Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2008-83

Union Pacific (UP)
Carroll, IA
October 28, 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-2008-83

1.Name of Railroad Operating Train #1: Union Pacific RR Co. [UP]	1a. Alphabetic Code: UP	1b. Railroad Accident/Incident No.: 1008CB027
2.Name of Railroad Operating Train #2: N/A	2a. Alphabetic Code: N/A	2b. Railroad Accident/Incident No.: N/A
3.Name of Railroad Operating Train #3: N/A	3a. Alphabetic Code: N/A	3b. Railroad Accident/Incident No.: N/A
4.Name of Railroad Responsible for Track Maintenance: Union Pacific RR Co. [UP]	4a. Alphabetic Code: UP	4b. Railroad Accident/Incident No.: 1008CB027
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 10 | Day 28 | Year 2008	7. Time of Accident/Incident: 07:58: ☑ 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
1	0	0	0	Council Bluffs

14. Nearest City/Town	15. Milepost *(to nearest tenth)*	16. State Abbr	16. State Code	17. County
Carroll	262.5	N/A	IA	CARROLL

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
22 F	1	1	1

22. Track Name/Number	23. FRA Track Class (1-9, X) — Code	24. Annual Track Density *(gross tons in millions)*	25. Time Table Direction 1. North 2. South 3. East 4. West — Code
Main Track No 2	4	6562	3

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	ISEG124

29. Speed *(recorded speed, if available)* R - Recorded E - Estimated — Code	31. Method(s) of Operation *(enter code(s) that apply)*	31a. Remotely Controlled Locomotive?
48 MPH — R	a. ATCS; b. Auto train control; c. Auto train stop; d. Cab; e. Traffic; f. Interlocking; g. Automatic block; h. Current of traffic; i. Time table/train orders; j.Track warrant control; k. Direct traffic control; l.Yard limits; m.Special instructions; n. Other than main track; o. Positive train control; p. Other *(Specify in narrative)*	0 = Not a remotely controlled; 1 = Remote control portable; 2 = Remote control tower; 3 = Remote control transmitter - more than one remote control transmitter
30. Trailing Tons *(gross tonnage, excluding power units)*: 6562	Code(s): b | e | N/A | N/A | N/A	0

32. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded *(yes/no)*	33. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box. Alcohol | Drugs
(1) First involved *(derailed, struck, etc)*	BRAC6272	34	yes	0 | 0
(2) Causing *(if mechanical cause reported)*	0	0	N/A	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	36. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	3	0	0	0	0	(1) Total in Equipment Consist	103	0	0	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	26	0	0	0	0

37. Equipment Damage This Consist	38. Track, Signal, Way, & Structure Damage	39. Primary Cause Code	40. Contributing Cause Code
$703,426.00	$548,144.00	T207	N/A

Number of Crew Members: 41. Engineer/ Operators	42. Firemen	43. Conductors	44. Brakemen	Length of Time on Duty: 45. Engineer/Operator	46. Conductor
1	0	1	0	Hrs 3 Mi 10	Hrs 3 Mi 10

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 — 1

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

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

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # HQ-2008-83

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) N/A N/A N/A N/A N/A

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

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

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

Alcohol	Drugs
N/A	N/A

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

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

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

64. Equipment Damage This Consist $0.00

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

66. Primary Cause Code N/A

67. Contributing Cause Code N/A

Number of Crew Members

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

Length of Time on Duty

72. Engineer/Operator Hrs 0 Mi 0

73. Conductor Hrs 0 Mi 0

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

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

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

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

OPERATING TRAIN #3

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

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

82. Train Number/Symbol N/A

83. Speed *(recorded speed, if available)* 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

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

113. Circumstance	Code
1. Rail Equipment Struck Highway User 2. Rail Equipment Struck by Highway User	N/A

114a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials?	Code
1. Highway User 2. Rail Equipment 3. Both 4. Neither	N/A

114b. Was there a hazardous materials release	Code
1. Highway User 2. Rail Equipment 3. Both 4. Neither	N/A

