Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2009-04

Burlington Northern Santa Fe (BNSF)
Littleton, CO
January 12, 2009

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-2009-4

1.Name of Railroad Operating Train #1: BNSF Rwy Co. [BNSF]	1a. Alphabetic Code: BNSF	1b. Railroad Accident/Incident No.: CO0109104
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: Union Pacific RR Co. [UP]	4a. Alphabetic Code: UP	4b. Railroad Accident/Incident No.: 0109DV021
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 01 Day 16 Year 2009	7. Time of Accident/Incident: 11:36: ☐ 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
68	18	3	0	Colorado

14. Nearest City/Town	15. Milepost *(to nearest tenth)*	16. State Abbr	16. State Code	17. County
Littleton	10.6	N/A	CO	DENVER

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
38 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
UP Main Track No 1	4	91.8	2

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	GBNVGAT414

29. Speed *(recorded speed, if available)* R - Recorded E - Estimated	Code	30. Trailing Tons *(gross tonnage, excluding power units)*
44 MPH	R	8155

31. 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

31a. 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

32. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded *(yes/no)*
(1) First involved *(derailed, struck, etc)*	AMOX13231	48	yes
(2) Causing *(if mechanical cause reported)*	0	0	N/A

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

Alcohol	Drugs
0	0

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
(1) Total in Train	2	0	0	0	1
(2) Total Derailed	0	0	0	0	0

36. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	68	0	0	0	0
(2) Total Derailed	18	0	0	0	0

37. Equipment Damage This Consist	38. Track, Signal, Way, & Structure Damage	39. Primary Cause Code	40. Contributing Cause Code
$1,035,637.00	$160,427.00	T207	N/A

Number of Crew Members

41. Engineer/ Operators	42. Firemen	43. Conductors	44. Brakemen
1	0	1	0

Length of Time on Duty

45. Engineer/Operator	46. Conductor
Hrs 1 Mi 56	Hrs 1 Mi 56

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
N/A MPH	N/A

58. 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

58a. Remotely Controlled Locomotive? 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 Ban	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

