BROTHERHOOD OF RAILROAD SIGNALMEN

FRONT ROYAL, VA

BEFORE THE NATIONAL TRANSPORTATION SAFETY BOARD

NTSB Accident Number: RRD18MR003

Proposed findings, probable cause, and safety recommendations, in connection with the February 4, 2018, head-on collision between southbound Amtrak P091-03 and standing CSXT freight F777-03 near Cayce, South Carolina.

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Final Submission

Accident Synopsis

On February 4, 2018, at approximately 2:27 a.m. Eastern Standard Time (EST), a collision occurred as a southbound National Passenger Railroad Corporation (Amtrak) train P091-03, operating on a track warrant, diverted from the main track through a hand-thrown switch into a storage track and collided head-on with stationary CSXT local freight train F777-03. The accident occurred on the Silica Storage Track Milepost 367, on CSXT Columbia Subdivision in Cayce, South Carolina.

The crew of Amtrak P091-03 included a locomotive engineer, conductor, assistant conductor, and five service employees. The train crew went on duty February 3, 2018, at 10:43 p.m. EST, at Hamlet, North Carolina. The train was scheduled to travel from Hamlet, North Carolina, to Jacksonville, Florida. Amtrak train P091-03 consisted of one locomotive and seven passenger cars. [1]

The crew members of CSXT 777-03 consisted of a locomotive engineer and a conductor. The train crew reported for duty on February 3, 2018, at 3:00 p.m. EST,

[1] National Transportation Safety Board – Operations and Human Factors Factual Report, p. 6

at the CSXT Cayce Yard in South Carolina. The train was scheduled to travel from the CSXT Cayce Yard to the auto facility located at Milepost 367 on the Columbia Subdivision. CSXT train F777-03 consisted of two locomotives and 38 loaded auto racks. The train crew stopped at the auto facility to add and remove cars from the tracks. They removed 34 empty cars and placed them into the Silica Storage Track.[2]

Prior to departure, Amtrak P091-03 conducted a job briefing with an Amtrak Road Foreman of Engines, wherein it was discussed that a signal suspension[3] was in effect between Mileposts S362.5 and S385.1 near Cayce, South Carolina.

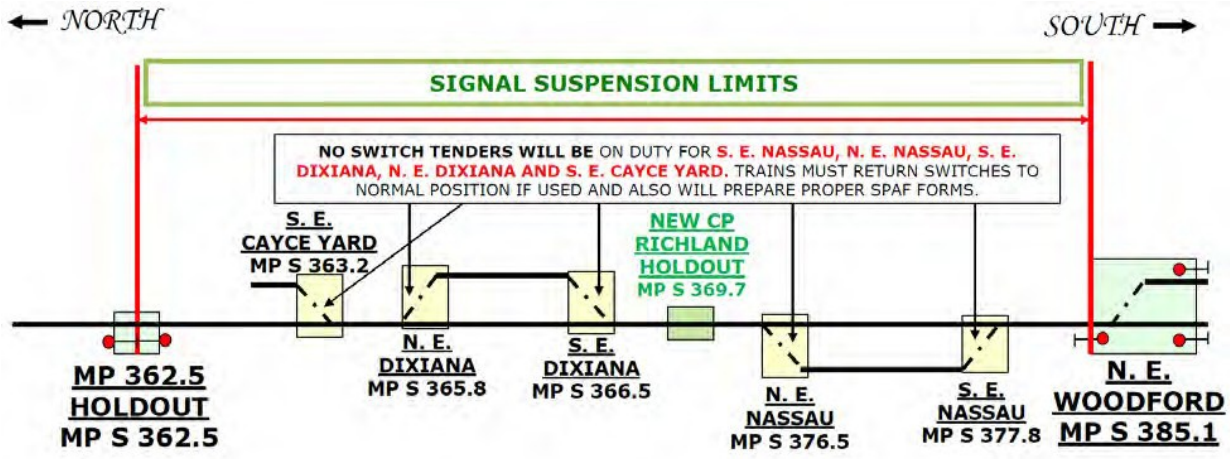


Figure 1. Diagram of the Signal Suspension Limits

On February 4, 2018, at approximately 2:01 a.m., CSXT train dispatcher granted Amtrak P091-03 an EC-1[4] (Track Warrant Control-D[5]) form to proceed through the limits of the signal suspension. At approximately 2:01 a.m. Amtrak P091-03 departed Columbia, South Carolina, and was stopped by the signal at Milepost 362.5 displaying a red aspect. As such, Amtrak P091-03 requested and was granted permission from the CSXT train dispatcher to pass the stop indication and continue southbound.[6] Amtrak P091-03 was traveling at about 57 miles per hour when it entered the Silica Storage Track and collided with CSXT local train F777-03.

CSXT Columbia Subdivision Signal System

The Signal System on CSXT's Columbia Subdivision, Mileposts S359.7 to S497.2, consists of a Traffic Control System (TCS) that governs movement in both direction on the main line and signaled siding tracks. This section of track is controlled by the FF dispatcher located in Jacksonville, Florida. CSXT operates trains through this

[2] National Transportation Safety Board – Operations and Human Factors Factual Report, p. 5
[3] Signal Suspension is in reference to wayside signals temporarily not in effect, the train dispatcher cannot authorize train movements through signal indications.
[4] Form EC-1 – A form used to record specific instructions or dispatcher messages from the train dispatcher regarding movements on controlled tracks.
[5] Track Warrant Control Non-Signaled (TWC-D) when the authority for movement on a controlled track is designated in special instructions, dispatcher message, or Form EC-1 as TWC-D, trains will be governed by verbal authority from the train dispatcher.
[6] National Transportation Safety Board – Operations and Human Factors Factual Report, p. 9

area utilizing the TCS system in accordance with CSXT Operating Rule 510[7] and general signal rules. On the day of the accident the signal system was under a temporary signal suspension.

