Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2012-21

BNSF Railway Company (BNSF)
Mesa, WA
July 2, 2012

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-2012-21

1.Name of Railroad Operating Train #1: BNSF Rwy Co. [BNSF]	1a. Alphabetic Code: BNSF	1b. Railroad Accident/Incident No.: NW0712102
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.: NW0712102
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 07 Day 02 Year 2012	7. Time of Accident/Incident: 06:30: ☐ 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	Northwest/Lakeside

14. Nearest City/Town	15. Milepost *(to nearest tenth)*	16. State Abbr	Code	17. County
Mesa	119.5	WA	53	FRANKLIN

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
83 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
Main		4	95.10		4

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. Yes	1	CNAMRBE052

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?
48 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)*: 17840

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

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)*	BNSF671133	63	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	3	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	125	0	0	0	0
(2) Total Derailed	32	0	0	0	0

37. Equipment Damage This Consist		38. Track, Signal, Way, & Structure Damage		39. Primary Cause Code		40. Contributing Cause Code	
	$1,749,355.00		$350,000.00		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 7 Mi 0	Hrs 7 Mi 0

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: 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. 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

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	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	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

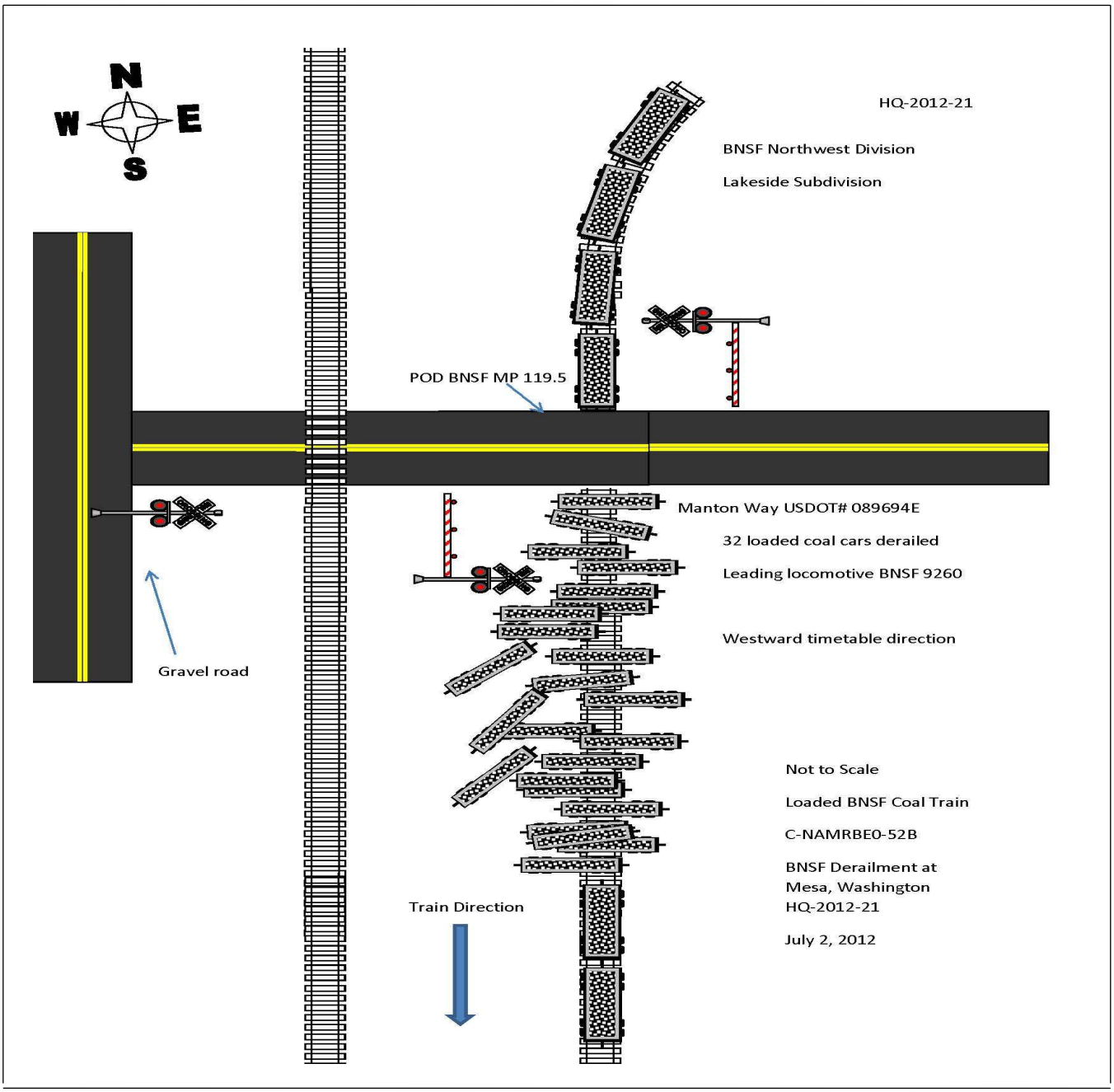
121. Age	122. Driver's Gender 1. Male 2. Female	Code	123. Driver Drove Behind or in Front of and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown	Code	124. Driver 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop 4. Stopped on Crossing 5. Other *(specify in narrative)*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