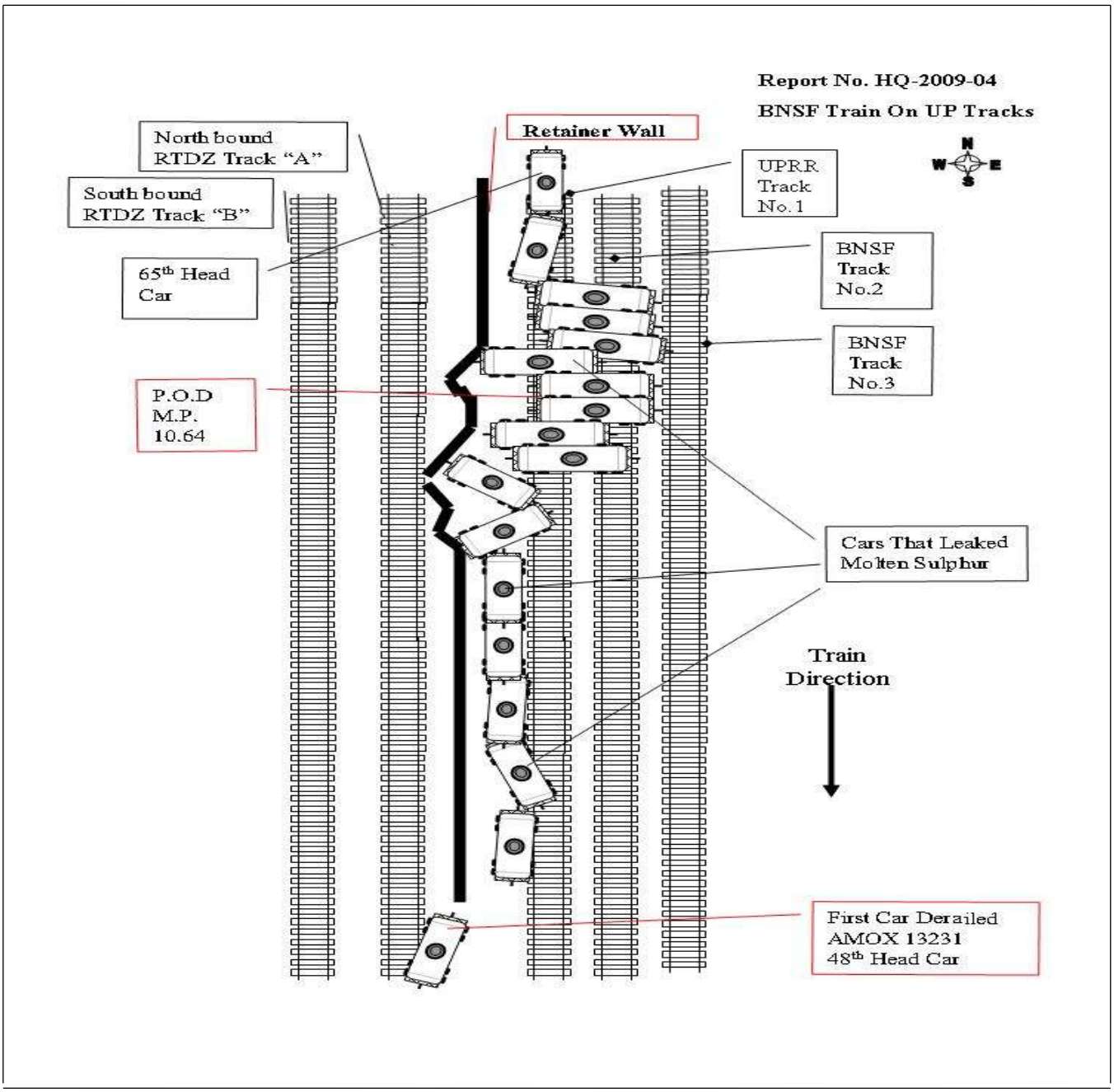
132. Locomotive Auxiliary Lights?	Code
1. Yes 2. No	N/A

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.



137. SYNOPSIS OF THE ACCIDENT

BNSF Railway (BNSF) G-BNVGAT-4-14A, a loaded freight train, derailed while traveling southward at a recorded speed of 44 mph on the Union Pacific Railroad Company's (UP) Colorado Springs Subdivision in the center of Littleton, Colorado, in Arapahoe County. The accident occurred on the UP Main Track Number 1 at UP milepost (MP) 10.64, on January 16, 2009, at 11:36 p.m. MST.

The train came to a stop immediately following an undesired emergency application of the train air brakes while traveling in an area known as the Littleton Depression. Upon inspection it was discovered that the 48th through 65th head cars of the train were derailed. The first car came to rest just on the west side of UP Main Track No. 1, about 250 feet south of the 2nd derailed car. The next seven cars came to rest lined up back to back also just on the west side of UP Main Track No. 1. The following eight cars came to rest in accordion style, fouling the UP Main Track No. 1 and the BNSF Main Tracks, Nos. 2 and 3. These derailed cars also encroached the adjacent Regional Transportation District (RTDZ) Light Rail Main Track A. Track damage to the RTDZ was minimal but a retaining wall that separated the two railroads at this point incurred considerable damage. The remaining two derailed cars were lined back to back.

There were no injuries reported by the two person BNSF crew. The train was carrying 68 loaded hazardous material cars listed as molten sulfur. The material safety date sheet (MSDS) identifies molten sulfur as a sulfurous, rotten egg smelling liquid material. It is classified as having a moderate health risk, a high flammability, and is a stable material. All 18 cars derailed were loaded with molten sulfur with 3 cars leaking. It was estimated that approximately 100 gallons leaked out of the cars and quickly solidified resulting in no health hazard. There were no fires and no evacuations. Damage estimates to the BNSF train consist was $1,035,637 and damages to the UP track was $160,427.

