



***Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2010-09***

***Burlington Northern Santa Fe (BNSF)
Santa Fe, TX
February 18, 2010***

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.

1. Name of Railroad Operating Train #1 BNSF Rwy Co. [BNSF]		1a. Alphabetic Code BNSF		1b. Railroad Accident/Incident No. 0210-105	
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. 0210-105	
5. U.S. DOT_AAR Grade Crossing Identification Number		6. Date of Accident/Incident Month 02 Day 18 Year 2010		7. Time of Accident/Incident 05:30:00 <input checked="" type="checkbox"/> AM <input 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 49		10. HAZMAT Cars Damaged/Derailed 15		11. Cars Releasing HAZMAT 2	
		12. People Evacuated 80		13. Division Gulf	
14. Nearest City/Town Santa Fe		15. Milepost (to nearest tenth) 18.1		16. State Abbr Code N/A TX	
17. County GALVESTON		18. Temperature (F) (specify if minus) 35 F		19. Visibility (single entry) Code 1. Dawn 3. Dusk 2. Day 4. Dark 1	
		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 Sngle Main Track		23. FRA Track Code Class (1-9, X) 4		24. Annual Track Density (gross tons in millions) 27.61	
		25. Time Table Direction Code 1. North 3. East 2. South 4. West 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 1	
		27. Was Equipment Attended? Code 1. Yes 2. No 1		28. Train Number/Symbol MTPLGAT117	
29. Speed (recorded speed, if available) Code R - Recorded E - Estimated 49 MPH R		30. Trailing Tons (gross tonnage, excluding power units) 7674		31. Method(s) of Operation (enter code(s) that apply) a. ATCS g. Automatic block m. Special instructions b. Auto train control h. Current of traffic n. Other than main track c. Auto train stop i. Time table/train orders o. Positive train control d. Cab j. Track warrant control p. Other (Specify in narrative) e. Traffic k. Direct traffic control Code(s) f. Interlocking l. Yard limits g N/A N/A N/A N/A	
		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 (1) First involved (derailed, struck, etc) FTLX311731		b. Position in Train 26	
		c. Loaded (yes/no) yes		33. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box. Alcohol 0 Drugs 0	
(2) Causing (if mechanical cause reported)		0		0	
		N/A		34. Was this consist transporting passengers? (Y/N) N	
35. Locomotive Units		a. Head End		Mid Train	
		b. Manual		c. Remote	
		d. Manual		c. Remote	
(1) Total in Train		2		0	
		0		0	
(2) Total Derailed		0		0	
		0		0	
36. Cars		a. Freight		b. Pass.	
		c. Freight		d. Pass.	
		e. Caboose			
(1) Total in Equipment Consist		50		0	
		39		0	
(2) Total Derailed		20		0	
		4		0	
37. Equipment Damage		This Consist \$832,001.00		38. Track, Signal, Way, & Structure Damage \$206,000.00	
		39. Primary Cause Code T399		40. Contributing Cause Code 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 9 Mi 25	
				46. Conductor Hrs 9 Mi 25	
Casualties to:		47. Railroad Employees		48. Train Passengers	
		49. Other		50. EOT Device? 1. Yes 2. No 1	
Fatal		0		0	
Nonfatal		0		0	
				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 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		57. Method(s) of Operation (enter code(s) that apply) a. ATCS g. Automatic block m. Special instructions b. Auto train control h. Current of traffic n. Other than main track		58a. Remotely Controlled Locomotive? 0 = Not a remotely controlled 1 = Remote control portable	

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
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59. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded(yes/no)	60. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.	Alcohol N/A	Drugs N/A
(1) First involved (derailed, struck, etc)	0	0	N/A			
(2) Causing (if mechanical cause reported)	0	0	N/A	61. Was this consist transporting passengers? (Y/N)		N/A

62. Locomotive Units	a. Head End	Mid Train b. Manual c. Remote	Rear End d. Manual c. Remote	63. Cars	Loaded a. Freight b. Pass.	Empty c. Freight 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 Derailed	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				Length of Time on Duty			

68. Engineer/Operators	0	69. Firemen	0	70. Conductors	0	71. Brakemen	0	72. Engineer/Operator	Hrs 0 Mi 0	73. Conductor	Hrs 0 Mi 0
Casualties to:	74. Railroad Employees	75. Train Passengers	76. Other	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		
Fatal	0	0	0								
Nonfatal	0	0	0								