The TCS system utilized at the accident location included Electrocode 4, which utilizes DC-coded track circuits to detect train positons, and in effect control signals and switches. Also, the equipment used at the location consisted of Union Switch & Signal M23 and M22 power switch machines that were normally operated by the dispatcher, color light wayside signals, and an Electric Lock 4 (EL4), which was used in conjunction with the Union Switch & Signal T-21 hand throw switches equipped with electric-locks and derails that were not controlled by the dispatcher. [8] The switch from the main track into the Silica Storage Track was a US&S T-21 equipped with an EL4.

CSXT Temporary Signal Suspension

On February 3, 2018, at 7:30 a.m. EST CSXT put in place a temporary signal suspension to make modifications to the signal system for the implementation of Positive Train Control (PTC). The temporary signal suspension was proposed and accepted by CSXT to install electronic track circuits, frame communication circuits, PTC compatible microprocessor-based vital logic controllers, and replace signals in relation to the implementation of PTC. CSXT Operating Rule 504.35 states the conditions which warrant temporary signal suspensions.

> "***Remove signals from service only when authorized by the proper authority and in the following circumstances:***
>
> ***a. Storm or flood renders signal system inoperative, or***
>
> ***b. Prompt restoration of signal system disruption for other cause(s) cannot be effected, or***
>
> ***c. Construction work necessitates the signals' temporary removal from service.****"*

Further, Operating Rule 504.36 states:

> ***"Special instructions, dispatcher message, or Form EC-1 may temporarily remove block signals and signal rules from service. When signal system is suspended, establish an alternate method of operation and notify all trains affected." [9]***

[7] **CSXT Operating Rule 510 – Traffic Control (TC**)
When the authority for movement on controlled tracks is designated in special instructions, dispatcher message, or Form EC-1 as TC, general signal rules are also in effect and signal indication authorizes and governs train movements in either direction.

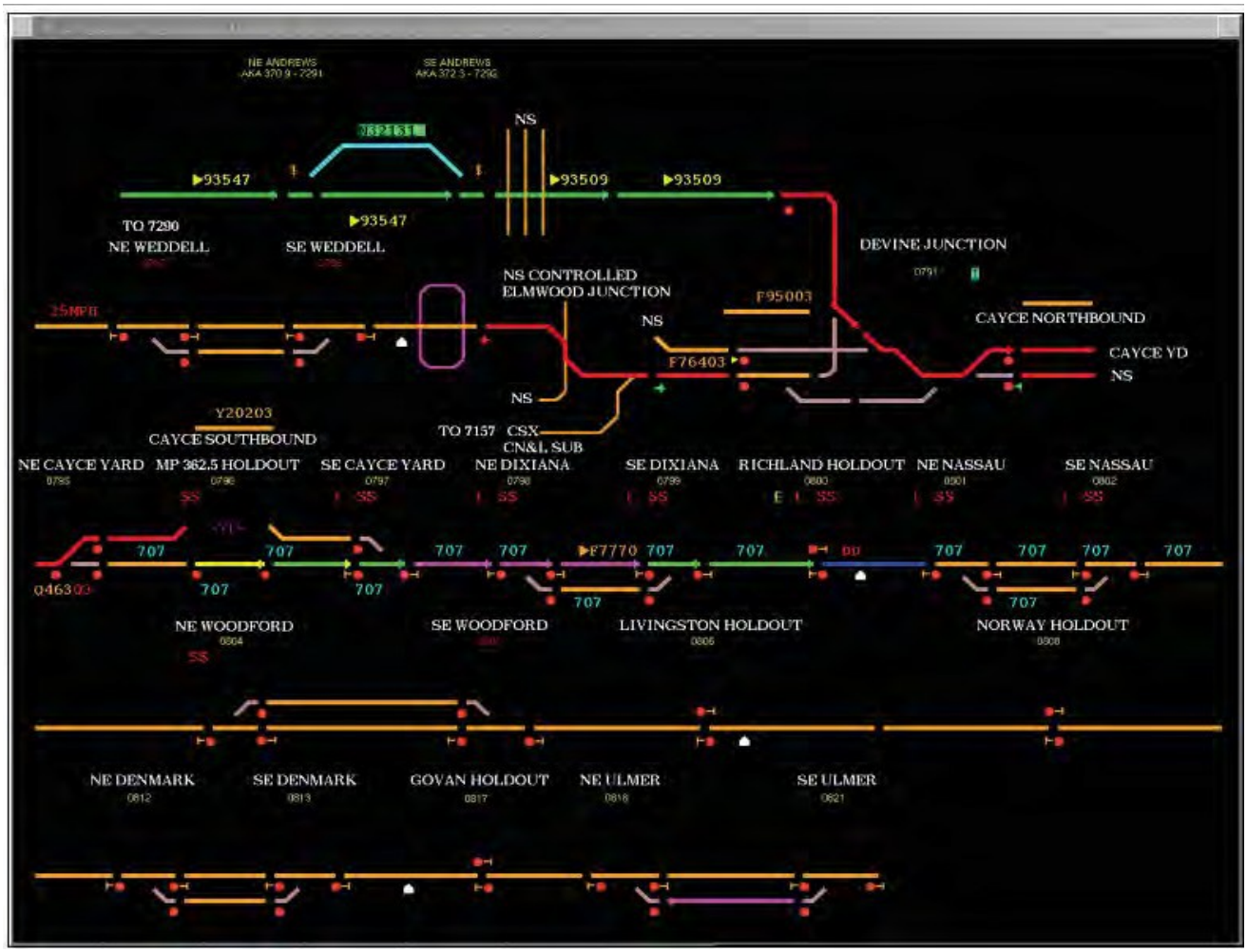
[8] National Transportation Safety Board – Signal and Train Control Factual Report, p.3

[9] National Transportation Safety Board – Signal and Train Control Factual Report, p. 14-15

At the time of the accident, the dispatcher was using TWC-D as an alternate method of operation in conjunction with an EC-1 Form as governed by Operating Rule 505.[10]

The ElectrologIXS-coded track circuits were properly operating and recorded the data in the block between S.E. Cayce and the Richland Holdout Signals. However, the dispatcher disregarded this data, as the signal system was suspended and the method of operation was TWC-D Operating Rule 505. Dispatchers are typically instructed to disregard track indications during a signal suspension, due to the FRA testing performed by signal personnel, which can give false track indications. The following screen shots are from CSXT CAD System on the day of the accident.