The BNSF train was being operated under centralized traffic control (CTC). The maximum operating speed for a loaded freight train on the UP Main Track No. 1 is 45 mph, as designated by the current BNSF timetable. This portion of railroad contains the UP and the BNSF tracks as well as the RTDZ tracks. The freight railroads are operated under the authority of the BNSF Timetable No. 5.

At the time of the derailment, it was night, clear, and the temperature was 38 °F.

The FRA's investigation determined the probable cause of the accident was due to a broken rail as a result of a detail fracture; Cause Code T207 - Broken Rail - Detail fracture from shelling or head check.

138. NARRATIVE

CIRCUMSTANCES PRIOR TO THE ACCIDENT

The two person crew of BNSF Train G-BNVGAT-4-14A consisted of a locomotive engineer and a conductor. They went on duty at 9:39 p.m. MST, on January 16, 2009, in Denver which is their home terminal. Each crewmember received more than the required statutory off-duty rest period prior to reporting for duty. The engineer was off 24 hours, 50 minutes; and the conductor was off 21 hours, 35 minutes.

The scheduled route of the loaded BNSF freight train was from Bonneville, Wyoming, south to Denver, then south to Galveston, Texas. The consist leaving Denver was equipped with 2 locomotives at the front of the train, 1 distributive power locomotive unit (DPU) on the rear, and 68 loaded tank cars. The last Class 1 train air brake test was performed in Bonneville, Wyoming, on January 15, 2009. The test was conducted successfully by BNSF personnel.

Both crewmembers were present in the control compartment of the lead locomotive when the derailment occurred. The engineer was positioned on the west side of the locomotive at the controls and the conductor was positioned in the conductor's seat on the east side of the locomotive. Interviews conducted by FRA Inspectors revealed that the trip was uneventful prior to the derailment.

This portion of the Colorado Springs Subdivision has three freight main tracks and two light rail commuter tracks. Looking from the west to east, the first two tracks are owned and operated by RTDZ, the third track is the UP's Main Track Number 1, and the fourth and fifth tracks are the BNSF's Main Tracks 2 and 3. The point

of derailment (POD) was at UP MP 10.64, which is on tangent track just south of a spiral in a 1-degree left-hand curve. This portion of track is located directly below the over passes of Littleton Boulevard in the center of Littleton, CO. The tracks are depressed here in what is known as the Littleton Depression. The grade at the POD is descending at a rate of 1.03-percent. This descending grade begins about 0.4 miles north of the POD at about UP MP 10.3. Just south of the POD, the grade continues to descend at a rate of 1.03-percent for about 1,000 feet to about UP MP 10.8. The grade then begins to climb out of the Littleton Depression at a rate of 1.03-percent grade.

Track conditions in the area of the derailment were good. UP Main Track Number 1 consisted of 133-lb Continuous-Welded Rail (CWR) on both sides which was laid new in 1987. The rail head is in good shape with little wear indicated. Ties are in good condition; no tie installation date was available. The ballast condition in the area was good, with a 2-foot shoulder on both sides. The rail was secured to the ties using a McKay type fastener on both sides. These fasteners are used to anchor the rail to the tie in order to prevent lateral, longitudinal, or vertical movement. Geometry and gage measurements taken post accident identified cross level deviations existed throughout the area of the derailment, but all deviations were within the limits prescribed within the FRA Track Safety Standards (TSS). The area of the derailment is in a very populated portion of Littleton, a southern suburb of Denver.

The railroad timetable direction of the BNSF train was south. The geographic direction was also south. Timetable directions are used throughout this report.

