



***Federal Railroad Administration  
Office of Safety  
Headquarters Assigned  
Accident Investigation Report  
HQ-2007-27***

***Burlington Northern Santa Fe (BNSF)  
Redoak, Iowa  
May 12, 2007***

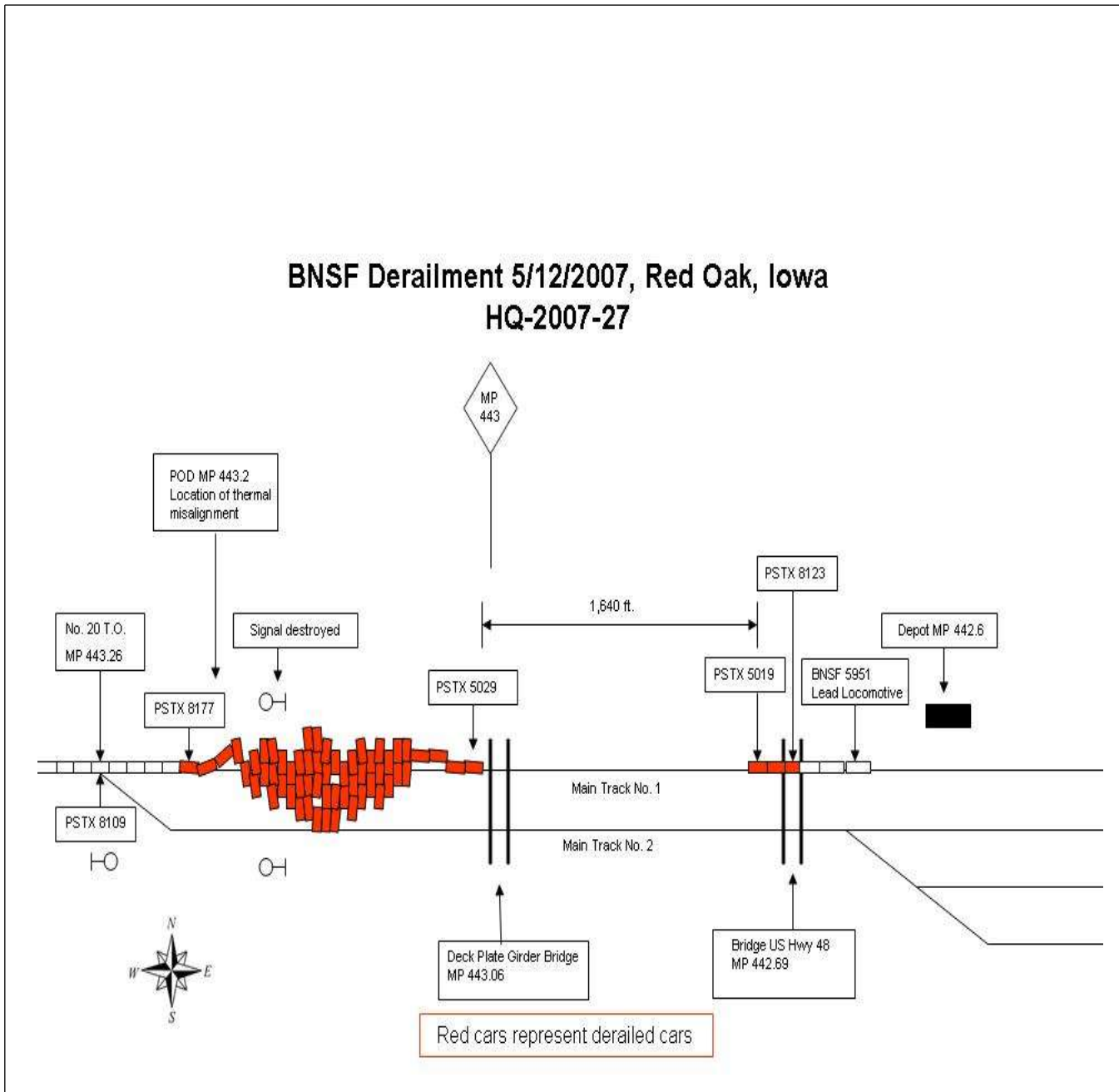
***Note that 49 U.S.C. §20903 provides that no part of an accident or incident report made by the Secretary of Transportation/Federal Railroad Administration under 49 U.S.C. §20902 may be used in a civil action for damages resulting from a matter mentioned in the report.***

