Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2006-21

Burlington Northern Santa Fe (BNSF)
Berea, Nebraska
April 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-2006-21

1.Name of Railroad Operating Train #1: BNSF Rwy Co. [BNSF]	1a. Alphabetic Code: BNSF	1b. Railroad Accident/Incident No.: PR0406109
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.: PR0406109
4. U.S. DOT_AAR Grade Crossing Identification Number:	5. Date of Accident/Incident: Month 04 / Day 08 / Year 2006	6. Time of Accident/Incident: 01:35: ☑ 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
0	0	0	0	Powder River

13. Nearest City/Town	14. Milepost (to nearest tenth)	15. State Abbr	15. State Code	16. County
Berea	379.6	N/A	NE	BOX BUTTE

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
25 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
Single Main		4	157.83		3

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: CCAM SAI022

28. Speed (recorded speed, if available) Code: R - Recorded; E - Estimated 50 MPH: E

29. Trailing Tons (gross tonnage, excluding power units): 18440

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	36	yes
(2) Causing (if mechanical cause reported)	N/A	N/A	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	35. Cars	Loade a. Freight	Loade b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	2	0	0	0	1	(1) Total in Equipment Consist	129	0	0	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	38	0	0	0	0

36. Equipment Damage This Consist	37. Track, Signal, Way, & Structure Damage	38. Primary Cause Code	39. Contributing Cause Code
1400000	170000	T299	N/A

Number of Crew Members / Length of Time on Duty

40. Engineer/ Operators	41. Firemen	42. Conductors	43. Brakemen	44. Engineer/Operator	45. Conductor
N/A	0	1	0	Hrs 3 Mi 50	Hrs 3 Mi 50

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: 2

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

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) Code: R - Recorded; E - Estimated 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): 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)	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	Loade a. Freight	Loade 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: 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

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

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

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

86a. 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 — Code: N/A

Rail Equipment Involved

83. 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

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

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

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

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 1. Yes 2. No 3. Unknown — Code: N/A

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

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

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

93. Driver's Age: 0

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

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

96. 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

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

98. 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

101. Casulties to Highway-Rail Crossing Users	Killed	Injured
	0	0

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

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

102. Highway Vehicle Property Damage (est. dollar damage): 0

103. Total Number of Highway-Rail Crossing Users (include driver): 0

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

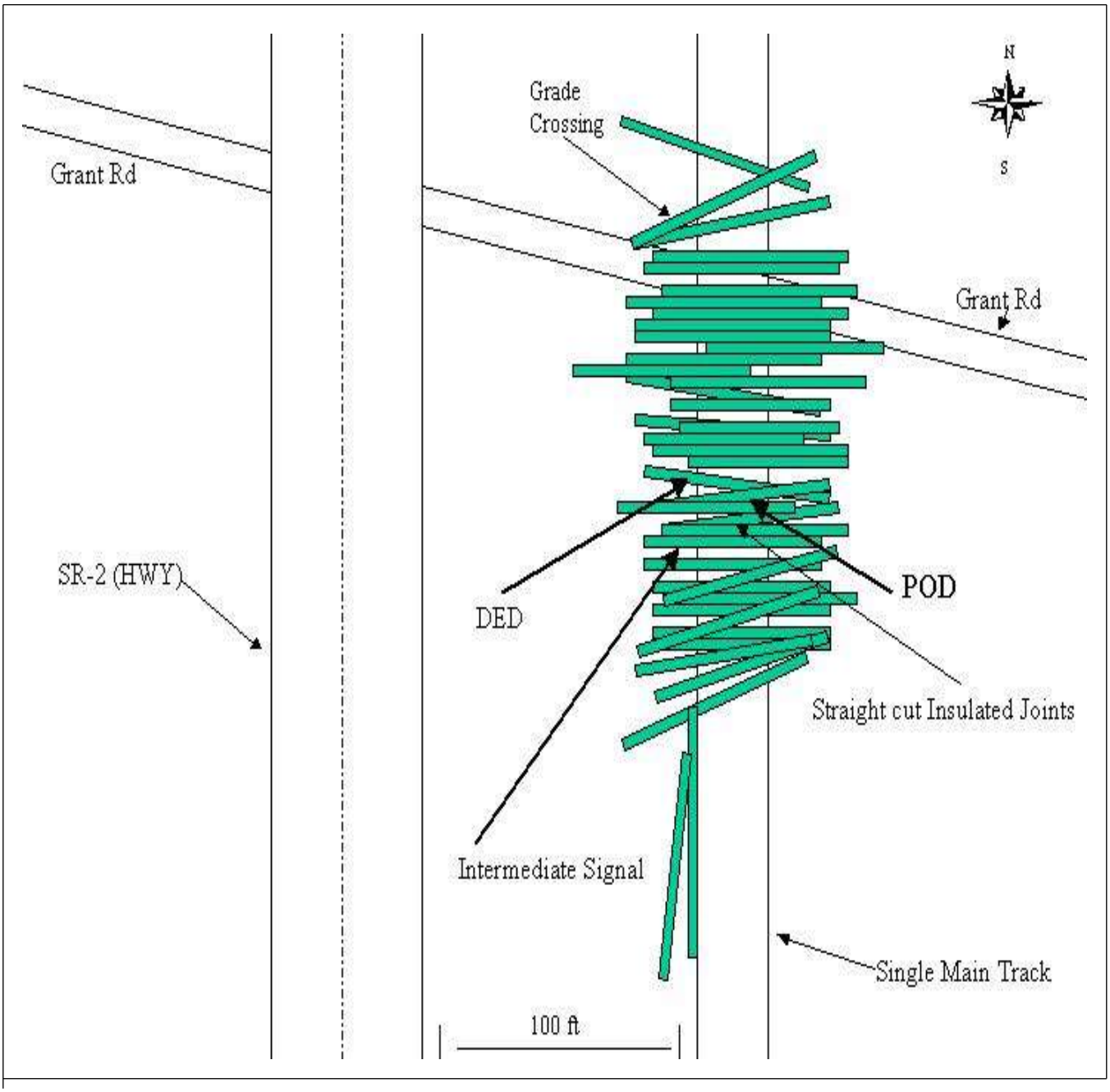
105. Locomotive Auxiliary Lights Operational? 1. Yes 2. No — Code: N/A