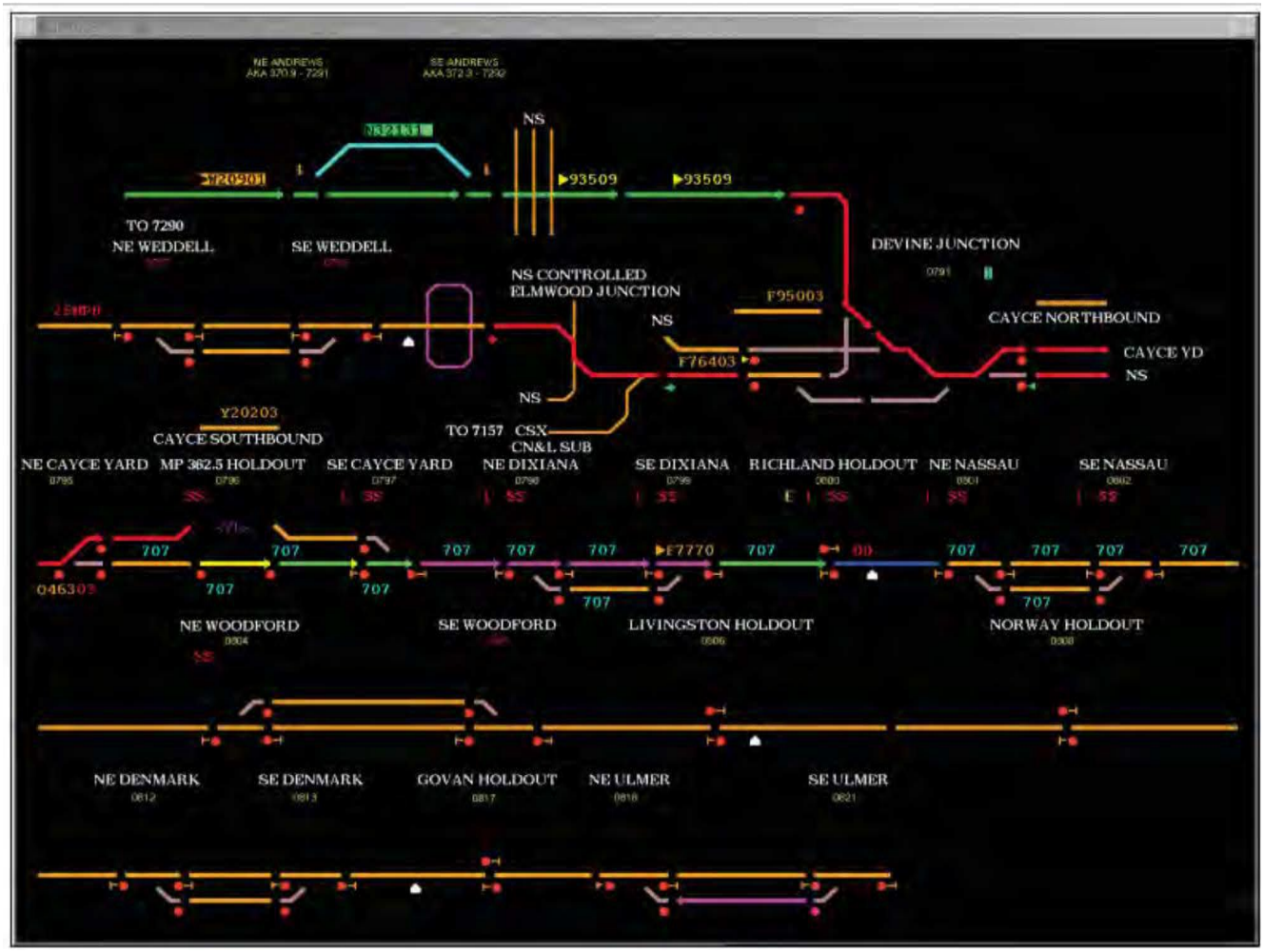
This exhibit reflects CSXT F777-03 occupying the tracks between S.E. Cayce Yard and S.E. Dixiana. Also, depicting the track south of S.E. Dixiana as unoccupied.[11]



[10] **CSXT Operating Rule 505 – Track Warrant Control Non-Signaled (TWC-D)**
When the authority for movement on a controlled track is designated in special instructions, dispatcher message, or Form EC-1 as TWC-D, trains will be governed by verbal authority from the train dispatcher.