DEPARTMENT OF TRANSPORTATION FEDERAL RAILROAD ADMINISTRATION		FRA FACTUAL RAILROAD ACCIDENT REPORT				FRA File # <u>HQ-2007-27</u>	
1. Name of Railroad Operating Train #1 BNSF Rwy Co. [BNSF]			1a. Alphabetic Code BNSF		1b. Railroad Accident/Incident No. NE0507106		
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. NE0507106		
5. U.S. DOT_AAR Grade Crossing Identification Number			6. Date of Accident/Incident Month 05 Day 12 Year 2007		7. Time of Accident/Incident 03:45: <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM		
8. Type of Accident/Incident (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 0		10. HAZMAT Cars Damaged/Derailed 0		11. Cars Releasing HAZMAT 0		12. People Evacuated 0	
14. Nearest City/Town Red Oak			15. Milepost (to nearest tenth) 443.2		16. State Abbr Code N/A IA		17. County MONTGOMERY
18. Temperature (F) (specify if minus) 90 F		19. Visibility (single entry) Code 1. Dawn 3. Dusk 2. Day 4. Dark 2		20. Weather (single entry) Code 1. Clear 3. Rain 5. Sleet 2. Cloudy 4. Fog 6. Snow 1		21. Type of Track Code 1. Main 3. Siding 2. Yard 4. Industry 1	
22. Track Name/Number Main Track No 1			23. FRA Track Class (1-9, X) Code 4		24. Annual Track Density (gross tons in millions) 117		25. Time Table Direction Code 1. North 3. East 2. South 4. 3
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 1	
						27. Was Equipment Attended? Code 1. Yes 2. No 1	
29. Speed (recorded speed, if available) Code R - Recorded E - Estimated 52 MPH R		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				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	
30. Trailing Tons (gross tonnage, excluding power units) 18602		31. Method(s) of Operation (enter code(s) that apply) g. Automatic block h. Current of traffic i. Time table/train orders j. Track warrant control k. Direct traffic control l. Yard limits				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)		PSTX8126		4		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 0	
						Drugs 0	
						34. Was this consist transporting passengers? (Y/N) N	
35. Locomotive Units		a. Head End		Mid Train		Rear End	
		b. Manual		c. Remote		d. Manual c. Remote	
(1) Total in Train		2		0		0 1	
(2) Total Derailed		0		0		0 0	
36. Cars		a. Freight		b. Pass.		c. Freight d. Pass. e. Caboose	
(1) Total in Equipment Consist		131		0		0 0 0	
(2) Total Derailed		60		0		0 0 0	
37. Equipment Damage		38. Track, Signal, Way, & Structure Damage		39. Primary Cause Code		40. Contributing Cause Code	
This Consist 3100685		208000		T109		N/A	
Number of Crew Members				Length of Time on Duty			
41. Engineer/Operators 1		42. Firemen 0		43. Conductors 1		44. Brakemen 0	
45. Engineer/Operator Hrs 4 Mi 05		46. Conductor Hrs 4 Mi 05					
Casualties to:		47. Railroad Employees		48. Train Passengers		49. Other	
Fatal		0		0		0	
Nonfatal		1		0		0	
50. EOT Device?		51. Was EOT Device Properly Armed?		52. Caboose Occupied by Crew?		N/A	
1. Yes 2. No 2		1. Yes 2. No 2		1. Yes 2. No			
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 N/A	
						54. Was Equipment Attended? Code 1. Yes 2. No N/A	
55. Train Number/Symbol N/A							
56. Speed (recorded speed, if available) Code R - Recorded E - Estimated 0 MPH N/A		58. 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				58a. Remotely Controlled Locomotive? 0 = Not a remotely controlled 1 = Remote control portable	
		g. Automatic block h. Current of traffic i. Time table/train orders j. Track warrant control k. Direct traffic control l. Yard limits				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) <div style="text-align: right;">0</div>		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) <div style="display: flex; justify-content: space-around;"><div>N/A</div><div>N/A</div><div>N/A</div><div>N/A</div><div>N/A</div></div>	
						2 = Remote control tower 3 = Remote control transmitter - more than one remote control transmitter <div style="text-align: right;">N/A</div>	
59. Principal Car/Unit (1) First involved (derailed, struck, etc) <div style="text-align: right;">0</div>		a. Initial and Number <div style="text-align: right;">0</div>		b. Position in Train <div style="text-align: right;">0</div>		c. Loaded(yes/no) <div style="text-align: right;">N/A</div>	
(2) Causing (if mechanical cause reported) <div style="text-align: right;">0</div>						60. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box. <div style="display: flex; justify-content: space-around;"><div>Alcohol N/A</div><div>Drugs N/A</div></div>	
						61. Was this consist transporting passengers? (Y/N) <div style="text-align: right;">N/A</div>	
62. Locomotive Units (1) Total in Train <div style="text-align: right;">0</div>		a. Head End <div style="text-align: right;">0</div>		Mid Train b. Manual <div style="text-align: right;">0</div> c. Remote <div style="text-align: right;">0</div>		Rear End d. Manual <div style="text-align: right;">0</div> e. Remote <div style="text-align: right;">0</div>	
(2) Total Derailed <div style="text-align: right;">0</div>						63. Cars (1) Total in Equipment Consist <div style="text-align: right;">0</div>	
						Loaded a. Freight <div style="text-align: right;">0</div> b. Pass. <div style="text-align: right;">0</div>	
						Empty c. Freight <div style="text-align: right;">0</div> d. Pass. <div style="text-align: right;">0</div>	
						e. Caboose <div style="text-align: right;">0</div>	
64. Equipment Damage This Consist <div style="text-align: right;">0</div>		65. Track, Signal, Way, & Structure Damage <div style="text-align: right;">0</div>		66. Primary Cause Code <div style="text-align: right;">N/A</div>		67. Contributing Cause Code <div style="text-align: right;">N/A</div>	
