NATIONAL TRANSPORTATION SAFETY BOARD

OFFICE OF RAILROAD, PIPELINE &

HAZARDOUS MATERIALS INVESTIGATIONS

Washington, D.C. 20594

DCA 11 FR 004

REAR END COLLISION OF CSXT Freight Trains
(TRAIN Q19423 with CSXT TRAIN Q61822)

On CSXT Transportation Monroe Subdivision
Mineral Springs, North Carolina

May 24, 2011

OPERATIONS GROUP FACTUAL REPORT

Prepared by: C. Wayne Workman, Operations Group Chairman

Event: CSXT freight train collided with a standing CSXT freight train
Date: May 24, 2011
Company: CSX Transportation (CSXT)
Location: Mineral Springs, North Carolina
Train: Train Q19423 (northbound--striking) with Train Q61822 (northbound–struck)

Operations Group:

C. Wayne Workman, NTSB Group Chairman-National Transportation Board
NTSB, IIC

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CSXT Florence Division Assistant Division Manager

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Brotherhood of Locomotive Engineers & Trainmen

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Accident Summary

Synopsis:

On May 24, 2011, at about 3:35 a.m., eastern daylight time, northbound CSX Transportation Monroe Subdivision train Q19423, struck the rear of northbound CSX Transportation train Q61822, which had stopped at milepost SG 314.0. The accident occurred in Mineral Springs, North Carolina, approximately eight miles south of the CSXT Monroe Yard. The striking train Q19423 consisted of twelve intermodal cars and the struck train Q61822 consisted of nine general merchandise cars. Each train had two crewmembers—a train engineer and train conductor both located at the front of the lead locomotive. The engineer and conductor of the striking train were killed; the conductor

and engineer of the struck train incurred minor injuries. The accident resulted in a fire of the two Q19423 locomotives and also included an equipment fire of the striking train. There were no hazardous materials in either trains consist. Total monetary damages were estimated at about $1.6 million.

CIRCUMSTANCES PRIOR TO THE ACCIDENT

At 01:20 a.m. May 24th, a track light was left on behind the S61623, a northbound train, between Richardson Creek (SF 303.9) and the S/E Marshville (SF 295.4). Due to the track light at this location, the following timeline occurred;

- 01:10 - S61623 went by the S/E of Marshville. The track light was reported to the Engineering Signal Specialist (ESS) in the Florence Division Operations Center by the FC Dispatcher. The ESS instructed the dispatcher to bring one more train through that location to see if the track light would go out on its own.

- 01:24 - Q69621 was given permission by the signal at Richardson Creek (SF 303.9) operating northbound toward the S/E of Marshville (SF 295.4)

- 02:32 - Q69724 (southbound) took siding at Marshville to await the arrival of the Q69621.

- 03:03:50 – Q61623 (northbound) went by the N/E of Waxhaw (SG 318.4)

- 03:07 – A signal maintainer was dispatched by the ESS to the location of the track light giving an ETA of 03:52.

- 03:13:23 – A signal was received in the field at the N/E of Waxhaw for the Q61822

- 03:15:10 – Q61822 (northbound) went by the N/E of Waxhaw (SG 318.4)

- 03:19 - Q69621 went by the S/E of Marshville and the track light did not go out after the train cleared the block between Richardson Creek and the S/E of Marshville

- 03:20:25 – A signal was received in the field at the N/E of Waxhaw for the Q19423

- 03:24:15 – Q61822 stopped at milepost SG 314.0

- 03:26:54 – Q19423 (northbound) went by the N/E of Waxhaw (SG 318.4)

- 03:31:57 – Q61623 went by the S/E of Monroe (SF 306.2). The train pulled to the N/E of Monroe (SF 305.3) to await the arrival of Q69721

- 03:34:53 – Q19423 impacts the rear of Q61822 standing at SG 314.0

- 03:35 – Q69724 was given permission by the signal at the S/E of Marshville moving in a southbound direction toward Richardson Creek

- 03:37:46 – FC Dispatcher receives a call from Q61822 crew informing him that they see fire at the rear of their train

Method of Operation

The Monroe Subdivision method of operation is Automatic Block System (ABS), designated by special instructions. ABS signals convey to trains the occupancy and/or condition of the track ahead of them. Their purpose is to control the movement of trains in territory where the entrance to each block is governed by fixed signals. Under normal conditions train movements are authorized by these signals.

