Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2007-01

Massachusetts Bay Transit Authority
Woburn, MA
January 9, 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-2007-1

1.Name of Railroad Operating Train #1: Massachusettes Bay Transit Authority [MBTA]	1a. Alphabetic Code: MBTA	1b. Railroad Accident/Incident No.: 0520
2.Name of Railroad Operating Train #2: N/A	2a. Alphabetic Code: N/A	2b. Railroad Accident/Incident No.: N/A
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: Massachusetts Bay Commuter RR **** [MBAX]	4a. Alphabetic Code: MBAX	4b. Railroad Accident/Incident No.: 0520
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 01 | Day 09 | Year 2007	7. Time of Accident/Incident: 01:38: ☐ 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: 09

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

14. Nearest City/Town	15. Milepost *(to nearest tenth)*	16. State Abbr	16. State Code	17. County
Woburn	10.40	N/A	MA	MIDDLESEX

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
43 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. West — Code
Main Track No. 2	3	N/A	2

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
3	1	322 South

29. Speed *(recorded speed, if available)* R - Recorded E - Estimated — Code	31. Method(s) of Operation *(enter code(s) that apply)*	31a. Remotely Controlled Locomotive?
62 MPH — R	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)*	0 = Not a remotely controlled; 1 = Remote control portable; 2 = Remote control tower; 3 = Remote control transmitter - more than one remote control transmitter

30. Trailing Tons *(gross tonnage, excluding power units)*: 0

Code(s): e | N/A | N/A | N/A | N/A

31a. Remotely Controlled Locomotive?: 0

32. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded *(yes/no)*
(1) First involved *(derailed, struck, etc)*	1644	1	no
(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
0	1

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	0	0	0	1	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	1	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
$450,000.00	$206,000.00	H499	M599

Number of Crew Members: 41. Engineer/ Operators	42. Firemen	43. Conductors	44. Brakemen
1	0	1	1

Length of Time on Duty: 45. Engineer/Operator	46. Conductor
Hrs 2 Mi 20	Hrs 2 Mi 20

Casualties to:	47. Railroad Employees	48. Train Passengers	49. Other
Fatal	2	0	0
Nonfatal	4	10	0

50. EOT Device? 1. Yes 2. No — 2

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
N/A	N/A	N/A

56. Speed *(recorded speed, if available)* R - Recorded E - Estimated — Code	58. Method(s) of Operation *(enter code(s) that apply)*	58a. Remotely Controlled Locomotive?
0 MPH — N/A	a. ATCS; b. Auto train control; g. Automatic block; h. Current of traffic; m.Special instructions; n. Other than main track	0 = Not a remotely controlled; 1 = Remote control portable

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # HQ-2007-1

57. 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): N/A | N/A | N/A | N/A | N/A

2 = Remote control tower
3 = Remote control transmitter - more than one remote control transmitter: N/A

59. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded *(yes/no)*
(1) First involved *(derailed, struck, etc)*	0	0	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
0	0

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

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	0	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	0	0	0	0
(2) Total Derailed	0	0	0	0	0

64. Equipment Damage This Consist: $0.00

65. Track, Signal, Way, & Structure Damage: $0.00

66. Primary Cause Code: N/A

67. Contributing Cause Code: N/A

Number of Crew Members

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

Length of Time on Duty

72. Engineer/Operator: Hrs 0 Mi 0

73. Conductor: Hrs 0 Mi 0

Casualties to:	74. Railroad Employees	75. Train Passengers	76. Other
Fatal	0	0	0
Nonfatal	0	0	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)*
R - Recorded
E - Estimated
Code: N/A MPH 0

84. Trailing Tons *(gross tonnage, excluding power units)*: 0

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)*	0	0	N/A
(2) Causing *(if mechanical cause reported)*	0	0	N/A

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

Alcohol	Drugs
0	0

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	0	0	0	0	0
(2) Total Derailed	0	0	0	0	0

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

91. Equipment Damage This Consist: $0.00

92. Track, Signal, Way, & Structure Damage: $0.00

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
0	0	0	0

Length of Time on Duty

99. Engineer/Operator: Hrs 0 Mi 0

100. Conductor: Hrs 0 Mi 0

Casualties to:	101. Railroad Employees	102. Train	103. Other
Fatal	0	0	0
Nonfatal	0	0	0

