Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2005-108

Norfolk Southern (NS)
Reynolds, Georgia
December 22, 2005

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-2005-108

1.Name of Railroad Operating Train #1: Norfolk Southern Corp. [NS]	1a. Alphabetic Code: NS	1b. Railroad Accident/Incident No.: 23530
2.Name of Railroad Operating Train #2: N/A	2a. Alphabetic Code: N/A	2b. Railroad Accident/Incident: N/A
3.Name of Railroad Responsible for Track Maintenance: Norfolk Southern Corp. [NS]	3a. Alphabetic Code: NS	3b. Railroad Accident/Incident No.: 23530
4. U.S. DOT_AAR Grade Crossing Identification Number:	5. Date of Accident/Incident: Month 12 / Day 22 / Year 2005	6. Time of Accident/Incident: 04:30: ☐ AM ☑ PM

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

8. Cars Carrying HAZMAT	9. HAZMAT Cars Damaged/Derailed	10. Cars Releasing HAZMAT	11. People Evacuated	12. Division
1	1	0	0	Georgia

13. Nearest City/Town	14. Milepost *(to nearest tenth)*	15. State Abbr	15. State Code	16. County
Crawford	M227.8	N/A	GA	PEACH

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

21. Track Name/Number	22. FRA Track Class (1-9, X)	Code	23. Annual Track Density *(gross tons in millions)*	24. Time Table Direction 1. North 3. East	Code
Single Main		3	12.9		1

OPERATING TRAIN #1

25. Type of Equipment Consist *(single entry)* 1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/switching 8. Light loco(s). 9. Maint./inspect.car A. Spec. MoW Equip.	Code	26. Was Equipment Attended? 1. Yes 2. No	Code	27. Train Number/Symbol
	1	1	1	198G620

28. Speed *(recorded speed, if available)* R - Recorded E - Estimated			Code
	34	MPH	R

29. Trailing Tons *(gross tonnage, excluding power units)*: 9477

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

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

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

31. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded *(yes/no)*
(1) First involved *(derailed, struck, etc)*	N/A	35	yes
(2) Causing *(if mechanical cause reported)*	0	0	N/A

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

Alcohol	Drugs
0	0

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

34. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote
(1) Total in Train	3	0	0	0	0
(2) Total Derailed	0	0	0	0	0

35. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	64	0	62	0	0
(2) Total Derailed	11	0	14	0	0

36. Equipment Damage This Consist	37. Track, Signal, Way, & Structure Damage	38. Primary Cause Code	39. Contributing Cause Code
390100	18000	T220	N/A

Number of Crew Members

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

Length of Time on Duty

44. Engineer/Operator	45. Conductor
Hrs 3 Mi 0	Hrs 3 Mi 0

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

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

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

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

OPERATING TRAIN #2

52. Type of Equipment Consist *(single entry)* 1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/switching 8. Light loco(s). 9. Maint./inspect.car A. Spec. MoW Equip.	Code	53. Was Equipment Attended? 1. Yes 2. No	Code	54. Train Number/Symbol
	N/A	N/A	N/A	N/A

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

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

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

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56. Trailing Tons *(gross tonnage, excluding power units)*	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)	2 = Remote control tower 3 = Remote control transmitter - more than one remote control transmitter
N/A			N/A N/A N/A N/A N/A	N/A

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

59. 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

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

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

62. 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

63. Equipment Damage This Consist: 0

64. Track, Signal, Way, & Structure Damage: 0

65. Primary Cause Code: N/A

66. Contributing Cause Code: N/A

Number of Crew Members

67. Engineer/ Operators	68. Firemen	69. Conductors	70. Brakemen
N/A	N/A	N/A	N/A

Length of Time on Duty

71. Engineer/Operator: Hrs 0 Mi 0

72. Conductor: Hrs 0 Mi 0

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

76. EOT Device? 1. Yes 2. No — N/A

77. Was EOT Device Properly Armed? 1. Yes 2. No — N/A

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

Highway User Involved

79. Type — 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)*

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

81. Direction *(geographical)* — Code: N/A
1.North 2.South 3.East 4.West

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

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

Rail Equipment Involved

83. 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)*

84. Position of Car Unit in Train: N/A

85. Circumstance — Code: N/A
1. Rail Equipment Struck Highway User
2. Rail Equipment Struck by Highway User

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

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

87. Type of Crossing Warning — Code(s): N/A N/A N/A N/A N/A N/A N/A
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