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

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

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

HQ-2006-21 Sketch. JPG



109. SYNOPSIS OF THE ACCIDENT

An eastbound BNSF Railway Company (BNSF) loaded coal train derailed on April 8, 2006, at 1:35 a.m. (MDT). The derailment occurred at milepost (MP) 379.6, on the Butte Subdivision, 3 miles west of Berea, Nebraska.

The crew consisted of an engineer and a conductor. The derailment happened on single main track. Train Symbol C-CAMSAI0-22 consisted of two lead locomotives and one DPU locomotive, pulling 129 cars. Cars 34 through 71 from the head end derailed, totaling 38 cars. No injuries or hazardous materials were involved. Substantial damage was incurred to the track and mechanical equipment at an estimated cost of $1,570,000.

At the time of the accident, it was dark with clear skies and an estimated temperature of 25 °F.

The probable cause of this derailment is determined to be some type of separation of the rail and is classified by code as, other rail or joint bar defect.

110. NARRATIVE

Circumstances Prior to the Accident

The operating crew of the eastbound loaded coal train, Train Symbol C-CAMSAI0-22, consisted of a locomotive engineer and a conductor. They first went on duty at 8:30 p.m. (MDT), on April 7, 2006, at Edgemont, South Dakota. Alliance, Nebraska, is the home terminal for the crew members, and all received more than the statutory, off-duty period at their away-from-home terminal, prior to reporting for duty.

Their assigned freight train consisted of three locomotives, two on the head end and one DPU unit facing west on the rear end of the train, and 129 loaded coal cars. It weighed 18,440 tons and was 6,848 feet long. No air brake test was required at Edgemont. The operating crew boarded and did their routine inspection before departing Edgemont, heading east, for the next crew change point in Alliance, NE. The last Class 1 air brake test required was preformed by the car department personnel in Lincoln, Nebraska, during its westbound trip. This is an extended haul train. This train was inspected as an empty consist in Lincoln and traveled to Caballo, Wyoming, where it was loaded and commenced the return trip to Lincoln for its next scheduled air test. The final destination for this train was Sadler, Missouri.

Prior to the derailment, the train was recorded by hot box detectors located at mileposts 390.4 and 386.8. Both detectors indicated no defects found.

As the eastbound loaded coal train approached the accident site, the engineer was seated at the control panel on the south side of the leading locomotive, monitoring the locomotive controls. The conductor was in his seat on the north side of the leading locomotive.

The railroad timetable direction of the train was east. The geographic direction was south. Timetable directions and milepost locations are used throughout this report.

The track was tangent in the area of the accident with a 0.38 percent descending grade. The single main track was made up of concrete ties and 136-lb. 10 CC CF 1 1991 and136-lb. RE VT RMSM 2004 continuous-welded rail (CWR). Approaching the point of derailment, there is a public grade crossing with cross bucks at milepost 379.62. The crossing consisted of wood ties and surface planking. Just east of the crossing was a dragging equipment detector (DED) at milepost 379.60, and an intermediate signal at milepost 379.57. The single main track runs adjacent to State Highway 2 with a 100-foot right-of-way between the track structure and roadway.

The train crew reported that as the eastbound coal train approached the accident area, their trip had been uneventful and their train was operating normally. Neither of the crew members felt any unusual slack action nor rough track, while passing over the derailment location.

