NATIONAL TRANSPORTATION SAFETY BOARD

OFFICE OF RAILROAD, PIPELINE AND HAZARDOUS

MATERIALS INVESTIGATIONS

WASHINGTON, D. C. 20594

BNSF Railway

Head-end Collision of Two BNSF Freight Trains

Panhandle, Texas

June 28, 2016

NTSB Accident Number: DCA16FR008

Operations and Human Performance Factual Report

Group Members

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Accident Synopsis, NTSB Accident DCA16FR008

For a summary of the accident, refer to the *Accident Summary* report in the docket for this investigation.

Figure 1: Burning wreckage of collision. (Photo courtesy of BNSF.)

OPERATIONS FINDINGS

Train Q-CHISBD6-27L

BNSF Railway (BNSF) westbound intermodal train Q-CHISBD6-27L consisted of 5 locomotives, 87 loads, 0 empties, 7451 tons, and 8497 feet, including locomotives.

The crew of BNSF train Q-CHISBD6-27L were called at 12:15 a.m. for an on duty time of 1:45 a.m. on Tuesday June 28, 2016, in Wellington, Kansas. The train crew, consisting of one locomotive engineer (engineer) and one conductor, were operating the train from the lead locomotive, identified as BNSF 5416 west. Both the engineer and the conductor were off duty for

21 hours and 25 minutes prior to reporting for duty.[1] The conductor and engineer were at their away from home terminal staying at BNSF's lodging facility in Wellington, Kansas and were working back to their home terminal of Amarillo, TX.

The engineer stated that upon arrival at BNSF's Wellington depot, he and the conductor had a robust job safety briefing. The engineer commented that the conductor was a qualified engineer working as a conductor and stated the Q-CHISBD6-27L had five locomotives, with the fifth locomotive isolated (not used for power to pull train).

At 2:31 a.m., the Q-CHISBD6-27L departed Wellington, westward on main track 2 on a signal displaying a proceed indication (green aspect) at milepost (MP) 238. The engineer told investigators they stayed on main track 2 until station Alva, MP 322.8. At Alva, the Panhandle Subdivision changes from multiple main tracks (2 main tracks) to single main track. The engineer stated they crossed over to main track 1 at East Noel, MP 325.5 where two main tracks were again part of the operation.

Investigators interviewed the BNSF Herford Subdivision Split Dispatcher (DS101) and the engineer of the Q-CHISBD6-27L.[2] DS 101 stated he contacted the crew of Q-CHISBD6-27L near station White Deer at CP5261 and informed the conductor and engineer they would meet an eastbound train at Panhandle, CP 5261, and that the Q-CHISBD6-27L would be traveling into the siding at Panhandle for the meet.

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[1] Refer to CFR 228 for additional information on Hours of Service requirements.

[2] During first shift, BNSF split the Hereford and Panhandle West territories from two positions into three positions to help handle the MW activity. The "Hereford Split" desk is currently a first shift territory only and takes over approximately 30 miles of the Hereford desk and 38 miles of the Panhandle West desk.

The dispatcher stated he told the crew, "it should be a 'Pretty Good Meet'.[3] The crew of the Q-CHISBD6-27L responded by stating, "Alright, going into Panhandle for a meet and then into town, over." The dispatcher responded by saying, "Correct, over". Investigators verified this communication during a review of radio communication transcripts.

The engineer stated that as the Q-CHISBD6-27L approached an intermediate signal at MP 523.2 displaying an approach medium signal (flashing yellow aspect) (See Appendix A). The approach medium signal required the train crew to proceed prepared to pass the next signal not exceeding 40 miles per hour (mph) and prepare for the diverging route not to exceed a maximum speed of 40 mph through the turnout as prescribed in the BNSF Panhandle Subdivision timetable. The engineer explained that he began to slow the train by reducing the throttle and further reduced the train speed to around 41 mph, keeping the throttle between "notch one" and idle as they approached the signal at CP 5261.[4] The signal at CP 5261 controlled movement into the east end of the Panhandle siding.

The engineer recalled that as their train approached the signal at CP 5261 he noted the eastbound train approaching on main track 1. The engineer also stated he immediately noticed the train was approaching the public highway-rail grade crossing that was just west of CP 5261 and believed the eastbound train was traveling faster than he thought it should have been. He then yelled to the conductor they were about to have a head-on collision and needed to jump from the

[3] "Pretty Good Meet" is in reference that the opposing trains Q-CHISBD6-27L and S-LACLPC1-26K would be arriving at Panhandle, TX at approximately the same time.

[4] Throttle lever starts in the idle position followed by notches 1 through 8. Locomotive power is increased by moving the throttle to a higher setting. Locomotive power is decreased by moving the throttle lever to a lower setting.

train. The engineer stated that he then "plugged the train," ran towards the rear cab door directly behind the engineer's control stand, and exited the cab of the locomotive.[5] He noted the train speed was about 41 mph as he exited the cab and stated he saw the conductor following him out of the cab. He then climbed down the engine steps at the rear of the lead locomotive on the north (engineer) side of the engine. He recalled seeing the conductor cross over the locomotive platforms between the lead and second locomotives that were facing in a westward direction. He observed the conductor on the first step on the front of the second locomotive on the north (engineer's) side. At this time, the engineer then jumped from the train; he recalled rolling and then getting up to his feet. He then proceeded to run northward away from the derailing train while looking back. He told investigators that he was unable to see the conductor.

