Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch

Accident Investigation Report
HQ-2016-1169

CSX Transportation (CSX)
Citra, FL
November 16, 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 November 16, 2016, at 3:55 a.m., EST, a northbound CSX Transportation (CSX) freight train, K21014 (striking train), collided with a southbound CSX freight train, N00113 (struck train). The striking train failed to stop for a red signal at NE Sparr at Milepost (MP) S718.6 on CSX's Wildwood Subdivision in Citra, Florida. Citra is 25 miles north of Ocala, Florida. The Wildwood Subdivision is centralized traffic control territory and both trains were operating on signal indication. The striking train was a loaded unit phosphate train with 3 locomotives and 100 cars. The struck train was a loaded unit coal train with 3 locomotives and 110 cars. As a result of the collision, 3 locomotives and 18 cars from the striking train derailed and 14 cars from the struck train derailed. The impact speed was recorded at 38 mph.

The Dispatcher planned for the striking train to hold the main line at the north-end of Sparr as the struck train entered the siding on the north-end and cleared the main line. The striking train failed to respond to an approach signal at SE Sparr and failed to stop at the stop signal at NE Sparr. The striking train passed the stop signal and collided with the struck train's nineteenth car, as it traversed the NE Sparr turnout.

There were no injuries to the train crews or public, and no evacuation ordered. Because of the 3 locomotives being derailed, there was 7,500 gallons of diesel fuel, 10 gallons of lubricating oil and 20 gallons of battery acid spilled. No other hazardous material was involved.

The reported equipment damage for the struck train was $1,045,972 and $3,095,923 for the striking train, bringing total equipment damage to $4,141,895 with track, right-of-way and signal damage of $284,087. Total damage for this accident is reported as $4,425,982.

At the time of the derailment, it was dark with clear skies and a full moon. The winds were mild with a temperature of 45 °F.

The Federal Railroad Administration (FRA) determined the crew of the striking train failed to comply with the approach signal indication at MP S720.9, and the stop signal indication at MP S718.6. The probable cause of the derailment was identified as cause code H221, automatic block or interlocking signal displaying a stop indication - failure to comply.

Additionally, FRA identified two contributing factors to the accident. Cause code H222, automatic block or interlocking signal displaying other than a stop indication – failure to comply, and cause code H104, employee asleep.

U.S. Department of Transportation Federal Railroad Administration	**FRA FACTUAL RAILROAD ACCIDENT REPORT**	FRA File #HQ-2016-1169

TRAIN SUMMARY

1. Name of Railroad Operating Train #1	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
CSX Transportation	CSX	000164377
2. Name of Railroad Operating Train #2	**2a. Alphabetic Code**	**2b. Railroad Accident/Incident No.**
CSX Transportation	CSX	000164377

GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
CSX Transportation	CSX	_HQ-2016-1169
2. U.S. DOT Grade Crossing Identification Number	**3. Date of Accident/Incident**	**4. Time of Accident/Incident**
	11/16/2016	3:55 AM

5. Type of Accident/Incident
Side Collision

6. Cars Carrying HAZMAT	7. HAZMAT Cars Damaged/Derailed	8. Cars Releasing HAZMAT	9. People Evacuated	10. Subdivision
0	0	0	0	Wildwood

11. Nearest City/Town	12. Milepost *(to nearest tenth)*	13. State Abbr.	14. County
Citra	S717.8	FL	MARION

15. Temperature (F)	16. Visibility	17. Weather	18. Type of Track
45 ˚F	Dark	Clear	Main

19. Track Name/Number	20. FRA Track Class	21. Annual Track Density *(gross tons in millions)*	22. Time Table Direction
Single Main Track	Freight Trains-60, Passenger Trains-80	48.8	South

U.S. Department of Transportation
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FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2016-1169

OPERATING TRAIN #1

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
Freight Train	Yes	K21014

4. Speed (recorded speed, if available) R - Recorded E - Estimated	Code	5. Trailing Tons (gross exluding power units)	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
38 MPH	R	13000		0

