Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch

Accident Investigation Report
HQ-2020-1377

CSX Transportation (CSX) Derailment and Fire
Draffin, Kentucky
February 13, 2020

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 February 13, 2020, at 6:46 a.m., EST, a southbound CSX Transportation Company (CSX) loaded ethanol train K42911 (Train 1) derailed when it struck a mudslide at Milepost (MP) CMG 123.8 on the CSX Florence Division, Kingsport Subdivision, in Draffin, Kentucky.

Train 1 consisted of 3 locomotives, all on the head-end, 96 loaded cars and 2 empty cars placed as buffers, one on each end of the train. Train 1 was 6,045 feet long with 13,172 trailing tons. Train 1 was being operated with Trip Optimizer and on a clear signal in rain and fog with approximately five car lengths' visibility when it struck a mudslide at 24 mph. The method of operation is Traffic Control System (TCS) with a maximum authorized speed of 25 mph.

The collision caused the three locomotives, the lead buffer car and four loaded tank cars to derail. The leading end of the lead locomotive ended up in the Russell Fork of the Big Sandy River. All three locomotives caught fire and were heavily damaged. Ninety-six cars were carrying hazardous materials, and two of the loaded tank cars were breached and caught fire.

Approximately 15 local residents were evacuated from seven homes by Pike County Emergency Management officials. At the time of the accident it was 57° F, dark with rain, fog, and calm winds.

There were two non-fatal injuries to railroad personnel. The damages reported by CSX were estimated to be $2,232,901 for equipment and $58,530 for track, totaling $2,291,431.

The Federal Railroad Administration's (FRA) investigation determined the probable cause of the accident was Cause Code M101 -- Snow, ice, mud, gravel, coal, sand, etc., on track and a contributing factor to be M199 -- (several inches of rainfall had occurred in the days leading up to the incident).

Positive Train Control (PTC) was not in use or installed on the Kingsport Subdivision.

U.S. Department of Transportation Federal Railroad Administration	**FRA FACTUAL RAILROAD ACCIDENT REPORT**	FRA File # HQ-2020-1377

TRAIN SUMMARY

1. Name of Railroad Operating Train #1	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
CSX Transportation	CSX	0220FL231

GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
CSX Transportation	CSX	0220FL231

2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident	4. Time of Accident/Incident
	2/13/2020	6:46 AM

5. Type of Accident/Incident
Derailment

6. Cars Carrying HAZMAT	7. HAZMAT Cars Damaged/Derailed	8. Cars Releasing HAZMAT	9. People Evacuated
96	4	2	15

10. Subdivision
CSX TRANSPORTATION - KINGSPORT

11. Nearest City/Town	12. Milepost *(to nearest tenth)*	13. State Abbr.	14. County
Draffin	CMG123.8	KY	PIKE

15. Temperature (F)	16. Visibility	17. Weather	18. Type of Track
57 ˚F	Dark	Fog	Main

19. Track Name/Number	20. FRA Track Class	21. Annual Track Density *(gross tons in millions)*	22. Time Table Direction
Single Main	Freight Trains-25, Passenger Trains-30	7.2	South

23. PTC Preventable	24. Primary Cause Code	25. Contributing Cause Code(s)
No	[M101] Snow, ice, mud, gravel, coal, s	M199

U.S. Department of Transportation
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FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # HQ-2020-1377

OPERATING TRAIN #1

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
Freight Train	Yes	K42911

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
24.0 MPH	R	13172		0

6. Type of Territory

Signalization: Signaled

Method of Operation/Authority for Movement: Signal Indication

Supplemental/Adjunct Codes: 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.)*	CSX 168	1	no		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	96	0	2	0	0
(2) Total Derailed	3	0	0	0	0	(2) Total Derailed	4	0	1	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
2232901	58530

