Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2010-60

Norfolk Southern Corporation (NS)
Midville, GA
November 21, 2010

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-2010-60

1.Name of Railroad Operating Train #1: Norfolk Southern Corp. [NS]	1a. Alphabetic Code: NS	1b. Railroad Accident/Incident No.: 040606
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: Norfolk Southern Corp. [NS]	4a. Alphabetic Code: NS	4b. Railroad Accident/Incident No.: 040606
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 11 | Day 21 | Year 2010	7. Time of Accident/Incident: 05:05:00 ☐ 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
18	10	5	59	Georgia

14. Nearest City/Town	15. Milepost *(to nearest tenth)*	16. State Abbr	16. State Code	17. County
Midville	S95.40	GA	13	BURKE

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
45 F	3	1	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 Track #S	4	13	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	192G521

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?
48 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)*: 7823

Code(s): j | N/A | N/A | N/A | N/A

31a. Remotely Controlled Locomotive?: 0

32. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded *(yes/no)*
(1) First involved *(derailed, struck, etc)*	SHPX204359	1	yes
(2) Causing *(if mechanical cause reported)*	N/A	0	yes

33. 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

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
(1) Total in Train	2	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	50	0	40	0	0
(2) Total Derailed	29	0	9	0	0

37. Equipment Damage — This Consist: $2,050,800.00

38. Track, Signal, Way, & Structure Damage: $300,000.00

39. Primary Cause Code: T204

40. Contributing Cause Code: N/A

Number of Crew Members

41. Engineer/ Operators	42. Firemen	43. Conductors	44. Brakemen
1	0	2	0

Length of Time on Duty

45. Engineer/Operator	46. Conductor
Hrs 4 Mi 5	Hrs 4 Mi 5

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. 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

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

113. Circumstance	Code
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?	Code
1. Highway User 2. Rail Equipment 3. Both 4. Neither	N/A

114b. Was there a hazardous materials release	Code
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
	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