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: N/A
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)*

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

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

Rail Equipment Involved

111. Equipment Code: N/A
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)*

112. Position of Car Unit in: 0

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # HQ-2007-1

110. Position	Code	113. Circumstance	Code
1.Stalled on Crossing 2.Stopped on Crossing 3.Moving Over Crossing 4. Trapped	N/A	1. Rail Equipment Struck Highway User 2. Rail Equipment Struck by Highway User	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	N/A	114b. Was there a hazardous materials release 1. Highway User 2. Rail Equipment 3. Both 4. Neither	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
Code(s)	N/A	N/A	N/A	N/A	N/A	N/A	N/A					

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

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

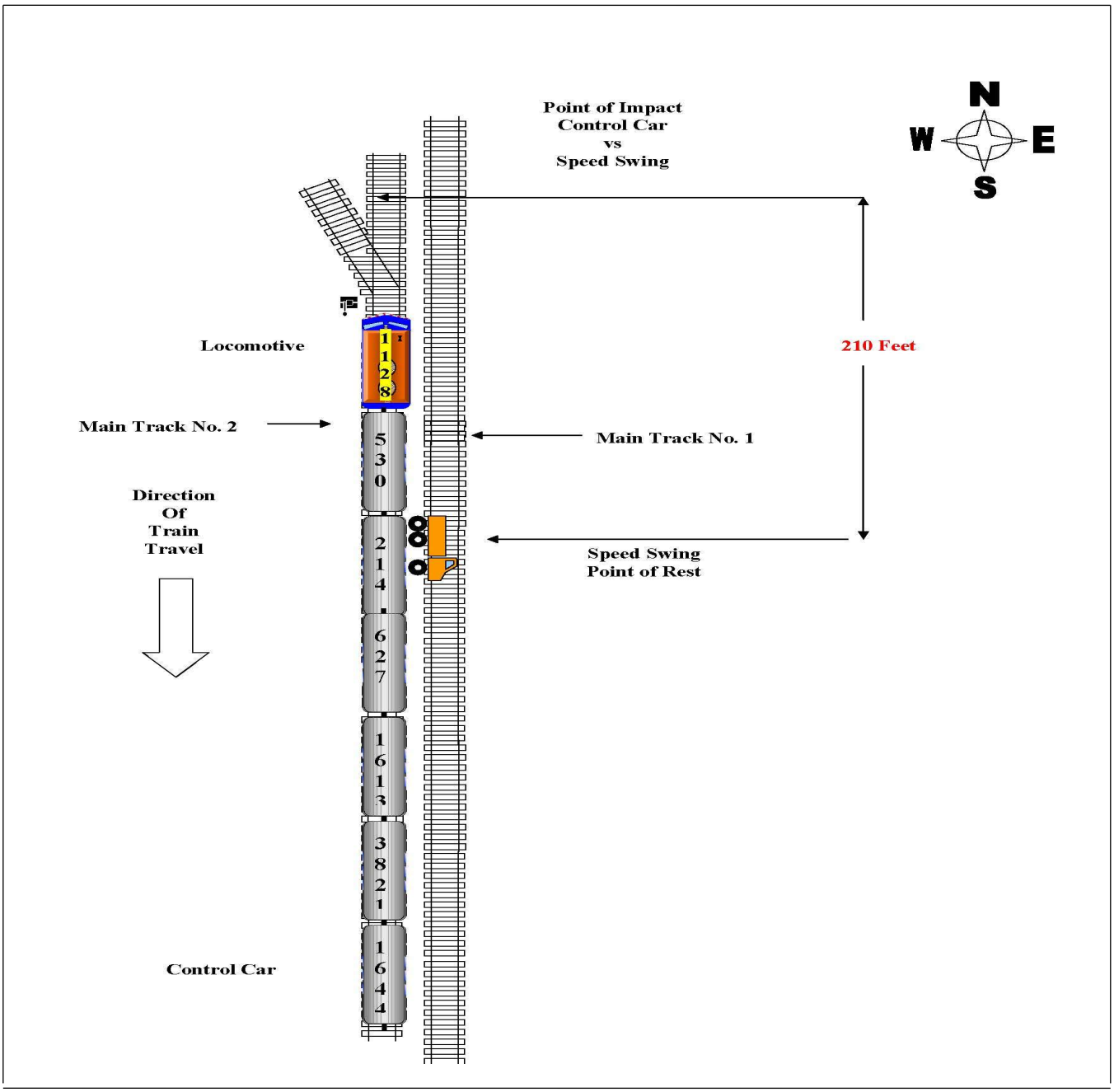
121. Age	122. Driver's Gender 1. Male 2. Female	Code	123. Driver Drove Behind or in Front of and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown	Code	124. Driver 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop 4. Stopped on Crossing 5. Other *(specify in narrative)*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

