

Federal Railroad Administration Office of Railroad Safety Accident and Analysis Branch

Accident Investigation Report HQ-2015-1070

Norfolk Southern Railroad Co. (NS) Dublin, VA July 14, 2015

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.

0	U.S. Department of Transportation						
	Federal Railroad Administration						

FRA FACTUAL RAILROAD ACCIDENT REPORT FRA File #HQ-2015-1070

		TDAINCH	N / N							
1. Name of Railroad Operating Train #1			1a. Alphabetic Code			1b. Railroad Accident/Incident No.				
Norfolk Southern Railway Company			NS		1	16523				
2. Name of Railroad Operating Train #2			2a. A	lphabetic Code	2	2b. Railroad Accident/Incident No.				
Norfolk Southern Railway Company			NS		1	16523				
GENERAL INFORMATION										
1. Name of Railroad or Other Entity Responsibl	e for Track Ma	intenance		1a. Alphabetic Code		1b. Railroad	Accider	nt/Incident No.		
Norfolk Southern Railway Company				NS		116523				
2. U.S. DOT Grade Crossing Identification Nun	ber			3. Date of Accident/I	ncident 4. Time of Accident/Incident			t/Incident		
			7/14/2015			3:50 PM				
5. Type of Accident/Incident						•				
Rear End Collision										
6. Cars Carrying 7. HAZMAT Ca	rs	8. Cars Releasing		9. People	10. Subdivisi					
HAZMAT 1 Damaged/De	ailed 1	HAZMAT	Evacuated	4	Pulaski	Pulaski				
11. Nearest City/Town	12. M	ilepost (to nearest tenth)	13.	State Abbr.	14. County					
Dublin, VA		NB306.2	v	A	PULASKI					
15. Temperature (F) 16. Visibility	17. Weather			18. Type of Track						
85 °F Day		Clear		Main						
19. Track Name/Number	20. FRA	Track Class		21. Annual		al Track Density 22. Time Tabl		22. Time Table Direction		
Main Track #1	Freight 7	Trains-60, Passenger Trains		(gross tons in millions) 19			West			

A	U.S. Department of Transportation
0	Federal Railroad Administration

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2015-1070

OPERATING T	RAIN #1
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1. Type of Equipment Consist:								2. Was Equipment Attended? 3. Train Number/Sy					mbol			
Freight Train								Yes 27VV514								
 Speed (recorded speed, if R - Recorded E - Estimated 	 Trailing T 4430 	Trailing Tons (gross exluding power units) 6a. Remotely Controlled I 0 = Not a remotely control ports 430 1 = Remote control ports 2 = Remote control ports 3 = Remote control ports					rolled Locor ly controlled ol portable t ol tower ope	Locomotive? Code trolled operation table transmitter 0								
6. Type of Territory								5-1	conote contr							
Signalization:																
Signaled																
Method of Operation/Auth	ority for	r Moveme	nt:													
Supplemental/Adjunct Cod	les:															
7. Principal Car/Unit (1) First Involved		a. Initia	l and Nun	nber b. Pos	ition in Train	c. L	oaded (yes/no	o)	8. If railro alcoho	ad employe l use, enter t	e(s) tested for he number th	r drug/ at were	Alcoho		Drugs	
(derailed, struck, etc.)		N	S 9100		1 no				positiv	e in the app	in the appropriate box.			0		
(2) Causing (if mechan cause reported)	(2) Causing (if mechanical, cause reported) NS 9100					1 no			9. Was this consist tra			ssengers?			No	
10. Locomotive Units	a.	. Head	М	id Train	Rear I	End	11. Cars		U 1 C-h	Loa	ded	Em	pty			
Car Locomotives.)	Cab	End	b. Manua	al c. Remote	d. Manual	e. Remote	Car Locomo	tives.)	ives.) a. I		a. Freight b. Pass. c		. Freight d. Pass.		aboose	
(1) Total in Train		2	0	0	0	0	(1) Total Consist	in Equi	in Equipment		0	43	0		0	
(2) Total Derailed		2	0	0	0	0	(2) Total	Deraile	Derailed 0 0		10	0		0		
12. Equipment Damage Thi	s Consi	st		13. Track, Sign	al, Way & Str	ucture Dam	nage		1							
11613	15				101138											
14. Primary Cause Code																
H222 - Automatic bloc	k or int	terlockii	ng signal	displaying of	her than a sto	op indicat	ion - failure	to con	nply.*							
15. Contributing Cause Co	de															
H605 - Failure to comp	ly with	h restrict	ted speed	l in connectio	n with the re	strictive in	ndication of	a bloc	k or interlo	cking sign	al.					
		Nun	nber of Cr	rew Members	-			Length of Time on Duty								
16. Engineers/Operators	17. Fir	emen		18. Conc	luctors	19. B	rakemen	20.1	Engineer/Op	erator		21. Co	onductor			
1		0			1		0	Hrs	s: 3	М	ins: 20	Hrs:	3	Min	s: 20	
Casualties to:	22. Ra	ulroad En	nployees	23. Train	n Passengers	24.	Others	25.	EOT Device	?		26. Was 1	EOT Device	Properly Ar	med?	
Fatal		0			0		0	L	~		Yes				Yes	
Nonfatal		2		-				27.	Caboose Oc	cupied by C	rew?				No	
28. Latitude	29. Longitu	de		~								110				
37.132865006				-80.6224	82299											
				00.0221				J								

