

Federal Railroad Administration Office of Safety Headquarters Assigned Accident Investigation Report HQ-2007-44

Burlington Northern Santa Fe (BNSF) Sikeston, Missouri July 19, 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 FEDERAL RAILF	OF TRA ROAD A	ANSPORT DMINIST	TATIO RATI	ON ION	FRAFA	ACTUA	L RA	ILR	ROAD AG	CC	IDENT R	EPORT		I	FRA Fil	e #	HQ-200	7-44		
1.Name of Railroad Operating Train #1									1a. Alphabetic Code					b. Railroad Accident/Incident No.						
2.Name of Railroad C	2a.	Alphabetic	Coc	le		2b. R	SFU/U/10/ 2b. Railroad Accident/Incident No													
N/A	N/A						1	N/A												
3.Name of Railroad C N/A	Sa. Alphabetic Code					3b. I	o. Railroad Accident/Incident No. N/A													
4.Name of Railroad F BNSF Rwy Co. [BN	4a. Alphabetic Code 4 BNSF					4b. I	 Railroad Accident/Incident No. SF0707107 													
5. U.S. DOT_AAR G	6. 1 Mo	Date of Acc onth 07	iden	t/Incident Day 19 Yea	ar 2007	7. T	Time of Accident/Incident 11:50:			ent AM	PM									
8. Type of Accident/I	ndicent	1. Derailt	nent		4. Side c	ollision		7.	. Hwy-rail c	ross	ing 10. E	xplosion-c	leton	ation 13.	Other			Code		
(single entry in co	de box)	2. Head o	n colli	sion	5. Rakin	g collisior	ı	8.	. RR grade o	cross	sing 11. F	ire/violent	rupti	ure	(descr	ibe in	1			
0. 0		3. Rear ei	ision	6. Broke	n Train co	ollision	9.	. Obstructio	n	12. 0	ther impa	cts		narrat	ive)		01			
9. Cars Carrying HAZMAT		10. HAZ	MAT (/Derai	Cars led		11.0 HA	Cars Rel	easin	ıg		12. People Evacuated	e 1			13. Divi	sion				
4 Damaged/Derailed									0		Evacuated	1		75			pringfiel	d		
14. Nearest City/Tow	'n					15. Milepost			tenth)		State Abbr	Code	17. County							
	5	Sikeston					learest a	168.5	58.5		N/A MO			NEW N			MADRID			
18. Temperature (F)		19. Visib	ility	(sing	gle entry)	Code	20. W	Weather (single		entr	entry) Code		21. Ty		e of Tra	ck		Code		
(specify if minus)) . F	1.1	Dawn	3.D	usk Dark		1. Cle		ear 3. Rain		5.Sleet	1		1. M	1. Main 3. Si		ıg	1 1		
86	, ¹	2.1	Day	4.1	Jaik	2 2	2	. Clo	Cloudy 4. Fog		6.Snow 1		2. Yard 4.		ard 4.	. Industry				
22. Track Name/Nu	mber					23. FRA	A Track	<u>n</u> .	Code 24. Annual Track Der (gross tons in		Density	7 25. Tir		me Table Direction		ction East	Code			
			Main	Track	5	Cita	55 (1), 1	·)	2	millions) 20					2. South	ı 4.		1		
							OPER	AT	ING TRA	IN	#1									
26. Type of Equipme	ent 1	. Freight tra	uin	4. W	ork train 7.	Yard/sw	itching	А	. Spec. MoV	W Ec	uip. Code	27. Was E	Equip	ment (Code	28. T	rain Nur	nber/Symbol		
Consist (single er	ntry) 2	. Passenger	train	5. Sir	ngle car 8.	Light loc	co(s).				I	Attend	ded?							
	3	. Commute	r train	6. Cu	t of cars 9.	Maint./ir	ispect.ca	ır			1	1. Y	es	2. No 1 HMEMNTW119						
29. Speed (recorded	speed, if	available)	Code	31	Method(s)	of Operati	on (ente	r code(s) t	that	apply)			31a. Rem	otely Co	ontrol	lled Loco	motive?		
