



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

***Accident Investigation Report
HQ-2018-1255***

***Norfolk Southern Railway (NS) Head-on Collision
Georgetown, Kentucky
March 18, 2018***

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

On Sunday, March 18, 2018, at 11:14 p.m., EDT, southbound Norfolk Southern (NS) freight train 175T817 (Train 1) passed an absolute stop signal without authority and was struck head-on by northbound NS freight train M74T817 (Train 2). The head-on collision occurred on the NS Lake Division, CNO&TP North District, at Milepost (MP) 72.2, on Main Track 1, approximately three miles south of Georgetown, Kentucky.

The head-on collision resulted in the derailment of 3 locomotives from Train 1, and 3 locomotives and 13 cars from Train 2. Both trains were carrying hazardous materials, and one hazardous material car released an unknown amount of Sulfuric Acid solution through a pressure relief valve. Approximately 500 residents were evacuated from 440 homes in Georgetown Estates.

The Engineer and Conductor of Train 1, and the Conductor of Train 2 were transported to Georgetown Hospital. The Engineer of Train 2 was transported to University of Kentucky Hospital.

Damage estimates total \$4,045,911, with equipment damages at \$3,611,808, and track, signal and structure damages at \$434,103.

The Federal Railroad Administration (FRA) determined the probable cause of the collision was H221 – Automatic block or interlocking signal displaying a stop indication – failure to comply.

FRA also determined the following contributing causes to the collision:

- H999 – Other train operation/human factors;
- H212 – Radio communication, failure to give/receive;
- H604 – Train outside yard limit, in block signal or interlocking territory, excessive speed; and,
- H599 – Other cause relating to train handling or makeup.

At the time of the accident it was dark with a temperature of approximately 40 ° F and clear skies.

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 Norfolk Southern Railway Company	1a. Alphabetic Code NS	1b. Railroad Accident/Incident No. 128890
2. Name of Railroad Operating Train #2 Norfolk Southern Railway Company	2a. Alphabetic Code NS	2b. Railroad Accident/Incident No. 128890

GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance Norfolk Southern Railway Company		1a. Alphabetic Code NS	1b. Railroad Accident/Incident No. 128890	
2. U.S. DOT Grade Crossing Identification Number		3. Date of Accident/Incident 3/18/2018	4. Time of Accident/Incident 11:14 PM	
5. Type of Accident/Incident Head On Collision				
6. Cars Carrying HAZMAT 44	7. HAZMAT Cars Damaged/Derailed 1	8. Cars Releasing HAZMAT 1	9. People Evacuated 400	10. Subdivision -
11. Nearest City/Town Georgetown, KY		12. Milepost (to nearest tenth) 72.3	13. State Abbr. KY	14. County SCOTT
15. Temperature (F) 48 °F	16. Visibility Dark		17. Weather Clear	18. Type of Track Main
19. Track Name/Number Main One		20. FRA Track Class Freight Trains-40, Passenger Trains-60		21. Annual Track Density (gross tons in millions) 45
		22. Time Table Direction South		
23. PTC Preventable Yes		24. Primary Cause Code [H221] Automatic block or interlockin		25. Contributing Cause Code(s) H999

OPERATING TRAIN #1

1. Type of Equipment Consist: Freight Train					2. Was Equipment Attended? Yes		3. Train Number/Symbol 175T817				
4. Speed (recorded speed, if available) R - Recorded 0.0 MPH E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 12110		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, J</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 (derailed, struck, etc.)		NS 8798	1	no				0	0		
(2) Causing (if mechanical, cause reported)		N/A	0	no	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	5	0	0	0	0	(1) Total in Equipment Consist	77	0	50	0	0
(2) Total Derailed	3	0	0	0	0	(2) Total Derailed	1	0	0	0	0
12. Equipment Damage This Consist 2764973			13. Track, Signal, Way & Structure Damage 0								
Number of Crew Members						Length of Time on Duty					
14. Engineers/Operators 1		15. Firemen 0		16. Conductors 1		17. Brakemen 0		18. Engineer/Operator Hrs: 6 Mins: 29		19. Conductor Hrs: 6 Mins: 29	
Casualties to:		20. Railroad Employees		21. Train Passengers		22. Others		23. EOT Device? Yes		24. Was EOT Device Properly Armed? Yes	
Fatal		0		0		0		25. Caboose Occupied by Crew?		N/A	
Nonfatal		2		0		0					
26. Latitude 38.174182328				27. Longitude -84.541023835							