0	U.S. Department of Transportation
•	Federal Railroad Administration

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2015-1070

OPERATING TR	AIN	#2
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Freight Train Yes 157VS13 1: Specific coorded goed, if available) Code 5. Trailing Tons (gross extuding power units) 6. Removely controlled connoptive intermediation comparation in the second power openition 7. Specific Territory 8. Removely controlled connoptive intermediation control control intermediation control control intermediation intermediation control control intermediation intermediation control control intermediation in the second control intermediation in the second control intermediation intermediation intermediation in the second control intermediation intermediation in the second control intermediation intermediation in the second control intermediation intermediation in the second control intermediation intermediation in the second control intermediation in the second control intermediation in the second control intermediation intermediation intermediation in the second control intermediation intermediatinte intermediat	1. Type of Equipment Cor	nsist:									2. W	as Equipment	Attended?	3. Train	Number/Syn	nbol				
1. Speci (excorde) geed, if available) Code 5. Trailing Tons (gross schulding power units) 6a. Remote/Controlled Controlled Controled Controled Controlled Controlled Controlled Controlled	Freight Train									Yes 15TV513										
P. Recorded E Edinated 0 MPH R 4678 I = Remote control pertable manominer 3 = Remote control pertable manominer 4 = Remote control pertable manominer 1 = Remote control pertable manoner 1 = Remote control pertable manominer 1 =	4. Speed (recorded speed,	if availa	able)	Code	5. Trailing T	ons (gross e	kluding po	ower units)) 6a. Remotely Controlled Locomotive? Code							Code				
E. Estimated 0 MPI R 4678 2 = Remote control rower operation 0 5. Type of Territory Signalization: Signaled Method of Operation/Authority for Movements: Signaled Signaled Method of Operation/Authority for Movements: Signaled O O 2. Principal Cac/Init a Initial and Number b. Position in Train c. Loaded (yee/in) 8. If railroad employee(s) tested for drug/ alcohol to se, enter the number that were positive in the appropriate box. 0 0 0. Causality of movemental Adjunct Code: 0	R - Recorded								0 = Not a remotely controlled operation 1 - Remote control portable transmitter											
3 = Remote control portable transmitter - more than one remote control transmitter - more	E - Estimated 0 MPH R 4678								2 = 1	Remote contr	ol tower ope	eration				0				
5. Type of Territory Signal contraction: Signal indication: Signal indication: Supplemental Adjunct Codes: Q 7. Friegled CarLinit: 0. Locating (<i>Irme-chancel</i> , c) 180X 662601 54 00 8. If railroad employees() lested for drag/ derivation care representation: 10. Locating (<i>Irme-chancel</i> , c) 180X 662601 54 00 9. Wes this consist transporting passengers? No 10. Locating (<i>Irme-chancel</i> , c) 180X 662601 54 00 9. Wes this consist transporting passengers? 10. Locating (<i>Irme-chancel</i> , c) 180X 662601 54 00 0. O									3 = 1	Remote contr	ol portable t	ransmitter - n	nore than one	e remote con	trol transmitt	er				
<form> Signal <th <="" colspan="2" signal<="" td=""><td>6. Type of Territory</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th></form>	<td>6. Type of Territory</td> <td></td>		6. Type of Territory																	
Signal Signal Indication / Antory for Movements : OPEN Solution / Antory for Movements : Signal Indication / Antory for Movements : OPEN Solution / Antory for Movements : Signal Indication / Antory for Movements : OPEN Solution / Antory for Movements : OPEN Solution / Antory for Movements : Active Movements : OPEN Solution / Antory for Movements : Active Movements : OPEN Solution / Antory for Movements : Active Movements : OPEN Solution / Antory for Movements : Active Movements : OPEN Solution / Antory for Movements : Active Movements : OPEN Solution / Antory for Movements : Active Movements : Antory for Movements :	Signalization:																			
