Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2008-74

SCAX &Union Pacific (UP)
Chatsworth, CA
September 12, 2008

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-2008-74

1.Name of Railroad Operating Train #1: Southern California Regional Rail Authority [SCAX]	1a. Alphabetic Code: SCAX	1b. Railroad Accident/Incident No.: 091208
2.Name of Railroad Operating Train #2: Union Pacific RR Co. [UP]	2a. Alphabetic Code: UP	2b. Railroad Accident/Incident No.: 0908LA014
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: Southern California Regional Rail Authority [SCAX]	4a. Alphabetic Code: SCAX	4b. Railroad Accident/Incident No.: 091208
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 09 | Day 12 | Year 2008	7. Time of Accident/Incident: 04:22:23 ☐ 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: 02

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
Chatsworth	444.2	N/A	CA	LOS ANGELES

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
74 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
Single Main	3	10.5	4

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	ML 111

29. Speed *(recorded speed, if available)* R - Recorded E - Estimated: 42 MPH — Code: R

30. Trailing Tons *(gross tonnage, excluding power units)*: 335

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): e | 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)*	SCAX 855	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	0

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	1	0	0	1	0
(2) Total Derailed	1	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	2	0	0	0
(2) Total Derailed	0	1	0	0	0

37. Equipment Damage — This Consist: $9,000,000.00

38. Track, Signal, Way, & Structure Damage: $117,325.00

39. Primary Cause Code: H220

40. Contributing Cause Code: N/A

Number of Crew Members

41. Engineer/ Operators	42. Firemen	43. Conductors	44. Brakemen
1	0	1	0

Length of Time on Duty

45. Engineer/Operator: Hrs 5 Mi 57

46. Conductor: Hrs 5 Mi 57

Casualties to:	47. Railroad Employees	48. Train Passengers	49. Other
Fatal	1	24	0
Nonfatal	1	58	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
1	1	LOF65-12

56. Speed *(recorded speed, if available)* R - Recorded E - Estimated: 40 MPH — Code: R

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)*: 1135

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): e | 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)*	UP8485	1	no
(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	1

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

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	2	0	0	0	0
(2) Total Derailed	2	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	7	0	10	0	0
(2) Total Derailed	1	0	9	0	0

64. Equipment Damage This Consist: $2,203,830.00

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

66. Primary Cause Code: H220

67. Contributing Cause Code: N/A

Number of Crew Members

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

Length of Time on Duty

72. Engineer/Operator: Hrs 4 Mi 53

73. Conductor: Hrs 4 Mi 53

Casualties to:	74. Railroad Employees	75. Train Passengers	76. Other
Fatal	0	0	0
Nonfatal	3	0	0

77. EOT Device? 1. Yes 2. No: 1

78. Was EOT Device Properly Armed? 1. Yes 2. No: 1

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: 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: 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	117. Whistle Ban 1. Yes 2. No 3. Unknown	Code
Code(s) N/A N/A 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

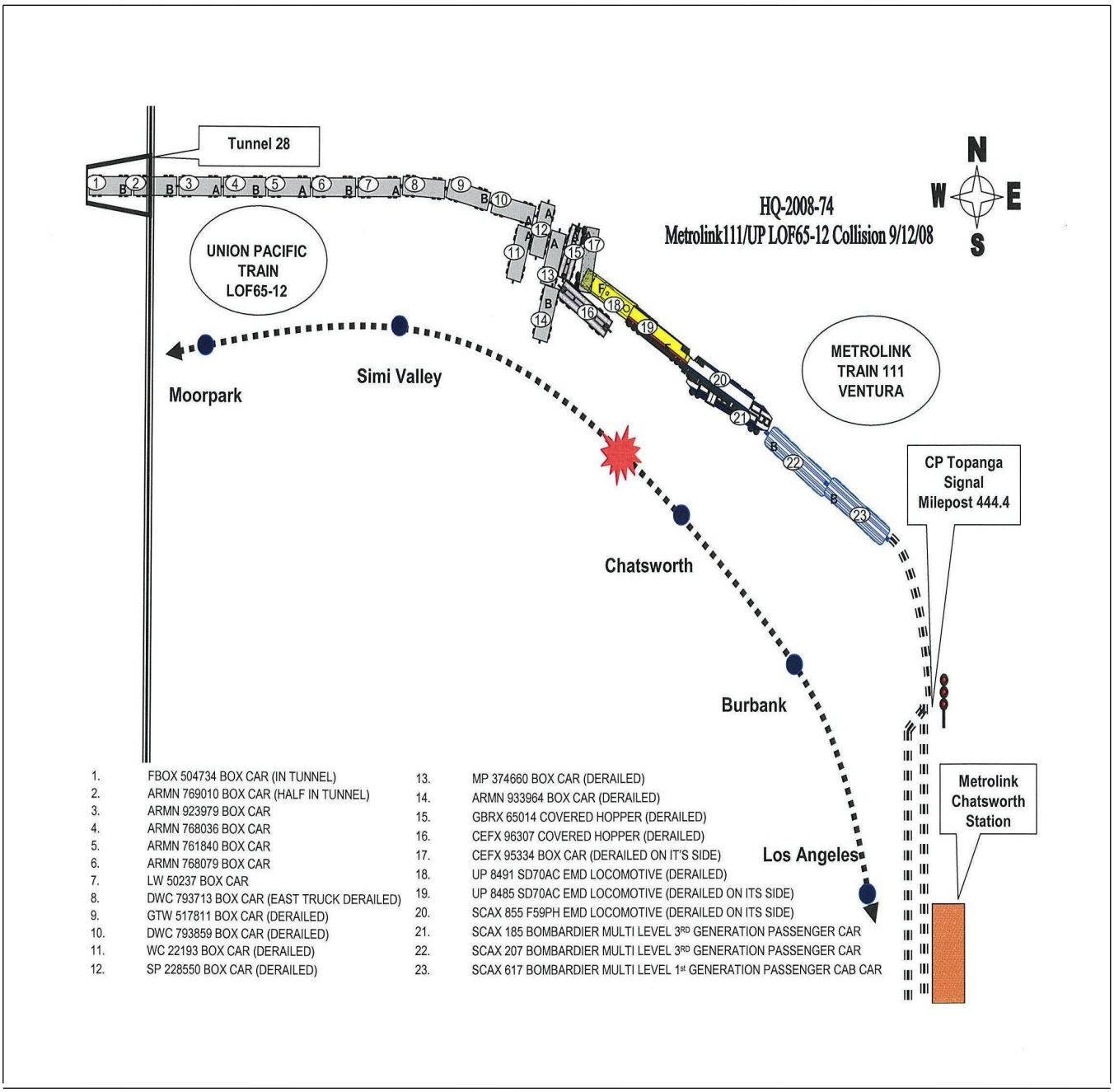
121. Age N/A	122. Driver's Gender 1. Male 2. Female	Code N/A	123. Driver Drove Behind or in Front of and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown	Code N/A	124. Driver 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop 4. Stopped on Crossing 5. Other *(specify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

At 4:22:23 p.m. PDT, September 12, 2008, a westbound Metrolink commuter train operated by the Southern California Regional Rail Authority (SCAX) ML-111, collided head-on with an eastbound Union Pacific Railroad (UP) local freight train LOF65-12, resulting in the death of the Metrolink engineer and 24 passengers. Metrolink Train ML-111 traveled in a locomotive forward configuration and at a recorded speed of 42 mph, and UP Freight Train LOF65-12 traveled at a recorded speed of 40 mph. The accident occurred on Metrolink's Ventura Subdivision at milepost 444.123, west of CP Topanga, geographically north of Chatsworth, CA. Chatsworth is located approximately 37 miles northwest of Los Angeles. Movements in this part of the railroad are under Centralized Traffic Control (CTC) by a Metrolink dispatcher located in Pomona, CA.