On July 2, 2012, at approximately 6:30 p.m. PDT, a westbound BNSF Railway (BNSF) freight train, C-NAMRBE0-52-B, derailed 32 railcars on single main track at milepost 119.5 in Mesa, Washington. Mesa is located on the BNSF's Northwest Division, Lakeside Subdivision and is approximately 119 miles west of Spokane, Washington and 27.4 miles east of Pasco, Washington. The method of operation at the accident site is by signal indication of a Traffic Control System under the authority of the BNSF train dispatcher in Fort Worth, Texas. The BNSF coal train consisted of four locomotives, three on the head end with one distributed power at the rear end. The train had 125 loads, no empties, and was 6,929 feet in total train length with 17,840 trailing tons.

The train was traveling at a recorded speed of 48 mph approaching the derailment site. As the locomotive engineer sounded the whistle for the Manton Way grade crossing, he observed a section of rough track just east of the public crossing. The train crew was about to report the rough track to the dispatcher when the train experienced an undesired emergency brake application. The train crew contacted the dispatcher and stated the BNSF 9260 experienced an undesired emergency brake application and was stopped at MP 121.

The train crew received no injuries and no hazardous materials were involved. The Lakeside Subdivision is an Amtrak route. The railroad reported $1,749,355 in equipment damage, and $350,000 in track damage.

At the time of the derailment it was daylight and clear with a southerly wind of 9 mph. The temperature was 83 degrees F.

The probable cause of the accident was irregular track alignment (FRA accident/incident code T109 - track alignment irregular, buckled/sunkink).

138. NARRATIVE

Circumstances Prior to the Accident:

The crew of westbound train C-NAMRBE0-52-B with leading locomotive BNSF 9260 consisted of an engineer and a conductor. The crew reported for duty at their home terminal in Hauser, Idaho at 11:30 a.m. PDT on July 2, 2012 after completing the required statutory off duty period. The train was scheduled to travel from Hauser, Idaho to Pasco, Washington, a distance of approximately 171 miles.

The crew had a copy of the train profile and there were no hazardous material cars on the train. The crew participated in a job briefing prior to the start of work and also briefed as the trip progressed. No setouts or pickups were done en route and the engineer had no problems with the dynamic brakes and did not take any issues with the handling of the locomotives. There were no exceptions noted to the safety devices on the controlling locomotive, BNSF 9260. The train crew was in possession of their general track bulletins and no restrictions were noted for the location of the derailment. Interviews conducted by the Federal Railroad Administration (FRA) revealed the trip was uneventful prior to the derailment.

An extended haul inspection was performed on this train at the Montana Rail Link (MRL) yard in Missoula, Montana on July 2, 2012. The air brake test slip was in the lead locomotive. The train departed the BNSF facility at Hauser, Idaho at 12:30 p.m. PDT on July 2, 2012.

As the train approached the derailment area, the engineer was seated at the controls of the leading locomotive on the right (north) side of the cab and the conductor was seated on the left (south) side of the cab. The train was traveling at 48 mph at the time of the incident.