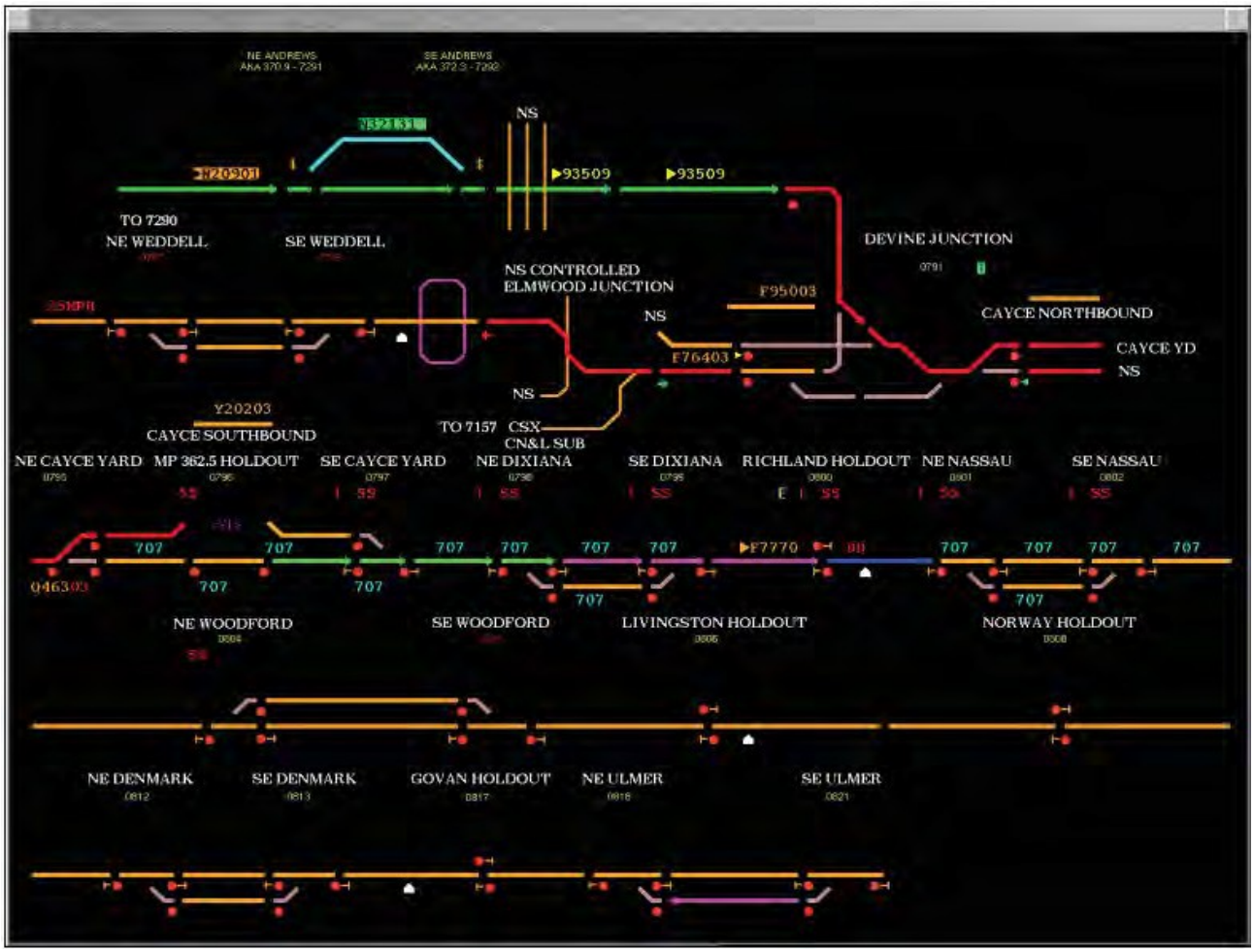
[11] National Transportation Safety Board – Signal and Train Control factual report, p. 6

This exhibit depicts CSXT F777-03 in the OS track of S.E. Dixiana with South track still showing unoccupied.[12]



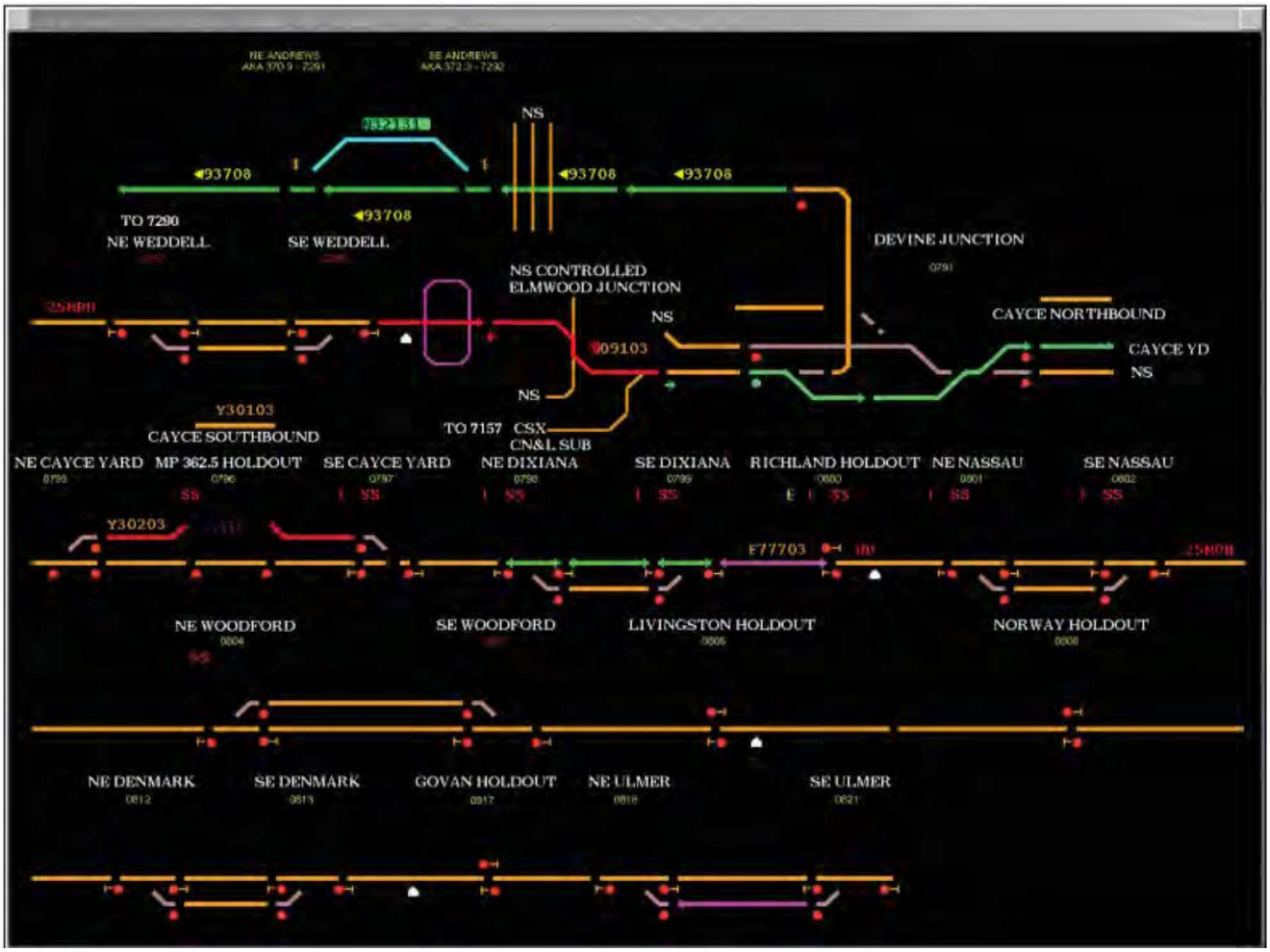
[12] National Transportation Safety Board – Signal and Train Control factual report, p. 7