Number of Crew Members				Length of Time on Duty			
68. Engineer/Operators <div style="text-align: right;">0</div>		69. Firemen <div style="text-align: right;">0</div>		70. Conductors <div style="text-align: right;">0</div>		71. Brakemen <div style="text-align: right;">0</div>	
72. Engineer/Operator Hrs <div style="text-align: right;">0</div> Mi <div style="text-align: right;">0</div>		73. Conductor Hrs <div style="text-align: right;">0</div> Mi <div style="text-align: right;">0</div>					
Casualties to:		74. Railroad Employees		75. Train Passengers		76. Other	
Fatal <div style="text-align: right;">0</div>		<div style="text-align: right;">0</div>		<div style="text-align: right;">0</div>		<div style="text-align: right;">0</div>	
Nonfatal <div style="text-align: right;">0</div>		<div style="text-align: right;">0</div>		<div style="text-align: right;">0</div>		<div style="text-align: right;">0</div>	
						77. EOT Device? 1. Yes 2. No <div style="text-align: right;">N/A</div>	
						78. Was EOT Device Properly Armed? 1. Yes 2. No <div style="text-align: right;">N/A</div>	
						79. Caboose Occupied by Crew? 1. Yes 2. No <div style="text-align: right;">N/A</div>	
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 <div style="text-align: right;">N/A</div>	
						81. Was Equipment Attended? 1. Yes 2. No <div style="text-align: right;">N/A</div>	
						82. Train Number/Symbol <div style="text-align: right;">N/A</div>	
83. Speed (recorded speed, if available) R - Recorded E - Estimated <div style="text-align: right;">N/A</div> MPH <div style="text-align: right;">0</div>		84. Trailing Tons (gross tonnage, excluding power units) <div style="text-align: right;">0</div>		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) <div style="display: flex; justify-content: space-around;"><div>N/A</div><div>N/A</div><div>N/A</div><div>N/A</div><div>N/A</div></div>	
						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 <div style="text-align: right;">N/A</div>	
86. Principal Car/Unit (1) First involved (derailed, struck, etc) <div style="text-align: right;">0</div>		a. Initial and Number <div style="text-align: right;">0</div>		b. Position in Train <div style="text-align: right;">0</div>		c. Loaded(yes/no) <div style="text-align: right;">N/A</div>	
(2) Causing (if mechanical cause reported) <div style="text-align: right;">0</div>						87. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box. <div style="display: flex; justify-content: space-around;"><div>Alcohol N/A</div><div>Drugs N/A</div></div>	
						88. Was this consist transporting passengers? (Y/N) <div style="text-align: right;">N/A</div>	
89. Locomotive Units (1) Total in Train <div style="text-align: right;">0</div>		a. Head End <div style="text-align: right;">0</div>		Mid Train b. Manual <div style="text-align: right;">0</div> c. Remote <div style="text-align: right;">0</div>		Rear End d. Manual <div style="text-align: right;">0</div> e. Remote <div style="text-align: right;">0</div>	
(2) Total Derailed <div style="text-align: right;">0</div>						90. Cars (1) Total in Equipment Consist <div style="text-align: right;">0</div>	
						Loaded a. Freight <div style="text-align: right;">0</div> b. Pass. <div style="text-align: right;">0</div>	
						Empty c. Freight <div style="text-align: right;">0</div> d. Pass. <div style="text-align: right;">0</div>	
						e. Caboose <div style="text-align: right;">0</div>	
91. Equipment Damage This Consist <div style="text-align: right;">0</div>		92. Track, Signal, Way, & Structure Damage <div style="text-align: right;">0</div>		93. Primary Cause Code <div style="text-align: right;">N/A</div>		94. Contributing Cause Code <div style="text-align: right;">N/A</div>	
Number of Crew Members				Length of Time on Duty			
95. Engineer/Operators <div style="text-align: right;">0</div>		96. Firemen <div style="text-align: right;">0</div>		97. Conductors <div style="text-align: right;">0</div>		98. Brakemen <div style="text-align: right;">0</div>	
99. Engineer/Operator Hrs <div style="text-align: right;">0</div> Mi <div style="text-align: right;">0</div>		100. Conductor Hrs <div style="text-align: right;">0</div> Mi <div style="text-align: right;">0</div>					
Casualties to:		101. Railroad Employees		102. Train		103. Other	
Fatal <div style="text-align: right;">0</div>		<div style="text-align: right;">0</div>		<div style="text-align: right;">0</div>		<div style="text-align: right;">0</div>	
Nonfatal <div style="text-align: right;">0</div>		<div style="text-align: right;">0</div>		<div style="text-align: right;">0</div>		<div style="text-align: right;">0</div>	
						104. EOT 1. Yes 2. No <div style="text-align: right;">N/A</div>	
						105. Was EOT Device Properly 1. Yes 2. No <div style="text-align: right;">N/A</div>	
						106. Caboose Occupied by Crew? 1. Yes 2. No <div style="text-align: right;">N/A</div>	
Highway User Involved				Rail Equipment Involved			
107. C. Truck-Trailer. F. Bus J. Other Motor Vehicle A. Auto D. Pick-Up Truck G. School Bus K. Pedestrian B. Truck E. Van H. Motorcycle M. Other (spec. in narrative) <div style="text-align: right;">N/A</div>				111. Equipment 3. Train (standing) 6. Light Loco(s) (moving) 1. Train(units pulling) 4. Car(s) (moving) 7. Light(s) (standing) 2. Train(units pushing) 5. Car(s) (standing) 8. Other (specify in narrative) <div style="text-align: right;">N/A</div>			
108. Vehicle Speed (est. MPH at impact) <div style="text-align: right;">N/A</div>				109. geographical 1. North 2. South 3. East 4. West <div style="text-align: right;">N/A</div>			
				112. Position of Car Unit in <div style="text-align: right;">N/A</div>			

