



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

***Accident Investigation Report  
HQ-2019-1344***

***Union Pacific Railroad Company (UP) Derailment  
Wells, Nevada  
June 19, 2019***

***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 Wednesday, June 19, 2019, at approximately 9:49 a.m., PDT, westbound Union Pacific Railroad Company (UP) freight train MNPRV-17 (Train 1) derailed 27 cars at approximately Milepost (MP) 611.25 on UP's Lakeside Subdivision. The derailment occurred approximately 5 miles east of Wells, Nevada, while Train 1 was traveling 38 mph on Main Track No. 1, while descending a 1-percent grade. The train consisted of three locomotives on the head-end and two mid-train Distributed Power Units (DPU), 120 loads, and 56 empties, totaling 16,501 trailing tons; it was 11,866 feet in length.

No injuries to employees, or the public were reported because of the derailment. Damages were estimated at \$918,075 for equipment and \$322,974 for track.

Elko County (Nevada) Sheriff's Office kept non-essential personnel away from the derailment as a precaution due to a breached derailed covered hopper, UTCX 53643, at position 79 in the train, releasing non-hazardous aluminum oxide powder onto the ballast. Additionally, Train 1 was carrying 20 cars laden with military ordnance at the rear of the train, none of which had derailed.

Nevada Highway Patrol ordered interstate highway I-80 closed immediately after the train derailment was reported. The highway runs adjacent to the railroad tracks on the south side, and remained closed from approximately 10:31 a.m. to 12:08 p.m., which affected a significant amount of automobile traffic that required re-routing to alternate roads.

Weather at the time of the accident was daylight and clear with a temperature of 46° F.

The Federal Railroad Administration (FRA) investigation determined the probable cause of the incident was H504 -- buffing or slack action excessive, train makeup.

**TRAIN SUMMARY**

1. Name of Railroad Operating Train #1 Union Pacific Railroad Company	1a. Alphabetic Code UP	1b. Railroad Accident/Incident No. 0619NC050
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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. 0619NC050
2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident 6/19/2019	4. Time of Accident/Incident 9:49 AM
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 UNION PACIFIC RAILROAD C
11. Nearest City/Town Wells	12. Milepost (to nearest tenth) 611.25	13. State Abbr. NV
		14. County ELKO
15. Temperature (F) 46 °F	16. Visibility Day	17. Weather Clear
		18. Type of Track Main
19. Track Name/Number Main Line 1	20. FRA Track Class Freight Trains-40, Passenger Trains-60	21. Annual Track Density (gross tons in millions) 21.2
		22. Time Table Direction West
23. PTC Preventable No	24. Primary Cause Code [H504] Buffing or slack action excessi	25. Contributing Cause Code(s)

**OPERATING TRAIN #1**

1. Type of Equipment Consist: Freight Train					2. Was Equipment Attended? Yes			3. Train Number/Symbol MNPRV-17			
4. Speed (recorded speed, if available) R - Recorded 38.0 MPH E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 16501		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, D, J</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.)		DRGW 50836	62	no				0	0		
(2) Causing (if mechanical, cause reported)				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	2	0	0	(1) Total in Equipment Consist	120	0	56	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	8	0	19	0	0
12. Equipment Damage This Consist 918075			13. Track, Signal, Way & Structure Damage 322974								
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: 5 Mins: 18		19. Conductor Hrs: 5 Mins: 18	
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 41.107035000				27. Longitude -114.903165000							

**SKETCHES**

Sketch - Sketch Wells, NV

MP 794688	empty	(59 <sup>th</sup> from head end)
SSW 28721	empty	(60 <sup>th</sup> from head end)
SP 691719	empty	(61 <sup>st</sup> from head end)
DRGW 50836	empty	(62 <sup>nd</sup> from head end)
CGFX 213	empty	(63 <sup>rd</sup> from head end)
CGFX 204	empty	(64 <sup>th</sup> from head end)
CGFX 1250	empty	(65 <sup>th</sup> from head end)
SSW 67784	empty	(66 <sup>th</sup> from head end)
ARMN 111220	empty	(67 <sup>th</sup> from head end)
TTZX 856883	empty	(68 <sup>th</sup> from head end)
UP 273625	empty	(69 <sup>th</sup> from head end)
TTZX 861572	empty	(70 <sup>th</sup> from head end)
UP 273753	empty	(71 <sup>st</sup> from head end)
TTZX 863837	empty	(72 <sup>nd</sup> from head end)
TTZX 84898	empty	(73 <sup>rd</sup> from head end)
TTZX 862147	empty	(74 <sup>th</sup> from head end)
TTZX 865775	empty	(75 <sup>th</sup> from head end)
TTZX 86388	empty	(76 <sup>th</sup> from head end)
TTZX 84856	empty	(77 <sup>th</sup> from head end)
SHQX 9612	load/fatty acid	(78 <sup>th</sup> from head end)
UTCX 53643	load/alumina powder	(79 <sup>th</sup> from head end)
CEFX 53968	load/alumina powder	(80 <sup>th</sup> from head end)
UTCX 51013	load/alumina powder	(81 <sup>st</sup> from head end)
UTCX 49177	load/alumina powder	(82 <sup>nd</sup> from head end)
BKTY 154913	load/lumber plywood	(83 <sup>rd</sup> from head end)
PULX 773116	load/vegetable oil	(84 <sup>th</sup> from head end)
TILX 291727	load/vegetable oil	(85 <sup>th</sup> from head end)