This exhibit shows CSXT F777-03 occupying tracks between N.E. Dixiana and Richland Holdout Signal. The track between Richland Holdout and the S.E. Dixiana does not show unoccupied after this point.[13]



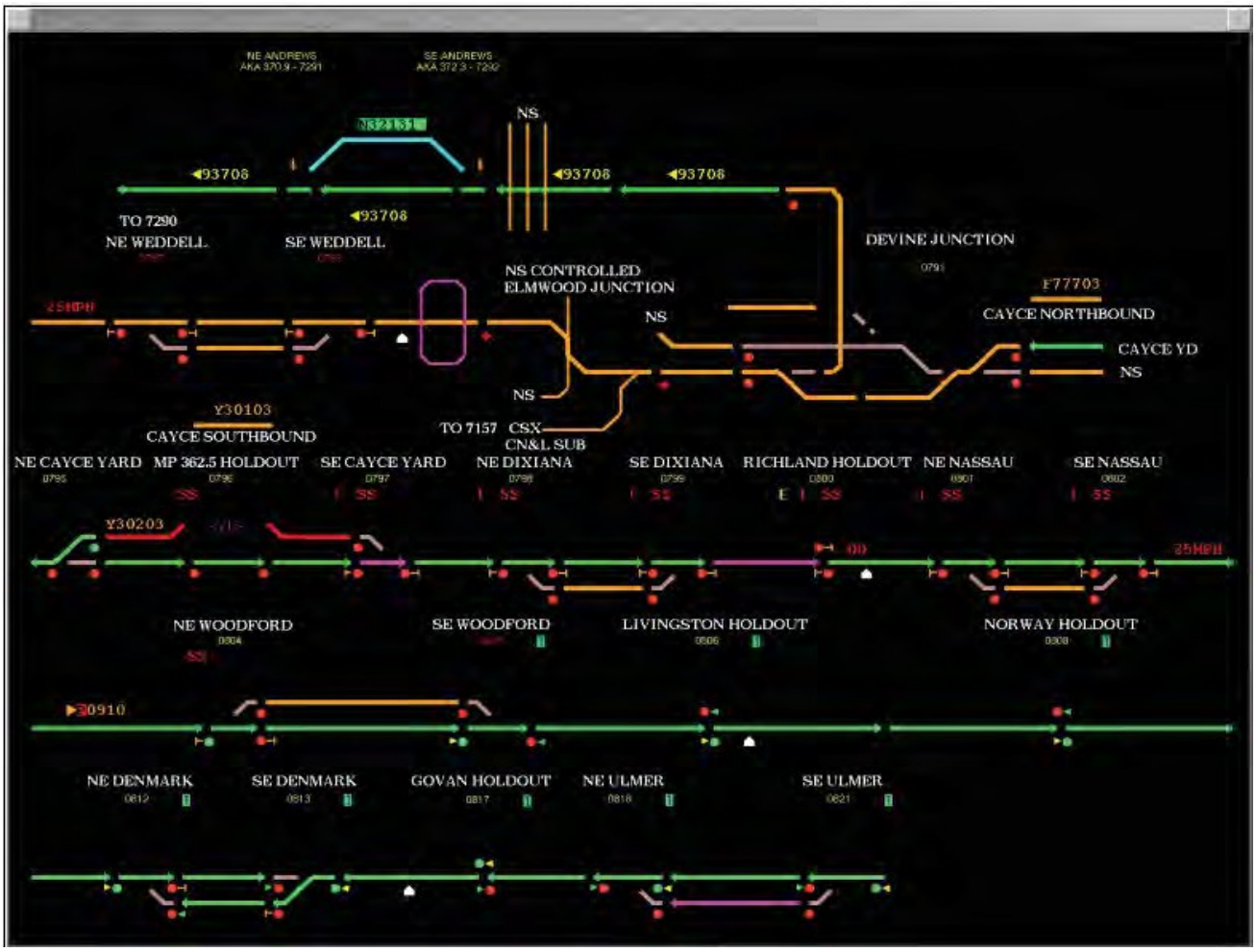
[13] National Transportation Safety Board – Signal and Train Control factual report, p. 8

This exhibit shows that CSXT F777-03 only occupying the track between S.E. Dixiana and Richland Holdout.[14]



