



***Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch***

***Accident Investigation Report
HQ-2016-1141***

***BNSF Railway Company (BNSF)
Panhandle, TX
June 28, 2016***

Note that 49 U.S.C. §20903 provides that no part of an accident or incident report, including this one, 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.

SYNOPSIS

Synopsis

On June 28, 2016, at approximately 8:21 a.m., CDT, eastbound BNSF Railway (BNSF) intermodal freight train, S-LACLPC1-26K, travelling at a recorded speed of 54 mph, collided head-on with westbound BNSF intermodal Freight Train Q-CHISBD6-27L, which was travelling at a recorded speed of 29 mph. The collision occurred on Main Track 1 at Milepost 525.4 on the BNSF Kansas Division Panhandle Subdivision in the town of Panhandle, Texas.

As a result of the collision, both crew members of the striking train, S-LACLPC1-26K, were fatally injured.

The Conductor on Train Q-CHISBD6-27L was fatally injured in the collision and the Engineer on Train Q-CHISBD6-27L jumped before impact and was moderately injured. The collision and subsequent derailment caused a substantial fire. Three locomotives and 10 freight cars on Train S-LACLPC1-26K derailed as a result of the collision, as did 5 locomotives and 3 freight cars on Train Q-CHISBD6-27L.

Total equipment cost was \$14,434,349 and the damage to track and structures was \$1,393,841, for a total damage cost from the collision of \$15,828,190.

At the time of the accident, the weather was daylight and clear with a temperature of 70° F.

FRA determined the probable cause of the accident was H221 – Automatic block or interlocking signal displaying a stop indication--failure to comply.

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 BNSF Railway Company	1a. Alphabetic Code BNSF	1b. Railroad Accident/Incident No. KS-0616-108
2. Name of Railroad Operating Train #2 BNSF Railway Company	2a. Alphabetic Code BNSF	2b. Railroad Accident/Incident No. KS-0616-108

GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance BNSF Railway Company		1a. Alphabetic Code BNSF	1b. Railroad Accident/Incident No. KS-0616-108	
2. U.S. DOT Grade Crossing Identification Number		3. Date of Accident/Incident 6/28/2016	4. Time of Accident/Incident 8:21 AM	
5. Type of Accident/Incident Head On Collision				
6. Cars Carrying HAZMAT 5	7. HAZMAT Cars Damaged/Derailed 2	8. Cars Releasing HAZMAT 2	9. People Evacuated 0	10. Subdivision Panhandle
11. Nearest City/Town Panhandle		12. Milepost (to nearest tenth) 525.4	13. State Abbr. TX	14. County CARSON
15. Temperature (F) 70 °F	16. Visibility Day		17. Weather Clear	18. Type of Track Main
19. Track Name/Number 1		20. FRA Track Class Freight Trains-80, Passenger Trains-90		21. Annual Track Density (gross tons in millions) 87.63
				22. Time Table Direction East

OPERATING TRAIN #1

1. Type of Equipment Consist: Freight Train					2. Was Equipment Attended? Yes		3. Train Number/Symbol S-LACLPC1-26K				
4. Speed (recorded speed, if available) R - Recorded 54.0 MPH E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 9120		6a. Remotely Controlled Locomotive? 0 = Not a remotely controlled operation 1 = Remote control portable transmitter 2 = Remote control tower operation 3 = Remote control portable transmitter - more than one remote control transmitter					Code 0	
6. Type of Territory Signalization: <u>Signaled</u> Method of Operation/Authority for Movement: <u>Signal Indication</u> Supplemental/Adjunct Codes: <u>Q</u>											
7. Principal Car/Unit		a. Initial and Number		b. Position in Train		c. Loaded (yes/no)		8. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box		Alcohol	Drugs
(1) First Involved <i>(derailed, struck, etc.)</i>		BNSF 5162		1		no				0	0
(2) Causing <i>(if mechanical, cause reported)</i>								9. Was this consist transporting passengers?		No	
10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)	a. Head End	Mid Train		Rear End		11. Cars (Include EMU, DMU, and Cab Car Locomotives.)	Loaded		Empty		e. Caboose
		b. Manual	c. Remote	d. Manual	e. Remote		a. Freight	b. Pass.	c. Freight	d. Pass.	
(1) Total in Train	3	0	0	0	2	(1) Total in Equipment Consist	56	0	0	0	0
(2) Total Derailed	3	0	0	0	0	(2) Total Derailed	10	0	0	0	0
12. Equipment Damage This Consist 6397615			13. Track, Signal, Way & Structure Damage 0								
14. Primary Cause Code H221 - Automatic block or interlocking signal displaying a stop indication - failure to comply.*											
15. Contributing Cause Code											
Number of Crew Members						Length of Time on Duty					
16. Engineers/Operators		17. Firemen		18. Conductors		19. Brakemen		20. Engineer/Operator		21. Conductor	
1		0		1		0		Hrs: 2 Mins: 6		Hrs: 2 Mins: 6	
Casualties to:		22. Railroad Employees		23. Train Passengers		24. Others		25. EOT Device?		26. Was EOT Device Properly Armed?	
Fatal		2		0		0		No		N/A	
Nonfatal		0		0		0		27. Caboose Occupied by Crew?		N/A	
28. Latitude 35.360988000				29. Longitude -101.334873000							