114c. State here the name and quantity of the hazardous materials released, if any.
N/A

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

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

116. Signaled Crossing *(See instructions for codes)*	Code
	N/A

117. Whistle Ban	Code
1. Yes 2. No 3. Unknown	N/A

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

119. Crossing Warning with Highway Signals	Code
1. Yes 2. No 3. Unknown	N/A

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

121. Age	122. Driver's Gender	Code
N/A	1. Male 2. Female	N/A

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

124. Driver	Code
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)*	N/A

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

126. View of Track Obscured by *(primary obstruction)*	Code
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	N/A

Casualties to:	Killed	Injured
129. Highway-Rail Crossing Users	N/A	N/A

127. Driver	Code
1. Killed 2.Injured 3. Uninjured	N/A

128. Was Driver in the Vehicle?	Code
1. Yes 2. No	N/A

130. Highway Vehicle Property Damage *(est. dollar damage)*
N/A

131. Total Number of Highway-Rail Crossing Users *(include driver)*
N/A

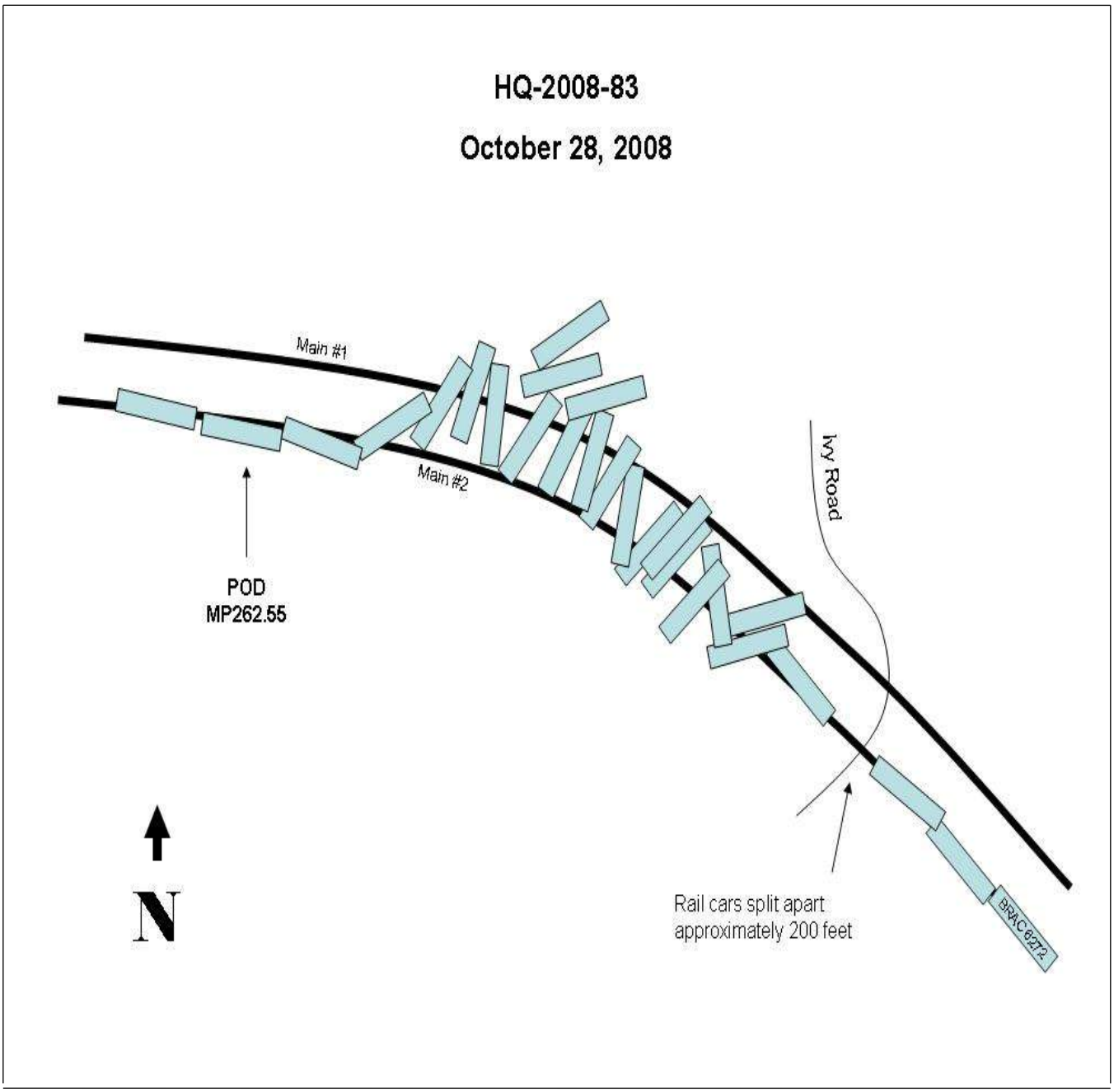
132. Locomotive Auxiliary Lights?	Code
1. Yes 2. No	N/A

