Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch

Accident Investigation Report
HQ-2021-1430

Union Pacific Railroad
San Marcos, Texas
June 6, 2021

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 June 6, 2021, at approximately 10:45 a.m. [1] CDT, Union Pacific Railroad (UP) grain train GSJO3D-04 (Train 1), handling 107 loads, 0 empties at 6,494 feet and 15,278 tons, was traveling southbound[2] on UP’s Austin Subdivision when 39 cars derailed at Milepost (MP) 215.58 in San Marcos, Texas (Hays County), approximately 50 miles north of San Antonio, Texas. Of the 39 rail cars derailed, 32 rail cars were upright, and 7 rail cars were on their side.

The method of operation for UP’s Austin Subdivision is a combination of Direct Traffic Control, Automatic Block Signal/Centralized Traffic Control with Positive Train Control (PTC) overlay. The Austin Subdivision has a maximum authorized speed of 60 miles per hour (mph), with a 25-mph speed restriction between MP 215.4 – MP 215.7 per the San Antonio Area (Austin Subdivision) Timetable #6, effective May 10, 2019. The area of the derailment was restricted to a speed of 25 mph due to a track configuration involving back-to-back 4-5 degree opposing curves.

There were no injuries to the public or crew, and no hazardous material involved.

This was an Amtrak route, but no delays occurred. The accident was not PTC preventable.

Weather at the time of the derailment was daylight, cloudy and 80° F.

Total estimated damages were $1,536,943 (Track: $636,912/Equipment: $900,031).

The Federal Railroad Administration (FRA) determined the probable cause to be T001--roadbed settled or soft.

[1] All times are Central Daylight Time (CDT).
[2] This is timetable direction, which will be used throughout this report.
## TRAIN SUMMARY