6. Type of Territory

Signalization:
Signaled

Method of Operation/Authority for Movement:
Signal Indication

Supplemental/Adjunct Codes:
Q

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.)*	CSXT 399	1	no		0	0
(2) Causing *(if mechanical, cause reported)*	0	0	no	9. Was this consist transporting passengers?		No

10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End e. Remote	11. Cars (Include EMU, DMU, and Cab Car Locomotives.)	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	3	0	0	0	0	(1) Total in Equipment Consist	100	0	0	0	0
(2) Total Derailed	3	0	0	0	0	(2) Total Derailed	18	0	0	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
3095923	284087

14. Primary Cause Code
H221 - Automatic block or interlocking signal displaying a stop indication - failure to comply.*

15. Contributing Cause Code
H104 - Employee asleep

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: 8 Mins: 25	Hrs: 8 Mins: 25

Casualties to:	22. Railroad Employees	23. Train Passengers	24. Others
Fatal	0	0	0
Nonfatal	0	0	0

25. EOT Device?	26. Was EOT Device Properly Armed?
Yes	Yes

27. Caboose Occupied by Crew? N/A

28. Latitude	29. Longitude
29.404852000	-82.106091000

U.S. Department of Transportation
Federal Railroad Administration

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2016-1169

OPERATING TRAIN #2

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
Freight Train	Yes	N00113

4. Speed (recorded speed, if available) R - Recorded E - Estimated	Code	5. Trailing Tons (gross exluding power units)	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
22 MPH	R	15551		0

6. Type of Territory

Signalization:
Signaled

Method of Operation/Authority for Movement:
Signal Indication

Supplemental/Adjunct Codes:
Q

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.)*	TILX 47166	19	yes		0	0
(2) Causing *(if mechanical, cause reported)*	0	0	no	9. Was this consist transporting passengers?		No

10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End e. Remote	11. Cars (Include EMU, DMU, and Cab Car Locomotives.)	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	3	0	0	0	0	(1) Total in Equipment Consist	110	0	0	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	14	0	0	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
1045972	0

14. Primary Cause Code
H221 - Automatic block or interlocking signal displaying a stop indication - failure to comply.*

15. Contributing Cause Code
H104 - Employee asleep

Number of Crew Members				Length of Time on Duty	
16. Engineers/Operators	17. Firemen	18. Conductors	19. Brakemen	20. Engineer/Operator	21. Conductor
2	0	1	0	Hrs: 3 Mins: 0	Hrs: 3 Mins: 0

Casualties to:	22. Railroad Employees	23. Train Passengers	24. Others
Fatal	0	0	0
Nonfatal	0	0	0

