



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

***Accident Investigation Report
HQ-2016-1142***

***Union Pacific (UP)
Green River, WY
June 27, 2016***

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 June 27, 2016, at approximately 6:00 p.m., MDT, a westbound Union Pacific Railroad (UP) loaded Intermodal Train, KG1LAC-26, derailed 19 rail cars/platforms, of its 130-car/platform train. The accident/incident occurred approximately 8 miles west of Green River, Wyoming, at Milepost (MP) 824.81, on the Evanston Subdivision of the UP's Salt Lake City area. Green River is located approximately 169 miles northeast of Salt Lake City, Utah, and approximately 274 miles west of Cheyenne, Wyoming.

Train KG1LAC-26 consisted of three leading locomotives, 130 loaded double-stacked intermodal cars/platforms (comprised of 68 single and articulated multi-well intermodal rail cars), and one distributive power locomotive (DPU) on the rear of the train; had 8,084 trailing tons; and was 9,525 feet in total length. The derailed cars were in car consist line item positions 29 through 11 (train consist positions 105 through 123). All 19 cars/platforms derailed in an upright position. There was no release of hazardous materials, no injuries to the crew or general public, and no ensuing fire resulting from this accident/incident.

The railroad damages reported were \$581,020 for equipment damages and \$320,063 for track, signal, way, and structure damages, for a total reported damage of \$901,083.

At the time of the accident/incident it was daylight (dusk) and clear, with light winds, and a temperature of 86 °F.

The method of operation in the area of the accident/incident is by signal indications of a traffic control system (TCS), on two main tracks, controlled by a UP dispatcher, located at the Harriman Dispatching Center, in Omaha, Nebraska, and supplemented with the safety overlay of an automatic cab signal (ACS) system.

Geographic and timetable direction of UP Intermodal Train KG1LAC-26 was westward, timetable directions will be used throughout this report, and all times will be expressed in mountain daylight time (MDT).

Probable Contributing Factors

The Federal Railroad Administration's (FRA) investigation determined that even though both of the following conditions were still in minimal compliance with FRA's standards, the two conditions in coordination were contributing factors to this accident/incident. The contributing factors were the combination of a worn switch point (FRA cause code T314 switch point worn or broken) and a worn wheel flange on Railcar DTTC 727746, which was the first railcar to derail (FRA cause code E64C worn flange).

Probable Cause

FRA's investigation determined the probable cause of the June 27, 2016, derailment at Control Point G825 was a gapped switch point (FRA cause code T319 switch point gapped) that, combined with the worn wheel flange (FRA cause code E64C worn flange) and worn switch point (FRA cause code T314

switch point worn or broken), allowed the wheel to climb the left-hand switch point of the Peru, Wyoming west crossover and derail Railcar DTTC 727746 and 18 trailing double-stack cars. The switch point had an unprotected flat vertical surface of 5/16-inch $\frac{3}{4}$ -inch below the running surface of the left-hand stock rail.

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 Union Pacific Railroad Company	1a. Alphabetic Code UP	1b. Railroad Accident/Incident No. 0616DV016
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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. 0616DV016	
2. U.S. DOT Grade Crossing Identification Number		3. Date of Accident/Incident 6/27/2016	4. Time of Accident/Incident 6:00 PM	
5. Type of Accident/Incident Derailment				
6. Cars Carrying HAZMAT 33	7. HAZMAT Cars Damaged/Derailed 0	8. Cars Releasing HAZMAT 0	9. People Evacuated 0	10. Subdivision Evanston Subdivision
11. Nearest City/Town Green River		12. Milepost (to nearest tenth) 824.810	13. State Abbr. WY	14. County SWEETWATER
15. Temperature (F) 86 °F	16. Visibility Day	17. Weather Clear	18. Type of Track Main	
19. Track Name/Number Main Track Two		20. FRA Track Class Freight Trains-60, Passenger Trains-80		21. Annual Track Density (gross tons in millions) 69.5
				22. Time Table Direction West

