Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2007-28

Southeastern Pennsylvania Transportation Authority (SEPA)
Philadelphia, Pennsylvania
May 14, 2007

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.

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # HQ-2007-28

1.Name of Railroad Operating Train #1: Southeastern Pennsylvania Transportation Authority	1a. Alphabetic Code: SEPA	1b. Railroad Accident/Incident No.: 050407R007
2.Name of Railroad Operating Train #2: Southeastern Pennsylvania Transportation Authority	2a. Alphabetic Code: SEPA	2b. Railroad Accident/Incident No.: 050407R007
3.Name of Railroad Operating Train #3: N/A	3a. Alphabetic Code: N/A	3b. Railroad Accident/Incident No.: N/A
4.Name of Railroad Responsible for Track Maintenance: Southeastern Pennsylvania Transportation Authority	4a. Alphabetic Code: SEPA	4b. Railroad Accident/Incident No.: 050407R007
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 05 Day 14 Year 2007	7. Time of Accident/Incident: 04:52:00 ☐ AM ☑ PM

8. Type of Accident/Indicent (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) — Code: 03

9. Cars Carrying HAZMAT	10. HAZMAT Cars Damaged/Derailed	11. Cars Releasing HAZMAT	12. People Evacuated	13. Division
0	N/A	N/A	0	N/A

14. Nearest City/Town	15. Milepost (to nearest tenth)	16. State Abbr	16. State Code	17. County
PHILADELPHIA	0.06	N/A	PA	PHILADELPHIA

18. Temperature (F) (specify if minus)	19. Visibility (single entry) 1. Dawn 2. Day 3.Dusk 4.Dark — Code	20. Weather (single entry) 1. Clear 2. Cloudy 3. Rain 4. Fog 5.Sleet 6.Snow — Code	21. Type of Track 1. Main 2. Yard 3. Siding 4. Industry — Code
68 F	2	1	1

22. Track Name/Number	23. FRA Track Class (1-9, X) — Code	24. Annual Track Density (gross tons in millions)	25. Time Table Direction 1. North 2. South 3. East 4. — Code
MAIN #2	1	N/A	1

OPERATING TRAIN #1

26. 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	27. Was Equipment Attended? 1. Yes 2. No — Code	28. Train Number/Symbol
	2	1	6572

29. Speed (recorded speed, if available) R - Recorded E - Estimated	Code	30. Trailing Tons (gross tonnage, excluding power units)
6 MPH	R	0

31. Method(s) of Operation (enter code(s) that apply): a. ATCS; b. Auto train control; c. Auto train stop; d. Cab; e. Traffic; f. Interlocking; g. Automatic block; h. Current of traffic; i. Time table/train orders; j.Track warrant control; k. Direct traffic control; l.Yard limits; m.Special instructions; n. Other than main track; o. Positive train control; p. Other (Specify in narrative)

Code(s)				
d	N/A	N/A	N/A	N/A

31a. Remotely Controlled Locomotive? 0 = Not a remotely controlled; 1 = Remote control portable; 2 = Remote control tower; 3 = Remote control transmitter - more than one remote control transmitter: 0

32. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	SEPA 286	1	N/A
(2) Causing (if mechanical cause reported)	0	0	N/A

33. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.

Alcohol	Drugs
N/A	N/A

34. Was this consist transporting passengers? (Y/N): Y

35. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote
(1) Total in Train	5	0	0	0	0
(2) Total Derailed	0	0	0	0	0

36. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	0	5	0	0	0
(2) Total Derailed	0	0	0	0	0

37. Equipment Damage This Consist	38. Track, Signal, Way, & Structure Damage	39. Primary Cause Code	40. Contributing Cause Code
0	0	H222	H605

Number of Crew Members				Length of Time on Duty	
41. Engineer/ Operators	42. Firemen	43. Conductors	44. Brakemen	45. Engineer/Operator	46. Conductor
1	0	1	2	Hrs 5 Mi 32	Hrs 5 Mi 32