Metrolink Train ML-111 consisted of a locomotive, two bi-level passenger cars and a cab car and was crewed by a locomotive engineer and conductor employed by Connex Railroad, a division of Veolia Transportation, under contract to Metrolink. As a result of the collision, the lead Metrolink locomotive telescoped into the bi-level coach car immediately behind it. In addition to the fatally injured locomotive engineer and 24 passengers, the Metrolink conductor and 135 passengers sustained injuries of varying severity and received some sort of emergency treatment, 123 of which emergency responders specifically identified by name. The remaining injured people were assumed to have departed the area following treatment without identifying themselves by name. Of the 135 passengers injured, Metrolink identified 58 passengers as having sustained FRA reportable injuries. The exact number of passengers on-board Train ML-111 at the time of the collision is not known, however, the train was estimated to have been at or near 50 percent capacity. The lead locomotive SCAX 855 of the Metrolink train caught fire due to the ruptured diesel fuel tanks that separated from the locomotive. The fire spread to UP Freight Train LOF65-12 lead locomotive UP 8485. No evacuation of the local area was ordered as a result of the locomotive fire, which was extinguished by local fire department personnel.

UP Freight Train LOF65-12 consisted of 2 locomotives and 17 cars and was crewed by a locomotive engineer, conductor, and brakeman, all of whom sustained FRA reportable injuries characterized as either critical or moderately severe; however all injuries were non-life threatening. The collision derailed both locomotives and 10 cars. There were no hazardous materials in the freight train consist.

Weather at the time of the accident was daylight and clear with a temperature of 74°Fahrenheit.

Metrolink estimated equipment damage at $9 million; track and signal damages were estimated at $117,325. UP estimated equipment damage at $2,203,830.

The collision was caused by the failure of the Metrolink train crew to comply with a fixed signal (other than automatic block or interlocking signal) displaying a stop indication.

138. NARRATIVE

Timetable and geographic directions are east and west. For the purpose of this report, timetable direction will be used. Timetable mileposts descend for westward train movement and ascend for eastward train movements.

CIRCUMSTANCES PRIOR TO THE ACCIDENT

METROLINK COMMUTER TRAIN ML-111

Metrolink Commuter Train ML-111 was crewed by a locomotive engineer and conductor. They went on duty at 5:54 a.m. PDT, September 12, 2008, at the Montalvo crew base, Ventura, CA, after being off duty for 8 hours and 49 minutes, which is more than the required statutorily off duty rest period. Between their on duty time and 9:23 a.m., the crew operated Metrolink Train ML-106 between Montalvo and Los Angeles Union Station and went off duty at 9:26 a.m. as part of their normal split-shift. Following an off duty period of 4 hours and 34 minutes, the crew returned to duty at 2:00 p.m. at the Central Maintenance Facility (CMF), Los Angeles, CA.

At 3:03 p.m., the crew departed the CMF and arrived at LA Union Station at 3:10 p.m., operating equipment designated as train ML-111. At 3:35 p.m., westbound Train ML-111 departed LA Union Station with one EMD F59PH locomotive pulling two Bombardier bi-level passenger cars and one Bombardier cab car en route to Moorpark, CA. The train made five routine station stops and was held for an approximate 5-minute stop at CP Raymer, Van Nuys, CA, to meet Amtrak Passenger Train ATK 784. At CP Bernson, milepost 446.8, Commuter Train ML-111 received an advance approach signal (flashing yellow); authorizing them to proceed prepared to stop at the second signal. At intermediate signal 4451, milepost 445.7, the crew of Commuter Train ML-111 received an approach signal indication (solid yellow) authorizing them to proceed prepared to stop at the next signal. At 4:19:23 p.m., Train ML-111 arrived at the Chatsworth Passenger Train Station, milepost 445.5, which is between intermediate Signal 4451 and CP Topanga, milepost 444.4. The engineer was in the lead locomotive and the conductor was positioned in the rear cab car. Following a 58-second station stop, Train ML-111 departed Chatsworth Station at 4:20:21 p.m. traveling west in Throttle 1 and directly went to Throttle 8.

The train crossed two public highway-rail grade crossings with active warning devices at Devonshire Avenue, milepost 445.20, and Chatsworth Boulevard, milepost 444.69, respectively. Event recorder data indicates that Train ML-111 reached a maximum speed of 54 mph between Chatsworth Rail Station and west of Chatsworth Boulevard highway-rail grade crossing. The train operator reduced the train speed to 43 mph in Throttle 4 prior to traversing CP Topanga, milepost 444.4, displaying a red (stop) indication and ran through a switch that was lined against the train movement and lined for the eastbound UP Train LOF65-12 allowing it to enter the siding. Heading west from CP Topanga, milepost 444.4, the track is single main track with a permanent curve speed restriction of 40 mph. The crew of Train ML-111 further reduced train speed to 42 mph from the point of the switch to the point of collision (POC), a distance of 1,384 feet, before colliding head-on with UP Freight Train LOF65-12 at milepost 444.123. Data from the event recorder on the Metrolink trailing cab car SCAX 617 indicates the locomotive engineer took no evasive action.

UNION PACIFIC FREIGHT TRAIN LOF65-12

The crew of UP Train LOF65-12 consisted of a locomotive engineer, a conductor and a brakeman. They went on duty at Gemco Yard, Van Nuys, CA, at 11:30 a.m. PDT, September 12, 2008, and were assigned to operate UP local freight train LOF65-12. The engineer and brakeman reported for duty after a 15 hour and 5 minute off duty period; the conductor reported for duty after being off duty for 89 hours. UP LOF65-12, commonly known as the Leesdale Local, was assigned to service local industries between Leesdale, CA, and Gemco Yard.

UP Freight Train LOF65-12 arrived at UP Oxnard Yard at 1:55 p.m., made set-outs and pick-ups of cars in and around the Oxnard Siding and began the return trip to Gemco Yard. The crew made the required air brake test and train inspection and departed Oxnard Yard at 3:00 p.m. toward Gemco Yard. UP Local Freight Train LOF65-12 stopped at CP Strathern, milepost 432.9 and waited on the Main Track to meet Amtrak Passenger Train ATK 775. While waiting, the brakeman moved from the lead locomotive to the second locomotive to eat lunch and elected to remain there until the train arrived at Gemco Yard. After ATK 775 passed, the crew of UP Local Freight Train LOF65-12 received a signal to depart and proceeded timetable direction east toward Los Angeles.

UP Train LOF65-12 consisted of 2 EMD SD70ACe locomotives with the lead locomotive facing forward and the trailing locomotive facing to the rear with 7 loads of mixed freight and 10 empties rail cars, 1,135 trailing tons and 1,164 feet in length. The train consist contained no hazardous materials.

UP Train LOF65-12 passed CP Davis, milepost 440.8 on a proceed signal, exited Tunnel 26 at milepost 442.58 and passed the approach diverging (yellow over yellow) Signal 4426 at 4:20 p.m., milepost 442.62, to enter the siding at east CP Topanga. It traversed a series of right- and left-hand curves between milepost 442.60 and the point of the collision. The train traveled through Tunnel 27, milepost 443.1, and exited Tunnel 28's east portal, milepost 444.0, and entered a 6-degree right-hand curve, in throttle 4 on a 1.0 percent descending grade, approximately 645 feet and 11 seconds prior to the point of collision. The locomotive engineer was seated at the controls on the south side of the locomotive and the conductor was on the north side of the leading locomotive. The brakeman was riding in the second locomotive unit, seated on the conductor’s seat, facing toward the rear end of the train on the south side of the locomotive. Event recorder data indicates two seconds prior to the accident, the locomotive engineer of UP Train LOF65-12 placed his train in emergency.