OPERATING TRAIN #2

1. Type of Equipment Consist: Freight Train					2. Was Equipment Attended? Yes			3. Train Number/Symbol M74T817			
4. Speed (recorded speed, if available) R - Recorded 32.0 MPH E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 10281		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, J</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 6584	1	no				0	0		
(2) Causing <i>(if mechanical, cause reported)</i>		N/A	0	no	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	0	(1) Total in Equipment Consist	58	0	84	0	0
(2) Total Derailed	3	0	0	0	0	(2) Total Derailed	6	0	7	0	0
12. Equipment Damage This Consist 846835			13. Track, Signal, Way & Structure Damage 434103								
Number of Crew Members						Length of Time on Duty					
14. Engineers/Operators 1		15. Firemen 0		16. Conductors 1		17. Brakemen 0		18. Engineer/Operator Hrs: 5 Mins: 14		19. Conductor Hrs: 5 Mins: 14	
Casualties to:		20. Railroad Employees		21. Train Passengers		22. Others		23. EOT Device? Yes		24. Was EOT Device Properly Armed? Yes	
Fatal		0		0		0		25. Caboose Occupied by Crew?		N/A	
Nonfatal		2		0		0					
26. Latitude 38.174119533				27. Longitude -84.541041660							

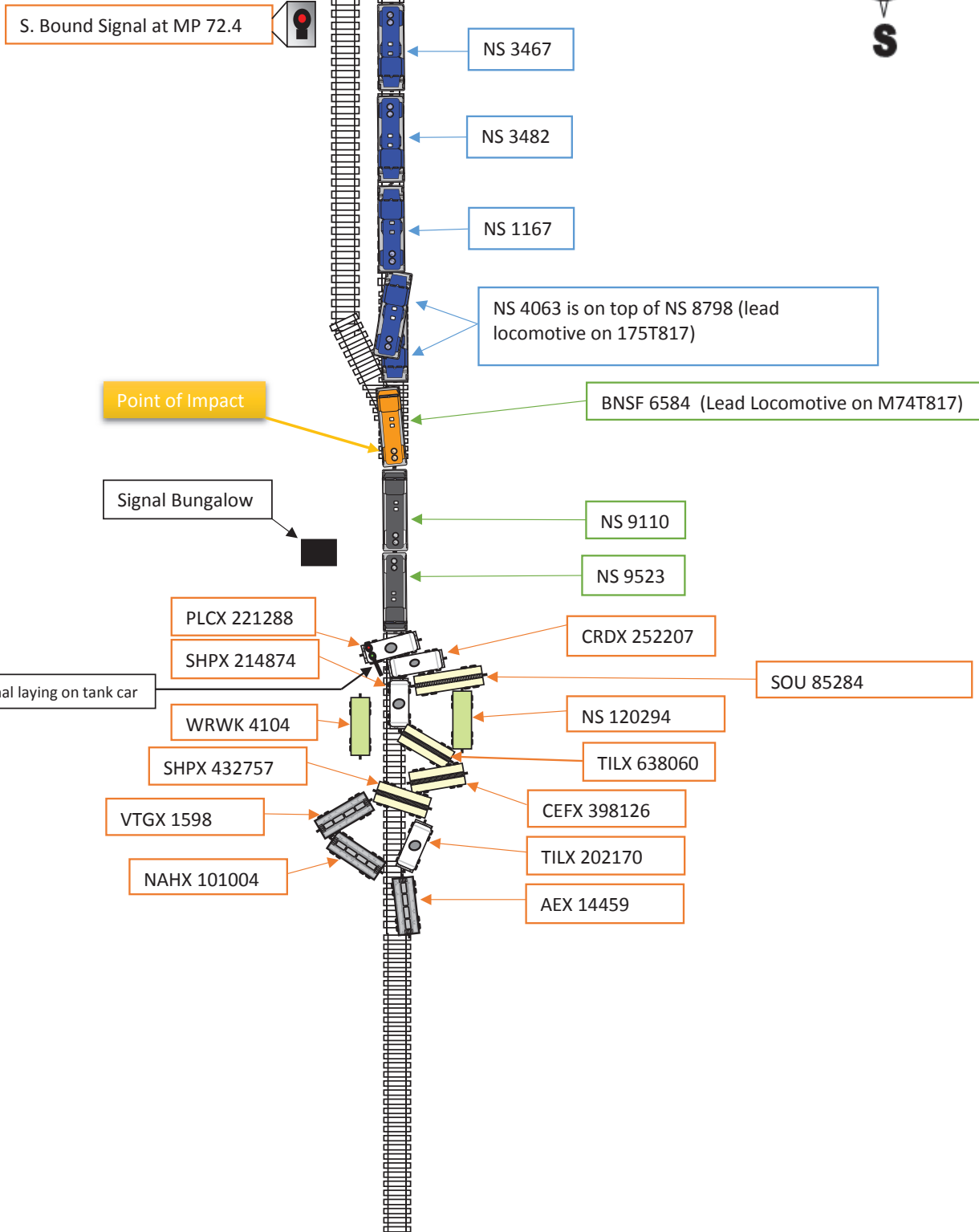
SKETCHES

Sketch - Sketch

HQ-2018-1255



NOT TO SCALE



NARRATIVE

Circumstances Prior to the IncidentNS Train 175T817

Southbound Norfolk Southern (NS) Freight Train 175T817 (Train 1) originated in Bellevue, Ohio, on March 17, 2018, with a destination of Macon, Georgia. Train 1 consisted of 5 locomotives on the head-end, two locomotives dead-in-tow, 77 loaded cars, and 50 empty cars. It was 7,100 feet long with 12,110 trailing tons.

When Train 1 reached Sharonville, Ohio, Milepost (MP) CJ 247, a crew consisting of an engineer and conductor was called to take Train 1 south. Both crew members had received their statutorily required rest period before reporting for duty at Sharonville Yard, their home terminal, on March 18, 2018, at 4:45 p.m., EDT. The crew took control of Train 1 on Main Track 1 at NS Sharonville Yard, and departed the terminal area at 8:01 p.m. EDT. The engineer was seated at the locomotive controls on the west side of the locomotive cab. The conductor was seated on the east side of the locomotive. Train 1 was a through train and did not require any tests or inspections at Sharonville Yard.