DEPARTMENT OF TRANSPORTATION FEDERAL RAILROAD ADMINISTRATION		FRA FACTUAL RAILROAD ACCIDENT REPORT				FRA File # <u>HQ-2007-27</u>	
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 1. Gates 4. Wig Wags 7. Crossbucks 10. Flagged by crew Crossing 2. Cantilever FLS 5. Hwy. traffic signals 8. Stop signs 11. Other (spec. in narr.) Warning 3. Standard FLS 6. Audible 9. Watchman 12. None				116. Signaled Crossing (See instructions for codes)		117. Whistle 1. Yes 2. No 3. Unknown	
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	
120. Crossing Illuminated by Street Lights or Special Lights 1. Yes 2. No 3. Unknown				Code N/A		N/A	
121. Age 0		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	
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		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 3. Passing Train 5. Vegetation 7. Other (specify in narrative) 2. Standing Railroad Equipment 4. Topography 6. Highway Vehicle 8. Not obstructed	
Casualties to: Killed Injured				0 0		127. Driver 1. Killed 2. Injured 3. Uninjured	
128. Was Driver in the Vehicle? 1. Yes 2. No				Code N/A		N/A	
129. Highway-Rail Crossing Users 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 N/A		133. Locomotive Auxiliary Lights Operational? 1. Yes 2. No	
134. Locomotive Headlight Illuminated? 1. Yes 2. No				Code N/A		135. Locomotive Audible Warning Sounded? 1. Yes 2. No	
136. 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