Method of Operational Autohority for Movement: Signal Indication Signal Indication Colspan="4">Signal Indication Colspan="4">Alcobe Signal Indication Colspan="4">Colspan= 4 Colspan= 4 Colspan= 4 <th c<="" td=""><td>Signaled</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th>	<td>Signaled</td> <td></td>	Signaled																		
Signal Indication Signal Indication Q A Initial and Number b. Position in Train C. Loade (yes/no) 8. If railroad employee(s) tested for drue, in drue were find	Method of Operation/Aut	hority fo	or Moveme	nt:																
Supplemental/Adjunct Codes: 2 2 7. Principal Car/Unit a. Initial and Number b. Position in Train c. C. Cadded (yee/no) 8. If railroad employee(s) tested for drug/ alcohol use, enter the number that were possive in the appropriate books. 0 0 (1) First Involved (derziled struke, etc.) TBOX 662601 54 no 9. Was this consist transporting passengers? 0 0 (2) Causing (f mechanic) TBOX 662601 54 no 9. Was this consist transporting passengers? 0 0 (1) Causing (f mechanic) TBOX 662601 54 no 11. Cars (noclude EWU, DMU, and Cah a. Freight b. Pass. e. Freight d. Pass. e. Caboose (Car Locomotives) (1) Total in Train 2 0 </td <td>Signal Indication</td> <td></td>	Signal Indication																			
Q 2 7. Frincjed Car/Unit a. Initial and Number b. Position in Train c. Loaded (yes/no) a. If railroad employee(s) tested for drug Alcohol Dugs (1) First Involved TBOX 662601 54 no 9. Was this consist transporting passengers? No (2) Causing (if mechanical rain rain TBOX 662601 54 no 9. Was this consist transporting passengers? No (1) Cocomotive Units a. Head Mid Train Rear End III. Cars Loaded Empty e. Caboose (1) Total in Train 2 0 0 0 (2) Total Derailed 3 0 5 0 0 (2) Total Derailed 0 0 0 0 (2) Total Derailed 3 0 5 0 0 (2) Total Derailed 0 0 0 0 (2) Total Derailed 3 0 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Supplemental/Adjunct Co	odes:																		
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1. Principal CarUnit a. Initial and Number b. Position in Train c. Loaded (yes/no) 8. If railroad employee(s) tesd for drug/ and bol use, enter the number that number number that number that number numb																				
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(2) Causing (if mechanical, cause reported)9. Was this consist transporting passengers?No(1) Cacomotive Units Exclude EMU, DMU, and Cal Enda. Head EndMid Train A manual c. RemoteRear End (1) Cars (Include EMU, DMU, and Cal Car Locomotives.)Loaded a. FreightEmpty to all Pass.c. Freightd. Pass.e. Caboose(1) Total in Train20000(2) Total DR Consist2602800(2) Total Darailed0000(2) Total Drailed30500(2) Total Darailed0000(2) Total Drailed30500(2) Equipment Damage This Consist13. Track, Signal, Way & Structure Damage 46664510113813. Track, Signal, Way & Structure Damage46664510113812. Equipment Damage This Consist13. Track, Signal, Way & Structure Damage 46664510113814. Primary Cause Code15. Contributing Cause Code19. Brakemen20. Engineer/Operator21. Conductor16. Engineers/Operators17. Firemen18. Conductors19. Brakemen20. Engineer/Operator21. Conductor21. Conductor16. Engineers/Operators12. Raitroad Employees23. Train Passengers24. Others25. EOT Device?26. Was EOT Device Properly Armed?16. Engineers/Operators12. Raitroad Employees23. Train Passengers24. Others <td>(1) First Involved (derailed. struck. etc</td> <td>.)</td> <td>TBO</td> <td>X 66260</td> <td>)1</td> <td>54</td> <td></td> <td>no</td> <td></td> <td>alcoho positiv</td> <td>I use, enter the app</td> <td>he number th ropriate box.</td> <td>at were</td> <td>0</td> <td></td> <td>0</td>	(1) First Involved (derailed. struck. etc	.)	TBO	X 66260)1	54		no		alcoho positiv	I use, enter the app	he number th ropriate box.	at were	0		0				