125. Driver Passed Highway Vehicle 1. Yes 2. No 3. Unknown	Code	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		N/A

Casualties to:	Killed	Injured	127. Driver 1. Killed 2.Injured 3. Uninjured	Code	128. Was Driver in the Vehicle? 1. Yes 2. No	Code
				N/A		N/A
129. Highway-Rail Crossing Users	0	0	130. Highway Vehicle Property Damage *(est. dollar damage)*	0	131. Total Number of Highway-Rail Crossing Users *(include driver)*	0

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

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



137. SYNOPSIS OF THE ACCIDENT

A southbound MBTA/MBAX commuter train collided with a roadway maintenance machine on January 9, 2007, at 1:38 p.m. EST. The collision occurred in Woburn, Massachusetts, at MBAX Milepost 10.38, on the New Hampshire Route Main Track No. 2.

At the time of the accident, six maintenance of way employees (MoW) were engaged in replacing switch ties at milepost 10.40. Two MoW employees were killed, one was seriously injured, and three others sustained minor injuries. There were no injuries to the train crew. Damages to the train equipment were estimated at $450,000, damages to track structure were $111,000, and the damage to the roadway maintenance machine was estimated at $95,000. In addition, 43 passengers were evacuated from Train 322 South with 10 reportable injuries. There was no derailment.

At the time of the accident, it was daylight and clear. The temperature was 43 F.

The MoW employees contributed to the severity of the accident by not erecting a shunting barricade at each end of the out-of-service track limits, as required by MBAX System Timetable Special Instruction No. 133-S1 and MBAX Roadway Worker Protection Manual Rule No. 321 (Exclusive Track Occupancy - Protection Out-of-Service).

The probable cause of the accident was removal of blocking devices by the train dispatcher which allowed a train to enter an out-of-service track occupied by MoW employees.

138. NARRATIVE

CIRCUMSTANCES PRIOR TO THE ACCIDENT

At 7:00 a.m., on Tuesday, January 9, 2007, an MBTA/MBAX train dispatcher reported for duty at the Cobble Hill Train Dispatching Office in Somerville, MA to work the Boston West territory. This was not her regularly assigned duty, but rather she was called for this job from the extra board.

At 7:30 a.m., six MoW employees (a track foreman, machine operator, and four additional MoW employees) reported for duty at Wilmington , MA. The foreman spoke with his supervisor and was instructed to replace switch ties on the New Hampshire Route, Main Track No. 2, at about milepost 10.40. The six MoW employees intended to use a Pettibone Speed Swing to replace the switch ties. The operator of the equipment checked the fuel and oil and started the Speed Swing. The foreman instructed the operator to drive the speed swing to the Woburn Public Delivery switch.

At approximately 11:20 a.m., an engineer, conductor, and assistant conductor went on duty at North Station to operate MBTA Train 319 en route to Lowell, MA. Upon arrival at Lowell, the crew and equipment turned to represent MBTA Train 322 to operate from Lowell back to Boston.

At 9:32 a.m., the dispatcher issued Form D No. M301 (Authority to occupy the main track), via radio, to a track foreman to operate track patrol Track Car No. TC 24293 south on Main Track No. 2 from CPF-BY (milepost 24.66) to Shop (milepost 20.30) in order to inspect track.

At 9:30 a.m., the gang arrived at Woburn. The track foreman called the Boston West dispatcher at 9:40 a.m., via cell phone, and requested a Form D Line 4 (remove track from service), Track No. 2 out of service between Crawford Interlocking (milepost 12.60) and Winchester Interlocking (milepost 7.90). The dispatcher told the foreman that she needed to run a track patrol through that area and could not give him the Form D until after the track patrol cleared the block. The foreman informed the dispatcher that he had already made arrangements with the track patrol to give permission through his out of service track. The dispatcher then issued Form D No. M302 at 9:45 a.m., which contained line 13, instructions to be clear at 3:00 p.m. The

foreman conducted an on-track safety briefing before the gang began the work.