An eastbound BNSF Railway Company (BNSF) freight train derailed on May 12, 2007, at 3:45 p.m. (CDT). The accident occurred at Red Oak, Iowa, milepost (MP) 443.2, on the BNSF Nebraska Division, Creston Subdivision. As a result, 60 cars were derailed.

There were no injuries or hazardous material spills as a result of the derailment. Total damages reported for the derailment were \$3,308,685.

At the time of the accident it was daylight and overcast with a temperature of 90 degrees Fahrenheit.

The cause of the derailment has been determined as a track alignment irregular. Train accident cause code T109 - track alignment irregular (buckled/sunkink).

138. NARRATIVE

**Circumstances Prior to the Accident**

The crew of Train Symbol C NAMSLC0 18 included a locomotive engineer and a conductor. They first went on duty at 11:40 a.m., CDT, on May 12, 2007, at the BNSF Hobson Yard in Lincoln, Nebraska. This was the away-from-home terminal for the crew members, and both received more than the statutory off-duty period, prior to reporting for duty.

Their assigned freight train consisted of three locomotives (two head, one rear) and 131 loads. The train, including locomotives, was 7,179 feet long and weighed 19,020 tons. The train was destined for Ventress, Louisiana, via the Union Pacific Railroad Company at North St. Louis, Missouri.

The train received a Class Ia air brake test at Lincoln, Nebraska, on May 12, 2007, at 8:14 a.m. The Class I air brake test was performed on May 8, 2007, at Alliance, Nebraska. The train departed Lincoln, Hobson Yard at 12:25 p.m., May 12.

There were no changes made to the consist after departing Lincoln prior to the derailment.

The railroad timetable and geographic direction of the train was east. Timetable directions are used throughout this report. As the eastbound train approached the accident area, the locomotive engineer was seated at the controls on the south side of the leading locomotive. The conductor was seated on the north side of the leading locomotive.