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Exclude EMU, DMU, and Cal Car Locomotives.)In Freider End ManualIn Freider AmanualIn Freider Car Locomotives.)In Freider a. FreightIn Freight b. Pass.In Freight d. Pass.In Fr	10. Locomotive Units			м	id Troin	Poor	End	11. Cars		Loaded			Em	ntu						
Car Locomotives.)b. Manualc. Remoted. Manuale. RemoteG. Manuale. RemoteG. Manuale. RemoteG. Manuale. Caboose(1) Total in Train2000000002800(2) Total Derailed00000(2) Total Derailed30500(2) Total Derailed00000(2) Total Derailed30500(2) Total Derailed00000(2) Total Derailed30500(2) Total Derailed00000(2) Total Derailed30500(46664)1313. Track, Signal, Way & Structure Damage13. Track, Signal, Way & Structure Damage14. Primary Cause Code13. Track, Signal, Way & Structure Damage14. Primary Cause Code15. Contributing Cause Code15. Contributing Cause Code15. Contributing Cause Code18. Control Crew Members19. Brakemen20. Engineer/Operator21. Conductor21. Conductor1010Hrs:5Mins:5Hrs:5Mins:516. Engineer/Operator12. Railroad Employees23. Train Pasengers24. Others25. EOT Device?26. Was EOT Device Properly Armed?10000010Hrs:5Mins:517. FreeYes100 <t< td=""><td>(Exclude EMU, DMU, and</td><td>l Cab</td><td>End</td><td>NI NI</td><td></td><td>i i i i i i i i i i i i i i i i i i i</td><td>Linu</td><td>(Include EM</td><td>IU, DM</td><td colspan="2">U, DMU, and Cab</td><td colspan="2"></td><td colspan="2">Empty</td><td></td></t<>	(Exclude EMU, DMU, and	l Cab	End	NI NI		i i i i i i i i i i i i i i i i i i i	Linu	(Include EM	IU, DM	U, DMU, and Cab				Empty						
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(2) Total Derailed 0 0 0 (2) Total Derailed 3 0 5 0 0 12. Equipment Damage This Consist 466645 13. Track, Signal, Way & Structure Damage 466645 13. Track, Signal, Way & Structure Damage 466645 101135 5 0 0 14. Primary Cause Code 13. Track, Signal Jaying other than a stop indication - failure to comply.* 5 0 0 15. Contributing Cause Code 15. Contributing Cause Code 1	(1) Total in Train		2	0	0	0	0	(1) Total Consist	in Equ	n Equipment		0	28	0	()				
12. Equipment Damage This Consist 13. Track, Signal, Way & Structure Damage 466645 101138 14. Primary Cause Code H222 - Automatic block or interlocking signal displaying other than a stop indication - failure to comply.* 15. Contributing Cause Code H605 - Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal. 16. Engineers/Operators 17. Firemen 1 0	(2) Total Derailed		0	0	0	0	0	(2) Total	Derailed		3	0	5	0)				
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15. Contributing Cause Code H605 - Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal. Length of Time on Duty Number of Crew Members Length of Time on Duty Number of Crew Members Length of Time on Duty 16. Engineers/Operators 17. Firemen 18. Conductors 19. Brakemen 20. Engineer/Operator 5 Hrs: 5 Mins: 5	H222 - Automatic blog	ck or ii	nterlockii	ng signal	displaying ot	her than a st	op indicat	tion - failure	to con	mply.*										
H605 - Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal.Length of Time on Duty16. Engineers/Operators17. Firemen18. Conductors19. Brakemen20. Engineer/Operator121. Conductor1010Hrs:5Hrs:5Mins:5Casualties to:22. Railroad Employees23. Train Passengers24. Others25. EOT Device?26. Was EOT Device Property Armed?Fatal00011111Nonfatal000111128. Latitude29. Longitude -80.64775943729. Longitude37.126586525-80.647759437	15. Contributing Cause Co	ode																		
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28. Latitude 29. Longitude 37.126586525 -80.647759437	Nonfatal		0			0		0								N/A				
37.126586525 -80.647759437	28. Latitude 29. Longitude																			
	37.126586525				-80.6477	59437														

