Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2009-29

BNSF Railway Company (BNSF)
Fort Scott, KS
June 23, 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-2009-29

1.Name of Railroad Operating Train #1: BNSF Rwy Co. [BNSF]	1a. Alphabetic Code: BNSF	1b. Railroad Accident/Incident No.: SF0606109
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.: SF0606109
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 06 Day 23 Year 2009	7. Time of Accident/Incident: 03:05: ☐ 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	Springfield

14. Nearest City/Town	15. Milepost *(to nearest tenth)*	16. State Abbr	16. State Code	17. County
Fort Scott	103.6	KS	20	BOURBON

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
96 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	62.10	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	CNAMMHS106

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?
25 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)*: 17493

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

31a. Remotely Controlled Locomotive?: 0

32. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded *(yes/no)*
(1) First involved *(derailed, struck, etc)*	RWSX23861	69	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	36. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	2	0	0	0	3	(1) Total in Equipment Consist	123	0	0	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	21	0	0	0	0

37. Equipment Damage This Consist	38. Track, Signal, Way, & Structure Damage	39. Primary Cause Code	40. Contributing Cause Code
$1,288,888.00	$148,500.00	T109	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 5	Hrs 1 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 — 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?
0 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)*	0	0	N/A
(2) Causing *(if mechanical cause reported)*	0	0	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	0	0	0	0	0
(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	0	0	0
(2) Total Derailed	0	0	0	0	0

64. Equipment Damage This Consist $0.00

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

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
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 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 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. 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

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110. Position 1.Stalled on Crossing 2.Stopped on Crossing 3.Moving Over Crossing 4. Trapped	Code N/A	113. Circumstance 1. Rail Equipment Struck Highway User 2. Rail Equipment Struck by Highway User	Code 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	Code N/A	114b. Was there a hazardous materials release 1. Highway User 2. Rail Equipment 3. Both 4. Neither	Code 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	116. Signaled Crossing *(See instructions for codes)*	Code	117. Whistle Ban 1. Yes 2. No 3. Unknown	Code
Code(s) N/A N/A N/A N/A N/A N/A N/A		N/A		N/A

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

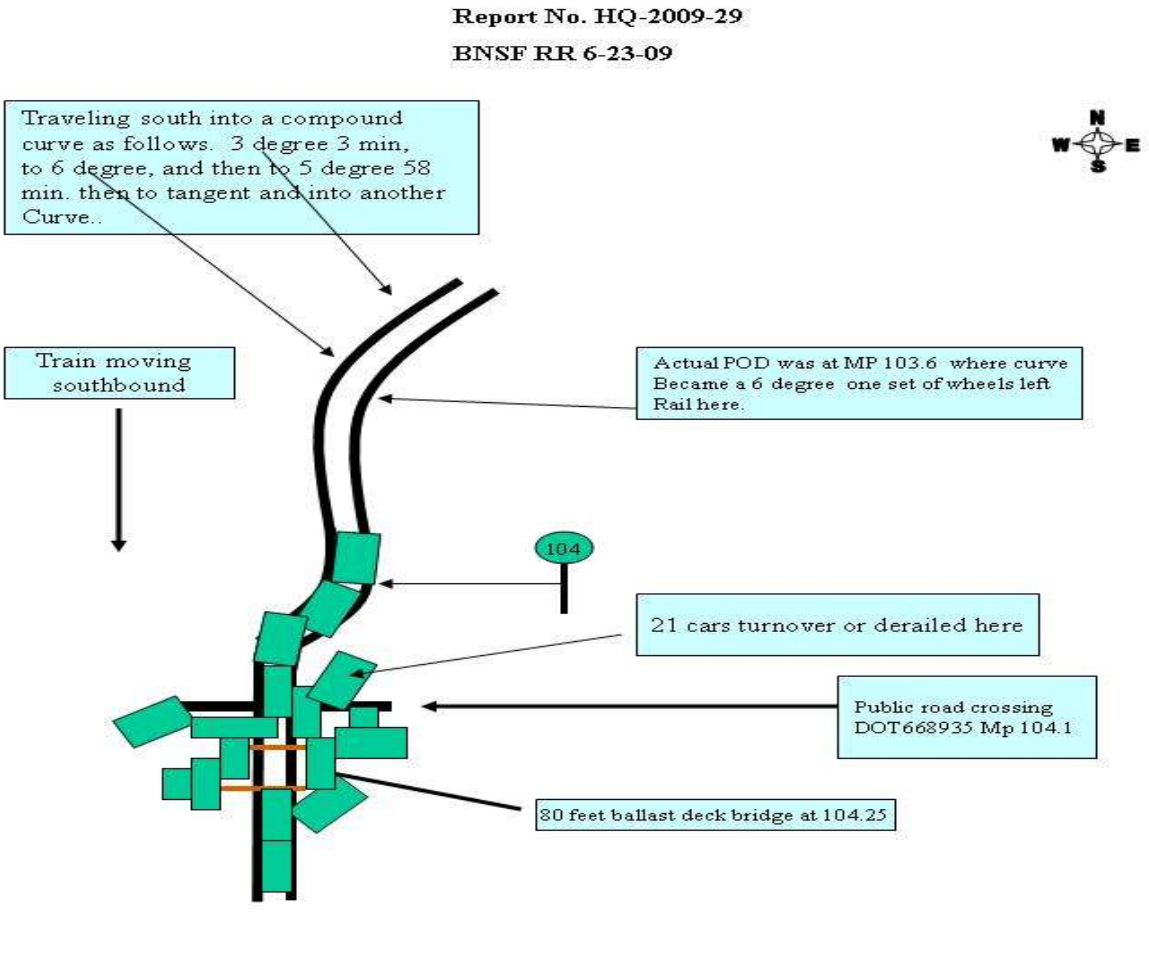
121. Age N/A	122. Driver's Gender 1. Male 2. Female	Code N/A	123. Driver Drove Behind or in Front of and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown	Code N/A	124. Driver 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop 4. Stopped on Crossing 5. Other *(specify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

