Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2006-82

Burlington Northern Santa Fe
St. Genevieve, Missouri
October 21, 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-2006-82

1.Name of Railroad Operating Train #1: BNSF Rwy Co. [BNSF]	1a. Alphabetic Code: BNSF	1b. Railroad Accident/Incident No.: SF1006115
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.: SF1006115
4. U.S. DOT_AAR Grade Crossing Identification Number:	5. Date of Accident/Incident: Month 10 / Day 21 / Year 2006	6. Time of Accident/Incident: 09:30: ☑ 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
14	0	0	0	Springfield

13. Nearest City/Town	14. Milepost (to nearest tenth)	15. State Abbr	15. State Code	16. County
Ste. Genevieve	67.3	N/A	MO	STE GENEVIEVE

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
48 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
Main Track		3	19.6		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: 1

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

27. Train Number/Symbol: HMEM NTW12 0

28. Speed (recorded speed, if available) R - Recorded E - Estimated: 39 MPH; Code: R

29. Trailing Tons (gross tonnage, excluding power units): 6853

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

	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
31. Principal Car/Unit (1) First involved (derailed, struck, etc)	N/A	2	N/A
(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	2	0	0	0	0
(2) Total Derailed	1	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	41	0	50	0	0
(2) Total Derailed	20	0	1	0	0

36. Equipment Damage: This Consist 875534

37. Track, Signal, Way, & Structure Damage: 225118

38. Primary Cause Code: T207

39. Contributing Cause Code: H993

Number of Crew Members

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

Length of Time on Duty

44. Engineer/Operator: Hrs 4 Mi 30

45. Conductor: Hrs 4 Mi 30

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: N/A

54. Train Number/Symbol: N/A

55. Speed (recorded speed, if available) 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): 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

58. 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

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	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

62. Cars	Loade a. Freight	Loade 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

63. Equipment Damage This Consist: N/A

64. Track, Signal, Way, & Structure Damage: N/A

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 N/A Mi N/A

72. Conductor: 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? 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 — 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	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

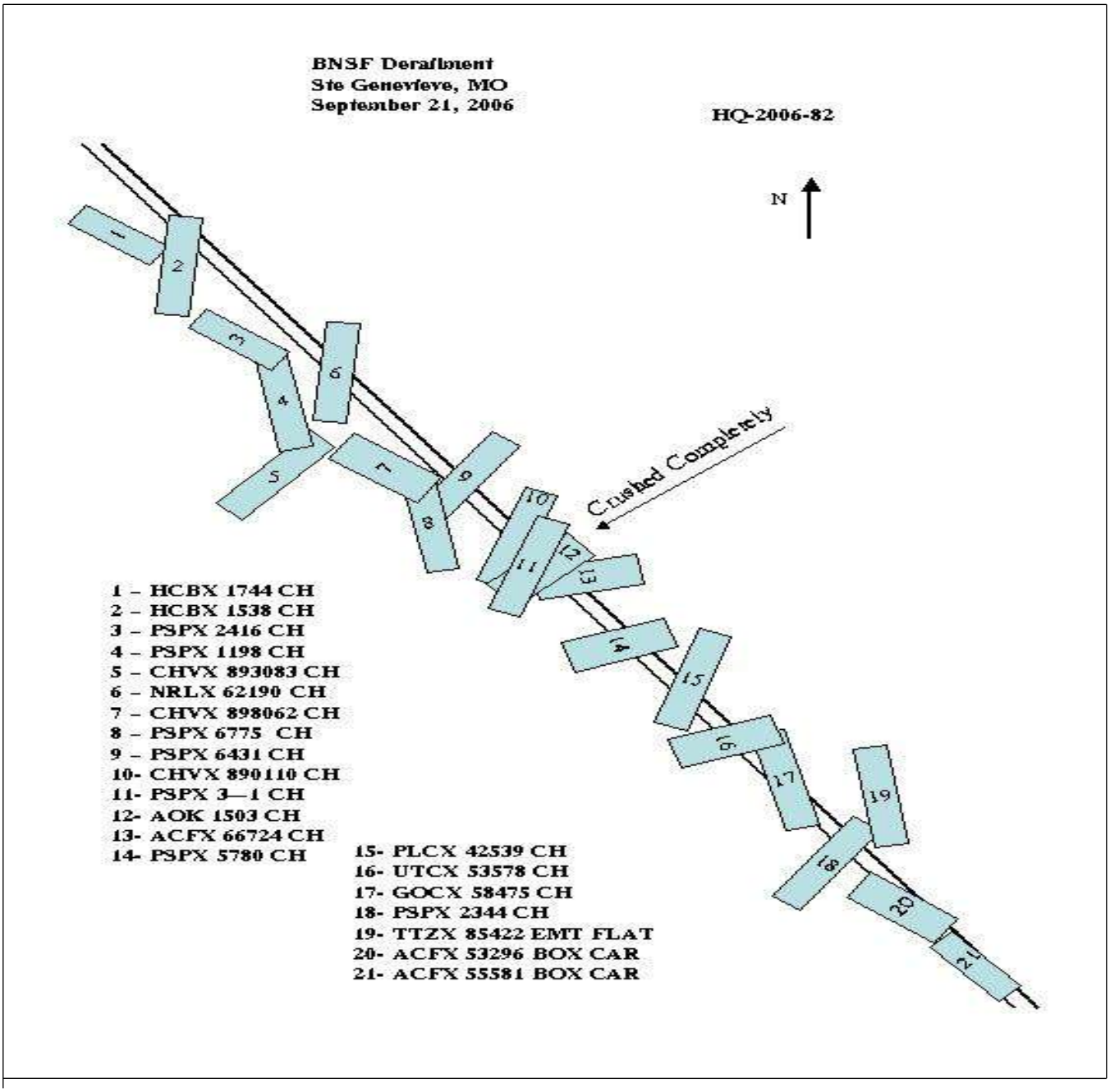
105. Locomotive Auxiliary Lights Operational? — Code: N/A
1. Yes 2. No

