
# *Federal Railroad Administration*
# *Office of Safety*
# *Headquarters Assigned*
# *Accident Investigation Report*
# *HQ-2005-17*

## *Union Pacific (UP)*
## *Salem, Illinois*
## *February 21, 2005*

***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-2005-17

| | | |
|---|---|---|
| 1.Name of Railroad Operating Train #1: UNION PACIFIC RAILROAD COMPANY | 1a. Alphabetic Code: UP | 1b. Railroad Accident/Incident No.: 0205SL011 |
| 2.Name of Railroad Operating Train #2: N/A | 2a. Alphabetic Code: N/A | 2b. Railroad Accident/Incident: N/A |
| 3.Name of Railroad Responsible for Track Maintenance: N/A | 3a. Alphabetic Code: N/A | 3b. Railroad Accident/Incident No.: N/A |
| 4. U.S. DOT_AAR Grade Crossing Identification Number | 5. Date of Accident/Incident: Month 02 / Day 21 / Year 2005 | 6. Time of Accident/Incident: 01:29: ☑ AM ☐ PM |

7. 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): 01

| 8. Cars Carrying HAZMAT | 9. HAZMAT Cars Damaged/Derailed | 10. Cars Releasing HAZMAT | 11. People Evacuated | 12. Division |
|---|---|---|---|---|
| 1 | 1 | 0 | 0 | St Louis |

| 13. Nearest City/Town | 14. Milepost (to nearest tenth) | 15. State Abbr | 15. State Code | 16. County |
|---|---|---|---|---|
| Salem | 252.3 | N/A | IL | MARION |

| 17. Temperature (F) (specify if minus) | 18. Visibility (single entry) 1. Dawn 2. Day 3.Dusk 4.Dark | Code | 19. Weather (single entry) 1. Clear 2. Cloudy 3. Rain 4. Fog 5.Sleet 6.Snow | Code | 20. Type of Track 1. Main 2. Yard 3. Siding 4. Industry | Code |
|---|---|---|---|---|---|---|
| 50 F | | 4 | | 2 | | 3 |

| 21. Track Name/Number | 22. FRA Track Class (1-9, X) | Code | 23. Annual Track Density (gross tons in millions) | 24. Time Table Direction 1. North 3. East | Code |
|---|---|---|---|---|---|
| Siding | | 2 | 0 | | 2 |

## OPERATING TRAIN #1

25. Type of Equipment Consist (single entry): 1. Freight train; 2. Passenger train; 3. Commuter train; 4. Work train; 5. Single car; 6. Cut of cars; 7. Yard/switching; 8. Light loco(s).; 9. Maint./inspect.car; A. Spec. MoW Equip. — Code: 1

26. Was Equipment Attended? 1. Yes 2. No — Code: 1

27. Train Number/Symbol: MBHP B21

28. Speed (recorded speed, if available) R - Recorded E - Estimated: 13 MPH — Code: R

29. Trailing Tons (gross tonnage, excluding power units): 9298

30. 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 N/A N/A N/A N/A

30a. 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

| 31. Principal Car/Unit | a. Initial and Number | b. Position in Train | c. Loaded (yes/no) |
|---|---|---|---|
| (1) First involved (derailed, struck, etc) | N/A | 71 | no |
| (2) Causing (if mechanical cause reported) | 0 | 0 | N/A |

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

| Alcohol | Drugs |
|---|---|
| 0 | 0 |

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

| 34. 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 | 0 | 0 | 0 | 0 | 0 |

| 35. Cars | Loade a. Freight | Loade b. Pass. | Empty c. Freight | Empty d. Pass. | e. Caboose |
|---|---|---|---|---|---|
| (1) Total in Equipment Consist | 66 | 0 | 56 | 0 | 0 |
| (2) Total Derailed | 18 | 0 | 3 | 0 | 0 |

36. Equipment Damage — This Consist: 4204

37. Track, Signal, Way, & Structure Damage: 95815

38. Primary Cause Code: E05C

39. Contributing Cause Code: H502

Number of Crew Members

| 40. Engineer/ Operators | 41. Firemen | 42. Conductors | 43. Brakemen |
|---|---|---|---|
| N/A | 0 | 1 | 0 |

Length of Time on Duty

44. Engineer/Operator: Hrs 1 Mi 15

45. Conductor: Hrs 1 Mi 15

| Casualties to: | 46. Railroad Employees | 47. Train Passengers | 48. Other |
|---|---|---|---|
| Fatal | 0 | 0 | 0 |
| Nonfatal | N/A | 0 | 0 |

49. EOT Device? 1. Yes 2. No — 1

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

51. Caboose Occupied by Crew? 1. Yes 2. No — 2

## OPERATING TRAIN #2

52. Type of Equipment Consist (single entry): 1. Freight train; 2. Passenger train; 3. Commuter train; 4. Work train; 5. Single car; 6. Cut of cars; 7. Yard/switching; 8. Light loco(s).; 9. Maint./inspect.car; A. Spec. MoW Equip. — Code: N/A

