



***Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2006-61***

***Southeastern PA Transportation Authority
Crestmont, PA
July 1, 2006***

Note that 49 U.S.C. §20903 provides that no part of an accident or incident report 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.

1. Name of Railroad Operating Train #1 Southeastern Pennsylvania Transportation Authority			1a. Alphabetic Code SEPA			1b. Railroad Accident/Incident No. 070106R004		
2. Name of Railroad Operating Train #2 Southeastern Pennsylvania Transportation Authority			2a. Alphabetic Code SEPA			2b. Railroad Accident/Incident 070106R004		
3. Name of Railroad Responsible for Track Maintenance: N/A			3a. Alphabetic Code N/A			3b. Railroad Accident/Incident No. N/A		
4. U.S. DOT_AAR Grade Crossing Identification Number			5. Date of Accident/Incident Month Day Year 07 01 2006			6. Time of Accident/Incident 02:54:00 <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM		
7. Type of Accident/Incident (single entry in code box)			1. Derailment 2. Head on collision 3. Rear end collision			4. Side collision 5. Raking collision 6. Broken Train collision		
			7. Hwy-rail crossing 8. RR grade crossing 9. Obstruction			10. Explosion-detonation 11. Fire/violent rupture 12. Other impacts		
						13. Other (describe in narrative) 02		
8. Cars Carrying HAZMAT 0		9. HAZMAT Cars Damaged/Derailed 0		10. Cars Releasing HAZMAT 0		11. People Evacuated 0		12. Division SYSTEM
13. Nearest City/Town CRESTMONT			14. Milepost (to nearest tenth) 2.80		15. State Abbr Code N/A PA		16. County MONTGOMERY	
17. Temperature (F) (specify if minus) 84 F		18. Visibility (single entry) Code 1. Dawn 3. Dusk 2. Day 4. Dark 2		19. Weather (single entry) Code 1. Clear 3. Rain 5. Sleet 2. Cloudy 4. Fog 6. Snow 1		20. Type of Track Code 1. Main 3. Siding 2. Yard 4. Industry 1		
21. Track Name/Number WARMINSTER/SINGLE			22. FRA Track Code Class (1-9, X) 3		23. Annual Track Density (gross tons in millions) .5		24. Time Table Direction Code 1. North 3. East 1	
OPERATING TRAIN #1								
25. Type of Equipment Consist (single entry)			1. Freight train 2. Passenger train 3. Commuter train			4. Work train 5. Single car 6. Cut of cars		
			7. Yard/switching 8. Light loco(s). 9. Maint./inspect.car			A. Spec. MoW Equip. Code 3		26. Was Equipment Attended? 1. Yes 2. No 1
28. Speed (recorded speed, if available) Code R - Recorded E - Estimated 11 MPH R			30. Method(s) of Operation (enter code(s) that apply) a. ATCS g. Automatic block m. Special instructions b. Auto train control h. Current of traffic n. Other than main track c. Auto train stop i. Time table/train orders o. Positive train control d. Cab j. Track warrant control p. Other (Specify in narrative) Code(s) e. Traffic k. Direct traffic control f. Interlocking l. Yard limits			30a. Remotely Controlled Locomotive? 0 = Not a remotely controlled 1 = Remote control portable 2 = Remote control tower 3 = Remote control transmitter - more than one remotely controlled transmitter 0		
29. Trailing Tons (gross tonnage, excluding power units) 0								
31. Principal Car/Unit		a. Initial and Number	b. Position in Train	c. Loaded (yes/no)	32. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.			
(1) First involved (derailed, struck, etc)		N/A	1	yes	Alcohol		Drugs	
(2) Causing (if mechanical cause reported)		0	0	N/A	0		0	
						33. Was this consist transporting passengers? (Y/N) Y		
34. Locomotive Units		a. Head End	b. Mid Train	c. Rear End	35. Cars		a. Freight	b. Pass.
			b. Manual	c. Remote			c. Freight	d. Pass.
(1) Total in Train		4	0	0	(1) Total in Equipment Consist		0	0
(2) Total Derailed		3	0	0	(2) Total Derailed		0	0
36. Equipment Damage This Consist		141000	37. Track, Signal, Way, & Structure Damage		2500		38. Primary Cause Code H221	
							39. Contributing Cause Code N/A	
Number of Crew Members				Length of Time on Duty				
40. Engineer/Operators N/A	41. Firemen 0	42. Conductors 1	43. Brakemen 1	44. Engineer/Operator Hrs 0 Mi 33			45. Conductor Hrs 1 Mi 18	
Casualties to:	46. Railroad Employees	47. Train Passengers	48. Other	49. EOT Device? 1. Yes 2. No 2			50. Was EOT Device Properly Armed? 1. Yes 2. No N/A	
Fatal	0	0	0					
Nonfatal	N/A	0	23	51. Caboose Occupied by Crew? 1. Yes 2. No			2	
OPERATING TRAIN #2								
52. Type of Equipment Consist (single entry)			1. Freight train 2. Passenger train 3. Commuter train			4. Work train 5. Single car 6. Cut of cars		
			7. Yard/switching 8. Light loco(s). 9. Maint./inspect.car			A. Spec. MoW Equip. Code 3		53. Was Equipment Attended? 1. Yes 2. No 1
								54. Train Number/Symbol 1134
55. Speed (recorded speed, if available) Code R - Recorded E - Estimated 0 MPH R			57. Method(s) of Operation (enter code(s) that apply) a. ATCS g. Automatic block m. Special instructions b. Auto train control h. Current of traffic n. Other than main track			57a. Remotely Controlled Locomotive? 0 = Not a remotely controlled 1 = Remote control portable		