Approaching the derailment site by rail from the east beginning at milepost 118.0 westward there are in succession, 3,168 feet of tangent, a 617 foot 1-degree 6-minute curve to the right, a 1,495 foot tangent, and 2,640 feet of curved track to the point of derailment at MP 119.5 which is on a 3,620 foot 2 degree 0 minute curve to the left with a .14 percent descending grade toward the west.

The railroad timetable direction of the train was west. The geographic direction was southwest. Timetable directions are used throughout this report.

THE ACCIDENT:

As the train approached Mesa traveling westward, the engineer observed what looked like rough track immediately east of the grade crossing at MP 119.53 in Mesa. The engineer and conductor both felt the rough track as the train traveled over the crossing. Approximately 60 seconds later, the train experienced an undesired emergency brake application and stopped. The engineer looked back and observed a cloud of dust.

The engineer attempted to recover the air brakes for the train, but the air brakes did not recover. According to the engineer, the section of rough track at the crossing might have been a thermal misalignment and may have caused the derailment.

The investigation revealed that the lead locomotives and the first 62 loaded coal cars traversed over the irregular track alignment and remained on the track. The 63rd rail car then derailed at the misalignment location which had quickly accelerated into a severe a track buckle under the impact of the loaded coal train. This action caused the following railcars (63rd through 94th) to also derail resulting in the cars rolling onto their sides, spilling their coal, and piling up west of the grade crossing. The point of derailment was noted on the grade crossing where car wheels derailed into both the gage and field side of the track and continued to be pulled for another 900 feet before the train came to a stop.

POST-ACCIDENT INVESTIGATION:

BNSF Engineering Instructions Rule 2.9, Special Inspections 2.9.1 - Hot Weather states in part: “When ambient temperature reaches or exceeds this threshold temperature (determined by the Division Engineer), inspect the following track every day between noon and 8:00 pm, or as instructed by the Roadmaster.” An investigation of BNSF track inspection records noted their track inspectors traversed the track from MP 99.3 to MP 137.0 every day during the last week prior to the derailment including an inspection the day of the accident. The last inspection through the derailment site was made at approximately 1 p.m. on July 2, 2012, 5 hours and 30 minutes prior to the accident. No track exceptions were noted in the surrounding area during these inspections.

Copies of the railroad’s inspector heat run reports and roadmaster tight rail reports were examined. Heat run reports provide information on the day of inspection, location inspected, time of inspection, ambient and rail temperature during the inspection, and any tight rail locations identified. Tight rail reports provide information on the tight rail location, time discovered, ambient and rail temperature, description of track and its condition, when track was last inspected, and a description of how a condition was corrected with pertinent comments like amount of rail removed. The investigation noted that no tight rail reports within the area of the derailment had been filed prior to the derailment.

BNSF engineering records noted the most recent track maintenance performed at the derailment site was on May 30, 2012, by a super tamper surfacing track out-of-face with a dynamic track stabilizer used to compact the ballast section behind the tamper after surfacing. Surfacing track out-of-face consists of a production tamper machine lifting the track structure up from its ballast section (roadbed) and tamping rock under the crossties to keep the rail and track structure level on straight track (tangent) and to maintain the proper elevation on the outside high rail of a curve to safely accommodate posted train speeds. A track stabilizer working behind a tamper will compact ballast rock around the track structure to prevent a misalignment of track caused by the instability of the disturbed ballast. Track lifts are usually kept to a minimum and lifted in increments of inches to minimize disturbance of the ballast and its track stability. During the last surfacing operation at the Mesa public grade crossing, the railroad stated employees complied with BNSF surfacing procedures and temporary speed restrictions for track work.