Casualties to:	47. Railroad Employees	48. Train Passengers	49. Other
Fatal	0	0	0
Nonfatal	2	0	0

50. EOT Device? 1. Yes 2. No: N/A

51. Was EOT Device Properly Armed? 1. Yes 2. No: N/A

52. Caboose Occupied by Crew? 1. Yes 2. No: N/A

OPERATING TRAIN #2

53. 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	54. Was Equipment Attended? 1. Yes 2. No — Code	55. Train Number/Symbol
	2	1	4646

56. Speed (recorded speed, if available) R - Recorded E - Estimated	Code
0 MPH	N/A

58. Method(s) of Operation (enter code(s) that apply): a. ATCS; b. Auto train control; g. Automatic block; h. Current of traffic; m.Special instructions; n. Other than main track

58a. Remotely Controlled Locomotive? 0 = Not a remotely controlled; 1 = Remote control portable

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57. Trailing Tons (gross tonnage, excluding power units): N/A

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): d | N/A | N/A | N/A | N/A

2 = Remote control tower
3 = Remote control transmitter - more than one remote control transmitter: 0

59. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	SEPA 206	2	N/A
(2) Causing (if mechanical cause reported)	0	0	N/A

60. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.

Alcohol	Drugs
N/A	N/A

61. Was this consist transporting passengers? (Y/N): Y

62. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote
(1) Total in Train	4	0	0	0	0
(2) Total Derailed	0	0	0	0	0

63. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	0	4	0	0	0
(2) Total Derailed	0	0	0	0	0

64. Equipment Damage This Consist: 2000

65. Track, Signal, Way, & Structure Damage: 0

66. Primary Cause Code: H222

67. Contributing Cause Code: H605

Number of Crew Members

68. Engineer/ Operators	69. Firemen	70. Conductors	71. Brakemen
1	0	1	2

Length of Time on Duty

72. Engineer/Operator: Hrs 2 Mi 0

73. Conductor: Hrs 2 Mi 0

Casualties to:	74. Railroad Employees	75. Train Passengers	76. Other
Fatal	0	0	0
Nonfatal	2	33	0

77. EOT Device? 1. Yes 2. No | N/A

78. Was EOT Device Properly Armed? 1. Yes 2. No | N/A

79. Caboose Occupied by Crew? 1. Yes 2. No | N/A

OPERATING TRAIN #3

80. 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: N/A

81. Was Equipment Attended? 1. Yes 2. No | Code: N/A

82. Train Number/Symbol: N/A

83. Speed (recorded speed, if available) Code: R - Recorded; E - Estimated: N/A MPH | N/A

84. Trailing Tons (gross tonnage, excluding power units): N/A

85. Method(s) of Operation (enter code(s) that apply)

a. ATCS; b. Auto train control; c. Auto train stop; d. Cab; e. Traffic; f. Interlocking; g. Automatic block; h. Current of traffic; i. Time table/train orders; j.Track warrant control; k. Direct traffic control; l.Yard limits; m.Special instructions; n. Other than main track; o. Positive train control; p. Other (Specify in narrative) Code(s): N/A | N/A | N/A | N/A | N/A

85a. Remotely Controlled Locomotive?
0 = Not a remotely controlled
1 = Remote control portable
2 = Remote control tower
3 = Remote control transmitter - more than one remote control transmitter: N/A

86. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	N/A	N/A	N/A
(2) Causing (if mechanical cause reported)	N/A	N/A	N/A

87. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.

Alcohol	Drugs
N/A	N/A

88. Was this consist transporting passengers? (Y/N): N/A

89. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote
(1) Total in Train	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

90. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

91. Equipment Damage This Consist: N/A

92. Track, Signal, Way, & Structure Damage: N/A

93. Primary Cause Code: N/A

94. Contributing Cause Code: N/A

Number of Crew Members

95. Engineer/ Operators	96. Firemen	97. Conductors	98. Brakemen
N/A	N/A	N/A	N/A

Length of Time on Duty

99. Engineer/Operator: Hrs N/A Mi N/A

100. Conductor: Hrs N/A Mi N/A

Casualties to:	101. Railroad Employees	102. Train	103. Other
Fatal	N/A	N/A	N/A
Nonfatal	N/A	N/A	N/A

