



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

***Accident Investigation Report
HQ-2018-1279***

***Norfolk Southern Railway (NS) Derailment
Eden, Alabama
July 5, 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

Westbound Norfolk Southern Railway (NS) freight train 22QA104 (Train 1) with 3 locomotives and 72 cars (43 loads, 29 empty, 8,631 tons, 10,194 feet in length), derailed 25 cars at Milepost (MP) 765.65 on the Alabama Division's East End District, near Eden, Alabama, on July 5, 2018, at 3:15 a.m., CDT.

The damages were estimated to be \$1,524,153 for equipment and \$573,174 for track, totaling \$2,097,327.

At the time of the derailment, the weather was 72° F, with clear skies and 3 mph winds from the northeast.

The Federal Railroad Administration (FRA) determined the probable cause of this accident is H504 – Buffing or slack action excessive, train makeup.

FRA did not identify any contributing factors

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 Norfolk Southern Railway Company	1a. Alphabetic Code NS	1b. Railroad Accident/Incident No. 130088
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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. 130088
2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident 7/5/2018	4. Time of Accident/Incident 3:15 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 -
11. Nearest City/Town Pell City	12. Milepost (to nearest tenth) 765.6	13. State Abbr. AL
		14. County ST CLAIR
15. Temperature (F) 72 °F	16. Visibility Dark	17. Weather Clear
		18. Type of Track Main
19. Track Name/Number Main	20. FRA Track Class Freight Trains-60, Passenger Trains-80	21. Annual Track Density (gross tons in millions) 29.7
		22. Time Table Direction West
23. PTC Preventable No	24. Primary Cause Code [H504] Buffing or slack action excessi	25. Contributing Cause Code(s)