HQ-2019-1344  
Wells, NV  
06/19/19  
9:48 a.m. PDT

Not to Scale

DPU Locomotive No. UP 4609 (2 total mid-train DPU's locomotive behind 78<sup>th</sup> car from the head end of train )

27 derailed cars (59<sup>th</sup> – 85<sup>th</sup> from head-end of train)

Lead Locomotive No. UP 6917 (3 total head-end locomotives)


MNPRV-17 Direction of Travel - Timetable West

UP Lakeside Subdivision, Milepos  
**41°06'25.3"N 114°54'**  
(41.107035, -114.903165)

58 head non-derailed cars

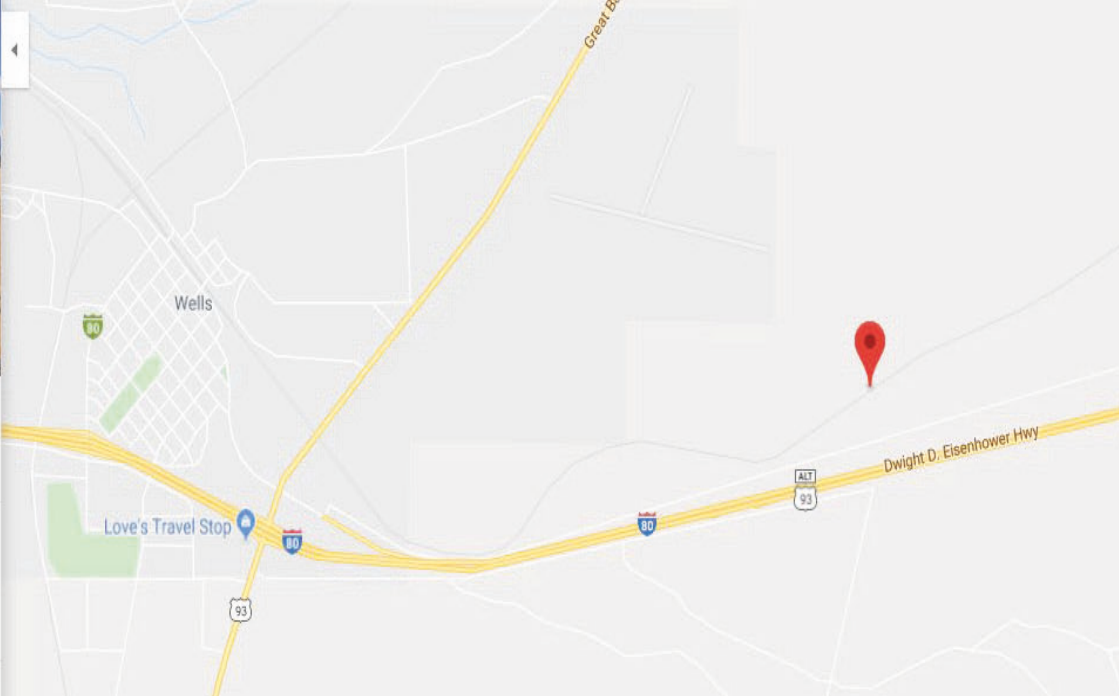


☰ 41.107035, -114.903165 🔍 ✕



41°06'25.3"N 114°54'11.4"W  
41.107035, -114.903165

[Directions](#) [Save](#) [Nearby](#) [Send to your phone](#) [Share](#)



**NARRATIVE**

For clarity and uniformity in this report, directions will be given per timetable directions for east and west and times will be given in Pacific Daylight Time (PDT) unless otherwise indicated.

