



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

***Accident Investigation Report
HQ-2019-1338***

***CSX Transportation (CSX) Q56027 Derailment
New London, Ohio
May 28, 2019***

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 May 28, 2019 at approximately 5:54 a.m., EDT, CSX Transportation (CSX) mixed freight train Q56027 (Train 1), consisting of 3 head-end locomotives, 116 cars, 89 loaded, 27 empties, 7,487 feet long with 11,234 trailing tons, derailed the leading axle (right and left No. 4 wheels) of locomotive CSXT 6539 at Milepost (MP) QI 43.4, in New London Township, Ohio. Train 1 had been traveling east at a recorded 40 mph on Main Track No. 1 on the Greenwich Subdivision. The train continued to travel more than 6 miles to Control Point (CP) 37 MP QI 37 where the train experienced an emergency brake application and a general pile-up of 2 locomotives and 22 loaded cars near Wellington, Ohio.

No evacuations or stay in place order was initiated. Road closures were set up in the immediate area to facilitate the emergency response. Several derailed refrigerated box cars released diesel fuel from their fuel tanks. One car caught fire. The fire and fuel spills were addressed by first responders. No injuries were reported to crew members or the public.

The accident was not PTC preventable, no hazardous material was released, and the route has no passenger trains.

The railroad reported damages of \$2,236,942, which included \$471,156 in track, signal, way and structure damage and \$1,765,786 in equipment damages.

It was dawn, clear, and the temperature was 60 °F at the time of the derailment.

The Federal Railroad Administration (FRA) investigation determined that the probable cause of the derailment was E51L – Broken or bent axle between wheel seats (Locomotive).

Additionally, FRA identified a contributing factor to be E59L – Other axle and journal bearing defects (Locomotive).

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 CSX Transportation	1a. Alphabetic Code CSX	1b. Railroad Accident/Incident No. HQ-2019-1338
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GENERAL INFORMATION

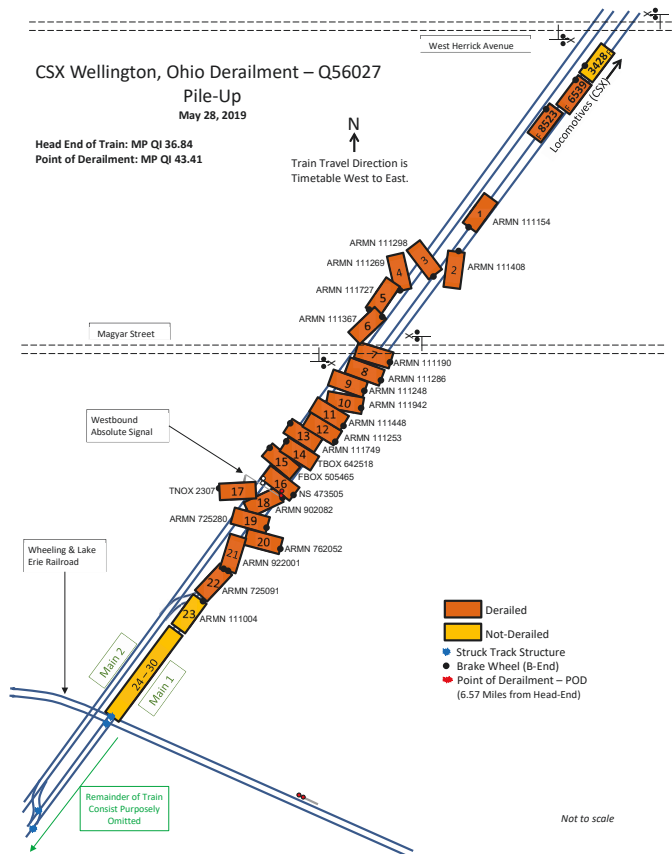
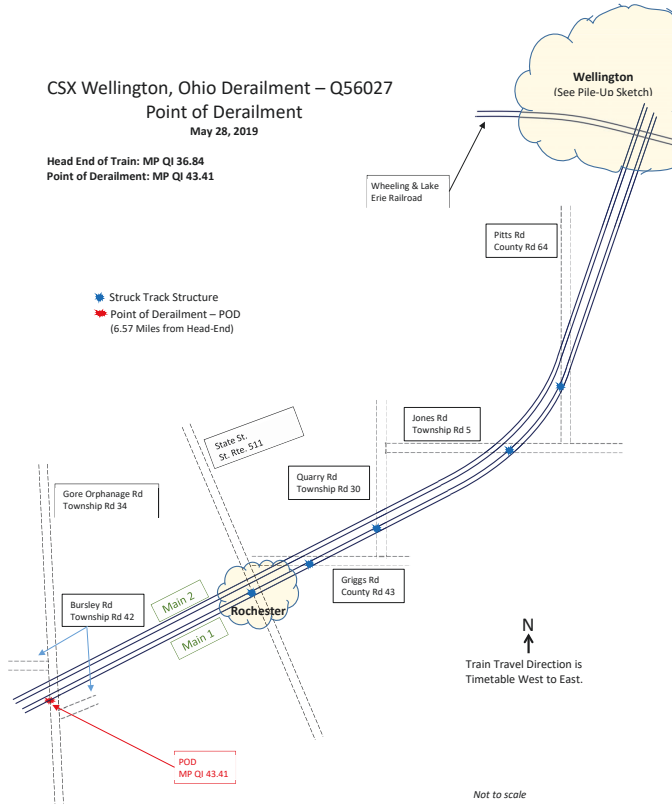
1. Name of Railroad or Other Entity Responsible for Track Maintenance CSX Transportation		1a. Alphabetic Code CSX	1b. Railroad Accident/Incident No. 000183222	
2. U.S. DOT Grade Crossing Identification Number		3. Date of Accident/Incident 5/28/2019	4. Time of Accident/Incident 5:54 AM	
5. Type of Accident/Incident Derailment				
6. Cars Carrying HAZMAT 0	7. HAZMAT Cars Damaged/Derailed 0	8. Cars Releasing HAZMAT 0	9. People Evacuated 0	10. Subdivision CSX TRANSPORTATION - GRI
11. Nearest City/Town New London		12. Milepost (to nearest tenth) Q143.4	13. State Abbr. OH	14. County HURON
15. Temperature (F) 60 °F	16. Visibility Dawn	17. Weather Clear	18. Type of Track Main	
19. Track Name/Number 1 Main		20. FRA Track Class Freight Trains-60, Passenger Trains-80		21. Annual Track Density (gross tons in millions) 108.4
				22. Time Table Direction East
23. PTC Preventable No		24. Primary Cause Code [E51L] Broken or bent axle between w		25. Contributing Cause Code(s) E59L