OPERATING TRAIN #2

1. Type of Equipment Consist: Freight Train					2. Was Equipment Attended? Yes		3. Train Number/Symbol Q-CHISBD6-27L				
4. Speed (recorded speed, if available) R - Recorded 29.0 MPH E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 7451		6a. Remotely Controlled Locomotive? 0 = Not a remotely controlled operation 1 = Remote control portable transmitter 2 = Remote control tower operation 3 = Remote control portable transmitter - more than one remote control transmitter					Code 0	
6. Type of Territory Signalization: <u>Signaled</u> Method of Operation/Authority for Movement: <u>Signal Indication</u> Supplemental/Adjunct Codes: _____											
7. Principal Car/Unit		a. Initial and Number		b. Position in Train		c. Loaded (yes/no)		8. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box		Alcohol	Drugs
(1) First Involved <i>(derailed, struck, etc.)</i>		BNSF 5416		1		no				0	0
(2) Causing <i>(if mechanical, cause reported)</i>								9. Was this consist transporting passengers?		N/A	
10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)	a. Head End	Mid Train		Rear End		11. Cars (Include EMU, DMU, and Cab Car Locomotives.)	Loaded		Empty		e. Caboose
		b. Manual	c. Remote	d. Manual	e. Remote		a. Freight	b. Pass.	c. Freight	d. Pass.	
(1) Total in Train	5	0	0	0	0	(1) Total in Equipment Consist	87	0	0	0	0
(2) Total Derailed	5	0	0	0	0	(2) Total Derailed	3	0	0	0	0
12. Equipment Damage This Consist 8036734			13. Track, Signal, Way & Structure Damage 1393841								
14. Primary Cause Code H221 - Automatic block or interlocking signal displaying a stop indication - failure to comply.*											
15. Contributing Cause Code											
Number of Crew Members						Length of Time on Duty					
16. Engineers/Operators		17. Firemen		18. Conductors		19. Brakemen		20. Engineer/Operator		21. Conductor	
1		0		1		0		Hrs: 6 Mins: 36		Hrs: 6 Mins: 36	
Casualties to:		22. Railroad Employees		23. Train Passengers		24. Others		25. EOT Device?		26. Was EOT Device Properly Armed?	
Fatal		1		0		0		Yes		Yes	
Nonfatal		1		0		0		27. Caboose Occupied by Crew?		N/A	
28. Latitude 35.360988000				29. Longitude -101.334873000							