Train S-LACLPC1-26K

The BNSF eastbound intermodal train, S-LACLPC1-26K, consisted of five locomotives; three on the head end of the train and two distributive power units (DPU) on the rear of the train. The train consisted of 108 loads, 0 empties, 9120 tons, and 10209 feet, including locomotives. [6]

The crew went on duty at 6:15 a.m. on June 28, 2016 at BNSF's Amarillo, Texas terminal. The train crew, consisting of one engineer and one conductor, where operating the train from the lead locomotive, and were identified as the BNSF 5162 east. The engineer had been off duty for 30 hours and 16 minutes and the conductor had been off duty for 61 hours and 45 minutes prior to reporting for duty. This train received its initial terminal Class I Air Brake test at 6:05 p.m.

[5] *Plugged the train* means that the engineer activated the emergency brakes.
[6] Distributed Power, one or more locomotive consists that are remotely controlled from the lead, locomotive.

on June 25, 2016, at Los Angeles, California. No defects were noted during the Class I Air Brake test.

The S-LACLPC1-26K did not have any contact with the Hereford Sub Split Dispatcher, DS 101, prior to departing Amarillo at 7:45 a.m. on June 28, 2016. At 8:06 a.m., DS 101 called another train on the subdivision (BNSF 7637 east) on the radio to provide instruction and they responded. DS 101 then called for BNSF 5162 east and they responded immediately, however, DS 101 was unable to hear their response. BNSF 7637 responded again followed by the BNSF 5162 east responding to the DS 101 for a second time. Again, DS 101 was again unable to hear the BNSF 5162 east responding to his call. DS 101 called for a radio check on the designated Amarillo radio channel 28 and an unknown (not identified) train immediately gave a, "check" to DS 101.

The S-LACLPC1-26K traveled on main track 2 from Amarillo to Roberts, Texas, MP 538.2, where DS 101 crossed the train over to main track 1 and proceeded eastward.

At about 8:15 a.m., the S-LACLPC1-26K encountered an approach medium signal (flashing yellow over red aspect) at CP 5314 (MP 531.4). This signal required the train to pass the next signal not exceeding 40 mph. The event recorder data shows that the train did not reduce speed as a result of the signal indication and train continued past CP 5314 at about 58 MPH.[7]. At 8:17 a.m., S-LACLPC1-26K encountered an approach signal (yellow aspect) at CP 5289 (MP 528.9) indicating that the crew must reduce the train speed to 30 mph and be prepared to stop at

[7] All times and speed for train S-LACLPC1-26K are based on the event recorder data recovered from the DPU locomotive on the rear of S-LACLPC1-26K.

next signal. Event recorder data shows that the train did not decrease speed and continued past the west switch of Panhandle, CP 5289, at about 62 MPH. At 8:20 a.m., the S-LACLPC1-26K had a stop signal (red aspect), indicating that the train must stop at CP 5261 (MP 526.1). The train did not stop and continued past CP 5261 at a speed of 65 MPH. The S-LACLPC1-26K collided with the Q-CHISBD6-27- L approximately 0.6 miles east of CP 5261 on the main track.

Signal Sequence

Eastbound Train S-LACLPC1-26K Signal Sequence

Signal Aspect – Flashing Yellow at CP5314 (MP 531.4)

9.1.6 Approach Medium- Action- Required Proceed Prepared to Pass next signal not exceeding 40 mph and be prepared enter diverging route at prescribed speed.

At 8:15:03 a.m. the S-LACLPC1-26K occupied the signal.

Signal Aspect- Yellow at CP5289 (MP 528.9)

9.1.8-Approach-Action Required- Proceed Prepared to stop at next signal. Trains exceeding 30 mph immediately reduce to that Speed.

At 8:17:39 a.m. train S-LACLPC1-26K occupied the signal.

Signal Aspect-Red – CP 5261 (MP 526.1)
9.1.15 Stop- Action Required- Stop

At 8:20 am. train S-LACLPC1-26K passed the signal.

Westbound Train Q-CHISBD6-27 L Signal Sequence

Signal Aspect Green over Red at MP 520.5

9.1.3 Clear-Action Required- Proceed

At 8:14:18 am. train Q-CHISBD6 27 L occupied signal

Signal Aspect Flashing Yellow over Red 9.1.6- Approach Medium at CP 5232 (MP 523.2)

Action Required- Proceed Prepared to Pass next signal not exceeding 40 mph and be prepared enter diverging route at prescribed speed.

At 8:17:134 am. train Q-CHISBD6 27 L occupied signal

Signal Aspect Red over Yellow at CP 5261

Diverging Approach- Action Required- Proceed on diverging route not exceeding prescribed speed through turnout; approach next signal prepared to stop. Trains exceeding 30 MPH immediately reduce to that speed.

At 8:20:10 a.m. train S-LACLPC1-26K passed signal; signal aspect changes from Red over Yellow to Double red, both lenses displaying Red.

BNSF Signal Awareness Form

The BNSF General Code of Operating Rule (GCOR), rule 1.47, and BNSF Special Instructions, Item 43, required that both train crews complete a Signal Awareness form.[8] (See Appendix B).

Event Recorder Data

Investigators downloaded data from the event recorder from the lead locomotive, BNSF 5162, of the striking train S-LACLPC1-26K in Amarillo, Texas on June 28, 2016. The event recorder data revealed that the alerter was active during the trip coming into Amarillo while Trip Optimizer was initiated and operating in auto control[9] (see following section for more

[8] BNSF Special Instructions Signal Awareness form rule requirement is in the Appendix B at end of the report.

