



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

***Accident Investigation Report
HQ-2017-1237***

***CSX Transportation (CSX)
Union, NJ
December 8, 2017***

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 December 8, 2017, at 2:08 p.m., EST, eastbound CSX Transportation (CSX) mixed freight Train Q40407, consisting of 3 locomotives and 141 cars (66 loads/75 empties), derailed 31 cars at Consolidated Rail Corporation (CRSH) C.P. Townley on track No. 2. The derailment occurred on Conrail's Lehigh Line located in Union, New Jersey, milepost (MP) 14.5. The method of operation in this area is signal indication. Train Q40407 was approximately 8,420 feet, weighed approximately 11,642 tons, and was traveling at a recorded speed of 34 miles per hour (mph) when the derailment occurred. The derailment occurred in three different sections of the train.

The three locomotives - CSXT 4709, CSXT 5433, and CSXT 2787 - did not derail. The first car behind the locomotives derailed the "B" end truck and remained coupled to the third locomotive. The second through fifteenth cars derailed in an accordion pattern and pileup. The second derailment location of the train involved the twenty-eighth car (TILX 649845 "A" end), twenty-ninth car (WCRC 65415 both wheel sets), and thirtieth car (CBTX 736971 "B" end). The third derailment location of the train involved the fifty-seventh through sixty-ninth cars. The cars derailed in an accordion pattern and pileup.

Because the train included hazardous materials residue cars, the Union Fire Department Fire Chief ordered a precautionary evacuation of approximately 150 people in the immediate area. The evacuation lasted approximately 3 hours. There was no release of any hazardous materials as a result of this derailment.

There were no injuries reported by the railroad or the public.

Total estimated damages for equipment is \$1,082,159 and track and structure damage is estimated to be \$930,044. Total damage estimates are \$2,012,203.

The weather at the time of the accident was clear and 36 °F.

The Federal Railroad Administration's investigation and the lab testing results concluded that the probable cause of this derailment was accident cause code T220 - Broken Rail – Transverse/compound fissure.

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 CSX Transportation	1a. Alphabetic Code CSX	1b. Railroad Accident/Incident No. 173334
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GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance Consolidated Rail Corporation	1a. Alphabetic Code CRSH	1b. Railroad Accident/Incident No. 127709
2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident 12/8/2017	4. Time of Accident/Incident 2:08 PM
5. Type of Accident/Incident Derailment		
6. Cars Carrying HAZMAT 25	7. HAZMAT Cars Damaged/Derailed 4	8. Cars Releasing HAZMAT 0
	9. People Evacuated 150	10. Subdivision Lehigh Line
11. Nearest City/Town Union	12. Milepost (to nearest tenth) 14.5	13. State Abbr. NJ
	14. County UNION	
15. Temperature (F) 36 °F	16. Visibility Day	17. Weather Clear
	18. Type of Track Main	
19. Track Name/Number No. 2	20. FRA Track Class Freight Trains-40, Passenger Trains-60	21. Annual Track Density (gross tons in millions) 10
	22. Time Table Direction East	

OPERATING TRAIN #1

1. Type of Equipment Consist: Freight Train					2. Was Equipment Attended? Yes		3. Train Number/Symbol Q40407				
4. Speed (recorded speed, if available) R - Recorded 34.0 MPH E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 11642		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>G</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>		ITFX 93104		4		yes				0	0
(2) Causing <i>(if mechanical, cause reported)</i>								9. Was this consist transporting passengers?		No	
10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)											
11. Cars (Include EMU, DMU, and Cab Car Locomotives.)											
12. Equipment Damage This Consist											
13. Track, Signal, Way & Structure Damage											
14. Primary Cause Code											
15. Contributing Cause Code											
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: 38		Hrs: 8 Mins: 38	
Casualties to:		22. Railroad Employees		23. Train Passengers		24. Others		25. EOT Device?		26. Was EOT Device Properly Armed?	
Fatal		0		0		0		Yes		Yes	
Nonfatal		0		0		0		27. Caboose Occupied by Crew?		N/A	
28. Latitude 40.681343000				29. Longitude -74.242454000							