OPERATING TRAIN #3

80. Type of Equipment Consist (single entry)	1. Freight train	4. Work train	7. Yard/switching	A. Spec. MoW Equip.	Code	81. Was Equipment Attended?	Code	82. Train Number/Symbol
	2. Passenger train	5. Single car	8. Light loco(s).		N/A	1. Yes 2. No	N/A	N/A
	3. Commuter train	6. Cut of cars	9. Maint./inspect.car					

83. Speed (recorded speed, if available) Code R - Recorded E - Estimated N/A MPH 0	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
84. Trailing Tons (gross tonnage, excluding power units) N/A				

86. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded(yes/no)	87. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.	Alcohol N/A	Drugs N/A
(1) First involved (derailed, struck, etc)	0	0	N/A			
(2) Causing (if mechanical cause reported)	0	0	N/A	88. Was this consist transporting passengers? (Y/N)		N/A

89. Locomotive Units	a. Head End	Mid Train b. Manual c. Remote	Rear End d. Manual c. Remote	90. Cars	Loaded a. Freight b. Pass.	Empty c. Freight 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 Derailed	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				Length of Time on Duty			

95. Engineer/Operators	0	96. Firemen	0	97. Conductors	0	98. Brakemen	0	99. Engineer/Operator	Hrs 0 Mi 0	100. Conductor	Hrs 0 Mi 0
Casualties to:	101. Railroad Employees	102. Train	103. Other	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		
Fatal	0	0	0								
Nonfatal	0	0	0								

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)	Code N/A	108. Vehicle Speed (est. MPH at impact)	N/A	109. geographical Code 1. North 2. South 3. East 4. West	N/A	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)	Code N/A
				112. Position of Car Unit in	0		

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 1. Gates 2. Cantilever FLS 3. Standard FLS 4. Wigs 5. Hwy. traffic signals 6. Audible Warning 7. Crossbucks 8. Stop signs 9. Watchman 10. Flagged by crew 11. Other (spec. in narr.) 12. None				Code N/A	116. Signaled Crossing (See instructions for codes)				Code N/A	117. Whistle Ban 1. Yes 2. No 3. Unknown	
Code(s)				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	
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				Code N/A	124. Driver 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop	
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	
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)	
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 freight train derailed in Santa Fe, Texas on February 18,2010 at 05:30 a.m. The derailment occurred within the downtown Santa Fe, Texas area on the Galveston Subdivision at mile post 18.1.

A total of twenty-four (24)cars derailed. Hazardous materials were involved and evacuations were ordered. The total damage to the cars and the track was reported to be \$1,038,001.00 (\$832,001.00 to equipment,\$206,000.00 to track & signal).

At the time of accident it was dawn and clear. The temperature was 35 degrees F.

The cause of the derailment was FRA cause code (T399) other frog, switch, and track appliance defects due to wheel batter located at the heel of the switch.

138. NARRATIVE

CIRCUMSTANCES PRIOR TO THE ACCIDENT:

The crew of the southward BNSF Freight Train M-TPLGAT1-17A included a locomotive engineer and a conductor; both reported to duty at 08:05 p.m. on February 17, 2010 at the BNSF Temple Rail Yard in Temple, Texas. This was the home terminal for both crew members. The engineer and conductor both received more than the required statutory off duty rest period prior to reporting for duty.

The assigned train consisted of two locomotives and 89 freight cars. BNSF Freight Train M-TPLAGAT1-17A was 5,498 feet long and weighed 7,674 tons. The train was scheduled to travel from Landes, Texas en route to BNSF Galveston Rail Yard in Galveston, Texas with no cars to be added or removed while en route. The train received a 1,500 mile train air brake test at Temple Yard at 06:10 a.m. on February 17, 2010 by a qualified mechanical inspectors. There were no exceptions taken. The train consisted of and required a 2-way End of Train Device (EOTD) Webtec Air Powered (BNQ 45302 ETD).

As the southbound train approached the site of the accident the locomotive engineer was seated at the controls on the west side of the leading locomotive. The conductor was seated on the east side of the leading locomotive.

The track chart shows the entire track to be on a descending grade (24.50-28.99% grade) at the time of the derailment. The track / point of derailment (POD) is on tangent track.

The geographic and railroad timetable direction of the train was south. Timetable directions will be used throughout this report.

As indicated by BNSF Railway, Gulf Division Timetable No.6, the method of operation at milepost 18.1 of the Galveston Subdivision was Automatic Block Signal System (ABS) and Track Warrant Control (TWC).

