Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2007-63

Burlington Northern Santa Fe (BNSF)
Imboden, Arkansas
October 20, 2007

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-2007-63

1.Name of Railroad Operating Train #1: BNSF Rwy Co. [BNSF]	1a. Alphabetic Code: BNSF	1b. Railroad Accident/Incident No.: SF1007114
2.Name of Railroad Operating Train #2: BNSF Rwy Co. [BNSF]	2a. Alphabetic Code: BNSF	2b. Railroad Accident/Incident No.: SF1007114
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.: SF1007114
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 10 | Day 20 | Year 2007	7. Time of Accident/Incident: 08:05:01 ☑ 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	0	0	0	Springfield

14. Nearest City/Town	15. Milepost (to nearest tenth)	16. State Abbr	16. State Code	17. County
Imboden	378.1	N/A	AR	LAWRENCE

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
50 F	2	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
Single Main Track	3	79.74	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	CNAMPAM306

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?
41 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) Code(s): e N/A N/A N/A N/A	0 = Not a remotely controlled; 1 = Remote control portable; 2 = Remote control tower; 3 = Remote control transmitter - more than one remote control transmitter: 0

30. Trailing Tons (gross tonnage, excluding power units): 17807

32. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	BNSF 9378	130	yes
(2) Causing (if mechanical cause reported)	0	0	no

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	3
(2) Total Derailed	0	0	0	0	1

36. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	125	0	0	0	0
(2) Total Derailed	0	0	0	0	0

37. Equipment Damage This Consist	38. Track, Signal, Way, & Structure Damage	39. Primary Cause Code	40. Contributing Cause Code
$86,000.00	$951,000.00	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 6 Mi 5	Hrs 6 Mi 5

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	51. Was EOT Device Properly Armed? 1. Yes 2. No
1	1

52. Caboose Occupied by Crew? 1. Yes 2. No: 2

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
1	2	EMHSNAM207

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?
0 MPH — R	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

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # HQ-2007-63

57. Trailing Tons (gross tonnage, excluding power units): 3422

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): e | N/A | N/A | N/A | N/A

2 = Remote control tower; 3 = Remote control transmitter - more than one remote control transmitter: 0

59. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	BNSF 5817	1	no
(2) Causing (if mechanical cause reported)	0	0	no

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

Alcohol	Drugs
0	0

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

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	2	0	0	0	1
(2) Total Derailed	0	0	0	0	0

63. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	0	0	120	0	0
(2) Total Derailed	0	0	7	0	0

64. Equipment Damage This Consist: $178,405.00

65. Track, Signal, Way, & Structure Damage: $0.00

66. Primary Cause Code: T207

67. Contributing Cause Code: N/A

Number of Crew Members

68. Engineer/ Operators	69. Firemen	70. Conductors	71. Brakemen
0	0	0	0

Length of Time on Duty

72. Engineer/Operator: Hrs 0 Mi 0

73. Conductor: Hrs 0 Mi 0

Casualties to:	74. Railroad Employees	75. Train Passengers	76. Other
Fatal	0	0	0
Nonfatal	0	0	0

77. EOT Device? 1. Yes 2. No: 1

78. Was EOT Device Properly Armed? 1. Yes 2. No: 1

79. Caboose Occupied by Crew? 1. Yes 2. No: 2

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: N/A

82. Train Number/Symbol: N/A

83. Speed (recorded speed, if available) Code: R - Recorded; E - Estimated: N/A MPH: 0

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)	0	0	N/A
(2) Causing (if mechanical cause reported)	0	0	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	0	0	0	0	0
(2) Total Derailed	0	0	0	0	0

90. Cars	Loaded a. Freight	Loaded 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

91. Equipment Damage This Consist: $0.00

92. Track, Signal, Way, & Structure Damage: $0.00

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
0	0	0	0

Length of Time on Duty

99. Engineer/Operator: Hrs 0 Mi 0

100. Conductor: Hrs 0 Mi 0

Casualties to:	101. Railroad Employees	102. Train	103. Other
Fatal	0	0	0
Nonfatal	0	0	0

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. 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

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

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

Rail Equipment Involved

111. 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

112. Position of Car Unit in: 0

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # HQ-2007-63

110. Position	Code	113. Circumstance	Code
1.Stalled on Crossing 2.Stopped on Crossing 3.Moving Over Crossing 4. Trapped	N/A	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? 1. Highway User 2. Rail Equipment 3. Both 4. Neither	N/A	114b. Was there a hazardous materials release 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	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					

116. Signaled Crossing (See instructions for codes)	Code	117. Whistle 1. Yes 2. No 3. Unknown	Code
	N/A		N/A

118. Location of Warning 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach	Code	119. Crossing Warning with Highway Signals 1. Yes 2. No 3. Unknown	Code	120. Crossing Illuminated by Street Lights or Special Lights 1. Yes 2. No 3. Unknown	Code
	N/A		N/A		N/A

