Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch

Accident Investigation Report
HQ-2018-1269

CSX Derailment
Alexandria, Virginia
May 19, 2018

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 Saturday, May 19, 2018, at about 7:02 a.m., EDT, CSX Transportation (CSX) southbound freight train X41518 (the train) derailed 31 cars at Milepost (MP) CFP102.9 on the CSX RF&P Subdivision, near Alexandria, Virginia. The train consisted of 3 locomotives, 167 mixed-freight cars, was 9,910 feet long, and had 14,394 trailing tons.

The derailment caused the rail bridge at MP CFP102.8 to collapse, and 22 of the derailed cars to fall onto the Norfolk Southern Railroad (NS) tracks below. None of the derailed cars contained hazardous materials; there was no evacuation because of the derailment; and no injuries were reported. Estimated damage was reported as $895,000 to equipment, and $6,005,760 to track, signal and structure.

The weather at the time of the derailment was 58 ° F, light rain, low clouds, winds 9 mph, and 93 percent humidity, with 7 miles of visibility. Prior to the accident, there was a severe storm warning for this area in effect up to 3:00 a.m. that included heavy rainfall.

The Federal Railroad Administration's (FRA) investigation determined the probable cause was M199 – Other extreme environmental conditions.

Contributing factors to the derailment were T002 – Rain damage to track, and T102 – Cross level of track irregular (not at joints).

U.S. Department of Transportation
Federal Railroad Administration

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2018-1269

TRAIN SUMMARY

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

GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
CSX Transportation	CSX	1

2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident	4. Time of Accident/Incident
	5/19/2018	7:02 AM

5. Type of Accident/Incident
Derailment

6. Cars Carrying HAZMAT	7. HAZMAT Cars Damaged/Derailed	8. Cars Releasing HAZMAT	9. People Evacuated	10. Subdivision
32	0	0	0	RF&P

11. Nearest City/Town	12. Milepost *(to nearest tenth)*	13. State Abbr.	14. County
Alexandria, Va.	CFP102.9	VA	FAIRFAX

15. Temperature (F)	16. Visibility	17. Weather	18. Type of Track
58 ˚F	Dawn	Rain	Main

19. Track Name/Number	20. FRA Track Class	21. Annual Track Density *(gross tons in millions)*	22. Time Table Direction
Main Track No. 1	Freight Trains-60, Passenger Trains-80	45	South

23. PTC Preventable
No

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OPERATING TRAIN #1

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
Freight Train	Yes	X41518

4. Speed (recorded speed, if available) R - Recorded E - Estimated	Code	5. Trailing Tons (gross excluding 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
37.0 MPH	R	14394		0

6. Type of Territory

Signalization:
Signaled

Method of Operation/Authority for Movement:
Signal Indication

Supplemental/Adjunct Codes:
D

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.)*	LEHX 1008	42	yes		0	0
(2) Causing *(if mechanical, cause reported)*	n/a	0	no	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	3	0	0	0	0	(1) Total in Equipment Consist	91	0	76	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	18	0	13	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
895000	6005760

14. Primary Cause Code
M199 - Other extreme environmental conditions (Provide detailed description in narrative)

15. Contributing Cause Code
T102 - Cross level of track irregular (not at joints)

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: 6 Mins: 12	Hrs: 6 Mins: 12

Casualties to:	22. Railroad Employees	23. Train Passengers	24. Others
Fatal	0	0	0
Nonfatal	0	0	0