**CIRCUMSTANCES PRIOR TO THE ACCIDENT**

Union Pacific Railroad Company (UP) westbound freight train MNPRV-17 (Train 1) consisted of 3 head-end locomotives, 2 mid-train distributed power (DP) locomotives located 99 cars from the head end, 120 loaded cars, and 56 empty cars. It was 11,866 feet long and had 16,501 trailing tons. Train 1 was an extended haul train that originated in North Platte, Nebraska, after receiving a class I brake test and pre-departure mechanical inspection by qualified mechanical inspectors.

The crew of Train 1, a locomotive engineer and conductor, went on duty at 3:30 a.m., Wednesday, June 19, 2019, at Ogden, Utah. Ogden was the home terminal for both employees, who had received their statutory, required off-duty time prior to reporting for duty. The crew was assigned to operate from Ogden to Elko, Nevada, 225 rail miles apart. Train 1 departed Ogden at 4:55 a.m.

As Train 1 approached the accident area, the Engineer was seated on the north (right) side of the lead locomotive at the controls, and the Conductor was seated on the south (left) side.

The accident occurred on the UP Lakeside Subdivision, where the method of operation is by signal indication of a Traffic Control System (TCS), on double main track, controlled by a UP train dispatcher located in Omaha, Nebraska. Per UP's Lakeside Subdivision Timetable No. 5 dated December 7, 2015, the maximum authorized timetable speed for westbound traffic in the accident area is 40 mph.

Due to the length of the train, the engineer had to use a balance of air brakes and dynamic brakes to control the train. Air brakes alone would stall out the train due to the number of brakes in the train, and full dynamic brakes could not control the speed due to the tonnage.

The track through the accident area consists of Continuous Welded Rail (CWR) on hardwood ties with double-shoulder tie plates and six-inch spikes. The rails on the tangent track are 136-pound, RE profile rail, manufactured in 1979. The rail lays on the double-shoulder ties plates that have a 6-inch-wide base and are 14 inches long, secured by four, 6-inch-long cut track spikes to fasten the rail to the plate (two rail-holding and two anchor spikes, one in each quadrant of the plate). The tie plates rest on treated 8-inch by 9-inch hardwood ties that are 8 feet 6 inches long and average spacing of 19 ½ inches between tie centers. The track ballast is crushed granite. The tie cribs appear to be full with an average of 12 inches of shoulder ballast.

Approaching the accident site from CP Moor Milepost (MP) 617.6, Train 1 entered a 1.4-percent descending grade with the train traversing multiple left- and right-hand curves at any one time. Interstate



highway I-80 runs adjacent to the track on the south side. The geographic and timetable direction for the train were west. Timetable directions are used throughout this report.

Weather at the time of the accident was daylight and clear with a temperature of 46° F.

## **THE ACCIDENT**

Train 1 was traveling west at a recorded speed of 38 mph with maximum dynamic brake and automatic brake fully released. The Engineer made a minimum service brake application just prior to the derailment at 9:49 a.m., at MP 611.25. Train 1 then experienced an undesired emergency (UDE) application of the air brakes that stopped the train.

The derailed cars were positioned 59 to 85 from the front of the train, none of which contained hazardous materials. No injuries were reported and no hazardous materials were released although non-hazardous aluminum oxide powder was released onto the ballast.

No injuries to employees or the public were reported because of the derailment. Damages were estimated at \$918,075 for equipment and \$322,974 for track.

Elko County (Nevada) Sheriff's Office arrived and set up a command post. Non-essential personnel were kept away from the derailment as a precaution due to a breached derailed covered hopper, UTCX 53643, at position 79 in the train, releasing non-hazardous aluminum oxide powder onto the ballast. An additional factor in limiting the non-essential personnel from the scene was the train consist showed 20 cars laden with explosive materials consisting of military ordnance at the rear of the train, positions 131 to 150 from the front of the train, none of which had derailed.

Nevada Highway Patrol ordered interstate highway I-80 closed immediately after the train derailment was reported. The highway runs adjacent to the railroad tracks on the south side, and remained closed from approximately 10:31 a.m. to 12:08 p.m., which affected a significant amount of automobile traffic that required re-routing to alternate roads.

## **POST-ACCIDENT INVESTIGATION**

On June 19, 2019, the Federal Railroad Administration (FRA) began an investigation of this accident. After the on-site inspection and investigation, FRA investigators requested all necessary event recorder downloads, dispatcher audio files, records, forms, and other documentation necessary to conduct the final analysis and conclusion concerning the facts of the accident. The following analysis and conclusions represent the findings of the FRA investigation.