104. EOT 1. Yes 2. No | N/A

105. Was EOT Device Properly 1. Yes 2. No | N/A

106. Caboose Occupied by Crew? 1. Yes 2. No | N/A

Highway User Involved

107. Code: A. Auto; B. Truck; C. Truck-Trailer.; D. Pick-Up Truck; E. Van; F. Bus; G. School Bus; H. Motorcycle; J. Other Motor Vehicle; K. Pedestrian; M. Other (spec. in narrative): N/A

108. Vehicle Speed (est. MPH at impact): N/A

109. geographical) Code: 1.North 2.South 3.East 4.West: N/A

Rail Equipment Involved

111. Equipment Code: 1.Train(units pulling); 2.Train(units pushing); 3.Train (standing); 4.Car(s) (moving); 5.Car(s) (standing); 6.Light Loco(s) (moving); 7.Light(s) (standing); 8.Other (specify in narrative): N/A

112. Position of Car Unit in: N/A

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110. Position 1.Stalled on Crossing 2.Stopped on Crossing 3.Moving Over Crossing 4. Trapped	Code N/A	113. Circumstance 1. Rail Equipment Struck Highway User 2. Rail Equipment Struck by Highway User	Code N/A
114a. 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	Code N/A	114b. Was there a hazardous materials release 1. Highway User 2. Rail Equipment 3. Both 4. Neither	Code N/A
114c. State here the name and quantity of the hazardous materials released, if any. N/A			

115. Type Crossing Warning 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								116. Signaled Crossing (See instructions for codes)	Code N/A	117. Whistle 1. Yes 2. No 3. Unknown	Code N/A
Code(s)	N/A	N/A	N/A	N/A	N/A	N/A	N/A				

118. Location of Warning 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach	Code N/A	119. Crossing Warning with Highway Signals 1. Yes 2. No 3. Unknown	Code N/A	120. Crossing Illuminated by Street Lights or Special Lights 1. Yes 2. No 3. Unknown	Code N/A

