Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2007-80

Union Pacific/Regional Transportation District
Littleton, CO
December 11, 2007

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # HQ-2007-80

1.Name of Railroad Operating Train #1: Union Pacific RR Co. [UP]	1a. Alphabetic Code: UP	1b. Railroad Accident/Incident No.: 1207DV012
2.Name of Railroad Operating Train #2: Regional Transportation District [RTDZ]	2a. Alphabetic Code: RTDZ	2b. Railroad Accident/Incident No.: Industry
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: Union Pacific RR Co. [UP]	4a. Alphabetic Code: UP	4b. Railroad Accident/Incident No.: 1207DV012
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 12 | Day 11 | Year 2007	7. Time of Accident/Incident: 07:00: ☑ AM ☐ PM

8. Type of Accident/Indicent *(single entry in code box)*: 1. Derailment; 2. Head on collision; 3. Rear end collision; 4. Side collision; 5. Raking collision; 6. Broken Train collision; 7. Hwy-rail crossing; 8. RR grade crossing; 9. Obstruction; 10. Explosion-detonation; 11. Fire/violent rupture; 12. Other impacts; 13. Other *(describe in narrative)* — Code: 01

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

14. Nearest City/Town	15. Milepost *(to nearest tenth)*	16. State Abbr	16. State Code	17. County
Littleton	11.3	N/A	CO	ARAPAHOE

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
16 F	2	6	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 1	4	63.84	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
1	1	CAIKM08

29. Speed *(recorded speed, if available)* R - Recorded E - Estimated — Code	30. Trailing Tons *(gross tonnage, excluding power units)*	31. Method(s) of Operation *(enter code(s) that apply)*	31a. Remotely Controlled Locomotive?
39 MPH — R	9880	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	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)*	TILX420077	18	yes
(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): N

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	2	0	3	0	1
(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	106	0	0	0	0
(2) Total Derailed	25	0	0	0	0

37. Equipment Damage: This Consist	38. Track, Signal, Way, & Structure Damage	39. Primary Cause Code	40. Contributing Cause Code
$1,857,950.00	$118,152.00	T299	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	46. Conductor
Hrs 4 Mi 30	Hrs 4 Mi 30

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

50. EOT Device? 1. Yes 2. No	51. Was EOT Device Properly Armed? 1. Yes 2. No
1	1

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
3	1	RTDZ3211

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?
45 MPH — E	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

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

c. Auto train stop; d. Cab; e. Traffic; f. Interlocking; i. Time table/train orders; j.Track warrant control; k. Direct traffic control; l.Yard limits; o. Positive train control; p. Other *(Specify in narrative)*

Code(s): 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)*	RTDZ216	1	N/A
(2) Causing *(if mechanical cause reported)*	0	0	N/A

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

Alcohol	Drugs
N/A	N/A

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

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

64. Equipment Damage This Consist: $600,000.00

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

66. Primary Cause Code: T299

67. Contributing Cause Code: N/A

Number of Crew Members

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

Length of Time on Duty

72. Engineer/Operator: Hrs 3 Mi 28

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: 1

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: 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. 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)*; Code: N/A

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

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

Rail Equipment Involved

111. Equipment 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)*; Code: N/A

112. Position of Car Unit in: N/A

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

115. Type Crossing Warning 1.Gates 2.Cantilever FLS 3.Standard FLS 4.Wig Wags 5.Hwy. traffic signals 6.Audible 7.Crossbucks 8.Stop signs 9.Watchman 10.Flagged by crew 11.Other *(spec. in narr.)* 12.None	116. Signaled Crossing *(See instructions for codes)*	Code	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