56. Trailing Tons (gross tonnage, excluding power units) 0		c. Auto train stop d. Cab e. Traffic f. Interlocking		i. Time table/train orders j. Track warrant control k. Direct traffic control l. Yard limits		o. Positive train control p. Other (Specify in narrative) Code(s) g N/A N/A N/A N/A		2 = Remote control tower 3 = Remote control transmitter - more than one remote control transmitter 0					
58. Principal Car/Unit (1) First involved (derailed, struck, etc) SEPTA 407		a. Initial and Number 1		b. Position in Train yes		c. Loaded (yes/no) yes		59. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box. Alcohol 0 Drugs 0					
(2) Causing (if mechanical cause reported) N/A		0		N/A		60. Was this consist transporting passengers? (Y/N) Y							
61. Locomotive Units		a. Head End		Mid Train b. Manual c. Remote		Rear End d. Manual c. Remote		62. Cars		Loade a. Freight b. Pass. c. Freight d. Pass. e. Caboose			
(1) Total in Train 4		0		0		0		(1) Total in Equipment Consist 0		0			
(2) Total Derailed 1		0		0		0		(2) Total Derailed 0		0			
63. Equipment Damage This Consist 36200		64. Track, Signal, Way, & Structure Damage 0		65. Primary Cause Code H221		66. Contributing Cause Code N/A		Number of Crew Members		Length of Time on Duty			
67. Engineer/Operators 1		68. Firemen 0		69. Conductors 1		70. Brakemen 1		71. Engineer/Operator Hrs 2 Mi 07		72. Conductor Hrs 2 Mi 02			
Casualties to: Fatal 0 Nonfatal 3		73. Railroad Employees 0		74. Train Passengers 15		75. Other 0		76. EOT Device? 1. Yes 2. No 2		77. Was EOT Device Properly Armed? 1. Yes 2. No N/A			
								78. Caboose Occupied by Crew? 1. Yes 2. No		2			
Highway User Involved						Rail Equipment Involved							
79. Type C. Truck-Trailer. F. Bus J. Other Motor Vehicle Code A. Auto D. Pick-Up Truck G. School Bus K. Pedestrian B. Truck E. Van H. Motorcycle M. Other (spec. in narrative) N/A						83. Equipment 3. Train (standing) 6. Light Loco(s) (moving) Code 1. Train (units pulling) 4. Car(s) (moving) 7. Light(s) (standing) 2. Train (units pushing) 5. Car(s) (standing) 8. Other (specify in narrative) N/A							
80. Vehicle Speed (est. MPH at impact) 0		81. Direction geographical 1. North 2. South 3. East 4. West N/A		Code N/A		84. Position of Car Unit in Train 0							
82. Position 1. Stalled on Crossing 2. Stopped on Crossing 3. Moving Over Crossing 4. Trapped N/A						85. Circumstance 1. Rail Equipment Struck Highway User 2. Rail Equipment Struck by Highway User N/A							
86a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? 1. Highway User 2. Rail Equipment 3. Both 4. Neither N/A						86b. Was there a hazardous materials release by 1. Highway User 2. Rail Equipment 3. Both 4. Neither N/A							
86c. State here the name and quantity of the hazardous materials released, if any. N/A													
87. Type of Crossing Warning Code(s) N/A N/A N/A N/A N/A N/A		1. Gates 2. Cantilever FLS 3. Standard FLS		4. Wig Wags 5. Hwy. traffic signals 6. Audible		7. Crossbucks 8. Stop signs 9. Watchman		10. Flagged by crew 11. Other (spec. in narr.) 12. None		88. Signaled Crossing Warning Code (See instructions for codes)		89. Whistle Ban Code 1. Yes 2. No 3. Unknown N/A	
90. Location of Warning 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach N/A				Code N/A		91. Crossing Warning Interconnected with Highway Signals 1. Yes 2. No 3. Unknown				Code N/A		92. Crossing Illuminated by Street Lights or Special Lights 1. Yes 2. No 3. Unknown N/A	
93. Driver's Age 0		94. Driver's Gender Code 1. Male 2. Female N/A		95. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train Code 1. Yes 2. No 3. Unknown N/A		96. Driver Code 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop 4. Stopped on Crossing 5. Other (specify in narrative) N/A							
97. Driver Passed Standing Highway Vehicle 1. Yes 2. No 3. Unknown N/A		Code N/A		98. View of Track Obscured by (primary obstruction) Code 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specify in narrative) 2. Standing Railroad Equipment 4. Topography 6. Highway Vehicle 8. Not obstructed N/A									
101. Casualties to Highway-Rail Crossing Users Killed 0 Injured 0				99. Driver Was 1. Killed 2. Injured 3. Uninjured N/A		Code N/A		100. Was Driver in the Vehicle? 1. Yes 2. No N/A		103. Total Number of Highway-Rail Crossing Users (include driver) 0			
104. Locomotive Auxiliary Lights? 1. Yes 2. No N/A		Code N/A		105. Locomotive Auxiliary Lights Operational? 1. Yes 2. No N/A		Code N/A		106. Locomotive Headlight Illuminated? 1. Yes 2. No N/A		Code N/A			
107. Locomotive Audible Warning Sounded? 1. Yes 2. No N/A		Code N/A		108. Locomotive Audible Warning Sounded? 1. Yes 2. No N/A		Code N/A		109. Locomotive Audible Warning Sounded? 1. Yes 2. No N/A		Code N/A			