OPERATING TRAIN #1

1. Type of Equipment Consist: Freight Train					2. Was Equipment Attended? Yes			3. Train Number/Symbol Q56027				
4. Speed (recorded speed, if available) R - Recorded 40.0 MPH E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 11234		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>Q, J</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 (derailed, struck, etc.)		CSXT 6539	2	yes				0	0			
(2) Causing (if mechanical, cause reported)		CSXT 6539	2	yes	9. Was this consist transporting passengers?			No				
10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)	a. Head End	Mid Train		Rear End		11. Cars (Include EMU, DMU, and Cab Car Locomotives.)	Loaded		Empty		e. Caboose	
		b. Manual	c. Remote	d. Manual	e. Remote		a. Freight	b. Pass.	c. Freight	d. Pass.		
		(1) Total in Train	3	0	0		0	0	(1) Total in Equipment Consist	89		0
(2) Total Derailed	2	0	0	0	0	(2) Total Derailed	22	0	0	0	0	
12. Equipment Damage This Consist 1765786			13. Track, Signal, Way & Structure Damage 471156									
Number of Crew Members						Length of Time on Duty						
14. Engineers/Operators 1		15. Firemen 0		16. Conductors 1		17. Brakemen 0		18. Engineer/Operator Hrs: 5 Mins: 39		19. Conductor Hrs: 5 Mins: 39		
Casualties to:		20. Railroad Employees		21. Train Passengers		22. Others		23. EOT Device? Yes		24. Was EOT Device Properly Armed? Yes		
Fatal		0		0		0		25. Caboose Occupied by Crew?		N/A		
Nonfatal		0		0		0						
26. Latitude 41.115208000				27. Longitude -82.329678000								

SKETCHES

Sketch - Sketch



NARRATIVE

Circumstances Prior to the Accident

CSX Transportation (CSX) eastbound mixed freight Train Q56027 (Train 1) originated in Cincinnati, Ohio, on May 27, 2019, and consisted of 3 locomotives and 80 cars of mixed freight, 53 loaded and 27 empty, with various commodities and a destination of Selkirk, New York. Train 1 received a pre-departure mechanical inspection and Class I brake test prior to departing Cincinnati. Enroute, Train 1 picked up an additional 36 cars in North Baltimore, Ohio, and upon departure, had 89 loaded and 27 empty cars, was 7,487 feet in length, and had 11,234 trailing tons.

The crew for Train 1 was comprised of an engineer and conductor, and was called for duty at 12:15 a.m., EDT, on May 28, 2019, in North Baltimore. North Baltimore was the away from home terminal for both crew members, and both had received more than the statutory rest prior to reporting for duty.