R - Recorded	natic 1	block	m.s	ther than main	ions i track		0 = Not a	remote	ly co	ntrolled										
E - Estimated 24 MPH K b. Auto train control h. Curren									rame rain orders	0. P	ositive train c	ontrol		1 = Remo 2 = Remo	ote contr	ol pe ol to	wer			
30. Trailing Tons (gross tonnage, d Cab i. Trail								/arrai	nt control	p. C	Other (Specify	in narrati	ve)	3 = Rem	ote cont	rol				
excluding power units) e. Traffic k. Direc									ic control		Code(s))		transmi	tter - mo	ore th	an one			
		5668		f.	Interlocking	g 1	.Yard lin	nits		6	e N/A N/A	A N/A M	N/A	remote	control t	ransr	nitter	0		
32. Principal Car/Unit	t	a. Initial a	and Nu	ımber	b. Positio	on in Traii	n c. l	Load	ed(yes/no)	33	. If railroad er	nployee(s)	teste	d for drug	/alcoho	l use,				
(1) First involved NS8369						1		1	N/A		enter the nu	mber that	were	positive i	n		Alcohol	Drugs		
(derailed, struck, e						_	ule appropr	late box.					N/A	N/A						
(2) Causing (if med cause reported)	chanica.	י ^ו	N/A			0		1	N/A	3	4. Was this co	onsist trans	sporti	ng passen	gers? (Y	′/N)		N		
35. Locomotive Units a. Head					Frain	Re	ar End		36. Cars	;			Lo	aded		Emp	ty			
		End	b. Ma	nual	c. Remote	d. Manua	l c. Rei	mote				a. Fre	eight	b. Pass.	c. Frei	ght o	d. Pass.	e. Caboose		
(1) Total in Trair	n	2		0	0	0	0		(1) Total	in E	quipment Con	sist 4	15	0	24		0	0		
(2) Total Deraile	d	1		0	0	0	0		(2) Total	Dera	uled	1	1	0	0		0	0		
37. Equipment Dama	ige	312544	:	38. Tra	ick, Signal, V	Way,	68000	0	39. Prima	ary C	ause			40. Cont	ributing	Caus	se			
This Consist				&	Structure Da	mage			Code			T207		Code T001						
41.5	10 5	Number	r of Cr	ew Me	Members				Length					of Time on Duty						
41. Engineer/ Operators	42. Fir	emen 43. Con			muuctors	44. DI	4. Blakemen		45. Engineer/Operator			M		46. Conductor			Mi 20			
		0			1		1		Hrs 7 Mi 20			Mi 20			III	Tils / Ivi		20		
Casualties to:	47. Railı	road Emplo	yees 4	8. Tra	ain Passengers 49. Other				50. EOT Device?					51. Was EOT Device Properly Armed?						
Fatal		0		0			0		1. Yes 2. No 1					1.	Yes	2	2. No			
Nonfatal		0			0 0				52. Caboose Occupied by Crew? 1. Yes 2. No					N/A						
						0	PERAT	ΓIN	G TRAIN	#2										
53. Type of Equipme	nt 1.	Freight tra	in	4. Wo	ork train 7.	Yard/swi	tching	А	Spec. MoV	V Eo	uip. Code	54. Was E	quip	ment C	ode	55, Т	rain Nun	ber/Symbol		
Consist (single en	ntry) 2.	Passenger	train	5. Sin	gle car 8.	Light loc	o(s).			-9	r cour	Attend	led?		·					
	3.	Commuter	train	6. Cu	t of cars 9.	Maint./in	spect.ca	r			N/A	1. Y	es 2	2. No 1	N/A		N/	A		
56. Speed (recorded	speed, if	available)	Code	58.	Method(s)	of Operati	on (ente	r code(s) t	that	apply)		Ī	58a. Remotely Controlled Locomotive?						
R - Recorded	0	MDH	N/A	a.	ATCS Auto train (g control 1	g. Autom	natic l nt of t	block raffic	m.S	pecial instruct	ions 1 track		0 = Not a remotely controlled						
E - Esumated	U	MPH	/A				union			U	aner anari mali	. uter		1 – Kull	ste com	.or p	ic			