THE ACCIDENT

At 4:22:23 p.m., Metrolink Commuter Train ML-111 and UP Local Freight Train LOF65-12 collided midway through a 6 degree curve at milepost 444.123, fatally injuring the locomotive engineer and 24 passengers of Train ML-111. Metrolink Commuter Train ML-111 locomotive SCAX 855 and the first bi-level passenger car SCAX 185 derailed and both UP locomotives and 10 freight cars derailed. Upon impact, locomotive SCAX 855 of ML-111 telescoped into the first passenger car SCAX 185 resulting in the death of 22 passengers seated in the coach. One passenger seated in the second bi-level car was also killed however the seating location of the 24th passenger fatality could be not determined. The collision also injured conductor and 135 passengers of Train ML-111, of which 58 sustained FRA-reportable injuries which also included the three crew members of UP Train LOF65-12.

As a result of the impact the locomotive UP Freight Train LOF65-12 was turned over onto its left side with the crew lying on the left side of the locomotive cab. The engineer stated that he and the conductor were removed from the cab through the left front window by emergency personnel because the front door was crushed closed. The brakeman riding the second locomotive was facing toward the rear of the train at the time of impact. He stated that suddenly he heard the air brakes go into emergency, at which point he dove and curled up into a ball on the floor behind the engineer's control stand and rode out the collision. The second locomotive derailed but remained upright. The brakeman exited the cab through the rear door of the locomotive and made his way to the lead locomotive, which was derailed and on its side where he saw the conductor and engineer helping each other away from the accident.

EMERGENCY RESPONSE

At 4:23 p.m., calls began to come in to the Los Angeles City 911 Dispatch Center. The callers reported a head-on train collision between a Metrolink passenger train and a freight train in the area of Heather Lee Lane in the Chatsworth area of the city of Los Angeles. At 4:24:31 p.m., the conductor of Metrolink Train ML-111 made a distress call to Metrolink Operations in Pomona, CA. The first 4-person fire engine arrived at 4:30 p.m. to West Heather Lee Lane. The fire captain assessed the situation upon his arrival, determined there were locomotives overturned with at least one on fire, one passenger car with major structural damage, and several freight cars derailed. He further observed local residents converging on the scene to assist passengers, some of whom were milling around in a confused state. He requested assistance of all available emergency response resources in the West Valley and within minutes fire and police units began to arrive on the scene. At the peak of the incident, there were 350 firefighters, 42 fire companies, 60 ambulances, 150 LA County Sheriff deputies, 440 Los Angeles Police Department officers and 5 helicopters dispatched to the scene.

A triage area was set up in a grassy area of Chatsworth Academy near the collision site. Helicopters and ambulances transported the injured to 12 local hospitals throughout the Los Angeles area. Fire, rescue and recovery operations immediately commenced and continued through the night and into the next morning.

POST-ACCIDENT INVESTIGATION

Accident investigators from the Federal Railroad Administration (FRA), National Transportation Safety Board (NTSB), UP, Metrolink, Metrolink contractors, California Public Utilities Commission (CPUC) and the Volpe Transportation Center began arriving on scene and preserving and collecting obtainable information. NTSB assumed overall command of the investigation and team members were assigned to the following investigation groups: Crash Worthiness, Human Performance, Mechanical, Operations, Passenger Car Forensics, Signal/Train Control, and Track.

On Saturday, September 13, after search and rescue operations had been completed and recovery operations were underway, accident investigators obtained medical records, training records, documentation, recordings, dispatcher logs, conductor's logs, delay reports, employee training, efficiency tests, train ride records, inspection reports, track charts, and other relevant documents.

CREW COMMUNICATION AND DELAYED IN BLOCK RULES

Investigation team members reviewed train crew voice recordings at the Metrolink Operations Center. The

recordings indicated that the locomotive engineer of Metrolink Train ML-111 radioed signal indications from the cab of his locomotive to the conductor as he observed the advance approach (flashing yellow) signal aspect at CP Bernson, milepost 446.8, at 4:17:28 p.m. authorizing them to proceed prepared to stop at the second signal, as required by Metrolink rule. In a subsequent interview, the conductor stated he could not recall hearing this signal call from the locomotive engineer at CP Bernson. There are no further radio communications recorded between the crew members of ML-111 from CP Bernson to the point of collision, which is contrary to requirements under the prevailing operating conditions by GCOR rule, Metrolink rule and FRA Emergency Order 20 (EO20).

At Intermediate signal 4451, milepost 445.7, the crew of Metrolink Train ML-111 received an approach signal indication (solid yellow) authorizing them to proceed prepared to stop at the next signal. The locomotive engineer was required to communicate this signal via radio to his conductor, which he did not do.

At 4:19:23 p.m., Metrolink Train ML-111 arrived at the Chatsworth Passenger Train Station, milepost 445.5, which is between Intermediate signal 4451 and CP Topanga, milepost 444.4.

Following the accident, the Metrolink conductor was interviewed on several occasions. He stated that after arriving at Chatsworth Train Station and after passengers departed and boarded at that station, the conductor advised the engineer via radio that everyone was on board and, according to his statement, he said, “Metrolink 111 highball” and in a subsequent interview said, “Highball 111 on a green signal.” He also stated he did not hear a response from the engineer. These statements do not appear on any recordings of radio transmissions available.

Rules governing Metrolink Train ML-111 after passing the approach signal (Signal 4451) require that the crew be prepared to stop at the next signal. The requirement strictly means to be prepared to stop at and for the next signal (GCOR 9.9 and Emergency Order 20). When a train is required to stop or slow down below 10 mph anywhere within the block, for any reason, the “delayed in block” rules for communications and speed rules become effective. The station stop at Chatsworth placed the train in a “delayed in block” condition that would have required both crew members to communicate between themselves that the train was delayed in block and for the locomotive engineer to advise the conductor of the next signal indication as it became visible. Therefore, the recordings indicate the conductor failed to alert the locomotive engineer of the delayed in block rules while stopped at Chatsworth Station and the locomotive engineer failed to call out the stop indication (red signal) at CP Topanga.

The conductor’s testimony conflicts with the train crew recording in that he stated the engineer on Train ML-111 did not relay information to him regarding the signal aspect at CP Bernson. However, his testimony agrees with the train crew recording that the locomotive engineer failed to call out the signal aspect at both Signal 4451 and CP Topanga.

These failures in communication between the locomotive engineer and the conductor were in violation of Emergency Order (EO) 20, which requires communication between the locomotive engineer and the conductor to report and acknowledge signals other than green and for the locomotive engineer and conductor to ascertain at the next scheduled stop why the message was not confirmed. The emergency order also states, “If necessary due to radio equipment failure, alternative means shall be established by the operating crew, e.g., via intercom, cellular telephone, etc., to accomplish the procedure.

The failures were also in violation of GCOR Rule 1.47 A.5.A, Fifth Edition, effective April 3, 2005, updated by Metrolink Timetable No. 05, effective September 1, 2007, that requires the conductor to record other than clear (green) signal indications on a Conductor Report Form.

Following interviews with the crew of UP Freight Train LOF65-12 and a review of the event recorder information recovered from the UP trailing locomotive, FRA concluded their actions were consistent with proper train handling and operating rules. They had approximately 4 seconds between the time they saw the Metrolink train approaching and the time of impact. The train was placed into emergency at approximately 2 seconds prior to impact. There were no exceptions taken concerning crew operation of UP Train LOF65-12.