SKETCHES

Sketch 1st section derailed

*** Not to scale**

CSX Q40407

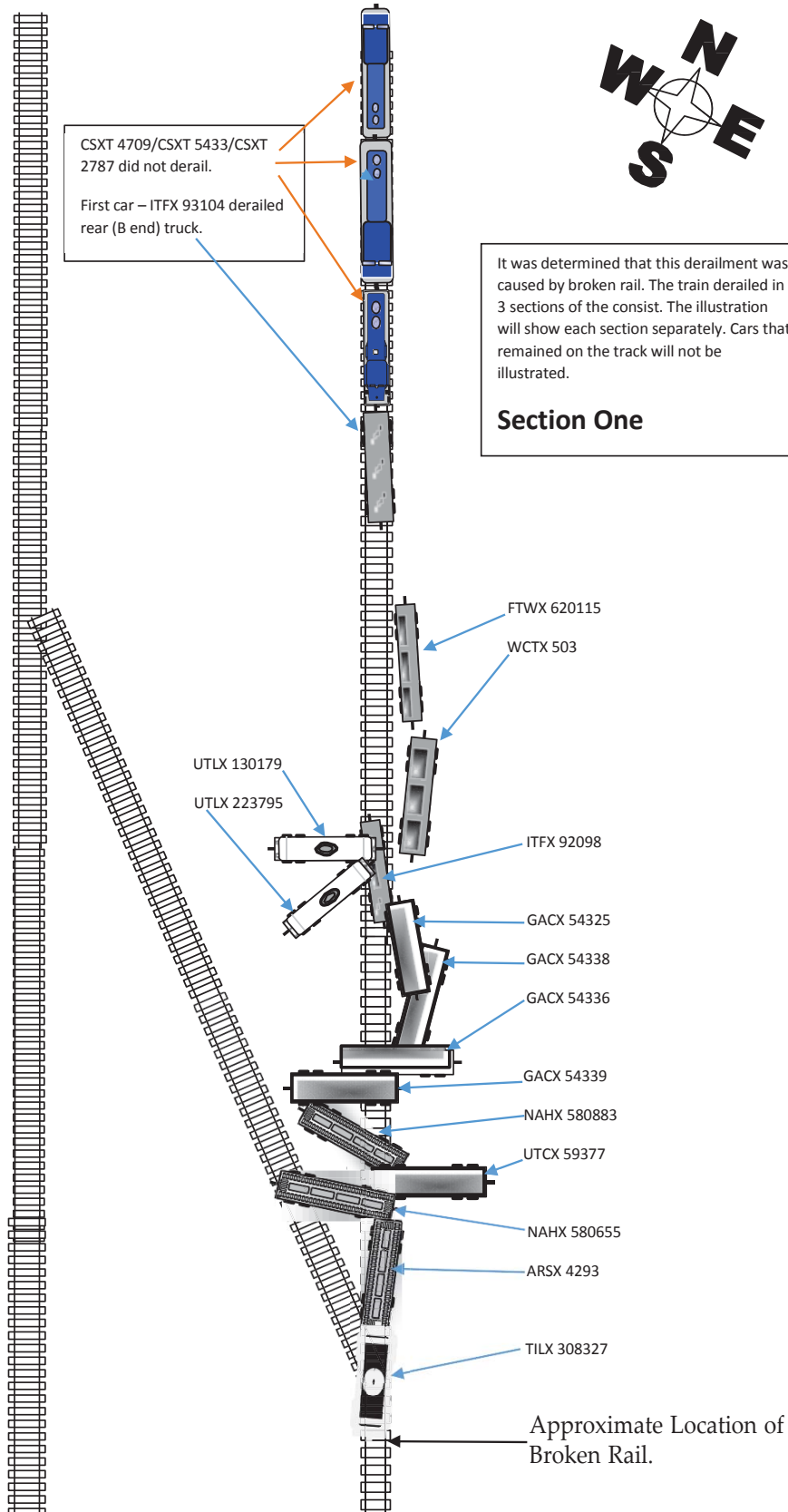
Deraiment 12/8/17

CSXT 4709/CSXT 5433/CSXT 2787 did not derail.
First car – ITFX 93104 derailed rear (B end) truck.