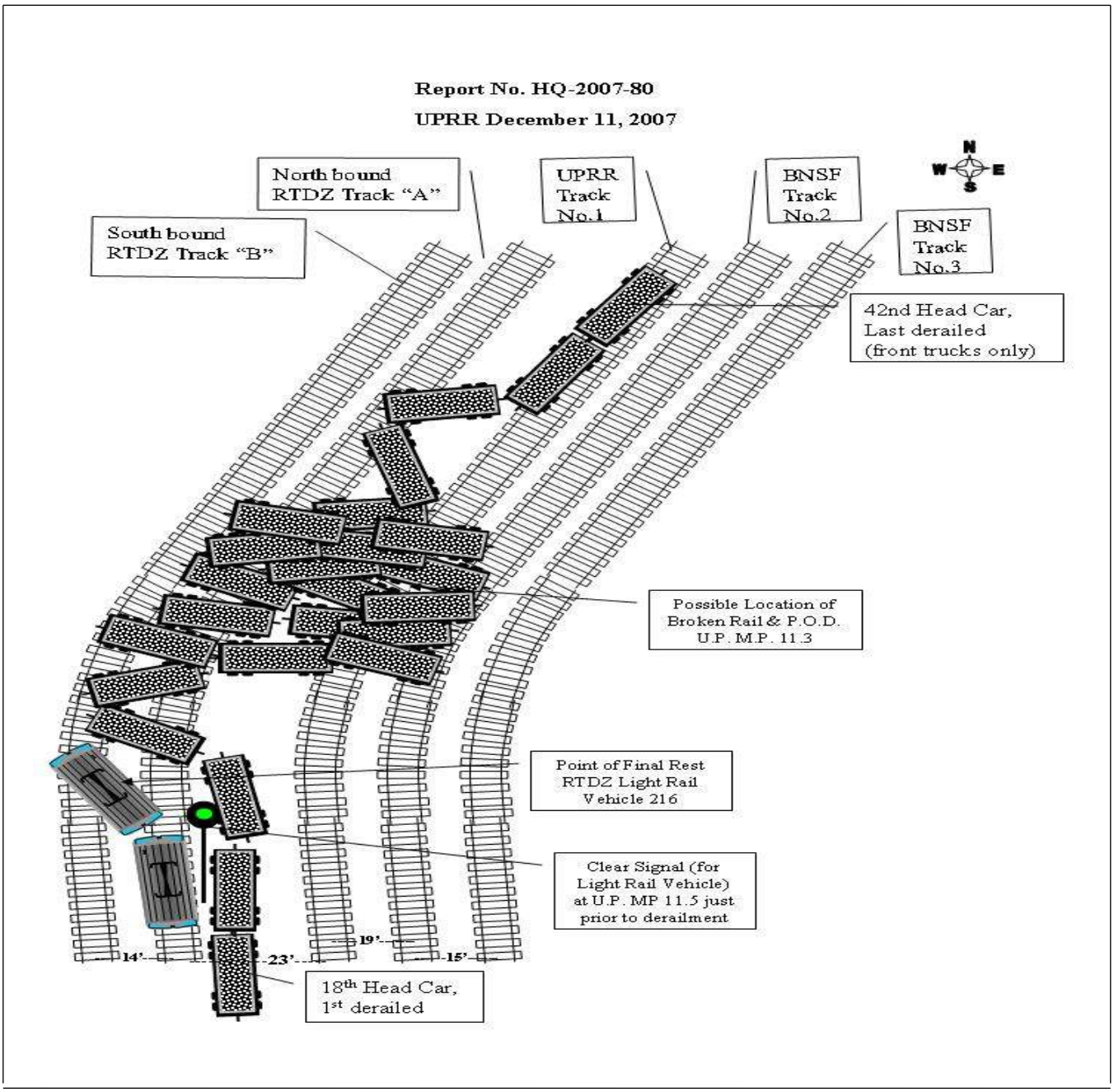
121. Age N/A	122. Driver's Gender 1. Male 2. Female	Code N/A	123. Driver Drove Behind or in Front of and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown	Code N/A	124. Driver 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop 4. Stopped on Crossing 5. Other *(specify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

Southbound Union Pacific Railroad Company (UP) loaded coal train, Symbol CAIKM-08, derailed on the UP Colorado Springs Subdivision about 1 mile south of Littleton, Colorado, in Arapahoe County. The accident occurred on the UP Main Track No.1 at milepost (MP) 11.3, on December 11, 2007, at 7 a.m., MST. The UP train was being operated under Centralized Traffic Control (CTC), at a recorded speed of 39 mph at the time which was recorded by the event recorder of controlling Locomotive No. UP 7330. The maximum authorized operating speed for a loaded coal train on the UP Main Track No. 1 is 45 mph, as designated by the current Burlington Northern Santa Fe Railway Company (BNSF) Timetable. The 18th through 42nd head cars derailed fouling BNSF Main Tracks No.2 and No.3, and Denver Regional Transportation District (RTDZ) Main Tracks A and B.

