Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2008-08

Burlington Northern Santa Fe (BNSF)
Melrose, IA
January 15, 2008

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-2008-8

1.Name of Railroad Operating Train #1: BNSF Rwy Co. [BNSF]	1a. Alphabetic Code: BNSF	1b. Railroad Accident/Incident No.: NE0108116
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: BNSF Rwy Co. [BNSF]	4a. Alphabetic Code: BNSF	4b. Railroad Accident/Incident No.: NE0108116
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 01 | Day 15 | Year 2008	7. Time of Accident/Incident: 12:30:00 ☑ 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
0	N/A	N/A	0	Nebraska

14. Nearest City/Town	15. Milepost *(to nearest tenth)*	16. State Abbr / Code	17. County
Melrose	314.2	N/A / IA	MONROE

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
6 F	4	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 No. 2	4	57.96	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	CBTMCGW003

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?
43 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)*: 18512	Code(s): g | j | N/A | N/A | N/A	0

32. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded *(yes/no)*	33. 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)*	FSTX5712	97	yes	0 / 0
(2) Causing *(if mechanical cause reported)*	0	0	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	36. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	2	0	0	0	1	(1) Total in Equipment Consist	130	0	0	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	22	0	0	0	0

37. Equipment Damage This Consist	38. Track, Signal, Way, & Structure Damage	39. Primary Cause Code	40. Contributing Cause Code
$1,240,865.00	$159,321.00	M507	N/A

Number of Crew Members				Length of Time on Duty	
41. Engineer/ Operators	42. Firemen	43. Conductors	44. Brakemen	45. Engineer/Operator	46. Conductor
1	0	1	0	Hrs 2 Mi 30	Hrs 2 Mi 30

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. 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)*

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

109. *geographical)* Code N/A
1.North 2.South 3.East 4.West

Rail Equipment Involved

111. 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)*

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	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.

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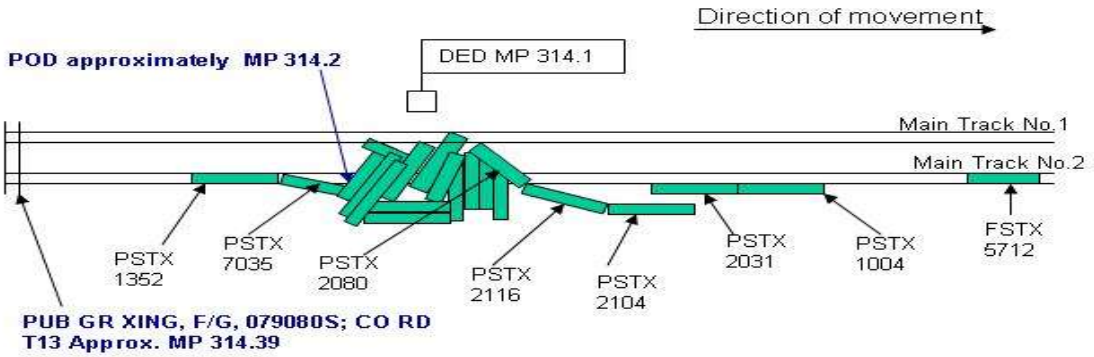
January 15, 2008



Note: Diagram not to scale.

Sketch based on photographs provided to FRA by BNSF and Iowa State Track Inspector.

Equipment had been moved from its derailed position before Federal Railroad Administration (FRA) inspectors arrived at the scene and BNSF did not provide a sketch. This sketch is based on photographs provided by BNSF and an Iowa State track inspector. FRA was unable to accurately represent all the car numbers and actual placement of the derailed equipment.

137. SYNOPSIS OF THE ACCIDENT

Eastbound Burlington Northern Santa Fe Railway Company (BNSF) loaded coal train C-BTMCGW0-30 derailed on January 15, 2008, at 00:30 a.m., CST. The derailment occurred 4.4 miles east of the town of Melrose, Iowa, at BNSF Milepost (MP) 314.2, on Main Track No. 2 of the Nebraska Division, Ottumwa Subdivision, in Monroe County. The crew reported an undesired emergency application of the train air brake system while traveling at a recorded speed of 43 miles per hour (mph). Inspection of the train revealed 22 cars derailed, the 97th through 118th rail cars from the head end of the train consist. No injuries were reported; no hazardous materials were involved.