[9] 49 CFR 229 defines alerter as a device or system installed in the locomotive cab to promote continuous, active locomotive engineer attentiveness by monitoring select locomotive engineer-induced control activities. If fluctuation of a monitored locomotive engineer-induced control activity is not detected within a predetermined time, a sequence of audible and visual alarms is activated so as to progressively prompt a response by the locomotive engineer. Failure by the locomotive engineer to institute a change of state in a monitored control, or acknowledge the alerter alarm activity through a manual reset provision, results in a penalty brake application that brings the locomotive or train to a stop.

information). In addition, the event recorder revealed that the alerter was active at 6:08 a.m. on June 28, 2016 as the train arrived in Amarillo.[10]

Trip Optimizer

The S-LACLPC1-26K lead locomotive, BNSF5162, was Trip Optimizer equipped which is a product manufactured by General Electric Transportation[11] (See Appendix C). General Electric transportation data records indicate the crew of the striking train (S-LACLPLI-26K) initiated Trip Optimizer prior to departing Amarillo.

Method of Operation:

BNSF Panhandle Subdivision

The Panhandle Subdivision is part of the BNSF Kansas Division and extends from Wellington, Kanas, MP 238.0, to MP 550.5 near Amarillo, Texas in a timetable east-west direction. The maximum authorized speed on the subdivision is 70 mph for freight trains with permanent speed restrictions between posted timetable mileposts. No passenger trains operate on the BNSF Panhandle Subdivision.

Signal indications of a centralized traffic control system govern train movements on the BNSF Panhandle Subdivision. The subdivision consists of multiple main tracks and single main track with sidings for passing.

[10] Refer to the docket for this accident for *Event Recorder Report.*

[11] Trip Optimizer Trip Optimizer is an intelligent, fuel-saving cruise control for a locomotive that optimizes fuel consumption based on a specific train's make up and the route traveled. When a train crew encounters a signal with a less favorable indication than proceed the engineer has to take charge of train, operate the train manually, and comply with signal indication requirements. Description of Trip Optimizer is in the Appendix at end of the report.

Operating Documents

The *General Code of Operating Rules* (GCOR), the *BNSF Special Instructions*, the *BNSF Kansas Area Timetable,* and BNSF specific rules governed the crews. This territory was part of the BNSF Kansas Division Area Timetable No. 1.

The BNSF operating rules and supplements were as follows:

- *General Code of Operating Rules*, Sixth Edition, effective April 1, 2015
- *BNSF System Special Instructions*, effective April 1, 2015
- *BNSF Kansas Area Timetable No.1*, effective January 6, 2016
- *TY&E Safety Rules*, effective January 1, 2015
- *Airbrake and Train Handling Rules,* effective April 1, 2015

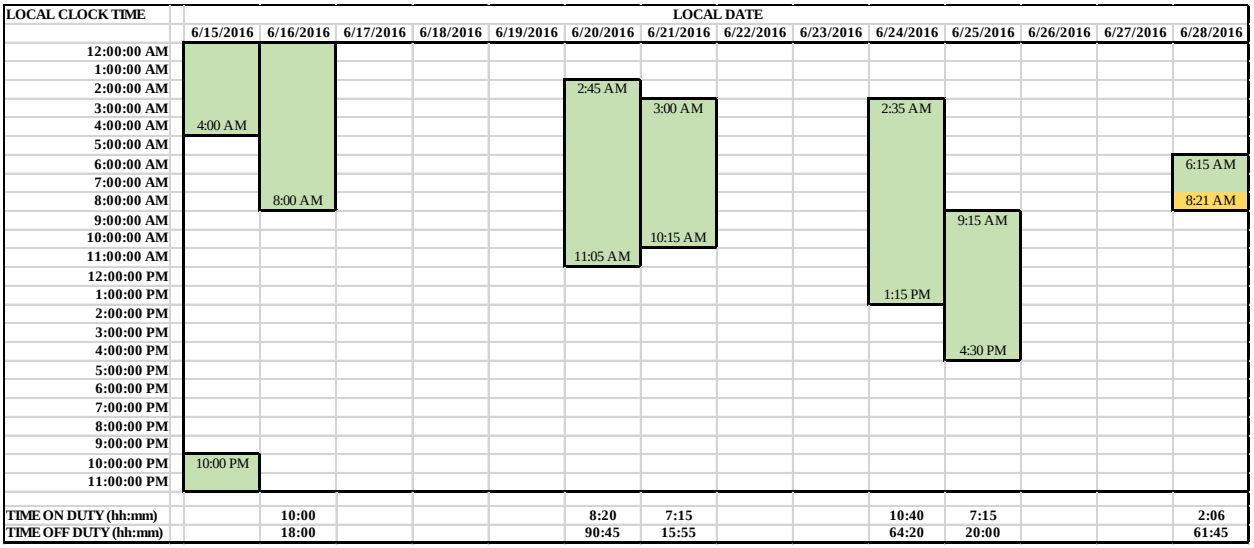
HUMAN PERFORMANCE FINDINGS

Crewmember Work/Rest History Prior to Accident

Conductor of S-LACLPC1-26K.

Records provided by BNSF disclosed information pertaining to the eastbound conductor's work schedule. On the day of the accident, June 28, 2016, the conductor went on duty at 6:15am and was on duty for 2 hours and 6 minutes when the accident occurred at 8:21 a.m. Table 1 shows additional data regarding the conductor's work schedule.

Table 1. S-LACLPC1-26K Conductor Work/Rest Schedule.