SKETCHES

Panhandle Sketch

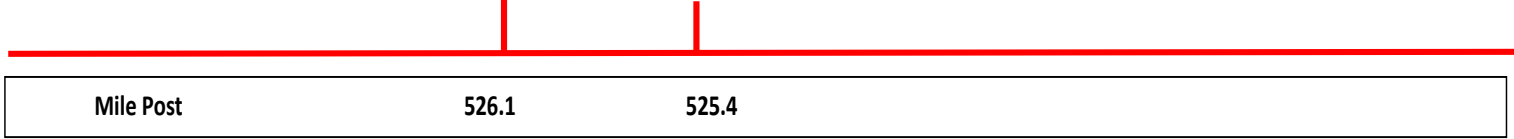
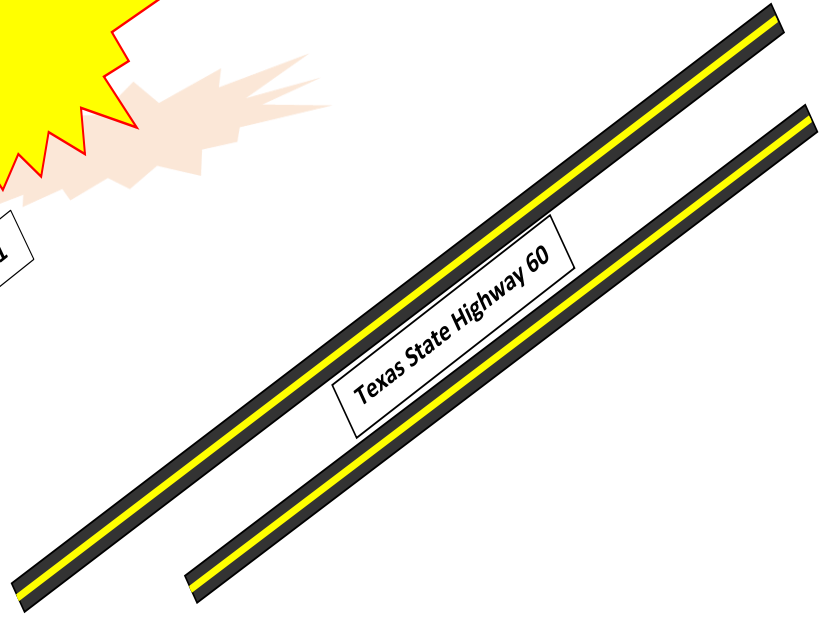
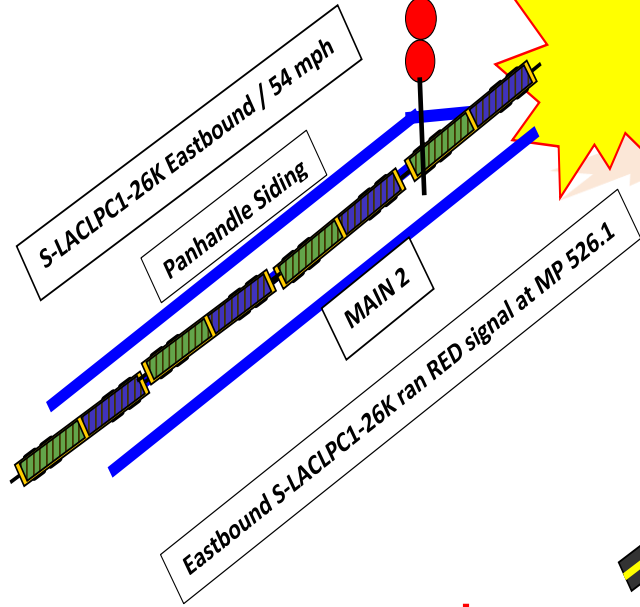


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BNSF Panhandle, TX Train Collision – June 28, 2016
MP 525.4 Panhandle Sub
NOT TO SCALE

Q = 5 Locomotives & 3 Freight Cars Derailed
S = 3 Locomotives & 10 Freight Cars Derailed
Massive Fire

Westbound Q-CHISBD6-27L was lined to enter siding at MP 526.1



NARRATIVE**Circumstances Prior to the Accident**

The crew of the westbound BNSF Railway (BNSF) Q-CHISBD6-27L (struck train) consisted of a locomotive engineer and a conductor. The crew went on duty at 1:45 a.m., CDT, on June 28, 2016 in Wellington, Kansas. This was the away-from-home terminal for both crew members, with their home terminal being Amarillo, Texas. Both crew members received more than their statutory off-duty rest period prior to reporting for duty.

The struck train consisted of five locomotives on the head-end and 87 loaded intermodal cars. It was 8,497 feet long and weighed 7,451 tons. The struck train received a Class 1 Air Brake test and pre-departure inspection on June 27, 2016 in Chicago, IL by BNSF qualified mechanical inspectors. This was an extended haul train.

The crew of the eastbound BNSF S-LACLPC1-26K (striking train) consisted of a locomotive engineer and a conductor. They first went on duty at 6:15 a.m., CDT, on June 28, 2016 in Amarillo, Texas. This is the home terminal for both crew members, and they both received more than their statutory off-duty rest period prior to reporting for duty.

