Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2006-92

Burlington Northern Santa Fe
Sadler, Missouri
November 29, 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-2006-92

1.Name of Railroad Operating Train #1: BNSF Rwy Co. [BNSF]	1a. Alphabetic Code: BNSF	1b. Railroad Accident/Incident No.: NE110612
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.: NE110612
4. U.S. DOT_AAR Grade Crossing Identification Number	5. Date of Accident/Incident: Month 11 / Day 29 / Year 2006	6. Time of Accident/Incident: 10:10: ☑ 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	Nebraska

13. Nearest City/Town	14. Milepost (to nearest tenth)	15. State Abbr	15. State Code	16. County
Iatan	40.3	N/A	MO	PLATTE

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
29 F		2		2		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	166.4		3

OPERATING TRAIN #1

25. Type of Equipment Consist (single entry)	A. Spec. MoW Equip.	Code	26. Was Equipment Attended? 1. Yes 2. No	Code	27. Train Number/Symbol
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		1	1	1	CBTMS FB044

28. Speed (recorded speed, if available)	Code	30. Method(s) of Operation (enter code(s) that apply)	30a. Remotely Controlled Locomotive?
R - Recorded E - Estimated 50 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: 0

29. Trailing Tons (gross tonnage, excluding power units): 17329

Code(s): e | l | N/A | N/A | N/A

31. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	N/A	60	yes
(2) Causing (if mechanical cause reported)	0	0	N/A

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

Alcohol	Drugs
0	0

33. Was this consist transporting passengers? (Y/N): N

34. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote	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	122	0	0	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	40	0	0	0	0

36. Equipment Damage This Consist	37. Track, Signal, Way, & Structure Damage	38. Primary Cause Code	39. Contributing Cause Code
20204602	69000	T099	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 8 Mi 00	Hrs 8 Mi 00

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: N/A

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)	A. Spec. MoW Equip.	Code	53. Was Equipment Attended? 1. Yes 2. No	Code	54. Train Number/Symbol
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		N/A	N/A	N/A	N/A

55. Speed (recorded speed, if available)	Code	57. Method(s) of Operation (enter code(s) that apply)	57a. Remotely Controlled Locomotive?
R - Recorded E - Estimated 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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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: 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 — 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