NS Train M74T817

Northbound NS Freight Train M74T817 (Train 2) originated in Macon, Georgia, on March 17, 2018, with a destination of Elkhart, Indiana. Train 2 consisted of 3 locomotives, all on the head end, 58 loads, and 84 empties. It was 8,483 feet long with 10,277 trailing tons.

When Train 2 reached Burnside, Kentucky, a crew consisting of an engineer and conductor was called to take Train 2 north. Both crew members had received their statutory rest period before reporting for duty at Burnside Yard, their away from home terminal, on March 18, 2018 at 6 p.m., EDT. The crew took control of Train 2 on Main Track Two at Burnside and departed at 6:50 p.m., EDT. The engineer was seated at the locomotive controls on the east side of the locomotive cab. The conductor was seated on the west side of the locomotive. Train 2 was a through train and did not require any tests or inspections at Burnside Yard.

The method of operation on the Lake Division CNO&TP North District is a Traffic Control System (TCS) supplemented by a Positive Train Control (PTC) system. Timetable and geographic directions are both south, and the maximum authorized speed is 40 mph. Beginning at MP 72.6, headed south, the two main tracks enter a 2-degree right-hand curve until becoming tangent at MP 73. There is a left-hand turnout at MP 72.2 where the track becomes a single main track, and remains tangent until a 2-degree left-hand curve beginning at MP 72.4. There is a descending grade that ranges between 0.52 and 0.46-percent.

Train 1 passed the approach signal at MP 69.9 at 11:07 p.m., EDT, traveling southbound on Main Track 1 at 36 mph. The approach signal was visible for 1,370 feet prior to Train 1 passing the signal, however

the engineer did not make any speed adjustment after passing the signal. The south absolute signal (CP Akers) was displaying stop, and visible for 1,030 feet. An emergency brake application was initiated by the crew of Train 1 at MP 72.0 while still traveling 35 mph. Train 1 stopped in 1,190 feet.

At about 11:10 p.m., EDT, Train 2 passed the intermediate signal at MP 74.8, displaying an approach diverging indication.