53. Was Equipment Attended? 1. Yes 2. No — Code: N/A

54. Train Number/Symbol: N/A

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

57. 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

57a. Remotely Controlled Locomotive? 0 = Not a remotely controlled; 1 = Remote control portable

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56. 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): N/A | N/A | N/A | N/A | N/A

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

| 58. Principal Car/Unit | a. Initial and Number | b. Position in Train | c. Loaded (yes/no) |
|---|---|---|---|
| (1) First involved (derailed, struck, etc) | 0 | N/A | N/A |
| (2) Causing (if mechanical cause reported) | 0 | N/A | N/A |

59. 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 |

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

| 61. Locomotive Units | a. Head End | Mid Train b. Manual | Mid Train c. Remote | Rear End d. Manual | Rear End c. Remote |
|---|---|---|---|---|---|
| (1) Total in Train | 0 | 0 | 0 | 0 | 0 |
| (2) Total Derailed | 0 | 0 | 0 | 0 | 0 |

| 62. Cars | Loade a. Freight | Loade 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 |

63. Equipment Damage This Consist: 0

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

65. Primary Cause Code: N/A

66. Contributing Cause Code: N/A

Number of Crew Members

| 67. Engineer/ Operators | 68. Firemen | 69. Conductors | 70. Brakemen |
|---|---|---|---|
| N/A | N/A | N/A | N/A |

Length of Time on Duty

71. Engineer/Operator: Hrs 0 Mi 0

72. Conductor: Hrs 0 Mi 0

| Casualties to: | 73. Railroad Employees | 74. Train Passengers | 75. Other |
|---|---|---|---|
| Fatal | 0 | 0 | 0 |
| Nonfatal | 0 | 0 | 0 |

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

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

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

## Highway User Involved

79. Type: 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

80. Vehicle Speed (est. MPH at impact): 0

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

82. Position: 1.Stalled on Crossing 2.Stopped on Crossing 3.Moving Over Crossing 4. Trapped — Code: N/A

86a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? 1. Highway User 2. Rail Equipment 3. Both 4. Neither — Code: N/A

## Rail Equipment Involved

83. 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

84. Position of Car Unit in Train: 0

85. Circumstance: 1. Rail Equipment Struck Highway User; 2. Rail Equipment Struck by Highway User — Code: N/A

86b. Was there a hazardous materials release by 1. Highway User 2. Rail Equipment 3. Both 4. Neither — Code: N/A

86c. State here the name and quantity of the hazardous materials released, if any.
N/A

87. Type of Crossing Warning: 1.Gates; 2.Cantilever FLS; 3.Standard FLS; 4.Wig Wags; 5.Hwy. traffic signals; 6.Audible; 7.Crossbucks; 8.Stop signs; 9.Watchman; 10.Flagged by crew; 11.Other (spec. in narr.); 12.None

| Code(s) | | | | | | | |
|---|---|---|---|---|---|---|---|
| N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

88. Signaled Crossing Warning (See instructions for codes) — Code:

89. Whistle Ban 1. Yes 2. No 3. Unknown — Code: N/A

90. Location of Warning 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach — Code: N/A

91. Crossing Warning Interconnected with Highway Signals 1. Yes 2. No 3. Unknown — Code: N/A

92. Crossing Illuminated by Street Lights or Special Lights 1. Yes 2. No 3. Unknown — Code: N/A

93. Driver's Age: 0

94. Driver's Gender 1. Male 2. Female — Code: N/A

95. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown — Code: N/A

96. 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

97. Driver Passed Standing Highway Vehicle 1. Yes 2. No 3. Unknown — Code: N/A

98. 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

| 101. Casulties to Highway-Rail Crossing Users | Killed | Injured |
|---|---|---|
| | 0 | 0 |

