Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2012-22

Union Pacific (UP)
Northbrook, IL
July 4, 2012

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-2012-22

1.Name of Railroad Operating Train #1: Union Pacific RR Co. [UP]	1a. Alphabetic Code: UP	1b. Railroad Accident/Incident No.: 0712PR007
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.: 0712PR007
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 07 | Day 04 | Year 2012	7. Time of Accident/Incident: 01:30: ☐ 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	Milwaukee Subdivisio

14. Nearest City/Town	15. Milepost *(to nearest tenth)*	16. State Abbr	16. State Code	17. County
Northbrook	17.5	IL	17	COOK

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
103 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
No. 1 MAIN	3	27	1

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	CCDPP 02

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?
38 MPH R	19591	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): g, h, 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)*	WEPX 2662	29	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	0	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	137	0	0	0	0
(2) Total Derailed	32	0	0	0	0

37. Equipment Damage This Consist	38. Track, Signal, Way, & Structure Damage	39. Primary Cause Code	40. Contributing Cause Code
$1,514,329.00	$3,704,500.00	T109	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 2 Mi 20	Hrs 2 Mi 20

Casualties to:	47. Railroad Employees	48. Train Passengers	49. Other
Fatal	0	0	2
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 — 2

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?
N/A 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

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

63. 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

64. Equipment Damage This Consist N/A

65. Track, Signal, Way, & Structure Damage N/A

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
N/A	N/A	N/A	N/A

Length of Time on Duty

72. Engineer/Operator Hrs N/A Mi N/A

73. Conductor Hrs N/A Mi N/A

Casualties to:	74. Railroad Employees	75. Train Passengers	76. Other
Fatal	N/A	N/A	N/A
Nonfatal	N/A	N/A	N/A

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. Code N/A
A. Auto
B. Truck
C. Truck-Trailer.
D. Pick-Up Truck
E. Van
F. Bus
G. School Bus
H. Motorcycle
J. Other Motor Vehicle
K. Pedestrian
M. Other *(spec. in narrative)*

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

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

Rail Equipment Involved

111. Equipment Code N/A
1.Train *(units pulling)*
2.Train *(units pushing)*
3.Train *(standing)*
4.Car(s) *(moving)*
5.Car(s) *(standing)*
6.Light Loco(s) *(moving)*
7.Light(s) *(standing)*
8.Other *(specify in narrative)*

112. Position of Car Unit in 0

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
0	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	0	0

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)*
0

131. Total Number of Highway-Rail Crossing Users *(include driver)*
0

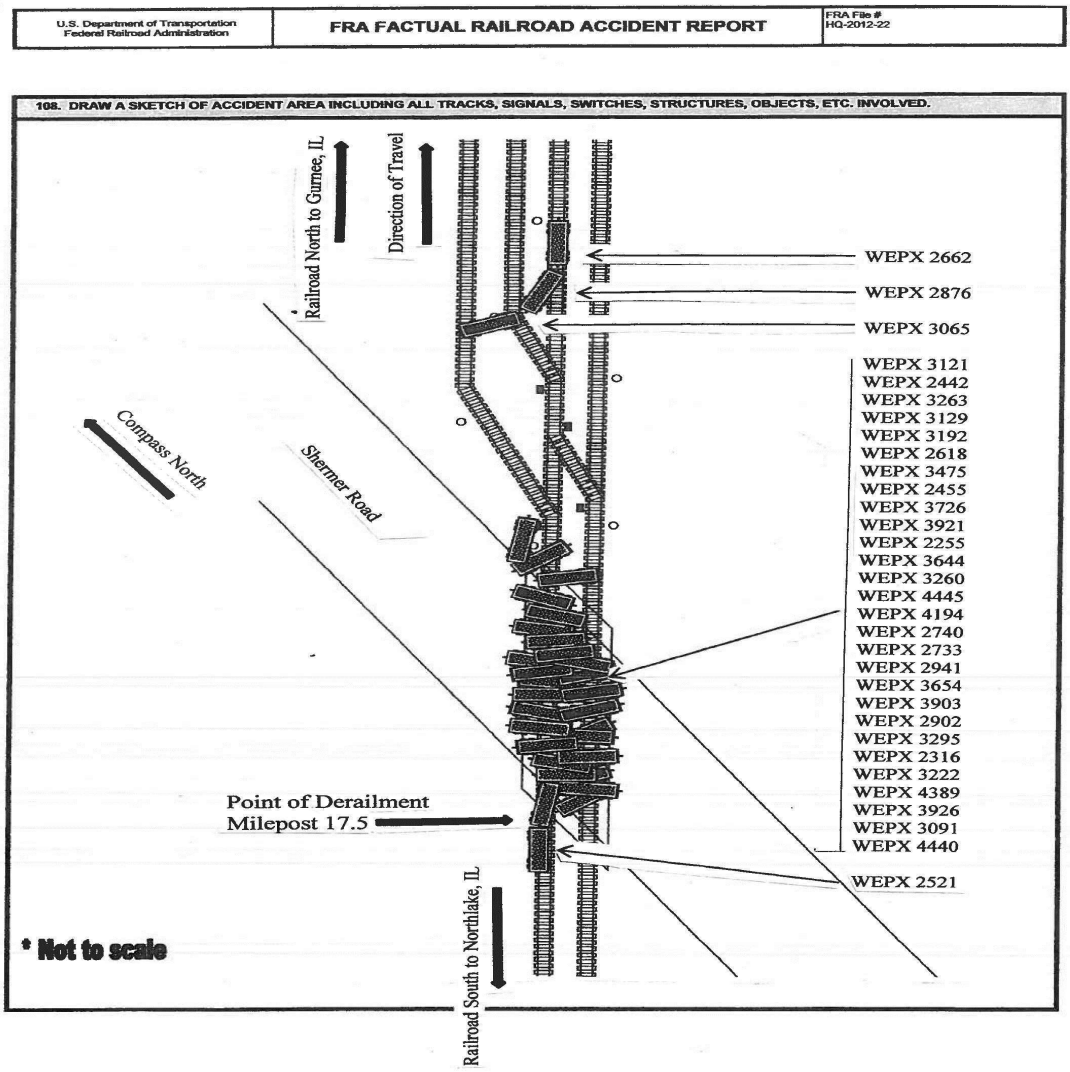
132. Locomotive Auxiliary Lights?	Code
1. Yes 2. No	N/A

