NATIONAL TRANSPORTATION SAFETY BOARD

Office of Railroad, Pipeline and Hazardous Materials Investigations
Washington, DC

TRACK & ENGINEERING GROUP CHAIRMAN FACTUAL REPORT

DCA16FR005

Union Pacific Railroad Head-on Collision/Derailment with Injuries

Granger, Wyoming
March 14, 2016

Factual Report Prepared by: Date: April 16, 2016
R. A. Hipskind

Accident

NTSB Accident Number:	DCA16FR005
Date of Accident:	March 14, 2016
Time of Accident:	9:41 p.m. (MDT)
Railroad Owner:	Union Pacific Railroad (UP)
Train Operator:	UP (for both trains)
Type of Train and No:	EB Local LCK41 of the 14th
Crew Members:	1 Engineer, 1 Conductor, 1 Brakeman
Type of Train and No:	WB KG1LAC of the 13th
Crew Members:	1 Engineer, 1 Conductor
Injuries:	2
Location of Accident:	Granger, WY

Synopsis

On Monday, March 14, 2016, at about 9:41 p.m., mountain daylight time (MDT), westbound Union Pacific freight train KG1LAC of the 13th was diverted from main track 1 through a switch at the east end of the Granger siding and collided head-on with a standing eastbound Union Pacific local freight train LCK41 (stopped) on Union Pacific's Evanston Subdivision near Granger, Wyoming. The locomotives of the standing train were stopped about 1463' west of the east switch. The westbound freight, KG1LAC—13 was operating at 46 mph on the main track before making an unplanned departure from the main track 1 through a switch lined into the siding whereupon the engineer placed the train into emergency. Initial information from a review of the locomotive event recorder indicated that the impact speed was about 30 mph. The method of operation was normally a traffic control system, but the signal system was out of service (suspended) due to installation of a positive train control system. While the signal system was suspended in the area of the incident, train operations continued under flagging authority.

As a result of the collision, the three crewmembers of the eastbound train and two crewmembers of the westbound local train were transported to a medical facility for treatment of minor injuries.

Damage was estimated at $2.0 million. Environmental conditions were night, cloudy skies, light winds and a temperature of 20° F.

Parties to the investigation include the Federal Railroad Administration (FRA), Union Pacific Railroad (UP), Brotherhood of Locomotive Engineers and Trainmen (BLET), Sheet Metal and Rail Transportation (SMART) and Brotherhood of Maintenance of Way Employes (BMWED).