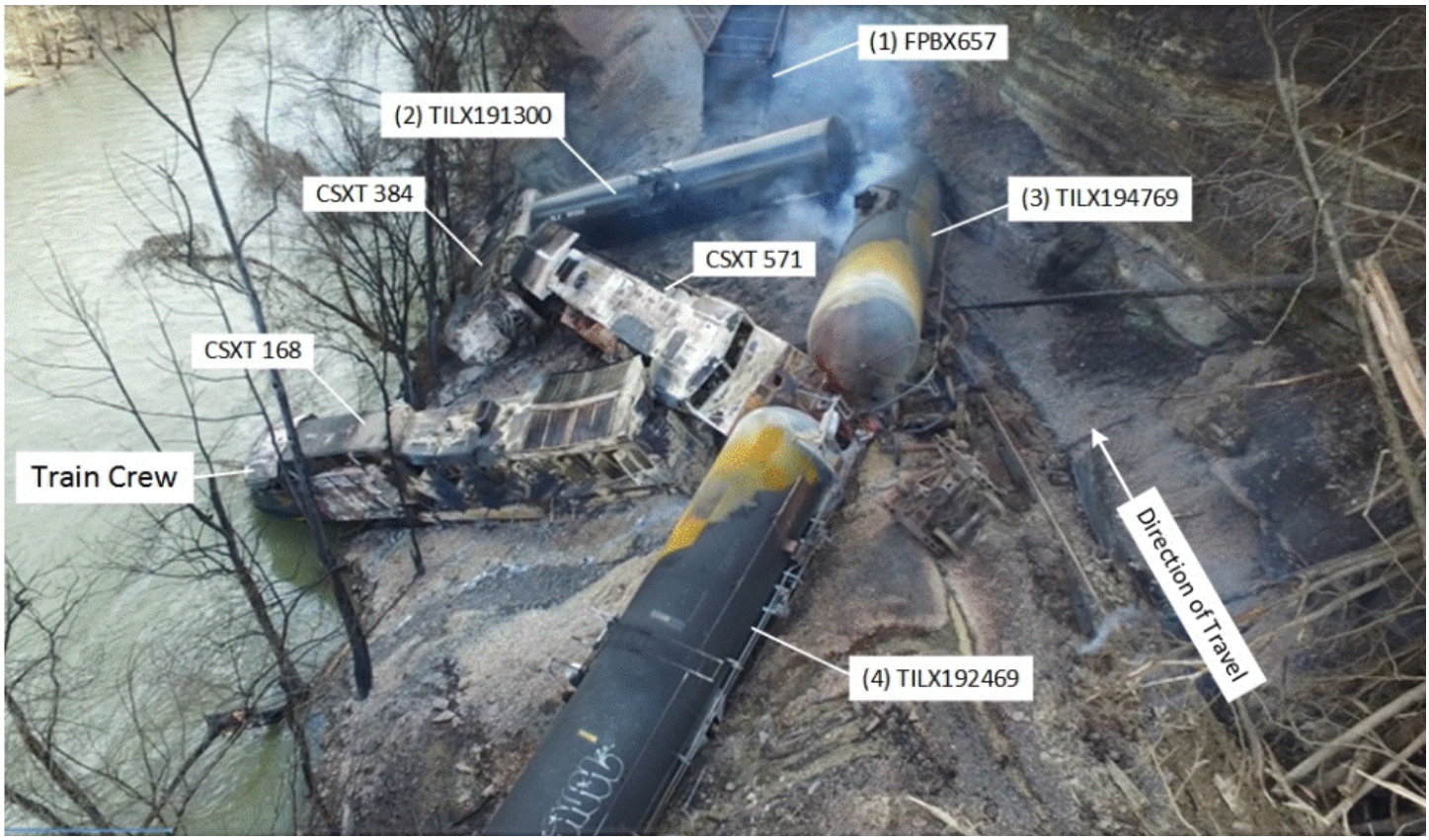
Number of Crew Members				Length of Time on Duty	
14. Engineers/Operators	15. Firemen	16. Conductors	17. Brakemen	18. Engineer/Operator	19. Conductor
1	0	1	0	Hrs: 5 Mins: 56	Hrs: 5 Mins: 56