Damage estimates to equipment totaled $1,240,865 and estimated damages to track totaled $150,000 with damage estimates to signal equipment totaled $9,321.

At the time of the derailment, the conditions were dark and clear with a temperature of 6 °F and wind was WNW at 6 mph.

The cause of the derailment was not determined. A broken rail was suspected because of contributing factors that were identified during the investigation. A dip in the track and two cars with Association of American Railroads (AAR) condemnable wheels, for high impacts, may have contributed to the cause of the derailment. However, approximately 467 feet of rail, along with 8 wheel sets were not recovered at the derailment site. The absence of this physical evidence did not allow a positive cause determination to be identified. Therefore, the investigation was closed with the cause noted as undetermined due to absence of substantive physical evidence.

138. NARRATIVE

CIRCUMSTANCES PRIOR TO THE ACCIDENT

The crew of BNSF Train C-BTMCGW0-03 consisted of an engineer and conductor. The crew went on duty at 10:00 p.m, CST, on January 14, 2008, at Creston, Iowa, which was the crews away from home terminal. Both crew members received more than the required statutory off-duty rest period prior to reporting for duty.

The assigned train consisted of 3 locomotives, 2 at the head-end and 1 at the rear, coupled to 130 loaded coal hopper cars. The train was 7,166 feet in length with 18,512 gross trailing tons, excluding the locomotives. The train was scheduled to travel from Creston en route to Galesburg, Illinois, with no pick ups or set outs scheduled while en route. The initial terminal air brake test and inspection had been performed on the train at Alliance, Nebraska, on January 12, 2008, as empty coal Train CGWBTM0-53. Loaded coal Train C-BTMCGW0 03 received a 1,000 mile inspection at Lincoln, Nebraska, on January 14, 2008. Both inspections were performed by BNSF mechanical personnel. The locomotives had a current daily inspection so an inspection was not performed by the crew prior to departing. BNSF Train C-BTMCGW0-03 departed Creston at 10:10 p.m., on January 14, en route to Galesburg. The maximum authorized speed for the train is 50 mph as outlined in the Nebraska Division Timetable No. 6, effective December 13, 2006.

As the eastbound train approached the location where the derailment occurred, the engineer was seated at the controls on the south side of the lead locomotive. The conductor was seated on the north side of the lead locomotive. The timetable and geographic direction for the train is east. Timetable directions are used throughout this report.

BNSF Main Track No. 2 in the area of the derailment at MP 314.2, is 132-lb welded rail attached to wood ties. The track at the accident site is tangent for 50 feet to the west; then a 1-degree right-hand curve; and again tangent for approximately 3,700 feet; followed by a 2-degree 22-minute left-hand curve; and again tangent for approximately 4,200 feet. The grade for this segment of track is ascending varying from 0.33 percent at the derailment site to 0.23 percent at MP 316.4. The track east of the derailment site is tangent for approximately 3,160 feet; then a 1-degree10-minute, right-hand curve; followed by a 0-degree 57-minute left-hand curve;

and then again tangent for approximately 2,600 feet. The grade for this segment of track is descending at varying rates from 0.33 percent at the derailment site to 0.18 percent at MP 311.

The Accident:

BNSF Train C-BTMCGW0-03 was traveling eastward on BNSF Main Track No. 2 with operating at a speed of 44 mph with the throttle in the idle position and the air brakes fully released as they approached the accident area. The speed at the time of the derailment was 43 mph. Both speeds were recorded by the event recorder in Locomotive No. BNSF 6192 which was the lead locomotive in the consist.

The event recorder indicates that the engineer began dynamic braking approximately 63 seconds after the head-end of the train passed over the area where the derailment occurred. According to the engineer, this was in anticipation of a slow order ahead at MP 307.3. Approximately 29 seconds later, the crew experienced an undesired emergency application of the train air brakes. The crew immediately notified the dispatcher.

Inspection of the train revealed that the west end of Car No. FSTX 5712 derailed with a broken coupler knuckle; a large gap of approximately 2,300 feet; then 4 cars derailed and on their sides on the south side of Main Track No. 2; followed by 15 cars in a pile blocking Main Track Nos. 1 and 2; and 2 additional cars derailed but upright at the west end of the pile, located at approximately MP 314.2. A total of 22 cars were derailed with 19 cars destroyed. The position of the derailed cars from the head end counting the locomotives was No. 97 through 118 of the consist.