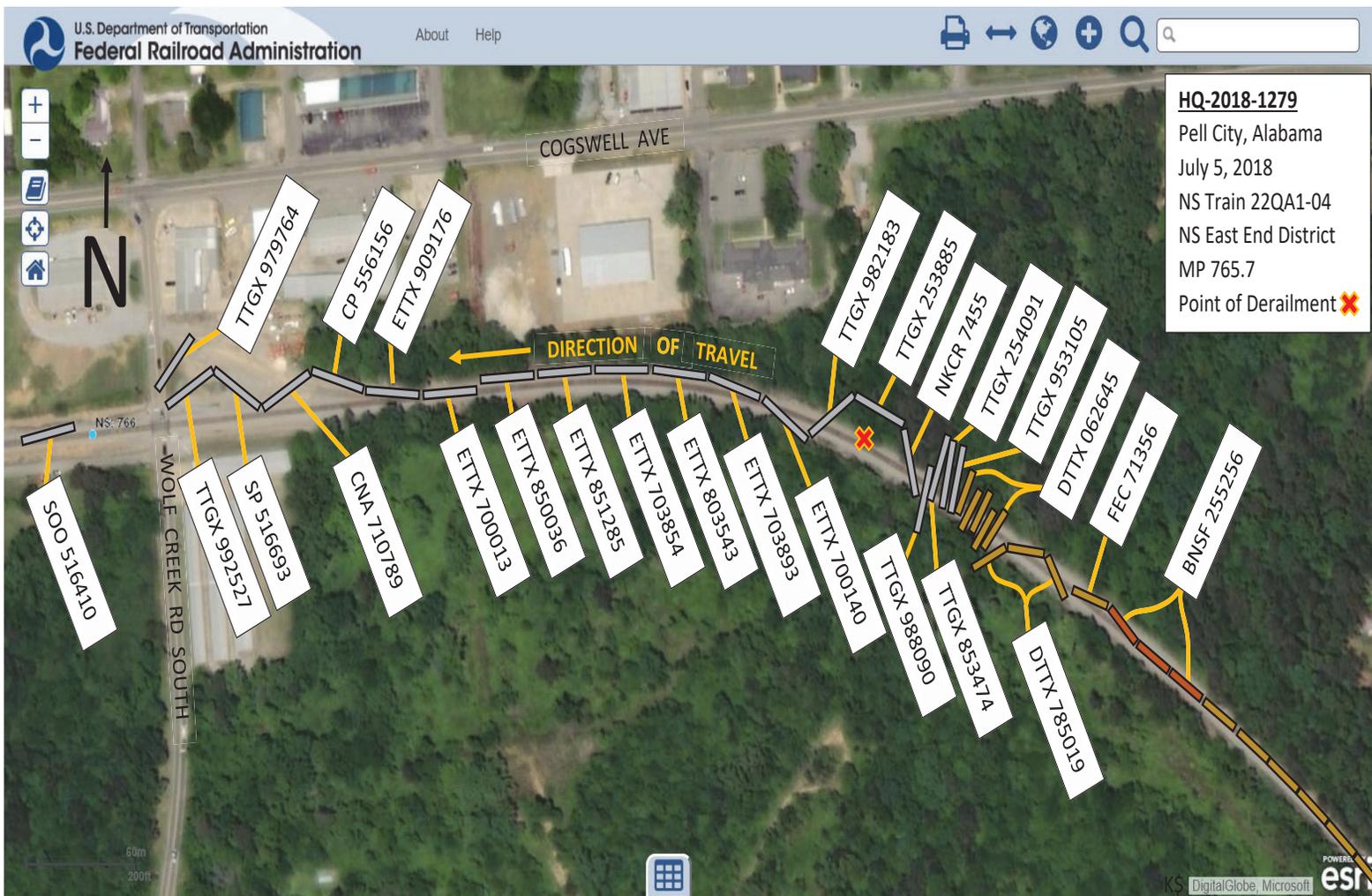
OPERATING TRAIN #1

1. Type of Equipment Consist: Freight Train					2. Was Equipment Attended? Yes			3. Train Number/Symbol 22QA104			
4. Speed (recorded speed, if available) R - Recorded 36.0 MPH E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 8631		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.)		SOO 516410	41	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	3	0	0	0	0	(1) Total in Equipment Consist	43	0	29	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	11	0	14	0	0
12. Equipment Damage This Consist 1524153		13. Track, Signal, Way & Structure Damage 573174									
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: 10 Mins: 15		19. Conductor Hrs: 10 Mins: 15	
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 33.587352000				27. Longitude -86.330433000							

SKETCHES

Sketch - Sketch

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NARRATIVE

Circumstances Prior to the Accident

Norfolk Southern Railway (NS) westbound freight train 22QA104 (Train 1) was a mixed freight train consisting of 3 locomotives, 43 loaded and 29 empty cars, and was 10,194 feet in length, with 8,631 trailing tons. Train 1 was scheduled to operate from NS Inman Yard in Atlanta, Georgia, to New Orleans, Louisiana. All required pre-departure tests and inspections were performed by qualified mechanical employees with no exceptions taken.

A crew, consisting of an Engineer and Conductor, was called for duty at 6 p.m., CDT, on July 4, 2018, at Inman Yard, their away from home terminal. Both crew members had received the statutory off-duty period prior to reporting for duty. The Engineer was seated at the controls on the right (north) side, and the Conductor was seated on the left (south) side of the lead locomotive.

The derailment occurred on the NS Alabama Division, East End District, at Milepost (MP) 765.65 near the town of Eden, Alabama. The timetable direction of the East End District is West. Timetable direction will be used throughout this report. Beginning at MP 765, the Single Main track enters a 6.1-degree right-hand curve before becoming tangent at MP 765.2, until it enters a compound 1.3-degree to 5-degree left-hand curve at MP 765.45, and becoming tangent again at MP 765.85. The grade through the area descends between 0.65-percent and 1.04-percent. The method of operation for this subdivision is a Traffic Control System (TCS), and the maximum authorized speed is 40 mph.

Train 1 departed Inman Yard at 7:43 p.m., EDT, on July 4, 2018. Prior to the accident, Train 1 stopped in Bremen, Alabama, (MP 685) and set-out rear locomotive NS 3540 in a siding track. Near MP 696, Train 1 hit a small pine tree that had fallen in the track. Before proceeding, the crew removed the tree from the track, inspected the train, and found no damages. The Engineer and Conductor said they noticed excessive train slack action (slack "run in") while handling the train prior to the derailment.

At the time of the derailment, the weather was 72° F, with clear skies and 3 mph winds from the northeast.

The Accident

At about 4:14 a.m., EDT, Train 1 began to slow down for a 40-mph curve at MP 764.9. Train 1 crested a hill operating about 36 mph and the crew stated they felt the slack "run in." At 4:15 a.m., EDT, the train experienced an undesired emergency application of the train brakes. After going into emergency, the train traveled 1,150 feet and came to a stop with the lead locomotive stopped directly on top of Roberts Mill Pond Road. The Engineer called the dispatcher and reported the emergency.

When the Engineer could not restore brake pipe pressure back to the air brake system, the Conductor dismounted the locomotive and walked back to perform a visual inspection of the train. Once the conductor discovered the derailed cars he turned around and headed back up to the lead locomotive.

As the Conductor was walking back up to the head end, the NS Dispatcher called the Engineer and informed him he had received a call that freight cars had derailed and were on the ground. Shortly after speaking to the dispatcher, a St. Clair County Sheriff's Deputy arrived at the Roberts Mill Pond Road highway grade crossing confirming freight cars were on the ground.

The Conductor, NS Road Foreman, and other railroad personnel assessed the scene and discovered 25 cars derailed at MP 765.65 in a general pile-up. The derailed cars, consist lines 41 to 65, consisted of 14 empty auto racks, 7 loaded auto racks, and 4 intermodal cars. The derailed intermodal cars were 3-unit articulated cars totaling 12 wells. Train 1 was operating on single main track in ABS territory on a clear signal, at a recorded speed of 40 mph and in light dynamic braking on a descending grade.

The St. Clair County Sheriff's Department and the local fire department responded to the scene. There were no injuries to railroad personnel or the general public. Total damages were estimated by NS to be \$1,524,153 for equipment and \$573,174 for track, totaling \$2,097,327. All repairs and inspections were completed and the track was re-opened for traffic at 12:08 a.m., EDT, on July 6, 2018.