FRA FACTUAL RAILROAD ACCIDENT REPORT

CROSSING INFORMATION

							- 1			
	nvolved					Rail Equi	ipment Involved			
1. Туре					5. Equipment					
2. Vehicle Speed (est. mph at impo	ction (geo	ographical)		6. Position of Car Unit in Train						
4. Position of Involved Highway U				7. Circumstance						
8a. Was the highway user and/or r in the impact transporting ha	ed				8b. Was there a hazardous materials release by					
8c. State here the name and quanti	ty of the hazardous r	naterial re	leased, if any.							
9. Type of Crossing Warning 1. Gates 4. Wig wags 2. Cantilever FLS 5. Hwy. traf 3. Standard FLS 6. Audible	Flagged by crew Other (spec. in a None	w narr.)	10. Signaled Cr	Crossing Warning 11. Roadway Conditions						
12. Location of Warning			13. Crossi	ing W	arning Intercon	nnected with Highway Signals 14. Crossing Illuminated by Street Lights or Special Li				
15. Highway User's Age 16. Highway User's Gender 17. Highway User Went Behim and Struck or was Struck b						or in Front of Train 18. Highway User / Second Train				
19. Driver Passed Standing Highw	w of Track Obs	scured	l by <i>(primary o</i>	obstruction)						
Casualties to: Killed Injured 21. Driver wa						s 22. Was Driver in the Vehicle?				
23. Highway-Rail Crossing Users		24. H	Property Damage ge)		25. Total (includin	l Number of Vehicle Occupants ag driver)				
26. Locomotive Auxiliary Lights?						27. Locomotive Auxiliar	ry Lights (Operational?	<u> </u>	
28. Locomotive Headlight Illumin			29. Locomotive Audible	e Warning	Sounded?					

10. Signaled Crossing Warning

Explanation Code

- 1 Provided minimum 20-second warning
- 2 Alleged warning time greater than 60 seconds
- 3 Alleged warning time less than 20 seconds

4 - Alleged no warning

- 5 Confirmed warning time greater than 60 seconds
- 6 Confirmed warning time less than 20 seconds

7 - Confirmed no warning

N/A - N/A

- <u>Explanation code</u>
- A Insulated rail vehicle
- B Storm/lightning damage
- C Vandalism
- D No power/batteries dead
- E Devices down for repair
- F Devices out of service

G - Warning time greater than 60 seconds attributed to accident-involved train stopping short of the crossing, but within track circuit limits, while warning devices remain continuously active with no other in-motion train present

H - Warning time greater than 60 seconds attributed to track circuit failure (e.g., insulated rail joint or rail bonding failure, track or ballast fouled)

J - Warning time greater than 60 seconds attributed to other train/equipment within track circuit limits

K - Warning time less than 20 seconds attributed to signals timing out before train's arrival at the crossing/island circuit

L - Warning time less than 20 seconds attributed to train operating counter to track circuit design direction

M - Warning time less than 20 seconds attributed to train speed in excess of track circuit's design speed

N - Warning time less than 20 seconds attributed to signal system's failure to detect train approach

O - Warning time less than 20 seconds attributed to violation of special train operating instructions

P - No warning attributed to signal systems failure to detect the train

R - Other cause(s). Explain in Narrative Description

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SKETCHES

HQ-2015-1070 S&TC Field Hand Sketch



HQ-2015-1070

NorFolkSouthen Rear-End Collision of 7-14-15

SKETCHES

HQ-2015-1070 NS Aerial View of car layout



SYNOPSIS

Synopsis of the Incident

On Tuesday, July 14, 2015, at approximately 3:50 p.m., EDT, a westbound Norfolk Southern Railway (NS) Freight Train 27VV514 struck the rear of stopped NS Train 15TV513 at a recorded speed of 30 mph. The maximum authorized speed for this section track is 40 mph. The collision occurred on NS' Virginia Division, Eastern Region, Pulaski District, Milepost NB 306.2 on single main track near Dublin, Virginia. The method of operation on the Pulaski District is by signal indication in a traffic control system. Timetable direction was west and geographical direction was southwest.