The Accident

At the time of the accident, the train was traveling on single main track at a recorded speed of 50 mph. The maximum authorized speed on the main track through the derailment area is 60 mph in accordance with BNSF Powder River Division Timetable No. 7, effective November 09, 2005.

At approximately 1:35 a.m. (MDT), the engineer made a brake pipe reduction to reduce speed for an approaching 40 mph speed restriction. Seconds later, the train experienced an undesired emergency application of the train air brake system. The engineer tried to reset the air but was unsuccessful. At that same time, the dragging equipment detector was indicating several defects and then went silent. The crew then suspected that they were on the ground.

Upon inspection, the conductor reported to the engineer that he thought there were approximately 38 cars derailed accordion-style. The 34th head car from the locomotive consist was the first car derailed. Two cars lay adjacent to the track and the remaining 36 cars were piled up accordion-style in the area of the intermediate signal, dragging equipment detector, and public grade crossing.

The public grade crossing, dragging equipment, and intermediate signal were all destroyed. The coal spilled out in all directions and was nearing the highway traffic lanes. Traffic was reduced on State Highway 2 to one lane for a short period of time, for coal recovery efforts. After a safe clearance was established for the cleanup crews and highway traffic, both traffic lanes were restored, but traffic was slowed. The county road was closed until the cleanup and restoration of the crossing was completed.

Approximately 300 feet of concrete track panels and the grade crossing were destroyed on the single main track. The track was back in service by 10 p.m., on April 8, with an approximate cost of $110,000 in track damage. The intermediate signal and dragging equipment detector were destroyed at a cost of $60,000. There was $1,400,000 in equipment damages. The total monetary damages were $1,570,000.

Analysis and Conclusions

Analysis

The train crew was sent for post-accident toxicological testing. The Federal Railroad Administration (FRA) Post-Accident Forensic Toxicology Report indicated that the employees had negative test results. Both crew members were properly rested. The event recorder indicated proper train handling and compliance with the operating rules.

Signal, wheel impact, and dragging equipment reader reports were analyzed and data indicated all were within guidelines before the derailment.

A BNSF track inspector had inspected the track on April 7, 2006, with no defects reported. BNSF Rail Detector Car #80 conducted its last inspection before the derailment on April 6, 2006, and no defects were detected in the area of the derailment site. The last geometry car inspection was made in October of 2005, and no defects recorded. Two service failures were detected at milepost 379.60 prior to the derailment. On September 9, 2005, an insulated joint failure was found and on March 23, 2006, a broken base on a piece of rail was discovered; both of these were on the north rail. These defects were repaired on the same days that they were detected.

Early in the investigation, two cars were identified as showing rail head marks on their left side rail wheels, which would have been running on the south rail. The marks clearly show the impression of a section of rail head as shown in the photos. The markings were on Car Nos. KCLX 59522 and BN 668326, the 32nd and 33rd cars from the head end. Car No. BN 668326 was the last car of the train consist which stayed upright and connected to the lead locomotive end. Both of these cars were taken into the Alliance yard with the rest of the head-end of the train. The first derailed car, BN 536350, was the 34th car from the head end and the last derailed car was Car No. KCLX 595247, the 71st car from the head end.

Approximately 40 feet of the south rail was not recovered, including the insulated joint.

Six rail sections, one set of wheels, and three pieces of a broken wheel were removed from the point of derailment and sent for analysis to Technical Research and Development, in Topeka, Kansas. The examination of the wheel set revealed all new breaks with no defects or inclusions. Wheel measurements indicated the wheels were in good condition before the derailment. The six sections of 136-lb. rail also revealed all new fractures with tensional type breaks. No defects or inclusions were found in any of the rail sections. The running surfaces of the rail appeared to be in good condition.

Conclusion

Upon investigation, review of reports from the BNSF officials, and the evidence compiled, the FRA's conclusion concurs with the railroad's findings. The discovery of the rail head markings on the rail car wheels just ahead of the first derailed car indicated that, at some time prior to the catastrophic event, some type of a rail or joint failure occurred on the south rail in the area where the wheel dragging detector and insulated joint for the intermediate signal lay. Indications show that there was some type of separation of the rail prior to the first derailed car. This is verified by the markings on the rail wheels of both cars ahead of the first derailed car. The railroad that a failed rail section was the cause of the derailment, but the type of failure cannot be specifically identified. The failure happened on the south rail and the section of rail was not recovered. In this area, there are at least two welds and an insulated joint, besides a possible internal defect in the rail itself. Any one of these could have been the failure.

Probable Cause

As a result of post-accident investigation, the FRA finds the following as the probably cause: Probable Cause - T299 Other rail and joint bar defects. The most likely cause of the derailment was a broken rail, but because the actual defect was not found, no specific type could be identified.