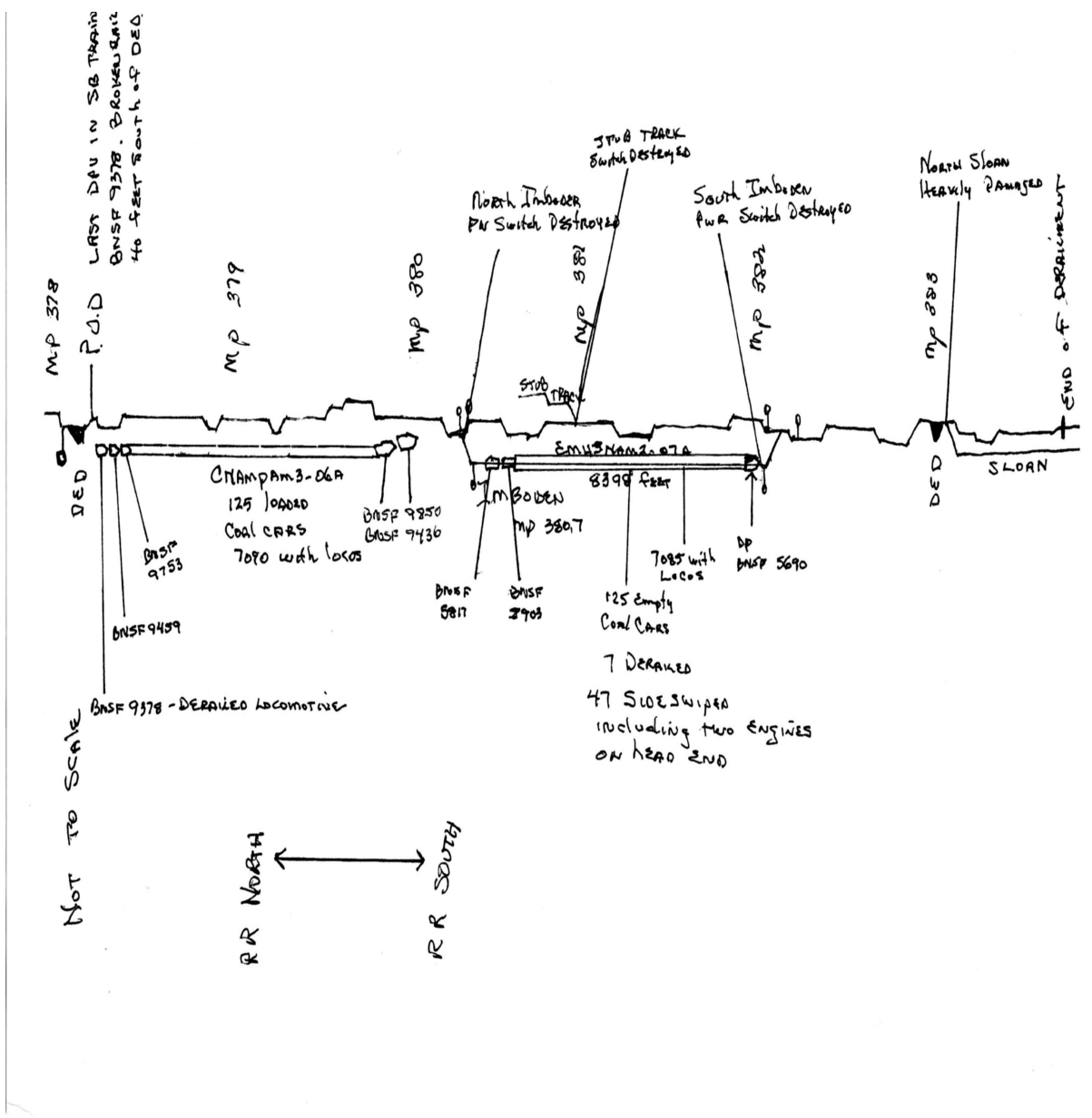
121. Age	122. Driver's Gender 1. Male 2. Female	Code	123. Driver Drove Behind or in Front of and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown	Code	124. Driver 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop 4. Stopped on Crossing 5. Other (specify in narrative)	Code
0		N/A		N/A		N/A

125. Driver Passed Highway Vehicle 1. Yes 2. No 3. Unknown	Code	126. 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		N/A

Casualties to:	Killed	Injured	127. Driver 1. Killed 2.Injured 3. Uninjured	Code	128. Was Driver in the Vehicle? 1. Yes 2. No	Code
				N/A		N/A
129. Highway-Rail Crossing Users	0	0	130. Highway Vehicle Property Damage (est. dollar damage)	0	131. Total Number of Highway-Rail Crossing Users (include driver)	0