108. DRAW A SKETCH OF ACCIDENT AREA INCLUDING ALL TRACKS, SIGNALS, SWITCHES, STRUCTURES, OBJECTS, ETC., INVOLVED.

A large, empty rectangular box with a thin black border, occupying most of the page. It is intended for the respondent to draw a sketch of the accident area, including tracks, signals, switches, structures, and objects involved.

109. SYNOPSIS OF THE ACCIDENT

SYNOPSIS OF THE ACCIDENT

All trains referred to in this synopsis are MU Commuter Trains.

Southbound SEPTA train 1143 collided head-on with a standing northbound SEPTA train 1134. on single main track . The accident occurred near Crestmont, Pennsylvania on July 1, 2006 at 2:54 p.m. EDT. The trains were operating on SEPTA's, single main track, at milepost 2.8 on the Warminster Line. Weather at the time of the accident was daylight and clear. The temperature was 84 degrees Fahrenheit.

There were a total of forty-four (44) non-life threatening injuries. Three train crew members and 23 passengers were injured on southbound train 1143. Three train crew members and 15 passengers were injured on northbound train 1134.

At 4:16 p.m. Abington Township police took precautionary measures and had forty people evacuated. At 4:44 p.m., a public announcement was made allowing everyone to return to their residence.

The southbound train consisted of four multiple unit locomotives (MU'S) . The first three MU's in the consist derailed. The northbound train consisted of four MU's. The lead MU derailed in the consist. Equipment damage to both trains, was estimated at \$177,200. Track damages were estimated at \$2,500.

The primary cause of the accident, is attributed to the engineer of the southbound train, for failing to comply with a displayed stop signal. The stop signal, an absolute/home signal, is located at Grove South Interlocking, at milepost 4.2 on single main track.

