Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch

Accident Investigation Report
HQ-2014-10

Union Pacific Railroad Company (UP)
Hoxie, AR
August 17, 2014

Note that 49 U.S.C. §20903 provides that no part of an accident or incident report, including this one, 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.

U.S. Department of Transportation
Federal Railroad Administration

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2014-10

TRAIN SUMMARY

1. Name of Railroad Operating Train #1	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
Union Pacific Railroad Company	UP	0814LK013
2. Name of Railroad Operating Train #2	**2a. Alphabetic Code**	**2b. Railroad Accident/Incident No.**
Union Pacific Railroad Company	UP	0814LK013

GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
Union Pacific Railroad Company	UP	0814LK013
2. U.S. DOT Grade Crossing Identification Number	**3. Date of Accident/Incident**	**4. Time of Accident/Incident**
0	8/17/2014	2:28 AM

5. Type of Accident/Incident
Head On Collision

6. Cars Carrying HAZMAT	7. HAZMAT Cars Damaged/Derailed	8. Cars Releasing HAZMAT	9. People Evacuated	10. Subdivision
25	1	1	500	Hoxie

11. Nearest City/Town	12. Milepost *(to nearest tenth)*	13. State Abbr.	14. County
Hoxie	228.6	AR	LAWRENCE

15. Temperature (F)	16. Visibility	17. Weather	18. Type of Track
79 ˚F	Dark	Clear	Main

19. Track Name/Number	20. FRA Track Class	21. Annual Track Density *(gross tons in millions)*	22. Time Table Direction
Mainline	Freight Trains-60, Passenger Trains-80	54.2	North

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OPERATING TRAIN #1

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
Freight Train	Yes	MASNL 16

4. Speed (recorded speed, if available) R - Recorded E - Estimated	Code	5. Trailing Tons (gross exluding power units)	6a. Remotely Controlled Locomotive? 0 = Not a remotely controlled operation 1 = Remote control portable transmitter 2 = Remote control tower operation 3 = Remote control portable transmitter - more than one remote control transmitter	Code
45 MPH	R	7241		0

6. Type of Territory

Signalization:

Signaled

Method of Operation/Authority for Movement:

Signal Indication

Supplemental/Adjunct Codes:

Q

7. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)	8. 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.)*	UP 9707	1	no		0	0
(2) Causing *(if mechanical, cause reported)*	0	0	no	9. Was this consist transporting passengers?		No

10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End e. Remote	11. Cars (Include EMU, DMU, and Cab Car Locomotives.)	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	2	0	0	0	0	(1) Total in Equipment Consist	47	0	39	0	0
(2) Total Derailed	2	0	0	0	0	(2) Total Derailed	22	0	19	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
3017827	862935

14. Primary Cause Code

H401 - Failure to stop train in clear

15. Contributing Cause Code

H999 - Other train operation/human factors (Provide detailed description in narrative)

Number of Crew Members				Length of Time on Duty	
16. Engineers/Operators	17. Firemen	18. Conductors	19. Brakemen	20. Engineer/Operator	21. Conductor
1	0	1	0	Hrs: 8 Mins: 48	Hrs: 8 Mins: 48

Casualties to:	22. Railroad Employees	23. Train Passengers	24. Others	25. EOT Device?	26. Was EOT Device Properly Armed?
Fatal	2	0	0	Yes	Yes
Nonfatal	0	0	0	27. Caboose Occupied by Crew?	N/A

28. Latitude	29. Longitude
36.023544000	-90.993491000

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FRA FACTUAL RAILROAD ACCIDENT REPORT

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OPERATING TRAIN #2

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
Freight Train	Yes	QNLPI 17

4. Speed (recorded speed, if available) R - Recorded E - Estimated	Code	5. Trailing Tons (gross exluding power units)	6a. Remotely Controlled Locomotive? 0 = Not a remotely controlled operation 1 = Remote control portable transmitter 2 = Remote control tower operation 3 = Remote control portable transmitter - more than one remote control transmitter	Code
31 MPH	R	9478		N/A

6. Type of Territory

Signalization:

Signaled

Method of Operation/Authority for Movement:

Signal Indication

Supplemental/Adjunct Codes:

Q, N/A

7. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)	8. 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.)*	UP 5070	1	no		0	0
(2) Causing *(if mechanical, cause reported)*	0	0	no	9. Was this consist transporting passengers?		No

10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End e. Remote	11. Cars (Include EMU, DMU, and Cab Car Locomotives.)	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	2	0	0	0	0	(1) Total in Equipment Consist	71	0	21	0	0
(2) Total Derailed	2	0	0	0	0	(2) Total Derailed	14	0	0	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
2303658	0

14. Primary Cause Code

H401 - Failure to stop train in clear

15. Contributing Cause Code

H999 - Other train operation/human factors (Provide detailed description in narrative)

Number of Crew Members

16. Engineers/Operators	17. Firemen	18. Conductors	19. Brakemen
1	0	1	0

Length of Time on Duty

20. Engineer/Operator	21. Conductor
Hrs: 4 Mins: 43	Hrs: 4 Mins: 43

Casualties to:	22. Railroad Employees	23. Train Passengers	24. Others
Fatal	0	0	0
Nonfatal	2	0	0

25. EOT Device?	26. Was EOT Device Properly Armed?	27. Caboose Occupied by Crew?
Yes	Yes	N/A

28. Latitude	29. Longitude
36.023544000	-90.993491000

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CROSSING INFORMATION

Highway User Involved		Rail Equipment Involved
1. Type N/A		5. Equipment N/A
2. Vehicle Speed *(est. mph at impact)* 0	3. Direction *(geographical)* N/A	6. Position of Car Unit in Train 0
4. Position of Involved Highway User N/A		7. Circumstance N/A
8a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? N/A		8b. Was there a hazardous materials release by N/A

8c. State here the name and quantity of the hazardous material released, if any.
0

9. Type of Crossing Warning	10. Signaled Crossing Warning	11. Roadway Conditions
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 N/A		N/A

12. Location of Warning	13. Crossing Warning Interconnected with Highway Signals	14. Crossing Illuminated by Street Lights or Special Lights
N/A	N/A	N/A

15. Highway User's Age	16. Highway User's Gender	17. Highway User Went Behind or in Front of Train and Struck or was Struck by Second Train	18. Highway User
0	N/A	N/A	N/A

19. Driver Passed Standing Highway Vehicle	20. View of Track Obscured by *(primary obstruction)*
N/A	N/A

Casualties to:	Killed	Injured	21. Driver was	22. Was Driver in the Vehicle?
			N/A	N/A
23. Highway-Rail Crossing Users	0	0	24. Highway Vehicle Property Damage *(est. dollar damage)* 0	25. Total Number of Vehicle Occupants *(including driver)* 0

26. Locomotive Auxiliary Lights?	27. Locomotive Auxiliary Lights Operational?
N/A	N/A
28. Locomotive Headlight Illuminated?	29. Locomotive Audible Warning Sounded?
N/A	N/A

10. Signaled Crossing Warning

1 - Provided minimum 20-second warning
2 - Alleged warning time greater than 60 seconds
3 - Alleged warning time less than 20 seconds
4 - Alleged no warning
5 - Confirmed warning time greater than 60 seconds
6 - Confirmed warning time less than 20 seconds
7 - Confirmed no warning
N/A - N/A

Explanation Code

A - Insulated rail vehicle
B - Storm/lightning damage
C - Vandalism
D - No power/batteries dead
E - Devices down for repair
F - Devices out of service
G - Warning time greater than 60 seconds attributed to accident-involved train stopping short of the crossing, but within track circuit limits, while warning devices remain continuously active with no other in-motion train present
H - Warning time greater than 60 seconds attributed to track circuit failure (e.g., insulated rail joint or rail bonding failure, track or ballast fouled)
J - Warning time greater than 60 seconds attributed to other train/equipment within track circuit limits
K - Warning time less than 20 seconds attributed to signals timing out before train's arrival at the crossing/ island circuit
L - Warning time less than 20 seconds attributed to train operating counter to track circuit design direction
M - Warning time less than 20 seconds attributed to train speed in excess of track circuit's design speed
N - Warning time less than 20 seconds attributed to signal system's failure to detect train approach
O - Warning time less than 20 seconds attributed to violation of special train operating instructions
P - No warning attributed to signal systems failure to detect the train
R - Other cause(s). Explain in Narrative Description