RTDZ Light Rail Vehicle (LRV) Symbol RTDZ32-1 with two occupied units, was traveling northward on their Main Track A. The operator noticed the UP coal train begin to derail in front of the LRV, spilling coal on the RTDZ tracks. The RTDZ LRV hit the spilled coal and derailed cars and as a result derailed both LRV units.

There were no injuries reported by the 2-person UP crew, or the 1 crew member and 29 passengers aboard the RTDZ LRV. No hazardous materials were involved and no evacuations were ordered. Damage estimates to the UP were $1,857,950 to the train consist and $118,152 to the track. RTDZ damage estimates are $600,000 for the equipment.

At the time of the derailment, it was daylight, snowy, and the temperature was 16 degrees Farhenhiet.

None of the rail that was sent to the UP laboratory for analysis had a defective condition that would give conclusive evidence that it was the cause of the derailment. Some of the wheels sent to the laboratory had nicks on the tread surface that would indicate contact with a broken rail.

PROBABLE CAUSE:

The probable cause is T-299, other rail and joint bar defects.

138. NARRATIVE

CIRCUMSTANCES PRIOR TO THE ACCIDENT

UP TRAIN CAIKM-08:

The 2 person crew of UP Train CAIKM-08 consisted of a locomotive engineer and a conductor. They went on duty at their home terminal in Denver, Colorado at 2:30 a.m., MST, on December 11, 2007. Each crewmember received more than the required statutory off-duty rest period prior to reporting for duty. Their rest periods were 20 hours and 45 minutes for the engineer and 20 hours and 35 minutes for the conductor.

The scheduled route of the loaded UP coal train was from Axial, Colorado, east to Denver, then south to Pueblo, Colorado. At Pueblo, the train was to be given to the BNSF. The BNSF was scheduled to operate the train to points east for unloading. The consist, upon leaving Denver, was equipped with 2 locomotives on the head-end, 3 locomotives in the middle of the train and 1 locomotive on the rear for distributive power, and 106 loaded coal cars. The last Class 1A (1,000 mile) air brake test was performed, at Pueblo, on December 7, 2007. Testing the End-Of-Train Device (EOTD) was conducted at Denver prior to departure. These tests were conducted successfully by UP mechanical personnel.

Both crew members were present in the control compartment of the lead locomotive when the derailment occurred. The engineer was positioned on the west side of the locomotive at the controls panel and the conductor was positioned in the conductor's seat on the east side of the locomotive. Interviews of the crew members performed by FRA revealed that the trip was uneventful prior to the derailment.

RTDZ TRAIN 32-11:

The 1-person crew of RTDZ LRV Train RTDZ32-11 consisted of an operator. He went on duty at 3:32 a.m.,

MST, at Englewood, Colorado. Since the RTDZ crew does not fall under FRA guidelines or Hours of Service, the off-duty period is not available. The operator was present in the control department, positioned at the controls on the west side of the front light rail vehicle.

The scheduled route of the LRV was from Littleton to Denver. The consist of the train was two units including the lead vehicle. A total of 29 passengers was aboard the LRV at the time of the collision. The LRV departed the Mineral Station about 1 mile to the south of the derailment site and was traveling north on tangent track heading toward a 1 degree 45 minute, right-hand curve, with a descending 0.84 percent grade.