When the train dispatcher issued Form D M302 to the track foreman, the dispatching machine recorded the track between Crawford and Winchester Interlockings as blocked. When the track between these two points was blocked the signals authorizing entry into that section of track displayed a red aspect which was a stop indication for any approaching trains. This was verified by the playback of the dispatchers signal system model board.

At 9:49 a.m., the train dispatcher issued Form D M303, via radio, to another track foreman (TC 70400) with Line 4 authority, Main Track 2 out of service between Shop (milepost 20.30) and Wilmington (milepost 15.20). This Form D also contained Line 13 instructions to be clear at 3:00 p.m.

On the day of the accident, the Signal Department was repairing the active warning devices at Central Street Crossing (milepost 26.0) on the Fitchburg Route. As a result, at 10:29 a.m., the Boston West dispatcher issued Form D M304 to eastbound Train No. 418 with Line 12 instructions to flag and protect Central Street Crossing. At 10:32, she issued Form D M305 to westbound Train No. 419 to flag and protect the same crossing.

At 10:48 a.m., the Boston West dispatcher issued a second Form D (M306) to the foreman of TC 24293 with Line 2 instructions to operate south on Main Track No. 1 between Shop (milepost 20.30) and Wilmington (milepost 15.20). The Form D contained Line 13 instructions to be clear at 11:20 a.m.

The Boston West dispatcher then issued Form D M307 at 10:59 a.m. to westbound Train No. 421, while the train was at Boston North Station, with Line 12 instructions to flag and protect Central Street Crossing. At 11:16 a.m., she issued Form D M308 to eastbound Train No. 420, while the train was at Fitchburg, to flag and protect the same crossing.

At 11:18 a.m., the Boston West dispatcher then issued an addition to Form D M306 with Line 2 authority to the TC 24293 to operate south on Main Track No. 2 between Wilmington (milepost 15.20) and Wilbur (milepost 12.90). At 11:42 a.m., she issued another Line 2 addition to Form D M306 to operate south on Main Track No. 2 between Wilbur (milepost 12.90) and Crawford (milepost 12.60).

Shortly after 11:42 a.m., the operator of the TC 24293 received permission from the foreman to enter the out-of-service track at Crawford. When the TC 24293 passed the work location at milepost 10.40, the Speed Swing was clear of Main Track No. 2, with the operator in the cab eating lunch.

In order to protect the Central Street Crossing, at 12:35 p.m., the Boston West dispatcher issued Form D M309 to eastbound Train No. 422 at Fitchburg, and at 12:38 p.m., she issued Form D M310 to eastbound Extra Engine 1016 at CPF-AY (milepost 35.75) on the Fitchburg Route to protect the same crossing. These Form D's were all issued via cell phone.

At 12:48 p.m., the dispatcher issued a third Form D (M311), via radio, to the track foreman of the TC 24293 to operate south on Main Track No. 2 between Winchester (milepost 7.90) and Somerville Jct. (milepost 3.20). The Form D also included Line 3 instructions to follow Train 320 into the block ahead and Line 13 instructions to be clear by 1:30 p.m. She also asked if they picked up an additional track car by the north track and the track foreman on TC 24293 confirmed that he had picked up an additional track car. This was also reflected on Form D M311.

The dispatcher then issued a Rule 241 for the TC 24293 (plus one) to proceed by the stop signal at Winchester to proceed south on Track No. 2. She asked if the foreman intended to drop down to Track No.1 and clear in Yard 10. The foreman stated that once he got to Somerville Jct. he would go Track No. 2 to Tower A and the additional track car would go to the East Route. The dispatcher acknowledged the transmission.

At 1:00 p.m., the dispatcher issued Form D M312, via cell phone, to westbound train No. 423, while the train was at North Station, to protect the Central Street Crossing.

At 1:10 p.m., the dispatcher radioed TC 24293 and asked if they were clear of Winchester. TC 24293 replied that they were clear of Winchester and the dispatcher acknowledged the reply. At this point, the track car was

now clear of the out-of-service track between Crawford and Winchester.