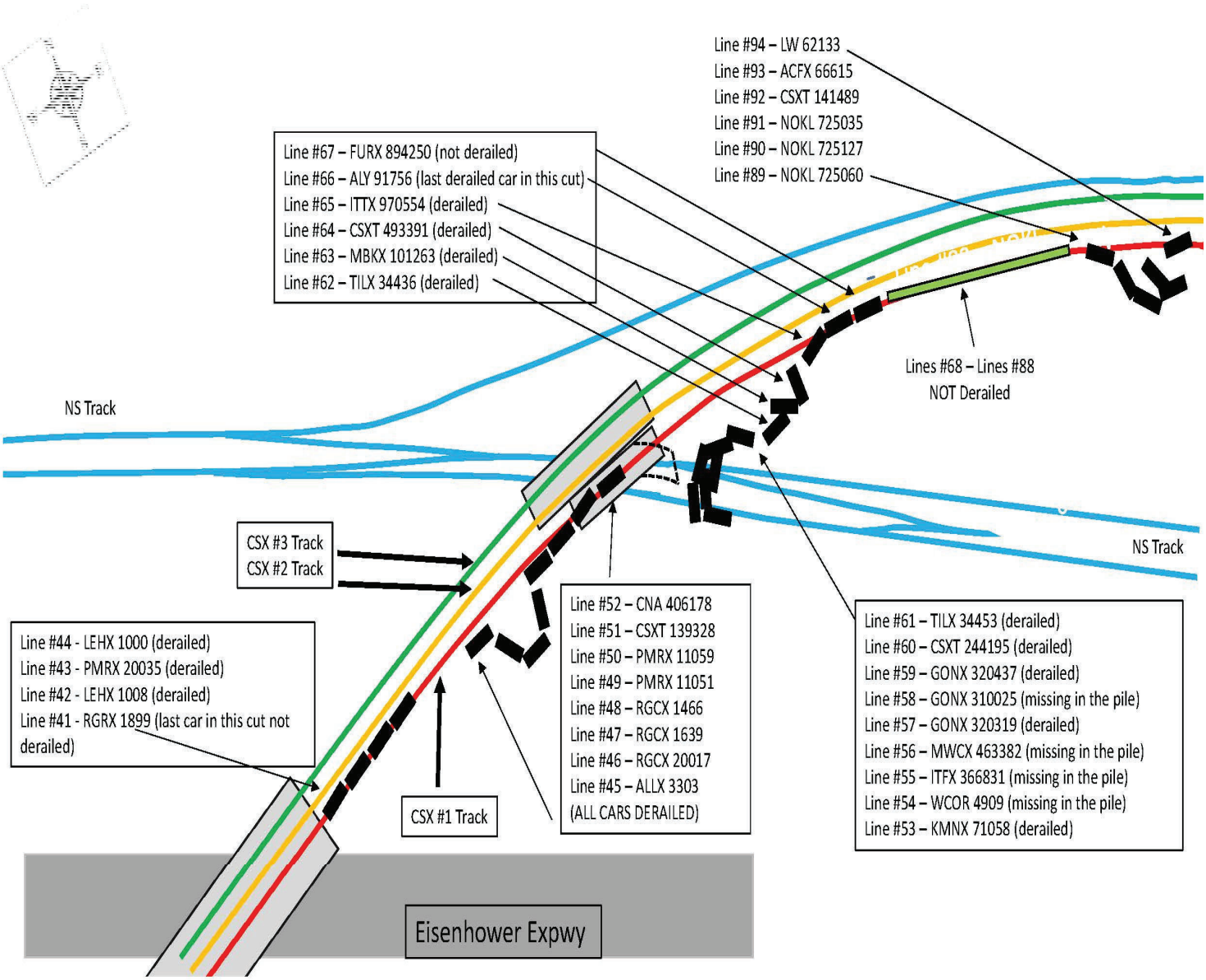
25. EOT Device?	26. Was EOT Device Properly Armed?
Yes	Yes

27. Caboose Occupied by Crew? N/A

28. Latitude	29. Longitude
38.806880000	-77.104620000

SKETCHES

Sketch - Accident Sketch



NARRATIVE

CIRCUMSTANCES PRIOR TO THE ACCIDENT

On Friday, May 18, 2018, CSX Transportation (CSX) southbound freight train X41518 (the train) originated in Cumberland, Maryland, with 183 cars. The train received all the required tests and inspections on May 17, 2018 with no exceptions taken. The train proceeded to Brunswick, Maryland, had 16 cars set off as scheduled, was recrewed, and departed with 3 head-end locomotives, and 167 cars (91 loaded and 76 empty). The train was 9,910 feet in length and had 14,394 trailing tons. The train had an equipment restriction that limited the maximum authorized speed to 50 mph.

At 12:50 a.m., EDT, on Saturday, May 19, 2018, a crew consisting of an engineer and conductor was called for duty at Brunswick to take the train to Richmond, Virginia. Both crew members received more than the statutory rest period prior to being called for duty. Brunswick was the away from home terminal for both employees.

The derailment occurred on the CSX RF&P Subdivision, near Alexandria, Virginia. Through the derailment area, the RF&P Subdivision is comprised of three main tracks that are designated, from east to west, Main Track 1, Main Track 2 and Main Track 3. Beginning at Milepost (MP) CFP103.6, the track curves 0.5-degrees to the right until MP CFP103.4, then is tangent until MP CFP103.2 where it curves 2.0-degrees to the left until MP CFP102.6. There is a 0.80-percent ascending grade beginning at MP CFP103.7, and a bridge that crosses over a Norfolk Southern (NS) yard at MP CFP102.8. The maximum authorized speed is 70 mph for passenger trains and 60 mph for freight trains, as designated by RF&P Subdivision Timetable No. 1, effective September 1, 2017. Time table direction on the RF&P Subdivision is south, and will be used throughout the report.

At approximately 6:59 a.m., EDT, the train passed control point (CP) AF, with the engineer seated on the right (west) side of the lead locomotive (CSXT 5470), and the conductor was on the left (east) side. The recorded speed was 37 mph, with the locomotive throttle in the eighth notch and no brakes applied, when the conductor reported feeling a “soft spot” in the track at MP CFP102.9 at about 7:02 a.m., EDT.