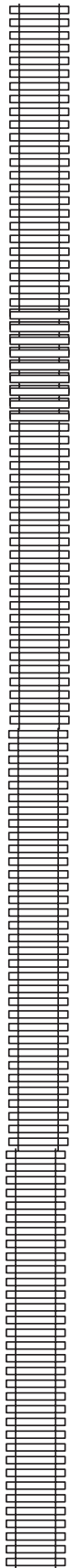
It was determined that this derailment was caused by broken rail. The train derailed in 3 sections of the consist. The illustration will show each section separately. Cars that remained on the track will not be illustrated.

Section One



SKETCHES

Sketch 2nd section derailed

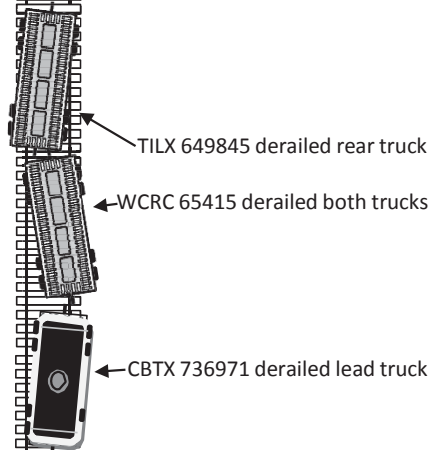


*** Not to scale**

CSX Q40407
Derailment 12/8/17

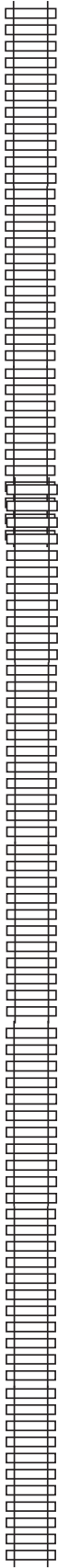
Due to slack action, and other mechanical forces, a 3 car derailment occurred involving the 28th-30th cars in the consist.

Section Two



SKETCHES

Sketch 3rd section derailed



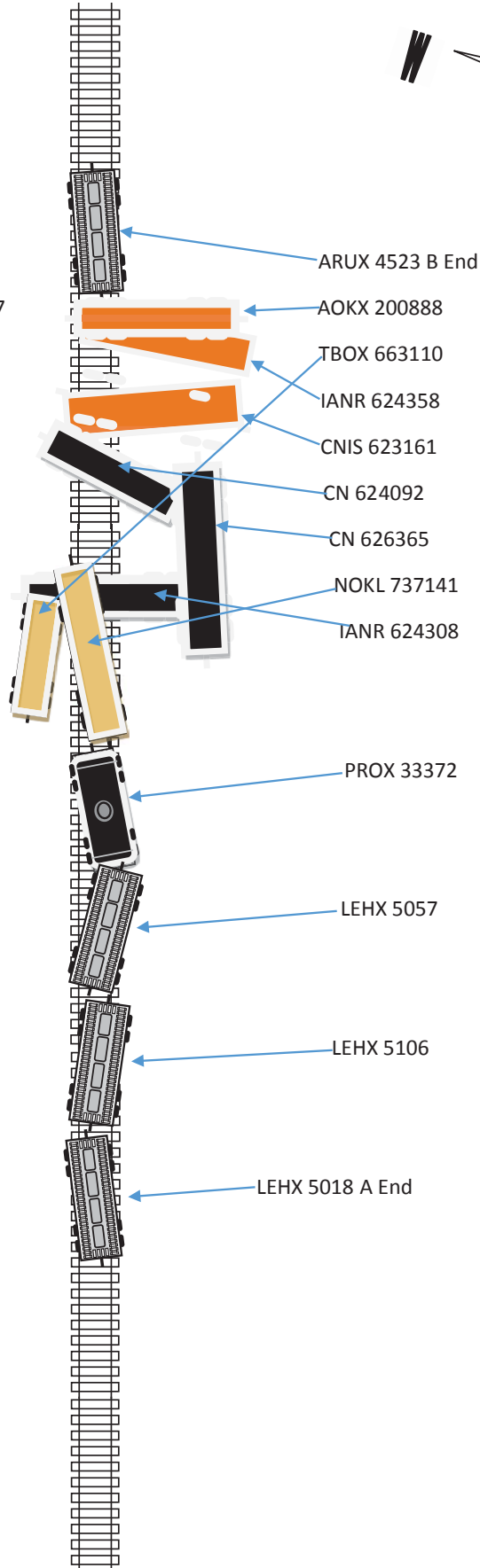
Due to slack action and other mechanical forces, the 57th – 69th cars derailed. The relative light weight of some of the cars (empty lumber cars) contributed to the cars coming to rest in a general pileup in an accordion pattern.

