



***Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch***

***Accident Investigation Report
HQ-2017-1224***

***Union Pacific Railroad Company (UP)
Morrison, MO
August 15, 2017***

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.

SYNOPSIS

On August 15, 2017, at 1:27 p.m., CDT, an eastbound Union Pacific Railroad (UP), mixed-freight train operating under Train QNPINP 14 (Train 1), struck the rear-end of a standing UP mixed-freight train operating under Train MNPPB 14 (Train 2). The rear-end collision occurred on UP's St. Louis Area Service Unit, Jefferson City Subdivision at Milepost (MP) 92.71, near the town of Morrison, Missouri, on Main Track No. 2. The method of operation is a Centralized Traffic Control double main track. Train 1, consisted of two lead locomotives, one distributed power unit (DPU), 82 loads, and 47 empty cars. Train 1 contained 11809 trailing tons and was 8213 feet long. Train 1 struck the rear of a stopped Train 2.

Due to the collision, the two lead locomotives and three cars from Train 1, and the rear 13 cars of Train 2, were derailed. There was no release of hazardous materials due to the collision.

The Federal Railroad Administration's (FRA) reportable total damages were \$928,500, equipment damages were estimated at \$850,040, and track, signal and structure damages were estimated at \$78,460.

Train 1's Engineer was injured as a result of the collision. No other injuries were reported.

At the time of the accident, it was daylight and the weather was partly sunny. The temperature was 72° F.

FRA's investigation determined the probable cause of the accident was Cause Code H222 - Automatic block or interlocking signal displaying other than a stop indication - failure to comply.

FRA determined a contributing cause was; H605 - Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal.

TRAIN SUMMARY

| | | |
|--|---------------------------|---|
| 1. Name of Railroad Operating Train #1 Union Pacific Railroad Company | 1a. Alphabetic Code UP | 1b. Railroad Accident/Incident No. 0817SL021 |
| 2. Name of Railroad Operating Train #2 Union Pacific Railroad Company | 2a. Alphabetic Code UP | 2b. Railroad Accident/Incident No. 0817SL021 |

GENERAL INFORMATION

| | | | | |
|---|--------------------------------------|---|---|--|
| 1. Name of Railroad or Other Entity Responsible for Track Maintenance Union Pacific Railroad Company | | 1a. Alphabetic Code UP | 1b. Railroad Accident/Incident No. 0817SL021 | |
| 2. U.S. DOT Grade Crossing Identification Number | | 3. Date of Accident/Incident 8/15/2017 | 4. Time of Accident/Incident 1:27 PM | |
| 5. Type of Accident/Incident Rear End Collision | | | | |
| 6. Cars Carrying HAZMAT 20 | 7. HAZMAT Cars Damaged/Derailed 0 | 8. Cars Releasing HAZMAT 0 | 9. People Evacuated 0 | 10. Subdivision Jefferson City |
| 11. Nearest City/Town Morrison, MO | | 12. Milepost (to nearest tenth) 92.7 | 13. State Abbr. MO | 14. County GASCONADE |
| 15. Temperature (F) 72 °F | 16. Visibility Day | | 17. Weather Cloudy | 18. Type of Track Main |
| 19. Track Name/Number Main #2 | | 20. FRA Track Class Freight Trains-60, Passenger Trains-80 | | 21. Annual Track Density (gross tons in millions) 141 |
| | | | | 22. Time Table Direction East |