110. NARRATIVE

CIRCUMSTANCES PRIOR TO THE ACCIDENT

All times in the narrative are Eastern Daylight Time

Operating Train #1 - SEPTA TRAIN 1143 (Southbound)

The crew of Southeastern Pennsylvania Transportation Authority (SEPTA) Train 1143 South, included a locomotive engineer, a conductor, and an assistant conductor. The engineer reported for duty on July 1, 2006, at SEPTA's, Warminster Station, located at Warminster, PA. The recorded on duty time for the engineer, was 2:21 p.m.

The conductor reported for duty on July 1, 2006 at SEPTA's, Suburban Station, located at Philadelphia, PA. The recorded on duty time for the conductor was, 1:36 p.m. After acquiring all of the necessary paper work, the conductor deadheaded to Warminster Station. The conductor arrived at Warminster Station at 2:21 p.m.

The assistant conductor reported for duty on July 1, 2006 at SEPTA's Suburban Station, also located at Philadelphia, PA. The recorded on duty time for the assistant conductor was 7:46 a.m. After reporting for duty, the assistant conductor prepared to work an assignment, prior to working on train 1143, then deadheaded to Warminster Station. The assistant conductor arrived at Warminster, PA at 8:31 a.m. All crew members received more than the statutory off duty period, prior to reporting to duty.

Their assigned commuter train, SEPTA 1143, consisted of four MU Locomotives. The units were, SEPTA 224, 218, 454, and the 453. The train was scheduled to operate between Warminster Station and the Philadelphia International Airport. The train received a class two brake test at Warminster, prior to departing.

The train crew conducted a job safety briefing prior to boarding train 1143. The engineer made four separate attempts to contact the train dispatcher by radio, but had no success. After the fourth attempt, the engineer called the dispatcher on the phone.

The dispatcher asked the crew to inspect the pantographs on their train. The dispatcher also informed the crew that there were no mandatory directives(form D's) and they were good to go. Train 1143 departed Warminster station at 2:41 p.m.

At 2:43 p.m., train 1143 departed Hatboro station. At 2:49:05 p.m. train 1143 went by the stop signal indication at Grove South Interlocking, ran through a trailing point switch, and then made a station stop at Willow Grove, PA. Train 1143 departed Willow Grove at 2:50 p.m. and made a station stop at Crestmont at 2:51 p.m. At 2:52 p.m., Train 1143 departed Crestmont station and continued to operate in a south direction.

As the southbound train approached the accident area, the locomotive engineer was seated at the controls on the east side of the leading MU locomotive. The conductor was located in the lead MU collecting fares from passengers. The assistant conductor was located in the second MU, also collecting fares from passengers.

Approaching the point of collision, there are in succession, tangent track for 4300 feet, a 3-degree 15 minute curve to the right for 1547 feet to the point of collision, and 36 feet beyond that point. The grade approaching the accident area is a 0.70% descending grade for 1300 feet and a 0.45% descending grade southwardly, for 1900 feet to the point of collision.

Operating Train #2 - SEPTA TRAIN 1134 (Northbound)

The crew of SEPTA Train 1134 North included a locomotive engineer, a conductor, and an assistant conductor. The engineer reported for duty at SEPTA's Roberts Yard, located in Philadelphia, PA on July 1, 2006. The recorded on duty time for the engineer was 12:47 p.m.

The conductor also reported for duty at SEPTA's Roberts Yard, located in Philadelphia, PA on July 1, 2006. The recorded on duty time for the conductor was 12:52 p.m. After a job briefing, both the engineer and conductor deadheaded to Suburban Station.

The assistant conductor reported for duty at SEPTA's Suburban Station, located at Philadelphia, PA. on July 1, 2006. The recorded on duty time for the assistant conductor was 8:28 a.m., having to work on an earlier run, prior to train 1134. All crewmembers received more than the statutory off duty period, prior to reporting to duty.

Their assigned commuter train, number 1134, consisted of four SEPTA MU's, 407, 371, 370, and the 399. The train was scheduled to operate between Suburban Station, at Philadelphia, PA to Warminster, PA. The train received a class one brake test at SEPTA's Powelton Yard, at Philadelphia, PA before its departure.

After a job safety briefing the crew of SEPTA Train 1134 departed Suburban station at 2:04 p.m. Train 1134 made station stops on the main line at the Market East, Temple University, Wayne Junction, Fern Rock, Melrose Park, Elkins Park, Jenkintown-Wyncote, and Glenside stations.