## **ANALYSIS AND CONCLUSIONS**

Analysis - Operating Practices/Train Handling: FRA reviewed the event recorder from the lead locomotive (UP 6917) and the linked DP locomotive (UP 6440). At the time of the incident the train was



not Positive Train Control (PTC) or Trip Optimizer (TO) equipped due to a lead locomotive swap in Cheyenne, Wyoming, because of a damaged windshield on UP 7900. In Cheyenne, UP 7900 was swapped out with the second unit in the consist UP 6917 which was not PTC or TO equipped. Train 1 was running with DPUs in synchronous mode with the lead consist, and the engineer was using a balance of dynamic brakes and air brakes to control speed. At the time of the undesired emergency brake application, the engineer had just made a minimum service brake application as the train approached 38 mph on a descending grade. The maximum timetable speed for this territory is 40 mph.

The use of balanced braking results in the Engineer cycling between dynamic brakes and air brakes and can increase the buffing forces within a train. Due to the train's length the train was occupying multiple curves while also changing between ascending and descending grades simultaneously. FRA's investigation concluded the train handling was compliant with all carrier train-handling rules and federal regulation, and though buff forces were generated during braking, it was the amplification of these in-train forces due to train make-up which led to the wheel lift that derailed the first involved car, DRGW 50836.

An inspection of train crew records revealed all training, testing, certification and hours of service (HOS) requirements were in compliance.

Conclusion - Operating Practices/Train Handling: FRA determined the train handling to be appropriate for the train length and terrain. Train handling did not cause or contribute to the severity of the incident.

Analysis - Track: A post-accident track inspection was conducted and no defects were noted. This segment of track is inspected twice weekly by UP track inspectors and no defective conditions were noted on the most recent track inspection performed on June 18, 2019, the day prior to the derailment.

Conclusion - Track: FRA determined track conditions did not contribute to the cause or severity of the incident.

Analysis - Signal and Train Control (S&TC): A review of the signal data indicated no exceptions for the last three hot box detectors Train 1 traveled over prior to derailling; no exceptions noted on a review of signal trouble logs from Moor to Alazon MP 617.4 to MP 603.7; no exceptions noted on a review of all signal test records required from Moor to Alazon; and no exceptions noted on a review of the UP Dispatch CAD Log from Moor to Alazon for 12 hours prior and 12 hours after the derailment.

The UP Lakeside Subdivision is equipped with a PTC system; however, UP 66917, the lead locomotive of Train 1, was not equipped with PTC so it was not active. Despite not being PTC-capable, an active PTC system is unlikely to have prevented the derailment.

Conclusion - Signal and Train Control (S&TC): FRA determined the signal system did not contribute to the cause or severity of the incident.

Analysis - Motive Power and Equipment (MP&E): On June 17, 2019, at 4:10 p.m., CDT, an extended

haul Class I brake test and pre-departure inspection was conducted on Train 1 by UP qualified mechanical inspectors at North Platte, Nebraska, which consisted of 120 loaded cars and 56 empty freight cars at its originating terminal as disclosed by review of Air Brake Test Inspection Certificate. FRA noted a discrepancy in the written record for the Class I brake test notification slip retained in the lead locomotive cab. The written notation for the total number of freight cars inspected did not match the total number of cars placed in train as reported in the scheduled train summary. FRA determined this was a clerical error made by the UP mechanical inspector who performed the brake test and filled out the air slip. FRA then resolved the discrepancy by notifying the railroad and determined that all cars placed in the train had received the required air brake test prior to the train's departure from its originating terminal, North Platte, Nebraska.

All locomotives placed in Train 1 were inspected at the accident site and no defects were noted.

Conclusion - Motive Power and Equipment (MP&E): FRA determined the mechanical condition of the equipment did not contribute to the cause or severity of the incident.

Analysis - Fatigue: FRA uses an overall effectiveness rate of 72 or less for 80 percent or more of the time 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. Below this baseline, fatigue was 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.

FRA obtained fatigue-related information, including work history, for all train operating employees involved in this accident. Based on the Fatigue Audit InterDyne (FAID) analysis, fatigue was not probable for any of the crew members involved in the accident.

Conclusion - Fatigue: FRA determined fatigue did not contribute to the cause or severity of the incident.

Analysis- Train Make-up: Train 1 was a designated Key Train with 31 cars of explosive and flammable materials. The train was 176 cars, 16,501 gross tons and 11,866 feet in length in the following break out: 3 locomotives; 98 mixed-freight cars (57 loads, 41 empties), of which 56 were equipped with cushioned drawbars; 2 DPU locomotives; and 78 mixed-freight cars (64 loads, 14 empties), of which 18 were equipped with cushioned drawbars. At the time of the derailment, the train was in compliance with current UP train make-up rules.