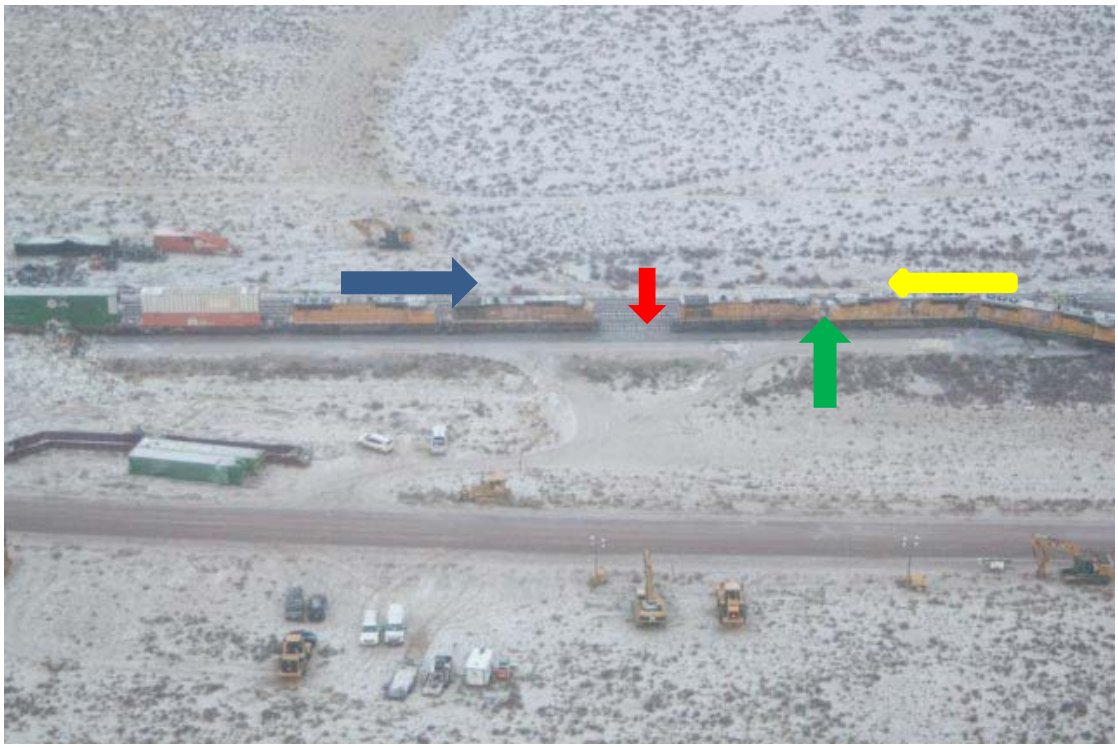

Figure 1. This is an aerial view on March 15, 2016, looking south at the derailment area. The red downward arrow identifies the point of collision (impact); the yellow arrow shows the position and EB direction of travel of the stopped local train, LCK41; the blue arrow identifies the WB direction of travel of the striking train; the green upward arrow identifies the "as found" position of the locomotives. Note: the striking train moved the stopped train about 246' west.

Circumstances Prior to the Accident

Eastbound (EB) Train LCK41 of the 14th (local train):

On Monday, March 14, 2016, a UP train crew, consisting of an engineer, a conductor and a brakeman, reported for duty at 2:00 p.m. MDT at Kemmerer, Wyoming. The crew took charge of a train LCK41 of the 14th (LCK41). According to Union Pacific documentation, the train consisted of two locomotives, 45 loads of coal and no empties. After completing a brake test and review of orders, the crew departed eastbound. The total train length was 2,430 feet and about 6,345 trailing tons.

Westbound (WB) Train KG1LAC 13 (intermodal freight train):

The KG1LAC--13, an intermodal freight train, with a UP train crew that consisted of an engineer and a conductor, reported for duty at Green River, WY at 7:30 p.m. MDT. The crew took charge of the train and departed westbound. The westbound train originated at Chicago, Illinois (Global 1 Yard) and was destined for Los Angeles, CA.

The intermodal train consisted of 3 locomotives, 129 loads and no empties. The train was 9,104' in total length with 8,171 trailing tons.

Accident Narrative

Train movement:

Both trains had no car restrictions and both trains were authorized to operate at authorized track speed, which was 49 mph for movement on either main track in the vicinity of Control Point (CP) Granger due to the suspension of the signal system and 30 mph on the Granger Siding.[1] The Evanston Subdivision is predominantly a 70 mph territory between milepost (MP) 817.3 and MP 993.6 with permanent speed restrictions listed in Timetable No. 5 for the Evanston Subdivision.

Upon departing their respective crew reporting locations, both trains proceeded toward their destinations. As both trains arrived at the Granger Siding area with the westbound train routed to take a "main 1 to main 1" route at the east end of "long siding", according to the dispatcher[2].

Prior to the arrival of the intermodal train, train LCK41 had traveled the Pocatello Subdivision and entered the Granger Siding at MP 846.81, which is located near the west end of the siding inside or east of the west end CP. After entering the siding, the local was waiting for the westbound intermodal train to clear the east switch before moving eastward. The engineer of the local stopped the local train about 1,600' west of the east clearance point at the east end of the siding before the intermodal was making its approach to the east end (See diagram No. 1 on next page). As the westbound intermodal train proceeded into CP 844, or the east end of Granger Siding, it suddenly diverted from main track 1 into the Granger Siding at about 46 mph. A review of recorder data indicated that the engineer placed the train into emergency immediately; however, the westbound proceeded westward and collided with the standing local train. Prior to the collision, the three crewmembers of the local rapidly departed the locomotive to safety. Both crewmembers of the intermodal train remained on board until the collision (impact).