DEPARTMENT FEDERAL RAILF	OF TRA ROAD AI	NSPORT DMINIST	TATI(RATI	ON ION	FRA FA	CTUAL	RAILR	OAD AC	CCIDENT REP	ORT	F	RA File	# <u>HQ-200</u>	07-44			
57. Trailing Tons (gross tonnage, excluding power units)					c. Auto train stop i. Time table/tr d. Cab j.Track warran e. Traffic k. Direct traffi				p. Other (Specify in r Code(s)	2 = Remo 3 = Remo transmit							
0				f.	f. Interlocking 1.Yard				N/A N/A N/A	N/A N/A	remote c	N/A					
59. Principal Car/Unit a. Initial and Nur			lumber	b. Positio	n in Train	c. Load	led(yes/no)	60. If railroad emp	loyee(s) tes	ted for dru							
(1) First involved (derailed, struck, etc) 0				0		N	N/A	the appropriate bo		hat were positive in		Alcohol	Drugs				
(2) Causing (if mechanical							61 Was this consist to		transporting passengers? (V/N			N/A					
cause reported) 0			0		Ν				N/A								
62. Locomotive Units		a. Head End	b. Ma	Mid T anual	rain c. Remote	c. Remote d. Manual		63. Cars	a. Freigh		oaded l t b. Pass. c. Freig		Empty ht d. Pass.	e. Caboose			
(1) Total in Train		0		0	0	0	0	(1) Total in	Equipment Consist 0		0	0	0	0			
(2) Total Deraile	d	0		0	0	0	0	(2) Total E	Derailed	0	0	0	0	0			
64. Equipment Dama	age	0		65. Tra	Track, Signal, Way,			66. Primary Cause			67. Cont Code	ributing C	Cause	NI/A			
		Numbe	r of Ci	rew Me	mbers	nage			Length of	Time on D	uty		N/A				
68. Engineer/	69. Fire	men		70. Co	onductors	71. Bral	temen	72. Engin	eer/Operator		73. Con	ductor					
Operators 0		0			0		0		Hrs 0 M	i O	Hrs 0			Mi 0			
Casualties to:	74. Railro	oad Emplo	oyees '	75. Tra	in Passengers	76. Othe	er	77. EOT I	Device?	NT/ A	78. Was EOT Device Properly			Armed?			
Fatal		0			0		0	79 Cabo	es Occupied by Crev	N/A	1.	IN/A					
Nonfatal		0			0		0		1. Yes 2. No				1				
						01	PERATIN	G TRAIN	1 #3								
80. Type of Equipme Consist (single en	80. Type of Equipment 1. Freight train 4. Work train 7. Yard/switching A. Sp A. Sp Consist (single entry) 2. Passenger train 5. Single car 8. Light loco(s).									Spec. MoW Equip. Code 81. Was Equipment Code 82. Train Number/Symbol N/A N/A N/A N/A N/A							
83. Speed (recorded	3. Commuter train 6. Cut of cars 9. Maint/inspect.car 83. Speed (recorded speed if available). Code 85. Method(s) of Operation (entre								nat apply)	1. Yes	2. No	otely Con	trolled Loco	omotive?			
R - Recorded	R - Recorded a. ATCS g. Automatic							olock ⁿ	n.Special instructions		0 = Not a	remotely	controlled				
E - Estimated	E - Estimated N/A MPH N/A b. Auto train control h. Current of t							raffic ⁿ	 Other than main tra b. Positive train contr 	ol	1 = Remo 2 = Remo	ote contro	ol portable				
84. Trailing Tons (gross tonnage, d. Cab							rack warran	t control 1	p. Other (Specify in r	narrative)	3 = Remo	ote contro	ol				
					Traffic Interlocking	k. 1	Direct traffi	c control	Code(s)		transmit remote c	ter - more ontrol tra	e than one	N/A			
						·		1		N/A N/A				1071			
86. Principal Car/Unit a. Initial and Nu				lumber	b. Positio	n in Train	c. Load	led(yes/no)	87. If railroad empleter the numb	oyee(s) test er that were	ed for drug e positive i	g/alcohol n	use,	Drugs			
(derailed, struck,	(derailed, struck, etc) N/A			N/A			N/A	the appropriate	box.	•		N/A	N/A				
(2) Causing (if mechanical cause reported) N/A				N	/A]	N/A	88. Was this const	ist transport	ting passengers? (Y/N) N/A							
89. Locomotive Uni	ts	a. Head		Mid T	`rain	Rea	Rear End			Lo Lo	aded	E	Empty	. Calana			
(1) Total in Train	n	End N/A	End b. Manual N/A N/A		c. Remote	N/A	c. Remote	(1) Total ir	n Equipment Consist	a. Freight N/A	N/A	C. Freigi N/A	N/A	N/A			
(2) Total Deraile	ed.	N/A	N	[/A	N/A	N/A	N/A	(2) Total F	Derailed	N/A	N/A	N/A	N/A	N/A			
91 Equipment Dam	age	1.011		02 Tro					02 Primary Cause Code			ributing (70000	1.011			
This Consist	91. Equipment Damage 9 This Consist N/A					nage	N/A	N/A Code N/A									
		Numbe	r of C	rew Me	mbers			Length of Time on Duty									
95. Engineer/	96. Fire	emen		97. C	Conductors	temen	99. Engineer/Operator 100. Conductor						Mi N/A				
N/A	101 D 1	N/A	1	102	N/A	102.04	N/A		Hrs N/A Mi N/A Hrs N/A Mi								
Casualties to:	101. Kali	ailroad Employees 10			102. Train 103. Ot		103. Other 1		104. EO1 105. was EO1 Device Property 1. Yes 2. No N/A 1. Yes 1. Yes 2. No								
	N/A			_	N/A		N/A		106. Caboose Occupied by Crew?								
Nonfatal N/A					N/A	1	N/A	1. Yes 2. No N/A									
107		Highw	ay Us	er Inv	olved			111 5	Rail	Equipmen	t Involve	d					
C. Truck-T	Frailer. F	. Bus	J	I. Other	Motor Vehi	ele	Code	111. Equipment 3.Train (standing) 6.Light Loco(s) (moving) Code									
A. Auto D. Pick-Up Truck G. School Bus K B. Truck E. Van H Motorcycle M					strian r (spec. in n	arrative)	N/A	1.Train(units pulling) 4.Car(s)(moving) 7.Light(s) (standing) 2.Train(units pushing) 5.Car(s)(standing) 8.Other (specify in parrative)									
108. Vehicle Speed		N/A	109.		geographic	al)	Code N/A	112. Position of Car Unit in									
(est. MPH at impact) N/A 1.North 2.South 3.East 4.West N/A										N/A							