This portion of the Colorado Springs Subdivision has three freight train main tracks and two light rail commuter tracks. From the west to east, the first two tracks are owned and operated by RTDZ with 14-foot track centers. Adjacent to the RTDZ tracks is the UP Main Track No. 1 with a 23-foot track center. Just to the east is the BNSF Main Track No. 2 which has a 19-foot track center and adjacent to it is the BNSF Main Track No. 3, with a 15-foot track center. All measurements were taken at the scene by the FRA Inspector in charge. The point of derailment (POD) was at UP Milepost 11.3, which is in the body of a 1 degree 45 minute, left-hand curve. The curve stretches for about 220 feet and is the last curve leading out of what is known as the Littleton Depression. The grade at the POD is flat. The approach to the POD, just to the north at UP Milepost 11.0, is +0.23 percent, and south at UP Milepost 11.75, the grade is +0.84 percent. The RTDZ tracks parallel the UP tracks at this location so geography is virtually the same.

Track conditions in the area of the derailment were good. UP Main Track No. 1 consisted of 133 lb Continuous-Welded Rail (CWR) on both sides which was laid new in 1998. The railhead is in good shape with little wear indicated. Ties are in good condition; no tie installation date was available. The ballast in the area is good, with a 2-foot ballast shoulder on both sides. The rail was secured to the ties using a McKay type fastener on both sides of the rail. These fasteners are used to anchor the rail to the tie in order to prevent lateral, longitudinal, or vertical movement. The area of the derailment is in a very populated portion of the southern suburbs of Denver.

The railroad timetable direction of the UP train was south; the geographic direction was also south. The railroad timetable direction of the RTDZ LRV was north; the geographic direction was also north. Timetable directions are used throughout this report.

THE ACCIDENT:

UP TRAIN CAIKM-08:

UP Train Symbol CAIKM-08 was traveling southward on UP Main Track No. 1 at a recorded speed of 39 mph on a restricted (flashing yellow) signal just prior to the derailment. The speed was recorded by the event recorder of controlling Locomotive No. UP 7330. The maximum operating speed for a loaded coal train on Main Track No. 1 is 45 mph, as designated by the current BNSF Timetable No. 5.

The head-end of the train had just passed through the Littleton Depression and was on tangent track. Both the engineer and the conductor stated they did not see or feel anything out of the ordinary while proceeding south toward Littleton, the next station. As the head-end was approaching Littleton, on a restricted signal, the locomotive engineer observed the signal change to a clear and began to increase the throttle as the head end was at approximately UP Milepost 11.4. The crew immediately felt the train slow and noticed they had experienced an undesired emergency brake application, bringing the train to a stop.

After coming to a stop, the engineer contacted the dispatcher to report the situation. Both he and the conductor could see dust behind them and the engineer noticed the brake lights of the derailed LRV. The conductor walked the train to inspect it and discovered that the 18th through the 42nd head cars of UP Train CAIKM-08 were derailed. All car counts include the locomotives. The 18th, 19th, and 20th head cars were laying on their sides with all the coal dumped onto the RTDZ tracks. The 21st head car was also on its side and blocking both RTDZ tracks. The 22th through the 39th head cars were stacked together in accordion style in a space less than 250 feet wide, all spilling their contents. They blocked both RTDZ tracks, UP Main track No. 1 and BNSF Main Track No. 2. The BNSF Main Track No. 3 was slightly blocked by a derailed set of trucks, with no track damage. The 40th and 41st head cars were listing at about a 45-degree angle, still containing most of the coal. The 42nd head car was upright with the south trucks derailed and the north trucks still on the rail. Soon after contacting the dispatcher, emergency response officials from the City of

Littleton, and the railroad began to arrive at the site.

RTDZ TRAIN 32-11:

RTDZ LRV RTDZ32-11 was traveling northward on RTDZ Main Track A, at an estimated speed of 45 mph on a clear signal indication just prior to the collision with the UP Train CAIKM-08. The operator noticed the southward moving coal train passing on the adjacent track just to the east. While approaching the clear signal, the LRV operator noticed the coal train begin to derail in front of him, spilling coal onto the RTDZ tracks. He stated he began braking and the LRV was lifted off the track by the spilled coal and came into contact with a glancing blow of the derailed coal hopper cars that had fouled the track. The speed of the LRV at the POD was not available as they are not equipped with event recorders. The derailed LRV came to a stop upright just west of the tracks. The LRV was carrying 29 passengers. The passengers were evacuated and no injuries were reported.