The striking train consisted of three locomotives on the head-end, two locomotives on the rear, and 56 loaded intermodal cars. It was 10,209 feet long and weighed 9,120 tons. The striking train received a Class 1 Air Brake test and pre-departure inspection on June 26, 2016 in Los Angeles, California by BNSF qualified mechanical inspectors. This was not an extended haul train.

The BNSF Panhandle subdivision consists of primarily double main track between milepost 325.5 and milepost 550.5 with about nine passing sidings. The subdivision's average daily train count is 71 trains. BNSF reported the 2015 total tonnage figure for Main Track 1 between milepost 520.0 and milepost 530.0 was approximately 87.5 million gross tons. The maximum authorized speed on the BNSF Panhandle Subdivision is 70 mph with no speed restrictions for either train per the BNSF Kansas Division Timetable No. 10 that was in effect at the time of the accident.

The striking train was traversing a descending grade ranging from .0 to .23 percent beginning at milepost 530.0 to milepost 525.0. From milepost 526.65 to the collision location at 525.4, the train was on a slightly descending grade of .23.

The struck train was traversing a slightly undulating grade of .13 to a -.23 percent from milepost 520.0 to milepost 526.0. From milepost 525.35 to the collision location at milepost 525.42, the train was traversing a slightly ascending grade of .23 percent. Main Track 1 is tangent from milepost 501.3 to milepost 527.4, throughout the accident area.

The Accident

Westbound Struck Train - Q-CHISBD6-27L

The struck train departed Wellington, Kansas, milepost (MP) 238, at 2:31 a.m. on June 28, 2016, travelling on Main Track 2, on a clear signal (green aspect) with locomotive BNSF 5416 in the lead. The struck train proceeded on Main Track 2 to Alva, MP 322.8, where the Panhandle Subdivision changes from double main track Centralized Train Control (CTC) operation to single main track CTC operation. The struck train proceeded on the single main track to East Noel, MP 325.5, then crossed over to Main Track 1. East Noel, where the Panhandle Subdivision changes from single main track to double main track.

The Hereford Subdivision Split Dispatcher (DS101) contacted the struck train at 8:15 a.m., and informed them that they would meet another train at Panhandle, Texas. DS101 informed the Engineer and Conductor that the struck train would be going into the siding at Panhandle (MP 526.1) for the meet. These communications were verified by transcripts of radio communications and interviews with the dispatcher and the Engineer of the struck train. The radio communications transcript revealed that the crew of the struck train acknowledged the meet, and that their train would go into Panhandle siding, and DS101 confirmed receipt of their response.

The maximum authorized speed on the BNSF Panhandle Subdivision is 70 miles per hour (mph), and the maximum authorized speed for the struck train at Panhandle was also 70 mph on the main track and 40 mph on the diverging side of the switch.

As the struck train approached the intermediate signal at MP 523.2 the signal was displaying an approach medium signal (flashing yellow aspect). According to BNSF operating rules, an approach medium signal requires the train crew to proceed prepared to pass the next signal not exceeding 40 mph, and to be prepared to enter a diverging route at timetable speed for that route. The Engineer reduced the throttle to slow the train down to comply with the rule, and then continued in idle or notch one as the train was approaching the signal at MP 526.1 at about 41 mph. The signal at MP 526.1 controlled movements into and out of the east end of the Panhandle Siding.

The Engineer of the struck train reported seeing the striking train approaching on Main Track 1. He told investigators in a post-accident interview that he recalled thinking the striking train was moving too fast and noticed that it was approaching Elsie Road, a public crossing inside of Panhandle and almost out of the striking train's authority. He stated he abruptly informed the Conductor that they were going to collide head-on and that they needed to jump from their train. The Engineer placed his train in emergency, and exited the rear cab door directly behind the Engineer's control stand. He recalled seeing the Conductor following him out of the cab. The Engineer then climbed down the steps on the rear of the lead locomotive, and saw the Conductor cross over the locomotive platforms between the lead locomotive and second locomotive, when she then stepped down to the first step on the platform. The Engineer then jumped from the train, rolled to his feet, and ran north away from his train, which collided with the striking

train seconds after he jumped. He looked back for the Conductor as he ran but did not see her.

