



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

***Accident Investigation Report
HQ-2017-1207***

***Norfolk Southern Railway Company (NS)
Pell City, AL
May 19, 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

Eastbound Norfolk Southern Corporation (NS) freight Train 154A1-19 with 6 locomotives (5 on the head-end and one on the rear) and 121 freight cars, derailed 30 cars at NS Milepost 761.6 on the East End Subdivision near Pell City, Alabama, on May 19, 2017, at 5:55 p.m., CDT. There were no reported injuries to the train crew or the public. Train NS 154A1-19 was traveling at a recorded speed of 45 mph when the train experienced an undesired emergency application of the train air brakes. The Conductor walked back to investigate and discovered 30 cars had derailed in a general pile up. Two of the derailed cars released approximately 60 tons of Sodium Chlorate, a Division 5.1 oxidizer. The derailment resulted in a precautionary evacuation of a nearby gas station, with four civilians inside, within 1,000 feet of the derailment at 6:10 p.m. The evacuation was lifted at 8:13 p.m. Hazardous materials contractor HEPCO was brought in to conduct the cleanup of released material.

The method of operation was traffic control system territory with a maximum authorized speed of 60 mph, and a permanent speed restriction of 55 mph beginning at MP 761.6 and extending through the curve. There was track damage of \$592,000 and equipment damage of \$1,140,482. The weather was 92 °F and clear, with 4 mph winds from the south. This derailment was not PCT-preventable. This resulted in the delay of Amtrak Train 19 from Atlanta, Georgia, to Birmingham, Alabama, and Train 20 from Birmingham to Atlanta. Amtrak provided bus service for passengers for each route.

Federal Railroad Administration (FRA) inspectors evaluated all relevant documents, and reviewed locomotive event recorder data. The probable cause is (H503) buffing or slack action excessive, train handling.

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 Norfolk Southern Railway Company	1a. Alphabetic Code NS	1b. Railroad Accident/Incident No. 125135
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GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance Norfolk Southern Railway Company	1a. Alphabetic Code NS	1b. Railroad Accident/Incident No. 125135
2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident 5/19/2017	4. Time of Accident/Incident 5:55 PM
5. Type of Accident/Incident Derailment		
6. Cars Carrying HAZMAT 15	7. HAZMAT Cars Damaged/Derailed 5	8. Cars Releasing HAZMAT 2
	9. People Evacuated 4	10. Subdivision East End
11. Nearest City/Town Pell City	12. Milepost (to nearest tenth) 761.6	13. State Abbr. AL
		14. County ST CLAIR
15. Temperature (F) 92 °F	16. Visibility Dusk	17. Weather Clear
		18. Type of Track Main
19. Track Name/Number Single Main Track	20. FRA Track Class Freight Trains-60, Passenger Trains-80	21. Annual Track Density (gross tons in millions) 30
		22. Time Table Direction East

OPERATING TRAIN #1

1. Type of Equipment Consist: Freight Train					2. Was Equipment Attended? Yes			3. Train Number/Symbol 154A1-19				
4. Speed (recorded speed, if available) R - Recorded 45.0 MPH E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 13207		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</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.)		SHPX 207297		79		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		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	5	0	0	0	1	(1) Total in Equipment Consist	107	0	14	0	0	
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	25	0	5	0	0	
12. Equipment Damage This Consist 1140482			13. Track, Signal, Way & Structure Damage 592000									
14. Primary Cause Code H503 - Buffing or slack action excessive, train handling												
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: 5 Mins: 25		Hrs: 5 Mins: 25		
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 33.595938000				29. Longitude -86.222794000								

SKETCHES

sketch

HQ-2017-1207



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Norfolk Southern (NS)
Train 154A1-19
Pell City, Alabama
May 19, 2017
NS Alabama Division
East End District MP 761.6

NARRATIVE

Circumstances Prior to the Accident

On May 19, 2017, the crew of Norfolk Southern Corporation (NS) freight Train 154A1-19 (the train), departed NS Norris Yard at 4:00 p.m., CDT, in Birmingham, Alabama. The train was a distributed power (DP) train, which consisted of 5 locomotives on the head-end, and a rear distributed power unit (DPU), 107 loads, 14 empties, 13,207 tons, and 6,903 feet. The train received an initial terminal Class I brake test by qualified NS mechanical personnel at Norris Yard, and was scheduled to move to NS Inman Yard, in Atlanta, Georgia.