OPERATING TRAIN #1

| | | | | | | | | | | | |
|---|-------------|------------------------|---|--------------------------------|---|---|-------------------------------------|--|------------|------------------------------------|------------|
| 1. Type of Equipment Consist: Freight Train | | | | | 2. Was Equipment Attended? Yes | | 3. Train Number/Symbol QNPINP 14 | | | | |
| 4. Speed (recorded speed, if available) R - Recorded 29.0 MPH E - Estimated | | Code R | 5. Trailing Tons (gross excluding power units) 11809 | | 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 0 | |
| 6. Type of Territory Signalization: <u>Signaled</u> Method of Operation/Authority for Movement: <u>Signal Indication</u> Supplemental/Adjunct Codes: <u>Q</u> | | | | | | | | | | | |
| 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 <i>(derailed, struck, etc.)</i> | | UP 7973 | | 1 | | no | | | | 0 | 0 |
| (2) Causing <i>(if mechanical, cause reported)</i> | | N/A | | | | no | | 9. Was this consist transporting passengers? | | No | |
| 10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.) | a. Head End | Mid Train | | Rear End | | 11. Cars (Include EMU, DMU, and Cab Car Locomotives.) | Loaded | | Empty | | e. Caboose |
| | | b. Manual | c. Remote | d. Manual | e. Remote | | a. Freight | b. Pass. | c. Freight | d. Pass. | |
| (1) Total in Train | 2 | 0 | 0 | 0 | 1 | (1) Total in Equipment Consist | 82 | 0 | 47 | 0 | 0 |
| (2) Total Derailed | 2 | 0 | 0 | 0 | 0 | (2) Total Derailed | 3 | 0 | 0 | 0 | 0 |
| 12. Equipment Damage This Consist 635077 | | | 13. Track, Signal, Way & Structure Damage 78460 | | | | | | | | |
| 14. Primary Cause Code H222 - Automatic block or interlocking signal displaying other than a stop indication - failure to comply.* | | | | | | | | | | | |
| 15. Contributing Cause Code H605 - Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal. | | | | | | | | | | | |
| 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: 1 Mins: 27 | | Hrs: 1 Mins: 27 | |
| Casualties to: | | 22. Railroad Employees | | 23. Train Passengers | | 24. Others | | 25. EOT Device? | | 26. Was EOT Device Properly Armed? | |
| Fatal | | 0 | | 0 | | 0 | | N/A | | N/A | |
| Nonfatal | | 1 | | 0 | | 0 | | 27. Caboose Occupied by Crew? | | N/A | |
| 28. Latitude 38.675734260 | | | | 29. Longitude -91.634553920 | | | | | | | |

OPERATING TRAIN #2

| | | | | | | | | | | | |
|---|-------------|------------------------|--|--------------------------------|---|---|------------|--|------------|------------------------------------|------------|
| 1. Type of Equipment Consist: Freight Train | | | | | 2. Was Equipment Attended? Yes | | | 3. Train Number/Symbol MNPPB 14 | | | |
| 4. Speed (recorded speed, if available) R - Recorded 0.0 MPH E - Estimated | | Code R | 5. Trailing Tons (gross excluding power units) 6329 | | 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 0 | |
| 6. Type of Territory Signalization: <u>Signaled</u> Method of Operation/Authority for Movement: <u>Signal Indication</u> Supplemental/Adjunct Codes: <u>Q</u> | | | | | | | | | | | |
| 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.) | | CMHX286034 | | 116 | | no | | | | 0 | 0 |
| (2) Causing (if mechanical, cause reported) | | N/A | | | | | | 9. Was this consist transporting passengers? | | No | |
| 10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.) | a. Head End | Mid Train | | Rear End | | 11. Cars (Include EMU, DMU, and Cab Car Locomotives.) | Loaded | | Empty | | e. Caboose |
| | | b. Manual | c. Remote | d. Manual | e. Remote | | a. Freight | b. Pass. | c. Freight | d. Pass. | |
| (1) Total in Train | 3 | 0 | 0 | 0 | 0 | (1) Total in Equipment Consist | 35 | 0 | 53 | 0 | 0 |
| (2) Total Derailed | 0 | 0 | 0 | 0 | 0 | (2) Total Derailed | 1 | 0 | 12 | 0 | 0 |
| 12. Equipment Damage This Consist 214963 | | | 13. Track, Signal, Way & Structure Damage 0 | | | | | | | | |
| 14. Primary Cause Code H222 - Automatic block or interlocking signal displaying other than a stop indication - failure to comply.* | | | | | | | | | | | |
| 15. Contributing Cause Code H605 - Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal. | | | | | | | | | | | |
| 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: 2 Mins: 2 | | Hrs: 2 Mins: 2 | |
| Casualties to: | | 22. Railroad Employees | | 23. Train Passengers | | 24. Others | | 25. EOT Device? | | 26. Was EOT Device Properly Armed? | |
| Fatal | | 0 | | 0 | | 0 | | Yes | | Yes | |
| Nonfatal | | 0 | | 0 | | 0 | | 27. Caboose Occupied by Crew? | | N/A | |
| 28. Latitude 38.675734260 | | | | 29. Longitude -91.634553920 | | | | | | | |

SKETCHES

Sketch



NARRATIVE

Circumstances Prior to the Accident*Striking Train UP Train QNPINP-14 (Train 1)*

The crew of Train 1 consisted of one Locomotive Engineer and one Conductor. The crew went on duty at 12:00 p.m., CDT, on August 15, 2017, in Jefferson City, Missouri. This is the away-from-home terminal for both crewmembers. Their assignment was to operate Train 1 from Jefferson City, Missouri to Dupou, Illinois, via Union Pacific's (UP) Jefferson City Subdivision. Prior to being called to work, the Engineer was off duty for 13 hours and 31 minutes and the Conductor was off duty for 14 hours and 10 minutes, both more than the required statutory off-duty rest period. Train 1 consisted of two lead locomotives, 82 loads, 47 empties, and one distributed power unit (DPU). Train 1 contained 11,809 trailing tons, and was 8,213 feet long. The air brake inspection was conducted at North Platte, Nebraska, on August 14, 2017.