ANALYSIS AND CONCLUSIONS:

ANALYSIS - TOXICOLOGICAL TESTING:

Both crew members received the required FRA Post-Accident Toxicological Testing per 49 CFR Part 219.

CONCLUSION:

The results were negative for both the engineer and conductor.

ANALYSIS - FRA TRACK INSPECTION:

FRA inspected the track at 15-feet 6-inch intervals for 15 stations west of the derailment site.

CONCLUSION:

The track was tangent; there were no alignment irregularities and no notable surface defects.

ANALYSIS - BNSF TRACK INSPECTION RECORDS:

BNSF track inspection records indicate that BNSF Main Track No. 2 at MP 314.2 had received 22 inspections by a qualified track inspector in the period from
December 15, 2007 through January 14, 2008.

Conclusion: No track defects were noted at this location.

Analysis - Detector Car Records: On January 7, 2008, just 8 days prior to the accident, Detector Car No. SRS863 made an inspection of this portion of the Ottumwa Subdivision on Main Track No. 2.

Conclusion:

No defects were noted at, or near MP 314.2.

ANALYSIS - GEOMETRY CAR RECORD:

On December 11, 2007, BNSF Geometry Car No. 085 made an inspection of this portion of the Ottumwa Subdivision on BNSF Main Track No. 2.

CONCLUSION:

BNSF Geometry Car No. 085 did identify a yellow tag Dip 31 defect of 1 11/16 inches verticle by 9 feet horizontal at MP 314.13. Although this is not an FRA defect, it is a fact of interest since it is in the area where the derailment occurred. Additional forces on the rail would have been experienced as the train passed over the dip. A decision was made by the BNSF Technical Research and Development Laboratory to perform a train simulation across that track perturbation to better understand the vehicle dynamics.

ANALYSIS - TRAIN SIMULATION:

A New and Untried Car Analytic Regime Simulation (NUCARS) of a loaded coal car traveling 43 mph was performed using the track geometry from December 11, 2007. In terms of derailment risk, the numbers as follows were calculated from the simulation results:

Maximum single wheel lateral/vertical forces (L/V): 0.15
Minimum vertical wheel load: 21,850 lb (61 percent of nominal)
Maximum vertical wheel load: 50,000 lb (140 percent of nominal)
Maximum lateral wheel load: 6,000 lb

All the peak values noted above occurred at the 1-11/16 inch deep by 9-feet long, yellow tag dip 31 defect at MP 314.13. None of the values are indicative of derailment level forces with regard to vehicle dynamics. Critical single-wheel L/V values would typically be around 0.8 to 1.0. A minimum vertical wheel load is considered unsafe at levels around 10 percent or below, much lower than the minimum values found in the simulation.

CONCLUSION:

The results of the vehicle dynamics simulation do not indicate derailment due to wheel climb, wheel lift, or rail rollover based on the measured geometry of December 11, 2007, with nominal car conditions. However, significant vertical forces of 140 percent above nominal were being produced at the yellow tag dip defect. Elevated forces would have been produced at the same point in the track by every loaded car passing the dip. These elevated vertical loads may well have accelerated defect growth in rail, welds, or joints. Additionally, vertical forces may well have been higher on the day of the derailment as the geometry car run was 34 days prior to the derailment. Engineering personnel indicated no surfacing was done at the yellow tag dip defect in the period of time between the geometry car run and the derailment.

ANALYSIS - HIGH WHEEL IMPACTS:

Additional facts of interest are two cars that had AAR condemnable wheels for high impact readings. Per AAR standards a high impact wheel is one producing greater than 90 kip vertical force. Car No. FSTX 5536 was located at position No. 21 of the consist with L1 wheel having a peak impact reading of 98.0 as recorded by the Bingham East Wheel Impact Load Detector (WILD) on January 13, 2008. Car No. FSTX 5837 was located at position No. 64 of the consist with R3 wheel having a peak impact reading of 93.6 as recorded by the Bingham East WILD on January 13, 2008. Both cars were ahead of the first car derailed and the cars were oriented so that both high impact wheels were on the south rail of Main Track No. 2. Coincidentally, the first few cars derailed in the derailment derailed to the south suggesting some catastrophic failure of either a rail or car component on the south side. Although these were high impact wheels, BNSF reports that they were below the lowest alarm level limit for the Bingham East WILD of 112 kips.