Eastbound Striking Train - S-LACLPC1-26K

The striking train departed Amarillo, Texas at 7:45 a.m., CDT, on June 28, 2016, travelling on Main Track 2 with locomotive BNSF 5162 in the lead. According to radio communication transcripts and train dispatcher DS101 interview, the crew of the striking train did not talk with DS101 prior to departing Amarillo. At approximately 8:06 a.m., DS101 conducted radio checks with three trains, including the striking train. All three trains responded to the DS101. Shortly after the radio checks, the striking train was crossed over from Main Track 2 to Main Track 1 at Roberts, MP 538.2.

At 8:15 a.m., the striking train encountered an approach medium signal (flashing yellow over red aspect) at MP 531.4. BNSF operating rules require a train that encounters this signal aspect to pass the next signal not exceeding 40 mph prepared to enter a diverging route at that speed. The striking train did not reduce its speed, continuing past MP 531.4 at approximately 58 mph. At 8:17 a.m., the striking train encountered an approach signal (yellow aspect) at MP 528.9, after which BNSF operating rules require a train encountering that aspect to reduce its speed to 30 mph and be prepared to stop at the next signal. The train did not decrease its speed and continued past MP 528.9 (the west switch of the Panhandle Siding) at a speed of 62 mph. At 8:20 a.m., the striking train encountered a stop signal (red aspect) at MP 526.1, which required the crew to stop before reaching that signal. The train proceeded past MP 526.1 at a speed of 65 mph. The striking train then collided with the struck train at 8:21 a.m., at approximately MP 525.4 on the BNSF Panhandle Subdivision traveling at a recorded speed of 54 mph.

Resulting from the collision, both crew members of the striking train were fatally injured. The Conductor on the struck train was fatally injured, and the Engineer jumped before impact and was injured. The collision and subsequent derailment caused a substantial fire and extensive damage to the derailed locomotives and cars. Three locomotives and 10 freight cars on the striking train derailed in the collision, as did 5 locomotives and 3 freight cars on the struck train. Total equipment cost was \$14,434,349 and the damage to track and structures was \$1,393,841, for a total damage cost from the collision of \$15,828,190. The striking train had two containers release HAZMAT: 39,154 lbs. (80 lb. drums) of resin solution, Class 3 Flammable Liquid, and 441 lbs. of aluminum paste, Class 4.1 Flammable Solid. All HAZMAT released in the collision was burned in the fire.

Emergency responders included local fire departments and police from state, county and local departments.

Analysis and Conclusions

Analysis - Toxicological Testing: This accident met the criteria for 49 CFR Part 219 Subpart C, Post Accident Toxicological Testing. Only the surviving crew member, the Engineer of the struck train, was tested. There were no remains of the other three train crew members found that could be tested.

Conclusion: Due to the inability to test the other three crew members involved in this accident, FRA could not determine if drug or alcohol use contributed to the cause or severity of this accident.

Analysis – Mechanical: On June 29, 2016 (post-accident), FRA mechanical inspectors performed air brake tests on the non-derailed freight cars of both trains at the accident site after the cars were pulled from the derailed cars. FRA mechanical inspectors were accompanied by BNSF mechanical inspectors for these tests. The test for the striking train included 47 cars and the two DP locomotives at the rear of the train. The test for the struck train included 52 cars and a locomotive that was brought to the site to conduct the test. No exceptions were taken to the operation of the brakes, or other mechanical components of either train as a result of these inspections.

Conclusion: FRA determined the mechanical condition of the involved equipment did not contribute to the cause or severity of this accident.

Analysis: Wayside Signal System: The investigation and testing of the wayside signal system was performed by the NTSB investigator, FRA S&TC inspectors and the BNSF Railway signal department personnel. The preliminary investigation found all signal equipment locked and secured with no indications of tampering or vandalism. In the presence of the FRA inspector, the BNSF signal department personnel began downloading the data from the wayside signal equipment. As each location was downloaded the signal instrument cases and involved signal heads were locked and sealed. The analysis of the signal system included the area between the last clear signal (intermediate signal 5332) for the striking train, and the last clear signal (intermediate signal 5201) for the struck train. The post-accident inspection of the switch located at CP 5261 revealed damage including a bent throw rod, detector rod, and lock rod. The reverse switch point was chipped and the normal switch point was rolled. This damage is consistent with a run through switch.

Inspection of the US&S M-23 switch machine revealed that the latch out device was effective and latched out. Additionally, this is evidence of a run through switch.