On June 26, 2012, BNSF records note a BNSF geometry car made a test run over the main track at the derailment site. A geometry test car is used to monitor track to detect track profile irregularities caused by rail tonnage dynamic forces. Irregularities detected include rail cant (side to side rail tilt), track unbalance (deviation from 3 inch unbalance), curve elevation (elevation of outside rail), crosslevel (zero level rail to rail), gage (distance between rails), rail misalignment (beginning to appear thermal or regular misalignment), and

running rail profile (dips and humps). At the point of derailment, milepost 119.5, the BNSF track measurement car strip chart noted 3/8 inch inward cant on the right rail, a 3 ¼ inch unbalance, 4 7/8 curve elevation, 57 inch gage, ¼ inch misalignment, ¾ inch profile on right rail, and 5/8 inch profile on the left rail all within the FRA Track Safety standards for FRA Class 4 track.

BNSF Chapter 1 Continuous Welded Rail (CWR) installation procedures Rule 1.1 Neutral Temperature states: Neutral temperature is the temperature at which the rail is neither in tension nor compression. The target neutral temperature is established to provide a specific desired neutral temperature to prevent track buckling. The track at the derailment site consisted of 141 pound CWR laid on concrete ties which were installed in 1992. The CWR was laid in 2003 at a neutral temperature of 95 degrees which is standard for the BNSF Northwest Division.

A field track inspection of the accident site identified a couple concrete ties at the track buckle as being deteriorated and worn more than 50% of their thickness on the underside. The defective ties were obvious and evident by the white discoloration on the track caused by concrete dust and scaling from excessive wear and deteriorating crossties. Inspection of the bottom of the adjacent concrete ties revealed that the other concrete ties were not as severely worn down resulting in an uneven and unstable contact between the base of the ties and the top of the subgrade. This unstableness in the track resulted in a floating track structure and was evident by the vertical pumping and lateral movement indentation marks at the outer edge of the ties approaching the crossing. Also noted were 1 inch longitudinal scratch marks on the top of the base of the rail made by the McKay rail clip fasteners a resulting in a longitudinal movement of the CWR westward towards and against the crossing.

ANALYSIS and CONCLUSIONS:

Analysis FRA Post Accident Toxicology Testing:
The accident met the criteria for FRA Post Accident Toxicology Testing, as required under Title 49 CFR, Part 219 Subpart C.

Conclusion:
Test results were negative for both the engineer and conductor.

Analysis Locomotive Data Recorder:
FRA obtained data from the event recorder on leading locomotive BNSF 9260 for analysis.

Conclusion:
Data analyzed from the printout of the leading locomotive's event recorder indicated the train was being operated at 48 mph at the point of derailment. The event recorder also indicated no unusual events related to train handling.

Analysis Crew Fatigue:
FRA obtained fatigue related information for the members of the train crew for the 10 day period preceeding the derailment.

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

Analysis – On Board Video:
The outward facing video from leading locomotive BNSF 9260 was viewed by FRA.

Conclusion:
FRA was able to determine that a thermal misalignment of the track was in progress east of the public crossing at Mesa, Washington as the loaded coal train approached milepost 119.5.

Analysis Weather Conditions:
The highest ambient temperature on July 2, 2012 was reported to be 91 degrees F at mid-afternoon. At time of the derailment, the ambient temperature was 83 degrees F with a probable rail temperature of 113 degrees F or warmer. It was daylight with clear visibility and a light southerly wind.

Conclusion:
On the day of the derailment, extreme heat from the high ambient temperature caused the rail temperature influenced by the sun's radiant heat to increase to at least 113 degrees F thereby creating internal compressive forces within the rail which caused the rail to expand beyond the BNSF Northwest Division's standard rail laying neutral temperature of 95 degrees. The loss of the neutral temperature resulted in the CWR expanding longitudinally through its rail fasteners towards the least resistance which was westward on the .14% decreasing grade. This resulted in the thermal forces accumulating against a fixed object which consisted of the grade crossing where a track misalignment at the east end of the crossing was formed. The misalignment at the weakest portion of the track next to the crossing was also influenced by worn concrete ties, just east of the crossing, floating on an unstable ballast section. Additional heat caused by friction between the train wheels and the top of the rail with repeated vertical, longitudinal, and lateral forces from the passing coal train resulted in a severe track buckle which caused the derailment.

PROBABLE CAUSE:
FRA's investigation determined that the probable cause of the accident was irregular track alignment (FRA accident/incident code T109 - track alignment irregular, buckled/sunkink).