1 Granger siding is 13,456' long and locally is known as the "long siding."
2 A more detailed examination of the dispatcher to employee in charge (EIC) is available in the Operations Group Chairman Factual Report.

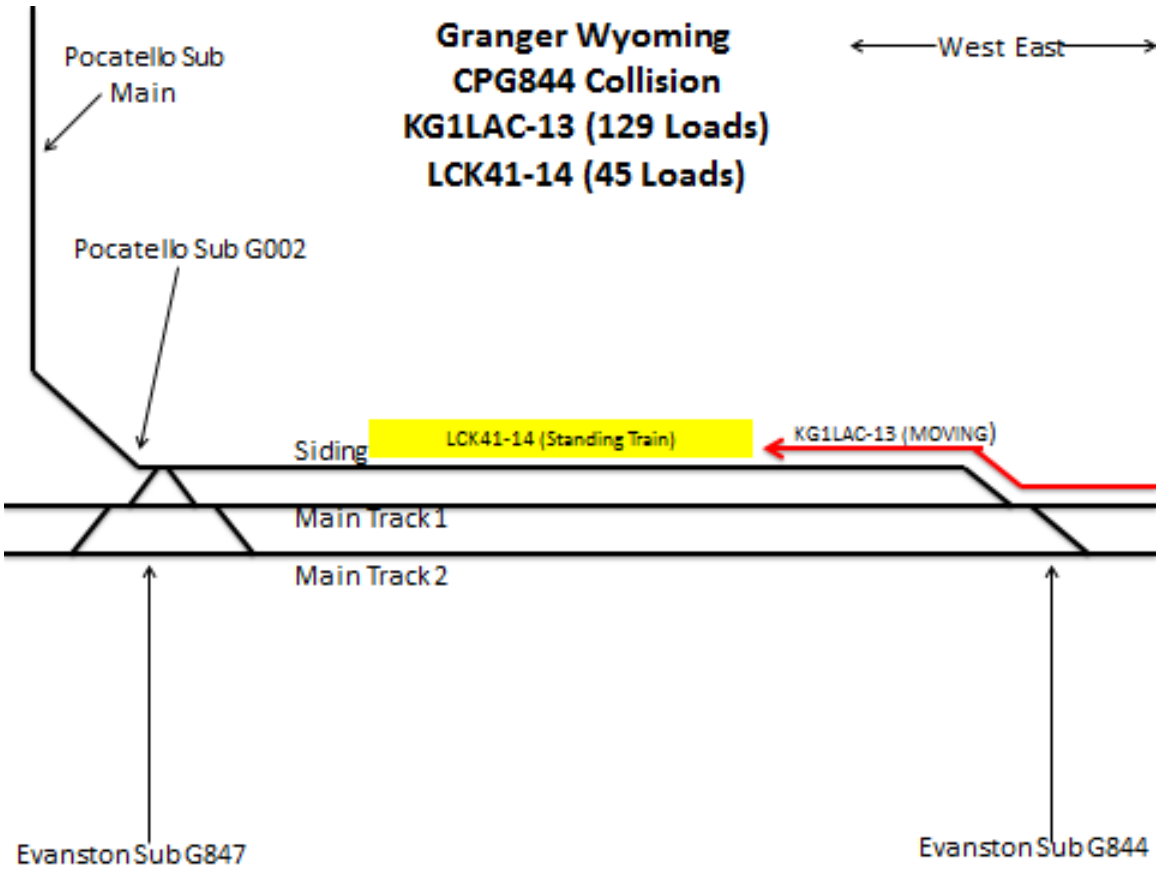

Diagram No. 1. Track layout in the Granger vicinity. The yellow highlighted area represents the track occupation of the local train. The red highlight represents the direction of travel the westbound train and its routing.

Post-accident Investigation

Track Description:

On this portion of the UP, the Evanston Subdivision consists of two main tracks between MP 816.9 (Green River) and MP 936.2. UP officials indicated they operate on average 50 trains daily on the Evanston Subdivision in the Granger area. According to UP documentation, the 2015 total combined tonnage figure for main track 1 and 2 was 134 million gross tons (MGT).