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 July 4, 2012, at 1:30 p.m., c.d.t., Union Pacific Railroad (UP) Train No. CCDPP 02, operating northbound on No. 1 Main Track, on UP's Milwaukee Subdivision, derailed 32 loaded freight cars at milepost 17.5. The derailment occurred at the west approach to the railroad bridge overpass of Shermer Road in Northbrook, Illinois, causing the bridge to collapse. The derailed cars consisted of loaded coal hoppers.

At the time of the derailment, one motor vehicle was traveling southbound on Shermer Road and was crushed by the collapsing bridge, resulting in the fatalities of the two vehicle occupants. There were no other injuries reported as a result of the accident. There was a total of $1,514,329 estimated equipment damage and $3,704,500 estimated track and structures damage.

At the time of the accident, the weather at Northbrook was reported as clear with west-southwest winds between 10 and 15 mph. The temperature was 103 °F.

The probable cause of the derailment was thermal misalignment of the track (track buckle /sun kink).

138. NARRATIVE

Circumstances Prior to Accident

A UP signal maintainer arrived at the Shermer Interlocking at approximately 8:30 a.m. on July 4, 2012, to investigate a reported signal problem on the No. 1 and No. 5 connection switches. He had secured local control of the interlocking and proceeded to test the switches. During the course of his work the signal maintainer noticed an anomaly in the track on the south side of the Shermer Road Bridge. He walked across the bridge to investigate and observed what he thought was a bent weld in the east rail approximately 15 feet south of the bridge. The signal maintainer was not qualified in track inspection so, at approximately 10:45 a.m., he called the track supervisor and reported what he observed.

At approximately 1 p.m. on July 4, 2012, the UP track supervisor began his hot weather track inspection at milepost 22.2 on the Milwaukee Subdivision, travelling southbound on No. 2 Main Track. The track supervisor was stopped at the north end of the Shermer interlocking waiting to receive permission to continue south at approximately 1:30 p.m.

The last train to operate without incident on the identical route taken by CCDPP 02 prior to the accident was MPRSS 04 at approximately 8 a.m. on July 4, 2012. At approximately 12:15 p.m., Train COKNA 04 operated northbound on the No. 1 Main Track and went through the No. 1 Switch onto the Canadian Pacific connection track. This train also traversed the derailment site without incident.

The crew of CCDPP 02 included a locomotive engineer and a conductor. They went on duty at 11:10 a.m., on July 4, 2012, at Northlake, Illinois. Both crew members received the statutory off duty period prior to reporting to duty. The engineer had been off duty for 92 hours and 40 minutes prior to reporting to this assignment and the conductor had been off duty for 115 hours and 54 minutes prior to commencing duty.

The crew took charge of train CCDPP 02, which was parked on Track 30 in Yard 9 at the Proviso Yard Terminal in Northlake, Illinois. They departed the yard at approximately 12:45 p.m. Their assigned freight train consisted of two lead locomotives, 137 loaded coal cars, and one locomotive at the rear of the train

remotely controlled by the engineer on the lead locomotive. It was 7,620 feet in length with 19,591 trailing tons. The train was scheduled to operate from Northlake, Illinois, to Pleasant Prairie, Wisconsin, with no intermediate stops. A Class 3 air brake test was performed by the engineer prior to the train's departure from Northlake.