THE ACCIDENT:

BNSF Train M-TPLGAT1-17A was operating at a speed 49 mph at the time the accident occurred. The speed was recorded by the event recorder on the lead locomotive - BNSF 5270. BNSF Railway Gulf Division Timetable #6, Galveston Subdivision, issued on April 2, 2008 page # 7, 1(A), lists this section of the Galveston Subdivision to be a maximum track speed of 55 mph for freight trains.

The engineer was operating the train in throttle position T4 when the train went into emergency brake application. Once stopped, the conductor began to walk and inspect the train discovering that 16 cars from the second locomotive, a total of 24 cars were derailed. While inspecting the derailment the conductor discovered two hazardous materials cars releasing a quantity of product. The conductor notified the engineer about the condition of the train and at that time the engineer notified the Galveston Subdivision Dispatcher concerning the undesired emergency event and the status and condition of the train.

Local law enforcement and fire department assisted in the precautionary evacuation of 10 residences with approximately 80 people involved. Utilizing the Santa Fe Junior High as the temporary gathering point the residence were allowed back into their homes at 05:30 p.m. At 06:50 p.m. Highway 6 was re-opened for vehicular traffic following a temporary closure.

ANALYSIS:

The train was equipped with a speed indicator and an event recorder as required. The relevant event recorder data was downloaded by the BNSF Road Foreman of Engines at the accident site and analyzed by the BNSF Superintendent of Operating Practices. The train crew was administered a Post Accident Toxicology Test.

FRA uses an overall effectiveness rate of 77.5 as the baseline for fatigue analysis, which is equivalent to 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 by each employee. If an employee does not provide sleep information, FRA uses default software settings.

FRA obtained fatigue related information including a 10-day work history for the two employees involved in this accident including the locomotive engineer and the conductor assigned to BNSF Train M-TPLGAT1-17A.

Investigating the cause of the derailment, the POD was located at the left hand heel of Switch # 5346N. A compromise rail-end joint (115/119) mismatch caused the rail to batter and wheels to pound on switch components. This caused complete failure of the heel block assembly. Both joint bars and the heel block were discovered broken. The heel block bolts were either broken or threads stripped out. The joint bars and rail were taken to BNSF's Technical Research and Development (TR&D) Facility in Topeka, Kansas for further inspection and analysis.

BNSF Geometry Car # 085 tested the Galveston Subdivision on December 11, 2009. One defect was detected within the derailment area.

On February 17, 2010 the BNSF Track Supervisor inspected the Galveston Subdivision. At MP 18.1 he noted defect number 213.121.05 - "less than two bolts per rail at each joint for conventional jointed rail class 2 through 5 track". Using the remedial action aspect he applied a 10 mph temporary speed restriction. Repairs were made that night and the speed restriction was removed.

CONCLUSION:

The locomotive engineer was in compliance with all applicable railroad operating and train handling requirements which was confirmed by the relevant event recorder data. Toxicology tests for both crew members had negative test results.

FRA concluded that fatigue was probable for the conductor (C1) and the engineer (E1) assigned to the M-TPLGAT1-17A.

Information for these two employees follows:

1. Conductor (C1) assigned to the M-TPLGAT1-17A

Sleep Setting - 77.5

Overall Effectiveness = 70.88

Chronic Sleep Debt = 7.98

Hours of Continuous Wakefulness = 23.48

Time of Day = 05:28

BAC Equivalent = >.05

Conclusion: Fatigue was probable for this employee however it was not a causal factor.

2. Engineer (E1) assigned to the M-TPLGAT1-17A

Sleep Setting - 77.5

Overall Effectiveness = 67.41

Chronic Sleep Debt = 8.64

Hours of Continuous Wakefulness = 21.97

Time of Day = 05:28

BAC Equivalent = >.05

Conclusion: Fatigue was probable for this employee however it was no a casual factor.

FRA concluded fatigue was not a contributing factor in this accident.

December 11, 2009 BNSF Geometry car survey noted exception at or near the POD. The track measurements / geometry noted during the survey were found to be in compliance with FRA Track Safety Standards. FRA concluded that due to the catastrophic nature of the derailment that all track measurements / geometry defects were not a contributing factor.

January 15, 2010 Herzog Services Inc. conducted a rail test on the Galveston Subdivision. No rail defects were detected in or around the derailment site.

Based on the conditions found at the POD the cause of this derailment was due to other frog, switch, and track appliance defects (FRA T399), due to the wheel batter located at the heel of switch.