UP inspects and maintains the main tracks on this portion of the Evanston Subdivision to Federal Railroad Administration (FRA) Track Safety Standards (TSS) for Class 5 track , which allows for a maximum operating speed of 80 mph for freight trains and 90 mph for passenger trains (passenger do not typically operate on the Evanston Subdivision, but occasionally and only if and when a detour is authorized). UP inspects

and maintains the Granger Siding for FRA Class 3 track, which allows for a maximum operating speed of 40 mph for freight and 60 mph for passenger trains; however, UP restricts the operating speed on the siding to 30 mph.

There was track structure damage in the immediate area of the impact (collision) and derailed equipment. Derailed cars and lading prevented initial detailed inspection for the immediate area of impact. Post accident observations by investigators disclosed that the track construction consisted of 133 pound RE, continuously welded rail[3] (CWR). The rails were predominantly 133 pound RE controlled cooled rail manufactured by Colorado Fuel and Iron (CF&I) in the 1970's (1973). The CWR that was installed was seated in 14 by 8 inch double shoulder tie plates that lay between the bottom surface of the rail and the top surface of timber crossties. The rail was fastened through the tie plates to standard wooden crossties with conventional six inch cut track spikes. The present day spiking pattern used by UP prior to the derailment consisted of two rail-holding spikes on the gage side of the rail with and additional anchor spike; one rail holding and one anchor spike on the field side.

Figure 2. This is a view looking east at the intermodal train derailed cars.

3 Continuous welded rail (CWR) means rail that has been welded together into lengths exceeding 400 feet.

Point of Impact (POI):

Investigators observed and photographed an area where locomotive debris from the locomotives impact area was present in the gage of the siding. Investigators formed a consensus that this location indicated the point of impact (POI)[4]. Investigators also determined that the POI was at MP 844.25, which is about 1,463' from the east end of the entrance to the siding or about 1,122' from the clearance point of the siding at the east end.[5]

Figure 3. This is a view looking south at collision of two locomotives.

On March 17, 2016, investigators inspected and photographically documented the No. 20 turnout (a right hand switch[6]) switch point area located at MP 844.02 on the main track that provides access to the siding. No exceptions were noted.

4 Investigators agreed that the striking train had shoved the standing train westward about 246'.
5 The clearance point refers to a location on the siding where the distance between the center of the side track and the center of the main track measure 13' apart, or identified as "track centers". A train passing by the clearance point towards the switch would be said to be in the foul of the main track, hence stopping short of the clearance points places a train "in the clear".
6 As one stands facing a set of switch points, how the turnout rails bend, either to the left or the right, determines whether the switch is referred to as "a left hand" or "a right hand" switch.

Table 1. Distances traveled by striking train

Location (Start)	Milepost	Location (To)	Distance (feet) from POS	Comments
E. Granger (POS)[7]	844.02	POF[8] 155.8	155.68	Start point
E. Granger (POF)	844.05	Clearance point(13') 185.15'	340.83	
E Granger (clear pt. 13')	844.08	POI 1,122.48	1,463.31	
Point of Impact	844.30	Head of train[9] 246.55	1709.86	"As found"
Head end of EB Train at rest	844.34	End of survey 5500.76	5500.76	End of survey
End of survey	845.39		7210.62	Total Feet

Figure 4. This is a view looking west at CP 844 and the east switch or entrance into Granger Siding.

7 POS refers to the point of switch, a location at the end of the switch point for the West Switch at Granger siding.
8 POF refers to the point of frog, a location at the transition point that allows train movement to continue into the siding provided the switch have been reversed to route the train accordingly.
9 The at rest position of the head end of the local reflects the distance shoved west by the striking train.

Damages:

UP engineering personnel conveyed that the damages for engineering were $25,518. This figure included costs for the installation of track panels[10], associated ballast and on-track materials and renewal of the CWR. This figure does not include additional costs associated with environmental remediation efforts.