25. EOT Device?	26. Was EOT Device Properly Armed?
Yes	Yes

27. Caboose Occupied by Crew? N/A

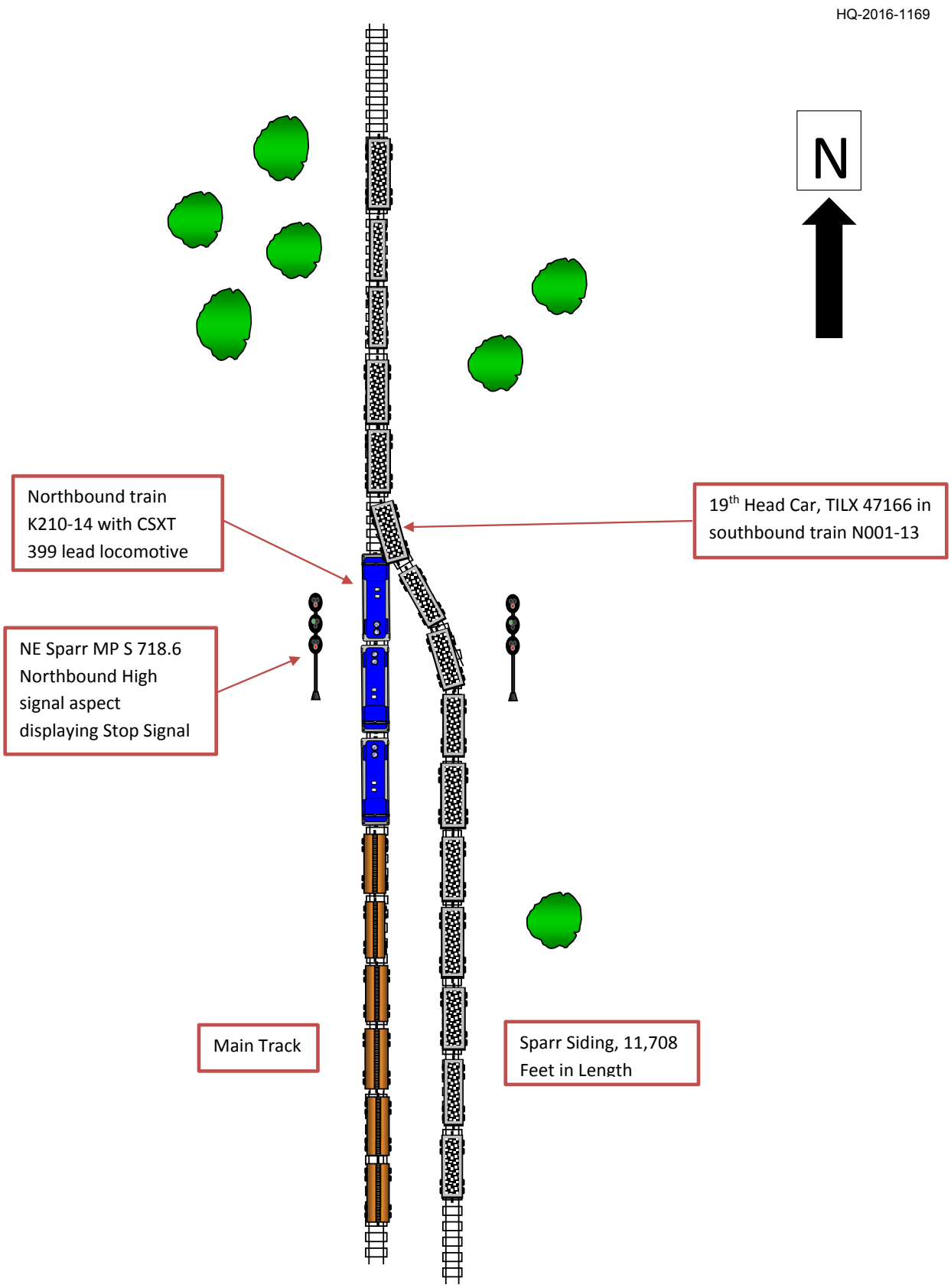
28. Latitude	29. Longitude
29.404852000	-82.106091000