The derailment occurred at Milepost (MP) QI 43.4 on the CSX Greenwich Subdivision, near New London Township, Ohio. The Greenwich subdivision operates timetable east, which will be used throughout this report. The track approaching the derailment site is tangent double main track, with a descending 0.26-percent average grade, and a maximum authorized speed of 60 mph. The method of operation is by signal indication of a traffic control system (TCS) with positive train control (PTC) overlay.

Train 1 was operating eastbound, maintaining a recorded speed of 40 mph, with the air brakes released, and the Engineer was using the dynamic brake to control the speed of the train. The Engineer was sitting on the south side, at the controls, of the lead locomotive, and the Conductor was seated on the north side.

It was dawn, clear, and the temperature was 60 °F at the time of the derailment.

The Accident

The crew felt the lead locomotive sway laterally, and observed the lead trucks of the trailing locomotive angled to the left with a great deal of smoke. Train 1 experienced an undesired emergency brake application at 6:04 a.m., EDT, as a result of the trailing locomotives and the head 22 cars derailing.

Of the derailed cars, 18 were refrigerated box cars and several released diesel fuel with at least one catching fire.

Emergency responders from the Wellington Community Fire District and Wellington Police Department were called and arrived on the incident scene. Additional emergency responders from the surrounding community and the Ohio State Highway Patrol also responded.

No evacuations or stay in place order was initiated. Road closures were set up in the immediate area to facilitate the emergency response. Both main tracks were blocked, and train traffic was rerouted or

suspended.

No injuries were reported to crew members or the public. The accident was not PTC preventable, no hazardous material was released, and the route has no passenger trains.

The railroad reported damages of \$2,236,942, which included \$471,156 in track, signal, way and structure damage and \$1,765,786 in equipment damages.

Post-accident/Incident Investigation

On June 28, 2019, the Federal Railroad Administration (FRA) began an investigation of this derailment. FRA investigators inspected the accident site, track, locomotives, and freight cars, and analyzed records, toxicology testing, rules compliance, and fatigue ratings for all train crew members.

The following analysis and conclusions, as well as any possible contributing factors and the probable cause described in this report, represent the findings of FRA's investigation.

Analysis and Conclusions

Analysis - Toxicology Testing: The derailment met the requirements of Title 49 Code of Regulations (CFR) Part 219, Subpart C, and the Engineer and Conductor of Train 1 were tested under that authority. The tests for both employees were negative.

Conclusion: FRA determined drugs and alcohol did not contribute to the cause or severity of the derailment.

Analysis - Fatigue: FRA uses an overall effectiveness rate of 72 or less for 80 percent or more of the time as the baseline for fatigue analysis. This is the level at which the risk of a human factors related accident is calculated to be equal to chance. Below this baseline, fatigue was not considered as probable for an 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 work history, for all train operating employees involved in this accident. Based on the Fatigue Audit InterDyne (FAID) analysis, some crew members involved were at greater risk of fatigue.

FRA concluded that fatigue was probable for the Conductor of Train 1, and the Conductor may have been working at a diminished level of safety (effectiveness) due to mental and/or physical attributes associated with fatigue. Based on an evaluation of the Conductor's performance, FRA concluded the presence of fatigue could not have contributed to the derailment.

Conclusion: FRA determined fatigue did not contribute to the cause or severity of the derailment.

Analysis – Train Operating Performance: The locomotives were equipped with a speed indicator and

event recorder as required by Federal regulations. The relevant event recorder data was downloaded by CSX Road Foreman of Engines and analyzed by FRA and CSX officials.

The Crew of Train 1 was found to be in compliance with all railroad operating rules and Federal regulations.

Conclusion: FRA concluded the operating performance of the crew of Train 1 did not contribute to the cause or severity of this accident.

Analysis – Track: Following the derailment, CSX and FRA reviewed the track leading up to the general pile-up at MP QI 37.

Strike marks were discovered on every highway grade crossing prior to the general pile-up.

The strike mark farthest from the pile-up (first strike mark) was located at Gore Orphanage Road (DOT# 518498J) at MP QI 43.4 in New London, Ohio. FRA determined this location, approximately 7 miles prior to the general pile-up at MP QI 37, to be the Point of Derailment (POD).

The strike marks consisted of noticeable wheel flange gouges of the gage side flangeway timber and asphalt on the south rail. Some of the marks were as much as 6 inches into the gage from the gage side of the railhead. Additionally, prior to the first strike mark, abrasions were on the gage face of the rails leading up to the POD that alternated inconsistently back and forth between the two rails but nothing noted derailed prior to this location. These abrasions can be typically found with excessive truck hunting.

Track measurements were taken of the track leading up to the highway crossing of the first strike mark.

The track was recently surfaced and aligned with very minimum deviations from straight and level.