UP estimated the total damages for the accident at about $2.0 million which included costs for the track structure damage mentioned above and all other derailment related costs typically complied for FRA reporting purposes, but does not include environmental remediation.

Post Accident Inspection

Testing of Track:

On March 17, 2016, track measurements were taken on the west side of the derailment footprint at 19 locations (stations) on 15-foot 6-inch intervals. The track had not been repaired and tamped before investigators arrived; the track field notes measurements reflect the gauge and crosslevel measurements only. An assessment of the alignment and surface conditions was reviewed in the track geometry test records section of this report and visual observations by investigators.

Figure 5. This is a view looking east at the area where the track field measurements were taken.

10 UP uses pre-built 40 foot track panels.

The track field notes inspection noted:

- The maximum measurement allowed for gage in FRA Class 3 track, which allows for a maximum authorized speed of 40 mph for freight and 60 for passenger trains, is 57 ¾ inches. Track notes recorded that the widest gage was 56 3/8 inches; or 1 3/8 of an inch under the FRA maximum allowable limit on the west side of the derailment. Track notes recorded that the widest gage was 56 ½ inches; or 1 ¼ of an inch under the FRA maximum allowable limit on the east side of the derailment.

- The maximum measurement allowable for crosslevel in FRA Class 3 track is 1¾ inches. Track measurements for the west side of the derailment found that the highest crosslevel measurement was 3/8 of an inch, or 1 3/8 inches under the maximum allowable. The highest value of crosslevel for the track measurements on the west side of the derailment was ½ of an inch or 1 ¼ inches under the maximum allowable.

[Note: See Appendix A that contains tables detailing the specific track measurements.]

The above two measured sections of track (where the field notes were taken) were the last segment of track that each respective UP train traveled over prior to the POI on March 14, 2016. Investigators' post-accident inspection from the west end of the derailment walking east from the west end of the undisturbed track toward the east switch of Granger Siding found there were no visual exceptions. From the beginning of the undisturbed track near milepost 844.2 (the east switch of the siding) no exceptions were noted and these observations are noted in the walking track inspection.

Geometry Tests:

UP last operated a geometry car to test main track 2 on the Evanston Subdivision on October 20, 2015. On October 19, 2015, the same geometry car tested main track 1. The Granger Siding last received a geometry test on May 7, 2013. No exceptions were noted in the vicinity of the impact.

Internal Rail Test Dates:

Investigators requested the last ultrasonic internal rail test data conducted by UP. According to UP documentation[11] provided, a rail flaw detection test car operated and tested rail on the Evanston Subdivision main track 1 on March 4, 2016, and main track 2 on March 7, 2016. UP last tested the Granger Siding for rail flaws on January 12, 2016. During the last internal rail flaw inspection for the siding, there were no defective rails marked in the immediate area of the POI or throughout the derailment footprint.

11 The investigative team requested test data for the last ultrasonic rail flaw detection from milepost 839 to 847.

Inspection Records

Track Inspection Records:

FRA regulations found in 49 CFR 213 require that a rail carrier's track inspection records be prepared and signed on the day of the inspection for frequency of compliance with the Federal Railroad Administration Track Safety Standards (FRA/TSS). FRA track inspection records are required to reflect actual field conditions and deviations from the FRA/TSS. The gross annual tonnage on the Evanston Subdivision does exceed 10 million gross tons annually. For the main tracks, UP has elected to operate at FRA Class 5 speeds requiring UP personnel to inspect the main track at least twice per calendar week. The siding is FRA Class 3 and it is required to be inspected weekly.

As part of the investigation, a qualified FRA track safety inspector conducted an inspection of UP's track inspection records to determine compliance of UP track and rail flaw inspection records with FRA regulations. The records review did not disclose any exceptions for the siding or main tracks or rail flaw detection remedial actions.

Last UP Track Inspection:

The track in the area of the derailment was last inspected on March 5, 2016, by a FRA qualified UP track inspector. Main track 1 was last inspected on March 14, 2016; main track 2 was last inspected on March 12, 2016. No exceptions were noted for the area of the impact and derailment footprint.