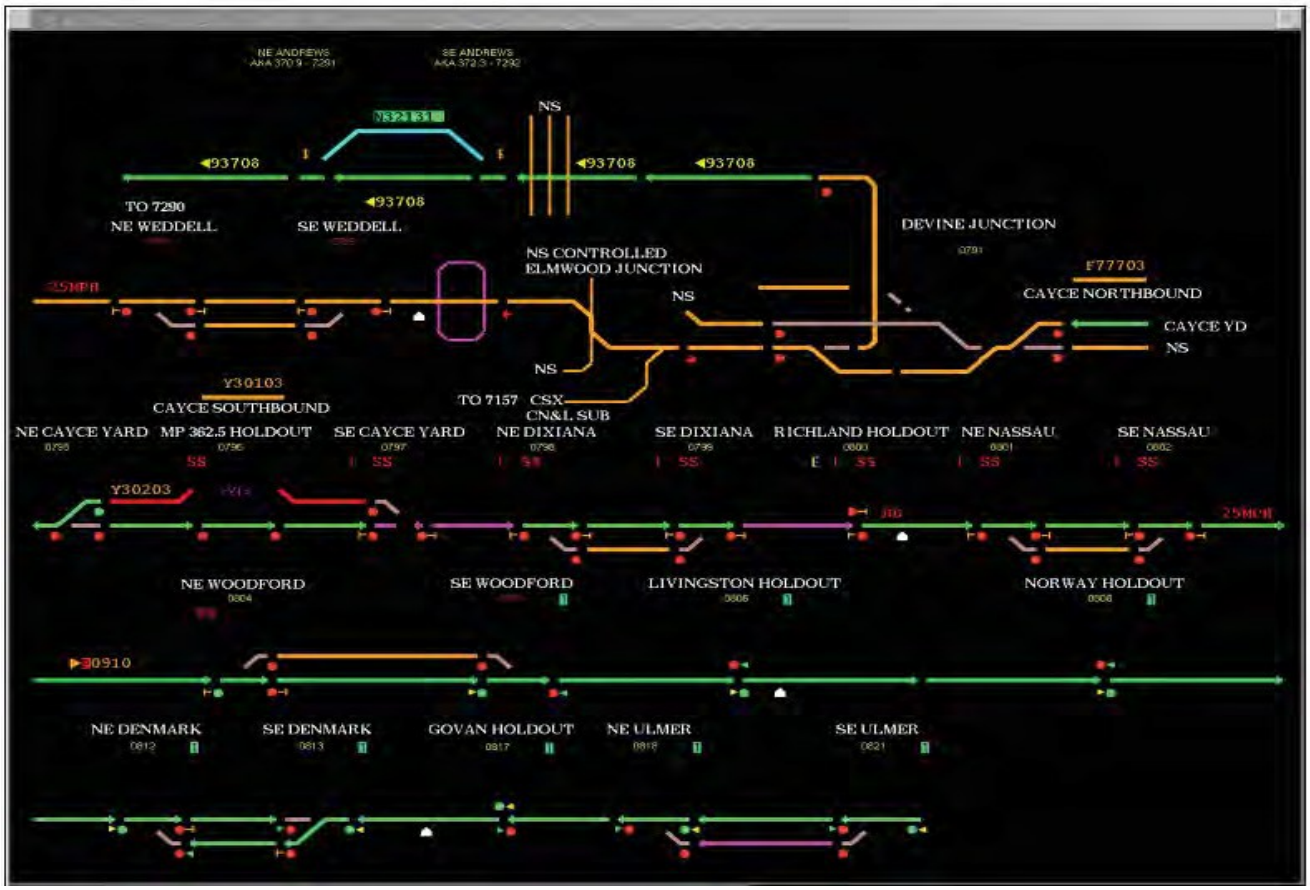
[14] National Transportation Safety Board – Signal and Train Control factual report, p. 9

This exhibit shows Amtrak P091-03 occupying the OS an S.E. Cayce Yard and the track between S.E. Dixiana and Richland Holdout is still showing occupied without train designation.[15]



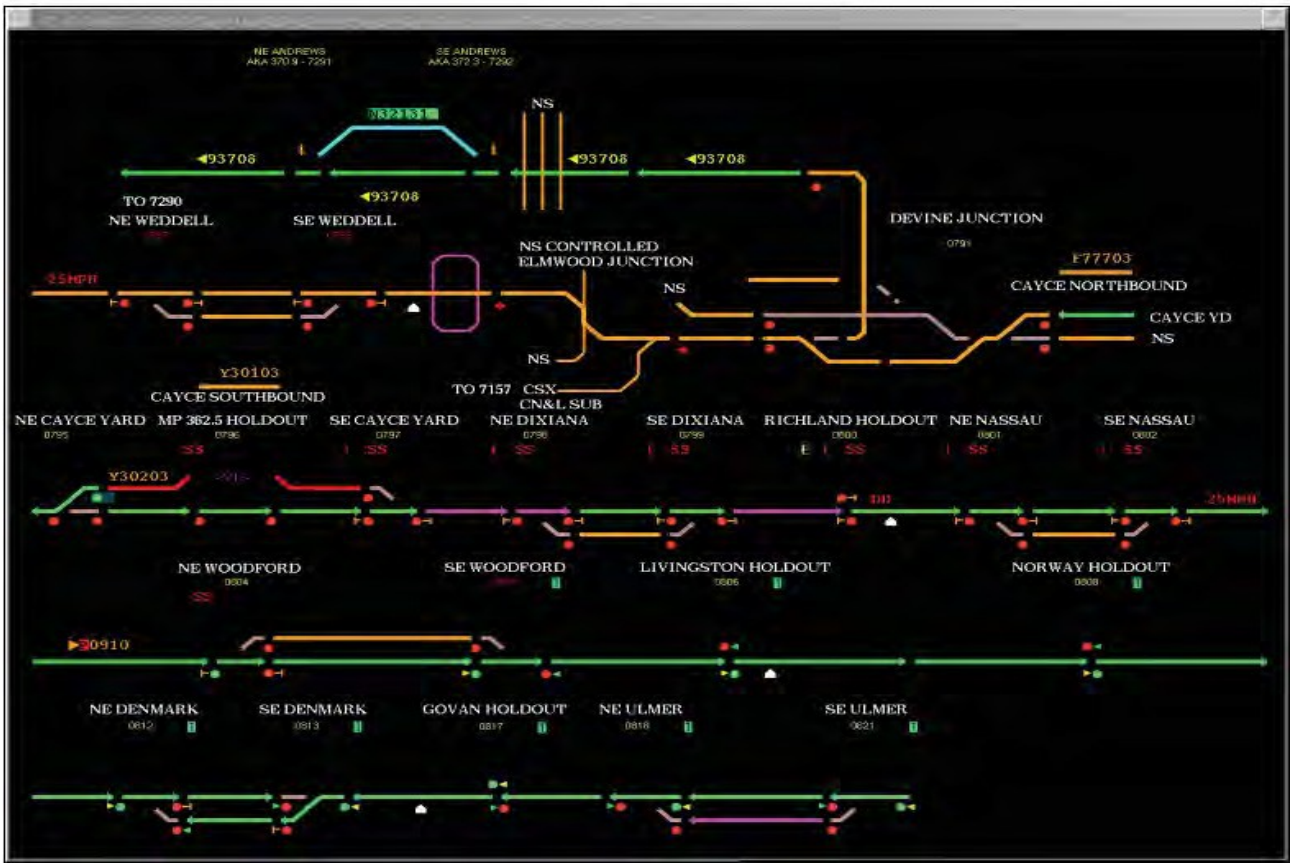
[15] National Transportation Safety Board – Signal and Train Control factual report, p. 10