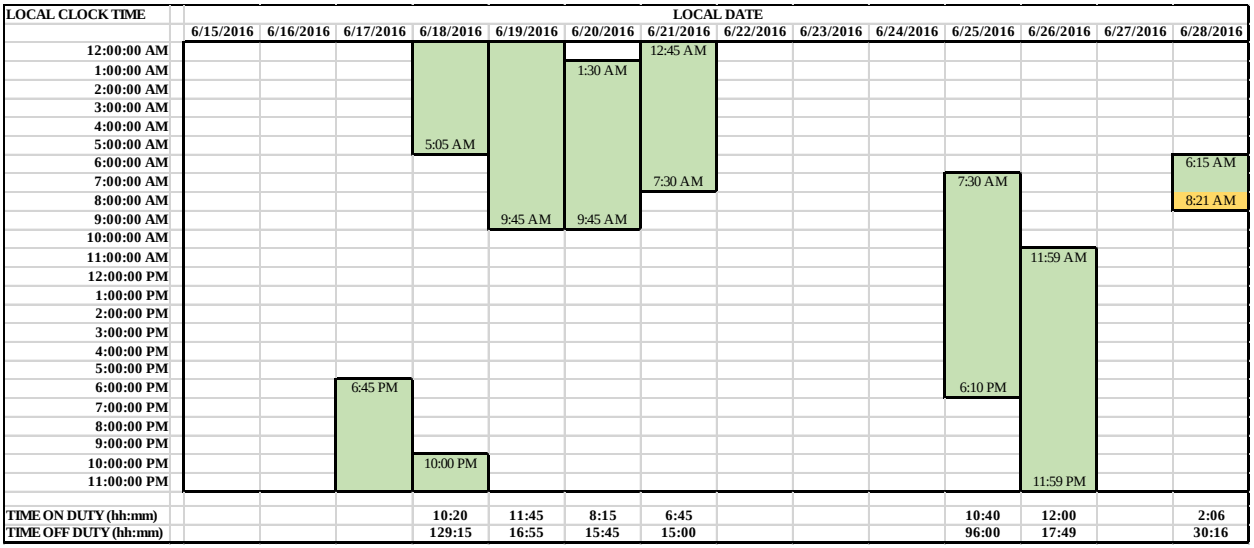


Note. Green shading is the time the employee was on duty. Yellow shading is the time of the accident.

Engineer of S-LACLPC1-26K.

Records provided by BNSF disclosed information pertaining to the eastbound engineer's work schedule. On the day of the accident, June 28, 2016, the engineer went on duty at 6:15am and was on duty for 2 hours and 6 minutes when the accident occurred at 8:21am. Table 2 shows additional data regarding the engineer's work schedule.

Table 2. S-LACLPC1-26K Engineer Work/Rest Schedule.



Note. Green shading is the time the employee was on duty. Yellow shading is the time of the accident.

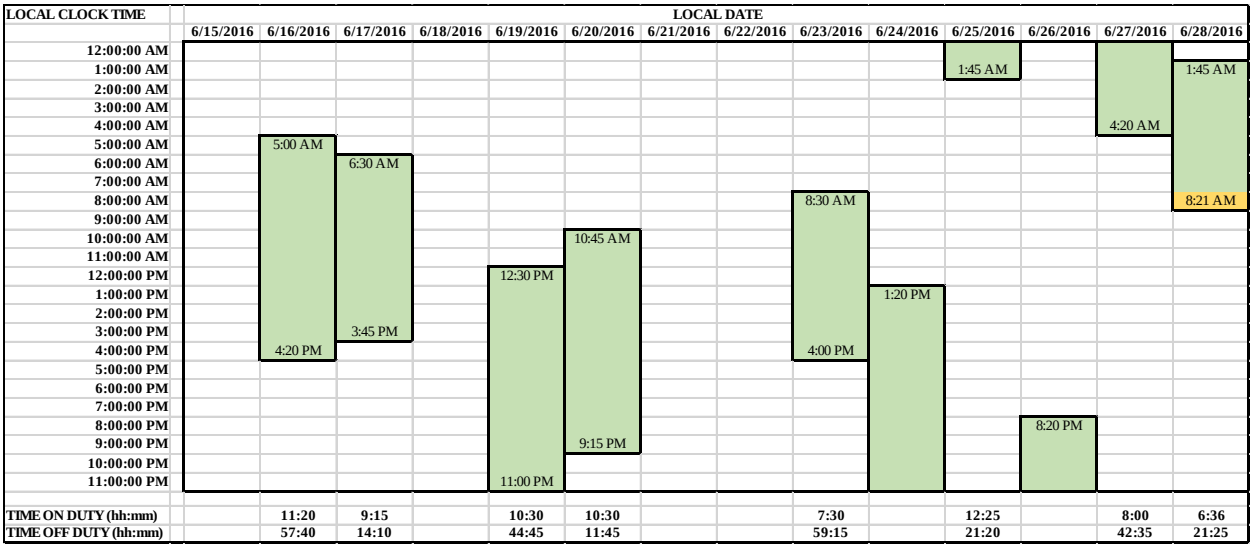
In addition, an interview was conducted on October 5, 2016, with the spouse of the engineer. With respect to June 27, 2016, the day preceding the accident, the spouse stated,

> I fell asleep that evening around 10:30 p.m. and [the engineer] went to bed before Midnight.

Conductor of Q-CHISBD6-27L.

Records provided by BNSF document the work schedule of the westbound conductor for several days preceding the accident. Table 3 illustrates the conductor's schedule.

Table 3. Q-CHISBD6-27L Conductor Work/Rest Schedule.