At about 11:11 p.m., EDT, Train 1 passed the absolute signal displaying a stop indication at CP Akers, MP 72.2, traveling at 19 mph, stopping approximately 460 feet beyond the signal, at MP 72.3. The crew of Train 1 attempted a reverse movement. The Engineer shoved 8 feet of slack before ceasing the attempt, remaining stationary.

At the time of the accident it was dark with a temperature of approximately 40 ° F and clear skies.

The Accident

At about 11:13 p.m., EDT, as Train 2 was in the 2-degree curve at MP 72.5 traveling 40 mph, Train 1 came into view at CP Akers. The Conductor of Train 1 exited the locomotive through the front door and ran to the tree line. The Engineer of Train 1 attempted to follow the Conductor but became entangled in the radio handset cord that was stretched across the locomotive cab. After realizing he couldn't exit, he laid down on the floor and covered his head with his hands.

The crew of Train 2 made an emergency brake application 701 feet before impact, slowing from 39 mph to 32 mph. The Engineer of Train 2 exited the locomotive cab through the back door to the walkway, while the Conductor placed his back against the conductor's console, placed his head in his hands, and braced for impact.

At approximately 11:14 p.m., EDT, Train 1 and Train 2 collided head-on at MP 72.3. Train 1 derailed the lead three locomotives, and one car, the 119th car from the head end, was found to be releasing Sulfuric Acid from the pressure relief valve. Train 2 derailed 3 locomotives, all remaining upright, and 13 cars in a general pile-up.

The Engineer of Train 1 was covered in fuel and sand, and his injuries prevented him from exiting the locomotive immediately. When he could exit the locomotive, the Engineer of Train 1 laid down on the ground and waited for help.

The Engineer from Train 2 was thrown off his feet and he slid down the locomotive walkway. He saw the Conductor of Train 2 exiting the locomotive through the rear cab door and the Conductor from Train 1 standing on the ground. The Train 2 Engineer and Conductor, and Train 1 Conductor moved through the woods to an open field, away from the fire and liquid coming from a tank car that was later identified as vegetable oil. At a nearby house, they asked the residents to call 911. The Engineer from Train 2 called the dispatch center and spoke to the Chief Dispatcher.

The Engineer and Conductor of Train 1, and the Conductor of Train 2 were transported to Georgetown Hospital. The Engineer of Train 2 was transported to University of Kentucky Hospital.

The derailed locomotives from Train 1 leaked an estimated 5,700 gallons of fuel, most of which was consumed in the post-impact fire. One tank car containing non-hazardous vegetable oil derailed and was breached, partially leaking its contents. Fuel and non-hazardous lube oil ignited post-impact and burned for approximately two hours.

At about Midnight, the Scott County Fire Chief ordered an evacuation of one-half mile around the accident location. The evacuation applied to about 100 homes, and affected 400 people. Twenty people were transported via bus, with the remaining 380 transporting themselves. The evacuation order was lifted by the Fire Chief at about 2 a.m., EDT.

Interstate 75 was closed until about 7 a.m., EDT, on March 19, 2018. A portion of Train 2 was blocking the Highway-Rail Grade Crossing at Lisle Road until another train could pull the rear section of the train south.

Damage estimates total \$4,045,911, with equipment damages at \$3,611,808, and track, signal and structure damages at \$434,103. On March 20, 2018, the main track was restored to service at 11:40 a.m.

In addition to the Federal Railroad Administration, the response to this accident included:

- Scott County Fire Department;
- Scott County Emergency Medical Services (EMS);
- Scott County Sheriff's Office;
- Kentucky Office of Emergency Management (OEM);
- Scott County Office of Emergency Management;
- Northern Kentucky Regional Hazardous Material – Weapons of Mass Destruction (WMD) Team;
- Kentucky Department of Environmental Protection – Emergency Response Team;
- Kentucky State Police;
- Lexington Fire Department;
- Lexington Emergency Medical Services (EMS);
- Georgetown Fire Department;
- NS Police Department;
- Pettit Environmental;
- R.J. Corman Emergency Services; and,
- Hulcher Services.

Post-Accident Investigation

The Federal Railroad Administration (FRA) Conducted an on-site investigation into the accident in cooperation with NS and local authorities.