At 2:44 p.m., SEPTA train 1134 went through Carmel Interlocking, diverting from the Main Line to the Warminster Line. Train 1134 made station stops at the Ardsley and the Roslyn Station. After departing Roslyn Station and continuing North, train 1134 came upon a stop and proceed indication displayed at Automatic Signal 505. Upon having a clear indication on the previous signal, the engineer took action to bring the train to a controlled stop. Train 1134 passed the stop and proceed signal indication at Automatic Signal 505 before coming to a complete stop, 119 feet past the signal.

The conductor came to the head end to find out why the train had stopped. The engineer informed the conductor that the signal at CP-Lynn displayed a clear indication and the 505 Automatic Signal was at a stop and proceed. The crew made three attempts to contact the train dispatcher via radio. At 2:52 p.m. while making a fourth attempt, the train dispatcher acknowledges the radio. The crew of train 1134 notified the train dispatcher about the signal indications at CP-Lynn and the 505 Automatic Signal. The train dispatcher acknowledged the information by saying "roger."

As train 1134 northbound, approached the accident area, the locomotive engineer was seated at the controls on the east side of the leading MU locomotive. The conductor was standing on the west side in the cab of the leading MU. The assistant conductor was in the lead MU taking tickets from passengers.

Nearing the point of collision, there are in succession, a segment of tangent track for 900 feet in length, a 2-degree curve to the right for 1300 feet, another section of tangent track for 1000 feet in length, and a 3-degree, 15 minute curve to the left for 36 feet to the point of collision, and 1547 feet beyond. The grade approaching the accident area is a 0.61% descending grade for 2100 feet, then a 0.26% ascending grade for 900 feet and finally, a 0.45% ascending grade northwardly for 400 feet to the point of collision.

The railroad timetable direction is north. The geographic direction is northeast. Timetable directions are used throughout this report.

THE ACCIDENT

Operating Train #1 - SEPTA TRAIN 1143 (Southbound)

SEPTA Train 1143 departed Crestmont Station and proceeded South at a recorded speed of thirty-nine (39) mph. Just prior to the accident, the train entered into a left-hand curve. The engineer saw the standing northbound train and initiated an emergency brake application. The engineer, then left his control station and ran through the commuter car, telling the passengers to "hold on." Shortly after, train 1143, collided with the standing southbound train, SEPTA 1134.

The engineer's view, approaching the point of collision, was limited to the 3-degree 15 minute curve to the right. Dense vegetation was present on the west side of the track. The engineer's site distance at this location on train 1143, to the head end of train 1134, was approximately 580 feet. At the point of collision, train 1143 was still moving at eleven(11) mph. These speeds were recorded by the event recorder of the controlling MU locomotive.

Operating Train #2 - SEPTA TRAIN 1134 (Northbound)

Operating on a clear signal indication, train 1134 approached the accident site. The next signal, Automatic Signal 505, displayed a stop and proceed indication. The engineer took immediate action to bring the train to a controlled stop. Train 1134 passed the stop and proceed signal, before coming to a complete stop, 119 feet past the signal. The conductor came to the head end to find out why the train had stopped. The engineer informed the conductor that the signal at CP-Lynn displayed a clear indication and the 505 Automatic Signal was at a stop and proceed.

The crew made three attempts to contact the train dispatcher via radio. At 2:52 p.m. while making a fourth attempt, the train dispatcher acknowledged the radio. The crew of train 1134 notified the train dispatcher about the signal indications at CP-Lynn and the 505 Automatic Signal.

After the dispatcher acknowledged the crew of 1134, both the engineer and conductor discussed as to why they would have a stop and proceed signal. Soon after, the engineer and conductor could see the southbound train approaching. They opened the vestibule door and told everyone sitting in the first couple of seats, "run forward, sit down and hold on." As the engineer and conductor ran back using the aisle way toward the second car, their train was struck, by Southbound Train 1143. The point of collision occurred on the Warminster Line, at milepost 2.8 on single main track.

Authorized Speed

The maximum authorized speed for trains is forty(40) mph, as designated in the current SEPTA Timetable Number 2, effective January 1, 2003.