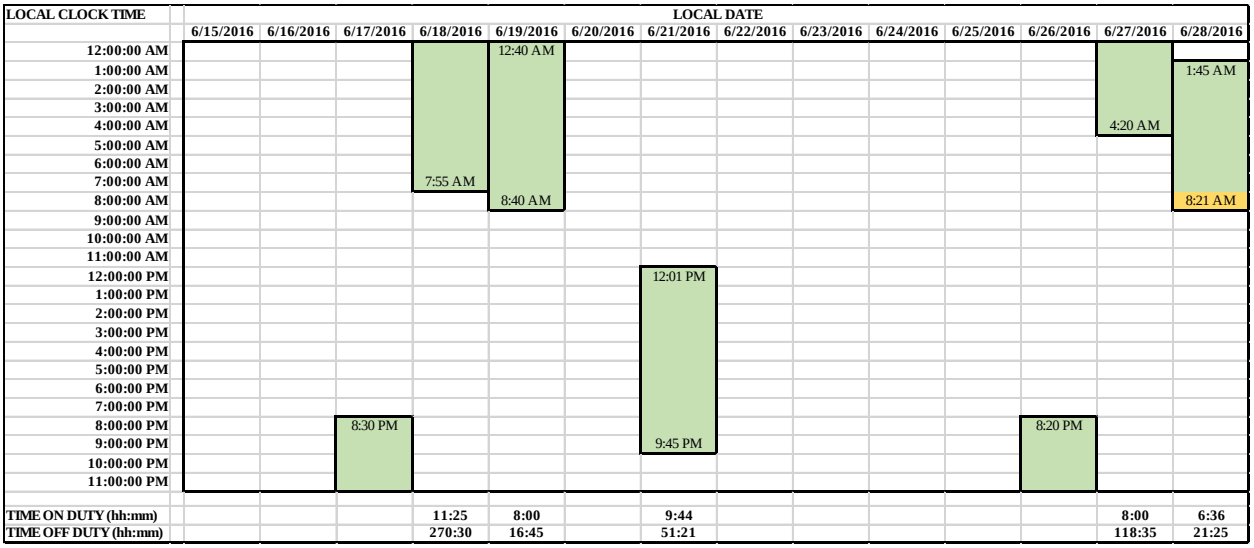


Note. Green shading is the time the employee was on duty. Yellow shading is the time of the accident.

Engineer of Q-CHISBD6-27L.

Records provided by BNSF document the work schedule of the westbound engineer for several days preceding in accident. Table 4 shows the engineer's schedule.

Table 4. Q-CHISBD6-27L Engineer Work/Rest History.



Note. Green shading is the time the employee was on duty. Yellow shading is the time of the accident.

Training/Certification

Conductor of S-LACLPC1-26K.

According to BNSF records, the conductor of the eastbound train began employment with the BNSF on April 21, 1977. The employee became a conductor on April 9, 1998 and received his most recent recertification on May 11, 2014. BNSF records indicated the conductor had taken and completed 75 training courses that covered various aspects of railroad operations including quality, rules, and safety between April 17, 1992 and January 20, 2016.

Engineer of S-LACLPC1-26K.

According to BNSF records, the engineer of the eastbound train began his employment with the BNSF on July 13, 1994. The employee became an engineer on April 9, 2003 and received his most recent recertification on March 29, 2016. BNSF records indicated the engineer had taken

and completed 130 training courses that covered various aspects of railroad operations including quality, rules, and safety between October 27, 1994 and January 4, 2016.

Conductor of Q-CHISBD6-27L.

According to BNSF records, the conductor of the westbound train began employment with the BNSF on March 15, 2004 as a conductor and received her most recent recertification on August 30, 2014. BNSF records indicated the conductor had taken and completed 169 training courses that covered various aspects of railroad operations including quality, rules, and safety between December 30, 2002 and June 7, 2016.

Engineer of Q-CHISBD6-27L.

According to BNSF records, the engineer of the westbound train began employment with the BNSF on August 19, 2002. The employee became an engineer on October 2006 and received his most recent recertification on March 1, 2016. BNSF records indicated the engineer had taken and completed 106 training courses that covered various aspects of railroad operations including quality, rules, and safety between November 15, 2002 and January 4, 2016.

Certificate Records

Conductor of S-LACLPC1-26K.

BNSF records indicated no certification revocations for the conductor of the eastbound train.

Engineer of S-LACLPC1-26K.

BNSF records indicated three certificate revocations for the engineer of the eastbound train, as shown in the Table 5.[12]

Table 5. Engineer of S-LACLPCI-26K Certificate Revocations.

DATE	REASON
07/23/2012	Exceeding the maximum authorized speed by greater than 10 mph by signal indication.
03/01/2015	Failed to stop for a dark signal
09/21/2015	Exceeded the maximum speed of Form A by greater than 10 mph

Conductor of Q-CHISBD6-27L.

BNSF records showed one certification revocation for the conductor of the westbound train on May 2, 2016 due to the train she was assigned to on this date "Exceeded the maximum authorized speed when train is out of compliance per Train Make-up Instructions, Per System Special Instructions."

Engineer of Q-CHISBD6-27L.

BNSF records indicated no certification revocations for the engineer of the westbound train.

[12] Refer to 49 CFR 240 for additional information regarding engineer certification and certificate revocation.

Operations Testing

Conductor of S-LACLPC1-26K.

Investigators examined the eastbound conductor's 2-year operational testing records.[13] BNSF safety records indicated the conductor failed 1 of 25 (3.8%) operational tests administered during this time. The failure occurred on May 1, 2016, and was in the category of "Operating Switches and Derails."