DEPARTMENT OF TRANSPORTATION FRA FACTUAL RAILROAD ACCIDENT REPORT FRA File # HQ-2007-44 FEDERAL RAILROAD ADMINISTRATION FRA FACTUAL RAILROAD ACCIDENT REPORT FRA File # HQ-2007-44													44	
110. Position Code 113. Circumstance													Code	
1.Stalled on Crossing 2.Stopped on Crossing 3.Moving Over Crossing 1. Rail Equipment Struck Highway User 4. Trapped N/A													N/A	
114a. Was the	114a. Was the highway user and/or rail equipment involved Code 114b. Was there a hazardous materials release													Code
in the impact transporting hazardous materials?											4 Neither	N/A		
1. Highway User 2. Rail Equipment 3. Both 4. Neither												1		
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 116. Signaled Crossing Code 117 Whistle												Code		
Crossing 2.Cantilever FLS 5.Hwy. traffic signals 8.Stop signs 11.Other (spec. in narr.) (See instructions for codes) 1. Yes Warning 3.Standard FLS 6.Audible 9.Watchman 12.None 2. No														
Code(s)	N/A	VA N/A N/A N/A N/A N/A N/A A N/A A A A A							3. Unknown	N/A				
118. Location of Warning Code 119. Crossing Warning Code 120. Crossing Illuminated by Street 1 Both Sides with Highway Signals Lights or Special Lights											by Street hts	Code		
2. Side of			1. Yes	1. Yes										
3. Opposit	e Side of Vehic	ele Appro	bach		N/A		2. No 3. Unknown		N/A 2. No 3. Unknown				N/A	
121.	122. Driver's	Gender	Code	123.	Driver Drov	ve Behind o	or in Front of	Code 124. Driver						Code
Age	1. Male				and Struck o	r was Struc	k by Second	Frain	1. Drov	e around or	thru the Ga	te 4	4. Stopped on Crossing	
N/A	N/A 2. Female 1. Yes 2. No 3. Unknown 2. Stopped and then Proceeded 5. Other (specify in narrative) N/A N/A 3. Did not Stop narrative)									5. Other (specify in narrative)	N/A			
125. Driver Pa	ssed	Coc	e 12	6. Vie	w of Track C	bscured by	(primary ob	struction)						Code
Highway V	ehicle			1. P	ermanent Str	ucture	3. Passi	ng Train 5. '	Vegetation	7. Oth	er (specif	îy in r	narrative)	1
1. Yes 2. No	3. Unknown	N/	A	2. S	tanding Railı	oad Equipr	nent 4. Topo	graphy 6. l	Highway Vehi	cle 8. Not	obstructed			N/A
Casualties to: Killed Injured 127. Driver Code 128. Was Driver in the Vehicle?									ne Vehicle?	Code				
							d 2.Injured 3.	Uninjured	19/7	121	1. Yes 2. No			a Usana
129. Highway-Rail Crossing Users N/A N/A							dollar damaş	N/A	151.	(include driver) N/A				
132. Locomotive Auxiliary Lights? Code 133. Locomotive Auxiliary Lights Operational?												Code		
1. Yes 2. No							N/A 1. Yes 2. No					N/A		
134. Locomot	ive Headlight I	lluminat	ed?				Code	135. Locor	notive Audible	Warning S	ounded?			Code
1. Y	es	2.	No				N/A	1.	Yes	2.1	No			N/A