88. Signaled Crossing Warning Code *(See instructions for codes)*: N/A

89. Whistle Ban — Code: N/A
1. Yes 2. No 3. Unknown

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

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

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

93. Driver's Age: N/A

94. Driver's Gender — Code: N/A
1. Male 2. Female

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

96. Driver — Code: N/A
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)*

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

98. View of Track Obscured by *(primary obstruction)* — Code: N/A
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

101. Casulties to Highway-Rail Crossing Users	Killed	Injured
	N/A	N/A

99. Driver Was — Code: N/A
1. Killed 2.Injured 3. Uninjured

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

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

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

104. Locomotive Auxiliary Lights? — Code: N/A
1. Yes 2. No

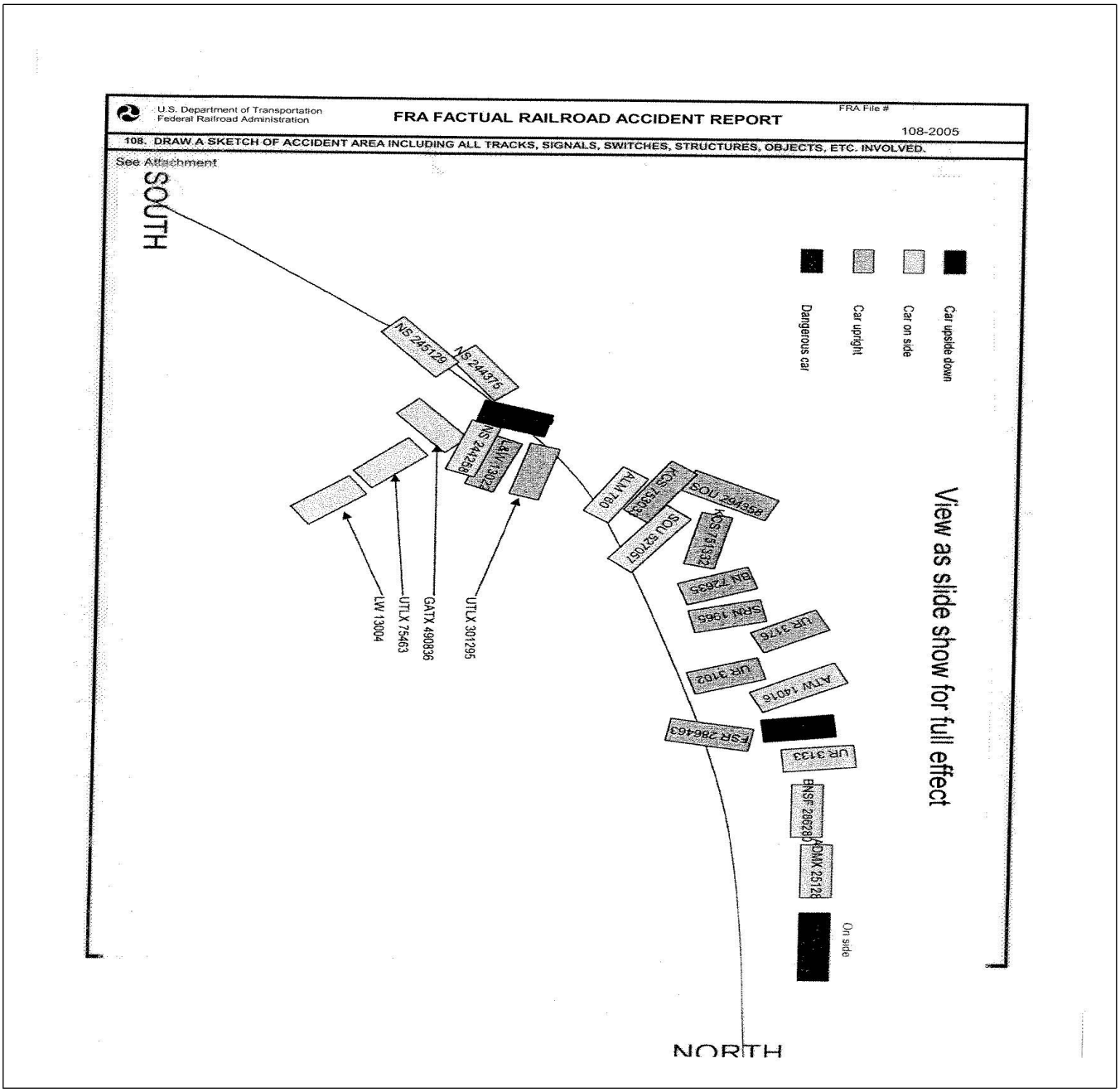
105. Locomotive Auxiliary Lights Operational? — Code: N/A
1. Yes 2. No