CSXT Operating Rules & Signal Aspect and Indications effective 12:01 a.m. January 1, 2010 and Florence Division timetable and special instructions effective 12:01 a.m. July 1, 2010 govern train operation on the Monroe Subdivision.

CSXT Monroe Subdivision is single track at milepost SG314. Trains are operated in either direction on a single main track by signal indication. Maximum authorized (timetable) speed for freight trains is 60 mph. At the accident location there is a permanent 50 mph speed restriction between MP SG317.1 and SG306.3.

INJURIES

The engineer and conductor of the struck train CSXT Q61822 sustained minor injuries and were transported to Carolina Medical Center. The engineer of the striking train Q19423 as killed in the impact. The conductor was life flighted to Carolina Medical Center, Charlotte, NC where he also died.

Injury Type	Q19423 Train Crew	Q61822 Train Crew
Minor Fatality Critical	0 2 0	2 0 0

DAMAGES

Locomotives	$950,000
Equipment	$623,000
Track	$43,000
Total Damages	$1,613,000

PERSONNEL INFORMATION

Q618-22
Engineer
36 year old Hired – 7/3/2000 10 years 10 months service
Last 6 months averaged 4 O-test (total 8 tests) / No Failures
Last Video Contact – 5/4/11 – May Safety Focus & BNSF Incident
2011 F2F Rules class – 5/4/11
Operational Test done In the last 6 months (Dec 1, 2010 to May 24, 2011)
0 – Authority
0- Banner test
2- Signal test last one 2/11

Conductor
49 year old Hired – 9/4/2005 – 5 years 8 months service
Last 6 months averaged 2 O-test (total 4 tests) / 3 Failures (103-I & GS-14)
Last video Contact – 5/3/11 – May Safety Focus/ Waycross incident
2011 F2F Rules class – 5/3/11
Operational Test done In the last 6 months (Dec 1, 2010 to May 24, 2011)
0 – Authority
0- Banner test
0- Signal test

Q194-23
Engineer
35 year old Hired – 7/3/2000 10 years 10 months service
From January thru May 24th. engineer made 44 trips on the Monroe Subdivision which included 3 deadhead trips.
Last 6 months averaged 4.3 O-test (total 13 tests) / No Failures
Last Video Contact – 5/11/11 – May Safety Focus
2011 F2F Rules class – 3/1/11
Operational Test done In the last 6 months (Dec 1, 2010 to May 24, 2011)
1 – Authority Test last one Jan 2011
1- Banner test last one Feb 2011
3- Signal test last one Jan 2011

Conductor
33 year old Hired – 7/31/2005 5 years 10 months service
Last 6 months averaged 7.5 O-test (total 30 tests) / No Failures
Last Video Contact – 5/11/11 – May Safety Focus
2011 F2F Rules class – 3/1/11
Operational Test done In the last 6 months (Dec 1, 2010 to May 24, 2011)
0 - Authority Test
2 - Banner test last one done April 2011
9 - Signal test last one done April 2011

OPERATING RULES

CSXT operating department employees are governed by CSX Transportation Operating Rules & Signal Aspects and Indications, effective January 1, 2010.
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Applicable Rules
The following rules are germane to this incident:

34. Communication of Signals and other Important Information
Employees must maintain a lookout for signals or conditions along track affecting the movement of their train.