116. Signaled Crossing *(See instructions for codes)*	Code
	N/A

117. Whistle Ban	Code
1. Yes 2. No 3. Unknown	N/A

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

119. Crossing Warning with Highway Signals	Code
1. Yes 2. No 3. Unknown	N/A

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

121. Age	122. Driver's Gender	Code
N/A	1. Male 2. Female	N/A

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

124. 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

125. Driver Passed Highway Vehicle	Code
1. Yes 2. No 3. Unknown	N/A

126. 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

Casualties to:	Killed	Injured
129. Highway-Rail Crossing Users	N/A	N/A

127. Driver	Code
1. Killed 2.Injured 3. Uninjured	N/A

128. Was Driver in the Vehicle?	Code
1. Yes 2. No	N/A

130. Highway Vehicle Property Damage *(est. dollar damage)*
N/A

131. Total Number of Highway-Rail Crossing Users *(include driver)*
N/A

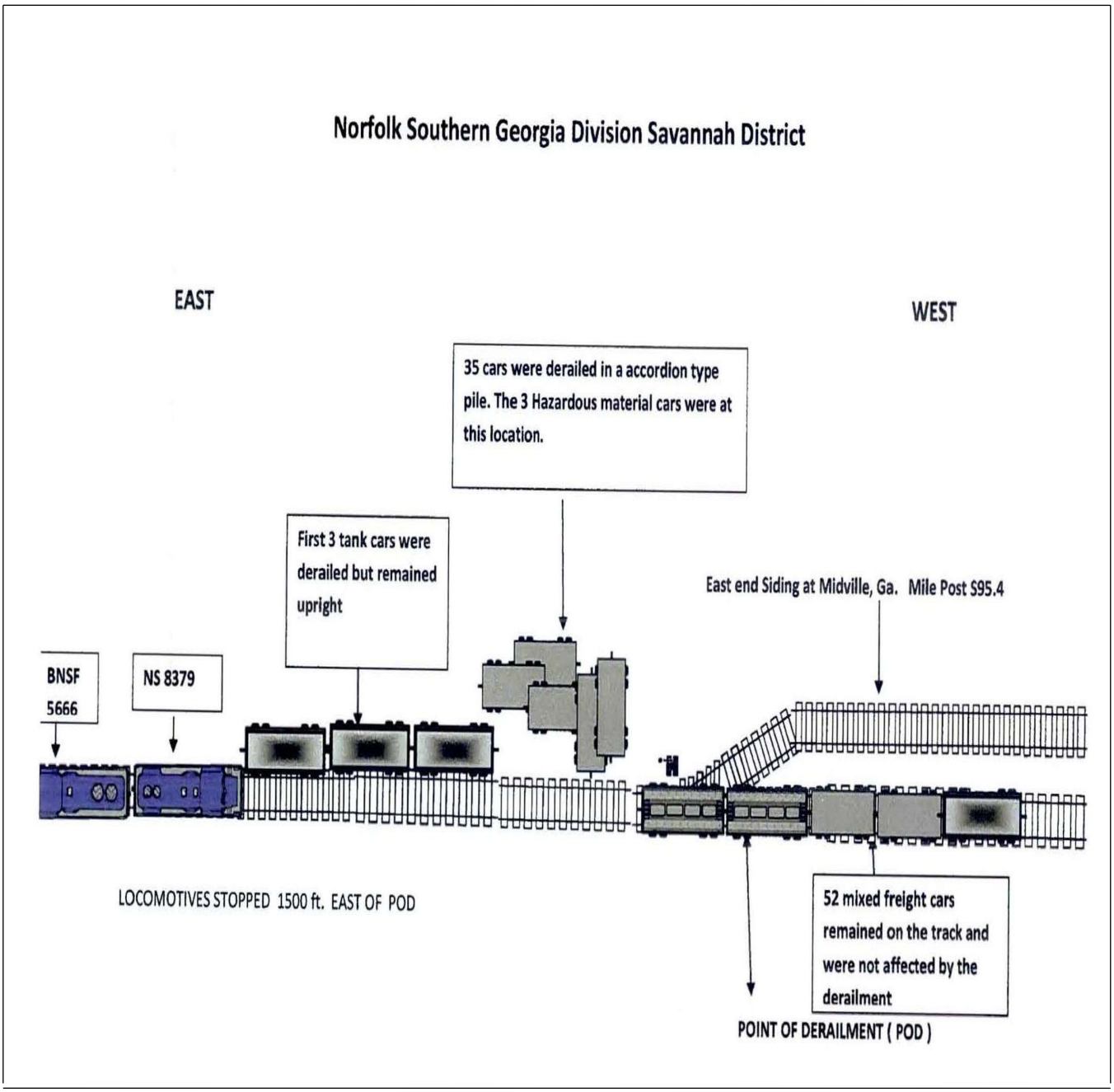
132. Locomotive Auxiliary Lights?	Code
1. Yes 2. No	N/A

133. Locomotive Auxiliary Lights Operational?	Code
1. Yes 2. No	N/A

134. Locomotive Headlight Illuminated?	Code
1. Yes 2. No	N/A

135. Locomotive Audible Warning Sounded?	Code
1. Yes 2. No	N/A

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



137. SYNOPSIS OF THE ACCIDENT

On November 21, 2010, at 5:05 p.m. Eastern Standard Time (EST), an eastbound Norfolk Southern Corporation (NS) Train192G521 derailed at MP S95.40 on NS Georgia Division in Midville, GA. The crew consisted of a locomotive engineer, conductor, and a conductor trainee. Train192G521 consisted of two locomotives and 50 loaded mixed freight cars and 40 empty cars, traveling eastbound from Macon to Augusta. The train gross tonnage was 7823 and was 5201 feet in length.

Train192G521 departed Brosnan Yard at 1 p.m. on a clear signal, heading East on the Savannah District, Georgia Division. According to the crew, the trip was uneventful as they approached Midville, GA. The train was traveling at 48 miles per hour (MPH), as they approached MP S95.40 when the train crew experienced an emergency brake application. The first three cars behind the second locomotive derailed in an upright position and remained coupled to the locomotives. The next thirty five cars also derailed but were scattered on their side and in a pile. Burke County Sheriff, fire and local emergency medical service, arrived at the scene around 5:15 p.m.

There were no injuries as a result of the derailment. A release of hazardous materials resulted in the Burke County Fire Department to evacuate 59 citizens from the surrounding area. Citizens were allowed to return to their homes after 48 hours. This is not an Amtrak route. Equipment damages totaled $2,050,800 with Track and Structure damages of $300,000.