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-2006-82_sketch.jpg



109. SYNOPSIS OF THE ACCIDENT

At approximately 9:30 a.m. CDT, October 21, 2006, northbound BNSF Railway Company (BNSF) manifest Train Symbol HMEMNTW1 20A derailed the rear set of wheels on the second locomotive and the following 21 cars. The derailment occured on the BNSF Springfield Division, River Subdivision at the south siding switch at Ste. Genevieve, Missouri, milepost(MP) 67.3.

No hazardous materials were released, and there were no personal injuries. Estimated damages were $875,534 for equipment and $225,118 for track and signal. The temperature was 48°F and clear.

It was determined that the probable cause of this derailment was a broken rail (T207 Detail fracture from shelling or head crack) located in the south siding switch at Ste. Genevieve.

A contributing cause (H993 Human Factor - track) was identified for the failuer of an employee contracted by the railroad to follow BNSF rail testing policy to properly hand test and identify the defective rail.

110. NARRATIVE

Circumstances Prior to the Accident

The crew on BNSF Train Symbol HMEMNTW1 20A consisted of and engineer, brakeman and conductor. They went on duty at Chaffee, Missouri; their home terminal, at 5 a.m. CDT, October 21, 2006. Both the engineer and the conductor had a 28-hours 25-minutes off-duty time prior to reporting for duty. The brakemen had 13-hours 30-minutes off-duty time prior to reporting for duty.

Train symbol HMEMNTW1 20A was a mixed freight train and had received a Class 1 (Initial Terminal) Air Test at Memphis, Tennessee at 2:30 p.m., October 20, 2006, by BNSF Car Department employees.

After coupling the train together due to a crossing that had been cut and conducting an air test, the train departed Chaffee at 6:55 a.m. They operated to the point of derailment without incident. As the train approached the point of derailment, all crew members were riding lead locomotive No. BNSF 985. The locomotive was short hood forward and the engineer was seated behind the control stand on the east side. The conductor and brakeman were both seated on the west side of the locomotive, the conductor being in the front seat and the brakeman directly behind him.

Track side warning detector at milepost (MP)77.2 found no exceptions for this train. The crew was operating the train at a recorded speed of 40 mph when they passed the signal governing the approach to South Ste. Genevieve located at MP 69.7. This signal was displaying a clear indication. As they approach the south end of Ste. Genevieve, the northbound home signal was also displaying a clear indication. They were traveling at a record speed of 39 mph (maximum authorized 40 mph) when they passed over the switch at the south end of Ste. Genevieve siding.

They were operating over river grade, tangent track, and had been for several miles prior to the derailment.