The weather at the time of the derailment was 58 ° F, light rain, low clouds, winds 9 mph, and 93 percent humidity, with 7 miles of visibility. Prior to the accident, there was a severe storm warning for this area in effect up to 3:00 a.m. that included heavy rainfall.

THE ACCIDENT

At about 7:02 a.m., EDT, the train experienced an undesired emergency. The lead locomotive came to a stop at MP CFP102.2. The crew called the dispatcher via radio and informed them that they were in emergency and had cars derailed.

The conductor performed a walking inspection of the train and found 25 cars, lines 42 through 66, had derailed between MP CFP102.5 and CFP102.8, and an additional 6 cars derailed at MP CFP103.2. Additionally, the rail bridge at CFP102.8 collapsed with some of the derailed cars falling onto the Norfolk Southern Railroad (NS) tracks below.
The below table provides additional information regarding the derailed cars:

No. in Train	Initial/Number	Action
42	LEHX 1008	Derailed, upright and in-line
43	PMRX 20035	Derailed, upright and in-line
44	LEHX 1000	Derailed, upright and in-line
45	ALLX 3303	Derailed, general pile-up
46	RGCX 20017	Derailed, general pile-up
47	RGCX 1639	Derailed, general pile-up
48	RGCX 1466	Derailed, general pile-up
49	PMRX 11051	Derailed, general pile-up
50	PMRX 11059	Derailed, general pile-up
51	CSXT 139328	Derailed, general pile-up
52	CNA 406178	Derailed, general pile-up
53	KMNX 71058	Derailed, Fell onto NS tracks
54	WCOR 4909	Derailed, Fell onto NS tracks
55	ITFX 366831	Derailed, Fell onto NS tracks
56	MWCX 463382	Derailed, Fell onto NS tracks
57	GONX 320319	Derailed, Fell onto NS tracks
58	GONX 310025	Derailed, Fell onto NS tracks
59	GONX 320437	Derailed, Fell onto NS tracks
60	CSXT 244195	Derailed, Fell onto NS tracks
61	TILX 34453	Derailed, Fell onto NS tracks
62	TILX 34436	Derailed, Fell onto NS tracks
63	MBKX 101263	Derailed, Fell onto NS tracks
64	CSXT 493391	Derailed, upright and in-line
65	ITTX 970554	Derailed, upright and in-line
66	ALY 91756	Derailed, upright and in-line
89	NOKL 725060	Secondary derailment, general pile-up
90	NOKL 725127	Secondary derailment, general pile-up
91	NOKL 725035	Secondary derailment, general pile-up
92	CSXT 141489	Secondary derailment, general pile-up

93	ACFX 66615	Secondary derailment, general pile-up
94	LW 62133	Secondary derailment, general pile-up

None of the hazardous material cars in the train were derailed. There was no evacuation, and no injuries reported because of the derailment.

Estimated damage was reported as $895,000 to equipment, and $6,005,760 to track, signal and structure.

Emergency first responders were notified, and Alexandria Fire Department was the first on scene at about 7:30 a.m., EDT.

POST-ACCIDENT INVESTIGATION

The Federal Railroad Administration (FRA) performed an investigation to identify the cause of the derailment. FRA investigators analyzed physical evidence, took measurements, reviewed inspection and maintenance records, and performed interviews.

The below analysis and conclusions represent the findings of FRA's investigation.

ANALYSIS AND CONCLUSIONS

Analysis - Federal Post Accident Toxicology Testing: This accident did not meet the criteria for Title 49 Code of Federal Regulations (CFR) part 219, subpart C, *Post Accident Toxicological Testing*, due to the accident being wholly attributed to natural causes.

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 77.5 percent as the baseline for fatigue analysis. At or above this baseline, FRA does not consider fatigue as probable for any employee.

FRA obtained a 10-day work history for the crew of the train. Default software sleep settings and information from the fatigue-related questionnaires was used for each employee. Upon analysis of that information, FRA concluded fatigue was not probable for the crew of the train.

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

Analysis - Train Handling: The locomotives were equipped with event recorders and speed indicators. The event recorder data was downloaded by CSX at the derailment site and reviewed by FRA. The download confirmed the train was traveling 37 mph, in throttle position 8 (T8), when the train experienced a sudden loss of brake pipe pressure that was not initiated by the locomotive engineer. The emergency brake application initiated by the end of train device (EOT) was followed by the engineer responding with

a reduction in throttle and placing the brake controls in the emergency braking position. No exceptions were taken to the engineer's operation of the train before, and response to, the derailment.

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

Analysis – Mechanical: FRA performed an inspection of the equipment involved in the derailment, finding two defective conditions. The brakes of GATX 19841, car 108 and not derailed, failed to release as required. Additionally, the brakes of UTLX 130183, car 118 and not derailed, failed to release as required. FRA determined, based on the type of defect and location of the cars in the train, it is not possible either condition contributed to the derailment.