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

Casualties to:	Killed	Injured	127. Driver 1. Killed 2.Injured 3. Uninjured	Code N/A	128. Was Driver in the Vehicle? 1. Yes 2. No	Code N/A
129. Highway-Rail Crossing Users	N/A	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? 1. Yes 2. No	Code N/A	133. Locomotive Auxiliary Lights Operational? 1. Yes 2. No	Code N/A
134. Locomotive Headlight Illuminated? 1. Yes 2. No	Code N/A	135. Locomotive Audible Warning Sounded? 1. Yes 2. No	Code N/A

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



137. SYNOPSIS OF THE ACCIDENT

A southbound BNSF loaded coal train No. CNAMMHS1-06A derailed 21 cars on June 23, 2009, at 3:05 p.m. CDT. The accident occurred approximately 4.7 miles south of Fort Scott, Kansas, at BNSF Milepost (MP) 103.6 on the BNSF Fort Scott Subdivision.

At the time of the accident it was daylight and clear. The temperature was estimated to be 96 °F.

The equipment damage was estimated at $1,288,888. Track damage was estimated at $140,000 and signal damage was estimated at $8,500. One car turned over in a small stream, but the contents were contained and removed by a local salvage contractor.

The FRA's investigation determined the probable cause of the accident was T-109 track alignment irregular, (a thermal misalignment/sun kink).

138. NARRATIVE

Circumstance Prior to Accident

The crew of BNSF train symbol CNAMMHS1-06A included a locomotive engineer and a conductor. They first went on duty at 2 p.m. CDT on June 23, 2009, at Fort Scott. This was the away from home terminal for both crewmembers, and each had their required statutory, off-duty rest period prior to reporting for duty.

Their assigned freight train consisted of five locomotives (two on the head-end and three on the rear of the train), 123 loaded coal cars, weighed 17,493 tons, and 7,180 feet long. This train was scheduled to travel to Springfield, Missouri, and the final destination was at a Georgia power plant in Scherer, Georgia. The train received an initial terminal air brake test at NAC Junction, located 20 miles north of Bill, Wyoming, by a train conductor on June 21, 2009, at 2:16 p.m. MDT. No other test was required. The train departed Fort Scott at 2:45 p.m. CDT on June 23, 2009. As the train approached the accident area, the locomotive engineer was seated at the controls on the west side of the lead locomotive; and the conductor was seated on the east side of the lead locomotive. The railroad timetable direction of the train was south, and the geographic direction was southeast. Timetable directions are used throughout this report.

The train was in and out of a series of curves beginning at MP 102.6 and ending at MP 105. The grade at this location is 1 percent descending. The track was constructed with 141-lb. continuous-welded rail (CWR) on wood crossties, and the spike pattern was two spikes on the gage side, two spikes on the field side, and two anchor spikes. The anchor pattern was three out of four ties plated with Pandrol Clips, and the fourth tie was conventional tie plates with curve blocks attached, and two field, one gage, and two anchor spikes.

The Accident

The train was being operated at 25 mph approaching the accident area. At the time the accident occurred, the train was being operated at 25 mph. Both of these speeds were recorded by the event recorders on the lead locomotive No. BNSF 5925 and locomotive No. BNSF 5601 which was the third locomotive from the rear

-end of the train. The maximum authorized speed of this track is 30 mph, as indicated in BNSF Timetable No. 6, dated January 17, 2007.