99. Driver Was 1. Killed 2.Injured 3. Uninjured — Code: N/A

100. Was Driver in the Vehicle? 1. Yes 2. No — Code: N/A

102. Highway Vehicle Property Damage (est. dollar damage): 0

103. Total Number of Highway-Rail Crossing Users (include driver): 0

104. Locomotive Auxiliary Lights? 1. Yes 2. No — Code: N/A

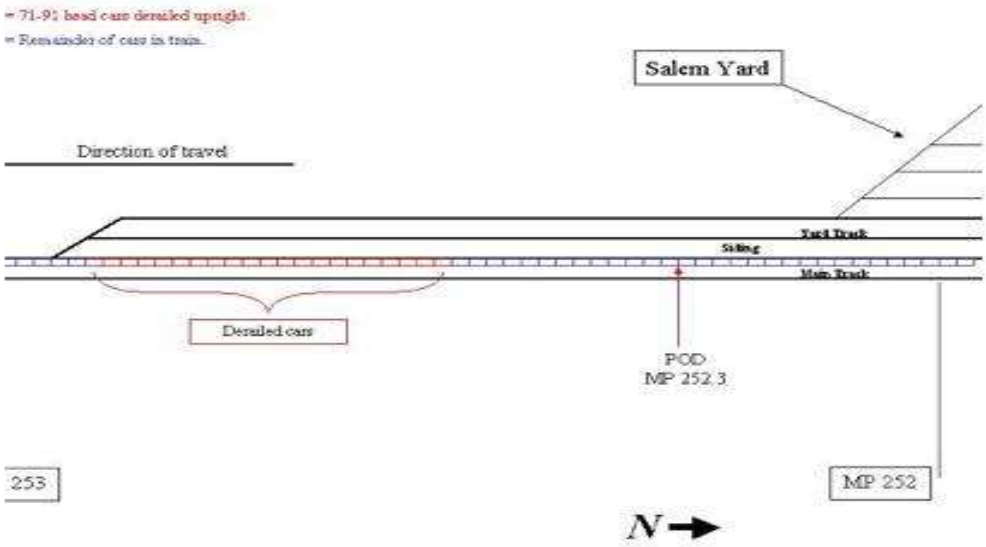
105. Locomotive Auxiliary Lights Operational? 1. Yes 2. No — Code: N/A

106. Locomotive Headlight Illuminated? 1. Yes 2. No — Code: N/A

107. Locomotive Audible Warning Sounded? 1. Yes 2. No — Code: N/A

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

HQ-17-
2005
sketch.jpg



109. SYNOPSIS OF THE ACCIDENT

Southbound Union Pacific Railroad Company (UP) Train Symbol MBHPB 21 was departing the siding at Salem, Illinois, milepost 252, on the Mt. Vernon Subdivision at approximately 2:30 a.m., on February 21, 2005, when it experienced an undesired emergency brake application. The cause of the undesired emergency brake application came from an unknown source in the train. The east rail rolled slightly to the outside, derailing the 69th head car (Car No. ACFX 64803). The train was being operated at a recorded speed of 13 mph when the undesired emergency occurred. The train consisted of two locomotives, 66 loads, 56 empties, 9,298 trailing tons, and was 7,433 feet in length.

The engineer was able to quickly recover the train brake pipe air and determined the air was being restored to the rear of the train by observation of the head-end air gauges. The crew decided not to walk the train as UP Operating Rule 6.23 requires, and started to pull south. The train moved approximately 2,737 feet and experienced a second undesired emergency. The crew felt a series of jerks as they stopped. The conductor and the Salem switch crew then walked the train and found the 69th through 89th head cars (21 cars) derailed. The 75th head car (Car No. ACFX 77263) was a load of hydrogen cyanide (poison gas); however it was not comprimised, and no evacuation was initiated. All derailed cars were upright and in line with the rail. The east rail was rolled out the entire length of the derailed cars.

At the time of the accident it was dark, cloudy, and the temperature was 50 °F. The damage costs were $4,204. to equipment and $95,815. to the tracks.

The cause of the original undesired emergency air brake application was never determined. The probable cause of the derailment was the slack action from the first undesired emergency air brake application and poor train make-up caused the east rail to roll out; the crew's failure to make a walking inspection of their train resulted in the derailment of the remaining cars.

110. NARRATIVE

Circumstances Prior to the Accident

The crew of Train Symbol MBHPB 21 included a locomotive engineer and a conductor. They both went on duty at 1:15 a.m., CST, at the UP Salem Yard office, in Salem, Illinois. This was the home terminal for both crew members and both received more than the statutory, off-duty period prior to reporting for duty.

Their assigned freight train consisted of 2 locomotives, 66 loads, 56 empties, 9,298 tons, and was 7,433 7,433 feet in length. The majority of the loads were toward the rear of the train in two blocks separated by seven empties. Under normal circumstances, this train originates on the Norfolk Southern Railway Company (NS) at Bellevue, Ohio. When it arrives Salem, a block of cars is usually removed from the head end of the train, and a block of cars from Train Symbol AINAR XX are added to the train. Train Symbol AINAR XX originates in Indianapolis, Indiana, on CSX Transportation, Inc. (CSX). Both trains receive a Class 1 brake test at their origins. After the block is added and removed from the outbound train, a Class 3 brake test is performed upon departure. On this date, a few things differed from normal. The outbound conductor noticed a 20/20 discrepancy from operating rules on his train orders. A 20/20 discrepancy from operating rules means there are 20 loads against 20 empties and switching is required to resolve this, prior to departure. Inbound train lists were reviewed on both trains, and Train Symbol "AINAR 20" did not match with the outbound train symbol.