THE ACCIDENT

BNSF Train G-BNVGAT-4-14A was traveling southward on UP Main Track No. 1 at a recorded speed of 44 mph just prior to the derailment. The speed was recorded by the event recorder of controlling Locomotive BNSF 5139. The maximum operating speed for a loaded freight train on Main Track Number 1 is 45 mph, as designated by the current BNSF Timetable No. 5.

The head-end of the train was ascending out of the Littleton Depression and was on tangent track. Both the engineer and the conductor stated they did not observe anything out of the ordinary, but the conductor stated that he felt a small dip in the track while proceeding south at Littleton. As the head-end was ascending out of the Littleton Depression, the locomotive engineer began a step increase in power from throttle position 4 to throttle position 8 as the head-end was at UP MP 10.8. The train traveled in throttle position 8 for about 0.2 miles when the crew felt the train slow, and noticed they had experienced an undesired emergency train brake application bringing the train to a stop with the head-end at UP MP 11.34.

After coming to a stop, the conductor contacted the dispatcher to report the situation. Soon after, emergency response officials from the railroad began to arrive at the site. The conductor began walking the train to inspect it. He noticed as he approached the back of the second locomotive, emergency response crews from the city of Littleton were arriving. He could see derailed cars but was halted from his inspection by local police who barricaded the derailment scene as a precaution.

After railroad personnel were allowed into inspect the derailment site, it was determined that the POD was at UP MP 10.64. They discovered that the 48th through the 65th head cars of BNSF Train G-BNVGAT-4-14A were derailed. All car counts include the locomotives. The 48th head car came to rest just on the west side of UP Main Track Number 1, about 250 feet south of the second derailed car. The 49th through the 55th head cars came to rest lined up back-to-back also just on the west side of UP Main Track Number 1. The 56th through the 63rd head cars came to rest in accordion style, fouling UP Main Track Number 1 and BNSF Main Tracks 2 and 3. They also fouled the nearest RTDZ Track number “A.” The 64th and 65th head cars were lined up back-to-back on UP Main Track No. 1. All the derailed cars contained molten sulfur. Three of the cars were breached; they were the 48th, 51st, and 60th head cars. An approximate total of 100 gallons of molten sulfer were spilled. The spilled liquid soon solidified in the cold weather and ommited a foul nontoxic sulfur odor.

About 780 feet of the UP Main Track Number 1 was destroyed and was put back in-service at 12:04 a.m., January 19, 2009. The BNSF Main Track Number 2 had about 312 feet of track destroyed and was also put back in-service at 12:04 a.m., January 19, 2009. The BNSF Main Track Number 3 had about 195 feet of track destroyed and repairs were finished at about 8:30 p.m., January 18, 2009. It was put into operating service at the same time as the other two main tracks. The RTDZ Main Track A had minimal track damage

but was kept out-of-service while the retaining wall was rebuilt. This track was back in operation a week later. There were no other vehicles or persons involved. The two person BNSF train members reportedly were uninjured. There were no evacuations necessary as the molten sulfur quickly solidified. Damage estimates to the BNSF train consist were $1,035,637 and the UP track damage estimates were $160,427.

The UP's emergency wreck clearing crews along with an emergency wreck clearing contractor, were called to help with removal of the cars and track repair at the derailment site. The contract company used was Hulcher based out of Cheyenne, Wyoming. They began arriving on scene at about 3:00 a.m., January 17, 2009.

ANALYSIS AND CONCLUSIONS

ANALYSIS - TOXICOLOGICAL TESTING:
The crewmembers of BNSF Train G-BNVGAT-4-14A were tested for alcohol and drug usage in accordance with FRA post-accident testing requirements.

CONCLUSION:
Results of the tests were negative and crew member intoxication was determined not to be a casual factor.

ANALYSIS - LOCOMOTIVE ENGINEER OPERATING PERFORMANCE:
The locomotive was equipped with a speed indicator and an event recorder as required by Federal regulations. The relevant event recorded data was downloaded by the trainmaster at the accident site, and analyzed at the UP locomotive facility at Denver.