The track was tangent for several miles approaching the derailment area and beyond. The grade from approximately 1.7 miles to 0.7 miles preceding the derailment was descending at 0.29 percent and then level up to and beyond the derailment area. Approximately 15 feet north of the point of derailment (POD) there was a two span, open deck, steel bridge that carried two main tracks over Shermer Road.

As CCDPP 02 approached the accident area, the locomotive engineer was seated at the controls on the east side of the leading locomotive with the short hood forward. The conductor was seated on the west side of the cab of the leading locomotive. The railroad timetable direction of the train was north while the geographic direction was northeast. Timetable directions are used throughout this report.

At the time of the accident, the train was being operated at a recorded speed of 38 mph. The maximum allowable speed for this train was 40 mph due to a Level 2 Heat Restriction which was in place as designated in Item 2-D of the UP System Special Instructions, effective Wednesday, April 7, 2010. The maximum authorized timetable speed in this area is 50 mph.

The Accident

The engineer was controlling the train using throttle modulation when the train experienced a sudden unintentional emergency application of the air brakes shortly after the head end passed over the Shermer Road bridge. He released the locomotive brake and waited for the head end of the train to stop. The engineer reported the accident to the train dispatcher and Deval control operator. The track supervisor was stopped on No. 2 Main Track and witnessed the accident. He assisted the conductor when the first responders arrived.

The 28th through the 59th cars derailed and were concentrated in a short area. The force of the derailment caused the bridge over Shermer Road to collapse onto the roadway below, crushing one automobile that was traveling southeast on Shermer Road. The derailment also knocked down power lines on the west side of right-of-way causing a grass fire.

The first responders to the scene were the Northbrook Fire Department, Glenview Fire Department, Northbrook Police Department, and Glenview Police Department. The North Regional Major Crimes Task Force (NORTAF) also responded and participated in the investigation.

Analysis and Conclusions

Analysis – Toxicological testing: The accident did meet the criteria for 49 CFR part 219 Subpart C post-accident toxicological testing. The crew members were tested under this authority at Elmhurst Memorial Hospital in Elmhurst, Illinois.

Conclusion: The test results for both crew members were negative.

Analysis – Fatigue: FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis, which is equivalent to blood alcohol content (BAC) of 0.05. At or above this baseline, we do not consider fatigue as probable for any employee. Software sleep settings vary according to information obtained from each employee. If an employee does not provide sleep information, FRA uses the default software settings.
FRA obtained fatigue related information, including a 10-day work history, for the two employees involved in this accident.

Conclusion: Upon Analysis of that information FRA concluded that fatigue was not probable for the two train crew members.

Analysis – Locomotive Engineer Operating Performance: FRA analyzed the data from the event recorder of Lead Locomotive, UP 5938. The event recorder data was consistent with proper train handling procedures

and no exceptions were noted.

Conclusion: Train handling was not a factor in this accident.

Analysis – Mechanical: The locomotives of CCDPP 02 and the equipment that was not destroyed in the derailment were inspected by UP employees and FRA officials. Six cars were discovered to have an early warning high flange wheel. No exceptions were taken to the locomotives or equipment.

Conclusion: No defects were noted that would have contributed to the cause of the accident.

Analysis – Bridge Structure: At this location two UP main tracks crossed over Shermer Road at a 35-degree angle. The bridge consisted of two open deck, steel spans per track with an overall length of 86 feet. It is designated as Bridge No. 17.47. The UP installed new open deck ties on Main Track No. 2 in 2009 and on Main Track No. 1 in 2011. There was a separate superstructure for each track, supported by separate steel pile piers in the center of the road and common concrete abutments at each end. Each steel span consisted of four rolled beams connected by steel diaphragms. At the abutments, the spans were supported by a steel cross beam that rested on the bridge seat. Due to the skew of the crossing, there were short beams at the ends of the main spans to provide a square end to the superstructure at the abutment back wall for support of the open deck ties. The pier consisted of a single row of driven steel piles that were encased in concrete at the roadway level. The pile pier supporting the No. 1 Main Track had a concrete cap. The pile pier supporting the No. 2 Main Track had a steel cap.

Shermer Road is a two-lane road with one lane in each direction on either side of a center bridge pier. The only portions of the underpass remaining in place after the accident were the two concrete abutments and a small portion of the steel pile pier. The back walls of the abutments had suffered moderate damage during the accident. Based on observation of the abutment bridge seats, it appeared that the span anchor bolts were either sheared off or pulled out. The concrete encased portion of the pier appeared intact but the steel piles above the encasement were damaged or missing. The pier piles that remained in position were bent northward as would occur by an impact from the south.