In the block of 98 cars between the DPU locomotives and the head-end locomotives were 56 cars equipped with cushioned drawbars. The draft gear travel on these drawbars is 10 inches with some additional travel in component wear. Using 20 inches of travel as an average per cushioned-equipped car, a block of 56 cars can have up to 93 feet of free travel within that block of cars.

Additionally, the weight of the cars between the head-end locomotives and DPU locomotives was not distributed evenly. Behind the head-end locomotives there was a block of 41 cars averaging 108.8 tons per car; this was followed by a block of 36 cars averaging only 40.8 tons per car, and finally a block of 21

cars averaging 117.6 tons per car. As the head-end locomotives were retarding the train from the head end, the lighter block was being squeezed between the heavier blocks ahead and behind it, creating lift. Once the compression of the lighter block reached a point where the lift exceeded the weight of the cars, a wheel on DRGW 50836 was lifted up with the flange running across the rail in a span of less than 2 feet at the point of derailment.

Event recorder data shows the following timeline:

- 9:48:30 a.m., Train 1 was traveling 34 mph, when the Engineer began increasing the dynamic brakes. The increasing dynamic brake resulted in the head end of the train retarding the movement; this resulted in an increase of the buff forces caused by the rear of the train pushing towards the locomotives.
- 9:48:53 a.m., Train 1 was traveling 35 mph, with full dynamic brakes. The increase in speed demonstrates the retardation of the dynamic brakes on the locomotives was not sufficient to control the speed of the train alone. As the rear of the train continued to push into the locomotives, the in-train forces continued to rise.
- 9:49:16 a.m., Train 1 was traveling 38 mph, when the Engineer made a minimum service brake application. The application of the train air brakes was initiated from the head end, spiking the amount of in-train force. Contributing to the situation, the lighter block of 36 cars was also transitioning from a descending grade to an ascending grade, and traversing a 1-degree, 58-minute right-hand curve. With the variety of all those in-train forces, at that moment, DRGW 50836 was lifted from its normal running position on the rail and derailed.
- 9:49:18 a.m., the PCS valve opened on the DPU unit UP 6440, indicating a rapid loss of brake pipe pressure that started closer to the DPU locomotives than the head-end locomotives.
- 9:49:21 a.m., the PCS valve opened on the lead unit UP 6917 indicating the emergency brake application.

FRA noted following this incident, that UP had a similar derailment on the UP Caliente Subdivision, Rocky Mountain Service Unit. The train was 12,927 feet in length, 20,572 gross tons and traversing a 1.5-descending grade with multiple curves. A car in block of 44 auto-rack cars averaging 75 tons per car placed near the head third of the train was sandwiched between two heavier blocks of cars averaging 130 tons per car and derailed as a result of in-train buff forces. These auto-rack cars were cushioned drawbar-equipped.

In October 2019, UP issued a System General Order change to their train make-up instructions, requiring when mixed with other equipment, continuous blocks of 20 or more auto-rack cars must be placed in the trailing 5,500 tons of the train.

FRA agrees this change will reduce the in-train forces by limiting the trailing tonnage behind these types of cars which tend to average much lighter than loaded tank cars and covered hoppers and are subsequently cushion drawbar-equipped. However, by only addressing a car type, this change does not address the two common factors that may occur in other types of cars, which is light weight reducing the forces needed for wheel lift to occur and significant blocks of cushioned drawbar-equipped cars (other

than auto-racks) which allow for a greater range of free travel that will amplify buffing and slack action within a train.

Conclusion: FRA determined the train make-up was the probable cause of the incident. Cause code H504 -- buffing or slack action excessive, train makeup.

Analysis - Toxicological Testing: This accident met the criteria for Title 49 Code of Federal Regulations (CFR) Part 219, Subpart C, Post Accident Toxicological Testing. The train crew was tested under FRA guidelines for the use of alcohol and drugs. The results were negative for all train crew members involved in the derailment.

Conclusion - Toxicology Testing: FRA determined drugs and alcohol did not contribute to the cause or severity of the incident.

## **OVERALL CONCLUSIONS**

FRA investigators reviewed the crew's qualification, testing, train handling, condition of the track, signal and train control, and equipment, and determined each were excluded as contributing to the accident.

## **PROBABLE CAUSE AND CONTRIBUTING FACTORS**

The FRA investigation determined the probable cause of the incident was H504 -- buffing or slack action excessive, train makeup.

FRA did not identify any additional contributing factors.