The Accident

At the time of the accident, Train Symbol HMEMNTW1 20A was being operated in accordance with clear signal indications at a record speed of 39 mph over the south siding switch at Ste. Genevieve, at MP 67.3. The crew reported they heard a loud pop, and at the same time, felt the lead locomotive (BNSF 985) experience a sudden drop, then immediately come back up. A second later, the brakeman stated he saw something that he thinks was a piece of rail come out from under the lead locomotive as they were experiencing an undesired emergency brake application. They could see the rear end of the second locomotive had derailed and could also see their train derailing behind them. The engineer intentionally released the independent brakes and allowed the locomotives continue on down the track to get away from the derailing cars. The locomotives stopped at MP 66.9 and the dispatcher was notified via radio. The conductor and brakeman then dismounted and started walking their train. It was discovered that the rear set of wheels on trailing Locomotive No. MRL 257 was derailed along with the head 21 cars of their train.

Analysis and Conclusions

Analysis:
The train was being operated within the limits of the posted maximum authorized speed of 40 mph. This train was traversing basically flat (river grade) track; therefore, there were no entrain forces that would have contributed to any train handling issues. This is substantiated by the event recorder download from Locomotive No. BNSF 985. Under BNSF authority, the train crew was transported to Cape Girardeau, Missouri, to the St. Francis Medical Center for drug and alcohol testing. The results from the test were negative for all members of the crew. The crew was relieved from duty at 7:45 p.m., October 21, 2006.

The last regular track inspection made prior to the derailment occurred on October 18, 2006, with no defects noted to this area. BNSF Geometry Car No. 85 was

operated over this territory October 18, 2006, with no defects noted in the vicinity of the derailment.

Investigation into the history of the rail that broke revealed that during an internal rail test that occurred in March 2004, the stock rail at this location was found to have excessive shelling and corrugation (SSC) and could not be tested. At this time, the rail was marked in the web by the Rail Detector Operator at SSC. On April 29, 2004, welding Gang TRWX 0130 ground the stock rail through this area and was able to clean up the rail so it could be tested. This condition was then shown as repaired. The next internal rail test occurred on September 20, 2004. At this time, they were able to get a good test and found no defects. The SSC marking on the web of the rail was not removed at this time. No defects were noted in any subsequent tests after that date.

On September 22, 2006, Test Car SRS No. 829, owned and operated by Sperry Rail Services conducted a test for internal rail defects in this area. A BNSF assistant track foreman accompanied the car this trip. As Test Car SRS No. 829 tested this area, an indication appeared on the screen that a rail defect could be present in the dead zone of the switch. The operator on Test Car No. SRS 829 dismounted the test vehicle, looked at the rail, and saw the SSC marked on the rail. (This was the mark made in March 2004). Instead of hand testing the suspect rail as required, he assumed the indication on the screen of a defective rail was account excessive shelling/corrugation on the rail that had been previously identified, and no further action was necessary. Twenty-nine days later, the same rail broke because of a detailed fracture measuring 70% of the rail head, causing the derailment of Train Symbol HMEMNTW1 20A.

The rail was sent to the BNSF lab in Topeka, Kansas for testing. It was determined that a portion of #115 25 RE CC USS Illinois 1984 rail had developed a detail fracture of 70% of the rail head and had broken in the dead zone of the switch. There was rail end batter which indicated this rail had previously broken prior to Train Symbol HMEMNTW1 20A arriving at this location.

Conclusion:

This Accident occurred because a #115 25 RE CC USS Illinois 1984 rail had broken due to a 70% internal defect that had developed in the rail head. The defect, as determined by the BNSF Technical Research & Development Physical Test Laboratory, was a detailed fracture. Human error was a contributing factor since the SRS Test Car identified the defect on September 22, 2006 and the operator failed to hand test the rail as required. The operator of the test car saw the SSC mark on the rail that had been marked on the rail in 2004 and assumed this was the reason his screen had received a defect indication and failed to hand test the rail. This was a serious error judgment of the SRS operator and was a direct violation of BNSF policy which states: "Any indications within the long tie area or Dead Zone must be hand tested."

The SRS operator has been banned from testing on the BNSF.

Probable Cause and Contributing Factors

The Federal Railroad Administration's investigation determined that the contributing factor was due to the failure of an employee contracted by the railroad to follow BNSF rail testing policy to properly hand test the rail and identify the defect.

The FRA's investigation concluded that the probable cause of this derailment was a broken rail (T207 Detail fracture from shelling or head check) located in the south siding switch at Ste. Genevieve.