Three of the four steel spans and other portions of the superstructure were found in the debris at the derailment site. Two of the spans were relatively intact with all four beams still connected by diaphragms. The third span had three of the beams intact and connected but was missing one exterior beam. All beams showed no evidence of any serious corrosion or section loss. All three spans were twisted or bent to some extent but none of them showed evidence of failure in vertical bending. Additional items found include cross beams, end beams, and end beam bearings, which were fairly intact. It appeared that the force of the derailing cars knocked some or all of the spans from the substructure.

Conclusion: No bridge conditions were noted that would have contributed to the cause of the accident.

Analysis – Track Structure: The track structure south of and including the POD was supported by granite rock ballast with a minimum of 8 to 12 inches under the crossties. The shoulder ballast extended about 12 inches off the end of the crossties and the ballast cribs between the crossties were generally full. The crossties measured 9-inches by 7-inches by 8-feet 6-inches long and were spaced 20 inches on center (nominal) or 22 crossties per 39-foot length of rail. Track construction south of and including the POD consisted of 115 pound RE controlled cooled continuous welded rail (CWR) manufactured by USS Illinois in 1967 and 1968. The rail was seated in 14-inch by 7 ¾-inch double shoulder tie plates, spiked to the crossties with conventional 6-inch cut track spikes. The UP standard for the anchor pattern preceding the derailment was every other crosstie box anchored.

On the bridge approximately 15 feet north of the POD the track was supported by bridge timbers which measured 10-inches by 11-inches by 12-feet long. Spacing was unable to be determined. The track construction on the bridge consisted of 136 pound RE VT rail manufactured by Evraz US in 2009. This rail was supported by Pandrol plates and fastened with Pandrol “E” clips. Rail anchoring was achieved by the use of the Pandrol system such that, in effect, every tie was solidly anchored.

UP conducts ultrasonic rail testing on the Milwaukee Subdivision at least twice annually. The last three tests through the area of the derailment on No. 1 Main Track were conducted on July 21, 2011, January 10, 2012, and May 29, 2012. The FRA reviewed the data from the test conducted on May 29 and no defects were

reported in the area of the derailment. The FRA Track Safety Standards in Part 213.237 require FRA Class 4 track to be ultrasonically tested for rail flaws once every 40 million gross tons or once a year, whichever interval is shorter. The UP exceeded this requirement.

During the investigation there were multiple fractures found in the rails that were recovered from the accident scene. These fractures were examined by FRA and UP officials and categorized as stress breaks caused by the derailment. The rail segments were shipped to Engineering and Scientific Investigation (ESI) for further analysis. Results of this analysis were not yet available at the time of this report.

FRA viewed the track image recording (TIR) taken from the lead locomotive of CCDPP 02. In the video it was evident that there was a track alignment anomaly on the No. 1 Main Track approximately 15 feet south of the Shermer Road Bridge. The recording showed that the track was shifted to the east at this location.

FRA completed a post-accident walking inspection of the No. 1 Main Track from milepost 17.0 to 17.9. Ties were noted to be in fair condition and the rail was properly anchored in accordance with UP's written CWR procedures. Some rail anchors were 1-inch to 1½-inches away from the north side of the ties, indicating rail movement was present. No FRA Part 213 deficiencies were noted outside of the area damaged by the derailment.

Conclusion: The track investigation revealed that the probable cause of the derailment was a thermal misalignment of the track due to an elevated rail temperature.

Analysis – Weather Conditions: The National Weather Service (NWS) reported that the temperature at the time of the derailment was approximately 103 °F. This temperature reading set a record for high temperature in Northbrook. On July 5, 2012, at approximately 1p.m., FRA inspectors took a rail temperature reading south of the derailment area on the undisturbed track. The rail temperature was 138 °F at that time and the weather was reported by the NWS to be nearly identical to the weather on July 4. This exceeds the UP's Milwaukee Subdivision rail laying temperature of 95 °F by 43°F.

On the Milwaukee Subdivision a Level 2 Heat Restriction is placed on the entire subdivision when the ambient temperature is reported to be at or above 95 °F. A Level 2 Heat Restriction is a blanket speed restriction which, on the Milwaukee Subdivision, limits freight trains averaging 90 tons or more per car to a speed of 40 mph, or timetable speed, whichever is lower.

Conclusion: Due to the abnormally high air temperature at the time the derailment occurred, the rail at the POD was in compression making a track buckle more likely to occur.

Probable Cause and Contributing Factors

The probable cause of the derailment was thermal misalignment of the track (track buckle /sun kink).