The Metrolink conductor stated he believed he had observed a green or clear signal aspect at CP Topanga prior to the departure of his train from Chatsworth Station. At the point of collision, he stated he was standing in the rear car of the train working on his delay report and other paperwork when he suddenly found himself

lying on the floor of the car and in great pain after a severe jarring sensation and sudden stop of the train. Post-accident sight distance testing concerning the conductor's statement that he could see a green signal while standing on the platform at Chatsworth Station can neither refute nor confirm his observation. All available tests, records and recordings of the signal system at CP Topanga indicate that the signal was red and was working as intended.

Metrolink Train ML-111 crew had worked together over the Ventura Subdivision for nearly 6 months prior to September 12. They operated two round trips daily, five days a week, Monday through Friday. When asked by the investigators to describe the events of the September 12 trip, the conductor stated they "normally" or "usually" get clear (green) signals all the way from Northridge (the station prior to Chatsworth) to Moorpark and that the locomotive engineer "99% of the time" would call a green signal at CP Topanga prior to departing Chatsworth Station.

REVIEW OF 49 CFR PART 217, OPERATIONAL TESTS AND INSPECTIONS-METROLINK/VEOLIA/CONNEX

The FRA Operating Practices Inspector assigned to assist in investigating the accident reviewed the Metrolink crews' efficiency testing records for a period of approximately three months prior to September 12. A subsequent, comprehensive FRA audit of operational tests and inspections in accordance with 49 CFR Part 217 revealed unacceptable programs and procedures as required by Connex's own efficiency testing program. The audit produced 17 violations, for which recommendations for civil prosecution were initiated.

49 CFR 217.9 requires each railroad to ".....periodically conduct operational tests and inspections.....in accordance with its written program." The program requirements are specified in 49 CFR 217.9(b) as they apply to this investigation.

DUTY CYCLE FOR THE CREW OF METROLINK ML-111

For the previous 6 months, the crew's regular assignment was a Monday through Friday split shift, 5:54 a.m. to 9:05 p.m., with a 4 hour and 32 minute interim release period. Hours worked are 5:54 a.m. to 9:26 a.m., a period of 3 hours, 32 minutes. The off duty release period was from 9:26 a.m. until 2:00 p.m., a total of 4 hours, 34 minutes off duty. The crew returns to duty at 2:00 p.m. and continues working until 9:05 p.m., a period of 7 hours and 5 minutes. The crew works a total of 10 hours and 37 minutes with an 8 hour, 49 minute off duty period. The crew operates four trips a day to LA Union Station on trains designated as 106, 111, 118, and 119. Even-numbered trains are eastbound and odd-numbered are westbound.

At 6:44 a.m., the crew departed Montalvo Passenger Rail Station on Metrolink Train ML-106, making 10 passenger stops en route to Los Angeles Union Train Station, arriving at 8:25 a.m., a distance of 70.7 track miles. At 8:32 a.m., the crew departed LA Union Rail Station arriving at the Central Maintenance Facility (CMF) at 8:53 a.m., a distance of 2.2 track miles. At 9:26 a.m., the crew was released from duty to begin their interim release period. They returned to duty at 2:00 p.m. During this time period, the conductor retired to a designated quiet room located within the facility and the engineer left the property.

DUTY CYCLE FOR THE CREW OF UP LOF65-12

The engineer, conductor, and brakeman arrived at their normal on and off duty point, UP Gemco Yard. The assigned engineer observed non-complying conditions on the locomotives while performing the daily inspections. He reported his findings to the mechanical facility and was instructed to not use the non-complying locomotives. The defective locomotive units were UP-2775, UP-2779, and UP-2720. The engineer located two locomotives, UP 8491 and 8485 used by an earlier inbound train and routinely inspected them for use. The regular brakeman gathered the required paperwork, including switch lists, track bulletins, and normal paperwork associated with this assignment. The brakeman coupled all of the air hoses and after allowing time for the brake pipe to charge, armed the End-Of-Train Device (EOTD) and performed a Class 1 Air Brake Test prior to departure, followed by an on-board job briefing. The train departed Gemco Yard at 12:25 p.m.

DESCRIPTION OF RAILROAD SIGNAL SYSTEM

On the Metrolink Ventura Subdivision, train movements operate in an east/west direction. The maximum

authorized timetable speed is 79 mph for passenger trains and 60 mph for freight trains, designated as FRA Class 4. Due to track curvature west of CP Topanga and extending beyond Tunnel No. 28, timetable speed is restricted to 40 mph and classified as FRA Class 3 track.

Train movements are governed by operating rules, General Orders, and Timetable Instructions. The method of operation is by signal indications of a Centralized Traffic Control (CTC) system utilizing four aspect signaling. The signal system is operated from a computer-assisted dispatcher machine located in Pomona, CA. The field signal system uses Direct Current (DC) track circuits, General Electric Transportation Services (GETS) Vital Harmon Logic Controllers, and GETS Electro-Code 4 processors to control Union Switch & Signal M-23A switch machines. The wayside signals are equipped with color light signal units.

METROLINK ML-111 RE-ENACTMENT TRAIN OBSERVATIONS

On September 15, members of the Operations Group boarded a re-enactment train and traveled to Chatsworth Station to observe block signal indications at CP Topanga, milepost 444.4. The re-enactment Metrolink ML-111 Train consisted of an identical locomotive, coach car, and cab car and transported investigators along the route of travel including Chatsworth Train Station west to the point of derailment. Chatsworth was the last station stop that ML-111 made before proceeding west toward CP Topanga.

The observations were made at the same time of day as the accident in order to determine if ambient light conditions, reflections, or atmospheric conditions affected the crew members' interpretation of signal aspects as well as overall visibility from the vantage point of both Metrolink conductor and engineer.

At 4:20 p.m., unaided visual observations of CP Topanga were made from the conductor's platform and from the platform adjacent to where the lead unit of Train ML-111 would have been stopped. The Metrolink dispatcher lined a clear signal at CP Topanga for an eastbound train movement into the siding so the westbound control signal on the mainline at CP Topanga would correspondingly display a stop (red) indication. A very faint glimmer of red was intermittently visible to some Operations Group members, while others reported seeing nothing.

At 4:30 p.m., the investigators boarded the cab of re-enactment locomotive Metrolink ML-111 at Chatsworth while it was sitting at its normal spot. The engineer stated he could see the block signal at CP Topanga but added he knew where to look through experience. The distance from the spot of re-enactment the ML-111 locomotive and CP Topanga is approximately 5,288 feet. The investigators instructed the engineer to proceed from a station stop and advance west toward CP Topanga and stop at a point where the red signal became clearly visible to him.

Re-enactment train Metrolink ML-111 proceeded west at 4:34 p.m. The engineer stopped short of the first road crossing at Devonshire Avenue, milepost 445.2, and stated he could clearly see the block signal. The signal was also clearly visible to some Operations Group members while others reported still seeing only an intermittently visible flickering red. At this point, the train had traveled 953 feet and was still 4,335 feet from CP Topanga.

Re-enactment train Metrolink ML-111 then backed up to spot the train at the Chatsworth Rail Station and the Metrolink dispatcher lined CP Topanga for its movement in order to display a yellow, green and red aspect. The Metrolink conductor stated he saw a clear (green) indication from Chatsworth Station.

At 4:45 p.m., a flashing yellow aspect was displayed at CP Topanga. The aspect was highly visible to all members of the Operations Group both in the cab and on the train station platform.

At 4:46 p.m., CP Topanga displayed a green aspect that again was highly visible to all members of the Operations Group.

At 4:51 p.m., CP Topanga displayed a stop (red) indication. The red signal was very faint and only intermittently visible from both the locomotive and train station platform. Not all members were able to observe the signal from that distance.