CONCLUSION:

The wheel impacts would also have contributed to additional forces put on the rail. These forces would have been increased in the area of the dip defect in the track.

ANALYSIS - LOCOMOTIVE ENGINEER OPERATING PERFORMANCE:

The lead Locomotive No. BNSF 6192 was equipped with a speed indicator and an event recorder as required. The event recorder was downloaded by the BNSF road foreman at the accident site, and analyzed by the BNSF Technical Research and Development Laboratory in Topeka, Kansas.

CONCLUSION:

The event recorder data from lead Locomotive No. BNSF 6192 does not suggest anything unusual that could contribute to the cause of the derailment. The locomotive engineer was in full compliance with all applicable railroad operating and train handling requirements.

ANALYSIS - BROKEN WHEEL:

A freight car wheel set with a circumferential break completely around the wheel plate was found in the pileup and sent to the BNSF Technical Research and Development Laboratory in Topeka for further analysis.

CONCLUSION:

The analysis showed that the fracture face contained no fatigue; only 100 percent new brittle fracture. The analysis confirmed that the wheel broke as a result of the derailment and was not the cause.

ANALYSIS - BRAKEN RAIL:

All rail, welds, and rail joints recovered at the derailment site were inspected for the presence of batter and defect; two requirements necessary for a rail, weld, or joint to be identified as a cause of a derailment. Two (2) pieces of rail were found with head batter and both were shipped to the Topeka Physical Test Laboratory for further analysis.

CONCLUSION:

Upon further inspection neither of these rails were found to have defects or the type of straight base break normally attributed to a broken rail caused derailment. Neither broken rail was identified as the cause of the derailment.

ANALYSIS - MISSING RAIL AND WHEEL SETS:

As of April 3, 2008, it has been determined that approximately 467 feet of rail has not been accounted for, as well as, eight wheel sets. Cleanup of the site has been completed without turning up any additional rail or wheel sets.

CONCLUSION:

Further analysis of these components would be needed to determine or eliminate them as a cause of the derailment. The large amount of rail not recovered leaves the possibility that the derailment was caused by a broken rail, weld, or joint. The un-recovered wheel sets leaves the possibility that the derailment was caused by a broken wheel or axle.

ANALYSIS: - FATIGUE

FRA obtained fatigue related information, for the 10-day period preceding this incident including the 10-day work history (on duty/off duty cycles) for all of the employees involved.

CONCLUSION:

Upon analysis of that information FRA concluded fatigue was not probable for any of the employees.

OVERALL CONCLUSIONS:

The railroad has been found to be in compliance with its own requirements and all Federal Regulations to date in this investigation. Nothing was found with the train makeup, train handling, track profile, and event recorder analysis to suggest any train handling, train makeup, or train dynamic issues caused this derailment. The characteristics of the derailment suggest a catastrophic car or track component failure. However, no broken car components were found other than the wheel set with the broken wheel plate. The broken wheel was determined to be the result of the derailment and not the cause. The two pieces of broken rail that were analyzed were also determined not to be the cause of the derailment.

The investigation revealed two potential causes/contributors to the derailment. The first was the yellow tag dip defect that was identified on December 11, 2007, and not repaired by the date of the derailment. The vicinity of this geometry defect to the POD suggests this defect as a possible cause. The second possible cause/contributor to the derailment was the high impact wheels in Car Nos. FSTX 5536 and FSTX 5837.

Due to the large amount of material that remains unaccounted for, a root cause of the derailment has not been positively identified.

The railroad suggests that the derailment be closed out with cause code M507 - investigation completed, cause could not be determined due to the absence of substantive physical evidence. FRA agrees.

PROBABLE CAUSE AND CONTRIBUTING FACTORS:

M507 - Investigation complete, cause could not be determined. Despite the investigative efforts of the FRA and BNSF, evidence required for proper cause determination was never recovered from the accident site.