Operational testing of the signal system commenced following the repair to the switch at CP 5261, and the reconstruction of Main Track Two. Testing procedures included the verification of signal aspects, lamp voltages checks, as well as shunt tests and ground tests at each location. An accident simulation using track shunts and local control of the control points was conducted to ensure signal system integrity. Verification of field aspects in correspondence with the back-office logs was also reviewed.

In preparation for positive train control the wayside signal system including control points and intermediate signals have functional wayside interface units (WIU). The WIU communicates to the BNSF Network Operations Center (NOC) the position of power switches as well as the signal aspects for each location. All power switch positions and signal aspects are monitored and recorded. A review of this data was also performed.

The data logs, tests, inspections and observations all indicated that the wayside signals for both trains

involved in this accident were operating as intended and displayed the correct aspects prior to the collision. The signals for each train were clearly visible to their respective crews as they approached them.

Conclusion: FRA determined the signal system did not contribute to the cause or severity of this accident.

Analysis – Track: It was not possible to inspect the track in the accident area due to the extensive damage resulting from the derailment and fire. A detailed inspection of internal rail flaw detection inspection records, an FRA geometry car inspection on June 10, 2016, a BNSF geometry car inspection on April 29, 2016 and BNSF track inspection records revealed no un-remediated defects were noted in the area of the collision. The track where the accident occurred was last inspected on June 27, 2016, by a qualified BNSF track inspector. The track inspection record noted no defects between milepost 520.0 to milepost 530.

Conclusion – FRA determined track did not contribute to the cause or severity of this accident.

Analysis - Human Factor Performance: The Engineer of the striking train was a BNSF employee for nearly 22 years, and a certified engineer for over 13 years, most recently recertified in March, 2016. The Engineer, according to BNSF records, had 13 operational test failures and one personal injury (non-FRA reportable) between 6/20/2006 and 6/28/2016. The Engineer had 3 certificate revocations, one in 2012 (exceeding maximum authorized speed by greater than 10 mph) and two in 2015 (exceeding the maximum authorized speed of a Form A by greater than 10 mph and failure to stop for a dark signal). The Engineer had two rules violations in 2016, most recently on June 1, 2016 for "Failure to Comply with the Requirements of an Approach Signal." The most recent rules infraction was given "Alternative Handling" by BNSF management. "Alternative Handling" on BNSF means that discipline for an infraction is deferred for a period, and if no other infractions occur, the infraction is removed from the employee's record. If another rule infraction occurs, then the original infraction is again considered for disciplinary action. The terms of the "Alternative Handling" for the June 1, 2016 rules infraction had not been determined at the time of the accident.

The event recorder from the third locomotive in the striking train consist (BNSF 3967), although suffering severe thermal damage, produced train operating information for the investigation. Due to the severity of the collision, the locomotive event recorders from the first locomotive, BNSF 5162, and the second locomotive, BNSF 7838, were not located in the wreckage.

According to the data from the event recorder in BNSF 3967, at approximately 8:03 a.m. while traveling at approximately 55 mph, the striking train had its speed reduced by the dynamic brake (DB) to under 50 mph at 8:05 a.m.. This operating action would coincide with the crossover move from Main Track 2 to Main Track 1 at Roberts, MP 538.4. The crossover at this location has a maximum speed of 50 mph. Throttle position of the train was DB until 8:05:25 a.m., at which time the throttle was notched up

progressively until it reached position 5 at 8:08 a.m. The throttle was then notched down to position 3 at 8:09 a.m., then notched up progressively until it reached position 7 briefly at 8:11 a.m., thereafter being notched down until it was placed in position 5 at 8:11:45 a.m. The train was operating at approximately 53 mph at this time, and it reached 60 mph at 8:18 a.m. Between these two times, 8:11:45 and 8:18:a.m., the striking train encountered two signals that required action by the crew. At 8:15 a.m. the striking train encountered an approach medium signal (flashing yellow over red aspect) at MP 531.4, and at approximately 8:17 a.m. the striking train encountered an approach signal (yellow aspect) at MP 528.9. No recorded train operating actions occurred from 8:11:45 a.m. until 8:18:30 a.m., a period of just under 7 minutes. At 8:18:30 a.m., a couple of brief throttle movements from position 5 to 4 and back to 5 were recorded. At 8:19:40 a.m., the throttle moved from position 5 to position 4. At 8:20:41 a.m., several operating actions took place. While at a speed of 62 mph, the pneumatic control switch (PCS) transitioned from "Closed" to "Open", indicating the emergency brake was applied, and the throttle position moved into DB. Data recording ended with the striking train moving at 54 mph at the time of the collision.