While at Chatsworth Station, accident investigators spoke to a man who regularly watches trains from the platform. The man told investigators he witnessed the departure of Metrolink ML-111 on September 12,

2008, and noted the train was running late. When he was asked what color the signal was at CP Topanga as Metrolink ML-111 departed, the man without hesitation stated the signal was green. He stated he was in the habit of leaning forward to look at the signal the trains departed on. When interviewed subsequent to the collision, the conductor of ML-111 stated to emergency responders that he also had observed a clear (green) signal at CP Topanga prior to departing the Chatsworth station. Post-accident testing indicates the signal system functioned as intended and refutes the testimony of the eyewitness and conductor that the signal at CP Topanga was green.

On September 16, a sight distance test was performed on the single main track in the 6-degree curve where a re-enactment UP locomotive and Metrolink passenger train were positioned coupler–to-coupler at the POC. The equipment was moved away from each other in equal intervals of 60 feet until the engineer of each could not see the other piece of equipment. The 60-foot measurement was used to reflect the time and distance covered each second at 40 mph. Those points were marked and measured. The UP locomotive was 300 feet west of the POC when the personnel could no longer observe the Metrolink train. The Metrolink equipment moved east 247 feet where the personnel stated they could no longer observe the UP locomotive. From those two points, investigators determined the linear sight measurement was 539.5 feet, as measured from coupler reference points.

POST-ACCIDENT INSPECTION/TESTING OF SIGNAL SYSTEM

On September 13, representatives from the FRA, NTSB, CPUC, Metrolink, UP, and Mass Electric Construction began their post-accident inspection and signal system testing. They found locks and seals intact on all signal and switch apparatus between CP Bernson and CP Davis as applied by Metrolink signal personnel following the accident.

The power switch machine at CP Topanga was damaged when Metrolink Commuter Train ML-111 trailed through it. The switch points were found open with wheel flange marks on the field side of the left-hand point, indicating the switch was lined reverse when Train ML-111 trailed through it. Damage to the switch structure consisted of a bent throw rod and basket rod. The dual control power switch machine was extensively damaged.

To facilitate the removal of damaged rail equipment from the accident scene and due to extensive damage caused to the power switch machine, MecRail signal personnel received permission from NTSB Signal Group Chairman via telephone on September 14 to replace the damaged switch machine at CP Topanga. They replaced the switch machine without first performing a ground test. Review of field and dispatcher signal logs verified that the switch at CP Topanga was in the reverse position and lined for the eastbound movement for UP Freight Train LOF65-12 at the time of the incident. In addition, the bent throw rod, basket rod, and power switch machine throw bar provided physical evidence to confirm the switch was reversed prior to the arrival of Metrolink ML-111. The NTSB Signal Group Chairman determined that the removal of the switch machine without first performing a ground test did not affect the integrity of the post-field testing.

On September 15, the signal team conducted tests at CP Topanga. A quarter inch obstruction gage was used to test the dual control power switch machine point detector and lock rod. Switch indication and overload circuits were tested. Indication, route locking, and time locking were tested. Track circuits were verified and signal circuits were tested for grounds. Loss of shunt timers, time releases, and timing devices were verified. The insulation resistance of underground switch and signal cables were tested. Signal lamp voltages were measured and signal aspects checked. Signals were checked for visibility and purity. The voltage on the westbound signal lamp measured 8.6 volts direct current and is within the prescribed lamp rating.

The signal team used progressive shunts to recreate train movements. During testing, signal aspects were observed at CP Davis and Signal 4426 for eastbound UP Train LOF65-12 and CP Bernson, Signal 4451, and CP Topanga for westbound Metrolink Train ML-111. The signal system functioned as intended with no exceptions noted.

On September 16, the signal team met with a GE Transportation representative. Vital Logic Controller (VHLC) modules were checked for correct software levels. No exceptions were noted.

Metrolink test and inspection records were collected. Signal trouble reports for CP Topanga on the Ventura

Subdivision were reviewed with no exceptions noted.

Train movements of both trains were simulated by using progressive shunts. During the train simulation, signal aspects were observed by placing signal personnel at CP Davis, Signal 4451, Signal 4426, CP Topanga and CP Bernson.

POST-ACCIDENT TESTING RADIO COMMUNICATION SYSTEM

On September 17, tests were conducted on eastbound and westbound trains simulating the same route Metrolink Train ML-111 and UP Train LOF65-12 traversed the day of the incident. Three radio tests were conducted with Motorola model HT-1250 handheld radios, similar in performance as the one Train #1's conductor used. The first test was on eastbound Metrolink ML-114 from the locomotive to the last cab car. It was a time-based test conducted approximately every 2 minutes as the train traveled from Simi Valley Train Station to the Northridge Rail Station. The second test was from westbound Metrolink ML-109.

Communication checks were conducted between the locomotive and last cab car. It was also a time-based test conducted approximately every 2 minutes as the train traveled from Northridge Train Station to Simi Valley Rail Station. With one exception, the dispatcher's office received the radio communication from all test points. There was a loss of communication when the train was inside Tunnel #26. The third and final test was done on the ground east and west of CP Topanga. The test was distance-based and was between the handheld radio and the dispatcher office using the Oat Mountain VHF radio. The only failed communications noted were within 100 feet of Tunnel #28.

A handheld radio believed to be the one used by the conductor of Metrolink Train ML-111, a Motorola model HT-1000, was delivered to CAZCOM, Inc., in Victorville, CA, for testing on September 23. CAZCOM's test results indicated the radio was working properly with minor deviations from specifications in frequency error. It was CAZCOM's opinion that the frequency error would not have caused a communication failure. However, the test result also indicated the battery in the device was unable to hold a charge and lost capacity within minutes, which reduced the radio transmitter power dramatically and did not provide adequate capacity to fully operate the radio. The report also indicated after three to five push-to-talk transmissions, the low battery audible warning indicator was active at the end of each subsequent push-to-talk function. CAZCOM concluded the lack of battery capacity could have been a cause of interrupted communications service from this radio within minutes of use.

Despite the inability to verify that the handheld radio was functioning properly, Emergency Order (EO) 20 prescribes procedures for the engineer in the controlling locomotive to ascertain at the next scheduled stop why a communication regarding a wayside signal affecting the movement of the train other than clear (green) indication, as was the advance approach (flashing yellow) transmitted at CP Bernson, was not acknowledged by the designated crew member, in this case, the conductor located in the cab car. Additionally, if the engineer fails to control the train movement in accordance with either a wayside signal indication or other restrictions imposed upon the train, the designated crew member (conductor) shall at once communicate with and caution the engineer regarding the restriction, and, if necessary, take appropriate action to ensure the safety of the train, including stopping the movement if appropriate.

In querying Metrolink Officials of why the Motorola HT-1250 model was used in the field testing versus the Motorola HT-1000 model purportedly used by the crew of Metrolink Train ML-111 and sent to CAZCOM for bench testing, Metrolink stated, "The HT 1000 model was replaced by the HT 1250 model and, other than user friendly additives, it has the same functionality, as far as we have determined over several years of use, as an HT 1000. As such, we did not specify, nor do we have cause to believe, testing radio connectivity with the dispatcher in the vicinity of the Chatsworth Incident with a HT 1000 would/could have altered the test results."

POST-ACCIDENT DRUG AND ALCOHOL TOXICOLOGY TESTING

The Metrolink 111 conductor and the three crew members of UP Train LOF65-12 were subjected to FRA post-accident toxicology testing, while the deceased Metrolink ML-111 locomotive engineer was given FRA post-accident fatality toxicology testing.

FRA Post-Accident Forensic Toxicology Report indicated marijuana was present in the urine and blood

specimens of the UP conductor. The other two UP employees and the Metrolink conductor had negative results. Post-accident toxicology test results on the deceased Metrolink locomotive engineer had negative results.