The crew of the train consisted of an engineer and conductor. Both crew members completed a statutory rest period prior to reporting for duty at 12:30 p.m., CDT. The Engineer was located on the right side of the leading locomotive, and the Conductor was seated on the left side of the locomotive and facing the direction of travel.

When approaching the accident location, the train was traveling on the NS Alabama Division, East End Subdivision. Beginning at milepost (MP) 761.6, and traveling east, the track enters a descending 1.13-percent grade, 1.3-degree left hand curve with 1.5-inch super elevation. The track is made of 132-pound, continuously welded rail. The method of operation was traffic control system (TCS) territory, with a maximum authorized speed of 60 mph, and a permanent speed restriction of 55 mph beginning at MP 761.6 and extending through the curve. Timetable direction for the East End Subdivision is east, and will be used throughout this report.

The crew of the train reported receiving an advanced approach signal at MP 774, but they stopped and waited for a more favorable signal. After receiving a clear signal, the crew proceeded without incident until the derailment.

Weather at the time of the derailment was dusk, with clear skies, 92 °F and winds from the south at 4 mph.

The Accident

The train was continuing east, at a recorded speed of 45 mph, near Pell City, Alabama, when the train crew experienced an undesired emergency application of the train's air brakes at 5:55 p.m. The Engineer made an emergency call over the radio, and the Conductor performed a walking inspection of the train and discovered 30 cars, lines 79 through 108, had derailed in a general pile up at MP 761.6. Of the 30 derailed cars, 5 cars (cars 79, 95, 96, 98, and 99) were placarded as hazardous. Two of the derailed hazardous cars released approximately 60 tons of Sodium Chlorate, a Division 5.1 oxidizer, which prompted the evacuation of a nearby gas station with 4 people inside at 6:10 p.m. The evacuation was ordered by the Pell City Fire Department and Pell City manager, and was lifted at 8:13 p.m., when it was determined to be safe.

A hazardous materials contractor, Pell City Police, and Pell City Fire Department responded to the derailment. As a result of the derailment, in addition to the precautionary evacuation, there was reported equipment damage of \$1,140,482 and track damage of \$592,000. No injuries were reported by the train crew, or the public, however Amtrak Train 19 and Amtrak Train 20 were delayed. Amtrak transported the passengers on these trains by bus.

This derailment was not positive train control (PTC) preventable.

Post-Accident Investigation

Analysis—Post-Accident Toxicological Tests: Post-accident toxicological testing was conducted on both crew members, and the dispatcher. All tests had negative results.

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.

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 a 10-day work history, for the train crew involved in the accident. Based on analysis of the facts reviewed, FRA concluded fatigue was not probable for the Engineer or Conductor.

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

Train Handling Performance Analysis: The locomotive event recorder data from the lead locomotive and DPU of the train were downloaded by NS and analyzed by FRA. The analysis disclosed that the Engineer operated the train within authorized timetable speeds, however, the train was on a descending grade of 1.13 percent, travelling west to east, and the Engineer was not following NS train handling rules regarding DPU operating instructions. The Engineer was operating the DPU locomotive independent of the lead locomotive (fenced). Operating this way, under the circumstances, did not allow for the DPU to adequately balance the buff forces incurred while the lead locomotive was in heavy dynamic braking, and the DPU was not applying any braking force. NS rules require DPU trains to be operated in synchronous mode under normal operations.

Conclusion: FRA determined the Engineer's train handling was likely the determining cause of the derailment.