Section 3

*** Not to scale**

CSX Q40407

Deraillment 12/8/17



NARRATIVE

Circumstances Prior to Incident

The crew of CSX Transportation (CSX) Train Q40407 (the train) consisted of an extra board engineer and an extra board conductor. Both crew members went on duty on December 8, 2017, at 5:30 a.m., EST, at Eastside Yard in Philadelphia, Pennsylvania. Both crew members were fully rested and received the statutory time off duty as required by the Federal Railroad Administration (FRA) hours-of-service regulations.

The train was a mixed freight train originated at CSX Locust Point Yard, Baltimore, Maryland, and consisted of 3 locomotives and 75 freight cars. The train received a Class 1 brake test at Locust Point Yard, and was scheduled to move to Conrail Oak Island Yard in Newark, New Jersey. There was an en-route pick-up in Wilmington, Delaware, where the crew picked up an additional 42 cars of mixed freight. A set and release was performed after the pick-up.

After arriving at East Side Yard, Philadelphia, Pennsylvania, the East Side Yard re-crew took the train and picked up an additional pre-tested 24 cars of mixed freight. This brought the total cars count to 141 cars of mixed freight with 11,642 trailing tons. After the pick-up, the crew performed a Class III brake test and continued eastward on the Conrail portion of the Lehigh Line beginning at Port Reading Junction in Manville, New Jersey at milepost (MP) 36.0.

The Lehigh Line is main line double track oriented in an east timetable direction with sporadic sidings at various locations. The tracks are numbered No. 1 and No. 2 from north to south. The Lehigh Line from Port Reading Junction to control point (CP) Aldene at MP 16.9 is solely for freight traffic. Starting at CP Aldene there is both freight and commuter train traffic. Timetable direction will be used throughout this report.

Approaching the derailment area at MP 14.5 in CP Townley, the Engineer was seated at the controls on the south side of locomotive CSXT 4709 and the Conductor was seated on the north side of the locomotive. At this point, the track descends at a 0.70-percent grade on tangent track. On track No. 2, the first switch traversed is the 1B and the second switch 3B approaching the derailment area.

The weather at the time of the accident was clear and 36 °F.

The Accident

The train was traveling eastbound on Lehigh Line Track No. 1 at CP Aldene (MP 16.9), on a medium clear signal. The train traversed the crossover to Lehigh Line Track No. 2 at a recorded speed of 34 mph. The Engineer reported he observed two clear signals at MP 14.9 and CP Townley. During the travel through Townley Interlocking AT mp 14.5, the Engineer and Conductor reported a "rough ride." Following this, the train experienced an undesired emergency brake application at a recorded speed of 34 mph at 2:08 p.m. When the Engineer looked in the mirror on the side of the locomotive cab, he saw that they

were derailed. The Conductor radioed “Emergency, Emergency, Emergency,” and within five minutes the first emergency responders arrived on scene.

When the Conductor walked the train, he discovered it had derailed in three separate sections. The sections of the derailment were comprised of cars from the first car to the fifteenth car, the twenty-eighth car to the thirtieth car, and the fifty-seventh through the sixty-ninth cars. Four hazardous material cars derailed; the fifth car (UTLX 130179 – 2582 - Ferric Chloride, residue), the fifteenth car (TILX 308327 - 1075 Liquefied Petroleum Gases, residue), the thirtieth car (CBTX 736971 – 1268 - Petroleum Distillates, residue), and the sixty-sixth cars (PROX 33372 – 1075 - Propane, residue). The Union Fire Department, Union, New Jersey, responded to the derailment. The Union Fire Chief, upon learning of the hazardous materials cars present, ordered a precautionary evacuation of approximately 150 people in the immediate area. The evacuation lasted approximately three hours.