As a result of the collision, 2 locomotives and 10 cars from Train 27VV514 derailed. The rear 8 cars of Train 15TV513 derailed. Equipment damages were reported as \$1,161,351 for Train 27VV514 and \$466,645 for Train 15TV513. Damage to track, signal, wayside and structures was reported as \$101,138. Both crew members of Train 27VV514 were treated for minor injuries and released from Pulaski Memorial Hospital. The crew members of Train 15TV513 were not injured. A tank car containing lube oil was among those derailed and it was breached leaking approximately 20,000 gallons. An empty HAZMAT car containing Sodium Hydroxide was also derailed but not breached. There was no fire. State Route "Old 11" was closed for approximately 30 hours, due to the derailment. An evacuation of four people was initiated due to the derailment being in close proximity to three homes, one storage building was also destroyed during the derailment. The evacuation was lifted after approximately 22 hours

The weather at the time of the collision was sunny and clear with a temperature of 85 degrees Fahrenheit.

The probable cause of the cause of the accident was failing to comply with an automatic block or interlocking signal displaying other than a stop indication (H222). A contributing factor was failing to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal (H605).

NARRATIVE

Circumstances Prior to the Accident

Norfolk Southern (NS) Train 27VV514 (Train Number 1)

NS Train Number 27VV514 (27V) originated in Walkerton, North Carolina. The operating crew went on duty at 12:30 p.m., EDT, at Roanoke, Virginia, on Tuesday July 14, 2015. The final destination for this train was Shelbyville, Kentucky. The train consisted of 2 locomotives and 43 empty autoracks. The train crew consisted of an engineer and a conductor who both received their statutory rest period before reporting for duty.

A review of the train documents found that the train crew reported for duty at 12:30 p.m. and took possession of Train Number 1 on Main Track 2 inside NS's Roanoke Terminal and departed the terminal at 1:24 p.m. Train Number 1 was a run-through and did not require inspection at that point. The train stopped twice before the collision, both times for traffic ahead. The first stop was at Arthur, Virginia, for 2 minutes, and the second stop was at Walton, Virginia, for 24 minutes.

As the westbound train approached the accident area, the Locomotive Engineer was seated at the controls on the north side of the leading locomotive. The Conductor was seated on the south side of the leading locomotive.

As Train Number 1 passed westbound through Dublin, Virginia, at Milepost (MP) NB-306 on the single main track, the crew operated the train through a left hand curve of 4 degrees, 50 minutes with 3.5-inch elevation for 0.10-mile. It then travelled on a tangent for 0.10-mile then another left hand curve of 3 degrees with 1.50-inch elevation for 0.20-mile. The train crew's visibility was unobstructed approaching the accident site.

NS Train 15TV513 (Train Number 2)

Train 15TV513 (15T) was stopped at the signal at MP 306.9 due to traffic ahead. The crew stated they had not even been aware that their train had been struck and noticed only that the airbrake system had lost air pressure. The Locomotive Engineer of Train 15T was seated at the controls on the north side of their leading locomotive and the conductor was seated on the south side.

The Accident

Train Number 1 passed an approach signal at Control Point (CP) JC (MP 302.1) at approximately 3:36 p.m., and a Restricting Signal at MP 304.7 at 3:43 p.m., before striking the rear of the Train Number 2 at 3:47 p.m. at MP 306.2. Train Number 1 passed the Restricting Signal at MP 304.7 at 21 mph then began increasing speed until striking the rear of the Train Number 2 at 30 mph. No brakes were applied prior to striking Train Number 2. The available sight/stopping distance was over 700 feet. The locomotive download revealed that the controls were in Power Notch 6 with the speed at 30 mph at the time of impact. Train Number 1's train line did not indicate an emergency brake application until after impact. It could not be determined from the download if the eventual emergency application came from the 27V Engineer or air hose separation due to the derailment. The collision took place on tangent track just after exiting a 4.5-degree left hand curve. The lead locomotive derailed but remained upright on the right-oward the inside of the curve, turned onto its left side and came to rest approximately 50 feet from the tracks. The rear locomotive derailed but remained upright on the right-of-way. The head 10 cars of Train Number 1 derailed but remained upright. The rear 8 cars of Train Number 2 derailed, including one hazardous materials (hazmat) residue car last containing Sodium Hydroxide.

Post-Accident

Initial reports were that there was a small leak of Sodium Hydroxide; subsequent inspection; however, concluded that there was no hazmat leak. Locomotive NS 9100 leaked an estimated 200 gallons of diesel fuel and also leaked an undetermined amount of acid from the locomotive batteries. One tank car containing non-hazardous lube oil derailed and breached. W.E.L. Inc. was called to the scene to undertake environmental remediation.