Train handling information for the struck train, obtained from the event recorder in the second locomotive, BNSF 7553, did not show any adverse train handling. The train was operated in compliance with the signal aspects and indications that were encountered, and the Engineer confirmed the train handling in his interview. At 8:20:40 a.m., at a speed of 37 mph and a throttle position of Idle, the PCS transitioned from "Closed" to "Open", the emergency brake was applied, and the electric air brake (EAB) brake pressure (BP) reduced from 79 psi to 8 psi. One second later, at 8:20:41 a.m., the throttle position transitioned to DB and the EAB BP reduced to 0 psi. The throttle position and EAB BP remained the same for the rest of the event recorder data. Two seconds later, at 8:20:43 a.m., the speed decreased to 36 mph and continued decreasing. Twelve seconds later, at 8:20:55 a.m., the data ended when the collision occurred.

Some critical parameters that record crew actions such as use of the bell, the horn, the alerter, and an engineer induced emergency (EIE) were only recorded in the lead locomotive's event recorder. Only the lead locomotives event recorder could provide information on whether operating actions were made by Trip Optimizer or a crew member. As previously mentioned, neither lead locomotive event recorders (BNSF 5162 or BNSF 5416) were located in the wreckage. It is unknown why the Conductor did not take any actions in response to the three restrictive signals that the striking train passed prior to the collision.

Cell phone records for all four train crew members involved in the accident were obtained and reviewed by FRA. There is no evidence that personal cell phones were used on either of the trains between the time both trains departed their originating stations and the accident.

Conclusion - FRA determined that human factor performance was the probable cause of this accident when the striking train crew failed to comply with signal indications, and failed to stop the train prior to the stop signal.

Analysis – Fatigue: FRA performed a fatigue analysis using the Fatigue Avoidance Scheduling Tool (FAST). FRA uses an overall effectiveness rating of 77.5 percent as the baseline for fatigue analysis, which is equivalent to a blood alcohol content (BAC) of 0.05. At or above this baseline, we do not consider fatigue as probable for any employee. Software sleep settings vary according to information obtained from each employee. If an employee does not provide sleep information, FRA uses the default software settings.

FRA obtained fatigue related information, including a 10-day work history, for the locomotive engineer and the conductor assigned to the striking train. Based on the results of the analysis, fatigue was not probable for the Conductor of the striking train, but was probable for the Engineer of the striking train. FRA discovered the Engineer of the striking train was receiving treatment for a sleep disorder and prescribed Eszopiclone and Armodafinil, as well as taking Zocor, Synthroid, and Claritin.

Eszopiclone is a short acting sleep aid that is marketed as Lunesta. It is a central nervous system depressant and carries warnings that in some cases it can impair daytime function the following day and in some cases pharmacodynamic tolerance or adaptation to some adverse depressant effects of Eszopiclone may develop; patients using 3 mg should be cautioned against driving or engaging in other hazardous activities or activities requiring complete mental alertness the day after use.

Armodafinil is a long acting Schedule IV controlled stimulant used to treat excessive sleepiness in patients with narcolepsy, sleep apnea, and shift work disorder. It is marketed as Nuvigil.

The Engineer of the striking train also possessed a continuous positive airway pressure (CPAP) device, which is commonly used as treatment for obstructive sleep apnea. However, the Engineer's spouse indicated that he seldom used it.

The combination of insomnia and sleep apnea would indicate that the subject may have been significantly more cognitively fatigued than the 75 percent effectiveness indicated by the analysis.

Conclusion: FRA determined that fatigue was likely for the Engineer of the striking train; however, it could not be positively determined if fatigue contributed to the cause or severity of this accident.

Overall Conclusions

FRA concluded the train accident was caused by the striking train failing to stop for the stop indication at MP 526.1. While the FRA investigation found the Engineer of the striking train was being treated for a sleep disorder, and taking several medications that could affect situational awareness, it could not be positively determined if this was a contributing factor in this accident.

Probable Cause and Contributing Factors

The FRA investigation concluded the probable cause of the accident was H221 – Automatic block or interlocking signal displaying a stop indication--failure to comply.