According to the interview, the Engineer performed a locomotive daily inspection before Train 1 departed Jefferson City, Missouri. He did not take any exceptions to the two lead locomotives.

The crew departed on Main Track No. 1 at Control Point (CP) M102. The crew received a diverging clear signal. The Conductor recorded a speed of 39 miles per hour (mph). At Milepost (MP) 97.2, the crew received an advance approach aspect, and the Conductor recorded a speed of 46 mph. A review of the locomotive download indicates the Engineer was stepping up the throttle position during this period with no application of Train 1's brakes. The crew then received an approach aspect at MP 94.8. The Conductor recorded a speed of 40 mph and indicated a "Cab Red Zone" conversation took place between the crew at this point. According to the crew, the trip was uneventful prior to the collision. The Conductor made no radio transmission concerning the approach signal he recorded on his Conductor Report Form. As the crew approached the accident site, they were traveling at a recorded speed of 38 mph, and reported seeing the rear of Train MNPPB-14 (Train 2) on Main Track No. 2. A review of UP's Jefferson City Train Dispatcher audio recordings does not indicate any conversation between the Dispatcher and Train 1 after the train departed from Jefferson City Yard and prior to the collision.

According to interviews, there was no communication between Trains 1 and 2 prior to the incident. On UP's St. Louis Service Unit, Jefferson City Subdivision, the method of operation is a Centralized Traffic Control (CTC) double main track. The maximum authorized speed from MP 0.0 to MP 115.6 is 60 mph, as designated in the current St. Louis Area Timetable No. 5, dated May 27, 2013. The maximum authorized speed for Train 1 was restricted to 50 mph, as indicated on the crew's Track Warrant Number 3935.

The signals prior to the collision were clearly visible with no vegetation obstruction.

The railroad timetable and geographic direction is east, and that timetable direction is used throughout this report.

Train MNPPB-14 (Train 2)

The crew of Train 2 consisted of an Engineer and a Conductor. The crew went on-duty at 11:25 a.m., CDT, on August 15, 2017, in Jefferson City, Missouri. This is the away-from-home terminal for both crewmembers. Their assignment was to operate Train 2 from Jefferson City, Missouri to Dupou, Illinois via the UP Jefferson City Subdivision. Both crew members received more than the statutory off-duty period

for rest prior to reporting for duty.

Train 2 consisted of three lead locomotives, 35 loads, and 53 empties. Train 2 contained 6,329 trailing tons, and was 5,810 feet long. According to the interviews of the crew, they were stopped at Morrison Junction (MP 91.1) for about 30 minutes prior to the accident. They reported that their trip was uneventful leading up to the collision.

The Accident

Train 1

A review of the inward-facing camera showed the Engineer sitting at the control stand and the conductor sitting in his seat. No communication between the crew members was observed just prior to the accident. The locomotive event recorder download from the lead locomotive indicated that the Engineer initiated the emergency air brake application at a recorded speed of 38 mph. After initiating the emergency brake application, Train 1 traveled 879 feet before impacting the rear of Train 2 at a recorded speed of 29 mph. Train 1 traveled another 89 feet after impact derailing both locomotives and the first three cars in the train. The locomotives on Train 1 came to rest on their side on Main Track No. 1. The crew had to exit the locomotive via the side window located on the Conductor's side. The Engineer from Train 1 reported leg and back injuries as a result of the collision.

Train 2

According to post-accident interviews, the crew on Train 2 did not feel the collision and only noticed the emergency application of the brakes. Following the collision, the crew of Train 2 heard the Train Dispatcher being called for on the radio and, when the Dispatcher answered, they heard a member of the crew on Train 1 say Train 1 had cars on the ground. A piece of maintenance-of-way-equipment was operating by the head-end of Train 2 on Main Track No. 1, and the Conductor got a ride with the Equipment Operator to the rear of Train 2. When he got to the rear, he found that Train 1 had struck the rear of Train 2.

Analysis and Conclusions

Analysis - FRA Post-Accident Toxicological Testing: Post-Accident Forensic Toxicology Reports indicate the crews of both trains had negative test results.

Conclusion: Toxicology did not contribute to the cause or severity of this accident.

Analysis - Fatigue: The Federal Railroad Administration (FRA) obtained fatigue-related information, including a 10-day work history, for the four employees involved in this accident, including the Engineer and Conductor from each train crew. Software sleep settings varied according to information obtained from each employee.