The engineer stated as their train passed MP 103.6, he and the conductor talked about how good the track looked and rode. As they passed a wayside signal at MP 104.27, the engineer asked the conductor how many handbrakes he had released. As the conductor was answering him, they had an undesired emergency application of the train air brake system. The engineer said that he tried to reset the air, and that the rear-end unit actually recovered to 80 psi, but the head-end never recovered. He was on the radio with the mechanical help desk as well as the train dispatcher. He and the conductor job-briefed, and the conductor proceeded to dismount and started walking toward the rear of the train. The conductor said that when he got to Bridge No.104.25, he could see cars turned over. He relayed this to the engineer and proceeded to collect necessary information for his reports.

Analysis and Conclusion

Analysis Toxicological Testing: The two crewmembers of BNSF train symbol CNAMMHS1-06A were mandatory post-accident toxicologically tested. The test results were negative.

Conclusion: Drugs and alcohol were not factors in this accident.

Analysis-Fatigue for Train Crew: FRA uses an overall effectiveness rate of 77.5 percent as a baseline for fatigue analysis, which is equivalent to a blood alcohol content (BAC) of 0.05. At or above this baseline, we do not consider fatigue as probable for any employee. Software sleep settings vary according to information obtained for 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 the two crew members involved in this accident.

Conclusion: FRA concluded fatigue was not probable for the engineer or the conductor assigned to BNSF train symbol CNAMMHS1-06A.

Analysis-Locomotive Engineer Operating Performance: The locomotive was equipped with a speed indicator and an event recorder as required. The relevant event recorder data was downloaded by the manager of operating practices at the accident site, and analyzed at the Springfield Division Office in Springfield, Missouri.

Conclusion: The locomotive engineer was in compliance with all applicable railroad operating and train handling requirements.

Analysis-Track: The last ultrasonic rail detection through this area was on June 3, 2009, with the Sperry Rail Car (SRS 967). There was one rail defect in the immediate area of MP 103 to 105. It was identified as a CF 10-percent at MP 104.111, and showed being removed from track on June 8, 2009. The last geometry car survey was on May 19, 2009, by BNSF Track Test Car No. TRPT1. There were not any exceptions in the area of the derailment.

During the investigation, it was revealed that the west/high rail was laid on July 7, 2004, at 100 °F, and that the east/low rail was laid on June 21, 2007, at 116 °F. The last major work done on this segment of track was in October 2008, with a tie and surfacing program. This location is in a left-hand compound curve with measurements as follows 3-degree, 3-minute curve into a 6 degree, then into a 5-degree, 58-minute curve, identified in BNSF track charts as curve No.103A.

BNSF track inspection records revealed that the track was last inspected on June 22, 2009. On this inspection, at approximately 7:00 p.m. CDT, the track inspection gang had concerns about a potential tight rail location at MP 103.6 area. They found an alignment deviation of about 1 inch and reduced the speed of track to 10 mph. They called the local roadmaster, and both agreed to have a track gang come out and de-stress the rail at this location.

The track inspection gang and a welding gang arrived at the location and cut the rail and removed 2-1/2 inches of rail. They began their work at approximately 10 p.m., and completed about 15 minutes after

midnight. It was later revealed that they removed about 6 feet of anchoring (Pandrol Clips) and used a rail expander to pull rails back together. They drilled the rail, placed joint bars on the rail and left for the night. The morning of June 23, the welding gang returned to this location to weld the rails. When they removed the joint bars the rail was gaped 1 inch with no movement. The welder and the roadmaster discussed this in a telephone conversation, and it was agreed that the welders shoot the welds. This resulted in adding one inch of rail when they should have removed 1 ½ inches of rail. This was not in accordance with the continuous-welded rail (CWR) plan on file in the Federal Railroad Administration office in Washington, D.C.

The FRA's first inspection following the derailment was noted on Form F6180.96 Report No. PLB-72, of June 24, 2009. No defects were noted in the track prior to the point of derailment. However, further investigation revealed the gangs did not remove 195 feet of anchoring either the night before or the morning of June 23, 2009, as prescribed in Chapter 3, Part 3.1, De-stressing rail, Procedure No. 2. This was noted on Form F6180.96 Report No. PLB-73.

Conclusion: The railroad was not in compliance with their own standards as well as all applicable FRA standards for de-stressing CWR. They failed to remove a sufficient amount of rail anchors and added rail when rail should have been removed to properly de-stress the rail to the desired rail temperature.

Overall Conclusion: The train was operated in full compliance with BNSF and all applicable Federal rules and standards. There was nothing discovered in the investigation that would indicate mechanical or signal causes. Evidence discovered at the derailment site and interviews with the division engineer, roadmaster, track inspector, and welder indicated the probable cause to be a thermal misalignment.

Probable Cause and Conclusion:

The FRA's investigation determined the probable cause of the accident was T-109 track alignment irregular, (a thermal misalignment/sun kink).