The event recorder data revealed that the train was traveling at 34 mph, in throttle position 6 at the time of derailment. The maximum authorized speed for this train was 40 mph as designated by the current Conrail (CRSH) timetable.

There were no injuries reported by the railroad or the public. Damage estimates totaled \$1,082,159 for equipment and \$930,044 for track, signal, way, and structures.

Analysis and Conclusions

Analysis – Toxicological Testing: The Engineer and Conductor were tested by CSX under the FRA Reasonable Suspicion Policy. Both crewmembers tested negative for drugs and alcohol. FRA’s investigation concluded that the Engineer and Conductor were not properly tested as per FRA regulations. There was over \$1.5 million in damage and the test should have been performed under Post Accident and not Reasonable Suspicion.

Conclusion: Drugs and alcohol were not factors in this accident.

Analysis – Engineer Performance: The Engineer had 10 years of service as a locomotive engineer. His last recertification was January 5, 2017. The Engineer was returning to work after the minimum statutory time off duty as required by law as indicated by work records and was fully rested for this assignment. The Engineer was currently working the extra board, and began his shift at 5:30 a.m. on December 8, 2017, at Eastside Yard. The Engineer stated that his commute time is about 20 minutes. After meeting with his Conductor and gathering his paperwork and equipment assignment, he and the Conductor held their job briefing. They then waited approximately three hours for the train to arrive. When the equipment arrived, the Engineer performed a daily inspection, checking the locomotives in the consist. The Engineer and Conductor picked up 24 cars from track No. 8 at Eastside Yard, and performed a headend double to their train. After the air test was completed, paperwork picked up, checked and completed, the Conductor boarded the head end. The train departed at 10:30 a.m. The Engineer reported there was nothing unusual nor any problems with locomotives for the train performance up to the point of the derailment.

Conclusion: The Engineer was in compliance with all CSX and FRA rules and regulations and was not a factor in the derailment.

Analysis – Conductor Performance: The Conductor of the train had four years of service as a Conductor, and held a valid conductor certification. The Conductor was returning to work after the minimum statutory time off duty as required by law as indicated by work records and was fully rested for this assignment. He was working the extra board and began his shift at 5:30 a.m. on December 8, 2017, at Eastside Yard.

The Conductor stated that his commute is about 20 minutes. After meeting with his Engineer and gathering the proper paperwork, they waited approximately three hours for their equipment. They performed a headend double and departed at 10:30 a.m. The Conductor reported no unusual occurrences during the trip prior to the accident.

Conclusion: The Conductor was in compliance with all CSX and FRA rules and regulations and was not a factor in the derailment.

Analysis – Mechanical Equipment: A review of all the required paperwork, cab signal inspection, calendar day inspection, and train brake testing was performed. All crews were in compliance with CSX rules and FRA regulations. The event recorder was analyzed and the Engineer operated within CSX rules, bulletin orders, and FRA regulations.

Conclusion: The train's equipment did not contribute to the derailment.

Analysis – Signal and Train Control: The FRA Signal and Train Control inspector completed a review of the Conrail signal wayside event recorder and signal records for CP Townley. The traffic control signal system and interlocking system were found to be operating properly according to design.

Conclusion: The signal system was not a factor to the derailment.

Analysis Track Inspection Records: On December 12, 2017, an FRA Track inspector conducted a review of Conrail's Track Inspection Records. The review covered records of track inspections for the Lehigh Line between January 2017 and December 2017. It revealed that the track leading to the accident site was last inspected on December 7, 2017, by a Conrail-qualified track inspector. The inspection record indicated that the inspector had inspected the Lehigh Line from MP 36.0 to MP 9.0 by hi-rail vehicle. The inspection record also indicates that the inspector had discovered and replaced a missing frog bolt in the 1B switch at CP Townley.

