Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch

Accident Investigation Report
HQ-2013-18

CSX Transportation Intermodal (CSXT)
New York City, NY
July 18, 2013

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.

U.S. Department of Transportation
Federal Railroad Administration

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2013-18

TRAIN SUMMARY

1. Name of Railroad Operating Train #1	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
CSX Transportation Intermodal	CSXT	000118580

GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
Metro North Commuter Railroad Company	MNCW	2013071844

2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident	4. Time of Accident/Incident
	7/18/2013	8:29 PM

5. Type of Accident/Incident
Derailment

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

11. Nearest City/Town	12. Milepost *(to nearest tenth)*	13. State Abbr.	14. County
New York City	9.9	NY	BRONX

15. Temperature (F)	16. Visibility	17. Weather	18. Type of Track
91 °F	Dusk	Clear	Main

19. Track Name/Number	20. FRA Track Class	21. Annual Track Density *(gross tons in millions)*	22. Time Table Direction
2	Freight Trains-40, Passenger Trains-60	10.4	North

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OPERATING TRAIN #1

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
Freight Train	Yes	Q-704-18

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
11 MPH	R	2536		0

6. Type of Territory

Signalization:

Signaled

Method of Operation/Authority for Movement:

Signal Indication

Supplemental/Adjunct Codes:

A, B, 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.)*	USWX638345	13	yes			
(2) Causing *(if mechanical, cause reported)*	0	0		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	2	0	0	0	0	(1) Total in Equipment Consist	24	0	0	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	10	0	0	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
33275	869260

14. Primary Cause Code

T110 - Wide gage (due to defective or missing crossties)

15. Contributing Cause Code

Number of Crew Members

16. Engineers/Operators	17. Firemen	18. Conductors	19. Brakemen
1	0	1	0

Length of Time on Duty

20. Engineer/Operator	21. Conductor
Hrs: 2 Mins: 15	Hrs: 2 Mins: 15

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?	27. Caboose Occupied by Crew?
Yes	Yes	N/A

28. Latitude	29. Longitude
40.875590000	-73.916054000

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CROSSING INFORMATION

Highway User Involved		Rail Equipment Involved
1. Type		5. Equipment
2. Vehicle Speed *(est. mph at impact)*	3. Direction *(geographical)*	6. Position of Car Unit in Train
4. Position of Involved Highway User		7. Circumstance
8a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? N/A		8b. Was there a hazardous materials release by N/A

8c. State here the name and quantity of the hazardous material released, if any.

9. Type of Crossing Warning	10. Signaled Crossing Warning	11. Roadway Conditions
1. Gates 4. Wig wags 7. Crossbucks 10. Flagged by crew 2. Cantilever FLS 5. Hwy. traffic signals 8. Stop signs 11. Other *(spec. in narr.)* 3. Standard FLS 6. Audible 9. Watchman 12. None N/A		N/A

12. Location of Warning	13. Crossing Warning Interconnected with Highway Signals	14. Crossing Illuminated by Street Lights or Special Lights
N/A	N/A	N/A

15. Highway User's Age	16. Highway User's Gender	17. Highway User Went Behind or in Front of Train and Struck or was Struck by Second Train	18. Highway User

19. Driver Passed Standing Highway Vehicle	20. View of Track Obscured by *(primary obstruction)*

Casualties to:	Killed	Injured	21. Driver was	22. Was Driver in the Vehicle?
23. Highway-Rail Crossing Users			24. Highway Vehicle Property Damage *(est. dollar damage)*	25. Total Number of Vehicle Occupants *(including driver)*

26. Locomotive Auxiliary Lights?	27. Locomotive Auxiliary Lights Operational?
Yes	Yes
28. Locomotive Headlight Illuminated?	29. Locomotive Audible Warning Sounded?
Yes	Yes

10. Signaled Crossing Warning

1 - Provided minimum 20-second warning
2 - Alleged warning time greater than 60 seconds
3 - Alleged warning time less than 20 seconds
4 - Alleged no warning
5 - Confirmed warning time greater than 60 seconds
6 - Confirmed warning time less than 20 seconds
7 - Confirmed no warning
N/A - N/A