Casualties to:	20. Railroad Employees	21. Train Passengers	22. Others	23. EOT Device?	24. Was EOT Device Properly Armed?
				Yes	Yes
Fatal	0	0	0	25. Caboose Occupied by Crew?	N/A
Nonfatal	2	0	0		

26. Latitude	27. Longitude
37.338256000	-82.396022000

SKETCHES

Sketch - Diagram



NARRATIVE

Circumstances Prior to the Incident

CSX Transportation (CSX) southbound key train K42911 (Train 1) consisted of 3 locomotives, 96 loaded ethanol cars, and 2 empty buffer cars. Train 1 was approximately 6,045 feet in length, and 13,172 trailing tons. Train 1 was a run-through train that originated in Marcus, Iowa, on February 11, 2020, with a destination of Charlotte, North Carolina. Train 1 had the required regulatory mechanical inspection and initial terminal Class I air brake test performed by Canadian National (CN) mechanical personnel in Marcus. A Class III Brake Test (Trainline Continuity Inspection) was performed by CSX mechanical personnel in Russell, Kentucky.

The crew of Train 1 consisted of a locomotive engineer and a conductor that reported for duty on February 13, 2020 at 12:50 a.m., EST, at the CSX Yard in Kingsport, Tennessee. Kingsport was the home terminal for both employees, and both had received the statutory time off prior to reporting for duty. After reporting for duty, the train crew deadheaded to CSX Shelby Yard in Shelbiana, Kentucky, via Railcrew taxi. The crew took possession of Train 1 which was located on track Main 1 inside yard limits and departed CSX Shelby Yard at 6:10 a.m. The Engineer was seated at the locomotive controls on the right side and the Conductor was seated on the left side of the locomotive cab.

The derailment occurred on the Northeast Region, Kingsport Subdivision in Draffin, Kentucky. The Kingsport Subdivision travels geographically and timetable north and south. The area of the derailment consists of a single main track, with a maximum authorized speed of 25 mph. The method of operation for this subdivision is Traffic Control. Train 1 had CSX Dispatcher's Bulletin with instructions to be on a look out for a slide between Milepost (MP) CMG120.8 to CMG120.9 and the north-end of Marrowbone and the south-end of Marrowbone.

Kingsport Subdivision, which follows alongside the Russel Fork River, has a series of curves as it mirrors the river's course. The last curve at MP CMG 123.7 Train 1 train traversed prior to colliding with the mudslide was a 2-degree, left-hand curve with a designated 1-inch super elevation with a slight ascending grade. At the accident site, there is a 3-degree, left-hand curve with a 0.15-percent ascending grade. A public road crossing with passive warning devices is situated approximately 1,800 feet north of the Point of Derailment (POD) at MP CMG 123.8. South of MP CMG 123.8, the track continues into a left-hand, 4-degree curve for approximately 1,500 feet with a level grade.

At the time of the derailment it was dawn with a temperature of approximately 57° F with rain and fog.

The Accident

Train 1 was operating south on the main track utilizing Trip Optimizer as required by CSX operating rules. Train 1 Engineer stated he complied with the two slide advisories that were on their bulletins about two to three miles prior to the accident. The Engineer disengaged Trip Optimizer to obey the slide

advisories and manually operated the train at 5 mph. When the head-end of the train cleared the limits of the slide advisories, the Engineer re-engaged Trip Optimizer. Train 1 passed through the area defined by bulletins without any issues.

Train 1 continued traveling south towards Kingsport and passed a clear signal at MP CMG 123.4. While traveling at 24 mph in notch 5, the crew observed a mudslide on the track at MP CMG 123.8. Approximately 250 feet before striking the mudslide, the Engineer initiated an emergency train brake application. The fog and rain made the mudslide difficult to see. The mudslide was approximately the same height as the nose of the locomotive and the Engineer tried to get on the floor because he thought the mudslide would come through the windshield. The locomotive moved as if it was going to tip over, but remained upright. The nose of the locomotive came to rest in the Big Sandy River and subsequently water started to enter the locomotive cab. Shortly thereafter, the equipment ignited into flames.