1. Name of Railroad Operating Train #1
   Union Pacific Railroad Company

1a. Alphabetic Code
   UP

1b. Railroad Accident/Incident No.
   0621SX005

### 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.
   0621SX005

2. U.S. DOT Grade Crossing Identification Number
   3. Date of Accident/Incident
      6/6/2021

4. Time of Accident/Incident
   10:45 AM

5. Type of Accident/Incident
   Derailment

6. Cars Carrying HAZMAT
   0

7. HAZMAT Cars Damaged/Derailed
   0

8. Cars Releasing HAZMAT
   0

9. People Evacuated
   0

10. Subdivision
    -

11. Nearest City/Town
    SAN MARCOS

12. Milepost (to nearest tenth)
    215.580

    TX

14. County
    HAYS

15. Temperature (F)
    80 °F

16. Visibility
    Day

17. Weather
    Cloudy

18. Type of Track
    Main

19. Track Name/Number
    MAIN 2

20. FRA Track Class
    Freight Trains-40, Passenger Trains-60

21. Annual Track Density (gross tons in millions)
    31.1

22. Time Table Direction
    South

23. PTC Preventable
    No

24. Primary Cause Code
    [T001] Roadbed settled or soft

25. Contributing Cause Code(s)
### OPERATING TRAIN #1

<table>
<thead>
<tr>
<th>1. Type of Equipment Consist:</th>
<th>Freight Train</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Was Equipment Attended?</td>
<td>Yes</td>
</tr>
<tr>
<td>3. Train Number/Symbol</td>
<td>GSJO3D-04</td>
</tr>
<tr>
<td>4. Speed (recorded speed, if available)</td>
<td>R - Recorded 22.0 MPH</td>
</tr>
<tr>
<td>E - Estimated</td>
<td></td>
</tr>
<tr>
<td>5. Trailing Tons (gross excluding power units)</td>
<td>R 15278</td>
</tr>
<tr>
<td>6. Type of Territory</td>
<td></td>
</tr>
<tr>
<td>6a. Remotely Controlled Locomotive?</td>
<td>Code</td>
</tr>
<tr>
<td>0 = Not a remotely controlled operation</td>
<td></td>
</tr>
<tr>
<td>1 = Remote control portable transmitter</td>
<td></td>
</tr>
<tr>
<td>2 = Remote control tower operation</td>
<td></td>
</tr>
<tr>
<td>3 = Remote control portable transmitter - more than one remote control transmitter</td>
<td></td>
</tr>
<tr>
<td>7. Principal Car/Unit</td>
<td>a. Initial and Number</td>
</tr>
<tr>
<td>b. Position in Train</td>
<td>23</td>
</tr>
<tr>
<td>c. Loaded (yes/no)</td>
<td>yes</td>
</tr>
<tr>
<td>8. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box</td>
<td>Alcohol</td>
</tr>
<tr>
<td>Drugs</td>
<td>0</td>
</tr>
<tr>
<td>9. Was this consist transporting passengers?</td>
<td>N/A</td>
</tr>
<tr>
<td>10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)</td>
<td>a. Head End</td>
</tr>
<tr>
<td>b. Mid Train Manual</td>
<td>2</td>
</tr>
<tr>
<td>c. Rear End Manual</td>
<td>0</td>
</tr>
<tr>
<td>d. Mid Train Remote</td>
<td>0</td>
</tr>
<tr>
<td>e. Rear End Remote</td>
<td>0</td>
</tr>
<tr>
<td>11. Cars (Include EMU, DMU, and Cab Car Locomotives.)</td>
<td>a. Loaded Freight</td>
</tr>
<tr>
<td>b. Loaded Pass.</td>
<td>0</td>
</tr>
<tr>
<td>c. Empty Freight</td>
<td>0</td>
</tr>
<tr>
<td>d. Empty Pass.</td>
<td>0</td>
</tr>
<tr>
<td>e. Caboose</td>
<td>0</td>
</tr>
<tr>
<td>(1) Total in Equipment Consist</td>
<td>1</td>
</tr>
<tr>
<td>(2) Total Derailed</td>
<td>39</td>
</tr>
<tr>
<td>12. Equipment Damage This Consist 900031</td>
<td>13. Track, Signal, Way &amp; Structure Damage 636912</td>
</tr>
<tr>
<td>14. Number of Crew Members</td>
<td></td>
</tr>
<tr>
<td>15. 14. Engineers/Operators</td>
<td>1</td>
</tr>
<tr>
<td>16. Firemen</td>
<td>0</td>
</tr>
<tr>
<td>17. Conductors</td>
<td>1</td>
</tr>
<tr>
<td>18. Brakemen</td>
<td>0</td>
</tr>
<tr>
<td>19. Engineer/Operator Hrs:</td>
<td>5</td>
</tr>
<tr>
<td>Mins:</td>
<td>5</td>
</tr>
<tr>
<td>20. Conductor Hrs:</td>
<td>5</td>
</tr>
<tr>
<td>Mins:</td>
<td>5</td>
</tr>
<tr>
<td>21. Casualties to: Railroad Employees</td>
<td>20</td>
</tr>
<tr>
<td>22. Train Passengers</td>
<td>21</td>
</tr>
<tr>
<td>23. Others</td>
<td>22</td>
</tr>
<tr>
<td>24. EOT Device?</td>
<td>Yes</td>
</tr>
<tr>
<td>25. Was EOT Device Properly Armed?</td>
<td>Yes</td>
</tr>
<tr>
<td>26. Caboose Occupied by Crew?</td>
<td>N/A</td>
</tr>
<tr>
<td>27. Latitude</td>
<td>29.818697000</td>
</tr>
<tr>
<td>28. Longitude</td>
<td>-98.006949000</td>
</tr>
</tbody>
</table>