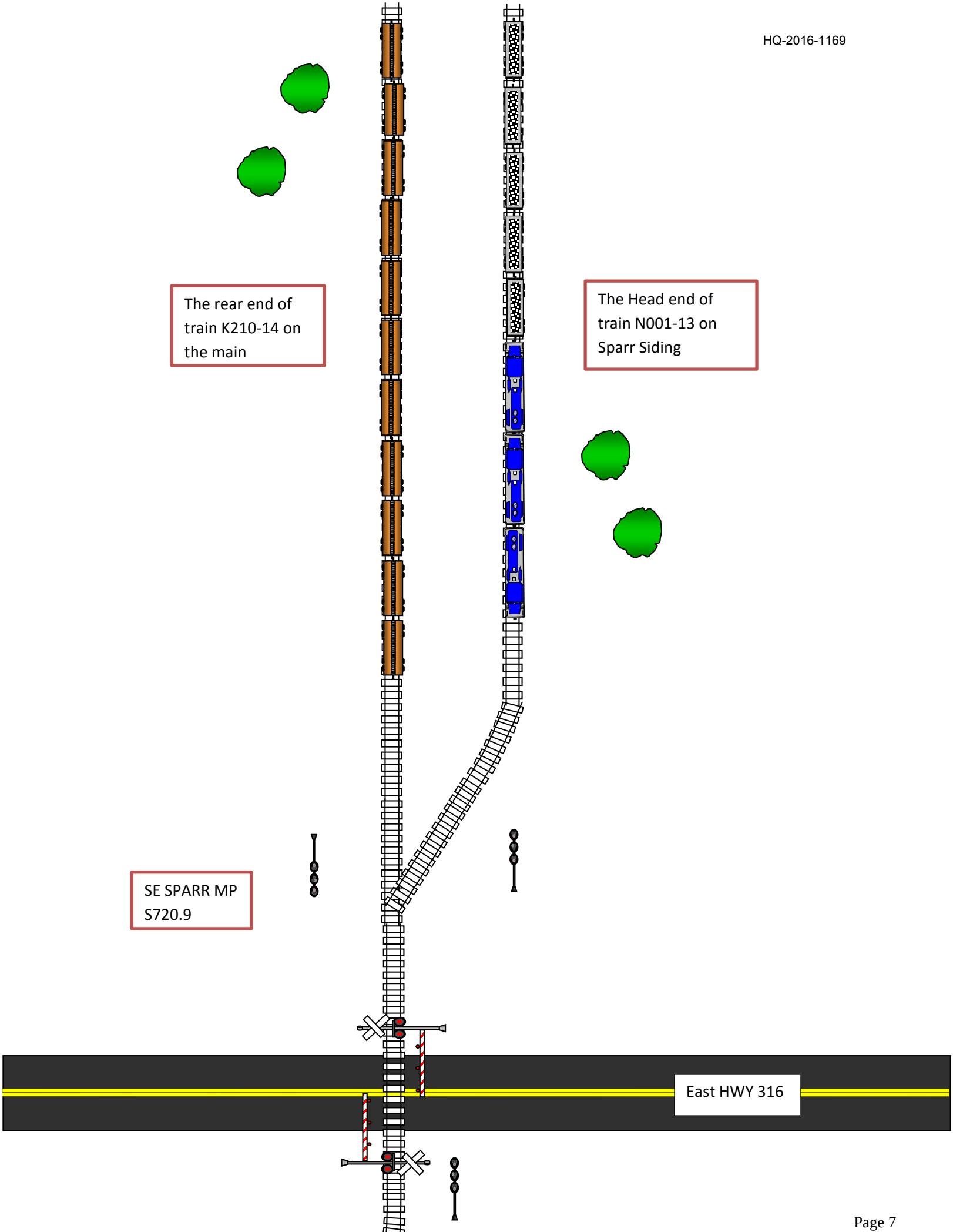
SKETCHES

Accident overview

SKETCHES

Sketch




The rear end of train K210-14 on the main
The Head end of train N001-13 on Sparr Siding
SE SPARR MP S720.9
East HWY 316

NARRATIVE

Circumstances Prior to the Accident

The crew of southbound CSX Transportation (CSX) Train N00113 (struck train) included a locomotive engineer, student engineer, and a conductor. They first went on duty at 12:55 a.m., EST, November 16, 2016, at CSX's Moncrief Yard in Jacksonville, Florida. This was the home terminal for all crew members and all received more than the statutory off-duty period prior to reporting for duty.

Their assigned freight train consisted of three locomotives and 110 loaded coal hopper cars. It was 6,049 feet long, and weighed 15,551 tons. The crew was taxied about 25 miles from Moncrief Yard to Baldwin Yard in Baldwin, Florida, and was scheduled to travel to TECO Bayside Power Station in Tampa, Florida.

The struck train received the required pre-departure inspection and Class 1 air brake test by qualified mechanical inspectors at Casky Yard in Pembroke, Kentucky. No tests or inspections were required prior to departure.

The train departed Baldwin Yard and travelled south without incident. The locomotive was equipped and running with Trip Optimizer. As the struck train approached the accident area, the Student Engineer was seated at the controls on the west side of the leading locomotive. The Locomotive Engineer was seated in the center of the cab and the Conductor was seated on the east side of the leading locomotive. They were on a medium approach signal and the Student Engineer disengaged the Trip Optimizer to run the train from the Main Track onto Sparr Siding.

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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, track profile. It then automatically controls throttle and dynamic brake according to the plan to provide smooth operation while keeping the train on schedule and minimizing fuel use.