The local switch crew assisted in the switching to resolve the 20/20 discrepancy. The third car behind the locomotive (Car No. UTCX 49942) was switched back to become the 35th car behind the locomotive. The engineer was seated at the controls on the west side of the locomotive and the conductor seated on the east side. The engineer pulled down to the switch at the south end of the siding and stopped his train using the automatic brake and performed a Class 3 air brake test at this time. Once stopped, the conductor got off the locomotive and removed the derail, lining the switch for movement. The engineer released the air brakes and slowly moved down about 200 feet to pick up the conductor. The engineer used the independent brake to stop his train at this time. The conductor boarded the locomotive and sat in the east seat of the locomotive. The engineer started to pull south, throttling the locomotive to approximately 13 mph, when they experienced an undesired emergency air brake application. When this occurred, the train had traveled approximately 1,177 feet since the last stop.

This section of railroad is tangent track with about 1 mile of a .45-percent descending grade approaching the siding switch. The grade then starts to ascend at .15-percent for about ½ mile. The grade then descends at .26-percent for 1½ miles.

The Accident

The train was being operated from a stop to a recorded speed of 13 mph when an undesired emergency air brake application occurred. Once stopped, the engineer immediately recovered the air as evidenced by the readings from his head-end device. The crew decided nothing was wrong due to the air being quickly restored and started to pull south again. The cause of the original undesired emergency air brake application was never determined. The train traveled approximately 2,737 feet and experienced a second undesired emergency air brake application. As the train stopped, the crew felt a series of jerks. The conductor then walked his train and found the train separated a few cars behind the locomotive, due to a broken knuckle, and the 69th through 89th cars were derailed. All cars were in line with the rail, and the east rail was rolled out toward the east. The damage costs were $4,204 to equipment and $95,815 to the tracks.

Analysis and Conclusion

According to the UP, the initial derailment of Car No. ACFX 64803 was caused by human-factor Cause Code No. H526, which is the failure to actuate off the independent brake at the time of the initial undesired emergency air brake application. This is in violation of UP Airbrake/Train Handling Rule No. 33.5. The

remaining cars were derailed as a result of the failure to walk the train after the undesired emergency air brake application, which is in violation of UP Operating Rule No. 6.23.

A post-accident inspection/investigation was conducted on February 25-26, 2005. During this inspection, records were obtained and reviewed, interviews were conducted, and an inspection of the scene/track was made. All cars had been repaired and released, therefore they were not available for FRA to inspection. The track was inspected at the point of derailment (POD), and it was noticed that seven new crossties had been replaced north of the POD. This action had been taken after the derailment occurred. The track inspector was asked why the ties were replaced, and he said they had employees available at the time, and it would give them something to do. South of the POD, numerous track panels had been installed due to the damage caused by the derailment. An FRA Track Inspector was asked to inspect the track and did so on March 9, 2005. He found four tie defects, two fastener defects, one continuous-welded rail (CWR) bolt defect, and one center-cracked angle bar. This resulted in bringing down the Class 2 (20 mph) siding to Class 1 (10 mph). Interviews of the involved crew, switch crew, and manager of yard operations (MYO) were conducted. All documents were reviewed and the following discrepancies were noted:

- The event recorder data does not show the engineer failing to bail off the independent brake during first undesired emergency air brake application,
- Two blocks of heavy loads on the rear of the train were separated by empties.

In addition to the above, repair records of the equipment were requested, and it was discovered that the carrier had given all 21 derailed cars a roller-bearing inspection and then released the cars for service. On February 25, 2005, the carrier was requested to provide reasonable proof the cars were on the ground for less than 200 feet, or perform proper repairs. Records were reviewed again on May 3, 2005, which resulted in five violations.

FRA does not agree with the carrier's initial cause. It is concluded that slack action from the first undesired emergency air brake application and poor train make-up caused the east rail to roll out, account poor tie condition. The crew's failure to walk their train caused the remaining cars to derail. During the first undesired emergency air brake application, the 69th head-end empty car rolled the east rail out toward the east, and the west wheel fell in the gauge. As the train proceeded to the south after recovering their air, the remaining 20 cars derailed due to the spread rail. If the cause was due to the engineer's failure to bail off his independent brake, the slack run-in and derailment would have occurred closer to the head end of the train. If weak ties were not a factor, an empty car would have popped off the rail without rolling the rail.

The crew of Train Symbol MBHPB 21 was drug and alcohol tested using the railroad's authority. Test results for both crew members were negative.

Probable Cause and Contributing Factors

The probable cause of the derailment was the slack action from the first undesired emergency air brake application and poor train make-up caused the east rail to roll out; the crew's failure to make a walking inspection of their train resulted in the derailment of the remaining cars.