The initial investigation by railroad officials and the FRA Investigator-in-Charge determined the POD to be at UP MP 11.3. Evidence at the scene indicated that the lead trucks of the first derailed car, Car No. TILX 420077, derailed in the body of an 1-degree 45-minute curve. Train momentum carried the car and derailed cars directly behind it about .05 mile. The next 2 derailed cars landed in a line along UP Main Track No.1, spilling the coal onto the RTDZ tracks. The cars behind the 3rd derailed car piled up in accordion style. The 23rd and 24th derailed cars were upright but listing at about a 45-degree angle; they contained their product. The last derailed car only had the lead trucks derailed and was upright. About 663 feet of the UP Main Track No. 1 was destroyed. It was put back in-service at 9:45 p.m., on December 13. The BNSF Main Track No. 2 required only minor track lining and was put back in-service at 11:30 p.m., on December 11. Then BNSF Main Track No. 1 had no track damage and once the derailed set of trucks were lifted off the track it was put back in-service at about 2:30 p.m. The RTDZ Main Track A had about 468 feet destroyed and was put back in-service around 12 a.m., on December 16. RTDZ Main Track B had a small amount of track damage, requiring a few ties and spikes as well as coal cleanup. It was put back in-service at the same time as Main Track A. There were no other vehicles or persons involved. The 2 person crew of the UP train did not report any injuries and no injuries were reported by the operator and passengers aboard the RTDZ LRV. There were no hazardous materials involved and no evacuations other than the passengers on the LRV. Damage estimates to the UP include $1,857,950 to the train consist and $118,152 to track. RTDZ damage estimates are $600,000 for the equipment and provided no estimate for track damages.

The UP's emergency wreck clearing crews along with two emergency wreck clearing contractors were called to help with removal of the cars, grade work, and laying of the new track through the derailment site. The contracting companies used were R. J. Corman, based out of Torrington, Wyoming, which arrived on scene at about 2:30 p.m., MST, and Hulcher, based out of Cheyenne, Wyoming, which arrived on scene at about 3:30 p.m., MST.

ANALYSIS AND CONCLUSIONS

ANALYSIS - TOXICOLOGICAL TESTING:

The crew members of UP Train CAIKM-08 were tested for alcohol and drug usage, in accordance with FRA post accident criteria.

CONCLUSION:

Results of the tests were negative. Intoxication was not a factor.

ANALYSIS - LOCOMOTIVE ENGINEER OPERATING PERFORMANCE:

The locomotive was equipped with a speed indicator and an event recorder as required. The relevant event recorded data was downloaded by the trainmaster at the accident site, and analyzed by the UP locomotive facility at Denver.

CONCLUSION:

The locomotive engineer was in compliance with all applicable railroad operating and train handling

requirements.

ANALYSIS:

FRA obtained fatigue related information, for the 10-day period preceding this incident including the 10-day work history (on duty/off duty cycles) for all of the employees involved.

CONCLUSION:

Upon analysis of that information FRA concluded that one or more of the employees may have been working at a diminished level of safety (effectiveness) due to mental and/or physical attributes associated with fatigue, which may have contributed to the cause of the accident.

ANALYSIS - TRACK INSPECTION:

This portion of track was completely rejuvenated in 2000, to make room for the RTDZ Light Rail System. The largest cross-level measurement under load (static measurement plus the amount of space between the base of the rail and the tie-plate) was 1/8 inches. Gage measurements around the curve measured from 56-1/2 inches to 56-3/4 inches. The CWR has little to no head loss and no shelling or corrugation. The past two track inspections performed by the FRA over this track did not note any defects around the POD. A suspected broken rail was found near the POD and sent into the UP laboratory in Omaha, Nebraska, for analysis, although not all rail pieces were recovered. All measurements were taken at the scene by the investigator-in-charge.

CONCLUSION:

Results of a track inspection in the area where the first car derailed revealed that the track was in very good condition, with no FRA defects noted. The results of the rail sent to the lab showed no evidence of a defective rail that would have caused the derailment; but nicks on the tread portion of wheels sent to the lab revealed evidence that the wheels came into contact with a broken rail.