This exhibit shows Amtrak P091-03 occupying S.E. Cayce Yard and N.E. Dixiana.[16]



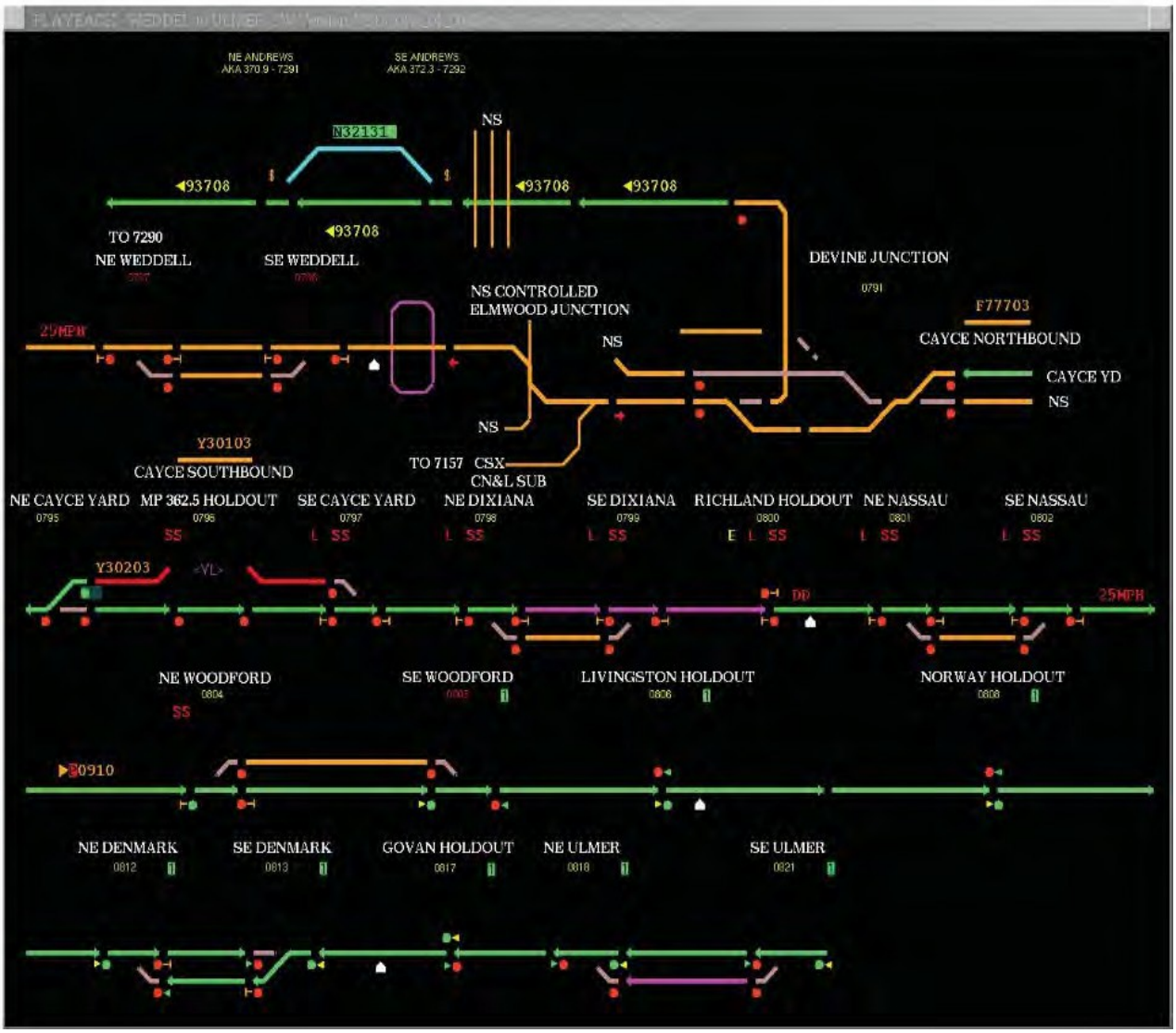
[16] National Transportation Safety Board – Signal and Train Control factual report, p. 11

This exhibit shows Amtrak P091-03 entering N.E. Dixiana with the track south of S.E. Dixiana still occupied.[17]



[17] National Transportation Safety Board – Signal and Train Control factual report, p. 12

This exhibit shows Amtrak P091-03 entering S.E. Dixiana OS Track with the track south of S.E. Dixiana still occupied.[18]



[18] National Transportation Safety Board – Signal and Train Control factual report, p. 13

Post-Accident Signal System Examination and Tests

The post-accident inspection found that all signal equipment was secured with no indications of tampering or vandalism. All signal aspects were verified, shunt tests, ground test, and operational tests of the signal system were completed. An accident simulation using testing equipment and local control of the control points was conducted to ensure signal system integrity. The signal aspects of that test were photographed and recorded. No exceptions were taken with the post-accident examination or testing.