POST-ACCIDENT DRUG AND ALCOHOL AUDIT - METROLINK

Subsequent to the collision, a follow-up inspection was conducted with Metrolink's contractor, Connex, for its drug and alcohol control per Rule 49 CFR Part 219. At issue was the failure of Connex to comply with the requirements of 49 CFR Part 219.205(a) concerning the timely and proper delivery and handling of specimen kits for the deceased locomotive engineer.

The Connex manager responsible for the proper handling of the fatality toxicological specimen box received the box from the Los Angeles County Coroner's Office on September 15, 2008, and incorrectly shipped the samples to Connex's Medical Review Officer (MRO) instead of FRA's designated laboratory, as required. A violation was recommended for non-compliance with 49 CFR Part 219.205(a).

POST-ACCIDENT INSPECTION/TESTING OF TRACK

Track geometry measurements were recorded on the curve west of CP Topanga. Investigators took measurements at 25 stations at 15.5 foot increments. No measurements were taken on the west side of the POC due to the disturbed track conditions and surfacing repairs initiated after the collision.

At CP Topanga, contact marks were found on the field side of the turnout's left-hand switch point about 31 feet from the end of the switch point. These marks extended for several feet along the switch point's length in a west direction toward the end of the switch point. Accident investigators noted the switch appeared to be in a reverse position; however, the switch points were not up against either stock rail. Investigators observed the operating rod that controls the throw of the switch was severely bent. The right-hand switch point's tip showed fresh signs of damage. The evidence supports the switch point was in the reverse position lined for the siding for eastbound UP Freight Train LOF65-12 and against the westbound main track movement at the time Metrolink Passenger Train ML-111 traversed through it.

TRACK INSPECTION RECORDS

Metrolink designates the maximum authorized timetable speed on its single main track between CP Topanga and Tunnel #28 as 40 mph, which would be classified as FRA Class 3. The 40 mph speed is due to a permanent speed restriction for the curvature of the track.

49 CFR Part 213 requires the carrier's track inspection records be prepared and signed each day an inspection is made. Track inspection records are required to reflect actual field conditions and any deviations from the FRA Track Safety Standards (TSS). The gross annual tonnage, the passenger operations and Metrolink's election to operate at FRA Class 3 speeds required Metrolink personnel to inspect the main track a minimum of two times per calendar week; however, Metrolink typically inspects the main track at least three times per week.

The annual gross tonnage on the Ventura Subdivision is 10.5 million gross tons. Metrolink operates 20 passenger trains, Amtrak operates 12 passenger trains, and UP operates approximately 9 freight trains daily.

Prior to the accident on September 12, a Metrolink track inspector designated per Rule 49 CFR Part 213.7(b) inspected the track in the collision area. The record of that inspection noted no exceptions in the area of the collision. FRA reviewed Metrolink's track inspection records dating back to March 1, 2008, and noted no exceptions. FRA reviewed Metrolink's list of qualified inspectors and persons designated to provide remedial actions on behalf of the railroad and took no exceptions. CPUC last inspected Metrolink's Ventura Subdivision on January 8, 2008. The inspection began at milepost 424.6 and ended at milepost 462.6. FRA conducted a geometry car survey over the Ventura Subdivision on March 17, 2008. No FRA exceptions were documented in the Chatsworth area.

ULTRASONIC RAIL TESTS

The last three ultrasonic tests to inspect rail for internal defects at the frequency required by 49 CFR Part 213.231(a) were conducted by Sperry Rail Services on July 31, 2008, and by Herzog Ultrasonic Rail Services on December 12, 2007, and October 17, 2007. The testing data identified no defective rails in the vicinity of the accident.

TRACK GEOMETRY CAR DATA

Investigators reviewed and examined the two most recent Metrolink geometry car data, dated July 30, 2008, and December 12, 2007. Metrolink contracts its track geometry testing through Holland Track Testing Services, which tested, measured and recorded data. In the vicinity of the POC, the data listed no geometry deficiencies.

METROLINK LOCOMOTIVE AND CAB CAR EVENTY RECORDERS

The Metrolink Train ML-111 trailing cab car SCAX 617 and the lead locomotive SCAX 855 event recorders were removed on-site by Bombardier mechanical forces and observed by FRA, NTSB and CPUC on the day after the incident, September 13, 2008. Regular download procedures would not work on the lead locomotive SCAX 855 event recorder due to the heavy damage it sustained in the collision. It was shipped to the manufacturer Bach-Simpson to retrieve the data where an NTSB representative was present to oversee and collect the downloaded information.

NTSB provided FRA download data from the lead locomotive SCAX 855 in the form of a screen capture, which is only a snapshot of the overall download data. The data from the screen capture shows only generic values from Chatsworth Train Station to the POC, such as speed, braking pressures (automatic and independent), and horn and bell applications. The time of impact on the lead locomotive SCAX 855 print screen download data was 2 minutes and 34 seconds ahead of the time on the trailing cab car SCAX 617 data. The time was adjusted accordingly to place accurate horn and bell recordings on the trailing cab car SCAX 617 tabular data. The accuracy of the speed as recorded on the lead locomotive SCAX 855 print screen download data was determined to be unreliable due to the FRA not knowing what wheel diameter was inputted when this data was configured.

The throttle positions were not properly recorded on lead locomotive SCAX 855 event recorder; throttle positions are not transmitted between the lead locomotive and the trailing cab car's event recorder. However, the governor solenoid sequences were recorded between lead locomotive SCAX 855 and trailing cab car SCAX 617 and from that data, throttle positions were calculated as depicted below. Manufacturer's drawings were used to verify the solenoid sequences that were recorded for each throttle position. This data was translated to verify throttle positions from Northridge Station to the POC. The following is a summary of events that was recorded on UP Train LOF65-12 from Chatsworth Rail Station to the POC:

Arrived Chatsworth Station	4:19:23	
Dwell Time - Chatsworth Station	58 Seconds	
Departed Chatsworth Station	4:20:21	
Horn Activation for Devonshire	4:20:55 - 4:20:05	
Devonshire Crossing	4:21:05 Throttle 8	Brakes Released 37MPH
Horn Activation for Chatsworth	4:21:27 - 4:21:44	
Chatsworth Crossing	4:21:44 Throttle 8	Brakes Released 54 MPH
Throttle Response	4:21:45 Throttle 6	Brakes Released 54 MPH
Throttle Response	4:21:46 Throttle 4	Brakes Released 54 MPH
Brake Application	4:21:50 Throttle 4	9 lbs. Reduction 54 MPH
Brake Release	4:22:05 Throttle 4	Brakes Released 43 MPH
Point of Collision	4:22:27 Throttle 4	Brakes Released 42 MPH

The trailing cab car SCAX 617 event recorder was transported to Metrolink's CMF and installed in an identical cab car SCAX 609 to power up and retrieves the data. This was successful and the data was extracted for evaluation and research. The event recorder clock must be synchronized manually when downloaded and, therefore, does not accurately match the time of events. The clock synchronization was done with personal watches by the NTSB and the Bombardier technician. The time was later adjusted to match the POC time of the locomotive UP 8491 download, which is synchronized with the atomic clock through global positioning

satellite (GPS) technology. Locomotive UP 8491 time was 1 minute and 10 seconds behind the SCAX 617 time. The tabular data was adjusted accordingly.