Train 1 Engineer and Conductor were initially trapped on the nose of the lead locomotive between the river and the post-impact fire. Train 1 Engineer toned up the CSX train dispatcher and called 911 to report the accident. They were eventually forced by the fire to exit the locomotive into the water and wade to the river bank with assistance from a CSX Trainmaster. Once on the river bank they waited for a fire department boat to take them to the opposite side of the river for transportation to Pikeville Medical Center. First responders transported both crew members to Pikeville Medical Center with non-life-threatening injuries.

Train 1 derailed the lead three locomotives of CSX 168, CSX 384, and CSX 571 along with the head five cars (1 buffer and 4 loaded tank cars). The three derailed locomotives leaked an estimated 11,318 gallons of fuel and 1,230 gallons of lube oil, much of which was consumed in the post-impact fire with a significant amount also going into the river. Also, 38,480 gallons of Ethanol were burned or spilled in the river.

Fuel, non-hazardous lube oil and Ethanol ignited post-impact and burned for approximately 30 hours. The Director of Emergency Management, Pike County stated that 7 houses were evacuated totaling 15 people. The evacuees were sent to the Elkhorn City Community Center.

The following departments, agencies, and railroad contractors responded to the accident site: Pike County Emergency Management, Pikeville Fire Department, Marrowbone Fire Department, Elkhorn City Fire Department, Millard Fire Department, The office of the Kentucky State Fire Marshall, Pike County Emergency Medical Services (EMS), Pike County Sheriff's Office, CSX Police Department, Elkhorn City Police Department, Kentucky Department of Environmental Protection – Emergency Response Team, Kentucky State Police, R.J. Corman Emergency Services, Hulcher Services, Petitt Environmental, and the Federal Railroad Administration (FRA). The Pike County Emergency Management Chief served as the Incident Commander.

Damages reported by CSX were estimated to be $2,232,901 for equipment and $58,530 for track,

totaling $2,291,431.

On February 21, 2020, the main track was restored back in service at 7 a.m.

Post-Accident / Incident Investigation

FRA reviewed all records, forms, and other documentation necessary to investigate the probable cause of the derailment. The following analysis and conclusions represent the findings of FRA's investigation.

Analysis and Conclusions

Analysis - Event Recorder Downloads: All three locomotives were equipped with speed indicators and event recorders as required by Federal regulations. The event recorders and video recorders on Train 1 were all destroyed by the post-impact fire. All recorders were forwarded to the NTSB laboratory where they were declared a total loss with no recoverable data.

The only information available came through the Trip Optimizer data log.

Analysis -Trip Optimizer Data: FRA reviewed the Trip Optimizer data log and confirmed that there was a successful Trip Optimizer trip initialization and trip end/summary on CSXT 168 on the morning of February 13, 2020. The Trip Optimizer data log showed that from the beginning of the trip to the time of the accident the train traveled 10.09 total miles and 6.5 of those miles were in auto control.

Based on that data log:

- At 06:04 a.m., the locomotive operator accepted the trip data. This would have been where the crew boarded Train 1 and the train departed from (Shelbiana, Kentucky) MP CMG 114.

- At 6:46 a.m., the trip ended near MP CMG 123.8.

The data shows Train 1 was traveling at 24 mph in throttle 5 after passing a clear signal when the mudslide was encountered and an emergency brake application was initiated by the crew.

Conclusion: The Trip Optimizer data indicated Train 1 was in compliance with CSX's operating rules and did not contribute to the cause or severity of the derailment.

Analysis - Crew Interviews: Train 1's Engineer was interviewed by NTSB and FRA. The Engineer's interview was consistent with the Trip Optimizer data and other facts obtained from the investigation.

Train 1's Conductor never made himself available to be interviewed by FRA investigators.

Conclusion: Train 1's Operating Performance did not contribute to the cause or severity of the

derailment.

Analysis - 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.

Neither crew member of Train 1 was tested due to the derailment being wholly attributable to natural causes.

The presence of drugs and alcohol would not have contributed to the mudslide.