The crew of northbound Train K21014 (striking train) included a Locomotive Engineer and a Conductor. They first went on duty at 7:30 p.m., on November 15, 2016, and were away from their home terminal of Waycross, Georgia. They were lodged at a hotel in Brandon, Florida, and taxied from the hotel to CSX Mulberry Yard in Mulberry, Florida. Both crew members received 16 hours and 5 minutes of off-duty prior to reporting for duty.

The striking train consisted of three locomotives and 100 loaded covered hopper cars of phosphate. It was 6,170 feet long, and weighed 13,000 tons. A yard crew assembled their train, preformed the required pre-departure inspection and Class 1 air brake test. After the train was ready, they were delayed in departing due to an end-of-train (EOT) device not being available. Once an EOT device was found, applied to the rear of the train, armed and tested, the northbound train departed at 11:50 p.m. The Locomotive Engineer was seated at the controls on the east side of the lead locomotive and the Conductor was seated on the west side. The striking train was traveling in a northbound direction towards Waycross Yard using the locomotive Trip Optimizer.

Railroad timetable direction, and geographic direction is north and south. Timetable directions are used throughout this report.

Weather at the time of the derailment was dark with clear skies and a full moon. The winds were mild with a temperature of 45 °F.

The Accident

Struck Train

The struck train was entering the siding at 20 mph. The crew saw the headlights of the striking train and the Student Engineer dimmed his headlight. Shortly after the striking train's locomotives passed the struck train's locomotives, the struck train experienced an emergency air brake application due to the collision.

Striking Train

At 3:52:26 a.m., on November 16, 2016, the striking train sounded the horn and bell for the East Highway 316 grade crossing and then passed the SE Sparr control point Milepost (MP) S720.9 at 44 mph on an approach signal. The approach signal required the train speed to be immediately reduced to 30 mph and be prepared to stop at the next signal, but the Engineer of the striking train failed to adjust the train speed. The download of the controlling locomotive of the striking train showed at 3:54:59 a.m., the was traveling at 49 mph. The striking train's Engineer was stirred (he later admitted to being asleep) by the locomotives of the struck train as it passed, and at 3:55:21 a.m., the striking train's Engineer made an emergency train air brake application. At 3:55:39 a.m., the striking train passes a stop signal at the NE Sparr control point (MP S718.6) at 41 mph. Seconds later, the striking train collided with the side of the struck train impacting the nineteenth car, TILX 47166, at a recorded speed of 38 mph.

Directly after the accident at 3:56:57 a.m., the Engineer of the struck train initiated an emergency call to the dispatcher and reported the accident. They notified the dispatcher that they were all okay. The dispatcher immediately dispatched emergency responders to the scene and inquired about the status of the striking train's crew. Moments later, the struck train's Engineer made a follow-up radio call confirming the striking train's crew was accounted for and did not need medical attention. Marion County Fire and Rescue along with Marion County Sheriff's Office from Ocala, Florida, responded to the accident.

The reported equipment damage for the struck train was $1,045,972 and $3,095,923 for the striking train, bringing total equipment damage to $4,141,895 with track, right-of-way and signal damage of $284,087. Total damage for this accident is reported as $4,425,982.

Analysis and Conclusion

Analysis – Toxicology Testing: This accident met the criteria for Title 49 Code of Federal Regulations Part 219, Subpart C, Post Accident Toxicological Testing. Testing samples were taken from the crew members of the striking train and the struck train.

Conclusion: Federal Railroad Administration (FRA) Post-Accident Forensic Toxicology Result Reports indicate the five employees tested all had negative test results.

Analysis – Mechanical Inspection: A complete inspection of the cars and locomotives from the accident site was conducted by CSX and FRA on the day of the accident. All required locomotives inspections, tests, and records were in compliance with Federal rules and regulations. Both trains received the required pre-departure inspections and air brake tests. No exceptions to the freight cars were noted.

Conclusion: There was nothing found on the equipment that would have contributed to or could have caused this accident.