Explanation Code

A - Insulated rail vehicle
B - Storm/lightning damage
C - Vandalism
D - No power/batteries dead
E - Devices down for repair
F - Devices out of service
G - Warning time greater than 60 seconds attributed to accident-involved train stopping short of the crossing, but within track circuit limits, while warning devices remain continuously active with no other in-motion train present
H - Warning time greater than 60 seconds attributed to track circuit failure (e.g., insulated rail joint or rail bonding failure, track or ballast fouled)
J - Warning time greater than 60 seconds attributed to other train/equipment within track circuit limits
K - Warning time less than 20 seconds attributed to signals timing out before train's arrival at the crossing/ island circuit
L - Warning time less than 20 seconds attributed to train operating counter to track circuit design direction
M - Warning time less than 20 seconds attributed to train speed in excess of track circuit's design speed
N - Warning time less than 20 seconds attributed to signal system's failure to detect train approach
O - Warning time less than 20 seconds attributed to violation of special train operating instructions
P - No warning attributed to signal systems failure to detect the train
R - Other cause(s). Explain in Narrative Description

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SYNOPSIS

Northbound CSX Freight Train Q704-18 operating on trackage rights over Metro-North Railroad (MNCW) derailed at 8:29 p.m., EDT, on July 18, 2013, at Milepost 9.9 on Metro-North's Hudson Line in the Bronx, New York. Ten cars of the 24-car train derailed. The entire train consisted of modified 89-foot intermodal flat cars, each loaded with four 20-foot containers of garbage waste. There was no hazardous material involved, and there was no evacuation of nearby residences or businesses. There was $869,260 in damage to the track, signal, and third rail structures and $33,275 in damages to equipment. There were no injuries to the train crew or the general public.

At the time of the accident, it was dusk and the temperature was reported as 91degrees F and clear with no precipitation. The daytime-high was above 90 degrees F each of the 3 days preceding the derailment.

The probable cause of the derailment was wide gage caused by the outward rail cant of the high (east) rail under increased dynamic wheel-rail loads due to a combination of excessive rail roll from abrasive deterioration of the concrete ties rail seat area, defective rail fastener insulators, excessive tie bending of cracked concrete crossties, and combined gage and profile deviations resulting from fouled ballast failing to properly support the track structure. The track structure on Track 2 at MP 9.9 on MNCW's Hudson Line was approaching the allowable limits of gage and profile for the class of track operated, a condition caused by the defective crossties and the improper fit of the rail fasteners exacerbated by the high ambient temperatures. The static condition of the track was further degraded by the dynamic forces of the moving train, which were higher than normal at the POD due to poor ride quality induced by the profile deviations present in the track structure due to fouled ballast.

NARRATIVE

Circumstances Prior to the Accident

The crew of CSX Transportation (CSX) Train Q704-18 consisted of a locomotive engineer, a conductor, a student engineer, and a conductor trainee. The regularly assigned Engineer and Conductor were operating the train with the Trainees observing. The crew reported for duty at 6:30 p.m., EDT, at CSX's Oak Point Terminal, the Bronx, New York, which is their home terminal. The crew members had received more than the statutory off-duty rest period prior to reporting for duty.

Train Q704-18 originated at the Oak Point Terminal, in the Bronx, and was scheduled to travel to its final destination of Waverly, Virginia. The train departed Oak Point Terminal with two locomotives and five cars at 6:30 p.m., and made one stop at the Waste Management Facility in Brooklyn, New York, where the crew picked up 19 additional cars. During the investigation, Federal Railroad Administration (FRA) inspectors discovered that the crew of Train Q704-18 failed to perform the required class III brake test on the train after picking up the additional 19 cars.

In the area of the accident, Metro-North's (MNCW) Hudson Line consists of two main tracks. The tracks are numbered from east to west Number 1 and Number 2. South of CP-8, the Hudson Line consists of three main tracks with the additional track designated as Main Track Number 4. Mileposts on the Hudson Line increase in a northward direction starting at Milepost (MP) 0.0 at Grand Central Terminal in New York City.

Both the railroad timetable and the geographic direction of the train are north. Timetable direction is used throughout this report.

The section of the Hudson Line where the derailment occurred is under the control of the Rail Traffic Controller (RTC) District C, located at MNCW's Railroad Operations Control Center (OCC) in Grand Central Terminal. Train movements are governed by a computer-aided Centralized Traffic Control System where all movements are authorized and governed by wayside and interlocking signals, cab signals, instructions issued by the RTC, or a combination of the above. Both main tracks in the area of the derailment are signaled for traffic in either direction.

MNCW operates the main tracks at this location as FRA Class 2 with authorized speeds of 25 mph for freight trains and 30mph for passenger trains. MNCW Timetable sets speeds for freight trains of 20 mph between CP-8 (MP 7.1) to CP-10 (MP 9.9), and 15 mph between CP-10 (MP 9.9) and MP 11.5, as designated in MNCW's Railroad Employee Timetable Number 1, effective February 27, 2011. The Bulletin Order in effect on November 18, did not show any temporary speed restrictions in effect between CP-10 and CP-11 on track 2 the day of the derailment.