133. Locomotive Auxiliary Lights Operational?	Code
1. Yes 2. No	N/A

134. Locomotive Headlight Illuminated?	Code
1. Yes 2. No	N/A

135. Locomotive Audible Warning Sounded?	Code
1. Yes 2. No	N/A

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



137. SYNOPSIS OF THE ACCIDENT

On October 28, 2008 at 7:00 a.m. CDT eastbound Union Pacific Railroad Company (UP) freight Train ISEG1-24 derailed 26 container cars. The accident occurred approximately 4 miles west of Carroll, Iowa at milepost (MP) 262.5 on the UP Council Bluffs Service Unit of the Boone Subdivision. There were no injuries reported or hazardous materials spilled as a result of the derailment. Total damages reported for the derailment were $ 1,251,570.

At the time of the accident it was dawn and the weather was clear with a temperature of 22 °F.

The FRA investigation determined the probable cause of the accident was FRA Cause Code T207- Broken Rail – Detail fracture from shelling or head check.

138. NARRATIVE

CIRCUMSTANCES PRIOR TO THE ACCIDENT

The train crew of UP Train ISEG1-24 consisted of an engineer and conductor. They first went on duty at 3:50 a.m. CST on October 28, 2008 at Boone, Iowa. This was their home terminal and both employees had received more than the required statutory off-duty rest period prior to reporting for duty. They were identified as a relief crew that was transported by a crew van from Boone to Vail, Iowa. The assignment was to relieve another train crew and transport the train to Boone.

The assigned train consisted of three locomotives on the head-end and 103 platforms on 39 multi-well articulated container cars. The train was 7,092 feet long and with 6,562 trailing tons. The train had received a Class 1 train air brake test the previous day before departing North Platte, Nebraska. The test was performed by UP mechanical personnel in North Platte on October 27, 2008. There were no changes to the train after departing North Platte. After departing Vail the trip was uneventful for the short 18 miles leading up to the derailment.

As the eastbound train approached the accident area on Main Track # 2 the locomotive engineer was seated at the controls on the south side of the lead locomotive. The conductor was seated on the north side of the same locomotive.

One mile prior to the derailment in succession is a 3,900 foot right-hand 1-degree curve; followed by less than 500 feet of tangent track and a 2-degree, 5-minute curve where the derailment occurred. In this area of the railroad leading up to the point of derailment (POD) there is a constant descending grade of between 0.22 and 0.32 percent.

The track at and leading up to the POD is constructed of 136-lb continuous-welded rail (CWR) on wood crossties. It is box anchored on every other tie with unit channel anchors leading both into and away from the POD. The overall condition of ballast, ties, and surface on the portion of curve not destroyed by the derailment was in good condition.

The railroad timetable direction of the train was east. The geographic direction was slightly southeast. Timetable directions are used throughout this report.

THE ACCIDENT

UP Train ISEG1-24 was being operated on Main Track # 2 at 48 mph approaching the derailment area. According to the train crew they did not observe or feel anything unusual prior to the derailment. The speed at the time of the derailment was 48 mph. All train speeds were recorded by the event recorder on the controlling locomotive. The maximum authorized speed for the train is 70 mph. At the time the derailment occurred the train was traversing a 50 mph timetable speed restriction area as designated in current UP Iowa Area Timetable # 3.