Engineer of S-LACLPC1-26K.

Investigators examined the eastbound engineer's 2-year operational testing records. BNSF records indicated that the engineer failed 6 of 93 (6.1%) the operational tests administered during this time (see Table 6).

Table 6. Engineer of S-LACLPCI-26K 2-Year Operational Testing

DATE	DESCRIPTION
03/01/2015	Dark Signal
05/02/2015	Airbrake and Train Handling, Slowing and Controlling Train, Stretch Braking
09/21/2015	Temporary Speed Restriction
09/21/2015	Speed Requirements
05/01/2016	Airbrake and Train Handling, Speed Reduction Fuel Conservation Speed
06/01/2016	Block Signal – Approach Aspects

[13] Refer to 49 CFR 217 for additional information on operational testing.

Conductor of Q-CHISBD6-27L.

Investigators examined the westbound conductor's 2-year operational testing records. BNSF safety records indicated the conductor failed 1 of 52 (1.9%) operational tests administered during this time. The failure occurred on May 2, 2016, with a description "Other Test Failures."

Engineer of Q-CHISBD6-27L.

Investigators examined the westbound engineer's 2-year operational testing records. BNSF safety records indicated no operational test failures during this time.

Alternative handling

Conductor of S-LACLPC1-26K.

BNSF records indicated no alternative handing for the conductor of the eastbound train in the two years prior to the accident (see Appendix D for a description of the alternative handling policy).

Engineer of S-LACLPC1-26K.

BNSF records indicated one instance of alternative handling for the engineer of the eastbound train in the two years prior to the accident. The June 1, 2016, alternative handling addressed an instance of "Failure to comply with the requirements of an approach signal."

Conductor of Q-CHISBD6-27L.

BNSF records indicated no alternative handing for the conductor of the westbound train in the two years prior to the accident.

Engineer of Q-CHISBD6-27L.

BNSF records indicated no alternative handing for the engineer of the westbound train in the two years prior to the accident.

Medical Factors

Refer to the *Medical Factual Report* in the public docket for this investigation.

Cell Phone Records

Investigators examined cell phone records of the crewmembers. For additional information, refer to the docket for this investigation.

APPENDIXES

Appendix A - BNSF Railway Signal Aspects and Indications

Signal Aspects and Indications—April 1, 2015 (Updated 9/1/15)

BNSF Railway — SIGNAL ASPECTS AND INDICATIONS

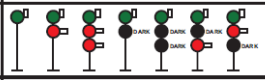
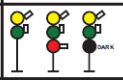
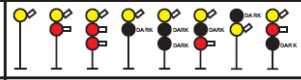
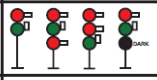
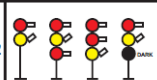
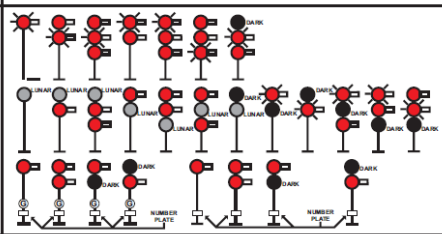
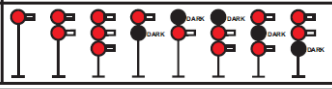
All signals are subject to modification indicated under individual subdivision special instructions.

DISTANT SIGNALS

Aspects shown in Rules 9.1.3 through 9.1.8 may be displayed with a "D" sign on the signal mast to identify the signal as a distant signal. When a "D" sign is displayed, if train is delayed per Rule 9.9 and Rule 9.9.1 between a distant signal and the next signal, proceed prepared to stop short of the next signal. Absolute signals at automatic switches, outside of block system limits, convey main track distant signal information for the other end of the siding.

BLOCK AND INTERLOCKING SIGNALS

Aspects shown in Rules 9.1.3 through 9.1.8 and 9.1.13 may be displayed on signals with or without a number plate on signal mast.

Rule	Aspects of Color Light and Semaphore Signals	Cab Signal Aspects	Name	Indication
9.1.3			CLEAR	Proceed.
9.1.4			APPROACH LIMITED	Proceed prepared to pass next signal not exceeding 60 MPH and be prepared to enter diverging route at prescribed speed.
9.1.5			ADVANCE APPROACH	Proceed prepared to pass next signal not exceeding 50 MPH and be prepared to enter diverging route at prescribed speed.
9.1.6			APPROACH MEDIUM	Proceed prepared to pass next signal not exceeding 40 MPH and be prepared to enter diverging route at prescribed speed.
9.1.7			APPROACH RESTRICTING	Proceed prepared to pass next signal at restricted speed.
9.1.8			APPROACH	Proceed prepared to stop at next signal. Trains exceeding 30 MPH immediately reduce to that speed. (Note: *Speed is 40 MPH for Amtrak and Commuter trains).*
9.1.9			DIVERGING CLEAR	Proceed on diverging route not exceeding prescribed speed through turnout.
9.1.10			DIVERGING APPROACH DIVERGING	Proceed on diverging route not exceeding prescribed speed through turnout prepared to advance on diverging route at the next signal not exceeding prescribed speed through turnout.
9.1.11			DIVERGING APPROACH MEDIUM	Proceed on diverging route not exceeding prescribed speed through turnout prepared to pass next signal not exceeding 35 MPH.
9.1.12			DIVERGING APPROACH	Proceed on diverging route not exceeding prescribed speed through turnout; approach next signal prepared to stop. Trains exceeding 30 MPH immediately reduce to that speed. (Note: *Speed is 40 MPH for Amtrak and Commuter trains.)*
9.1.13			RESTRICTING	Proceed at restricted speed.
9.1.14	Not used (Reserved for PTC tabling purposes only)			
9.1.15			STOP	Stop.