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



Form FRA F 6180.39 (11/2006)

137. SYNOPSIS OF THE ACCIDENT

Northbound BNSF Railway Company (BNSF) freight Train Symbol H-MEMNTW1-19 derailed 1 locomotive and 11 cars on July 19, 2007, at 11:50 a.m., CDT. The accident occurred near Sikeston, Missouri, at milepost (MP)168.5 on the BNSF Springfield Division, River Subdivision.

There were no injuries to the train crew. The New Madrid County Sheriff's Department ordered an evacuation of approximately 75 people because a tank car carrying hazardous materials was among the derailed equipment. Later that day, at approximately 3 p.m., it was determined the tank car had not been compromised and the evacuation order was lifted without incident to anyone.

Equipment damages were \$312,544. Track damages were \$ 68,000, with no signal or bridge damage.

At the time of the accident the weather was clear and the temperature was 86 °F.

The cause of this derailment has been determined to be a broken rail, Cause Code T207, Broken Rail - Detailed Fracture from shelling or head check, with a major contributing factor of Cause Code T001, Roadbed settled or soft.

138. NARRATIVE

Circumstances prior to the accident

The crew of northbound BNSF Train Symbol H-MEMNTW1-19 consisted of an engineer, a conductor, and a brakeman. They went on duty at Memphis, Tennessee, at 4:30 a.m. CDT, July 19, 2007. This was the away-from-home terminal for all crew members, and all received 12 hours 30 minutes off-duty time prior to reporting.

Their train consisted of 2 locomotives, 45 loads, and 23 empties. It had a length of 4,539 feet, a weight of 5,668 tons, and originated in Memphis destined for Northtown, Minnesota. This train received a Class 1 air test in Memphis on July 19, 2007, at 4:55 a.m., performed by BNSF car department employees, and departed Memphis at 5:15 a.m.

Train Symbol H-MEMNTW1-19 made no pick-ups or set-outs en route and had operated approximately 186 miles to the point of derailment without incident. Nearing the accident site the engineer was seated at the controls of lead Locomotive No. NS 8369, with the short hood forward. The conductor and the brakeman were also in the lead locomotive, sitting on the west side. The conductor was in the front seat and the brakeman was in the rear seat. They had passed a Hot Box Detector at MP 189.52 which is 21 miles prior to the derailment, and had received a radio message that no defects were found. The last signal they passed prior to the derailment was located at MP 169.2 and was displaying a clear indication. They were operating through a temporary 25 mph slow order. This area is basically flat, river grade, tangent track.