At the time of the accident visibility was clear with a temperature of 45 Fahrenheit.

The probable cause of this derailment is broken field weld. FRA accident code T204.

138. NARRATIVE

Circumstances Prior to the Accident

The crew of Train192G521 consisted of a locomotive engineer, conductor and conductor trainee. The crew went on duty at 1 p.m. EST, November 21, 2010, at the NS Brosnan Yard in Macon, GA. This is also the home terminal for each. All crew members received more than the statutory off duty period prior to reporting for duty. The conductor received train orders, Class 1 airbrake test slip, and train consist at Brosnan Yard before departing. The crew boarded Train192G521 consisting of two locomotives, BNSF 5666 in the lead and NS 8379 trailing, with fifty loaded mixed freight and forty empty cars. Train192G521 had 7823 trailing tons and was 5201 feet in length. At 1 p.m., Train192G521 received authority No. 7495 from the train dispatcher to proceed from Macon, GA MP 123 to Augusta, GA on the NS Savannah District. The train departed Brosnan Yard at 2:15 p.m. in an eastward direction destined for Augusta.

The train crew was seated in the lead locomotive when they departed Brosnan Yard in an eastward direction on a clear signal for Augusta, GA on the Savannah District. According to the train crew there were no scheduled stops and the trip was uneventful. Approaching the accident location, the engineer was seated at the controls on the right side of locomotive BNSF 5666; the conductor was seated on the left side in the conductor's seat, and the conductor trainee was seated in the center seat. The train was operating at a recorded speed of 48 mph as it approached MP S95.4.

Trains traveling between MP S94.5 to MP S95.4 would experience an ascending grade of .17 percent. The single main track is tangent between these locations; the East Midville Siding switch is at MP S95.4. The track at the derailment location is constructed with 115-pound continuous welded rail (CWR) fastened to wooden crossties. The rail is box anchored 294 feet before, after, and through the switch. The track runs parallel with Georgia State Route 17 and intersects Georgia State Route 56 located at MP S94.0 at the eastern most limits of the town of Midville, GA. There is one industry, several businesses, city government offices, and residential houses at this location.

NS timetable and geographic direction is east/west. NS timetable directions are used throughout this report.

The Accident

The crew consisting of the engineer, conductor, and conductor trainee reported that while operating over the East Midville Siding switch they heard a loud crack or pop. The lead locomotive began rocking hard from side to side, prior to the train's air brake system going into emergency. The conductor said when he looked backwards, he could see a cloud of smoke and realized the cloud was a result of the three cars that remained coupled to the engines being dragged in the ballast. At 5:05 p.m. the train experienced an emergency air brake application while traversing over the East Midville Siding Switch at MP S95.4 coming to a stop 1500 feet later. The engineer immediately contacted the dispatcher by locomotive radio to notify him the train had gone into emergency. He also informed the dispatcher that the conductor was going to walk the train to assess the derailment. The conductor and the trainee gathered the paper work and dismounted the locomotive to investigate. As the conductor approached the rear locomotive he stated that there were several cars piled up about fifteen car lengths from the locomotives. He instructed the trainee to return back to the locomotive. They both boarded the lead engine, and the conductor briefed the engineer of the derailment. The engineer immediately contacted the dispatcher to inform him of the derailment. The entire crew walked the derailment again to assess the damage. The engineer used the train consist to note which cars derailed and what materials were being transported. The engineer noted that hazardous material cars were involved in the derailment. He went back to the locomotive and informed the dispatcher that hazardous material cars were involved. The dispatcher instructed the engineer to secure the cars still coupled to the locomotives, separate from the train, and proceed to Herndon, the next station at MP S90.0. They arrived at Herndon at 6 p.m. The dispatcher contacted the crew once they reached Herndon and instructed them to proceed to Millen at MP S79. They arrived at Millen at 7 p.m. The NS Road Foreman of Engines arrived at the depot at about 8:00 p.m. At this time the engineer gave the Road Foreman of Engines all the paperwork including; the train consist, the brake slip, the wheel report, the bulletins, the track authorities, and the delay report.

At 5:28 p.m. the Burke County Sherriff's Department notified the fire department of the derailment and dispatched Engine Company 4 to the derailment site. The Burke County Sherriff's Department was directing travel flow while the fire chief talked to the engineer by cell phone about the hazardous materials involved in the derailment. Other agencies responding to the derailment included The Burke County Emergency Management Agency, U.S. Environmental Agency, and Georgia Environmental Protection Division.