SPECIAL ASPECTS WHICH ARE NOT PART OF AUTOMATIC BLOCK, CTC AND INTERLOCKING SYSTEMS			
Rule	**Aspects**	**Name**	**Indication**
9.1.16		TAKE SIDING INDICATOR	When illuminated, hand operate switch to enter next siding or to leave siding and enter main track.
9.1.22		SLIDE FENCE INDICATOR	When illuminated continuously or when not illuminated, slide fence has been activated; proceed at restricted speed.
9.1.23		SLIDE FENCE INDICATOR	When flashing, slide fence has not been activated.
9.1.24		RESUME SPEED	End of slide fence restriction; resume speed.
9.1.25		HIGH WATER INDICATOR	When red or not illuminated, high water may be present; proceed at restricted speed through detection limits identified by timetable.
9.1.26		HIGH WATER INDICATOR	When green, no high water has been detected.

General Signal Instructions

In addition to Rule 9.1 of the General Code of Operating Rules, the following General Signal Instructions apply on BNSF Railway:

- Dwarf signals will display the same aspects and indications as high signals.
- The following symbols are used in diagrams of signal aspects.

 To indicate a number plate.

 To indicate a flashing light.

 To indicate color light signal head.

 To indicate position of semaphore arm.

 To indicate grade marker.

Automated Horn System (AHS)

 Flashing - operating as intended.

 Steady or not illuminated - not operating as intended.

Appendix B – Signal Awareness Form

General Code of Operating Rules, Rule 1.47

1.47 Duties of Crew Members

The conductor and the engineer are responsible for the safety and protection of their train and observance of the rules. They must ensure that their subordinates are familiar with their duties, determine the extent of their experience and knowledge of the rules. They must instruct them, when necessary, how to perform their work properly and safely. If any conditions are not covered by the rules, they must take precautions to provide protection.

A. Conductor Responsibilities

1. The conductor supervises the operation and administration of the train (if trains are combined with more than one conductor on board, the conductor with the most seniority takes charge). All persons employed on the train must obey the conductor's instructions, unless the instructions endanger the train's safety or violate the rules. If any doubts arise concerning the authority for proceeding or safety, the conductor must consult with the engineer who will be equally responsible for the safety and proper handling of the train. Certified conductors must have a current certificate in their possession while on duty.
2. The conductor must advise the engineer and train dispatcher of any restriction placed on equipment being handled.
3. The conductor must remind the engineer that the train is approaching an area restricted by:
    - Limits of authority.
    - Track warrant.
    - Track bulletin.
    - or
    - Radio speed restriction.
4. The conductor must inform the engineer after the train passes the last station, but at least 2 miles from the restriction.
5. When the conductor is not present, other crew members must obey the instructions of the engineer concerning rules, safety, and protection of the train.
6. Freight conductors are responsible for the freight carried by their train. They are also responsible for ensuring that the freight is delivered with any accompanying documents to its destination or terminals. Freight conductors must maintain any required records.

B. Engineer Responsibilities

1. The engineer is responsible for safely and efficiently operating the engine. Crew members must obey the engineer's instructions that concern operating the engine. A student engineer or other qualified employee may operate the

engine under close supervision of the engineer. Any employee that operates an engine must have a current certificate in their possession.

2. The engineer must check with the conductor to determine if any cars or units in the train require special handling.

C. All Crew Members' Responsibilities

1. To ensure the train is operated safely and rules are observed, all crew members must act responsibly to prevent accidents or rule violations. Crew members in the engine control compartment must communicate to each other any restrictions or other known conditions that affect the safe operation of their train sufficiently in advance of such condition to allow the engineer to take proper action. If proper action is not being taken, crew members must remind engineer of such condition and required action.
2. Crew members in the engine control compartment must be alert for signals. As soon as signals become visible or audible, crew members must communicate clearly to each other the name of signals affecting their train. They must continue to observe signals and announce any change of aspect until the train passes the signal. If the signal is not complied with promptly, crew members must remind the engineer and/or conductor of the rule requirement. If crew members do not agree on the signal indication, regard the signal as the most restrictive indication observed.

2. Crew members must not use binoculars or similar devices to determine the position, aspect, or indication displayed by a fixed signal.
3. When the engineer and/or conductor fail to comply with a signal indication or take proper action to comply with a restriction or rule, crew members must immediately take action to ensure safety, using the emergency brake valve to stop the train, if necessary.

Special Instructions item 43-Signal Awareness/Position of Switch Form, Item 43

Item 43

Subdivision-specific signal awareness/position of switch forms available at on-duty points must contain at least the minimum requirements shown on the standard form. These forms may contain additional subdivision-specific information as approved by the Division General Manager. When subdivision specific signal awareness/position of switch forms are not available, crew members may request a standard form be included with the GTB. In addition to observing and calling signals as required by GCOR 1.47, the conductor must fill out one of these forms in ink while operating on BNSF and foreign railroads. Foreign railroads operating on BNSF are allowed to use their own signal awareness/position of switch forms when approved.

All block signal names or aspects, yellow or yellow/red flags and trackside warning detector exceptions must be recorded.

Record the following:

• CLEAR signals - Name or aspect.

