Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2006-44

Burlington Northern Santa Fe
Lockwood, Missouri
June 8, 2006

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

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # HQ-2006-44

1.Name of Railroad Operating Train #1: BNSF Rwy Co. [BNSF]	1a. Alphabetic Code: BNSF	1b. Railroad Accident/Incident No.: SF0606102
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: BNSF Rwy Co. [BNSF]	3a. Alphabetic Code: BNSF	3b. Railroad Accident/Incident No.: SF0606102
4. U.S. DOT_AAR Grade Crossing Identification Number:	5. Date of Accident/Incident: Month 06 / Day 08 / Year 2006	6. Time of Accident/Incident: 04:00: ☑ AM ☐ PM

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

8. Cars Carrying HAZMAT	9. HAZMAT Cars Damaged/Derailed	10. Cars Releasing HAZMAT	11. People Evacuated	12. Division
4	0	0	0	Springfield

13. Nearest City/Town	14. Milepost (to nearest tenth)	15. State Abbr	15. State Code	16. County
Lockwood	159.7	N/A	MO	DADE

17. Temperature (F) (specify if minus)	18. Visibility (single entry) 1. Dawn 2. Day 3.Dusk 4.Dark	Code	19. Weather (single entry) 1. Clear 2. Cloudy 3. Rain 4. Fog 5.Sleet 6.Snow	Code	20. Type of Track 1. Main 2. Yard 3. Siding 4. Industry	Code
70 F		4		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
Main Track		4	54.64		2

OPERATING TRAIN #1

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

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

27. Train Number/Symbol: HKCK MEM10 7

28. Speed (recorded speed, if available) — Code
R - Recorded
E - Estimated 44 MPH — Code: R

29. Trailing Tons (gross tonnage, excluding power units): 10373

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

30a. Remotely Controlled Locomotive?
0 = Not a remotely controlled
1 = Remote control portable
2 = Remote control tower
3 = Remote control transmitter - more than one remote control transmitter
2 = South, 4 = West — 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	21	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

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	4	0	0	0	0
(2) Total Derailed	0	0	0	0	0

35. Cars	Loade a. Freight	Loade b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	76	0	37	0	0
(2) Total Derailed	36	0	6	0	0

36. Equipment Damage — This Consist: 963723
37. Track, Signal, Way, & Structure Damage: 250000
38. Primary Cause Code: T207
39. Contributing Cause Code: N/A

Number of Crew Members

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

Length of Time on Duty

44. Engineer/Operator: Hrs 2 Mi 0
45. Conductor: Hrs 2 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: N/A

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

54. Train Number/Symbol: N/A

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

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

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

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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)	59. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.	Alcohol	Drugs
(1) First involved (derailed, struck, etc)	N/A	N/A	N/A		N/A	N/A
(2) Causing (if mechanical cause reported)	N/A	N/A	N/A	60. Was this consist transporting passengers? (Y/N)	N/A	

61. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote	62. Cars	Loade a. Freight	Loade b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	N/A	N/A	N/A	N/A	N/A	(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	(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

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

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

Casualties to:	73. Railroad Employees	74. Train Passengers	75. Other
Fatal	N/A	N/A	N/A
Nonfatal	N/A	N/A	N/A

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

Highway User Involved

79. Type — Code: N/A
C. Truck-Trailer. F. Bus J. Other Motor Vehicle
A. Auto D. Pick-Up Truck G. School Bus K. Pedestrian
B. Truck E. Van H. Motorcycle 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) 3.Train (standing) 6.Light Loco(s) (moving)
2.Train(units pushing) 4.Car(s) (moving) 7.Light(s) (standing)
5.Car(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	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					