ANALYSIS - LAB:

A couple of suspicious broken rails and one suspicious broken wheel were sent to the UP Lab in Omaha, Nebraska. Although no visible evidence seen at the POD indicated a flaw in any of the rails or the wheel, the location where they were found in relation to the POD indicate that one of them could be the possible cause of the derailment.

CONCLUSION:

After analysis by the lab technicians, it was concluded that no defects or flaws were evident in either of the rails or on the wheel. However, one of the rails had batter on it that would be consistent with train wheels riding over it after it broke. Also, marks on the tread surface of the wheel indicate contact with a broken rail.

ANALYSIS - MECHANICAL INSPECTION:

A close examination of derailed cars was performed at the scene by a UP mechanical manager. He found that the initial car that was derailed was a coal Car No. TILX 420077. A suspected wheel was sent to the UP laboratory in Omaha for analysis. Wheels on the car ahead of the initial car were discovered to have a nick on the tread of the wheels.

CONCLUSION:

Results of the mechanical inspection found no mechanical problems that might have been a casual or contributing factor to the derailment. The results of the wheels sent to the lab showed no indication of flaws or defects and are not considered as a casual factor. The nick in the wheels was determined to be from contact with a broken rail.

ANALYSIS - WEATHER:

Weather the day of the accident was snowy and calm. The temperature was 16 degrees F. The weather during the week prior to the derailment was cold, with little or no snow, and temperatures ranging from highs in the mid 50s and lows in the low teen's.

CONCLUSION:

The weather during the week leading up to the derailment had a wide range of temperatures. These wide ranges of temperatures can add stress to the rail as it is continuously trying to expand and contract. This added stress could have been a factor as to why the rail broke.

ANALYSIS - EMERGENCY COMMUNICATION AND FUTURE MITIGATION:

FRA organized a meeting with RTDZ, Federal Transit Administration (FTA), Colorado Public Utilities Commission (CPUC), UP, and BNSF to discuss emergency communication procedures and future mitigation. RTDZ Light Rail Emergency Response Plan explains emergency procedures between the RTDZ operation center and the UP and BNSF dispatching centers. The communication procedures were not followed in this incident. There is no intrusion detection system in this location.

CONCLUSION:

Per federal requirement, Title 49 Code of Federal Regulations, Part 659, an annual review of the RTDZ System Safety Plan is conducted by the CPUC. RTDZ, UP and BNSF representatives confirmed the emergency communication plan has been implemented in their operation centers. When the derailment occurred, the UP and BNSF dispatching centers were notified by the train crew. Because of the timing of the derailment and collision, there was no time to notify the LRV operator. It was concluded that because the incident was reported so quickly by employees involved, and local management was on the scene communicating shortly afterward, it was not necessary to make the calls as the plans requires. FRA indicated the plan should have been followed regardless. RTDZ responded that in the past regarding other incidents, the communications and protocol had worked as intended between the RTDZ and the freight railroads. RTDZ, UP, and BNSF felt that any intrusion detection system would not have prevented this accident. They feel that constant communication and the emergency response procedures would work to prevent future accidents.

OVERALL CONCLUSION:

The railroad was in compliance with their own and all applicable Federal standards. Train Symbol CAIKM-08 was traveling south at a recorded speed of 39 mph. All operating and mechanical causes were ruled out by the investigation and lab analysis. The crew of Train Symbol CAIKM-08 knew of no outstanding information as to why the cars derailed. The operator of the RTDZ LRV did not see anything out of the ordinary prior to the derailment and had no information as to why the cars of Train Symbol CAIKM-08 derailed directly in front of his train. None of the rail that was sent to the UP laboratory for analysis had a defective condition that would give conclusive evidence that it was the cause of the derailment. Some of the wheels sent to the laboratory had nicks on the tread surface that would indicate contact with a broken rail.

PROBABLE CAUSE:

The probable cause is T-299 --Other rail and joint bar defects - broken rail.