The following analysis and conclusions represent the findings of the FRA investigation into this accident.

Analysis and Conclusions

Analysis - Train 1 Engineer Training Record: The Engineer of Train 1 worked as a yard conductor for 11 years. He was required by his union bargaining agreement to attend locomotive engineer training. His training spanned 28 months.

Training documents obtained from NS noted the following:

- January 28, 2015: during a train ride evaluation, he failed the physical characteristics portion.
- March 2, 2015: training documents note a failure concerning his knowledge of physical characteristics and failures concerning his use of both automatic and dynamic brakes.
- March 26, 2015: during a 52-mile performance evaluation there was a failure on physical characteristics. It was also noted he was not able to perform a briefing for an approach signal.
- April 14, 2015: training was interrupted for over 18 months due to disciplinary action. This included decertification for 30 days after he passed the stop signal at CP Akers without authority.
- October 20, 2016: he failed a signal examination on which he incorrectly answered a question concerning Medium Speed on approach signals.
- November 25, 2016: he failed a performance evaluation with a supervisor noting seven failures during a 38-mile trip. One of these failures involved his knowledge of the district's physical characteristics and two failures involving brake use.
- December 10, 2016: he failed a 51-mile performance evaluation with his supervisor noting five failures. These failures included job briefing, knowledge of physical characteristics, and knowledge and application of operating speeds. Also noted was his need for direction in complying with two approach signals.
- December 30, 2016: a coach interview indicated he was still learning the terrain and train handling.
- January 11, 2017: an evaluation noted five failures including knowledge of physical characteristics and use of the dynamic and automatic brakes. Comments during the 140-minute evaluation indicate he needed direction complying with two approach signals. Train handling issues were also noted.
- January 31, 2017: coach interview indicated that he was still learning the terrain and needed guidance while operating a train.
- February 15, 2017: a supervisor noted three failures during an evaluation including physical characteristics and dynamic brake use. Comments from this evaluation indicate his difficulties with knowledge of signal locations and speed restrictions.
- February 27, 2017: coach interview indicated that he was still learning the terrain and needed guidance while operating a train.
- March 22, 2017: a performance evaluation was performed by downloading his locomotive trip data; he scored 100 percent.
- March 23, 2017: he passed a performance evaluation ride with a score of 98 percent.
- March 28, 2017: he was promoted to locomotive engineer with a score of 100 percent.
- February 6, 2018: he received an annual evaluation by download and scored 100 percent.
- March 18, 2018: he passed the stop signal at CP Akers without authority resulting in a head-on collision.

FRA received coach interview documents relating to the Engineer of Train 1. The coaches stated that

they had not been interviewed and the statements attributed to them did not accurately reflect their opinions concerning the difficulties the trainee was experiencing during training. Both coaches stated to FRA they did not feel the Engineer of Train 1 was ready to be promoted to locomotive engineer at the time he was promoted.

The difficulties with this individual's training indicate he was struggling with mastering the skills required to be an engineer. On April 14, 2015, the Engineer of Train 1 passed the stop signal at CP Akers without authority, on the same track, in the same direction, and was decertified for a period of 30 days. His lack of knowledge of the territory compounded his difficulties in his job performance.

Conclusion: FRA determined the training of the Engineer of Train 1 contributed to the cause of the accident. (Cause code H999)

Analysis - Event Recorder Downloads: All eight locomotives were equipped with speed indicators and event recorders as required by Federal Regulations. The event recorder and video recorder on the lead locomotive of Train 1 (NS 8798) were both destroyed by the post-impact fire. Two other event recorders were found to be inoperative. The event recorder data from the second locomotive of Train 1 (NS 4063) was downloaded and analyzed by carrier officials, as was the lead locomotive of Train 2 (BNSF 6584).

The recorded speed of Train 2 at the time of impact was 32 mph. The maximum authorized speed for the location was 40 mph.

Train 1 passed the approach signal at MP 69.9 at about 11:07 p.m. traveling southbound at 36 mph. The engineer did not reduce speed as required by NS ROR 346 which required a reduction to medium speed, defined as 30 mph, after passing the signal. An emergency brake application was initiated by the crew 2.1 miles later at a speed of 35 mph, stopping in 1,190 feet. The event recorder and field measurements indicate that Train 1 travelled approximately 460 feet beyond the red signal, at MP 72.3, and stopped physically fouling Main Track 2 at CP Akers.