88. Signaled Crossing Warning (See instructions for codes) — Code: 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

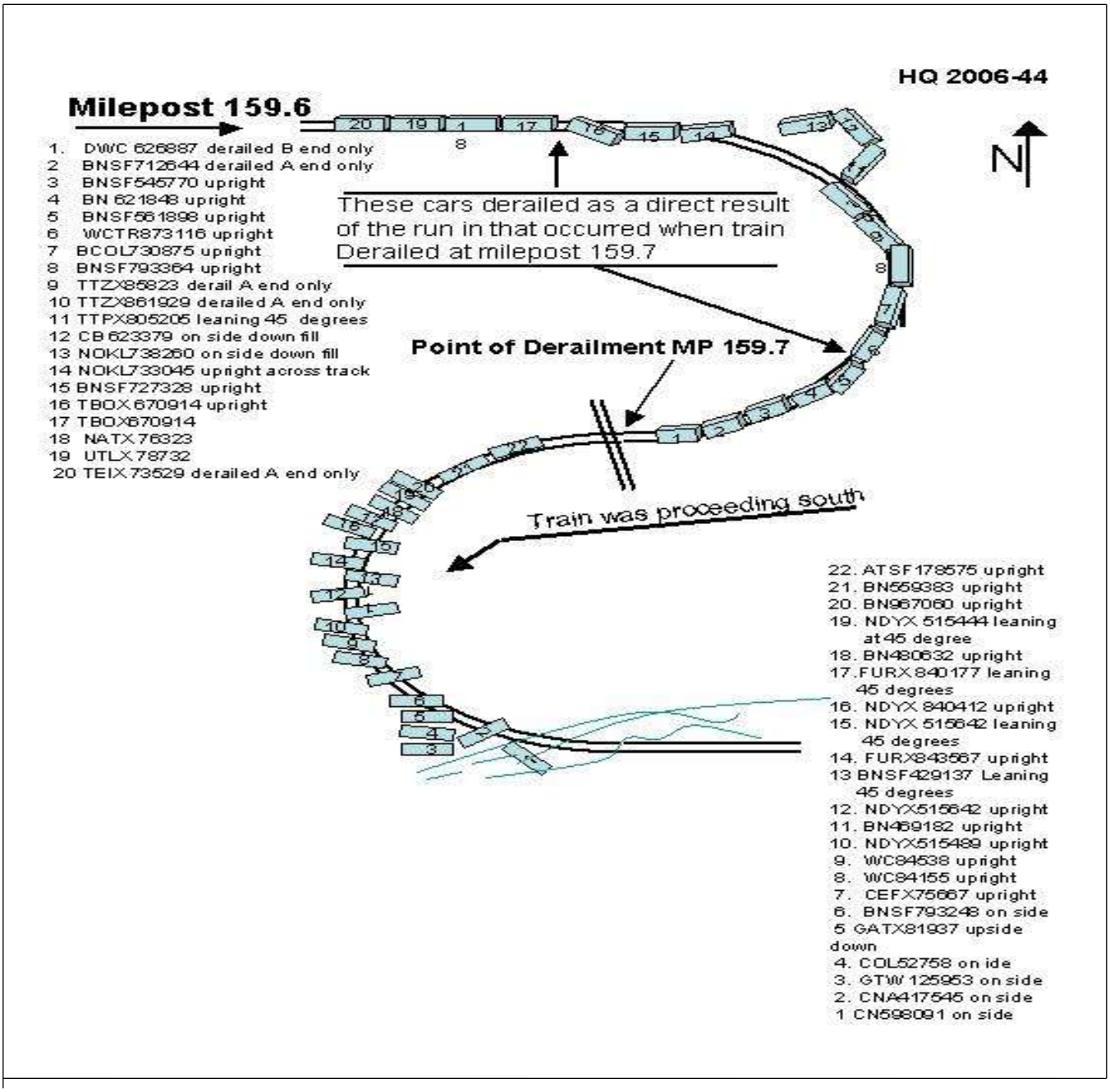
105. Locomotive Auxiliary Lights Operational? — Code: N/A
1. Yes 2. No

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-2006-44Sketch.jpg



109. SYNOPSIS OF THE ACCIDENT

At approximately 4 a.m. CDT, June 8, 2006, a BNSF southbound mixed freight Train Symbol H KCKMEM1 07 derailed at milepost (MP) 159.7 in the vicinity of Lockwood, Missouri. This derailment occurred on the BNSF's Springfield Division, Ft. Scott Subdivision. There were no injuries or any hazardous materials involved. Forty-two cars were derailed, resulting in equipment damages of $963,723; track damages of $250,000; and no signal damage. The temperature was 70 °F and the weather was clear. The cause of this derailment has been determined to be a broken rail that had an internal defect (T207 - Detailed Fracture).