Conclusion: FRA concluded fatigue was not probable for the crews assigned to either train involved in this accident.

Analysis - Locomotive Engineer and Conductor Operating Performance: The lead locomotive of Train 1 was equipped with a speed indicator and event recorder as required. The locomotive was also equipped with an inward-facing camera. The recorder data and camera video were downloaded and analyzed by FRA and UP officials.

Conclusion: The crew of Train 1 was not in compliance with applicable railroad operating and train handling requirements. The crew did not comply with approach indication at MP 94.7 as required by UP's System Special Instructions Item 19: *Block and Interlocking Signals*, which requires the crew to

proceed but be prepared to stop before any part of the train or engine passes the next signal. Freight trains exceeding 30 mph must immediately reduce to 30 mph. The crew of Train 1 also did not comply with General Code of Operating Rules Rule 1.47, *Duties of Crew Members*, which states, in part:

- Communicate clearly to each other the name of signals affecting their train as soon as signals become visible or audible.
- Continue to observe signals and announce any change of aspect until the train passes the signal.
- Communicate clearly to each other the speed of the train as it passes a signal with an indication other than Clear.
- Immediately remind the engineer of the rule requirement if the signal is not complied with.

Analysis - Operational Testing: The test results for the previous six months for the crew of Train 1 were provided to FRA. The Engineer was stop-tested on one occasion with no exceptions.

Conclusion: UP properly monitored its employees in the field, and inadequate operational testing was not an issue.

Analysis-Interviews: The crews of Train 1 and Train 2 were interviewed after the accident by FRA.

Conclusions: The Engineer of Train 1 stated that he felt the primary cause of the accident was inattentiveness of his Conductor combined with the train Dispatcher's neglect in answering the radio when he had been toned up back near MP 104. The Conductor of Train 1 stated that he felt the primary cause of the accident was that the Train 1 Engineer was going too fast and could not stop the train. The Engineer and Conductor on Train 2 were stopped at the time of the impact and were in compliance with all applicable operating and train handling requirements.

Analysis-Inspection of Train Braking Systems: Train 1 received a Class I air brake test on August 14, 2017. There were no open defects on the lead locomotive.

Conclusion: The locomotive and air brake system on Train 1 worked properly and was not a factor in the collision.

Analysis - Signal Tests/ Inspections Performed and Results: Signal inspection of the last four signal aspects were reviewed by FRA and UP. A brief synopsis was provided by UP for each intermediate signal.

99.1 Intermediate

- At 12:57:12 p.m., Train 2 passes Signal 99.1 with a Green aspect (indication to Proceed)
- At 1:18:32 p.m., Train 1 Passes Signal 99.1 with a Green Aspect (indication to Proceed)

97.3 Intermediate

- At 12:59:55 p.m., Train 2 passes Signal 97.3 with a Green Aspect (indication to Proceed)
- At 1:21:22 p.m., Train 1 passes Signal 97.3 with a Flashing Yellow Aspect (indication to Proceed prepared to stop at second signal)

94.7 Intermediate

- At 1:02:45 p.m., Train 2 passes Signal 94.7 with a Flashing Yellow Aspect (indication to Proceed prepared to stop at second signal)
- At 1:24:26 p.m., Train 1 passes Signal 94.7 with a steady Yellow Aspect (Indication to Proceed preparing to stop before any part of a train or engine passes the next signal)

92.9 Intermediate

- At 1:05:41 p.m., Train 2 passes Signal 92.9 with a steady Yellow Aspect (indication to Proceed

preparing to stop before any part of a train or engine passes the next signal)

- At 1:09:59 p.m., the rear-end of Train 2 passes Signal 92.9, and begins to generate a code to display a steady Yellow Aspect at Signal 94.7
- At 1:24:32 p.m., Train 1 passes Signal 92.9 with a Red Aspect (indication to Proceed at restricted speed)
- The steady Yellow Aspect was generated for 14 minutes and 25 seconds prior to Train 1 passing the steady yellow signal aspect.

Conclusion: FRA concurred with UP that the signal system was working properly and was not a causal factor in the accident.

Overall Conclusion

The railroad was in compliance with UP and FRA standards. The signal system and Train 1's air brake system functioned properly. The data reviewed from the event recorder and the interview process revealed that the crew of Train 1 was not in compliance with applicable railroad operating and train handling requirements. It was determined that the crew of Train 1 was not attentive to their job-related duties pertaining to the requirements of restricted speed.

Probable Cause and Contributing Factors

FRA's investigation determined the probable cause of the accident was Cause Code H222 - Automatic block or interlocking signal displaying other than a stop indication - failure to comply.

FRA determined a contributing cause was; H605 - Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal.