



***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.

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 Norfolk Southern Railway Company	1a. Alphabetic Code NS	1b. Railroad Accident/Incident No. 116523
2. Name of Railroad Operating Train #2 Norfolk Southern Railway Company	2a. Alphabetic Code NS	2b. Railroad Accident/Incident No. 116523

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. 116523	
2. U.S. DOT Grade Crossing Identification Number		3. Date of Accident/Incident 7/14/2015	4. Time of Accident/Incident 3:50 PM	
5. Type of Accident/Incident Rear End Collision				
6. Cars Carrying HAZMAT 1	7. HAZMAT Cars Damaged/Derailed 1	8. Cars Releasing HAZMAT 0	9. People Evacuated 4	10. Subdivision Pulaski
11. Nearest City/Town Dublin, VA		12. Milepost (to nearest tenth) NB306.2	13. State Abbr. VA	14. County PULASKI
15. Temperature (F) 85 °F	16. Visibility Day	17. Weather Clear		18. Type of Track Main
19. Track Name/Number Main Track #1		20. FRA Track Class Freight Trains-60, Passenger Trains-80		21. Annual Track Density (gross tons in millions) 19
				22. Time Table Direction West

OPERATING TRAIN #2

1. Type of Equipment Consist: Freight Train		2. Was Equipment Attended? Yes		3. Train Number/Symbol 15TV513							
4. Speed (recorded speed, if available) R - Recorded E - Estimated 0 MPH		Code R	5. Trailing Tons (gross excluding power units) 4678		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 (1) First Involved (derailed, struck, etc.) TBOX 662601		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.						
(2) Causing (if mechanical, cause reported) TBOX 662601					Alcohol 0						
					Drugs 0						
					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		
			b. Manual	c. Remote	d. Manual	e. Remote	a. Freight	b. Pass.	c. Freight	d. Pass.	e. Caboose
(1) Total in Train		2	0	0	0	0	(1) Total in Equipment Consist 26	0	28	0	0
(2) Total Derailed		0	0	0	0	0	(2) Total Derailed 3	0	5	0	0
12. Equipment Damage This Consist 466645			13. Track, Signal, Way & Structure Damage 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.											
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: 5		Hrs: 5 Mins: 5	
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 37.126586525				29. Longitude -80.647759437							

CROSSING INFORMATION

Highway User Involved		Rail Equipment Involved	
1. Type		5. Equipment	
2. Vehicle Speed (<i>est. mph at impact</i>)	3. Direction (<i>geographical</i>)	6. Position of Car Unit in Train	
4. Position of Involved Highway User		7. Circumstance	
8a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials?		8b. Was there a hazardous materials release by	
8c. State here the name and quantity of the hazardous material released, if any.			
9. Type of Crossing Warning 1. Gates 4. Wig wags 7. Crossbucks 10. Flagged by crew 2. Cantilever FLS 5. Hwy. traffic signals 8. Stop signs 11. Other (<i>spec. in narr.</i>) 3. Standard FLS 6. Audible 9. Watchman 12. None		10. Signaled Crossing Warning	11. Roadway Conditions
12. Location of Warning		13. Crossing Warning Interconnected with Highway Signals	14. Crossing Illuminated by Street Lights or Special Lights
15. Highway User's Age	16. Highway User's Gender	17. Highway User Went Behind or in Front of Train and Struck or was Struck by Second Train	18. Highway User
19. Driver Passed Standing Highway Vehicle		20. View of Track Obscured by (<i>primary obstruction</i>)	
Casualties to:	Killed	Injured	21. Driver was
23. Highway-Rail Crossing Users		24. Highway Vehicle Property Damage (<i>est. dollar damage</i>)	22. Was Driver in the Vehicle?
26. Locomotive Auxiliary Lights?		25. Total Number of Vehicle Occupants (<i>including driver</i>)	
28. Locomotive Headlight Illuminated?		27. Locomotive Auxiliary Lights Operational?	
		29. Locomotive Audible Warning Sounded?	

10. Signaled Crossing Warning

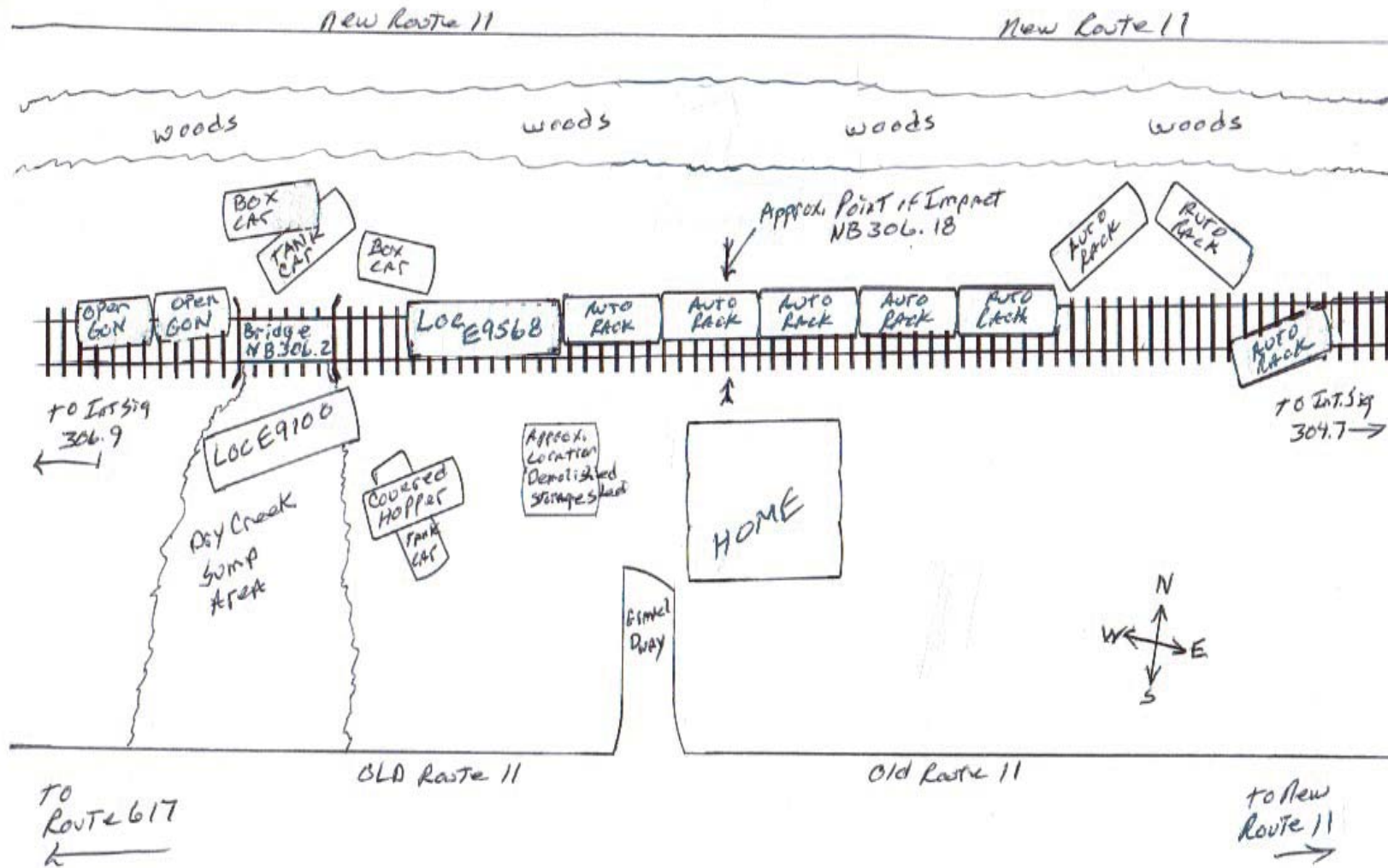
- 1 - Provided minimum 20-second warning
- 2 - Alleged warning time greater than 60 seconds
- 3 - Alleged warning time less than 20 seconds
- 4 - Alleged no warning
- 5 - Confirmed warning time greater than 60 seconds
- 6 - Confirmed warning time less than 20 seconds
- 7 - Confirmed no warning
- N/A - N/A

Explanation Code

- 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

SKETCHES

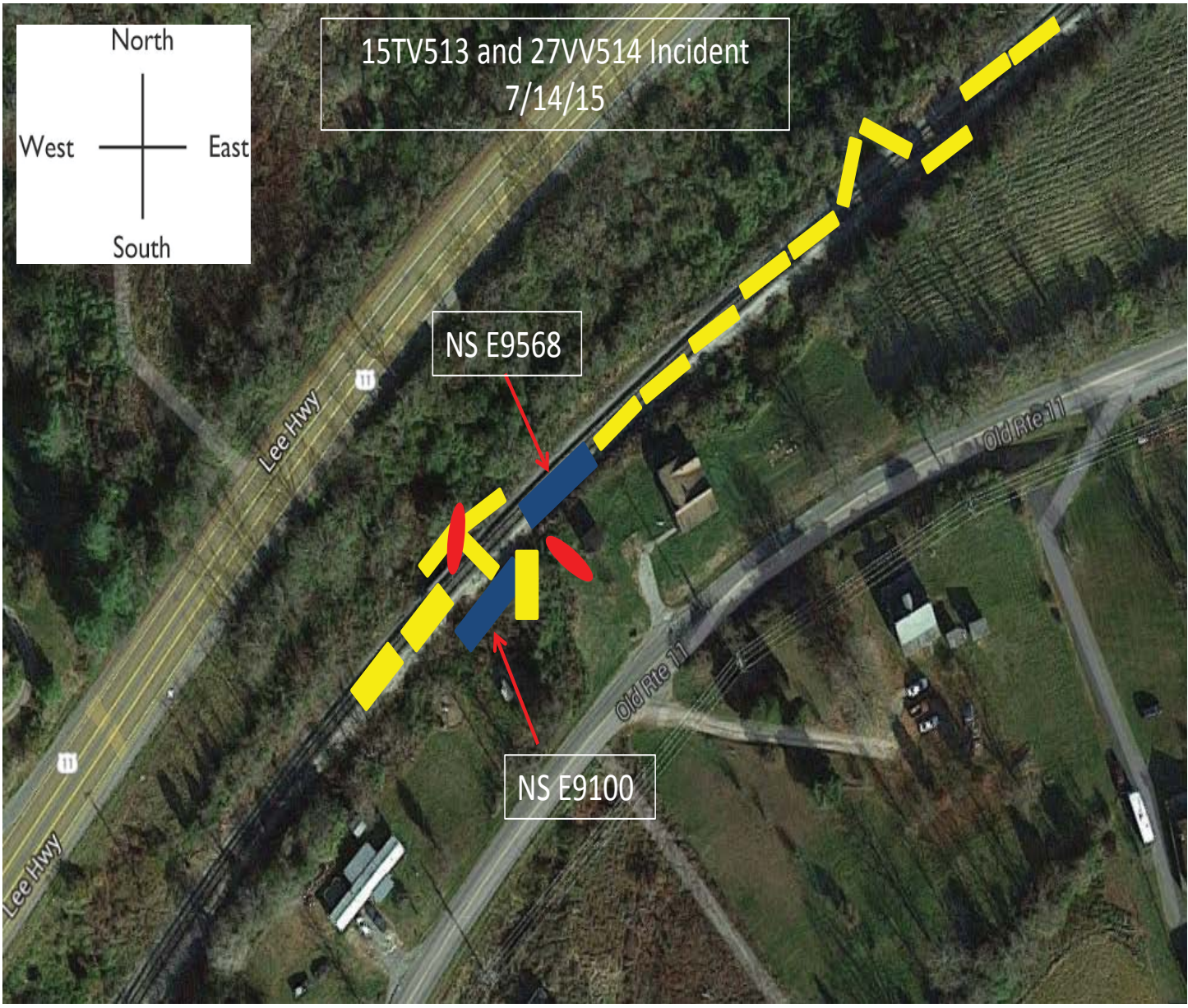
HQ-2015-1070 S&TC Field Hand Sketch



HQ-2015-1070
Norfolk Southern
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 of Train Number 1 (NS 9100) derailed to the left toward 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).