• All other signals - Name or aspect of the signal, the train speed and time signal passed. • Flags - Name and location of each flag, the train speed and time flag passed.

When speed indicator is not visible to the conductor, the engineer must call out the speed, in addition to the signal name or aspect, if other than CLEAR. Should the conductor be unable to record a signal aspect due to other activities, this fact must be noted on the form, including the reason.

When operating on an Approach or Diverging Approach signal indication, the engineer must notify the conductor when the train speed has reduced to the required speed. The conductor must note the time the train has reduced to the required speed on the signal awareness form and repeat the time to the engineer. A job safety briefing between the conductor and engineer must confirm understanding that the train may be required to stop at the next signal.

In non-signaled territory or Double Track ABS territory (outside of restricted limits or yard limits) a crew member must record:

• Name and location of hand operated main track switches, switch point locks, and derails operated.

• Name and location of hand operated main track switches left in reverse position.

• Time and initials of employee operating the main track switch, switch point lock or derail.

• Time and initials they are finally restored to the proper position on the Signal Awareness/Position of Switch form.

• Entry of appropriate box number when switch is left in reverse position. Information must be recorded on the form as soon as practical after initially changing the position of the switch, switch point lock or derail. The time the switch, switch point lock or derail is restored and secured must be recorded on the form and initialed by the conductor and engineer before the crew departs that location. If not practical for both the conductor and engineer to initial the form, after a job safety briefing, the person filling out the form can enter the other initials on the form. Initialing each entry serves as a cross check to indicate switch, switch point lock or derail position has been briefed between crew members.

In addition, in non-signaled territory or Double Track ABS territory (except in restricted limits and yard limits), after a crew member lines a hand operated main track switch, the crew member must communicate with the engineer by radio using the following format, while physically at the switch location:

• “(Crew member title and name) has lined (switch at MP location or name of switch and station name) to the (normal/ reverse) position.”

Before movement may occur, the engineer must respond using the following format:

• “Engineer (name) understands (employee title and name) has lined (switch at MP location or name of switch and station name) to the (normal/reverse) position.” If radios become inoperable, all members of crew must job safety brief regarding use of hand operated main track switches, switch point locks, and derails before use, with notation of inoperable radio made on the Signal Awareness/Position of Switch form. At the completion of each trip all forms must be turned in as directed by the Division General Manager. Additionally, in non-signaled and double track ABS territory, the Position of Switch form must be signed by the conductor and a copy turned in
with all track warrants.

Standard forms:

Signal Awareness Form (Location to Location)

Date:_____ Conductor:_____ Engineer:_____

Train Symbol:_____

Block System Limits

Signal Location Detector Exception	Signal Name						*Speed	*Time Passed Time at Required Speed	Flag Location and Name
	Clear (Mark X)	Approach Medium (Mark X)	Approach (Mark X)	Stop and Proceed (Mark X)	Stop (Mark X)	Other (Mark X)			
Examples									
CP 5325	X								
CP 5332			X				40 MPH	1545 1548	
WSS Anna		X					60 MPH	1715	
TWD MP 566.5	Exception - Main 1, Hot Journal, Axle 45, Right side								

*It is not required to indicate speed and time for CLEAR signals.
The following abbreviations may be used: AL - Approach Limited, AA - Advance Approach, AR - Approach Restricting, DC - Diverging Clear, DAD - Diverging Approach Diverging, DAM - Diverging Approach Medium, DA - Diverging Approach, R - Restricting
Y - Yellow Flag, Y/R - Yellow/Red Flag

Figure 2: BNSF Railway Signal Awareness Form

Appendix C – Trip Optimizer

TRIP OPTIMIZER

An onboard locomotive control system, **Trip Optimizer (TO)**, computes a train's characteristics, creating an optimal trip profile, then automatically controls locomotive throttle and dynamic brakes to reduce fuel burn and provide efficient train handling.

Trip Optimizer is an intelligent, fuel-saving cruise control for a locomotive that optimizes fuel consumption based on a specific train's make up and the route traveled. The system calculates the optimum speed profile by considering factors such as train length, weight, and track profile, then automatically controls throttle and dynamic brake according to the plan to provide smooth operation and minimize fuel use.

Appendix D – BNSF Alternative Handling Policy

Alternative handling is a non-punitive response to rule violations that includes training and other non-disciplinary measures. An alterative handling event will be recorded on the employee's operational testing record rather than the employee's personal record. It will not be considered discipline and may only be used to determine eligibility for future alternative handling in the event of a subsequent violation and to document non-punitive counseling given to the employee. Where possible, notices of investigation will contain alterative handling options.

Parties to the Investigation - Acknowledgment Signatures

_____ Date __03/23/17_____

Tomas Torres, Railroad Investigator

National Transportation Safety Board - Operations Group Chairman

_____ Date __03/23/17_____

Michael Hoepf, Human Performance Investigator

National Transportation Safety Board - Human Performance Group Chairman

_____ Date _//s//03/10/17_____

Stephen Dupont, Operating Practices Specialist

Federal Railroad Administration

_____ Date//s//03/15/17_____

Chris Martinez, Operating Practices Inspector

Federal Railroad Administration

_____ Date //s//03/10/17_____

Aaron Ratledge, General Director Operating Practices

BNSF Railway

_____ Date //s//03/06/17_____

Kamron Saunders, Safety Team

International Association of Sheet Metal, Air, Rail and Transportation Workers (SMART)

_____ Date ___no reply_____

Erich M. Jeske, Safety Task Force

Brotherhood of Locomotive Engineers and Trainmen (BLET)