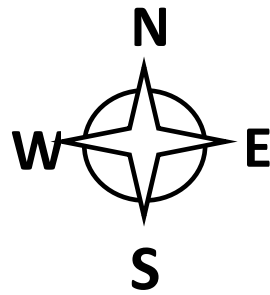
OPERATING TRAIN #1

1. Type of Equipment Consist: Freight Train					2. Was Equipment Attended? Yes			3. Train Number/Symbol KG1LAC 26				
4. Speed (recorded speed, if available) R - Recorded 39 MPH E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 8084		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, A</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.)		DTTC 727746		105		yes				0	0	
(2) Causing (if mechanical, cause reported)		NA		0				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	1	(1) Total in Equipment Consist	130	0	0	0	0	
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	19	0	0	0	0	
12. Equipment Damage This Consist 581020			13. Track, Signal, Way & Structure Damage 320063									
14. Primary Cause Code T319 - Switch point gapped (between switch point and stock rail)												
15. Contributing Cause Code E64C - Worn flange												
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: 4 Mins: 0		Hrs: 4 Mins: 0		
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 41.549465000				29. Longitude -109.592624000								

SKETCHES

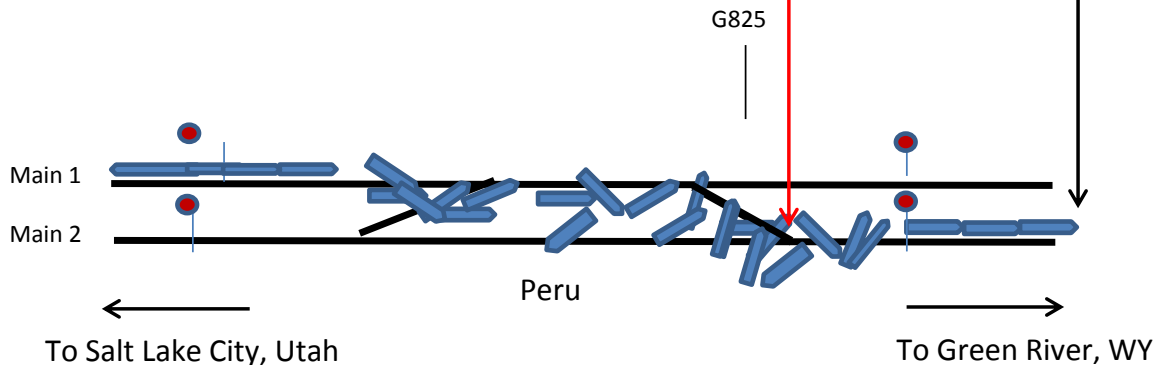
Sketch

HQ-2016-1142



Not to Scale

UP Train KG1LAC 26 was proceeding west on Main Track #2 and crossed over to Main Track #1 at the east crossover at Peru, Wyoming (Control Point CP825). The train crossed over at 39 MPH (in 40 MPH crossover), the three leading locomotives and 101 railcars made it through the crossover with the 102nd railcar derailing (DTTC 727746) causing a total of 19 railcars; cars 102 through 121 in consist to derailed.



NARRATIVE

Circumstances Prior to the Accident/Incident

On June 27, 2016, a UP train crew consisting of an engineer and a conductor, after having received a statutory off-duty (rest) period, reported for duty at 2:00 p.m., MDT. They reported for duty at their away-from-home terminal at UP's Green River Terminal in Green River, Wyoming. UP's Salt Lake City terminal is the home terminal for both crew members, and they were to be assigned a train to operate back to their home terminal.