CONCLUSION:
The locomotive engineer was in compliance with all applicable railroad operating train handling requirements and FRA Standards. Train handling was not considered a casual factor in the derailment

ANALYSIS - FATIGUE:
FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis, which is equivalent to blood alcohol content (BAC) of 0.05. At or above this baseline FRA does not consider fatigue as probable for any employee. Software sleep settings vary according to information obtained from each employee. If an employee does not provide sleep information, FRA uses the default software settings.

FRA obtained fatigue related information, including a 10-day work history, for two employees involved in the accident, including the locomotive engineer and conductor assigned to BNSF Train G-BNVGAT-4-14A.

CONCLUSION:
FRA concluded crew member fatigue was not probable for either of the two employees involved in the accident.

ANALYSIS - TRACK:
Both the BNSF and UP performed a field investigation at the time of the derailment. All measurements taken were provided by the UP. Measurements were taken from the POD north 234 feet. Measurements were also taken from the POD south 78 feet. These measurements were taken at 15 foot 6 inch intervals. At each station, cross level and gage measurements were taken. The largest cross level measurement under load (static measurement plus the amount of space between the base of the rail and the tie plate) was 1 1/8 inches. This measurement was recorded at the second station about 31 feet north of the POD. Cross level measurements taken throughout the remainder of the stations ranged from 1/2 to 7/8 inches. Gage measurements throughout the stations ranged from 56 1/4 to 56 3/4 inches. The CWR had little to no head loss. There is no corrugation but some shelling was present. The previous month track inspections were conducted by the FRA Inspectors over this portion of track. One defect in the vicinity of the POD was identified. The FRA track inspector located a broken rail and identified it as a detailed fracture defect. It was found at MP 10.8, about 0.2 miles south of the POD. The last UP track inspection was conducted on January 13th, with no defects identified in this area. The latest Ultrasonic rail defect detection test car that tested the rail in this area prior to the derailment did not note any exceptions in the area of the derailment. This test was conducted on November 11, 2008. The latest track geometry car that tested the track structure prior to the derailment noted some tight gage in the area of the derailment, but the measurements noted were within FRA standards. This test was conducted September 18, 2008.

CONCLUSION:
Results of a post-accident track inspection in the area where the first car derailed revealed that the track was in good condition, with no FRA defects noted. Although cross level measurements were evident, no measurements noted as defective according to the FRA records. One broken rail had considerable wheel impact batter on the head of the rail, indicating that traffic had been moving over it after it had broken. This rail also had shadows on the sheared part of the rail that resemble growth rings associated with a detail fracture. FRA's Track Integrity Specialist noted the possibility of a detail fracture in one other of the rails, as well as wheel batter that would indicate traffic ran over the broken rail just prior to the derailment. With the amount of head checks in the area and the history of detailed fracture defects found in the area, it was determined that a broken rail caused from a detail fracture defect originating from shelling or head check is the probable cause of the derailment.

ANALYSIS – MECHANICAL INSPECTION:
A close examination of derailed cars was performed at the scene by BNSF mechanical personnel and wheel measurements were taken on all wheels involved.

CONCLUSION:
Results of the mechanical inspection found no mechanical problems that might have been a casual or contributing factor to the derailment.

Overall Conclusions:
The railroad was operating in compliance with their own rules and all applicable Federal standards. One broken rail had considerable wheel impact batter on the head of the rail, indicating that traffic had been moving over it after it had broken. FRA's Track Integrity Specialist noted the possibility of a detail fracture in one of the rails, as well as the wheel batter. The amount of head checks in the area and the history of detail fracture defects found in the area, provide convincing evidence that this is the cause.

PROBABLE CAUSE AND CONTRIBUTING FACTORS

The FRA's investigation determined the probable cause of the accident was due to a broken rail as a result of a detail fracture; Cause Code T207 - Broken Rail - Detail fracture from shelling or head check