Page 3
UP 5416 Lead Engine  GSJO3D-04

2 X 1  F B B  DPU TRAIN
DPU UNIT # UP 7983

UP 7404 Trailing Loco

HQ-2021-1430
UP DERAILMENT
San Marcos, Texas
6 June 2021

No Derailments From
Car 1 – 22 from Head End
Cars Not Shown

CMO 112356   #23 H/E Derailed Upright
1ST Derailed Car in Train from Head End

No Derailments From
Car 24 – 57 from Head End
Cars Not Shown

Not To Scale
No Derailments From
Car 76 – 78 from Head End
Cars Not Shown
No Derailments From
Car 99 – 107 from Head End
Cars & North Facing DPU Engine
Not Shown
Circumstances Prior to the Accident
On June 6, 2021, the crew of Train 1 was called on duty at Valley Jct., Texas at 5:40 a.m. The crew consisted of an Engineer and Conductor that had received the statutorily required rest prior to reporting for duty.
The train originated at St. Joseph Yard in St. Joseph, Missouri, and was destined for Laredo, Texas. After departing, there were no changes to the consist, nor were there any reported train handling issues prior to the accident.
At the time of the accident, the Engineer was seated at the controls on the forward right side of the leading locomotive, while the Conductor was seated on the left side of the lead locomotive.

The Accident
At approximately 10:45 a.m., Train 1 approached MP 215.58 at a recorded speed of 22 mph and encountered soft, settled roadbed, derailing 39 loaded cars (line 23, lines 58-75 and lines 79-98). Seven of the cars were on their sides and 32 remained upright. No Emergency Services were requested. UP personnel responded to the accident. Archived local weather reports indicate that several inches of rain had fallen in the days leading up to the derailment.

Post-Accident Investigation
The FRA and UP investigated the accident.

Analysis and Conclusions
Analysis – Toxicological: FRA Post-Accident Forensic Toxicology Result Reports were conducted on both crew members and each had negative test results.
Conclusion: FRA determined that drug and alcohol use did not contribute to the cause or severity of the accident.
Analysis – Fatigue: FRA performed a fatigue analysis using (FAID). 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 factors 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 the 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 train's Engineer and Conductor. Based on the results of the analysis, fatigue was not likely for both employees involved in the accident.
Conclusion: FRA determined fatigue did not contribute to the cause or severity of the accident.
Analysis – Motive Power and Equipment: A mechanical inspection was performed on Train 1. Car CMO 112356 (line 23 in the train) was discovered during the inspection to have a thin-flange at the L-3 position on the A-end wheels, which remained on the rail, and did not exhibit signs of derailment damage; however, the wheels and the brake beam on the B-end of the car had extensive damage as a result of...
the derailment. No defects were noted on the additional 38 derailed cars inspected during the initial on-scene investigation.

Conclusion: FRA determined damage to cars was a result of the derailment, and no mechanical conditions or issues disclosed contributed to the cause or severity of the accident.

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

Conclusion: FRA determined the operating crew’s performance did not contribute to the cause or severity of the accident.

Analysis – Track & Structures: This segment of the Austin Subdivision main track consists of 136 lb. rail on wood ties. The ballast is made up of 1.5 to 2.75-inch clean rock. Fasteners throughout the location consisted of cut spikes with a standard anchor pattern. Curve blocks were also installed on every 4th tie. The point of derailment (POD) was identified to be at MP 215.58 on Main track #2.

The last UP geometry car test at this location was EC4 on February 22, 2021, with no defects recorded. In the review of the UP track inspection records, for the period of May 1, 2021, to June 6, 2021, a track inspection was conducted at this location nine times as part of the required weekly inspection of the main line, with no defects noted during those inspections.

Following the derailment, a total of 72 track panels were used to reconstruct the main track and restore service.

Previous FRA track inspections on May 4, 2021, noted fouled ballast defects approximately forty feet in length at MP 215.58 on the Austin Subdivision Main Track #2. Upon review of the outward facing locomotive camera, it appeared the fouled ballast was still present. Post derailment inspection on June 7, 2021, showed the subgrade at the location where the previous defect was noted at MP 215.58 contained a significant amount of mud.

Conclusion: FRA determined the cause of the accident to be T001--Track (roadbed, settled or soft).

**Overall Conclusion:** FRA concluded the condition or functionality of the crew, locomotives, cars, or safety appurtenances did not contribute to the cause or severity of the accident, and that soft, settled roadbed was the probable cause.

**Probable Cause:** The FRA determined the probable cause to be T001--Track (roadbed, settled or soft).