The evaluation of the event recorder from BNSF 6584 indicates that Train 2 was in compliance with all carrier operating rules.

Conclusion: FRA determined the failure of the crew of Train 1 to comply with an Automatic block or interlocking signal displaying a stop indication was the cause of the accident. (Cause code H221)

Analysis - Crew Interviews: All crew members of both trains were interviewed separately by FRA. The Engineer of Train 1 stated that the last signal passed before the Stop Signal was displaying a clear indication; The Conductor of Train 1 contradicted this by stating that he clearly observed an Approach Signal, and called it out in the cab but the Engineer did not acknowledge him. The contradicting statements made by the crew of Train 1 indicates there was a lack of communication which led to the loss of situational awareness.

The crew of Train 2 stated they had been operating on favorable signals approaching the accident site. These statements were confirmed by the lead locomotive's forward-facing video.

Conclusion: FRA determined that lack of communication and situational awareness by the crew of Train 1 contributed to the cause and severity of the accident. (Cause code H999)

Analysis - Cell Phone Use on board the Locomotive: Cell phone records were obtained for the crew of Train 1. At the time of the accident there were no calls or texts transmitted by the crew's cell phones. Cell phone records also revealed no data or cellular usage prior to the accident. The use of electronic devices was not indicated as a distracting activity.

Conclusion: FRA determined the use of cell phone devices did not contribute to the cause or severity of the accident.

Analysis - Hours of Service (HOS): Hours of service records were obtained from NS for all crewmembers. All crew members received the statutorily required rest period before going on duty.

Conclusion: FRA determined that HOS did not contribute to the cause or severity of the accident.

Analysis - Toxicology Testing: This accident met the criteria for Title 49 Code of Federal Regulations (CFR) Part 219, Subpart C, *Post-Accident Toxicological Testing*. The crews of both Train 1 and Train 2 were tested for the presence of drugs and alcohol.

All tests were negative for drugs and alcohol.

Conclusion: FRA determined that drugs or alcohol did not contribute to the cause or severity of the accident.

Analysis – Fatigue: FRA performed a fatigue analysis using the Fatigue Avoidance Scheduling Tool (FAST). FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis. At or above this baseline, the FRA does not consider fatigue as probable for any employee. Inputs into the FAST software vary based on information obtained from each employee.

FRA obtained fatigue-related information, including a 10-day work history, for all four employees involved in the collision of Train 1 and Train 2. The results indicated fatigue was not probable for any of the crew members.

Conclusion: FRA concluded that fatigue did not contribute to the cause or severity of the accident.

Analysis - Train Operations: The engineer of Train 1 had 13.5 years of service including 11 months as an engineer. This engineer passed the same stop signal without authority in 2015.

The conductor of Train 1 had 3 1/2 years of service and had not been trained as an engineer.

The crew of Train 1 was found to have violated the following carrier rules:

- passing the absolute stop signal at CP Akers without authority;
- exceeding the maximum authorized speed beginning at MP 69.9;
- failure to announce by radio that Train 1 was stopped by an emergency brake application;
- failure to immediately warn other conflicting movements that could be approaching that Train 1 had passed the absolute stop signal without authority; and,
- failure to promptly notify the Train Dispatcher and/or proper authority that Train 1 was stopped by an emergency brake application and had passed a stop signal without authority.

No exceptions were taken to the actions of the crew of Train 2.

Conclusion: FRA determined the non-compliance of operating rules by the crew of Train 1 contributed to the cause and severity of the accident. (Cause codes H221, H604, H212)

Analysis - Positive Train Control (PTC): The district on which the collision occurred (CNO&TP North) is equipped with PTC. Train 1's lead locomotive (NS 8798) was not PTC equipped. The trailing four locomotives (NS 4063, NS 1167, NS 3482, and NS 3467) were PTC equipped.

Train 2's locomotives (BNSF 6584, NS 9110, and NS 9523) were all PTC equipped; however, the PTC equipment on the lead locomotive (BNSF 6584) was not interoperable with the NS system.

Lake Division Operating Bulletins in effect pertaining to PTC covering the area of the accident are LAOPB-005 and LAOPB-022. Train 1 was required to be operated with the PTC system active per LAOPB-005 effective January 1, 2018. Similarly, Train 2 was required to utilize the PTC system per LAOPB-022 effective February 20, 2018.