Calculations determined by engineered design and field measurements allow for a maximum speed of a standard freight train, with a three-inch unbalance, well above the maximum authorized speed of 60 mph for the FRA Track Safety Standards (TSS) Class 4 track.

Main track No. 1 was constructed with 140-pound welded rail that was installed in 1976. The rail fastenings to wood crossties consist of cut spikes and granite ballast with double shouldered tie plates. No breaks or discontinuities were in the rail at the POD.

Measurements taken, and conditions in field, did not indicate defective conditions with crossties, fasteners, or any other track component. Review of CSX track inspection records, disturbance, and geometry reports as well as internal rail tests indicated no prior conditions.

Conclusion: FRA determined the condition of the track did not contribute to the cause or severity of the derailment.

Analysis – Mechanical: Train 1 consisted of 3 head-end locomotives and 116 cars, and no distributed power was assigned to this train at the time of the derailment. A review of all regulatory required

inspection and testing documents of Train 1 conducted by the railroad prior to the accident were reviewed by FRA and no exceptions were taken.

The initial on-site mechanical investigation at the location of the pile-up (CP 37/MP QI 37) found that the first wheelset derailed was the leading wheelset (of traction motor assembly No. 4) of locomotive CSXT 6539 (consist position No. 2). An examination of the wheelset found numerous impacts to the wheels and additional damage to the truck consistent with being derailed for a significant time. Evidence also showed a possible axle failure to the wheelset/traction motor assembly No. 4.

No additional conditions were observed on-site to the derailed rolling stock that were consistent with a possible cause or contributing factor to the accident.

While re-railing locomotive CSXT 6539, the traction motor assembly No. 4 was removed, and the axle was confirmed to have failed/broken. The railroad secured it for additional review and analysis.

Locomotive CSXT 6539 was a four-axle, two truck design, 3000 horsepower, Electro-Motive Diesel model GP 40-3. It was built in 1979 and was equipped with Wabtec Fast Brake type air brake equipment. This locomotive had its last periodic inspection performed on March 26, 2019, at Cumberland, Maryland, as recorded on the Form FRA F 6180.49A (blue card). The previous required 33-day mechanical calendar day inspection was dated May 25, 2019, in Cincinnati, Ohio. The last calendar day inspection recorded was dated May 27, 2019, in Cincinnati, Ohio, and no defects were identified.

Maintenance records indicate that the lubrication levels of all traction motor suspension bearings were last performed in Cincinnati on May 25, 2019, just three days prior to the accident.

On June 3, 2019, at the CSX Locomotive Shop in Huntington, West Virginia, an initial teardown and review of the traction motor assembly was performed.

Representatives from the railroad, FRA and component manufacturers attended. The conditions observed were documented and the components were retained for further review and independent failure analysis.

CSX contracted Engineering Systems, Inc. (ESi) of Omaha, Nebraska, to perform the independent failure analysis.

ESi failure analysis concluded the following:

1. Either the wick became clogged with debris, or debris formed between the wick and axle interrupting the oil path.
2. Lubrication was interrupted between the wick and axle.
3. The overheating caused the wick to be consumed by localized fire.
4. Once operated in an overheated state, the axle failed due to liquid metal embrittlement.

5. The brittle fracture of the axle was caused by the intergranular penetration of the melted bearing, which weakened the axle to the point it could not withstand the stress imposed.

The failure analysis from the axle, conducted by ESI, was reviewed by FRA and its findings appear consistent with observations made in the field by FRA MP&E investigators.

FRA concludes locomotive CSXT 6539 No. 4 traction motor assembly developed a lack of lubrication causing the right-side No. 4 suspension bearing to overheat and fail (Cause code E59L). Continuing to operate in this condition, the axle also overheated and failed, causing the derailment (Cause code E51L).

Conclusion: FRA determined the lack of lubrication contributed to the cause of the derailment, and led to the failure of the suspension bearing, which was the cause of the derailment.

Overall Conclusions: The FRA investigation found no human factor, track, signal or hazardous material issues that were contributing factors to the cause of the derailment.

The FRA investigation found the POD to be located at MP QI 43.4 at the at-grade crossing for Gore Orphanage Road (DOT# 518498J) as well as indications of track structure damage leading to the pile-up at MP QI 37 caused by a derailed wheel. FRA concludes the No. 4 traction motor assembly of locomotive CSXT 6539 experienced an axle failure due to lack of lubrication at MP QI 43.4, in New London, Ohio, at 5:54 a.m., EDT, and derailed. The wheel remained derailed for more than 6 miles until damaging the interlocking at CP 37, and causing the general pile-up.

Probable Cause:

The FRA investigation determined that the probable cause of the derailment was E51L – Broken or bent axle between wheel seats (Locomotive).

Additionally, FRA identified a contributing factor to be E59L – Other axle and journal bearing defects (Locomotive).