwood Yard, Cleveland OH.

A Wheel Impact Load Detector (WILD) at Grafton, OH., recorded an elevated reading, but was below the threshold for the detector to activate and send a "defect indicated" radio voice message to the inbound 038009 crew. An internal electronic exception report was generated and sent to the General Car Foreman. The car would be routed to a repair facility after unloading.

Westbound CSX Train 0377-09 was the last train over Number One Main Track at the derailment site. Carrier records indicate the time was 9:58 a.m and the train crew of CSX Train 0377-09 said they did not see or here anything unusual. Subsequent investigation show that the lead locomotive of CSX Train 0377-09 was equipped with a video camera. Reviewing the movie from that video camera shows a dark spot at the rail joint on Main Track Number One, at milepost QD 155.62 on the south rail, which was conclusively determined to be the point of derailment.

The investigative team reviewed the history of the derailment site and determined that at this location, a plug rail was installed after a rail defect was detected on December 15, 2006. The plug rail was 136 lb rail RE section measuring 20-feet 5-inches in length and had offset joint bars and bolts that secured it in place. The 136 lb rail brand marking was 136.10 Beth Steelton May 1996, RE CC. No joint plug CSX rail ultrasonic test certification marking was visible on the rail.

The west end joint had evidence of multiple fractures and rail end batter, however, the rail was tested on July 5, 2007 and on April 17, 2007 and no internal rail flaws were detected during those tests. This area is the location where the first car (NATX 300991) initiated the derailment. Rail fragments from this joint area were found approximately 125 feet west of the P.O.D, and approximately 200 feet east of the P.O.D, within the wreckage area. Portions of the plug rail and adjoining track along with pieces of broken rail and bolt have been sent to the National Transportation Safety Board (NTSB) Laboratory.

CONCLUSION:

Investigation of all factors involved in railroad operations revealed that CSX was not in compliance with the Federal Track Safety Standards concerning the joint bars installed on the west end of the plug.

On September 12, 2007, CSX replaced the field 132-136 joint bar on the west end of the plug. Prior to replacement, both the field and gage joint bars were “step” or “transition” or "compromise" joint bars made to accommodate the difference in the head height of these two rail sections (3/16” unworn rail to unworn rail). These step bars are stamped “132” on one end and “136” on the other end of the bar. When the field bar was replaced, a straight joint bar was installed, (Stamped “132-136” in the center of the bar).

While the bottom of head to top of base (fishing) dimension is the same for both 132 and 136 RE rail sections, the installation of the straight bar on the field side paired with a step bar on the gage side, resulted in an asymmetrical clamping force into the rail. This improper mechanical loading of the rail resulted in undesirable internal rotational (twist) force in the railhead. Despite the 3/16” step in the bars the accumulated tonnage on the parent rail forced CSX to deeply grind the railhead in the 136 down in a “ramp” to match the treads of the two rails. This ramp resulted in dynamic impact loads on the asymmetrically clamped rail. These two forces likely caused premature and accelerated fatigue in the railhead and web/base fillet area of the 136 lb rail resulting in its catastrophic failure.

As a result, evidence for a civil penalty will be submitted to the office of Chief Counsel for the non¬complying conditions noted above

GENERAL CONCLUSIONS:

An analysis of all the factors involved in the accident show conclusively that the only causal factor involved in the accident was the catastrophic failure of the rail under load. There were no other contributing factors in the accident.

Peripheral to the accident was the finding by FRA HM personnel that gasket material used in the vacuum relief device of a majority of the nation’s ethanol rail fleet was incompatible, causing premature failure of the gasket and a subsequent loss of contents.

PROBABLE CAUSE:

The probable cause of the accident is FRA Cause Code T211: Broken Rail - Head and Web Separation (within joint bar limits). This is due to the east end of the west joint of the 136-lb plug rail, which measured 20-feet 5-inches, shattering under the movement of the CSX Train Q380-09 at milepost QD155.62. Both CSX Transportation and the Federal Railroad Administration agree with the probable cause.