Approximately halfway through a 2-degree 5-minute right-hand curve the train experienced an undesired emergency application of the train air brake system. Immediately following the emergency application the train crew contacted the UP dispatcher and informed him that the train was in emergency.

The conductor of the derailed train walked back to inspect the train and discovered 26 container cars derailed in the small town of Maple River, Iowa (near Carroll). The derailed cars were fouling both main tracks and the roadway on both sides of Ivy Road grade crossing; DOT No. 190782M.

ANALYSIS AND CONCLUSIONS

ANALYSIS – TOXICOLOGICAL TESTING:
Since this accident exceeded the $ 1 million dollar major accident threshold, the two crewmembers of UP Train ISEG1-24 were tested under Federal Railroad Administration (FRA) mandatory post-accident toxicological test requirements.

CONCLUSION:
The test results obtained from the FRA Alcohol and Drug Control Program manager were negative for both employees tested.

ANALYSIS – LOCOMOTIVE ENGINEER OPERATING PERFORMANCE:
The lead locomotive was equipped with a speed indicator and event recorder as required. The recorder data was downloaded by the UP Manager of Train Operations (MTO) at the accident site, and the data was analyzed by UP officials at the UP Council Bluffs Service Unit office in Council Bluffs, Iowa.

CONCLUSION:
The locomotive engineer was in compliance with all applicable railroad operating and train handling requirements. The crew was in compliance with all railroad rules and Federal Standards. The crew performance did not contribute the cause of the accident.

ANALYSIS – FATIGUE:
The results of the Fatigue Avoidance Scheduling Tool (FAST) are based of information FRA obtained during this investigation. These include a 10-day work/rest history report supplied by the UP and a completed fatigue analysis questionnaire from both crewmembers involved in the derailment. Software sleep settings varied according to information obtained from each employee.

CONCLUSION:
Based on the FAST analysis, fatigue was not a factor for either crewmember.

ANALYSIS – TRACK; RAIL; AND GEOMETRY CAR INSPECTIONS:
The track was last traversed and inspected by a UP hi-rail inspection vehicle on October 25, 2008. The last ultra sonic rail detection test through this area was on October 27, 2008, the day before the derailment. The prior two rail detection tests were conducted August 26, 2008, and July 1, 2008, respectfully. The last geometry car survey with the UP EC-5 inspection car was on October 9, 2008.

CONCLUSION:
UP Track inspection records indicate that the track was inspected within the required frequency of 30 days

prior to the accident. There were no defects recorded at or near the POD on these inspections, including the most recent conducted on October 27, 2008.

The three previous ultrasonic rail tests on the curve at this location did not reveal any rail defects, including the test the previous day. The UP Manager of Track Maintenance (MTM) reported that the previous day's test was considered a difficult test, but that the detector car was able to make an uninterrupted continuous search thru the accident area. He stated that the head checking and wear observed on the rail may have contributed to a defect being undetected.

Even if a valid search had been interrupted on the previous day's ultrasonic rail test, no remedial action would have been required under Title 49 Code of Federal Regulations (CFR) §213.237(e). This is because the rail had not reached the requirements outlined in §213.237(a) requiring an internal search for rail defects at least once a year or every 40 million gross tons (mgt), whichever interval is shorter.

In the FRA Track Compliance Manual a non-test is not defined in absolute technical terms. Rather, the provision leaves this determination to the rail test equipment operator who is uniquely qualified on that equipment.

There were no FRA defects noted in the area of POD on the last geometry car survey. The survey did reveal some gage deviations that did not meet UP maintenance standards, but were within the parameters of FRA standards.

ANALYSIS – RAIL:
The UP forwarded two suspect pieces of rail to Rail Sciences Inc., in Omaha, Nebraska, for further evaluation.