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

Analysis – Fatigue: FRA obtained fatigue-related information, including work history, for both train operating employees involved in this accident.

Conclusion: FRA concluded that excessive fatigue most likely did not contribute to the cause or severity of this accident.

Weather - Analysis: There was no mining or human activity observed in the vicinity of the mudslide origination point. Rainfall was recorded for nine straight days preceding the incident with daily totals ranging from a low 0.06 to a high of 1.33 inches of rain. During the recorded timeframe, there was a total of 4.02 inches of rain. The historical average for the area for the month of February was 3.23 inches.

Conclusion: The preceding rainfall was above the historical average for the area this incident took place. FRA believes the excessive rain contributed to the mudslide which caused the derailment. (Cause code M199)

Analysis-Track and Track Structure: FRA obtained track inspection records from CSX from November 2019 to the date of derailment. CSX inspected this segment of track at the frequency requirements of Title 49 CFR Part 213 -- Track Safety Standards. The inclement weather conditions did not require a special inspection of this track segment.

On October 15, 2019, an ultrasonic rail test was conducted on CSX's Kingsport Subdivision. Sperry Rail Service, Inc. (car 948) conducted this inspection. No defects were recorded in the vicinity of the mudslide.

On February 05, 2020, and February 10, 2020, a qualified CSX track inspector conducted a regular track inspection and took no exception to the track conditions in the area.

On February 12, 2020, CSX operated one of its track geometry cars (TGC3) over 151.43 miles of the Kingsport Subdivision that included the area where the derailment occurred on February 13th. The data

from the testing on the 12th did not indicate any track geometry exceptions within the area of the derailment footprint or in the curve on the approach to MP 123.8.

In lieu of taking track field note measurements and due to the complexity of the hazardous materials concerns and excessive coverage of the track structure by the debris from the mudslide, FRA is accepting the track geometry measurement data (measured under load) from CSX's TGC3 of the previous day before the accident.

The point of collision or point of derailment (POC/POD) was identified at a location about midpoint into the expanse of the mudslide. Investigators observed how the depression into the mudslide angled outward away from the bluff area and toward the river side below the track structure. A still image of the area from the fire department video taken about one hour after the event confirms the above description. Due to the unsafe conditions of the active mudslide, a consensus was reached by the investigators that the point of derailment was located at MP 123.8.

Conclusion: FRA determined the track and track structure did not contribute to the cause or severity of the derailment but a mudslide on the track was the cause of the derailment. (Cause code M101)

Analysis – Mechanical: A full mechanical inspection was not possible because some of the equipment was on fire and first responders were allowing time to ensure the derailment site was safe. However, FRA reviewed the most recent wayside detection records, which showed no evidence of any issues or exceptions reported.

A post-accident mechanical inspection was performed on the derailed locomotives and freight cars and did not indicate any mechanical defects that would have been a contributing factor to this accident.

On February 14, 2020, FRA Motive and Power Equipment Inspectors completed a mechanical walking inspection and an FRA Class 1 brake test on all cars that did not derail. Post-accident inspections and tests of the non-derailed cars in the train revealed no exceptions (defects). All cars inspected and tested revealed good integrity of the train air brake system. All brakes applied and released as designed.

In addition, an inspection was performed of the End of Train Device (EOT) for proper calibration, communication and functionality with no exceptions taken.

Conclusion: FRA determined that defective equipment did not contribute to the cause or severity of the accident.

Overall Conclusions

FRA determined that CSX was in full compliance with its own standards and all applicable Federal standards. This derailment was wholly attributable to natural causes which created a mudslide that covered the track on which Train 1 was operating.

Probable Cause and Contributing Factors

FRA determined the probable cause of this derailment to be M101 -- Snow, ice, mud, gravel, coal, sand, etc., on track.

Additionally, FRA determined contributing factors to be M199 -- (several inches of rainfall occurred in the days leading up to the incident).

The derailment occurred on the Kingsport Subdivision, which was not equipped with PTC. Nevertheless, this derailment was not PTC preventable.