The State of Georgia Department of Transportation (DOT) closed the intersection of Highway 56 and Highway 17 in Midville, GA and U.S. Highway 25 in Millen, GA. The Burke County Sheriff's Department was the primary agency performing the evacuation of the local citizens. Utilco Railroad Services, Hulcher Services, and R.J. Corman Derailment Services provided derailment services. The Sheriff's Department lifted the evacuation and road closures at 2:00 p.m. on November 23, 2010. The track was restored to service at 3:00 p.m. on November 24, 2010.

Analysis and Conclusions

Analysis – Locomotive Engineer Operating Performance

The event recorder download from lead locomotive BNSF 5666 indicated at the time of the emergency air brake application the locomotive was operating forward in the number 3 throttle position at a recorded speed of 48 mph. NS management took to no exceptions to the train handling. Locomotive BNSF 5666 was equipped with an on-board video camera. The FRA viewed the video of the on-board camera at the NS office in Atlanta, GA. The video portion of the camera failed to show any evidence leading to the cause of the derailment. However, just prior to the emergency train air brake application, the video showed the locomotive sway from side to side as it traveled over the switch. This movement was noted as normal movement over the switch. The audio portion of the video did not produce any unusual sounds.

Conclusion:

Train handling or train make up was not a factor in the derailment.

Toxicological Conclusion:

A toxicology test of all crew members was performed and the results were negative.

Analysis and Conclusions

Hazardous Material Analysis

SCMX4309 a loaded ,tank car containing 176,370 pounds of Methyl Ethyl Ketone, classified as a flammable liquid, sustained a head puncture and released all its contents onto the ground. Following the derailment, a fire ensued when a cable from a bulldozer rubbed against a section of rail causing a spark which ignited the flammable vapor from car SCMX4309. This occurred during the clearing operations. The fire was limited to the roadbed and ground on the north side of the track structure and was allowed to burn in a controlled manner consuming most of the spilled product.

TCMX450166, a loaded covered hopper car was laying on its side and containing 188,800 pounds of Sodium Carbonate Peroxyhydrate, classified as oxidizer, sustained damage to the underside of two of its five hoppers, which was releasing about 50,000 pounds of product onto the ground. The product remaining in the car was unloaded into trucks and forwarded to the consignee.

OLNX114053, a tank car containing the residue of Chlorine, classified as poisonous gas, sustained a two inch hairline fracture in the tank shell on the side of the car, releasing minimal intermittent amounts of Chlorine gas. An emergency response railroad contractor stopped the vapor leak using a temporary patch made of a steel epoxy compound held in place by a steel bar and J-clamps with magnets. The remaining product vapor was pumped into a tank truck containing a solution of Sodium Hydroxide, and forwarded to the consignee.

Two loaded tank cars, TCIX06193 containing 196,200 pounds and GATX090681 containing 201,150 pounds of Sodium Hydroxide Solution, classified as corrosive material, together released about 60,000 pounds of product onto the ground. One of the cars sustained a small puncture in the tank shell on its left side, while the other car sustained damage to its safety valve. The remaining product in both cars was transferred into tank trucks and forwarded to their consignee.

Conclusion: Hazardous materials were not a causal factor in the derailment.

Operating Practices Analysis

The engineer said he was operating at track speed and did not observe any unusual track conditions as Train 192Q521 passed MP S95.4. The event recorder on BNSF locomotive 5666 revealed the train was traveling at 48 mph, brake pressure was a constant 89 lbs and the throttle was in position 3. The trains' airbrake system went into emergency at MP S95.4 and the train stopped in about 1500 ft.

Operating Practice Conclusion: Train operation was not a causal factor in this derailment.

Analysis – Track:

On March 16, 2009, Sperry Rail Test Car 975 made a search for internal rail defects with one exception noted at MP S95.40. The defect noted was a Defective Weld Field (DWF). The defect was found on the left rail on 115 pound rail. NS records indicate the defect was repaired on March 16, 2009. On August 2, 2010, Sperry Rail Test Car 975 made a search for internal rail defects with one exception noted at milepost S95.40. The defect noted was a Defective Weld Field (DWF). The defect was found on the left rail on 112 pound rail. NS records indicate the defect was repaired on August 2, 2010. On October 26, 2010 the NS36 Geometry Car conducted a survey over this segment of track with no exceptions noted. The main track has a maximum speed of 50 mph, FRA Class 4, which requires twice weekly inspections. The accident location was last inspected by NS Assistant Track Supervisor on November 19, 2010, with no exceptions noted in the derailment area. There were no speed restrictions in place at the derailment location.