UP Program Maintenance Work Prior to the Derailment:

According to UP officials, the following are the most recent program maintenance activities for the tracks in the vicinity of the Granger siding:

- Last rail laid on main track 1---1981
- Last rail laid on main track 2---1984
- Granger siding rail laid----1991
- Last crosstie and surfacing for main tracks 1 & 2 and Granger siding---2011

Parties to the Investigation - Acknowledgment Signatures

The undersigned designated *Party to the Investigation* representatives attest that the information contained in this factual report for the head-on collision of two Union Pacific trains on March 14, 2016, at Granger, WY, is a factually accurate representation of the information collected during the investigation, to the extent of their best knowledge and contribution in this investigation.

_____//s//_____ Date __4-18-16__

Richard A. Hipskind, NTSB

_____//s//_____ Date __4-18-16__

James E. “Butch” Moeller, UP

_____//s//_____ Date __4-18-16__

Anthony Moler, FRA

_____//s//_____ Date __4-18-16__

Mike Gekas, BMWED

Appendix A

The following are the track field notes and measurements taken by investigators on the Granger Siding on March 17, 2016. This was the area of the approach for the

LCK41 before it stopped.

STATION[12,13,14]	GUAGE[15]	CROSSLEVEL[16]	RAIL SIDE[17] (L/R)	COMMENT
-1	56 ¼”	-3/8”	L	
0	56 ¼”	-1/4”	L	
1	56 ¼”	-3/8”	L	
2	56 1/8”	-1/4”	L	
3	56 ¼”	-3/8”	L	
4	56 ¼”	-3/8”	L	
5	56 ¼”	-3/8”	L	
6	56 5/8”	-1/16”	L	
7	56 ¼”	-1/16”	R	
8	56 3/8”	0		
9	56 ¼”	-1/16”	R	
10	56 1/8”	0		
11	56 ¼”	0		
12	56 ¼”	-1/16”	R	
13	56 3/8”	0		
14	56 ¼”	-1/8”	R	
15	56 3/8”	-1/16”	R	
16	56 ¼”	-1/16”	R	65/65 speed sign between station 17 & 18 on south side of Granger siding.
17	56 ¼”	-1/8”	R	

The following are the track field notes and measurements taken by investigators on the Granger Siding on March 17, 2016. This was the area of the approach for the

12 Milepost numbering increases as station numbering increases.
13 Station “-1” starts 258.8’ east from point of impact (POI).
14 Station numbering were assigned traversing east from POI
15 Gauge and crosslevel were static measurements (not under load).
16 Crosslevel value is assigned on either “L” or “R”.
17 “L” refers to the left rail and “R” is the right rail when facing east.

KG1LAC--13 before it collided with train LCK41.

STATION[18,19,20]	GUAGE[21]	CROSSLEVEL[22]	RAIL SIDE[23] (L/R)	COMMENT
0	56 ¼”	-1/4”	R	
1	56 ¼”	-1/4”	L	
2	56 1/2:”	0		
3	56 ½”	-1/2”	R	
4	56 3/8”	-1/4”	L	
5	56 ¼”	0		
6	56 ¼”	-1/8”	L	
7	56 3/8”	-3/8”	R	
8	56 ¼”	-1/16”	R	
9	56 1/4”	-1/8”	R	¼ Mile Marker @ station 9 on south side of Granger siding
10	56 ¼”	-3/8”	R	
11	56 3/8”	-1/8”	R	
12	56 3/8”	-1/4”	L	
13	56 3/8”	-1/8”	L	
14	56 3/8”	-3/8”	R	
15	56 3/8”	-1/2”	R	@ Station 15 debris started going West.

18 Milepost numbering decreases as station numbering increases.
19 Station “0” starts 21’ 5/8” west from POI.
20 Station numbering was assigned traversing west from POI.
21 Gauge and crosslevel were static measurements (not under load).
22 Crosslevel value is assigned on either “L” or “R”.
23 “L” refers to the left rail and “R” is the right rail when facing east.