The investigation found Conrail was in compliance with all regulations for the frequency of inspections.

On December 12, 2017, FRA conducted an inspection of Conrail's Monthly Switch Inspection Records for the Lehigh Lines, between CP Roselle Park, CP Townley, and Irvington Industrial Switch, from January 2017 to November 2017. CP Townley was last inspected on November 16, 2017, with no exceptions taken by the Conrail Track Inspector.

The inspections of the Monthly Switch Inspection Records revealed that Conrail was complying with all FRA requirements for monthly inspection of the switches on the Lehigh Line from MP 16.0 and MP 12.7.

FRA reviewed Geometry Car records for the Lehigh Line from February 2, 2017 to October 13, 2017. The records revealed that there were six surveys of the Lehigh Line conducted. CSX conducted one survey of both tracks on February 14, 2017. Norfolk Southern (NS) conducted two surveys of Track No. 2, one on February 23, 2017, and the other on June 15, 2017. NS also conducted a survey of Track No. 1 on August 8, 2017. Conrail contracted with Holland Track Geometry Testing to conduct two surveys. Holland required two days to complete a survey of both tracks. The first half of the first survey was conducted on June 5, 2017, and the second half was conducted on June 8, 2017. The next survey Holland conducted started on October 12, 2017, and concluded on October 13, 2017. The records indicate that Track No. 2 of the Lehigh Line was last tested on October 13, 2017. None of the geometry cars had detected a geometry defect at or near CP Townley on either track.

On December 12, 2017, FRA also inspected the rail inspection records for the Lehigh Line from November 2016 to November 2017. The records indicate that Sperry had conducted six inspections in 2017 and Nordco had conducted four inspections in 2016. Nordco also conducted a walking inspection of the crossovers at Townley on November 2, 2016. Both companies had used various test vehicles for their rail testing.

On June 19, 2017, two 10-percent transverse defective rails were discovered, one at MP 16.81 on Track No.1 and the other at MP 32.21 also on Track No. 1. Conrail placed a speed restriction of 30 mph on both defects when they were discovered. The rail was replaced the next day. On June 22, 2017, a 40 percent defective weld was discovered at MP 18.16 on Track No. 2. The defective rail was replaced immediately.

No defective rails were reported by either company at or near CP Townley.

The rail on Track No. 2 of the Lehigh Line was last ultrasonically tested for internal rail defects on November 27, 2017, by Sperry test vehicle No. 952. The Rail Inspection Records indicate that no internal defects were discovered.

The post-accident analysis of the rail at the point of derailment classified the failure as follows: "The rail failed as a result of a combination fracture initiated at shelling fatigue cracks on the gage side of the running surface." The rail inspection performed just 18 days prior to the derailment did not note any exceptions in the reports for the area of the rail failure. However, the B-Scan review shows that the car received a response in the general vicinity of where the derailment occurred. The operator acknowledged and tagged that area as a surface condition. There is not enough information that would allow matching the exact location of the rail break with the B-Scan tape since not all the rail pieces were matched to determine their specific location in the track.

CSX sent two pieces of rail to TUV Rheinland Industrial Solutions, Inc., located at 100 Industrial Blvd., Aliquippa, PA 15001, for analysis. The Analysis Report was completed by Wolf Railway Consulting LLC, located at 2838 Washington Street, Avondale Estates, GA 30002, signed by Brett Pond, Ph.D., PE, Principal Metallurgist.

Conclusion: FRA determined the rail failed due to a combination fracture initiated at shelling fatigue cracks on the gage side of the running surface.

Overall Conclusion

FRA's investigation determined that a rail fractured due to a transverse defect in the head of the rail when a prior train operated over it. Due to the location of the break in the turnout section of a switch "dead zone," the signal system did not detect the broken rail. There were no other factors from Operating Practices, Motive Power and Equipment, or Track that contributed the derailment. Post-accident drug and alcohol testing, while not in compliance with the FRA regulations, indicated drugs and alcohol did not contribute to the derailment. Fatigue was also not an issue in this derailment.

Probable cause

FRA's investigation concluded that the probable cause of this derailment was accident cause code T220 - Broken Rail – Transverse/compound fissure.