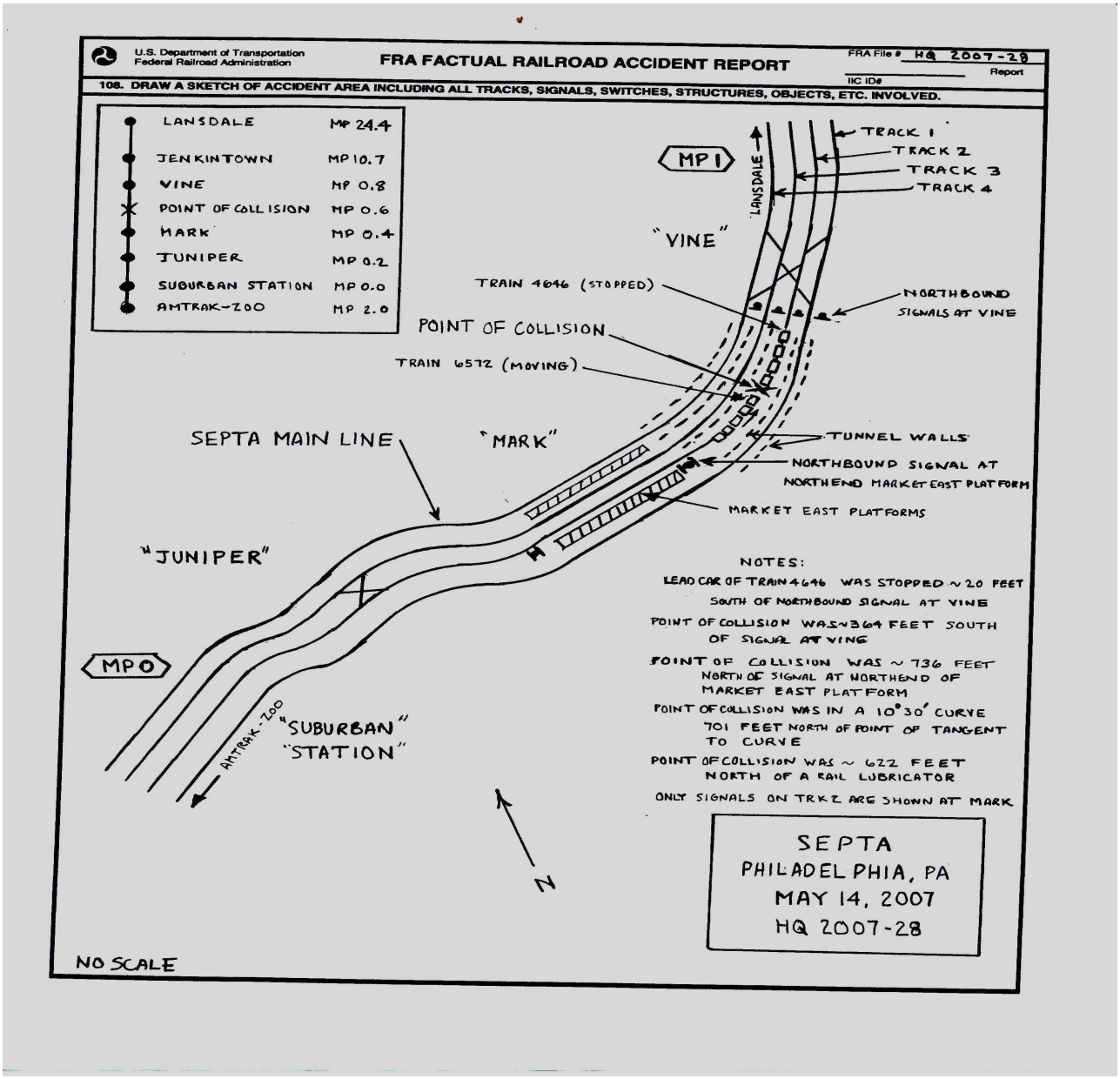
121. Age N/A	122. Driver's Gender 1. Male 2. Female	Code N/A	123. Driver Drove Behind or in Front of and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown	Code N/A	124. Driver 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop 4. Stopped on Crossing 5. Other (specify in narrative)	Code N/A

125. Driver Passed Highway Vehicle 1. Yes 2. No 3. Unknown	Code N/A	126. View of Track Obscured by (primary obstruction) 1. Permanent Structure 2. Standing Railroad Equipment 3. Passing Train 4. Topography 5. Vegetation 6. Highway Vehicle 7. Other (specify in narrative) 8. Not obstructed	Code N/A

Casualties to:	Killed	Injured	127. Driver 1. Killed 2.Injured 3. Uninjured	Code N/A	128. Was Driver in the Vehicle? 1. Yes 2. No	Code N/A
129. Highway-Rail Crossing Users	N/A	N/A	130. Highway Vehicle Property Damage (est. dollar damage)	N/A	131. Total Number of Highway-Rail Crossing Users (include driver)	N/A

132. Locomotive Auxiliary Lights? 1. Yes 2. No	Code N/A	133. Locomotive Auxiliary Lights Operational? 1. Yes 2. No	Code N/A
134. Locomotive Headlight Illuminated? 1. Yes 2. No	Code N/A	135. Locomotive Audible Warning Sounded? 1. Yes 2. No	Code N/A

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



137. SYNOPSIS OF THE ACCIDENT

A northbound Southeast Pennsylvania Transportation Authority, (SEPA), passenger train had a rear end collision with another northbound SEPA train on May 14, 2007 at 4:52 p.m. EST. Neither train derailed. The accident occurred in the Center City Commuter Tunnel, (CCCT), in Philadelphia at Vine Interlocking milepost 0.6.

There was minor equipment damage and no track or signal damage reported. There were 37 minor injuries, including 4 railroad employees and 33 passengers, reported to the Federal Railroad Administration, (FRA).