After the collision

After the head on collision, both train crews broadcast over the radio, "emergency, emergency, emergency" to the SEPTA One Train Dispatcher. The crew of 1134 informed the train dispatcher that they were involved in a head on collision with a southbound train and that there were several injuries. At 2:58 p.m. the train dispatcher informed train 1134 that, police have been notified and emergency personnel are enroute. At 3:00 p.m., train 1134 notified the train dispatcher that medical assistance had arrived.

The following is a list of the organizations that responded:

Police	Fire	
Cheltenham	Abington	Jenkintown - Standby
Lower Moreland	Roslyn	Hatboro Fire Police
Jenkintown	Willow Grove	Glenside - Standby
Upper Moreland	Edge Hill	North Penn Goodwill - Relief/Food

Upper Dublin McKinley County Dept. Of Public Safety
SEPTA Weldon Ft, Washington -Standby
Abington

EMS

Second Alarmers Whitmarsh
Cheltenham VMSC Narberth
Ambler Trihampton
Springfield VMSC Lansdale
Bryn Athyn Burlnome
Plymouth

Federal Agencies

U.S. Department of Homeland Security Transportation Security Administration
National Transportation Safety Board

Initial reports indicate that six(6) passengers were transported to Holy Redeemer Hospital, seven(7) passengers were transported to Elkins Park Hospital, and three (3) SEPTA and fourteen(14) passengers were transported to Abington Memorial Hospital. At the time of the accident injury information indicates that there were reportable injuries to two(2) employees and one(1) passenger. They all were admitted at Abington Memorial Hospital for observation:

- One employee on duty (neck sprain/strain)
- One employee on duty (fracture, lower back)
- One passenger (bruise/contusion, forehead)

All other passengers and employees were evaluated, treated and released.

Since the time of the accident, there is a total of 34 reportable injuries.

At 4:16 p.m., Abington Township police evacuated 11 houses and forty people from the 1400 block of Grovonia. At 4:44 p.m., a public announcement was made that allowed everyone to return to their residence. This was done as a precautionary measure. There were no hazardous materials on the SEPTA trains.

ANALYSIS AND CONCLUSIONS

ANALYSIS

Post accident toxicological tests were performed on four crew members and the dispatcher. All tests were negative.

SEPTA signal personnel, in the presence of FRA, performed post accident signal tests. There were no exceptions noted and the signal system functioned as intended. On July 3, 2006, SEPTA conducted operational testing between CP-Lynn and Grove South interlocking with a test train. No exceptions were found during testing. Signal test records, event recorder and trouble history records were requested and reviewed. No signal defects were noted.

A playback of the Train Dispatcher Centralized Traffic Control (CTC), in the presence of SEPTA and FRA officials, showed eight(8) SEPTA trains, prior to train 1143, going through Grove South interlocking with train symbols properly tracking, no switch out of correspondence, or signal overrun alarms.

After the accident, event recorder data was down loaded, from the lead MU locomotive of the two(2) trains, SEPTA 224 and SEPTA 407. The event recorder data was analyzed by SEPTA at Wayne Electric Shops in Philadelphia, PA. This was done in the presence of SEPTA officials, FRA and NTSB investigators. The three (3) investigation teams reviewed the results of the analysis, and concurred with the following conclusions:

Moving SEPTA Train -1143

According to the event recorder data from MU locomotive, SEPTA 224, it departed Warminster Station at 2:41 p.m. The time is consistent with the engineer and conductor's statements and supported by the dispatcher record of train movement.

At 2:49:05 p.m. MU locomotive 224 went by the stop signal indication at Grove South Interlocking, with the throttle position in idle. It continued on at twenty-six(26) mph, and ran through a trailing point switch.

At 2:53 p.m. the engineer of MU locomotive 224, placed the brake valve handle into emergency position. The train was moving at eleven(11) mph at the point of impact.

Standing SEPTA Train -1134

According to the event recorder data from MU locomotive, SEPTA 407, the train departed Roslyn station at 2:47 p.m. and stopped 119 feet beyond the 505 Automatic Signal at 2:48 p.m. The train was stopped (0 mph) at the point of impact.

Records Inspections

Employee training and rules examination records for employees of trains 1134 and 1143 and the train dispatcher on duty, were reviewed. They disclosed no apparent indication of inadequate training or testing of the rules.

A records review of track inspections conducted over the previous 60 days revealed no significant track defects noted.

An inspection of equipment inspection records revealed that no mechanical defects were noted.

