



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

***Accident Investigation Report
HQ-2020-1403***

***Union Pacific
Elkhart, Iowa
December 25, 2020***

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

Synopsis

On December 25, 2020, at approximately 6:37 a.m. CST, Union Pacific Railroad Company's (UP) southbound mixed freight train MSSDM-24 with 3 conventionally configured locomotives handling 100 loads, 8 empties, at 7,408 feet in length and 13,050 tons derailed 24 cars (18 loads / 6 empties) at Milepost (MP) 86.4 on the Mason City Subdivision of the Great Lakes Division near Elkhart (Polk County), IA – approximately 12.5 miles north of Des Moines, IA.

The Method of Operation for the Mason City Subdivision is Train Control System (Centralized Traffic Control) with Positive Train Control (PTC) and a maximum authorized speed of 60 mph – per the Union Pacific's Mason City Subdivision Timetable effective October 10, 2011.

There were no injuries to crew nor the public.

There was one hazardous material car (TILX362019 - UN1262 OCTANES 3// PG II) with an "unquantifiable amount" leaking adjacent to a waterway with no evacuations required. The leak was mitigated by Union Pacific's Hazardous Material Response group. A 36-foot pre-stressed concrete bridge (MP 86.53) was destroyed due to the derailment which was replaced temporarily with two 60-inch corrugated metal pipe culverts.

This was not an AMTRAK route, nor was the accident PTC preventable.

Weather at the time of the derailment was described as dark, clear and 3°F.

Total estimated damages were \$2,163,915 (Track: \$139,232 / Equipment: \$2,024,683).

The Federal Railroad Administration (FRA) determined the probable cause to be "T207 detail fracture from shelling or head check."

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 Union Pacific Railroad Company	1a. Alphabetic Code UP	1b. Railroad Accident/Incident No. 1220GL020
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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. HQ-2020-1403 (NRC# 1294956)	
2. U.S. DOT Grade Crossing Identification Number		3. Date of Accident/Incident 12/25/2020	4. Time of Accident/Incident 6:37 AM	
5. Type of Accident/Incident Derailment				
6. Cars Carrying HAZMAT 42	7. HAZMAT Cars Damaged/Derailed 15	8. Cars Releasing HAZMAT 1	9. People Evacuated 0	
10. Subdivision -				
11. Nearest City/Town ELKHART		12. Milepost (to nearest tenth) 86.40	13. State Abbr. IA	14. County POLK
15. Temperature (F) 3 °F	16. Visibility Dark	17. Weather Clear		18. Type of Track Main
19. Track Name/Number Main		20. FRA Track Class Freight Trains-60, Passenger Trains-80		21. Annual Track Density (gross tons in millions) 34.7
		22. Time Table Direction South		
23. PTC Preventable No		24. Primary Cause Code [T207] Broken Rail - Detail fracture fr		25. Contributing Cause Code(s)

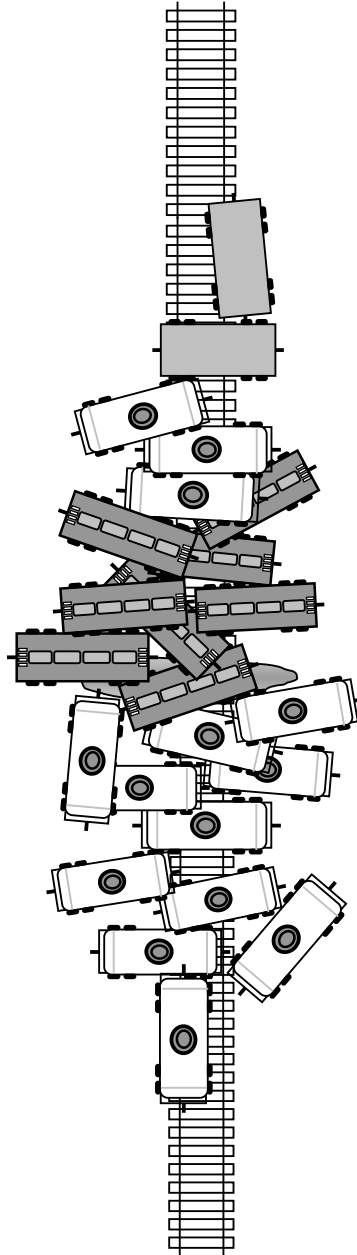
OPERATING TRAIN #1

1. Type of Equipment Consist: Freight Train		2. Was Equipment Attended? Yes		3. Train Number/Symbol MSSDM 24							
4. Speed (recorded speed, if available) R - Recorded 38.0 MPH E - Estimated	Code R	5. Trailing Tons (gross excluding power units) 13050	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>J, 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>	TILX 638586	7	no		0	0					
(2) Causing <i>(if mechanical, cause reported)</i>	TILX 638586	7	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	3	0	0	0	0	(1) Total in Equipment Consist	100	0	8	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	18	0	6	0	0
12. Equipment Damage This Consist 2024683		13. Track, Signal, Way & Structure Damage 139232									
Number of Crew Members						Length of Time on Duty					
14. Engineers/Operators 1	15. Firemen 0	16. Conductors 1	17. Brakemen 0	18. Engineer/Operator Hrs: 10 Mins: 37		19. Conductor Hrs: 10 Mins: 37					
Casualties to:		20. Railroad Employees	21. Train Passengers	22. Others	23. EOT Device? Yes		24. Was EOT Device Properly Armed? Yes				
Fatal	0	0	0	25. Caboose Occupied by Crew? N/A							
Nonfatal	0	0	0								
26. Latitude 41.748778000		27. Longitude -93.526985000									

SKETCHES

Sketch - Sketch UP Ankeny IA

HQ-2020-1403
NRC NO. 1294956
UP ANKENY, IA.