SYNOPSIS

Synopsis

On August 17, 2014, at 2:28 a.m., CST, southbound Union Pacific (UP) freight train, MASNL-16, traveling at a recorded 45 miles per hour, collided head-on with a northbound UP freight train, QNLPI-17, traveling at a recorded 31 miles per hour mph. The collision occurred at Milepost 228.6 on UP trackage of the North Little Rock Service Unit, Hoxie Subdivision, in the town of Hoxie, Arkansas.

There were two fatalities on Train MASNL-16, the Engineer and Conductor, and two severe injuries on Train QNLPI-17, the engineer and conductor, with hazardous materials released and 500 individuals evacuated within a 1.5 mile radius of the derailment. The collision resulted in the damage and derailment of 2 locomotives and 41 cars on MASNL-16, and 2 locomotives and 14 cars on QNLPI-17. The estimated monetary damage to mechanical equipment, signal system, and track structure was $6,184,420.00.

At the time of the incident, the weather was dark, clear, and a temperature of 79 degrees Fahrenheit.

The head-on collision was caused by the failure of southbound Train MASNL-16 to stop in the clear for the northbound movement of Train QNLPI-17. With northbound Train QNLPI-17 entering the limit of Control Point (CP) CPY 229, southbound Train MASNL-16 passed a wayside signal, 2263, displaying a flashing yellow signal aspect indicating “proceed prepared to stop at second signal,” then passed another wayside signal, 2273, displaying a yellow signal aspect indicating “proceed prepared to stop,” and then as Train QNLPI-17 was traversing the turnout at CP CPY 229, southbound Train MASNL-16 passed the home signal, 2285, displaying a red signal aspect indicating “stop,” and struck Train QNLPI 17 head-on. The cause of the accident was the failure of MASNL-16 to stop for the red signal. A contributing factor in this incident was human failure, H999.

NARRATIVE

Narrative

Circumstances Prior to the Accident

The crew of Train MASNL-16, one locomotive engineer and one conductor, went on duty at 5:40 p.m., CST, on August 16, 2014, in Dexter, Missouri. Prior to reporting for duty, each crew member received more than the statutory off-duty rest period. The consist of their freight train included 2 locomotives with 47 loads and 39 empties, was 5,468 feet in length and weighed 7,241 tons. There were no changes in route.

The crew of Train QNLPI-17, one locomotive engineer and one conductor, went on duty at 9:45 p.m., on August 16, 2014, in North Little Rock, Arkansas. Prior to reporting for duty, each crew member received more than the statutory off-duty rest period. The consist of their freight train included 2 locomotives with 71 loads and 21 empties, was 5,896 feet in length and weighed 9,478 tons. There were no changes in route.

Southbound Train MASNL-16 with Union Pacific Railroad's (UP) Locomotive 9707 in the lead and controlling position received the required equipment inspections and testing prior to departing at 6:31 a.m., from Dexter.

Note: With no surviving members of the train crew available for interview and extensive damage to the locomotive, investigators were unable to determine the positions of the Engineer and Conductor or determine which individual may have been at the controls of the locomotive. As Train MASNL-16 approached Hoxie, Arkansas, northbound work Train WNLPSB-15 performed a rolling inspection of Train MASNL-16 as it passed their location. After doing so, the Conductor of WNLPSB-15 stated over the radio, "Hi ball south bounder" indicating no issues. He did not receive a response as normally expected. As Train MASNL-16 continued and entered the limits of Hoxie approaching Control Point (CP) CPY 229, the automated locomotive horn sequencer was activated and continued sounding until deactivating shortly before the accident. According to the surviving event recorder of the trailing locomotive, the train had accelerated to 45 mph in locomotive throttle position number 7, remaining unchanged until the time of collision at 2:28 a.m.