CONCLUSION:
Rail Sciences determined the rail failed due to a detail fracture originating from the head checking on the gage corner of the rail.

ANALYSIS – ACCIDENT SITE CURVE DATA:
An on-site FRA inspection was performed on the portion of the curve not damaged by the derailment.

CONCLUSION:
A walking inspection of the curve not disturbed by the derailment revealed several areas where head checking was evident on the hi-rail. The undamaged rail on the high side of the curve also exhibited similar head and gage loss to the failed rail.

The UP MTM for this territory accompanied the FRA inspector on the inspection and stated there had observed no prior history of broken rails on this curve until a rail broke under a train approximately 26 hours prior to this derailment. It was discovered that the rail had broken in two places approximately 10 feet apart on the hi-rail of the curve at MP 262.6. The rail was replaced and welded by local maintenance forces that same day.

The rail that was changed and welded the previous day was not disturbed by the derailment and was not a contributing factor in the derailment. There was no evidence of other rails replaced on the high side of this curve since it was originally laid in 1993.

ANALYSIS – CURVES ON MAIN TRACK # 2:
All curves (28) on Main Track # 2 were inspected by the FRA between Denison and Boone, Iowa, looking at overall appearance, head and gage loss, and rail surface conditions, such as corrugation and head checking. These inspections were focusing on any similarities to the curve that the derailment occurred on.

Prior to 2006 this territory ran directional traffic with Main Track # 2 handling only westbound trains. At that time it received approximately 1/3 less tonnage than the tonnage operating over Main Track # 1.

After 2006 and the installation of CTC, the traffic pattern has change and many more eastbound trains are being operated over Main Track # 2. Many of these trains are loaded coal trains that contribute greatly to the overall tonnage operated on this subdivision.

CONCLUSION:
Of the 28 curves analyzed only 5 had a similar or greater degree than the curve where this derailment occurred. All five of these curves had the hi-rail relayed during years 2000 and 2004 or at least 7-years newer than the age of rail broken in the derailment.

Three of these curves currently have the same year and manufacturer as the curve in question. Although all three had significant head loss, they were only about half the head loss as the rail at the POD. Only one of these three curves had head checking visible, and it was only slight in comparison.

Analysis – RAIL CARS ON TRAIN UP ISEG1-24:
A walking inspection of the rail cars on UP TRAIN ISEG1-24 that made it over the POD was made on October 29, 2008 to look for any wheel markings that would indicate striking something blunt prior to the derailment.

CONCLUSION:
It was discovered that the first car derailed had definitive marks on two of its north wheels which is consistent with wheels striking a blunt object such as a broken rail. This indicated that the rail most likely broke under the train causing the derailment.

OVERALL CONCLUSIONS

The railroad was in compliance with Carrier rules and all applicable FRA standards. The data reviewed from the event recorder ruled out train handling as a cause. There were no marks discovered on the rail or ties prior to the pile-up to suggest anything mechanical or track related happened prior to the POD. There were also no track components, i.e. bridges, grade crossings, or turnouts at the POD that could have contributed to the cause.

Although the grade and curvature of the track were not a causal factor in this derailment, it most likely contributed to the rail surface conditions over a period of time. This is because of the dynamic braking taking place on this curve when loaded eastbound trains traverse it. This surface condition prevented the ultrasonic rail test vehicle from achieving the most accurate test possible the previous day.

At this time, no rail in the curves currently on Main Track # 2 of the Boone Subdivision possesses the same deteriorating conditions as the broken rail found in this derailment. With the causing rail having no prior history of defects or breaks, and the increase in annual tonnage now being operated over this main, rail in curves of similar nature could experience similar consequences when wear and surface conditions reach the level this rail did and should be monitored closely by the UP.

It was determined that just one rail car prior to the first car derailed had definitive marks on the north wheels, consistent with the wheel striking a blunt object such as a broken rail. This indicated that the rail most likely broke under this train causing the accident.

PROBABLE CAUSE AND CONTRIBUTING FACTORS

The FRA investigation determined the probable cause of the accident was Cause Code T207- Broken Rail – Detail fracture from shelling