NARRATIVE**Circumstances Prior to the Accident**

Train 1's crew consisted of one Engineer and one Conductor who reported for duty at 8:00 p.m., CST, on December 24, 2020, at Mason City, IA. This was the home terminal for the crew, and both crew members had received the statutory off-duty rest period prior to reporting for duty.

Train 1 was a mixed freight southbound train consisting of 3 conventionally configured locomotives, 100 loaded and 8 empty cars, at 7,408 feet in length, and 13,050 trailing tons. Train 1 originated at Park Yard (MP 349.4) in St. Paul, Minnesota on December 24, 2020 with a destination of Des Moines, Iowa, MP 73.6 via the Mason City Subdivision. Train 1 received the required Class I Initial Terminal Air Test & Inspection by the Conductor and Engineer prior to departing St. Paul at 1:00 p.m., CST December 24, 2020. The train did not have any equipment restrictions and was designated as a key train. After departing St. Paul, 8 cars were added at Mason City, Iowa with the required air test completed by the inbound "chase crew" at 11:00 p.m., CST December 24, 2020.

Train 1 was operating on the UP Mason City Subdivision within the Great Lakes Division. The Mason City Subdivision operates geographically north-south, and timetable north-south. Timetable direction will be used throughout this report. The Mason City Subdivision is single main track with a maximum authorized speed of 60 mph. The method of operation for this subdivision is Traffic Control System Centralized Traffic Control with Positive Train Control (PTC) overlay. The train was under a cold weather speed restriction of 40 mph.

The crew did not report any issues with the train after departing Mason City approaching the derailment. At the time of the derailment, the Engineer was located at the controls of the lead locomotive, while the Conductor was in the conductor's seat.

The Accident

At MP 86.97, the train passed a clear signal indication southbound where the track is tangent with primarily 0 percent grade, once crossing over the trailing point hand throw switch at MP 86.86 (Elkhart). The train continued southbound to MP 86.4 over a 36-foot pre-stress concrete bridge at a recorded speed of 38 mph.

At approximately 6:37 am, CST, at MP 86.4 the train experienced an undesired emergency (UDE) of the air brakes at a recorded speed of 38 mph. Throttle position was notch 4 and PTC was active. Immediately after the head end of the train passed over the bridge, the 8th car in the consist (TILX 638586) derailed followed by the trailing 23 cars.

The conductor inspected the train after stopping and found a total of 24 cars derailed (18 loads and 6 empties) lines 108 through 86 and a 36-foot ballast deck bridge destroyed.

Weather at the time of the derailment was described as dark, clear and 3°F.

Post-Accident Investigation

FRA, in conjunction with the Union Pacific, investigated this accident.

Analysis and Conclusion

Analysis Special Human Factors - Fatigue: FRA uses an overall effectiveness rate of 63 as the baseline for fatigue analysis. This is the level at which the risk of a human factor related accident is calculated to

be equal to chance. Any schedule that violates the overall effectiveness rate on the date of the accident or in the days leading up to the accident are considered to be at risk of fatigue contributing to the accident. The higher the FAID score, the higher fatigue exposure. Below this baseline, fatigue is not considered as probable for an 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.

Conclusion: FRA obtained fatigue-related information, including work history, for all train operating employees involved in this accident. FRA concluded that excessive fatigue was present but did not contribute to the cause or severity of the accident.

Conclusion: FRA determined fatigue did not cause or contribute the severity of the accident.

Analysis – Toxicological Testing: This accident met the minimum requirements of Title 49 Code of Federal Regulations Part (CFR) §219 and toxicological testing was accomplished. Federal Railroad Administration Post-Accident Forensic Toxicology Result Reports indicate the two employees tested each had negative test results.

Conclusion: FRA determined neither drugs nor alcohol were primary or contributory causes to the accident.

Analysis – Operating Practices: The Engineer and Conductor were found to be compliant with all applicable FRA Regulations, railroad operating and train handling rules and requirements. The relevant event and video recorder data was downloaded by the UP-Manager of Operating Practices and reviewed by FRA and UP Officials with no exceptions noted.

Conclusion: FRA determined that operating practices did not cause nor contribute to the severity of the accident.

Analysis – Track & Structures: On January 8, 2021, UP Director of Track Maintenance Iowa Service Unit reported to FRA Track a suspect rail would be sent to the Union Pacific Lab in Omaha, Nebraska for further analysis and inspection. No report of the lab analysis was received. The suspect rail was located on the south end of the ballast deck bridge on the west rail. The rail section is 155 lb. 1954 Illinois. There was visible rail end batter to the wheels on the west side's first car (CMO 20127) behind the engines. Based on the evidence UP stated the rail in question was the cause of the derailment and FRA Track Integrity concurred with the findings.

Conclusion: FRA determined the cause of the derailment to be "T207 broken rail (detail fracture from shelling or head check)".

Overall Conclusion

FRA determined the cause of the accident to be due to a broken rail "T207 detail fracture from shelling or head check."

Probable Cause

The FRA investigation determined the probable cause of the accident to be "T207 detail fracture from shelling or head check" with no contributing factors.