UP LOCOMOTIVE EVENT RECORDERS

Event recorder data for UP Freight Train LOF65-12 second locomotive UP 8491 was downloaded at the collision site by UP's Manager of Operating Practices (MOP) and was the only UP download received by the FRA. The lead locomotive UP 8485 had no power to the system because first responders disconnected the battery cable. Both crash-hardened memory modules from the UP 8485 and UP 8491 were removed by the UP mechanical forces and observed by FRA, NTSB, and CPUC and were sent to UP headquarters, Omaha, NE, for evaluation. An NTSB representative was in Omaha at the time the event recorders arrived to oversee and collect the download. UP mechanical forces were unable to retrieve the event recorder download from the UP 8485 memory module because it had been damaged in the collision and removed prematurely from the locomotive. The memory module must be wired in with the Functionally Integrated Railroad Electronics (FIRE) cab computers and powered up to retrieve such data. The NTSB and UP returned to the UP 8485 to retrieve the FIRE cab computers. The NTSB was able to retrieve the information off the FIRE cab computer for the UP 8485 but have not released that data to the FRA.

The following reflects downloaded event recorder data from the UP 8491 (second locomotive) immediately prior to and at the point of collision:

5 seconds prior to POC:	41 MPH - Brakes Released - Throttle Notch 3 Dynamics
4 seconds prior to POC:	41 MPH - Brakes Released - Throttle Notch 8 Dynamics
3 seconds prior to POC	40 MPH - 58 lbs. Reduction - Throttle Notch 8 Dynamics
2 seconds prior to POC	40 MPH - Emergency App. - Throttle Notch 8 Dynamics
1 second prior to POC	40 MPH - Emergency App. - Throttle Notch 8 Dynamics
Impact	40 MPH - Emergency App. - Throttle Notch 1 Dynamics

Locomotive UP 8491 download indicates that at 3 seconds prior to the collision, there was a 58-pound brake pipe reduction. The engineer was in the process of applying an emergency application when this was recorded. The emergency brake was not fully applied until 2 seconds prior to impact.

POST-ACCIDENT INVESTIGATION - HAZARDOUS MATERIALS

An FRA Hazardous Materials inspector was the first FRA inspector to arrive at the scene at 5:45 p.m. He was advised the UP had provided the fire department with a train list that identified a hazardous materials tank car was in the train. The FRA inspector interviewed the UP operating officer in charge regarding this issue. He learned the fire department had telephoned UP and requested the train list at 5:40 p.m. The UP provided the fire department a previously assigned train consist for the lead locomotive involved in the accident. He asked UP Officials why the fire department was not given the train list the crew had with them at the time of the accident and was informed the cab of the locomotive was searched but the list was not found. The cab was damaged by fire from the collision and it is likely the train consist was consumed by the fire. As a result of the information sent by the UP, the fire department assumed there was hazardous material in the train. Line 54 of the train consist showed car number NTRX 22906 contained "RESIDUE LAST CONTAINED HAZARDOUS WASTE LIQUID NOS (CADMIUM SILVER), 9, NA 3082, PG III." Still unable to reconcile the train consist, fire department personnel walked the UP train at approximately 9:06 p.m. and faxed in car numbers to the UP. By running a car history and waybills on the car numbers identified by the fire department, an accurate rendition of the train consist was made at 10:59 p.m. and it was verified there were no hazardous materials present.

FRA recommended a prosecution for civil penalties against the UP for non-compliance with 49 CFR 171.2(k).

ANALYSIS AND CONCLUSIONS

ANALYSIS - PART 217 OPERATIONAL TESTS AND INSPECTIONS, METROLINK/CONNEX

FRA found that prior to September 12th no test had been made by any official on GCOR Rule 1.10, employee use of electronic devices. Connex's efficiency testing guide refers to that rule as one of 22 rules it expected officers to test for.

CONCLUSIONS - PART 217 OPERATIONAL TESTS AND INSPECTIONS

To address the efficiency testing of the crew on Metrolink Train ML-111, in the 3 months prior to September 12, neither crew member met standards of Part 217 testing requirements, testing at various locations and times, testing under various operating conditions or testing for use of electronic devices.

FRA recommended prosecution for civil penalties for non-compliance with 49 CFR 217.9.

ANALYSIS - SIGNAL

Results of the signal team investigation indicate the signal system was not a contributing factor in the accident. Train movements were simulated and signal purity of all involved signals checked. The signal system was tested for conflicting opposing routes and signal aspects were verified. A review of signal data logs and field signal system testing proved the signal system was functioning correctly at the time of the accident.

CONCLUSIONS - SIGNAL

The signal system functioned as intended. Examination of maintenance records showed no condition that prevented the signal system from operating as designed.

ANALYSIS - METROLINK EQUIPMENT

Metrolink Commuter Passenger Train ML-111 consisted of one locomotive (SCAX 855), two coach cars (SCAX 185 and SCAX 207), and one cab car (SCAX 617).

The lead locomotive SCAX 855 and first bi-level car SCAX 185 were totally destroyed and scrapped on site; the second bi-level car SCAX 207 and cab car SCAX 617 sustained significant damage. Damages to all four vehicles were estimated at $9.0 million. FRA identified four defects on SCAX 855. FRA found thermal cracks on the front truck of SCAX 855 and determined they did not contribute to the incident. The two remaining cars, SCAX 207 and SCAX 617, were air tested and moved to Metrolink's CMF for further inspections. Maintenance records were also inspected on all three cars and the locomotive.

CONCLUSIONS - METROLINK EQUIPMENT

The inspection of the equipment and the records revealed no defects that could have contributed to the incident.

ANALYSIS - UNION PACIFIC EQUIPMENT

The Union Pacific Train LOF65-12 consisted of 2 locomotives and 17 freight cars. The following is a consist list provided by Union Pacific:

Lead Locomotive:	UP8485	SD70ACe	Forward	Derailed
2nd Locomotive:	UP8491	SD70ACe	Backward	Derailed
Car 1:	CEFX95334	Hopper	Empty	Derailed
Car 2:	CEFX96307	Hopper	Empty	Derailed
Car 3:	ARMN933964	Reefer	Load	Derailed
Car 4:	GBRX65014	Hopper	Empty	Derailed
Car 5:	MP374660	Box	Empty	Derailed
Car 6:	SP228550	Box	Empty	Derailed
Car 7:	WC22193	Box	Empty	Derailed
Car 8:	DWC793859	Box	Empty	Derailed
Car 9:	GTW517811	Box	Empty	Derailed
Car 10:	DWC793713	Box	Empty	Derailed
Car 11:	LW50237	Box	Empty	Not Derailed
Car 12:	ARMN768079	Reefer	Load	Not Derailed
Car 13:	ARMN761840	Reefer	Load	Not Derailed

Car 14:	ARMN768036	Reefer	Load	Not Derailed
Car 15:	ARMN923979	Reefer	Load	Not Derailed
Car 16:	ARMN769010	Reefer	Load	Not Derailed
Car 17:	FBOX504734	Box	Load	Not Derailed

The lead locomotive UP 8485 was re-railed and moved to Moorpark, CA and the second locomotive UP 8491 was re-railed and moved to Oxnard, CA. Cars 1 through 7 were totally destroyed and scrapped on site. Cars 8 through 10 were moved to Moorpark and de-trucked for bearing inspections and repairs. Cars 11 through 17 were moved to Moorpark for inspection and put back into service. Damage to all equipment, i.e., locomotives and cars, was estimated at $2,203,830.

Locomotive UP 8485 and the 10 remaining cars were inspected at Moorpark. Locomotive UP 8491 was inspected at Oxnard. FRA reviewed maintenance records noting one defect that was unrelated to this incident.

CONCLUSION - UNION PACIFIC EQUIPMENT

A review of all records of tests, inspections and maintenance on the UP equipment revealed no defects that could have contributed to the accident.