Approaching the point of derailment (POD) the train crew observed a misalignment of the track approximately 300 feet east of the turnout located at MP 443.26. The crew braced themselves in preparation to traverse the irregular track.

The track at the POD is tangent and on an ascending grade of .45 which begins 3/10 of a mile west of the POD. The grade is descending for 2.2 miles at an average of .63 degrees prior to it ascending again at MP 443.5. The track is constructed of 132-pound continuous-welded rail (CWR) rail on concrete ties. A number 20 turnout is located 315 feet west of the POD. A deck plate, girder bridge with wood cross ties is located 740 feet east of the POD. The bridge did not incur any structural damage as a result of the derailment.

**The Accident**

The train was being operated at 52 mph approaching and at the time of the accident. Speeds were recorded by the event recorder of the controlling locomotive. The maximum authorized speed for this train is 55 mph, as designated in the current BNSF Timetable No. 5.

At 3:45 p.m. on May 12, Train Symbol C NAMSLC0 18 was traveling eastward at milepost 443.2. The engineer was seated at the control stand and the conductor was seated at his normal position in the cab of the lead and controlling locomotive when a train line initiated emergency air brake application brought the head end of the train to a stop at milepost 442.7. The

accident resulted in the derailment of 60 cars beginning with the 2nd head car and ending with the 61st head car. The head locomotive consist and the head four cars traveled 1,640 feet beyond the POD before coming to a stop at milepost 442.7. The 2nd through the 4th head cars were derailed and remained upright and coupled together. The 5th through the 59th head car were all derailed and on their sides. These cars left the track and piled up in the area of the POD. The 60th and 61st head cars were derailed but remained upright and coupled to the rear portion of the train. The weather was daylight, clear and the temperature was 90 &#778;F. Visibility was unrestricted approaching the accident area.

#### Analysis and Conclusions

##### Analysis

BNSF and FRA personnel responded to the accident. BNSF and FRA conducted inspections of the track and equipment following the accident. A download of the event recorder was analyzed by the BNSF and FRA to determine if train handling contributed to the cause of the accident. The BNSF downloaded the on board camera from the controlling locomotive to determine if track irregularities contributed to the cause of the accident.

Post-accident toxicology testing of the crew was conducted. Results were negative.

The crew was interviewed by BNSF immediately following the accident. The FRA interviewed the crew several days after the derailment. The crew reported witnessing a "sunkink" or a misaligned track prior to the derailment. The dispatchers audio recording of the events immediately following the derailment were also reviewed. It was noted that the crew reported observing misaligned track immediately following the derailment.

The last ultrasonic rail detection test through this area was on May 10, 2007, and the last geometry car survey was on April 1, 2007. Neither of these inspections identified defects in the accident area. The track was inspected by hi-rail vehicle on May 11, 2007, with no exceptions taken in the area. Track inspection records revealed that this track was inspected well within the required frequency the prior month before the accident, with no federal exceptions noted in the immediate area.

Post accident evaluation of the equipment made by BNSF and FRA produced no suspicious mechanical components.

BNSF and FRA analyzed readouts from the last trackside warning detector (TWD). The detector located at milepost 445.2 produced no alarms.

Fatigue analysis software (FAST) was used to correlate the train crew's level of fatigue based on the prior 10-day work/rest cycle of the employee. The result was that fatigue was probable for the conductor, but not for the engineer.

##### Conclusion

The video captured by Locomotive No. BNSF 5951 was analyzed and found to confirm that the track was misaligned 300 feet east of the turnout at milepost 443.26. This confirmed the allegations made in crew interviews and the dispatcher's audio recordings.

The data reviewed from the event recorder ruled out train handling as a cause. No suspicious mechanical components were found. There were no marks found on the rail or ties prior to the derailment.

Fatigue was probable for the conductor, however, it was not a cause or contributing factor of this derailment.

##### Probable Cause and Contributing Factors

The cause of this derailment is T109 - track alignment irregular (buckled/sunkink).