34-A. Required Announcements
1. Within the Locomotive Cab
Employees in the operating cab of an engine must communicate the following information to each other, including the track name or number in multiple-track territory:
a. The name of each signal governing the movement of their train as soon as the signal aspect is clearly visible and again just before passing it.
b. The name of each sign displayed in connection with:
(1) TWC authority,
(2) Yard limits,
(3) Temporary speed restrictions, and
(4) Work forces limits
c. The observance of burning fusees.
2. By Radio
A crewmember in the operating cab of an engine must announce by radio the following conditions or occurrences:
a. The name and location of each block and controlled point signal.
b. Train entry into each TWC authority, from any location.
c. Train departure from each TWC authority, as soon as the authority is reported clear to the train dispatcher.
d. Passenger train arrival and departure at passenger stations.

e. The presence of cars loaded with pulpwood or poles in the train when approaching trains and equipment on adjacent tracks.
f. Train entrance into a passing siding.
g. When stopping, and each fifteen minutes after being stopped, on a main track or passing siding. These announcements must include the train ID, engine number, and direction of travel. In multiple track territory, the track name or number must be included in the announcement. Crewmembers not in the operating cab must acknowledge signal and TWC announcements. If a crewmember fails to acknowledge a communication, the engineer must determine the reason at the next scheduled stop.

225. Movements Requiring Restricted Speed
A signal indication requiring Restricted Speed applies until the leading end of the train reaches the next governing signal. When a signal aspect requiring Restricted Speed is displayed by a signal governing movements into non-signaled territory, it will apply:
1. To the movement of the entire train through turnouts and crossovers, and
2. Until the leading end of the train reaches the end of signaled territory

228. Absent or Imperfectly Displayed Signals
A signal imperfectly displayed must be regarded as the most restrictive indication that can be conveyed by that signal.
Exceptions:
1. If only one indication is possible, this indication will govern.
2. When the arms of a semaphore signal can be seen, they will govern;
3. When one colored light is displayed in the cluster of lights of a color position light signal, it
will mean the same as two lights in the cluster; or
4. When one or more lower units of a color light signal aspect is dark, the aspect will be observed as though the lights that should be displayed were displaying red. This does not apply to Rule C-1290

a. A signal imperfectly displayed must be reported promptly to the train dispatcher. If a fixed signal is absent from the place where it is usually shown, movement must be governed by the most restrictive indication that can be given by that signal. This absence must be reported to the train dispatcher immediately.

Restricted Speed - A speed that will permit stopping within one-half the range of vision, it will also permit stopping short of a train, a car, an obstruction, a stop signal, a derail or an improperly lined switch. It must permit looking out for broken rail. It will not exceed 15 MPH.

CSXT'S Program of Operational Rule Tests and Inspection

Each railroad, under 49CFR—217 Railroad Operating Rules must have a program of operational tests and inspections (efficiency tests). CSXT's formal program is in compliance with the regulation was effective on January 1, 2010. The program provided quotas and testing requirements. Tests were to be spread out and not confined to specific times and days of the month. The tests were to include CSXT and foreign line crews operating over the CSXT property. Testing methods should include visual observation, monitoring live and previously recorded radio and telephone transmission, scrutiny of locomotive event recorder data, and use of radar or other approved wayside speed monitoring devices. Provisions are made for shunt or shunting track barricades.

The Safety Board obtained test records that could be identified as related to stop signal, restricted speed, main track banner test from CSXT for the previous 12 months. Those test records reflect the following,

Stop Signal Tests
- System – total 7132 failures 6
- Florence Division – total 500 failures 0
- Monroe Subdivision – total 62 failures 0

Restricted Speed Tests
- System – total 2641 failures 4
- Florence Division – total 598 failures 2
- Monroe Subdivision – total 99 failures 0

Restricting Signal Tests
- System – total 5823 failures 6
- Florence Division – total 766 failures 2
- Monroe Subdivision – total 111 failures 0

Main Track Banner Tests
Shunting Track
- System – total 3227 failures 12
- Florence Division – total 724 failures 2
- Monroe Subdivision – total 110 failures 0

Dispatcher Involvement
- System – total 1894 failures 6
- Florence Division – total 104 failures 0
- Monroe Subdivision – total 7 failures 0

POST ACCIDENT INVESTIGATION

SIGHT DISTANCE TEST DATA:

On May 26, 2011, the Operations/Human Performance group met to develop and review a protocol for conducting sight distance tests. The group convened after performing a hi-rail trip along with the track and engineering representatives along the accident route from the Northward Absolute signal at Waxhaw, N.C. and the estimated collision point on the Monroe Subdivision milepost SG314.2. The sight distance test began at approximately 4:50 a.m. on May 27, 2011. After detailed job briefing preceded the actual testing, Signal Maintainers were instructed to darken signal SG316.0 while the investigative team boarded the test locomotives at the North end of Waxhaw, N.C. and other group investigators positioned themselves at Collins Road appropriately 1000 feet in advance of signal SG316. 0 to assist in the identifying the first location the dark signal at SG316.0 could be identified. Other investigators positioned themselves at the estimated point of impact with a simulated obstruction device to represent the end of train Q61822 ahead would have been located.