At the time of the accident in was daylight and clear with a temperature of 68° F.

The accident was caused by failure of the locomotive engineer to comply with restricted speed rules.

Failure of the crew to comply with an Automatic Block Signal or Interlocking Signal displaying other than a stop indication.

A contributing cause was failure of the crew to comply with restricted speed in connection with the restrictive indication of a bolck or interlocking signal.

138. NARRATIVE

CIRCUMSTANCES PRIOR TO THE ACCIDENT

The crew of Southeastern Pennsylvania Transportation Authority, (SEPA), train 6572, (operating train #1), included a locomotive engineer, a conductor, and two assistant conductors. They first went on duty at 6:20 a.m. EST on May 14, 2007, at SEPA's Suburban Station in Philadelphia, Pennsylvania. This was the home terminal for the crew members and they received more than the statutory off duty period prior to reporting for duty. On this day both the engineer and the conductor were provided an interim release period of 5 hours at Suburban Station. The release period was from 9:32 a.m. to 2:32 p.m. EST. They were finally released from duty at 8:25 p.m. for a total of 9 hours and 10 minutes on duty.

The crew of SEPA train 4646, (operating train #2), included a locomotive engineer, a conductor, and two assistant conductors. They first went on duty at 2:42 p.m. EST. May 14, 2007, at SEPA's West Trenton terminal. This was the home terminal for all crew members and all received more than the statutory off duty period prior to reporting for duty.

Train 6572 was re-crewed at Suburban Station at about 4:46 p.m. EST. The out-going engineer informed the new engineer that a Class II brake test and a running brake test was done between Powelton Yard and Suburban Station.

Train 6572 consisted of 5 cab cars, (individually powered units). Lead unit 286 followed by 153, 154, 381 and 380. This train was re-crewed at Suburban Station. The previous engineer relayed to the new engineer that everything was OK with the brakes and the mechanical condition of the train.

Train 4646 consisted of 4 cab cars, (individually powered units). Lead unit 255 followed by 203, 9015 and 206.

The engineer on train 6572 was the only person in the cab at the time of the accident. Other crew members were located in cars 286, 154 and 381- first, third and fourth respectively.

The engineer on train 4646 was the only person in the cab when struck by train 6572. Other crew members were located in the rear car, 206.

Both trains, 6572 and 4646 normally operate northward through the Center City Commuter Tunnel, (CCCT), on track number 1. Earlier in the day, train service through the CCCT had been interrupted by an unrelated bomb scare that caused several delays. This caused another northbound train, 6844, to remain on track number 1 at Suburban Station waiting for a re-crew. Due to this, trains 4646 and 6572 were routed to track number 2.

Train 4646 made a routine stop at Market East passenger station, milepost 0.50, at 4:48 p.m. EST which was 8 minutes behind schedule. Upon departure, the engineer radioed the dispatcher at the Regional Rail Operations Center, (RROC), and advised of the necessity to cross back over to track number 1 for their scheduled stop at North Broad Street passenger station, milepost 2.90. The dispatcher complied and began to follow procedures for setting up signals for crossing over to track number 1. This required train 4646 to stop at Vine 4E signal, milepost 0.80, at 4:51 p.m. EST.

At this time the engineer of train 6572 was taking charge of his train at Suburban Station, milepost 0.0.

In the area of this accident the track is on a 10 ½° curve to the left. The grade of the track is level.

The railroad timetable direction is northbound, which is used throughout this report.

THE ACCIDENT

Train 6572 departed Suburban Street passenger station at 4:48:38 p.m. EST in a northbound direction. The following are sequential signal aspects, time received, and train speed:

- **Suburban 4E signal "clear" 4:48:53 18 mph**
- **Juniper signal "approach" 4:49:09 23 mph**
- **Cab signal drops to "restricting" 4:49:16 22 mph**
- **Mark 14E "restricting" 4:49:58 0 mph**
- **Mark 4E "restricting" 4:52:20 14 mph**

After stopping at Market East station between 4:49:58 and 4:52:20 EST, train 6572 gained speed up to 17 mph. At this time he was, unknowingly, about 204 feet from the rear end of train 4646, who was still stopped at Vine 4E signal. Train 6572 then initiated a service brake application. A few seconds later an emergency brake application. Speed dropped to 14 mph just 83 feet behind train 4646. Impact into train 4646 was at 6 mph. The impact caused both trains to move ahead about 9 feet.