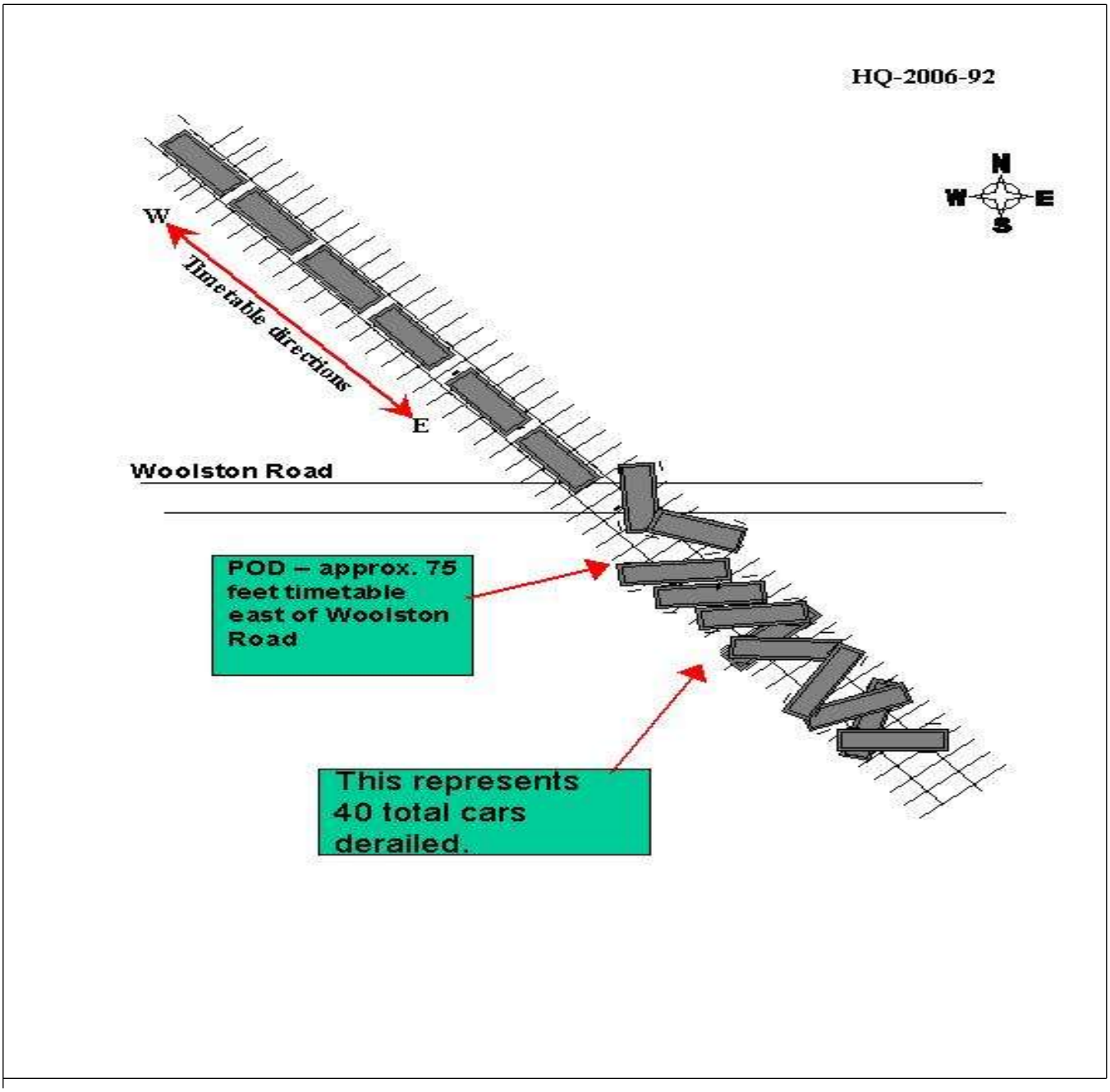
105. Locomotive Auxiliary Lights Operational? — Code: N/A
1. Yes 2. No

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-2006-92 sketch.jpg



109. SYNOPSIS OF THE ACCIDENT

On November 29, 2006, at approximately 10:10 a.m. (CST), BNSF Railway Company (BNSF) coal Train Symbol CBTMSFBO-44A derailed 40 cars (57th through 96th head cars) at milepost (MP) 40.35, on the single Main Track. The accident occurred about 75 feet east of the Woolston Road Crossing (DOT No. 095 196 J) in Platte County, Missouri, approximately 3 miles east of Iatan, Missouri.

Train Symbol CBTMSFBO-44A consisted of three diesel electric locomotives (BNSF 5878, lead locomotive; CEFX 1005, trailing locomotive; and BNSF 9829, a distributed power unit) and 122 cars with 17,360 trailing tons. The train length was 6,476 feet. At the time of the derailment, Train Symbol CBTMSFBO-44A was traveling eastward (timetable direction) at a recorded speed of 50 mph. The geographic direction was south. Timetable directions are used throughout this report. The weather was cloudy with 16 mph winds. The temperature was 29 degrees Fahrenheit.
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There were 39 coal cars destroyed with damages estimated at $2,204,602. Track damages were estimated at $64,000. Signal damages were estimated at $5,000, making the total estimated accident damages $2,273,602. There were no injuries to the train crew.

The probable cause of the accident was vertical deflections (track dips) just west of the point of the derailment causing the trucks on Car No. CEFX 60382, the 60th head car, to bounce resulting in wheel unloading and derailment of the train.

110. NARRATIVE

Circumstances Prior to the Accident

Train Symbol CBTMSFBO-44A originated at the Black Thunder Mine in Colorado, with a destination of Brookline, Missouri. On the prior empty cycle, the train (Train Symbol SFBATM-43) received a Class 1 brake test - initial terminal inspection on November 26, 2006, at Alliance, Nebraska. On the subsequent loaded cycle, it received a Class 1A brake test - 1000-mile inspection at Lincoln, Nebraska, between 1 a.m. and 1:45 a.m., November 29, 2006. No exceptions were noted on either inspection.