ANALYSIS - TRACK

The general construction of the Main Track east of CP Topanga consists of 136 lb. Continuous Welded Rail (CWR). The rail is seated in 16 by 7¾ inch double shoulder tie plates that lay between the bottom surface of the rail and the top surface of timber crossties. The rail is fastened through the tie plates to standard timber crossties with four lag screws, two on the gage side and two on the field side. The track west of the CP Topanga is where the curve begins and the structure changes to concrete ties with elastic fasteners, one on each side of the base of the rail. The wooden crosstie sections of track averaged 24 ties per 39 linear feet. The concrete tie section averaged 19½ ties per 39 feet. The rail is held in place by two elastic fasteners, one on the gage side and one on the field side. The wooden crosstie section was predominantly box anchored with four rail anchors per crosstie, two rail anchors applied to each rail, a rail anchor on each side of a crosstie with rail anchors applied to every crosstie commonly referred to as box anchored. The CWR in the concrete tie sections is secured on every tie with the two elastic fasteners. The track was supported by a mixture of semi-angular granite ballast that filled the crosstie cribs. The depth of the ballast was estimated at 20 to 22 inches. The ballast shoulders measured 20 inches on tangent and 24 inches in the curve. There were no fouled ballast conditions. At the POC, Metrolink maintains a 6 degree curve with 4½ inches of elevation.

The turnout is constructed of CWR. The switch point area is completely welded without rail joints and is constructed with Samson switch points and stock rails are beveled for a protected fit of the switch point against the stock rail.

CONCLUSIONS - TRACK

A review of all records, tests and inspections on the track in the area of the POC revealed no conditions that would have contributed to the collision.

ANALYSIS - HAZARDOUS MATERIALS

With the exception of the defect noted with UP's inability to provide an accurate consist, or train car list, and the ensuing confusion for first responders, hazardous materials were not present in UP Freight Train LOF65-12 and played no role in contributing to the accident.

CONCLUSION - HAZARDOUS MATERIALS

The inability of first responders to accurately know whether hazardous materials were present in the train may have contributed to delays in responding to the emergency. Preventing these delays is precisely the purpose behind the hazard communication requirements of 49 CFR Part 172 so that first responders can immediately identify and react to the presence of hazardous materials in an emergency. The impact of the failure of the system to deliver accurate information in a crisis such as this cannot be estimated.

In recognition of this failure, FRA is recommending a violation to the UP under 49 CFR 171.2(k), which states, "No person may, by marking or otherwise, represent that a hazardous material is present in a package, container, motor vehicle, rail car, aircraft, or vessel if the hazardous material is not present."

ANALYSIS - TOXICOLOCICAL TESTING

FRA Post-Accident Forensic Toxicology Reports indicate marijuana was present in the urine and blood specimens of the UP conductor. The other two UP employees and the Metrolink conductor had negative results.

Post-accident toxicology test results on the deceased Metrolink locomotive engineer had negative results.

CONCLUSIONS -TOXICOLOGICAL TESTING

Based on the data obtained from FRA Post-Accident Laboratory (117 ng/mL of THCA in urine, and 1.1 ng/mL of THC and 13.7 ng/mL of THCA in blood), the UP conductor appears to have last used marijuana anywhere from a few hours to late the night before the accident.

It is assumed the conductor did not use marijuana between the time of the crash and sample collection. Due to the length of time it took to obtain the blood samples after the accident (over nine hours), without additional evidence, it is not possible, with any certainty, to provide a more narrow range of times for the last ingestion of the drug.

ANALYSIS - FATIGUE

FRA obtained fatigue-related information, including a 10-day work history, for the Metrolink ML-111 engineer and conductor involved in the collision.

CONCLUSION - FATIGUE

FRA concluded fatigue was not a probable factor for either the engineer or conductor of Metrolink Train ML-111. It should be noted this analysis assumes no sleep disorders or drowsiness-inducing drugs.

ANALYSIS - LOCOMOTIVE CAB DISTRACTIONS AND THE USE OF ELECTRONIC EQUIPMENT

Records regarding the Metrolink engineer's cell phone activity on the day of the accident were obtained from his service provider under subpoena from the NTSB. These records include the times and dates of incoming and outgoing telephone calls, Short Message Service (SMS) text messages, pictures/video messages, and web browser use. This information and cell phone records of rail enthusiasts were used to correlate the timing of cell phone activity to and from the engineer's cell number in relation to the engineer's duty hours and train operations. On the day of the accident, the Metrolink engineer was on duty for two periods of time. The engineer was responsible for the operation of Metrolink Train ML-106 from 6:44 a.m. until 8:53 a.m. During this period, the engineer's cell phone received 15 text messages, sent 15 text messages and placed 2 outgoing telephone calls. He was then off duty until 2:00 p.m. The engineer was responsible for the operation of Metrolink Train ML-111 from 3:03 p.m. until the time of the accident. During this period, the engineer's cell phone received 7 text messages, sent 6 text messages, and made two 75-second outgoing telephone calls. According to the time on the cell phone provider's records, the last text message received by the engineer's phone before the accident was at 4:21:03 p.m., and the last text message sent from the engineer's cell phone was 4:22:01 p.m., 22 seconds before the collision. This final text message was sent after Metrolink 111 had run through the switch and passed the stop signal (red) indication at CP Topanga.

Cell phone records indicate the total text messages for the period 12:00 a.m. until the time of the accident at 4:22:23 p.m. was 47 sent and 50 received. During the time the locomotive engineer was responsible for the operation of a train, 21 text messages were sent, 22 text messages were received and 4 outgoing telephone calls were made.

CONCLUSION - LOCOMOTIVE CAB DISTRACTIONS AND THE USE OF ELECTRONIC EQUIPMENT

In recognition of the potential disastrous consequences of the use of electronic devices by railroad crews while in operation, which increase the likelihood of distracting the employees from their duties, FRA enacted Emergency Order 26 (EO26), on October 27, 2008. EO-26 prohibits the use of electronic devices such as cell phones by train crews and other applicable railroad employees while in the performance of their duties.

APPLICABLE RULES AND REGULATIONS

a. Emergency Order 20 (EO-20) and GCOR 1.47a.5.a. - Failure of locomotive to comply with communication requirements as set for in FRA EO20 regarding “delayed in block”.

b. 49 CFR 219.205(a) - failure to properly ship the fatality toxicological specimen box to the designated FRA testing laboratory.

c. 49 CFR 171.2(k) - producing a shipping paper indicating the presence of hazardous materials in a train consist when no hazardous materials were present.

d. 49 CFR 217.9 - failure to periodically conduct operational tests and inspections to determine the extent of compliance with its code of operating rules, timetables, and timetable special instructions (17 counts).

Following the accident, Metrolink published Special Instructions #23.08, dated October 3, 2008, requiring a second conductor or engineer in all lead locomotives and head-end cab cars. The instructions require the conductor or engineer to:

A. Call all signals; comply with all indications
B. Remind the engineer operating the controls of upcoming restrictions
C. remain at the assigned location

On October 1, 2008, the FRA Administrator signed Emergency Order 26 (EO-26) with an effective date of October 27, 2008, prohibiting the use of personal electronic devices, including cell phones, capable of distracting railroad employees engaged in safety-critical duties, such as while in the locomotive cab of moving equipment, or while working on the ground in close proximity to live track.

PROBABLE CAUSE AND CONTRIBUTING FACTORS

FRA concluded the collision was caused by the failure of the Metrolink train crew to comply with a fixed signal (other than automatic block or interlocking signal) displaying a stop indication. FRA also believes the Metrolink locomotive engineer’s use of a personal cell phone for text messaging while he was at the controls of his train is a likely source of locomotive cab distraction and may have been a significant contributing cause to the accident.