The engineer immediately radioed the dispatcher and reported he had just run into a train ahead. He did not initiate an "emergency" call as prescribed by Federal Regulations. The dispatcher asked for a repeat.

The engineer on train 6572 first noticed the train ahead by seeing the rear marker lights reflecting on the tunnel walls about a car length away. This is when he claims he initiated an emergency brake application.

Supervisors were dispatched to the scene within several minutes. There were multiple, minor, injuries on board due to the force of the impact. The two trains were coupled but not derailed. Both trains were thoroughly inspected and found to be safe for movement although they could not be separated at this time. Supervisors on the scene made a decision to transport all injured people, via this train, to Temple University station. They arrived at Temple at about 5:25 p.m. EST. At this point the injured were transported to area hospitals by emergency personnel by 5:45 p.m. EST.

ANALYSIS and CONCLUSIONS

Investigation of the accident included a review of the hours of service performance for all employees involved. All employees were in compliance with the number of hours worked within the 10 days prior to this accident. There were, however, several missing hours of service records.

FRA took no exceptions to an observation of a single car brake test on cab car 286 after the accident.

The weather conditions at the time of the accident were favorable with a temperature of 68°F clear and dry.

A rail greaser is located between Market East and Vine Interlocking. Examination of the rail in this area revealed no conditions that could have contributed to the accident.

Wayside signals and radio communications were inspected. Both systems were found to be working as intended and did not contribute to the accident.

Post accident inspection of train 6572 including cab cars 286, 153, 154, 381 and 380 revealed defective wheel slip tanks in cars 154 and 380. (Supervisor's memo, (attached), refers to cab car #381 with a defective wheel slip tank. However, SEPA's "Vehicle History Report" indicates the two cars with defective wheel slip tanks were 154 and 380). These defects did not contribute to the accident.

Data from the event recorder was used to determine if there were problems with the effects of braking on train 6572. The Rail Equipment Engineering Department concluded that brakes worked as intended and deceleration of train 6572 was normal under the current conditions.

Train 6572 was originally in charge of another engineer. A change of crew took place at Suburban Station at about 4:46 p.m. EST.

The new engineer operated the train from Suburban Station to Market East with no unusual occurrences. After stopping at Market East, he proceeded under a "restricting" signal, meaning the next signal at Vine would be either "Restricting" or "Stop". He reached a top speed of 17 mph, 2 mph over permitted speed in this situation. About this time the engineer stated he saw red reflective lights on the tunnel wall ahead about 267 feet. He initiated a full service brake application but did not seem to slow down, so then he placed the brakes in "emergency". At this point he was about 83 feet from the rear of train 4646 sitting at Vine. The train was being operated in excess of the restricted speed rule.

Restricted speed defined: All movements at restricted speed must be prepared to stop within one half the range of vision. The movement must be controlled in such a manner that permits stopping short of other trains or equipment occupying or fouling the rail envelope, obstructions on the track, improperly lined switches, derails set in derailing position, any signal requiring a stop, looking out for broken rail and not exceeding the speed limitation assigned to the particular track segment (15 mph within interlocking limits, 20 mph outside interlocking limits, or less when lesser civil speeds apply).

Railroad officials acted appropriately in response to the accident by transporting injured passengers and employees as quickly as possible for medical attention.

The engineer was tested under the authority of 49 CFR 219 Subpart C. The tests results were negative.

CONCLUSION

The engineer of train 6572 did not operate within restricted speed rules.

PROBABLE CAUSE & CONTRIBUTING FACTORS

A contributing cause was failure of the crew to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal.

The FRA found that this accident occurred because the engineer failed to comply with provisions of restricted speed.