Applicable Federal Regulations

▸ The locomotive engineer on train 1143 was in violation of 49 CFR Part §240.305(a)(1) Operate a locomotive or train past a signal indication, excluding a hand or a radio signal indication or a switch, that requires a complete stop before passing it. SEPTA held a hearing as required by 49CFR Part §240.307.

▸ The locomotive engineer on train 1143 was in violation of Emergency Order Number 20. The engineer failed to communicate the indication of the signals at Grove North(Approach signal), Grove South(Stop signal), and the Automatic Signal 506(Stop and Proceed) to a designated crew member.

Applicable NORAC Operating Rules 8th Edition, Effective January 1, 2003

The locomotive engineer on train 1143 failed to follow the following NORAC operating rules.

- ▸ Rule D - Employee conduct
- ▸ Rule 94(b) - Calling signals on push pull trains
- ▸ Rule 244 - Signal requiring stop
- ▸ Rule 285 - Approach Signal
- ▸ Rule 292 - Stop Signal
- ▸ Rule 291 - Stop and Proceed Signal
- ▸ Rule 956 -Observing signals; Moving engines

Conclusions

1. After a formal review, it has been concluded that, neither the condition of the track, the signal system, the MU locomotives, the weather, drug or alcohol use, nor the engineer's work schedule, played any significant part of this accident.
2. The train and engine crew of the standing northbound train, SEPTA 1134, complied with SEPTA's Operational Procedures and did not contribute to the cause of the accident.
3. The call for emergency response was prompt and appropriate to the accident.
4. The computer software for train dispatching, disclosed several issues:
 - a. The audible alarm system does not have a unique alarm for trains that overrun signals.
 - b. SEPTA does not have a procedure in place for audible overrun signal alarms.
 - c. Because the systems audible alarms sound alike, train dispatchers become complacent, and do not focus on what triggered the alarm.

d. The interlocking signal will change to the color purple when the signal is overrun and then changes back to red after the train clears the interlocking. This occurs at several different interlocking signals. At other interlocking signals, the over run signal will maintain the purple color, until the train dispatcher resets the alarm.

The software is not consistent throughout the train dispatching center. During the course of events in this accident, the Grove South Interlocking Signal, changed to purple when SEPTA Train 1143 passed the stop signal, and then was restored to the color red, after train 1143 cleared the interlocking.

5. The engineer of southbound SEPTA Train 1143 failed to take appropriate action when approaching the stop signal indication located at Grove South Interlocking. This inaction resulted in the train passing the stop signal, then caused it to run through a trailing point switch, and finally collide with SEPTA Train 1134.

Probable Cause & Contributing Factors

Probable Cause

The engineer of SEPTA Train 1143, failed to comply with NORAC Operating Rule 292, Stop Signal. The absolute stop signal was displayed on single main track, at Grove South Interlocking, on SEPTA's Warminster Line. This corresponds with H221-Fixed Signal, Interlocking signal displaying a stop indication - failure to comply.

This is also a violation of 49 CFR Part §240.305(a)(1) Operate a locomotive or train past a signal indication, excluding a hand or a radio signal indication or a switch, that requires a complete stop before passing it. SEPTA held a hearing as required by 49CFR Part §240.307.

Contributing Factors

▸ The locomotive engineer on train 1143 was in violation of Emergency Order Number 20. The engineer failed to communicate the indication of the signals at Grove North(Approach signal), Grove South(Stop signal), and the Automatic Signal 506(Stop and Proceed) to a designated crew.

▸ The locomotive engineer on train 1143 failed to follow the following NORAC operating rules.

▸ Rule 94 b - Requirements applying to push-pull trains that do not have cab signals in service for the direction of movement, and are operating in territory where the maximum speed of trains exceeds 30 MPH:

▸ 1. When a wayside signal affecting the movement of the train displays an Approach, Medium Approach, Slow Approach, Restricting, of Stop and Proceed aspect, the engineer must verbally communicate to a qualified employee on the engine or train, the name and location of each signal, as soon as signal is clearly visible. In multiple track territory, the engineer must include the track number.

▸ Rule 285 - Approach Signal -Trains must proceed prepared to stop at the next signal. Trains exceeding Medium Speed must begin reduction to Medium Speed as soon as the engine passes the Approach Signal.

▸ Rule 291 - Stop and Proceed Signal - Stop, then proceed at Restricted Speed until the entire train has cleared all interlocking and spring switches