FRA also closely examined the wheels of the first three cars to derail (positions 42 through 44). All wheels were observed to be within Federal requirements with no visible indications of wheel batter. Several wheels were observed to have small flat spots consistent with an emergency brake application. The additional damage observed was consistent with post-derailment contact with the concrete ties and roadbed.

FRA conducted a review of the derailed cars, truck assemblies and wheel sets that were to be scrapped at the derailment site. All observations of damage were consistent, with conditions that were caused due to the derailment and recovery operations. No exceptions were noted.

The last equipment detector the train traversed over before the accident location was on the Capital Subdivision at Hyattsville, Maryland, MP BAA 33.7. A report was pulled from the detector and no exceptions were taken by CSX or FRA to the entire train as it passed over at approximately 6:06 a.m.

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

Analysis – Track: The curve at MP CFP102.9 is a two-degree right-hand curve with a designed super elevation of 4 inches constructed with concrete crossties in good condition, spaced 24 inches on center (nominal). The rails were fastened to the crossties using elastic fasteners on the gage and field sides of each rail. The rail was 136-pound continuous welded rail (CWR), with a clean, full ballast section.

On May 16, 2018, a CSX qualified track inspector conducted a regular inspection and did not take exception to the condition of the track. There were no FRA defects noted for the area of the derailment. FRA reviewed the CSX track inspection records for the period of March 3, 2018 to May 16, 2018 and found no exceptions to the frequency of inspections.

Sperry Rail Services ultrasonic rail tests for the last test dated January 1, 2018, did not record any rail defects within one mile of the derailment site. No exceptions were taken to this report.

CSX provided track disturbance reports from April 6, 2017 to October 31, 2017 along with a report from

the CSX TGC3 (Track Geometry Car 3). The track disturbance reports showed one instance of out of face surfacing and two occasions of spot surfacing covering Main Track 1 where the derailment occurred. The TGC3 report showed no FRA defects on Main Track 1 at MP CFP102.9. No exceptions were taken to these reports.

FRA performed a post-accident inspection of the track at the derailment site including the tracks over the subgrade fill-failure. There were no exceptions taken to the undisturbed track. At the subgrade fill-failure there was a vertical deflection present on the low-rail in the curve. Investigators determined the failure of the subgrade was due to excessive rain, and the washed-out subgrade caused irregular track conditions.

Track notes and measurements were taken of the area approaching the derailment site and no defective conditions were noted.
The Point of Derailment (PD) was observed to be at MP CFP102.9. Indications of a wheel flange traversing the head of the east rail of Main Track 1 and then dropping into the gage was documented. At this same location, the ballast and subgrade had fallen away (washed out) down the steep embankment to the east side (field side) of Main Track 1. Additional observations near the PD found numerous cars derailed to the east side. The main Track bridge 1 over the NS was severely damaged/partially collapsed with the bridge and derailed cars blocking the NS right-of-way. CSX Main Track 2, adjacent to the accident, sustained minor damage in the form of an alignment deviation caused by the derailed equipment on Main Track 1.

Conclusion: FRA determined the failure of the subgrade was due to excessive rain, and contributed to the cause of the derailment. (T002 – Rain damage to track). Furthermore, the rain damage caused the low rail in the curve at the accident site to have an irregular cross level, which also contributed to the derailment. (T102 – Cross level of track irregular).

Analysis – Weather: Alexandria, Virginia, received a total of 5.99 inches of rain in six days leading up to the derailment. The excessive runoff, and saturated soil, eroded the subgrade supporting the track.

Conclusion: FRA determined the excessive amount of rain led to the subgrade failure and irregular track alignment, and therefore was the probable cause of the derailment. (M199 – Extreme weather conditions).

Analysis – Signal and Train Control: All downloads and signal test records were reviewed. The downloads showed that the signal system was working as intended. The CAD System download showed that the train occupied CP AF at 6:59:13 a.m., EDT. The train then occupied the block south of the CP AF at 7:00:24 a.m., EDT. The block south of CP AF is where the derailment occurred.

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

OVERALL CONCLUSIONS

The derailment occurred at MP CFP102.9 at a subgrade fill failure due to the excessive rain in the area. The point of derailment is 238 feet north of the bridge on Main Track 1 and about 60 feet south of the fill failure. The fill failure was limited to the east (field side) of Main Track 1, causing it to suddenly, and severely, warp under movement.

PROBABLE CAUSE AND CONTRIBUTING FACTORS

The FRA's investigation determined the probable cause was M199 – Other extreme environmental conditions.

Contributing factors to the derailment were T002 – Rain damage to track, and T102 – Cross level of track irregular (not at joints).