At 1:19 p.m., TC 24293 radioed the dispatcher and told her that they were stopped at Somerville Jct. and ready for a Rule 241 Authority. The dispatcher acknowledged the transmission and issued a Form 241 from Track No. 2 to Track No. 2 at Somerville Jct. TC 24293, repeated the Rule 241 instructions and the dispatcher confirmed it.

At 1:20 p.m., the track foreman on TC 70400 radioed the Boston West dispatcher stating that he was close to Shop and requested a Rule 241 to operate north into the yard. The dispatcher replied that she had MBTA Train 322 lined at Shop to drop down around him and when the train cleared Shop she would issue his authority. The foreman acknowledged the transmission.

At approximately 1:22 p.m., MBTA Train 322 left Lowell operating south on Main Track No. 2. The train continued to operate on Track No. 2 until crossing over to Main Track No. 1 at Shop Interlocking. At Wilmington Interlocking, MBTA Train 322 crossed back over to Main Track No. 2 and made a station stop at Anderson Station, which is at Crawford Interlocking.

At 1:24 p.m., TC 24293 radioed the dispatcher and stated that he had cleared Somerville Jct. and that Form D M311 was fulfilled at 1:25 p.m. The track patrol was now two blocks south of the out-of-service track between Crawford and Winchester. The dispatcher acknowledged and confirmed the transmission.

At 1:26 p.m., the TC 70400 foreman radioed the dispatcher however received no answer. At 1:27 p.m., the dispatcher answered TC 70400 and told him to stand by. The foreman acknowledged the transmission. The dispatcher then immediately got back to the foreman and asked if he was ready for a Rule 241 authority to operate to the Shop lead. The foreman confirmed that he was ready and the dispatcher issued a Rule 241 authority to operate past the stop signal on Track No. 2 to proceed north into the yard. The foreman repeated the instructions and the dispatcher confirmed the transmission.

At 1:29:54, the dispatching system recorded the train dispatcher requesting the removal of the blocking devices from the out-of-service track between Crawford and Winchester. At 1:30:07, the system unblocked the track segment. This information was verified by the dispatchers computer record of commands.

At 1:32 p.m., a signal maintainer telephoned the dispatcher and told her that the Central Street crossing was back in service. The dispatcher acknowledged the maintainer and stated that MBTA Trains 423 and 422 still had Form D's in effect, reqiring them to stop and protect the crossing. She further stated that she would notify MBTA Train 423 to cancel their Form D because they were far enough away; however, she would allow Train 422 to fulfill their Form D.

The following significant events occurred within a 22-second time period. The dispatchers computer record of commands indicates the dispatcher called for L4 signal at Crawford at 1:32:21 p.m. At 1:32:35 the dispatchers computer record of commands recorded the train dispatcher requesting the removal of blocking devices between Winchester and Somerville Jct. These limits had just been released by the MoW operator of TC 24293. At 1:32:43 p.m., L4 signal at Crawford, leading to the out-of-service track between Crawford and Winchester, indicated clear. At 1:33:10 p.m., MBTA Train 322 entered Crawford on a clear signal indication.

At 1:33 p.m., the TC 70400 foreman radioed the dispatcher and reported clear of his work area between Shop and Wilmington, which was two blocks north of the Crawford/Winchester block. The foreman said that he would give the dispatcher back her permit in a minute and the dispatcher acknowledged his transmission.

At 1:34 p.m, the dispatcher telephoned the Pan Am Railway's District 3 Train Operations Manager (dispatcher) and stated that the Central Street Crossing was back in service and the blocking devices could be removed. She also received a train update from the Pan Am Railway's dispatcher.

At 1:38 p.m., the dispatcher radioed MBTA Train 423 to cancel Form D M312 and the engineer acknowledged the transmission. The dispatcher then radioed the MoW TC 70400 foreman. The foreman informed the dispatcher that he wanted to cancel Form D M303. The dispatcher acknowledged and canceled the Form D at 1:39 p.m. The foreman repeated the instructions and the dispatcher acknowledged his repeat.

THE ACCIDENT:

MBTA Train 322 was routed at Crawford with signal indication south on to the Main Track No. 2. At 1:37:18 the train entered the work limits at CP Crawford. While operating at a recorded speed of 62 mph, the engineer observed the MoW crew as he operated through a 1-degree 54-minute left hand curve under the Salem Street overhead bridge (milepost 10.59). Maximum authorized speed for this train is 60 mph. The engineer immediately sounded the control cab whistle and simultaneously placed the train into an emergency brake application, which was verified by the control cab download information.