CSX crews operating on MNCW are governed by MNCW Employee Timetable Number 1 effective February 17, 2011, Metro-North Operating Rules MN-400 effective February 17, 2011, CSX Air Brake and Train Handling Rules effective April 1, 2010, and CSX SafeWay Safety Rules and Company Policies and Programs effective July 1, 2012.

Track Number 2 in the area of the derailment is constructed of a mix of 136-lb RE and 140-lb RE continuous welded rail (CWR) placed on concrete crossties spaced 24 inches on center fastened with Pandrol low shoulder E clips and supported by crushed trap rock ballast.

Approaching the derailment site from the south there are, in succession, a 0.75-mile tangent followed by a 3- to 4-degree compound left hand curve, followed by a short tangent, leading to the spiral of a 7-degree left hand curve where the derailment occurred. There is a short 0.25 percent descending grade approaching the point of derailment.

As the train approached the area of the derailment, the Locomotive Engineer was seated at the controls on the east side of the leading locomotive with the Student Engineer seated on the west side of the leading locomotive. The Conductor and Conductor Trainee were seated in the cab of the trailing locomotive.

Train Q704-18 entered MNCW territory at CP-8 (MP 7.1) coming off the single-track CSX Oak Point Link line entering MNCW main Track Number 4. As the train approached CP-10 (MP 9.9), the Engineer slowed his train preparing to stop at the CP-10 northward home signal on Track Number 4 which displayed a stop indication. The Engineer stated that he slowed his train to 2 mph using dynamic brake. When the signal changed to a more favorable indication he released the dynamic brake and opened the throttle as the train traversed the turnout connecting Track Number 4 to Track Number 2 at CP-10. The event recorder shows the train accelerated to a recorded speed of 19 mph.

The Accident

The Engineer was very familiar with this run and anticipated he would be held for northbound MNCW local Train Number 781 and he was prepared to stop at CP-10. As he approached CP-10 he heard over the radio that the Conductor on Train Number 781 had been bitten by a dog and was instructed to hold his train and wait for police at Marble Hill Station, MP 9.8. The Engineer of Train Q704-18 was traveling at a recorded speed of 2 mph when he received a signal to proceed at CP-8 ahead of Train Number 781. He proceeded through the turnout from Track Number 4 to Track Number 2 passing Train Number 781 stopped on Track Number 1 at the station. The Engineer intended to operate his train by increasing the speed gradually to 15 mph, idle off, and then coast through the rock cut at MP 10.2 and slowly apply throttle again as the train slowed due to the resistance of the curves. The event recorder showed Train Q704-18 accelerated to 19 mph, as it approached the derailment area, and was moving at 11 mph when the derailment occurred.

While MNCW Train Number 781 was stopped at the north end of the Marble Hill Station platform, the Engineer of Train Number 781 was seated at the controls on the east side of the cab in the lead EMU cab car and gave Train Q704-18 a roll by inspection as it passed him. As the end of Train Q704-18 was approximately six car-lengths ahead of his cab, the Engineer of Train Number 781 observed sparks coming from the wheels on the west side of the middle of Train Q704-18. He radioed Train Q704-18 and told him he was dragging something or that his train may be derailed.

When Train Q704-18 received this message, the Engineer proceeded to apply a full service brake application. He reduced his brake pipe approximately 12 psi when an emergency brake application occurred. Car 11 derailed with the west wheel of the lead axle dropping in the gage of the west rail at MP 9.99 (72 feet and 10 ¼ inches north of the CP 10 southward home signal). As the train continued forward, the other wheels of the car traversed the area without derailing. A car length later, additional wheels dropped into the gauge and derailed due to the high rail of the curve rolling outward. As the trailing cars derailed they shifted to the right of track center. The trailing truck of Car 11 and the lead truck of Car 12 broke free and Cars 12 and 13 uncoupled. Car 12 rolled 45 degrees to the east and three of its four containers fell off on to Track Number 1, shunting the signal circuit. Train Q704-18 traversed a total of 1,050 feet before coming to rest with Cars 11 and 12 leaning to the east in the foul of adjacent track main Track Number 1. Other than Car 12, all of the cars that derailed remained upright. The last four cars of the train did not derail.

When the train came to rest, the lead locomotive was adjacent to the Spuyten Duyvil Station platform. The Engineer initiated an emergency broadcast, "Emergency - Emergency - Emergency." The Conductor and Conductor Trainee exited the cab and proceeded to walk the train and reported the derailment to the RTC.