106. Locomotive Headlight Illuminated? — Code: N/A
1. Yes 2. No

107. Locomotive Audible Warning Sounded? — Code: N/A
1. Yes 2. No

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

HQ-108-2005 sketch.jpg



109. SYNOPSIS OF THE ACCIDENT

On December 22, 2005, the train crew for Norfolk Southern (NS) northbound Train 198G620 reported for duty at NS Columbus Yard, in Columbus, Georgia (GA) at 1:30 p.m., Eastern Standard Time (EST). The crew consisted of a conductor and locomotive engineer. The train consisted of three locomotives, NS 6628, NS 5344 and KCS 7015, and 126 cars of which 21 contained hazardous material. The train weighed 9,477 tons and was 7,124 feet in length.
About 4:30 p.m., Train 198G620 was operating at 34 miles per hour (mph) on the Columbus District single main track. Near milepost (MP) M228 they felt the slack run in, then adjust at MP M227.5, then the crew experienced an undesired emergency application of the train air brakes. After the train stopped, the conductor walked back 18 cars and observed the train had broken a knuckle on the 18th car. He asked the engineer to throw off a knuckle and pull ahead 18 car lengths. The conductor mounted the last car and told the engineer to shove back ten car lengths. At MP M227.3 he could see the rear portion of the train and instructed the engineer to stop. He observed the 22nd through the 46th cars had derailed. The first derailed car was KCS 751332 a load containing pulp-board. A loaded Liquid Carbon Dioxide hazardous material car, GATX 27403 tank car, was one of the 25 derailed cars, but was not leaking.
Track damage is $18,000, equipment damage is $390,100. There were no injuries or hazardous material spilled. The temperature was 58 F with clear visibility.
The cause of the derailment was a broken rail(transverse/compound fissure).