The weather at the time of the start of the tests was overcast and dark with temperatures in the 70's.

CSXT provided two locomotives of the same class (CW40-8) that was operated in the lead of train Q19423 for the tests. An NTSB investigator, and representatives from the FRA, BLET along with the locomotive engineer and train conductor were on the leading locomotive to perform the visual tests described below.

Signal SG 316.0
Time 05:15 a.m.
General concurrence of the ability to observe dark signal SG316.0 - 964 feet
Simulated Obstruction Device at the estimated point of impact
Time 05:35 a.m.

1. Engineer observed the simulated EOT device and reflection on light on the track – 450 feet
2. Conductor observed the reflection of light on the track – 419 feet
3. Conductor observed simulated EOT device – 364 feet.

Positive Train Control

SXT intends to install Positive Train Control on the Monroe Subdivision during one of its later phases of implementation. Positive Train Control implementation would have responded to train movement as follows;
Q194-23 would have had an approach signal at NE Waxhaw (SG 318.4) and a restricted-proceed signal at the Intermediate signal at MP SG 316.1.

Approach Signal, requires a train exceeding 30 MPH to immediately begin a reduction to 30 MPH, as soon as the locomotive passes the approach signal. Restricted Proceed requires a train to operate at restricted speed (i.e. not exceed 15 MPH) and be prepared to stop within one-half the range of vision.

1. At NE Waxhaw, upon receiving an approach signal, the 0194-23 is required by CSX operating rules to begin slowing their train to 30 MPH, and be prepared to stop at the intermediate signal SG 316.1 The PTC Onboard display would have indicated to the engineer that it's next target is the intermediate signal at SG 316.1 for restricted speed (15 MPH). The PTC system does not enforce the approach signal by requiring a reduction to medium speed, but does provide for a "soft target" speed of 30 MPH.

2. Soft Target, in an approach block, once the locomotive engineer reduces the speed of the train to 30 MPH, the PTC on-board will enforce a 30 MPH limit, and warn the engineer when speed increases to 33 MPH and will stop the train if the speed reaches 35 MPH. The system does not enforce until the speed is reduced, so if the engineer maintains a speed above 30 MPH the system will not warn or enforce a stop.

3. At the intermediate signal at SG 316.1, the PTC on-board system would have set an enforceable target speed of restricted speed (15 MPH). Depending on the speed and the on-board brake algorithm's predicted speed, the engineer will receive a warning to slow the train. If the engineer's actions are not sufficient, the onboard system will stop the train.

4. Once past the intermediate signal at SG 316.1, the PTC on-board would enforce restricted speed's upper limit of 15 MPH.

The PTC Onboard system has no way of knowing where the rear end of a train ahead is, and does not enforce Restricted Speed's half the range of vision component, However, the system does enforce the 15 MPH cap on restricted speed. When the speed of the locomotive reaches 18 MPH the Onboard displays a warning prompt to the engineer of the over speed. If the speed reaches 20 MPH the Onboard system would stop the train.

Operations Group - Acknowledgment Signatures

The undersigned designated *Party to the Investigation* representatives attest that the information contained in this report is a factually accurate representation of the information collected during the investigation, to the extent of their best knowledge and contribution in this investigation.

_____ Date_____
C. Wayne Workman, NTSB

_____ Date_____
Bill Setser, CSXT, ADM, Florence Division

_____ Date_____
Joe Corcoran, FRA

_____ Date_____
Kimble Jackson, BLET

_____ Date_____
Jim Herndon, UTU