Analysis and Conclusions

Analysis: Toxicological Testing: There were no toxicological tests performed on the train crew as none was required.

Conclusion: There was no indication that intoxication was a factor in this derailment.

Analysis: Fatigue: FRA obtained fatigue-related information, including a 10-day work history, for the Locomotive Engineer and Conductor of Train Q704-18. FRA was unable to obtain sleep information from the crew so the default software settings were used.

Conclusion: FRA concluded that fatigue was not probable for the crew of Train Q704-18.

Analysis - Locomotive Engineer and Conductor Operating Performance: The lead locomotive was equipped with a speed indicator and event recorder as required by Federal regulations. The event recorder was downloaded and analyzed by a CSX Trainmaster. No exceptions were taken on the actions of the crew.

Conclusion: CSX Train Q704-18 was being operated in compliance with all applicable railroad operating rules and Federal regulations.

Analysis - Equipment and Lading

Equipment: Locomotive Inspection: Lead Locomotive CSXT 8833 and trailing locomotive CSXT 8846 were inspected for mechanical defects and evidence of derailment at CSX's Croton West Yard. Motive Power and Equipment (MP&E) inspectors took no exceptions to any defects on the equipment except for item Number 24 (meter 368-day) on Form F6180-49a which was not signed and dated for being inspected. This defect was immediately corrected after the office copy was examined and found to have the proper certification.

Equipment: Freight Cars: The cars involved in the derailment were initially inspected by FRA and railroad MP&E inspectors for mechanical defects and evidence of derailment and no exceptions were taken. The four containers on the car were inspected for structural integrity and locking devices were inspected for securement and no defects were noted.

Equipment: Freight Cars: Six cars from Train Q704-18, including the three cars ahead of the derailed cars, and the first three derailed cars, were selected for further tear down and analysis. This inspection was completed at CSX's Selkirk, New York, car shops on August 6, 2013. The car's trucks were removed and disassembled to determine if any conditions existed that could have caused or contributed to the derailment. All components were found to be free of any defects and no exceptions were taken.

Equipment: Lading: The containers from the flat cars involved in the derailment were inspected for proper loading and weight distribution by FRA and railroad MP&E inspectors. The investigation revealed that all of the containers inspected were loaded properly within acceptable weight limits as required.

Conclusion:

There were no defects noted on the locomotives, equipment, or lading of Train Q-704-18 and mechanical failure was not a probable cause of this derailment.

Analysis: Signal Systems and Traffic Control - The investigation revealed that all wayside and control center equipment for controlling train movements on MNCW's Hudson Line was inspected and found to be operating as intended.

Conclusion:

The Signal and Train Control Systems operated as intended and were not a probable factor in this derailment

Analysis -Weekly FRA Required Track Inspection: FRA's investigation revealed that the Hudson Line was inspected by a qualified track inspector within the frequency as required by Title 49 Code of Federal Regulations (CFR) Part 213. No defects were noted on Track Number 2 in the vicinity of MP 9.9 during review of the last railroad inspection and repair report.

Conclusion:
MNCW's Hudson Line was inspected in compliance with all applicable Federal regulations

Analysis - Internal Rail Testing: FRA reviewed MNCW's records of internal rail testing of the Hudson Line in the area of the derailment. The inspection revealed that the last test for internal rail defects was conducted on April 29, 2013, by Sperry Rail Services utilizing Car Number 129. There were no internal rail defects detected during the inspection. The review also found that MNCW met the requirements of 49 CFR Part 213 for internal rail testing.

Conclusion:

MNCW was in compliance with internal rail testing requirements.

Analysis - Automatic Track Inspection Program (ATIP) Geometry Car Testing MNCW ATIP Geometry Car: The investigation revealed that MNCW had contracted with Engineering Services to conduct an automated track geometry inspection through the derailment area on October 17 and 18, 2012 and April 23 and 24, 2013. A review of the test data disclosed the widest gage recorded during the October 17, 2012, inspection was 57.598 inches at MP 9.9 for a length of 18 feet. An inspection of the same area conducted on the following day (October 18, 2012) found no exceptions to the gage. The inspection of April 23, 2013, found no exceptions to the gage. The inspection of the following day, April 24, 2013, disclosed a gage of 57.708 inches for 116 feet at the same location.