132. Locomotive Auxiliary Lights? 1. Yes 2. No	Code	133. Locomotive Auxiliary Lights Operational? 1. Yes 2. No	Code
	N/A		N/A
134. Locomotive Headlight Illuminated? 1. Yes 2. No	Code	135. Locomotive Audible Warning Sounded? 1. Yes 2. No	Code
	N/A		N/A

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



137. SYNOPSIS OF THE ACCIDENT

At approximately 8:05 a.m. CDT, October 20, 2007, on the BNSF's Springfield Division, Thayer South Subdivision, at Imboden, Arkansas in Lawrence County, Arkansas, southbound C-NAMPAM-3-06, derailed at Mile Post 378.1 account of a broken rail.

The rail was Tennessee USA, manufactured in 1981. The rail section was 132# standard carbon with a 40% detail fracture from head check. The derailment occurred 2.6 miles north of Imboden, Arkansas. This train consisted of 125 cars and 5 locomotives, with 3 of the locomotives being used as distributive power on the rear end of the train. The rear DP of C-NAMPAM-3-06, the BNSF 9378, derailed but stayed upright. The initial derailment occurred 40 feet south of the dragging equipment detector located at milepost 378.075. This has the derailed locomotive on the ground on concrete ties until the train was stopped by another detector, coming to a stop at Mile Post 383.5. This has the derailed locomotive traveling approximately 5.4 miles. It was dragged through the north siding switch at Imboden, Arkansas where it is believed all six axles may have derailed. The C-NAMPAM-3-06 sideswiped the front two locomotives of the E-MHSNAM-2-07, the BNSF 5817 and the BNSF 8903, which were stopped with no crew on board in the siding at Imboden, AR.

The measurements of the track centers at this location were 15 feet center to center. The southbound derailed locomotive struck the E-MHSNAM-2-07 again as it went into a right hand curve, sideswiping lines 1-11, including the engines, derailing lines 12 thru 18, and sideswiping lines 19 thru 47. The E-MHSNAM-2-07 consisted of 120 empty coal cars, was not crewed and was to travel northward. It consisted of 2 locomotives on the head end and one distributive power locomotive on the rear end. The C-NAMPAM-3-06 was stopped just south of the north Sloan Switch by another dragging equipment detector, located at milepost 383.4.

Both the north and south power switches at Imboden were straight railed toward the siding to get traffic moving by approximately 4:30 a.m. CDT on 10-21-2007. The track was opened at 7:30 p.m. CDT on 10/23/2007. The derailed cars of the E-MHSNAM-2-07 received damages of $167,100 dollars and the two locomotives, the BNSF 5817 and the BNSF 8903, received $11,305.00 worth of damage. Approximately 80 track panels and three switches were used along with an unknown number of concrete ties to repair the main line.

There was no track damage to the siding. Early estimates of damages are approximately 1.2 million dollars. There were no injuries to railroad personnel, citizens, and no hazmat release. This is not an Amtrak route. At the time of the derailment the weather was daylight, clear and dry with a temperature of 60 degrees.

The derailment was caused by a broken rail (Detail fracture from shelling or head check).

138. NARRATIVE

CIRCUMSTANCES PRIOR TO THE ACCIDENT

The crew of train number one, the southbound C-NAMPAM-3-06 went on duty at Thayer, Missouri, and was called for 2:00 a.m. CDT. The crew consisted of an engineer and a conductor. Train C-NAMPAM-3-06 was a loaded coal train headed south out of Thayer, Missouri. The final destination was Memphis, Tennessee. Both crew members had received more than the statutory off duty time.

The train was a loaded coal train and was required to have a 1,000 mile air test. The train was restricted to track speed according to the timetable, special instructions and train orders. The car men at Thayer had tested the train and the train's brakes prior to the train crew's arrival. The rear engine (the BNSF 9378) was being used as the end of train device. This was also the last motor of the train and was the one involved in the derailment. There were no changes made to the train after it left Thayer, MO. It consisted of 5 motors, 2 front and three rear and 125 loaded coal hopper cars, was 6,720 feet in length and weighed 17,807 tons. Thayer, Missouri was the home terminal for both crewmembers. The train finally departed Thayer, MO southbound on the Thayer South subdivision at approximately 5:30 a.m. CDT. The late departure was due to heavy traffic. The train made two stops meeting trains along the route before reaching the accident site.

Approaching the accident site the engineer was seated at his assigned position; at the controls on the west side of the train going south with the conductor sitting on the east side of the locomotive at his assigned

station. He was also seated in the forward most seat. The train was going south and the railroad timetable was also indicating north to south. Timetable directions will be used throught this report. The topography of the accident area is a series of short curves and tangents with the grade topping out at .50 just north of the North Imboden siding switch.