The accident occurred on the BNSF Nebraska Division, St. Joseph Subdivision, on the single Main Track. The St. Joseph Subdivision extends from MP 0.5 to MP 207.5, a distance of 207 miles. The method of operation is Centralized Traffic Control (CTC), which is controlled from the BNSF Dispatching Center in Ft. Worth, Texas. BNSF Timetable No. 5, effective at 8:00 a.m. (CST), December 17, 2003, authorizes a 50 mph maximum speed for freight trains in the accident area.

The rail near the point of derailment is 132-pound continuously-welded rail (CWR). It was manufactured by CFI, rolled in the 2nd month of 1984. The rail is secured on concrete ties with spring clip fasteners in good condition. Approaching the accident area, the track is tangent from MP 41.9 to the point of derailment. The average grade is .14 percent descending for eastbound trains. The grade is .05 percent descending at the point of derailment.

The crew of Train Symbol CBTMSFBO-44A included a locomotive engineer and a conductor. They had gone on duty at Lincoln, at 2:10 a.m., November 29, 2006. They had received the required statutory off duty period prior to being called for the train.

Prior to the accident, the locomotive engineer was seated at the controls on the south side of the leading locomotive. The conductor was seated on the north side in the front seat.

The last signal indication prior to the accident was a flashing yellow. Due to the signal indication and the descending grade, the engineer operated the train gradually reducing the throttle to idle approaching the accident area.

The Accident

The train speed was traveling at a recorded speed of 50 mph. Shortly after crossing Woolston Road, Train Symbol CBTMSFBO-44A experienced a train line induced emergency brake application. The conductor walked back to the 17th head car finding a broken knuckle. While the crew was replacing the knuckle, a motorist called the BNSF Police reporting derailed cars. The crew was unaware of the derailment prior to this report. After being contacted by the BNSF dispatcher, the conductor walked toward the rear of train and discovered 40 cars derailed (57th through 96th head cars).

Analysis and Conclusion

Analysis
The BNSF Technical Research and Development Department (TRD) collected and examined evidence secured from the accident site. Evidence included, but was not limited to, event recorder data, broken wheels, broken truck side frames, broken rails, and track geometry car data. Through analysis of evidence, TRD ruled out train make-up, train handling, and train dynamics as possible accident causes. TRD also ruled out failure of truck components as possible accident causes. Analysis showed the truck components were broken as a result of the accident. Early in the investigation, TRD considered the probable cause of the accident was a

broken rail. There were 5 portions of rail secured near the point-of-derailment. One of those portions was missing the head of the rail. This piece was never found and analysis was inconclusive to determine a broken rail as a possible accident cause.

In the accident area, the last track geometry car inspection was November 3, 2006. No defects were found. The last ultra-sonic rail test was November 14, 2006. No defects were found. The last hi-rail vehicle inspection was November 28, 2006.

During the last BNSF track geometry test, a series of three track dips (approximately 1 inch of vertical deflection) were detected just west of Woolston Road. TRD conducted a New and Untried Car Analytic Regime Simulation (NUCARS) to determine if conditions were capable of producing truck bounce. The NUCARS revealed the track dips produced truck spring bottoming and nearly complete unloading on wheels of trailing trucks (lead, left hand wheels). Minimum wheel loads of 79 pounds were produced when the expected wheel loads should have been 37, 500 pounds.

Post accident alcohol and drug tests of both crew members were negative.

Conclusion
Analysis of the event recorder download ruled out any operating issues as a cause. Inspections of all equipment ruled out all mechanical causes. The NUCARS revealed the track dips produced truck spring bottoming and nearly complete unloading on wheels of trailing trucks (lead, left hand wheels). Minimum wheel loads of 79 pounds were produced when the expected wheel loads should have been 37, 500 pounds.

Probable Cause

The FRA found the probable cause of the accident to be vertical deflections (track dips) just west of the point of the derailment causing the trucks on Car No. CEFX 60382, the 60th head car, to bounce resulting in wheel unloading and derailment of the train.