Northbound Train QNLPI-17 with UP 5070 in the lead and controlling position received the required equipment inspections and testing prior to departing at 10:57 p.m. from North Little Rock. The Engineer was seated at the controls of the locomotive on the east side of the crew compartment and the Conductor was seated on the west side of the compartment. According to interview statements from the Engineer, he observed the headlights of the approaching southbound Train MASNL-16, but could not determine the distance or speed.

With northbound Train QNLPI-17 entering the limit of CP CPY 229, southbound Train MASNL-16 passed a wayside signal, 2263, displaying a flashing yellow signal aspect indicating "proceed prepared to stop at second signal," then passed another wayside signal, 2273, displaying a yellow signal aspect indicating "proceed prepared to stop," and then as Train QNLPI-17 was traversing the turnout at CP CPY 229, southbound Train MASNL-16 passed the home signal, 2285, displaying a red signal aspect indicating "stop," and struck Train QNLPI 17 head-on.

The track alignment and grade approaching the accident site, is straight, but undulating, varying from 0.01 at Milepost (MP) 228.6 with a gradual change to 0.31 as it extends to BNSF Railway and UP Interlocker at MP 226.48. Extending southward from 228.6 the grade gradually changes to 0.02 at MP 230.0. The Federal classification of track in the involved area is Class 4.

Both trains were operating in the Hoxie Subdivision on single and double main track with movements governed by operating rules, timetable instructions, general orders and signal indications of a traffic control system (TCS). The signal system consists of color-light type signals displaying four signal aspects that are controlled by electronic track circuits, with power operated switches and movements directed by a dispatcher located in Omaha, Nebraska. The maximum authorized speed is 70 mph for freight trains and 75 mph for passenger trains with the turnout speed at the accident site from Main Number 1 to Main Number 2, at 40 mph. This is an Amtrak route. The progression of signal aspects from proceed to stop are as follows: Green to Flashing, Flashing to Yellow, and Yellow to Red.

The railroad timetable direction of Train MASNL-16 was south and the railroad timetable direction of Train QNLPI-17 was north. Timetable directions are used throughout this report.

The Accident

After southbound Train MASNL-16 collided head-on with northbound Train QNLPI-17, Train MASNL-16's lead locomotive, UP 9070, derail and traveling a short distance, was struck by sufficient force from its trailing locomotive, CSXT 4716, and consist, that it turned on its axis about 150 degrees and ended up with the head-end positioned northward, rolling onto its side with the conductor's area of the crew compartment on the ground. CSXT 4716 while derailed remained upright. Train MASNL-16's speed at impact was recorded at 45 mph by the event recorder on CSXT 4716. The event recorder of UP 9070 was severely damaged and forensics analysis was unable to provide data. The maximum authorized speed for this train was 50 mph. The Conductor was ejected from the locomotive and found nearby on the ground and the Engineer was crushed in the wreckage. Both crew members were fatalities and transported for autopsy.

Train QNLPI-17's lead locomotive, UP 5070, was derailed and displaced at about a 35-degree angle to the trackage, continuing to face southward, rolling onto its side with the conductor's area of the crew compartment on the ground. UP 4530, the trailing locomotive was derailed and turned on its side. Train QNLPI-17's speed at impact was recorded at 31 mph by the event recorder on UP 5070. The maximum authorized speed for this train was 50 mph. After movement had stopped, the Engineer found himself standing down near the steps to the lower level of the cab and observed his Conductor wedged near the engineer's control stand. He then extricated the Conductor and assisted him to safety and went in search of help. Both members of the train sustained serious injuries and were transported to local hospitals.

Hoxie and other area emergency services, hazardous materials, and law enforcement personnel quickly responded and railroad personnel were dispatched to the accident site to provide assistance to their employees and investigate the cause of the incident.

The collision and point-of-derailment at MP 228.6 resulted in the damage and derailment of two locomotives and 41 cars on Train MASNL-16 and two locomotives and 14 cars on Train QNLPI-17.