At 1:38 p.m., the watchman/lookout assigned to the MoW gang saw MBTA Train 322 approaching the work location on Main Track No. 2. He immediately sounded his hand held air horn and attempted to warn the MoW gang of the train's approach. Upon hearing the warning sounded by the watchman/lookout, the operator of the Speed Swing sounded his horn, looked in his rear view mirror and realized that the train was on Track No. 2. He opened the door of the Speed Swing and jumped to the ground to avoid injury as a result of the impending impact. The train struck the equipment throwing it forward approximately 210 feet fatally injuring two MoW employees who were standing in Main Track No. 2 directly in front of the Speed Swing.

At 1:39 p.m., the engineer of MBTA Train 322 telephoned the Boston West dispatcher and reported that he hit a piece of track equipment near the public delivery switch. He said that his radio was dead and they had no communication. He also stated that they needed ambulances and emergency equipment right away.

The dispatcher then called over to the chief dispatcher and told him that Train 322 hit track equipment and it was her fault. She stated, “I pulled down the wrong freaking` block and he hit something.” As a result of the accident, two members of the MoW crew were fatally injured, one was seriously injured, and the three other members were treated and released from the hospital. Forty-three passengers were evacuated from the train and 10 passengers were reported injured.

MBAX’s Cobble Hill dispatching office personnel placed emergency calls to the Woburn Police and Fire Departments. According to the assistant conductor of Train 322, Woburn Police, Fire, and Ambulance arrived at the accident scene within 15 minutes. MBTA Police arrived shortly after.

ANALYSIS:

All three train crew members of MBTA Train 322 and the Boston West dispatcher had proper rest prior to their assignments. This was a regular assignment for the train crew. They were all NORAC Rules qualified and were qualified on the physical characteristics.

The dispatcher was a NORAC Rules qualified extra board employee. She was also qualified on the physical characteristics.

The MoW foreman involved in the accident was qualified on the NORAC Operating Rules, MBAX RWP Rules, and the physical characteristics of the portion of out-of-service track under his control.

The event recorder of locomotive number 1128 and control car 1644 was downloaded on January 10, 2007. MBTA Train 322's recorded speed immediately prior to the accident was 62 mph. The event recorder also confirmed that an emergency brake application was made and the trains’s air brake system was working as intended. An analysis of the download records indicated that the locomotive engineer was in compliance with all applicable railroad operating and train handling requirements. MBCR maintenance records also indicate that a proper Class 1 brake test was performed on Train 322's consist at 6:00 a.m. on January 9, 2007. Also, a post accident inspection was performed on control car 1644 and confirmed that the headlights and horn were operating properly. All downloads and inspections were performed by MBAX mechanical personnel.

An FRA review of MBAX track inspection records indicated that the New Hampshire Route Main Line was inspected in accordance with all applicable Federal regulations.

FRA’s review of MBAX’s efficiency testing of the dispatcher revealed that between July 1, 2003, and January 9, 2007, MBAX conducted a total of 59 observations. Only three observations were conducted for rules pertaining to recording/application of blocking devices. In a 40-month period, MBAX supervision conducted only one observation of the dispatcher with regard to NORAC Rule 133, removing track from service. Of the 59 recorded observations, two failures were recorded. One failure for radio procedures and one failure for

verification of instructions.

FRA's review of MBAX's efficiency testing of the crew of Train 322 revealed that between July 1, 2003, and January 9, 2007, 195 observations were conducted on the engineer, 53 observations on the conductor, and 80 observations were conducted on the assistant conductor.

FRA's review of MBAX's efficiency testing on the six members of the MoW gang revealed the following: A total of 201 observations were conducted between December 14, 2004 and January 9, 2007. During this time period, only two observations were conducted on NORAC Rule 133, track out-of-service. There were no observations conducted on the foreman for NORAC Rule 133, track out-of-service. There were a total of 36 observations pertaining to Rule G (drug and alcohol) conducted on the six members of the MoW gang with no failures. A total of nine failures were revealed; eight failures were noted for roadway workers not wearing orange vests and one failure noted for a foreman smoking in a nonsmoking area while on duty.