110. NARRATIVE

The following information was obtained from an investigation that was conducted by the FRA.
Circumstances Prior To The Accident
On December 22, 2005, at 1:30 p.m., an NS train crew reported for duty at Columbus Yard in Columbus, GA. The two employees, an engineer and conductor, were assigned to operate Northbound freight Train 198G620 from Columbus Yard in Columbus to Brosnan Yard, in Macon, GA. The train consisted of three locomotives, NS 6628, NS 5344, and KCS 7015, 126 cars, 64 loads and 62 empties, weighing 9,477 tons and 7,124 feet in length.
The crew had a job briefing and contacted the yardmaster for location of their train, which was on the main track at the north end of the yard. The engineer contacted the train dispatcher and copied track warrant 5096 authorizing Train 198G620 to operate from Newby MP (M287.0) to Columbus Jct. (M220.0) on the NS Columbus District, Georgia Division. They departed Columbus Yard at 2:08 p.m.
The engineer said the dynamic brakes were not working properly when they left Columbus Yard, therefore, he had to control the train speed using throttle modulation and the train air brakes. The engineer was sitting on the right side of the locomotive cab, and the conductor was sitting in the front seat on the left side of the locomotive cab. The train was traveling in a northward direction at 34 mph.
Approaching the derailment location, beginning at MP M230, the track is tangent, with 0.12-percent descending grade for a distance of 0.7 mile. At MP M229.7 begins a 1.5-degree left hand curve with a .07-percent descending grade. The next mile is tangent on a .07-percent descending grade. At MP M228.1 begins a 2.5-degree left hand curve, then a 2.7-degree right hand curve for 0.6 mile.
The railroad's timetable direction of this train is north. The geographic direction was northwest. Timetable directions are used throughout this report.
The Accident
The engineer said at MP M228.0 he felt the slack run in and adjust out when the locomotive reached MP M227.5. At this point the train traveling at 34 mph had an undesired emergency application of the train air brakes. The lead locomotive came to a stop at MP M227.3. The conductor looked back and could see an opening in his train. He walked toward the rear of his train and informed the engineer they had broken a knuckle. He asked the engineer to throw off a knuckle and pull ahead 18 cars. The conductor stopped the

movement at the knuckle, secured three step protection, and replaced the broken knuckle. He mounted the rear car, instructed the engineer to shove back ten car lengths, and observed the rear portion of his train, which had derailed. About 5 p.m. the conductor called the engineer via radio and told him to notify the train dispatcher that 25 cars had derailed on Train 198G620. After reviewing the train consist, he informed the dispatcher that one of the derailed cars contained hazardous material, Liquid Carbon Dioxide.
At 5:45 p.m. the train dispatcher notified the assistant superintendent of operations in Atlanta, GA, the assistant division engineer in Atlanta, the trainmaster at Americus, GA, and the roadmaster and mechanical superintendent at Macon about the derailment. They arrived at the accident site about 6:50 p.m. to determine the cause. Derailment repair crews from Hulcher and RJ Corman arrived at bout 10 p.m. and began the accident clean up.

Analysis and Conclusion
These damages did not qualify for Post Accident Toxicological Testing under Subpart-C of 49 CFR, Part 219.201. However, NS officials made a good faith determination and tested the engineer and conductor. The tests were negative for both employees.
The maximum authorized speed on the Columbus District is 49 mph. At the point of derailment (POD), the speed is restricted to 35 mph. The download from the event recorder indicates that Train 198G620 reached a speed of 34 mph prior to the emergency application of the train air brakes. NS road foreman of engines reviewed the event recorder and determined that the engineer followed all train handling requirements.
NS is required to conduct operational tests and inspections on all train and engine service employees. A review of tests conducted on the locomotive engineer revealed that NS officials checked this individual for operating and safety rules compliance a total of 60 times between November 22, 2005 and December 22, 2005, with no failures recorded. The conductor was observed a total of 54 times with no failures recorded.
The FRA conducted an inspection of NS track records, which included: the Sperry Rail Car Report dated August 9, 2005, track geometry car report dated September 14, 2005, and track inspections for the week of December 19, 2005 through December 23, 2005. After reviewing these records no defects were noted that were related to this accident.
An investigation of the derailment site was conducted by FRA and NS mechanical, engineering and transportation managers. At this location, the rail was 115 lbs welded rail rolled in December 1953 and installed in 1999 by NS Maintenance of Way. New wood crossties and track surfacing was completed in January 2005. At MP M227.8, the POD, investigators found a section of 115 lbs rail that was battered in the left hand curve on the high rail. An inspection of this rail-end indicated the rail contained an internal defect. This was shown by a dark area located on the bottom of the rail ball surrounded by a shiny, brightly colored break. The suspected pieces of broken west rail was cut out and sent to NS's laboratory for testing. NS tested the two pieces of rail and the test revealed the rail pieces had about 40% Transverse Defect. The Transverse Defect contained 30% normal growth and 10% rapid growth. The cause of the derailment of Train 198G620 was a Transverse/Compound Fissure.