FRA ATIP Geometry Car: The investigation revealed that FRA conducted tests of both main tracks in the area of the derailment with the DOTX 220 on June 4 and 6, 2013. A review of FRA test data disclosed no exceptions to the track geometry on Track Number 2 in the vicinity of the derailment at MP 9.9. Review of the data revealed that there was a profile measurement of 2 inches in both rail and a gage measurement of 57 5/8 inches in the derailment area at MP 9.9 on Track Number 2. The maximum allowable deviation for profile is 2 ¾ inches in Class 2 track and the maximum allowable gage for Class 2 track is 57 ¾ inches.

Conclusion -

Review of the ATIP data from testing conducted by Engineering Services and FRA disclosed gage and profile deviations in the area of the derailment that were at or near the limits for Class 2 track. Rail traffic over these areas had continued without any record of corrective action probably resulting in continued degradation of both the profile of both rails and the gage of Track Number 2 in the vicinity of MP 9.9.

Analysis - Track Structure: MNCW's Hudson Line in the area of the derailment was constructed of a mix of 136-lb/140-lb RE CWR fastened with elastic fasteners to standard concrete crossties on crushed stone ballast. The crosstie condition were fair to good with a sufficient number in place to generally support the track structure and maintain surface, alignment, line, and gage for the class of track operated. The majority of the ballast section was generally well-drained and of sufficient depth and quality to support the track structure.

However, just south of the point of derailment (POD) there existed a 10-foot long area of fouled ballast, followed by a 12-foot long area of fouled ballast just north of the POD which had allowed the track surface to deteriorate to the point of the 2 inches profile condition found on both rails measured during the ATIP test.

Throughout the vicinity of the POD, it was found that the rail base had slipped under the polymer insulator clips on the field side of both the high and low rails, which added approximately 5/8 inches to the static gage when under load. The investigation further revealed extensive abrasion in the rail seat area of the concrete ties on both the high and low rails, with a 3/8 inches compression groove worn under the field side of the high (east) rail seat. Just south of the POD, two consecutive concrete ties were found to have numerous structural cracks that revealed evidence of center-bound tie conditions, and the concrete crossties at the POD were found to be broken in the vicinity of the rail seat of the high (east) rail.

Conclusion:

The track at MP 9.9 on MNCW's Hudson Line was in a condition approaching the limits of gage and profile for the class of track operated. The rail fastening system was in poor condition, with the additional stress of ambient temperatures above 90 degrees F forcing the base of the rail against the polymer insulators, dislodging them up and out from under the rail clip and increasing the static gage measurement. The fouled ballast just before and after the POD failed to hold the track in proper surface resulting in a profile deviation of at least 2 inches on each rail.

Overall Conclusions

Fatigue analysis was conducted with negative results and was not a factor in the accident. FRA's investigation concluded that except for a failure to conduct a required brake test, the performance of the train crew and the operation of the train was in compliance with all railroad operating rules and Federal regulations. The failure of the crew to complete the brake test had no bearing on the accident. There were no defects noted with the locomotives, equipment, or lading of the train's consist and all were found to be in compliance. Inspection of the signal systems and traffic control revealed that all wayside and control center equipment for controlling train movements was operating as intended and compliant with all regulations. Analysis of track inspection and internal rail testing records showed that inspections and testing were completed as required. Analysis of the data from several tests completed by both a MNCW contract geometry car and a FRA ATIP geometry car, that were conducted in the months prior to the accident, revealed that although no defects under 49 CFR Part 213, the Track Safety Standards, were discovered or verified on each of the inspections trips through the area of the POD, gage and profile deviations in the area of the derailment were at or near the limits for Class 2 track. Analysis of the track structure revealed that although the track

the POD, gage and profile deviations in the area of the derailment were at or near the limits for Class 2 track. Analysis of the track structure revealed that although the track in the vicinity of the POD was in compliance with FRA regulations for the class of track operated, isolated gage, surface, and tie conditions combined to create a wide gage condition under the dynamic loading of the train, causing the accident.

Probable Cause and Contributing Factors

The probable cause of the derailment was wide gage caused by the outward rail cant of the high (east) rail under increased dynamic wheel-rail loads due to a combination of excessive rail roll from abrasive deterioration of the concrete ties rail seat area, defective rail fastener insulators, excessive tie bending of cracked concrete crossties, and combined gage and profile deviations resulting from fouled ballast failing to properly support the track structure. The track structure on Track 2 at MP 9.9 on MNCW's Hudson Line was approaching the allowable limits of gage and profile for the class of track operated, a condition caused by the defective crossties and the improper fit of the rail fasteners exacerbated by the high ambient temperatures. The static condition of the track was further degraded by the dynamic forces of the moving train, which were higher than normal at the POD due to poor ride quality induced by the profile deviations present in the track structure due to fouled ballast.