Both trains were out of compliance with existing NS operating bulletins regarding PTC.

FRA concluded if the PTC-equipped locomotives in each consist were in the lead, and PTC was initialized, the PTC system would have likely prevented the accident.

Conclusion: FRA determined that the absence of functioning PTC on both south and northbound trains contributed to the severity of the accident. (Cause code H599)

Analysis – Track and Track Structure: A complete inspection of the track and track structure from MP 71.0 to MP 73.0 was conducted by FRA.

The widest track gage measurement was obtained at the west end of the accident area. The gage at that location measured 56.75 inches. Maximum gage for FRA Class 4 track is 57.50 inches, so no exception was taken to the track gage. The maximum allowable cross level for FRA Class 4 track is 1.75 inches. There was no exception taken to cross level. The maximum deviation in alignment for Class 4 Track is 1.50 inches. There was no exception taken to alignment. The rail was 136-pound per foot manufactured

by Mittal in 2011 and installed September 2011. The latest production tie installation was in 2014.

As part of the investigation, an audit of NS track inspection records from January 2, 2018, to March 18, 2018, was conducted by FRA. This track is required to be inspected twice weekly with one calendar day interval between inspections. FRA took no exceptions to the inspection frequency.

The FRA records inspection revealed no defects were documented by the railroad inspectors in the subject milepost, MP 71.0 to MP 73.0.

All required track inspections of NS Lake Division, CNO&TP District were performed in accordance with the Federal Track Safety Standards (TSS) for the designated class of track, as required under Title 49 CFR 213.233. Proper remedial action was taken on all noted defects on the NS track inspection.

Conclusion: FRA determined that track and track structure did not contribute to the cause or severity of the accident.

Analysis – Signal System: The method of train operation through the involved area is by signal indication of a Traffic Control System (TCS), supplemented by Positive Train Control (PTC) on a single main track to the south CP Greendale MP 77.4 and a double main track to the north CP Georgetown MP 69.9. The area is equipped with Safetran color light wayside signals and a General Railway Signaling (GRS) model 5H switch machine operated by the Kentucky Dispatcher.

On March 19 and 20, 2018, the associated TCS equipment was inspected and tested by NS signal personnel under the observation of FRA. Various operational tests were conducted in the accident area. Operational tests, review, and analysis of FRA-required periodic signal system test records revealed that the signal system functioned as intended in accordance with FRA safety regulations.

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

Analysis – Mechanical: A full mechanical inspection was not possible due to the locomotives being on fire and first responders ensuring the scene was stable and safe. The derailed locomotives and freight cars inspected did not reveal any evidence of a contributing or probable cause to this accident. The most recent wayside detection records did not reveal evidence that may have contributed to this accident.

FRA Investigators met with the NS Trainmaster on the scene and received the consists from Train 1 and Train 2. Post-accident mechanical inspection of all trains involved did not indicate a mechanical defect that would have been a contributing factor to this accident.

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

Overall Conclusions

The FRA investigation concluded the Engineer of Train 1 struggled throughout his training process, as demonstrated by his lack of knowledge of the territory and performance operating on the same territory. Post-accident interviews demonstrated a lack of communication and situational awareness by the crew of Train 1 as they approached CP Akers, and failed to reduce their train speed to 30 mph as required. This led to Train 1 failing to stop at CP Akers, fouling the turnout from the Single Main to Main Track 2. The crew of Train 1 then failed to report, via radio, they had operated past the stop signal to provide warning to an approaching train.

Additionally, FRA concluded while NS rules required both Train 1 and Train 2 to be operated with an active PTC system, both trains were built with non-PTC compliant locomotives in the lead. An active and functioning PTC system would have prevented the collision.

The crew of Train 2 was unable to visually determine that Train 1 was in the foul until seconds before impact due to the collision occurring at night, and the limited sight distance.

Probable Cause and Contributing Factors

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

FRA also determined the following contributing causes to the collision:

- H999 – Other train operation/human factors;
- H212 – Radio communication, failure to give/receive;
- H604 – Train outside yard limit, in block signal or interlocking territory, excessive speed; and,
- H599 – Other cause relating to train handling or makeup.