Under the traffic control system on the New Hampshire Route Main Line, train movements were authorized by color light signals installed on the wayside of each block or segment of track. The appearance, or aspect, of the signal conveys an indication, or information specifying the allowed movement into the block beyond the signal.

The signals on the two main tracks were either at control points (CP) or automatic block signals. The signals at the CP's were also locations the dispatcher could direct trains to crossover from Track No. 1 to Track No. 2 or vise versa. Between the CP's were automatic block signals that were affected by the disruption of a track circuit, such as an occupancy of a train or other field conditions. These signals were not wired to the dispatchers display.

Post accident tests were conducted on the signal system by MBAX. According to MBAX Chief Engineer (C&S), the post accident tests indicated that the signal system in both the field and office functioned as designed. The FRA review of the video replay of the signal system dispatcher's model board and the print out of the dispatcher's signal system computer commands also confirmed that the signal system was working as intended.

Interviews conducted by FRA and NTSB and the video replay of the dispatchers model board revealed that the MoW gang failed to erect shunting barricades at each entrance of the out-of-service limits as required by MBAX System Timetable Special Instructions Rule 133-S1, and MBAX Roadway Worker Protection Manual Rule 321. If the blocked section of track had an occupancy indication, the track would be colored magenta or a combination of blue (blocked) and red (occupied). Shunting would have generated the red occupancy in the track segment and the work area would have been Magenta. During the time the track was removed from service by Form D M302, from 9:30 a.m. to the time of the collision (1:38 p.m.), there were only two incidents when the blocked track was magenta. The first time was at 10:41 a.m. for 18 minutes. The second time was at 1:14 p.m. for 8 minutes. The speed swing can shunt the rail during the process of placing the equipment on the track. These times coincide with the times that the speed swing was put on the track at the beginning of the shift and when the speed swing was put on the track after lunch.

When the dispatcher blocked a section of track, the computer program first required an entry into the blocking field to designate that the track was blocked. It was up to the discretion of the dispatcher what information he would inpute into the blocking field. On the day of the accident the Boston West dispatcher entered the form D number, (M302) into the blocking field. After entering this identifier, another dialogue box appeared on the computer monitor and the train dispatcher then selected the "block" feature. The section of track between Crawford and Winchester was blocked at 9:43:35 a.m. When the train dispatcher wanted a section of track unblocked, the dispatcher would select the blocked track first. Then a dialogue box appears on the model board with the identification the train dispatcher originally used when the track was blocked. The train dispatcher must then delete the identifying information. Then the blocking dialogue box appears and the train dispatcher selects the "unblock" feature. On the day of the accident, the track was unblocked at 1:30:07 p.m.

Post-accident toxicological testing performed by FRA on blood and urine samples taken from the deceased revealed that he had used marijuana likely within several hours of the accident. Based on the concentrations found, the deceased was likely still impaired in judgement, attention to his environment, and/or the performance of any required safety-critical functions at the time of the accident.

CONCLUSION:

When the six-man MoW gang removed the track between Crawford and Winchester from service through the dispatcher, they established exclusive track occupancy. The Federal Roadway Worker Protection Regulation requires that movement of train within working limits shall be made only under the direction of the roadway worker in charge. When the dispatcher removed the blocking devices, cleared the signal at Crawford, and allowed Train 322 to enter the out-of-service limits without the authority of the roadway worker in charge, she violated § 214.321 (d).

The six-man MoW gang failed to erect shunting barricades at each entrance of the out-of-service track. If shunting barricades had been erected as required, this would have displayed on the dispatcher's model board and prevented the dispatcher from clearing the signal at Crawford.

PROBABLE CAUSE AND CONTRIBUTING FACTORS:

The MoW employees contributed to the severity of the accident by not erecting a shunting barricade at each end of the out-of-service limits, as required by MBAX System Timetable Special Instruction No. 133-S1 and MBAX Roadway Worker Protection Manual Rule No. 321 (Exclusive Track Occupancy - Protection Out-of-Service). Post-accident toxicological testing performed by FRA on blood and urine samples taken from the deceased revealed that he had used marijuana likely within several hours of the accident. Based on the concentrations found, the deceased was likely still impaired in judgement, attention to his environment, and/or the performance of any required safety-critical functions at the time of the accident.

The probable cause, as determined by the Federal Railroad Administration, was the removal of blocking devices by the dispatcher which allowed a train to operate into an out-service-track occupied by MoW employees.