THE ACCIDENT:

Train C-NAMPAM-3-06 had just gone past the dragging equipment detector at 378.075 and had received no alarm. According to the download from this train, the train was moving 41 miles per hour (mph) in a 40 mph zone. This is a recorded speed. According to measurements taken in the field, the rail broke underneath this coal train, derailing the last engine, the BNSF 9378, 40 feet south of the dragging equipment detector. The derailment occurred at 8:03 a.m. CDT on 10/20/2007. This engine remained upright but rolled the rails out on both the left and the right hand sides, depending of which way the curve went.

The track structure was concrete ties with safe lock clips. The ties were spaced every 24 inches, center to center. The BNSF 9378 initially had only the rear truck, with three axles derailed, but somewhere around the North Imboden Siding switch all six axles derailed. This engine destroyed the North Power Switch at Imboden, milepost (MP) 380.3, the Imboden hand throw switch at MP 380.9, the South Power Switch at Imboden at MP 382.1 and the north switch at Sloan, MP 383.4. There is also another dragging equipment detector at MP 383.3 which did tell the train they were on the ground.

At this time,the Memphis Terminal Dispatcher responded to the 911 call that was issued by the dragging equipment detector at MP 383.4 at 8:05 a.m., according to the dispatcher's tapes. The C-NAMPAM-3-06 told her that they were stopping anyway as the train had jerked in an unusual way Train E-MHSNAM-02 was located in the siding at Imboden, Arkansas, facing northward. It did not have any crew on board. It consisted of the BNSF 5817 on the head end, with the BNSF 8903, just behind it. This was followed by 120 empty coal cars and the DPU, BNSF 5690. This train was 6580 feet in length and weighed 3,422 tons.

During the derailment the BNSF 9378 sideswiped the leading two engines; the BNSF 5817 and the BNSF 8903 of the E-MHSNAM-2-07. It is believed from the wheel marks that the whole engine, the BNSF 9378, derailed at North Imboden, sideswiped these two engines, bounced back across the rail, breaking the main line and continued rolling out rail as it went. The track centers at this location were 15 foot center to center. As it came around a sharp right hand curve it damaged car 1 thru 11, including the engines. It derailed lines 12 thru 18 and damaged lines 19 through 47. When the main track straightened back out, the engine pulled away from the train on the siding and continued southward on the main track. C-NAMPAM3-06 continued south and it is believed from wheel marks that the south switch at Imboden could possibly be where the front three axles re-railed themselves. This switch was completely destroyed. The southbound train finally stopped at milepost 383.75. There was no release of hazardous material and no evacuation or injuries to railroad personnel of citizens.

ANALYSIS AND CONCLUSIONS

Train E–MHSNAM-2-07 damages incurred account of derailment:

Equipment	$178,405.00
Track	0.00
Total	$178,405.00

Train –C-NAMPAM3-06 damages incurred in Derailment:

Equipment	$86,000.00
Track, Signal, and Other Appurtenances.	$951,000.00
Total Costs	$1,037,000.00

FRA inspection of Track along with carrier representatives agreed upon the T207 code, Detail Fracture from Shelling of Head Check. Sperry Rail services was also brought in and agreed with FRA's findings. FRA also checked the wheels on the BNSF 9378 to see if there were drag marks on all six axles which there were. The train crew was transported by the BNSF Road Foreman to the West Plains, Missouri hospital to do the blood

and alcohol testing. There were no failures of either crew member from the results of these tests. FRA Headquarters made the decision that the circadian rythym report would not be required as the accident was track caused.

The FRA thus concludes that this derailment was caused by the catastrophic failure of the west rail underneath the last locomotive in the consist, the Distributive Power Engine BNSF 9378, the rear engine of the south bound C-NAMPAM-3-06 This conclusion was reached after examination of the rail ends at the point of derailment, and subsequent shattering of the rail.

This conclusion is also supported further by the results of the BNSF laboratory analysis. If this had occurred under anything but the last engine, there would have been more than one car on the ground. The wheel marks only show three sets of trucks until you get to North Imboden where it appears all six went on the ground. With the train in the siding and with the track centers, which measured 15 feet center to center, the train in the siding could only have been struck if all six wheel sets were on the ground. At the end of the derailment only one set of axle marks were found on the ties, further lending support to the conclusion that three axles were re railed at some point during the derailment, possibly at South Imboden. The south Imboden switch was too heavily damaged to make a determination on whether it was the point of re-railing or not. From the time FRA got the call to the time FRA arrived at the actual derailment site, several hours had passed. Much of the rerailing had taken place including the derailed locomotive and the seven cars in the siding.

PROBABLE CAUSE:

The derailment was caused by a broken rail (Detail fracture from shelling or head check).