The crew was originally called for Train KG3LB-26 but was swapped to Train KG1LAC-26 at 5:00 p.m. Train KG1LAC-26, an intermodal freight train consisted of three leading locomotives, a rear-end distributive power unit (DPU), 130 loaded double-stacked platforms in a mixture of single and articulated multi-well intermodal rail cars and no empties. The train was 9,525 feet in total length and consisted of 8,084 trailing tons. Per statements of the crew, who acknowledged the train's air brake inspection slip (record) located in the cab of leading Locomotive UP 8875, Train KG1LAC-26 had received an FRA Class I Extended Haul Brake Test at North Platte, Nebraska. After a job briefing the crew of Train KG1LAC-26 departed Green River, MP 817 on Main Track No. 2 westward.

Upon departing Green River, the Engineer was at the controls seated in the Engineer's seat on the north side of the locomotive and the Conductor was seated in the conductor's seat on the south side of the locomotive. The crew stated that they experienced no train handling problems and the trip was uneventful up to the time of the derailment.

The track in the vicinity of the accident/incident site is predominantly composed of rail sections of 133-pound continuous welded rail (CWR). The rail was laid in 1985. The rail is fastened to concrete ties and elastic fasteners on Main Track No. 2 approaching the east switch at Peru, Wyoming. Approaching the accident/incident site from the east the track is tangent. Measuring from the accident/incident site, it is approximately 1,400 feet headed east to the nearest curve and approximately 1,500 feet headed west to the nearest curve. The grade is .82-degree ascending on the one mile of track prior to accident/incident site and one mile after the accident/incident site the grade descends .82-degrees. The derailment of UP Train KG1LAC-26 occurred on the east crossover switch at Peru traversing from Main Track No. 2 to Main Track No. 1.

The geographic direction was west and the railroad timetable direction for the KG1LAC-26 was west. Timetable directions are used throughout this report.

The Accident/Incident

Upon approaching the Control Point (CP) at station Peru, Wyoming (CP-G825), the crew acknowledged receiving a diverging clear signal indication. The train proceeded through the east crossover switches at CP-G825 at a recorded speed of 39 mph as it traversed from Main Track No. 2 to Main Track No. 1. The authorized timetable speed through the crossovers at CP-G825, is 40 mph, per the instructions of UP's Salt Lake Area Timetable No. 5, effective 0900C Monday, December 7, 2015.

As the rear of the train was continuing to proceed through the east switch of the east crossover at MP 824.81, the crew suddenly experienced a non-engineer inducted emergency application of the train's air brake system. The Engineer immediately announced, via the radio, to UP's train dispatcher that their

train was in emergency after having experienced an undesired emergency (UDE) application of their train's air brake system. Meanwhile, the Conductor detrained and set six hand brakes on the head-end of their train. A short time later, a Sweetwater County, Wyoming Deputy Sheriff arrived and informed the crew that the rear portion of their train had derailed. The Deputy then drove the Conductor toward the rear of the train as far as possible until the wreckage blocked their way. The Conductor and Deputy got out of the vehicle and began to walk toward the rear of the train, while having to climb over wreckage to get to the rear of the train. Upon arriving at the rear of the train, the Conductor secured seven rail cars/platforms and the DPU locomotive that had not derailed. On further investigation, the Conductor was able to determine that the leading locomotives and 101 platforms had successfully traversed through the crossover with platform 102 (DTTC 727746), being the first platform to derail. It was later determined that a total of 19 platforms, sequences 102 - 121, had derailed in an accordion-style derailment.

Post-Accident/Incident Investigation

On June 28, 2016, the Federal Railroad Administration (FRA) began an investigation of this accident/incident. FRA's Region 8 management assigned a Track Safety Inspector as Investigator/Inspector-in-Charge (IIC) of this investigation. They also assigned an Operating Practices Inspector, a Motive Power & Equipment Inspector, and a Signal and Train Control Inspector to assist the IIC.

Upon commencing its investigation FRA's investigators inspected the accident/incident site, including the track approaching and the point-of-derailment, which FRA determined was on Main Track No. 2, at switch number 3B, of the east crossover. FRA also conducted a detailed inspection of all of the derailed rail cars, the east crossover switches, and associated signals at CP-G825.