Post-accident/Incident Investigation

On July 5, 2018, the Federal Railroad Administration (FRA) began an investigation of this derailment. An FRA Chief Inspector, Operating Practices Inspector, Track Inspector, Mechanical Inspector, and Hazmat Inspector responded to the accident site and were assigned the accident investigation.

FRA conducted interviews with the train crew, and requested and received all records, forms, and other documentation necessary to conduct their final analysis and draw conclusions concerning the pertinent facts of the accident. The following analysis and conclusions represent the findings of FRA's investigation.

Analysis and Conclusion

Analysis – Toxicological: The accident met the criteria for Title 49 Code of Federal Regulations (CFR) Part 219 Subpart C, Post-Accident Toxicological Testing.

Both crew members were tested and had negative results.

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

Analysis – Fatigue: FRA performed a fatigue analysis using the Fatigue Avoidance Scheduling Tool (FAST). 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. Inputs into the FAST software vary based on information obtained from each employee.

FRA obtained fatigue-related information, including a 10-day work history for the Engineer and Conductor

from Train 1. The results of the analysis indicate fatigue was highly probable for both the Engineer and Conductor of Train 1 due to their irregular work-rest cycles, and working in the early morning hours when they were predisposed to sleep.

Despite the probability for fatigue for both employees, FRA determined the presence of fatigue would not have affected the outcome of the derailment.

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

Analysis – Operating Practices: FRA reviewed the rules compliance and the historical operational testing conducted on the East End District by NS Supervisors. FRA found that frequent and adequate operational testing was performed on the East End District by multiple supervisors over the five-month period reviewed.

A review of the train handling, based on the event recorder download from the Train 1 lead locomotive (UP 4150), did not identify any train handling or rules compliance exceptions.

Train 1 was made up with 41 auto racks in the middle of the train with 17 articulated intermodal cars on the head end and 12 articulated cars on the rear. The distribution of the cars in Train 1 created a train with very poor handling characteristics where throttle and braking are concerned. Each auto rack has approximately 3 feet of slack which equates to about 123 feet of slack in the middle of the train. The articulated cars on the head and rear of the train would have an extremely small amount of slack between each car. Excessive slack action in the middle of the train does not allow the engineer the capability to properly control slack for the entire train.

Conclusion: FRA determined the probable cause of the derailment was the excessive slack action in the middle of the train caused by train makeup. (Cause code: H504)

Analysis – Mechanical: FRA inspected all derailed equipment to the extent possible. During clean-up operations, derailed cars and related parts, wheels, brake parts, car bodies, etc., were moved to a staging area adjacent to the derailment site. Physical inspection of locomotives, cars, and car parts disclosed no defective conditions related to the cause or contributing factors of the accident. A review of repair records for derailed cars found no causal factors.

Records from the two previous wayside detectors encountered by the derailed cars were obtained and reviewed. These records showed no issues or exceptions reported.

Conclusion: FRA determined the mechanical condition of Train 1 did not contribute to the cause or severity of the derailment.

Analysis – Track: An observation of the track structure ahead of and behind the derailment location did not identify any exceptions to the track standards. NS provided the Geometry Car Strip Chart, with an

inspection date of April 19, 2018, which presented no exceptions to the Track Safety Standards. The Eden Spur Switch at MP 765.80 was last inspected on June 8, 2018, with no exceptions to the Track Safety Standards. The Eden Spur Switch is a 136 lbs., Right-Hand Turnout, with a Number 10 Spring Frog. The Eden Spur Switch was secured with a Maintenance of Way lock and had a switch clamp installed prior to the derailment. The hook portion of the switch clamp had a stress break likely caused by the derailment. The main track switch point prior to the clearing work did not show any definitive blunt force strikes or markings. There was no indication of an improperly fitting switch point.

The portion of rail inspected did not show indications of any internal rail flaws that could have resulted in a broken rail. All breaks and separations in the rail were caused by torch cuts or stress break during the clearing of the derailment. NS conducted the last internal rail flaw inspection on May 11, 2018. The internal rail flaw records did not present any exceptions to the Track Safety Standards. NS Rail Added/Removed Reports exhibited no work being performed near the derailment location from July 4, 2017 to July 5, 2018. NS Alabama Division 2015 Track Charts identify the track structure as having a 0.65- percent descending grade with a 1.3 to 5.0-degree left hand compound curve and a curve elevation of 1 to 4 inches. The curve was spiked correctly to handle the forces of the curvature under load of a train.

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

Overall Conclusion

FRA concluded NS was compliant with its rules on the placement of loads and empties in the train, however, the trailing tonnage (loaded cars) behind the empties in the middle of the train proved to be unevenly distributed. The block of loaded articulated intermodal cars, pushing the slack in on a large block of mostly empty auto racks after cresting the hill, in the curve on a descending grade, was likely the cause of the derailment.

Probable Cause

FRA determined the probable cause of this accident is H504 – Buffing or slack action excessive, train makeup.

FRA did not identify any contributing factors.