Hazardous materials were released from one car, TILX 270474, containing an unrefined alcoholic beverage, considered a flammable liquid, did not pose a threat to the surrounding population and the 25,118 gallons of product were allowed to burn out. However, since preliminary information at the time of the accident indicated hazardous materials were present, as a precautionary measure the incident commander (initially Hoxie Fire Chief, later Walnut Ridge Fire Chief) ordered an evacuation of 0.5-mile radius, later expanded to 1.5 miles, of the accident location involving about 500 individuals from the surrounding area of Hoxie. The evacuation was initiated on August 17, at 3:30 a.m., and was rescinded at 3:00 p.m., on August 18. There were no fatalities, injuries or exposure from the released substance.

All of the involved locomotives were damaged sufficiently to release diesel fuel into the environment with approximately 8,000 gallons lost and later addressed by the environmental contractors of the railroad.

Analysis and Conclusions

Analysis - Toxicological Testing

This accident met the criteria for 49 CFR Part 219, Subpart C, Post Accident Toxicological Testing. The Engineer and Conductor for both trains were tested under FRA guidelines for the use of alcohol and drugs. The results were negative for all crew members of both trains.

Conclusion: Drug or alcohol use was not a factor in this collision.

Analysis - Fatigue Analysis

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

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 all employees involved in this accident.

Train MASNL-16
• Engineer - Fatigue was not probable for this employee
• Conductor - Fatigue was not probable for this employee

Train QNLPI-17
• Engineer - Fatigue was probable for this employee
• Conductor - Fatigue was not probable for this employee

Conclusion: Fatigue was not probable as a contributing factor in this accident

Analysis - Train Crew Performance

Train MASNL-16: With the destruction of the event recorder for the lead and controlling locomotive, UP 9707, investigative analysis of the event recorder data for CSXT 4716, the trailing locomotive, found the Locomotive Engineer's actions to be inconsistent with safe and proper train handling procedures.

Train QNLPI-17: Investigative interviews with members of the train crew and analysis of event recorder data for the lead and controlling locomotive, UP 5070, found the Engineer's actions to be consistent with safe practices and proper train handling procedures.

Conclusion: The actions of Train MASNL-16 train crew were found to be a contributing factor and cause of the accident.

Analysis – Motive, Power and Equipment (MP&E)

FRA MP&E and UP Mechanical Department personnel inspected records and performed field investigations of locomotives and cars for any contributing factors.

Conclusion: No issues were found.

Analysis – Track Structure

FRA Track and UP Maintenance-of-Way personnel inspected records and performed field investigations of the track structure for any contributing factors.

Conclusion: No issues were found.

Analysis – Signal System

FRA Signal and Train Control and UP Signal Department personnel inspected records and performed field investigations of the TCS for any contributing factors.

Conclusion: No issues were found.

Overall Conclusion

The head on collision was caused by the failure of southbound Train MASNL-16 to stop in the clear for the northbound movement of Train QNLPI-17. With northbound Train QNLPI-17 entering the limit of CP CPY 229, southbound Train MASNL-16 passed a wayside signal, 2263, displaying a flashing yellow signal aspect indicating "proceed prepared to stop at second signal," then passed another wayside signal, 2273, displaying a yellow signal aspect indicating "proceed prepared to stop," and then as Train QNLPI-17 was traversing the turnout at CP CPY 229, southbound Train MASNL-16 passed the home signal, 2285, displaying a red signal aspect indicating "stop," and struck Train QNLPI-17 head-on.

Probable Cause and Contributing Factors

The probable cause for this accident is human error, Accident Cause Code H401, "Failure to stop train in the clear." Contributing factors in this accident can be attributed to human error, Accident Cause Code H999, "Other train operation/human factors" where investigation determined that there were a number of factors indicating the train crew of Train MASNL-16 had lost their situational awareness (i.e., lack of response to the roll-by from northbound WNLPSB-15), signal awareness forms that reflected detailed information until shortly before the accident, automated horn sequencer operating past area requiring application and locomotive in throttle position number seven and slowly accelerating to 45 mph when they should have been decelerating as required by the wayside signal indications.