Analysis—Mechanical Performance: An FRA Motive Power and Equipment (MP&E) Inspector inspected the first five cars to derail that remained upright and were moved to a safe location (SHPX 207297; KCSM 19034; KCSM 19033; RNMX 6226; and KCS 129634). The remaining 25 cars that derailed were in a pile-up condition or had been moved due to wreck clean up. This inspection revealed that SHPX 207297's number 3 and number 4 axles were the first to derail. FRA required NS to position SHPX 207297 and KCSM 19034 on the nearest repair track when safe to do so for further inspection. SHPX 207297 was moved from Lincoln, Alabama, to NS' freight car repair facility at Norris Yard, in Birmingham. The car was inspected by FRA's MP&E inspector on June 20, 2017. During this inspection, the following defective conditions were disclosed. The B-end stub sill was cracked on the BL side of the stub sill 4 inches extending to the rear of the stub sill, where the crack continued another 4 inches across the back of the stub sill, for a total crack length of 8 inches. Title 49 CFR Section 215.121(B2) states that any crack in the center sill 6 inches or more is defective. Further inspection revealed the A-end AL side stub sill cracked 3 ½ inches along the side towards the rear of the stub sill and extending along the back another 2 ½ inches, for a total of 6 inches of left side stub sill crack. Inspection of the A-end AR side revealed a similar crack that extended 3 inches on the side and 2 ½ inches across the back, for a total of 5 ½ inches of right side stub sill crack. The A-end stub sill indicates it is twisted by a ¼-inch raised area

at the AR stub sill side crack area, where the metal is separated and a 1/8-inch rust line of unpainted stub sill exposed at the area where the sill attaches to the tank.

Records inspection of SHPX 207297, built March 2005 and utilized to transport phosphoric acid solution, indicate the last reported bad order date was January 29, 2017, for wheels in Louisville, Kentucky.

Records indicate on February 16, 2017, the number 3 and number 4 wheels were replaced due to high kip readings. A single car brake test was performed with an automatic test device.

On June 27, 2017, an FRA MP&E Inspector inspected KCSM 19034, the second car in the derailment with NS mechanical employees. This car was identified as being the car coupled to the first car to derail (SHPX 207297). During this inspection, it was revealed that the Gibb wear at the L2 and R2 positions was measured at 1 ½ inches on both sides. In accordance with Association of American Railroads (AAR) Standards Rule 46, Table 1, "measurements that reach 1 ½ inches or more require repair to reduce the Gibb wear to ½ inch."

Conclusion: Both freight cars were identified as having defective conditions. These conditions were FRA-condemnable defects and AAR condemnable defects. However, these mechanical conditions were not a factor for this accident.

Analysis—Track Structure: An inspection of the track through the accident area by NS and FRA did not show any defects that would have been present prior to the accident and subsequent derailment.

Conclusion: Track structure was not a factor for this accident.

Analysis—Hazardous Materials Performance: Five of the 30 derailed cars contained hazardous materials or residue hazardous materials. Tank Car SHPX 207297 contained residue, class 8 Phosphoric Acid solution. It was the first car to derail and it remained upright and did not experience a loss of product. Tank Cars DPRX 258584 and UTLX 672306 contained residue, class 3 Benzene. They derailed on their sides and sustained significant damage, but were not breached and did not experience a loss of product.

Covered hopper cars UNPX 12840 and CRDX 18014 were loaded with about 200,000 pounds each of class 5.1 Sodium Chlorate. These two cars derailed on their sides and were breached/destroyed in the derailment and lost their entire contents. Environmental clean-up lasted until June 19, 2017. FRA reviewed the hazardous materials documents in possession of the crew at the time of the derailment.

The documentation was compliant.

Conclusion: Hazardous materials were not a causal factor in the derailment.

Overall Conclusion

FRA determined the Engineer manipulated the DP locomotive to provide continuous tractive effort while the lead locomotives were applying retardation through dynamic braking. This operation caused excessive buff forces that resulted in the subsequent derailment.

Probable Cause

FRA determined the probable cause of this accident was cause code H503 – buffing or slack action excessive, train handling. No contributing factors were identified.