Analysis – Track Structure: An inspection of the track near the accident by CSX and FRA did not show

any defects that would have been present prior to the accident and subsequent derailment. The track topography near the accident at MP S718.6 would have the struck train entering the turnout of the 1.07-degree curve and was ascending a 0.19-percent grade. The struck train was operating on tangent track for approximately 4,200 feet prior to entering the switch. The striking train was exiting a 1.07-degree, right-hand curve and was descending a 0.19-percent grade.

Conclusion: Track structure was not a factor for this accident.

Analysis – Signal System: FRA inspected the signal system and determined it displayed the proper signal sequence for train movements on both tracks. A review of the data logs from the computer-aided dispatch system at Jacksonville Dispatch Center determined that the dispatcher display aspects were not in conflict with the signal aspects along the right-of-way. All tests, downloads, and documentation revealed that the signal system functioned as intended prior to and at the time of the accident. The Rail-View camera replay from both lead locomotives confirmed that the proper signal aspects were present with unrestricted visibility.

Conclusion: The signal system operated as required and was not a factor for this accident.

Analysis – Fatigue Analysis: Striking Train Conductor: FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis. At or above this baseline, FRA does 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 subject of this investigation. Information for the employee follows:

1. Conductor assigned to the striking train.

Sleep setting - Good

Overall effectiveness = 64.75 percent

Lapse index = 3.475

Reaction time = 154 percent

Chronic sleep debt = 8.58

Hours of continuous wakefulness = 14.93

Time of day 3:56 a.m.

In addition to FRA's Fatigue Analysis, the striking train's Conductor voluntarily participated in a sleep study. The results of the sleep study were negative.

Conclusion: FRA's baseline for fatigue analysis is 77.5 percent effectiveness and the analysis indicated that the subject was at an effectiveness level of 64.75 percent indicating fatigue was possible for this employee. FRA concluded the Conductor had an irregular work-rest cycle and was working in the early morning hours where he was predisposed to sleep. Fatigue was highly probable for the Conductor and subject of this investigation.

Analysis - Fatigue Analysis: Striking Train Engineer: FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis. At or above this baseline, FRA does 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 subject of this investigation. Information for the employee follows:

1. Engineer assigned to the striking train.
Sleep setting - Good
Overall effectiveness = 68.32 percent
Lapse index = 2.61
Reaction time = 146 percent
Chronic sleep debt = 7.73
Hours of continuous wakefulness = 14.93
Time of day 3:56 a.m.
Conclusion: FRA's baseline for fatigue analysis is 77.5 percent effectiveness and the analysis indicated that the subject was at an effectiveness level of 68.32 percent indicating fatigue was possible for this employee. FRA concluded the Engineer had an irregular work-rest cycle and was working in the early morning hours where he was predisposed to sleep. Fatigue was highly probable for the striking train's Engineer and subject of this investigation.
Analysis – Locomotive event recorders: The locomotive event recorders were downloaded by CSX along with the Rail-View cameras.
Conclusion: The Rail-View camera replay from both lead locomotives confirmed that the proper signal aspects were present with unrestricted visibility. The event recorders confirmed the train speeds and operational events of both trains as listed in this report.
Analysis – Train Crew Interviews: Statements from the train crews and dispatcher taken by CSX were provided to FRA. Follow-up interviews were conducted on November 17 and November 18, 2016.
According to statements from the struck train's crew, by the time they realized the striking train was traveling too fast, there was insufficient time to do anything or warn them via the radio. The Engineer and Conductor from the striking train crew both indicated that they had fallen asleep.
A complete review of the engineers, conductors, and dispatcher training and certification records was made with no exceptions noted.
Conclusion: Qualifications and training was not an issue for this derailment. Both the Engineer and Conductor from the striking train stated they had fallen asleep, and missed the last two wayside signals, which ultimately led to collision and subsequent derailment.

Overall Conclusion

FRA determined the crew of the striking train failed to comply with the approach signal indication at MP S720.9, and the stop signal indication at MP S718.6. The probable cause of the derailment was identified as cause code H221, automatic block or interlocking signal displaying a stop indication - failure to comply.
Additionally, FRA identified two contributing factors to the accident. Cause code H222, automatic block or interlocking signal displaying other than a stop indication – failure to comply, and cause code H104, employee asleep.