Emergency responders from both the town of Dublin and Pulaski County were dispatched to the scene. Upon arrival, they met with the train crew and obtained information about the contents of the train.

The derailment was adjacent to a marshy area. Fuel and non-hazardous lube oil extended into the marshy area, where they were trapped by a containment trench. The oil was pumped out of the trench and material, pooled on the ground, was vacuumed up.

Four residents were evacuated. The evacuation was lifted after approximately 22 hours. State route "Old 11" was closed for approximately 30 hours. Approximately 1,200 feet of track panels were installed on the Single Main Track. On July 15, 2015, the main track was restored with the initial train service at 8:00 p.m.

Locomotive Downloads

The 27V locomotive (NS 9100) was equipped with a speed indicator and event recorder as required by Federal regulations. The relevant event recorder data was downloaded by the NS Road Foreman of Engines and analyzed by NS officials. The controlling locomotive throttle was in Power 6 at the time of the derailment. Recorded train speed at the time of impact was 30 mph. Maximum authorized speed for Train Number 1 at the time was Restricting Speed which would have allowed the crew to stop within one half the range of vision and not exceeding 20 mph.

Crew Interviews

Both crewmembers of Train Number 1 were interviewed separately by the Federal Railroad Administration (FRA). The interviews statements and locomotive video download were not consistent. The crewmembers both stated categorically that the last signal passed before the collision was displaying a clear signal indication. After a thorough investigation of the signal system turned up no abnormalities, FRA obtained the video download from the lead locomotive. The video confirmed the signal displayed a Restricting indication when passed by the crew. The Engineer provided cell phone records, which were later found to be incomplete.

Crew Distractions on Train Number 1

Both crew members sent and received numerous text messages during the trip while the train was moving. The Conductor made and received several cell phone calls, including one when the Restricting Signal may have been in view of the crew. The Engineer's cell phone records indicate one text message was received and one text message was sent within 1-minute of the collision. A second cell phone belonging to the Engineer was discovered in the operating compartment of the controlling locomotive after the collision. The phone was on at the time of discovery. Four magazines and a newspaper were also found in the wrecked locomotive. The brakes of Train Number 1 were not applied prior to striking Train Number 2 despite over 700 feet of sight distance.

Analysis and Conclusions

Analysis - Toxicology Testing

Toxicology testing was conducted due to the damage amount being estimated to exceed \$1,000,000. The crew on Train Number 1 submitted to drug and alcohol testing under the requirement of Title 49 Code of Federal Regulations (CFR) Part 219, Subpart C.

Conclusion - Test results were negative for the Engineer and Conductor.

Analysis - Fatigue

FRA obtained fatigue-related information for the 10-day period preceding the derailment including the 10-day work history (on duty/off duty cycles) for the Engineer and Conductor of Train Number 1.

Conclusion - FRA concluded that fatigue of the train crew was not a contributing factor in the derailment.

Analysis - Track

FRA inspected the track in the derailment area and conducted a review of track safety maintenance and inspection records required by Federal regulations.

Conclusion - Track was not a causal nor contributing factor in the rear-end collision and derailment.

Analysis - Signal System

Thorough inspection and testing of the signal system and inspection of pre-collision test records revealed the system to be operating properly and as intended with no exceptions taken.

Conclusion - The signal system was not a causal or contributing factor in this incident.

Analysis - Mechanical

Train Number 1 received a Class 1 Initial Terminal Train air brake test required by 49 CFR Section 232.205 and was running on a Class 1 Air Slip in compliance with Federal regulations. FRA conducted a thorough inspection of all cars and locomotives and a comprehensive review of equipment records and found no indication that the cars or locomotive could have contributed to this accident.

Conclusion - The overall mechanical condition of the locomotives and cars involved in the collision and subsequent derailment excluded both as having contributed to this accident.

Overall Conclusion

The crew of Train 27V, after passing a Restricting Signal at MP 304.7, failed to comply with restricted speed. Evidence found after the accident, including cell phone usage records, reading material, not knowing the indication of the last signal passed, and the absence of a brake application prior to the collision, suggest the crew members were distracted from performing their duties.

Probable Cause and Contributing Factors

FRA's investigation concluded the probable cause of the derailment was the Train Number 1 crew failed to comply with an automatic block signal displaying other than a stop indication (H222). A contributing factor was Train Number 1's crew failure to comply with restricted speed in connection with the restrictive indication of a block signal (H605).