Post-accident inspection of the switch located at Milepost S366.9 was completed. There was no damage to the T-21 switch with electric lock. Switch was found to be in the reverse position, with a pad lock in the latch stand and the bayonet in the foot pedal. The derail in conjunction with the switch suffered damage, as the connecting rod was bent, derail broken, and wires from the junction box were pulled out and broken. With exception of the derail there were no defects noted during the examination of the signal system or the associated signal appurtenances.[19]

CSXT Signal Maintenance Records

Railroad maintenance, inspection, and tests records for signal locations for the signal block between S.E. Cayce Yard and the Richland Holdout CP do not reflect any FRA violations nor any connection with this accident. [20]

Temporary Signal Suspension

The CSXT Signal Department routinely performs temporary signal suspensions in conjunction with signal cutovers. A signal cutover is for the purpose of converting existing signal systems to new systems. During a temporary signal suspension the signal system is disabled for purpose of making alterations to the system and perform the testing required by FRA regulations before it can be placed in revenue service.

The FRA regulates signal suspensions through Title 49 Code of Federal Regulations (CFR) Part 235 *"prescribes application for approval to discontinue or materially modify block signal systems, interlockings, traffic control systems, or other similar appliances, devices, methods, or systems, and provides for relief from part 236 of this title."* On April 4, 2011, the FRA granted CSXT a waiver from filing an application, when making modifications to a signal system in relation to the implementation of PTC.[21] This waiver was then extended by the FRA until December 31, 2020.[22] It is important to note that in the FRA's presentation it states *"FRA does not require approval of temporary signal suspensions"* [23] However, CSXT still requested and was granted relief from Title 49 CFR Part 235, for the implementation of PTC.

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[19] National Transportation Safety Board – Signal and Train Control factual report, p. 17
[20] National Transportation Safety Board – Signal and Train Control factual report, p. 18
[21] National Transportation Safety Board - Group C Exhibit 21
[22] National Transportation Safety Board – Group C Exhibit 25
[23] National Transportation Safety Board – Group G Exhibit 28

Temporary Signal Suspension in Cayce, South Carolina

To accomplish Phase 7 of CSXT's implementation of PTC on the Columbia Subdivision between Milepost S363.00 to Milepost S380.00, it filed for a waiver with the FRA. On March 21, 2016, the FRA provided written authorization for CSXT to proceed with the signal system modification, in accordance with the procedures set forth in Docket Number FRA-2010-0160.[24] The temporary signal suspension that was in place on February 3, 2018, began at 7:30 a.m. EST and was in conjunction with modifications made for the implementation of PTC. It was scheduled to be in place for two days with signal personnel on duty for 12 hours on February 3, 2018, leaving the signal system abandoned until the signal personnel was scheduled to return on February 4, 2018, after receiving the proper rest as mandated in the FRA Hours of Service Law.

Proposed Contributing Factors and Recommendations

BRS proposes that:

- CSXT's failure to manage their workforce in order to have signal personnel on-sight throughout the temporary signal suspension, in essence, led to a signal system abandonment. A typical industry practice is to have signal personnel work in two 12-hour shifts in order to provide protection of the signal system 24 hours a day while it is suspended and complete the cutover in an efficient and expedited manner to minimize the safety risks involved with a signal suspension. Moreover, the signal personnel on-site have a replicated image of the CAD system display from the dispatch center, which provides an added layer of safety and a double check. In the instant case, it is likely that signal personnel would have identified the track occupancy light as true track occupancy rather than a false indication provided in the course of testing. The BRS believes that CSXT's failure to have signal personnel on-sight throughout the entire signal suspension was a contributing factor to the accident.

  In response, the BRS strongly supports the FRA's Safety Advisory, which proposed the following:

  1. Ensure sufficient personnel are utilized to continue work until the system is restored.
  2. If train traffic is allowed within the limits during the suspension
     a. Establish smallest possible limits
        i. No more than three control points if possible
     b. Minimize the duration of the signal suspension
        i. No more than 12 hours if possible
     c. Take measures to ensure only through traffic is allowed to operate
        i. Avoid any movements that require the manipulation of switches

[24] National Transportation Safety Board – Group C Exhibit 27

3. If switches are manipulated by hand, establish effective means of verifying that all switches have been returned to the proper position prior to any train traffic. Examples include:

a. Spiking or clamping with lock
b. Signal employee serving as switch tender
c. Require first train through the limits (after switches have been operated) to proceed through the limits at Restricted Speed.[25]

To expand on the FRA's Safety Advisory, the BRS would like to add that all trains proceeding through a signal suspension should proceed at restricted speed and not just the first train through the limits after switches have been operated. The suggested measure of just having the first train travel at restricted speed, would not have prevented the accident at Cayce, South Carolina, as Amtrak P091-03 would not have been operating at restricted speed, able to stop half the distance of the misaligned switch. Having each train travel at restricted speed provides an additional safety precaution to allow trains to come to a stop prior to a misaligned switch or other obstruction that would not be detected when the signal system is suspended. At a minimum, whenever a switch is manipulated within the limits of a signal suspension, FRA should require trains to move at restricted speed until a train has traveled in each direction.

Additionally, a job briefing between the Dispatcher and the Signal Department employee-in-charge should have been conducted to describe what impact the signal work would have on the signal system. Here we have a situation where the signal system, though suspended, was mostly functional as indicated in the CAD screens shots. Had there been a proper job briefing, the dispatcher would have known that he could depend on the indications on his CAD screen, he would have known that the occupied track indications left by CSXT train F777-03 could have indicated that there was a problem and taken appropriate action.

These comments constitute BRS's proposed contributing factors and recommendations. The BRS appreciates the opportunity to participate as a party to this investigation.

Respectfully,

Cory Claypool, BRS – Grand Lodge Representative

Brandon Elvey, BRS – Grand Lodge Representative

[25] National Transportation Safety Board – Group G Exhibit 11