110. NARRATIVE

Circumstances Prior to the Accident

BNSF Railway Company (BNSF) Train Symbol H KCKMEM1 07, a mixed freight train, originated in Kansas City, Kansas, where it received an initial terminal air test on June 6, 2006, at 6:15 p.m. The two-member crew consisting of an engineer and a conductor went on duty at Ft. Scott, Kansas, MP 98, at 2 a.m., June 8, 2006. Ft. Scott is the away-from-home terminal for both crew members. They had received 12 hours 15 minutes off-duty time prior to reporting for duty. Ft. Scott is a crew change point, and they took control of this train upon its arrival. They departed Ft. Scott at 2:20 a.m., June 8, 2006, and made no pick-ups or set outs en route, and operated to MP 159.7 without incident. The engineer was operating lead Locomotive No. BNSF 4113 with the short hood forward, and was sitting behind the control stand on the west side. The conductor was sitting on the east side of the lead locomotive. They had just passed a track-side warning detector (TWD) at MP 154.7 and had received a radio message with no defects found. They were proceeding geographically and timetable direction south, on clear signals, at 45 mph. Starting at MP 158.6, there is a 1-percent descending grade southbound that ends at the bridge at MP 159.9. There are two curves in this area, a right-hand 3-degree 15-minute curve, and a left-hand 3-degree 41-minute curve. The initial derailment occurred at MP 159.7, which is at the extreme south end of the spiral of the curve within a very few feet of tangent track.

The Accident

Train Symbol H KCKMEM1 07 consisted of 4 locomotives, 76 loads, 37 empties, 10,373 tons, and was 7,310 feet long. As the train approached MP 159.7, it was traveling at a recorded speed of 44 mph. Approximately 1-minute 18-seconds prior to the derailment, the engineer had set the train up in dynamic braking in preparation of slowing the train for a 25 mph speed restriction starting at MP 160.8. Speed tapes from lead Locomotive No. BNSF 4143 indicate the traction motor current was 600 amps. Since this was a heavy tonnage train, the engineer felt he should supplement the dynamic braking, so just seconds prior to the derailment, he made a 10-pound brake pipe reduction. Another 4-pound reduction was being initiated when the train had an emergency brake application. The maximum authorized speed for this train was 45 mph, as designated in the current BNSF Springfield Division Timetable No. 5. The crew states they neither saw nor felt anything unusual. When the train stopped, the conductor got off the locomotive and started walking the train at which time he found that the 17th through 38th cars and the 49th through 68th cars from the head end were derailed.

Analysis and Conclusions

After the derailment occurred, both train crew members were transported to the Barton County Memorial Hospital at Lamar, Missouri, for post-accident toxicological testing. Drug and alcohol tests were performed on both crew members, and test results were negative.

The last inspection on this trackage was performed on Monday, June 5, 2006. The BNSF geometry car had operated over this territory on May 9, 2006, with no defects noted. Internal rail testing was done by Sperry Rail Services (Car SRS 829) on May 22, 2006, with no indication of a defect in this area.

The derailment was caused by a broken rail as determined by the test results from BNSF's Technical Research & Development Physical Test Laboratory in Topeka, Kansas. It is thought that, account shelling found on the gage side of the rail, it masked the detection of the 10 percent detail fracture that was present in this rail. Also, rail wear measurements revealed the vertical head loss was at the condemnable limit according to BNSF Standards.

Probable Cause and Contributing Factors

The Federal Railroad Administration found the probable cause of HQ-2006-44 to be a detailed fracture from shelling or head check. This accident occurred due to the fact that a 1949 Tennessee Brand 132.25-pound rail had developed a 10 percent internal defect, determined to be a detailed fracture, and broke under the train.