Overall Analysis:

NS officials recovered a section of rail from the Midville, GA derailment site and forwarded it to the Research and Tests Department at Roanoke, Virginia on January 20, 2011. This rail section was located about 12 ft west of the north guard rail and was recovered near the Point of Derailment (POD). The mating east side of the fracture was not recovered. NS research Department conducted a visual examination of the rail which indicated a vertical break in a field weld. The rail section had severe batter at the running surface, consistent with wheel tread impact from westbound trains. No flange marks were evident on the head, base, or web of the rail that indicated any wheels had derailed during this westbound move. The derailed train was eastbound and could not have produced the receiving end batter associated with this broken weld.

Analysis indicated that the fracture origin was in an area near the web/base fillet on the gage side of the rail. Macroscopic examination of this area revealed a circular depression connected with a rectangular-shaped depression that extended to the surface of the collar. The fracture was difficult to evaluate due to the corrosion of the rail. However, NS researchers viewed this area from a different angle and determined a channel containing dendrite structures were observed radiating from the depressions. Dendrites are formed only when a void is created during final solidification of the weld metal. Visible dendrites in the fracture face are associated with shrinkage voids, hot tears, or gas voids. The presence of these dendrites is positive evidence of a defect in the area of fracture initiation.

Regarding the defective weld, no stamping was present on the weld to indicate the age of this weld. However, the general appearance indicates that the weld was not recently made.

The presence of receiving end batter from a westbound train indicates that the weld was broken prior to the arrival of eastbound Train192G521. In addition, markings on the flange and tread/front face radius of the L3 wheel on the south side of the 2nd locomotive (NS 8379) indicates that the wheel had struck something despite the fact that all wheels were properly on the rails after the derailment. The west end of the main filler and wing rail would have provided the only opportunity for this wheel to re-rail prior to encountering the east end of the wing rail which would have forced the wheel to the north (away from the track). According to NS research team, these multiple marks may correspond to the marks on the L-3 wheel.

Overall Conclusion:

FRA agrees with NS rail evaluation as to the cause of this derailment. The probable cause of the derailment was a Broken Weld (Field), FRA Code T204.

Fatigue Analysis and Conclusion:

FRA obtained fatigue information from NS, including a 10-day work history for the three NS employees involved in this derailment. They were the Engineer, Conductor, and Conductor Trainee of Train Q192G521. A program default setting of excellent was used when conducting this analysis. FRA uses an overall effectiveness rate of 77.5 percent as a baseline for fatigue analysis program, which is equivalent to blood alcohol content (BAC) of 0.05. At or above this baseline, FRA does not consider fatigue as probable. The results of trains crews fatigue analysis follows:

Fatigue Conclusions:

Train Symbol 192G521 engineers's effectiveness level at the time of the derailment was 86.47 percent.
Lapse index of 2.0
Reaction Time 116
Chronic Sleep Debt 6.06
Hours of continuous Wakefulness 11.13 Hours
Time of day 5:07 p.m.
Blood Alcohol Equivalency of approximately <0.05

Conclusion: Fatigue was not evident for this employee.

Train Symbol 192G521 conductors's effectiveness level at the time of the derailment was 86.27 percent.
Lapse index of 2.0
Reaction Time 116
Chronic Sleep Debt 6.06
Hours of continuous Wakefulness 11.13 Hours
Time of day 5:07 p.m.
Blood Alcohol Equivalency of approximately <0.05

Conclusion: Fatigue was not evident for this employee.

Train Symbol 192G521 trainee's effectiveness level at the time of the derailment was 83.93 percent.
Lapse index of 2.5
Reaction Time 120
Chronic Sleep Debt 6.49
Hours of continuous Wakefulness 11.13 Hours
Time of day 5:07 p.m.
Blood Alcohol Equivalency of approximately <0.05
Conclusion: Fatigue was not evident for this employee.