After their on-site inspection and investigation FRA conducted interviews with the train crew members of UP's Train KG1LAC-26. FRA's investigators also requested and received all records, forms, and other documentation necessary to conduct their final analysis and draw conclusions concerning the pertinent facts of the accident/incident. The following analysis and conclusions, as well as any possible contributing factors and the probable cause in this report, represent the findings of FRA's investigation.

Analysis and Conclusions

Analysis-Post-Accident Toxicological Testing: This accident/incident met the criteria for Title 49 Code of Federal Regulations, Part 219, Subpart C, Post-Accident Toxicological Testing (Part 219).

Conclusion: The train crew was tested under Part 219 authority, and the test results were negative for both crew members.

Analysis-Crew Fatigue: FRA obtained fatigue-related information, including a 10-day work history, for the train crew members.

Conclusion: Upon analysis of the fatigue-related information with FRA's Fatigue Analysis Scheduling Tool (FAST) program, FRA concluded that fatigue was not probable for both crew members.

Analysis-Locomotive Event Recorder: FRA obtained and analyzed locomotive event recorder downloads from leading locomotive, UP 8875, of UP's Train KG1LAC-26.

Conclusion: FRA's analysis of the locomotive event recorder downloads concurred with UP's analysis; the speed of Train KG1LAC-26 when an UDE was initiated and the ensuing derailment occurred was 39 mph. Additionally, FRA's analysis noted no exceptions to improper train handling on the part of the train

crew.

Analysis-Locomotives and Rail Cars: FRA inspected the derailed rail cars for non-complying conditions.

Conclusion: During FRA's investigation, it was determined that the south wheel on the leading truck of platform DTTC 727746 (the first car to derail) had a worn wheel flange. Despite being worn, the wheel flange complied with FRA standards.

Analysis-Track and Track Appliances and Structures: FRA inspected the track, associated track appliances, and structures (switch, signals, etc.) at the point of derailment, which was determined to be on Main Track No. 2 at MP 824.81.

Conclusion: During its investigation into the accident/incident, FRA discovered that the initial derailment occurred on the reverse switch point of switch 3B at MP 824.81. Switch 3B is the east switch of the east crossover, located on Main Track No. 2, at CP-G825. FRA determined that the switch point was worn and that the switch point was gapped between the point and stock rail; however, both conditions complied with FRA standards. FRA was also able to determine that the switch point had been struck and that there were marks indicating that wheel climb had occurred at this location. FRA determined that the gapping of the reverse switch point of switch 3B, at CP-G825, enabled the worn wheel flange of platform DTTC 727746 to strike the switch point which then caused wheel climb on the leading truck of that platform and resulted in the ensuing derailment of platform DTTC 727746 and 18 trailing platforms.

Possible Contributing Factors

FRA's investigation determined that even though both of the following conditions complied with FRA's standards, the two conditions in coordination were contributing factors to this accident/incident. The contributing factors were the combination of a worn switch point (FRA cause code T314, switch point worn or broken) and a worn wheel flange on platform DTTC 727746, which was the first platform to derail (FRA cause code E64C worn flange).

Probable Cause

FRA's investigation determined that even though the probable cause of this accident/incident, a gapped switch point on switch 3B, still complied with FRA standards, that the gapped switch point, when coupled with the contributing factors of a worn switch point and a worn wheel flange, was the probable cause of this accident/incident. The gapping of the reverse switch point of switch 3B, at Control Point G825, enabled the worn wheel flange of platform DTTC 727746 to strike the switch point which then caused wheel climb on the leading truck of that car and resulted in the ensuing derailment of platform DTTC 727746 and 18 trailing platform. FRA's investigation determined the probable cause of this accident/incident was the gapped switch point of switch 3B's reverse switch point (FRA cause code T319 switch point gapped) between switch point and stock

rail.