This train was being operated geographically and timetable direction north.

The Accident

As the train approached MP 168.50 it was traveling at a recorded speed of 24 mph, as revealed by the event recorder download from trailing Locomotive No. BNSF 4380. For several minutes prior to the derailment, this train was being operated in Throttle Position 3, generating 300 amps of traction motor current, and was consistently traveling at 24 to 25 mph. There were no train handling issues involved in this derailment.

The crew states that as they approached the south end of the crossing at MP 168.50, they felt lead Locomotive No. NS 8369 bottom out, bounce back up, and then the locomotive's rear plow hit the crossing planks. They knew immediately that the rear end of their locomotive had derailed. Simultaneously, they experienced an undesired emergency air brake application and could see their train derailing behind them. When their train stopped, the engineer immediately radioed the BNSF dispatcher and reported the derailment as the conductor was reviewing the train consist and found the sixth car behind their locomotives was hazardous. Not knowing whether it had been compromised or not, the crew got off the train and walked down the track to find a place of safety.

The Sikeston Department of Public Safety and the New Madrid County Emergency Management Services responded to the derailment and an evacuation was ordered. Approximately 75 people were evacuated. After the Emergency Management Services people arrived on the scene, they were able to determine the tank car had not been compromised and the evacuation order was lifted at approximately 3 p.m. When it was safe to return to the derailment site, it was determined the lead locomotive and the first 11 cars had derailed.

Analysis and Conclusion

Analysis

The crew was not tested for drug and alcohol since it was determined there was no human factor involved nor did the derailment meet the FRA threshold of \$1,000,000 in damages.

The last track inspection was performed on Monday, July 16, 2007. The last geometry car test was preformed utilizing BNSF Geometry Car No. 80 on May 21, 2007. There were 10 track geometry conditions found during this inspection that were located at MP 168.50 and MP 168.51 that required immediate repairs and/or slow orders to provide for safe train operations. The last Internal Rail Test was preformed April 4, 2007, with no defects noted in this area.

The extreme fouled ballast conditions in this area have been present for at least the past several months, allowing severe geometry deviations to develop. This fouled ballast condition was initially cited by an FRA track inspector on April 11, 2007. Then on May 21, 2007, BNSF Geometry Car found numerous deviations in the exact same area. Post-accident inspection by the FRA determined it was obvious no proper remedial action had been taken prior to the derailment that occurred on July 19, 2007. The BNSF's Technical Research and Development Laboratory (TR&D), aided in their analysis by the FRA Track Inspector in Charge, expressed concerns about the track quality stating, "The track quality in the area was questionable, and any repairs that had been made were either minimal or ineffective." This conclusion was reached after viewing FRA pictures of the derailment area indicating extreme fouled ballast conditions. Also, the broken rail provided by the BNSF supervisors, because of the small defect found, would probably not have broken under normal track conditions.

Conclusion

The BNSF determined this derailment was most probably caused by a broken rail, "Detailed fracture from shelling or head check", with a major contributing factor of "Roadbed settled or soft." A severe profile deviation had developed just a few feet south of the private road crossing at MP 168.50. The profile measurements at this location were taken by BNSF track supervisors. They determined the profile deviation measured three and one-quarter inches, which is below Class 1 track standards. This pumping action caused rail fatigue, resulting in rail failure. The severe profile caused lead Locomotive No. NS 8369 to bottom out, bounce up, then back down, striking the crossing boards, subsequently derailing the rear end of the lead locomotive and the 11 head cars.

Probable Cause and Contributing Factors

A contributing Cause Code of T001 Roadbed settled or soft, was listed as, "At the very least a major contributing factor."

The probable cause of this accident is Cause Code T207 Broken Rail - Detailed fracture from shelling or head check, in a 1937 112-lb head-free rail. Since there were extreme fouled ballast conditions at this location, it was believed this was a major contributing factor in causing the rail to break, subsequently derailing the train. The rail that broke did have a very small (8%) detailed fracture in the middle of the head.