



**SIGNAL & TRAIN CONTROL /
TRACK & ENGINEERING GROUP -
FACTUAL REPORT OF INVESTIGATION**

**Rear-End Collision between
Eastbound UP Freight Train MGRCY 04 and
Eastbound UP Freight Train MPCNP 03 near
Granite Canyon, Wyoming on
October 4, 2018**

RRD 19 FR 001

(7 Pages)

**NATIONAL TRANSPORTATION SAFETY BOARD
OFFICE OF RAILROAD, PIPELINE & HAZ-MAT INVESTIGATIONS
WASHINGTON, D.C. 20594**

**TRACK & ENGINEERING / SIGNAL & TRAIN CONTROL -
FACTUAL REPORT OF INVESTIGATION**

A. ACCIDENT

Type: Rear-End Train Collision
Date and Time: October 4, 2018 at 7:40 p.m. MDT
Location: Granite Canyon, Wyoming
Carrier: Union Pacific Railroad
Train #1: Eastbound Freight Train MGRCY 04
Train #2: Eastbound Freight Train MPCNP 03
Fatalities: 2
Injuries: 0

**B. TRACK & ENGINEERING / SIGNAL & TRAIN CONTROL -
INVESTIGATIVE GROUP**

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C. ACCIDENT SUMMARY

For a summary of the accident, refer to the Accident Summary in the docket for this investigation.

D. DETAILS OF THE INVESTIGATION

1. Signal & Train Control System

1.1 Description of Signal & Train Control System

The UP Laramie Subdivision¹ extends from MP 509.5 in Cheyenne, Wyoming to MP 682.8 in Rawlins, Wyoming in a timetable east-west direction. The maximum authorized timetable speed on both main tracks is 55 mph for freight trains and 70 mph for passenger trains between mileposts 509.5 and 565.3, and 70 mph for freight trains and 79 mph for passenger trains between mileposts 565.3 and 682.8. Permanent speed restrictions between posted mileposts are listed in the timetable. In the vicinity of the accident, the UP authorizes train movements with a Traffic Control System (TCS) supplemented with an Automatic Cab System (ACS) and enforced with a Positive Train Control System (PTC). Train movements are coordinated by a train dispatcher located at the Harriman Dispatch Center in Omaha, Nebraska. Train movements on the Laramie Subdivision are governed by operating rules, special instruction, timetable instructions, and the signal indications of the traffic control system and automatic cab system.

The signal system uses coded track circuits for train occupancy detection. Wayside signals are colorlight and searchlight signals with upper and lower signal heads capable of displaying green, yellow, and red aspects for train movements in either direction.

1.2 Signal System Data Logs

Field signal and train control equipment transmit data to the UP-dispatch center where it can be displayed on a dispatcher's terminal. The dispatch center CAD data logs and PTC data logs were downloaded.

Field signal and train control data logs for wayside signal locations between CP W528 and CP W530 were downloaded see Table 1. In addition, data from three wayside defect detectors in the vicinity of the point-of-collision were downloaded.

The main track 2 defect detector log at MP 557.9 (hot bearing, dragging equipment, high/wide and high wind detector) indicated train MGRCY-04 had 3 engines and 105 cars with 438 axles and a train length of 6,501 feet. The main track 1 defect detector log at MP 545.3 (hot bearing, dragging equipment, high/wide and high wind detector) indicated train MGRCY-04 had 4 engines and 104 cars with 438 axles and a train length of 6,404 feet. The main track 1 defect detector log at MP 534.7 (hot bearing, dragging equipment, high/wide and high wind detector) indicated train MGRCY-04 had 3 engines and 105 cars with 438 axles and a train length of 6,404 feet. No defect alarms were recorded at the three defect detector sites for train MGRCY-04. Table 2 is a summary of the data downloads from the defect detectors.

Table 1- Summary of UP Signal Data Logs

Time	Signal Location	Event
6:48:56	CP W530	Signal 2 requested clear for Train MPCNP-03
6:55:02	CP W530	Signal 2 indicates clear
6:56:43	CP W530	Track circuit 11 indicates occupied by Train MPCNP-03

¹ North Platte Area Timetable No. 5, effective December 11, 2017

6:57:32	CP W528	Signal 12 requested clear for Train MPCNP-03 (stacked request)
7:01:56	CP W528	Signal 12 indicates clear
7:04:04	CP W530	Signal 2 indicates stop Switch indicates normal OS indicates occupied by Train MPCNP-03
7:04:17	CP W528	Track circuit indicates occupied by Train MPCNP-03
7:07:04	CP W528	Signal 12 indicates stop Switch indicates normal OS indicates occupied by Train MPCNP-03
7:09:59	CP W530	Track circuit 11 indicates unoccupied by Train MPCNP-03
7:10:33	CP W530	Switch indicates normal OS indicates unoccupied by Train MPCNP-03
7:12:39	CP W530	Signal 2 requested clear for Train MGRCY-04
7:13:20	CP W528	Track circuit 12 indicates unoccupied by Train MPCNP-03
7:14:56	CP W528	Switch indicates normal OS indicates unoccupied by Train MPCNP-03
7:15:12	CP W530	Signal 2 indicates clear
7:28:23	CP W528	Signal 12 requested clear for Train MGRCY-04
7:29:03	CP W530	Track circuit 11 indicates occupied by Train MGRCY-04
7:37:29	CP W528	Track circuit 12 indicates occupied by Train MGRCY-04
7:37:29	CP W530	Signal 2 indicates stop Switch indicates normal OS indicates occupied by Train MGRCY-04
7:38:31	CP W528	Switch indicates normal OS indicates occupied by Train MGRCY-04
7:39:01	CP W530	Track circuit 11 indicates unoccupied by Train MGRCY-04
7:39:18	CP W530	Switch indicates normal OS indicates unoccupied by Train MGRCY-04
7:40:15	CP W528	Switch indicates normal OS indicates unoccupied by Train MGRCY-04
7:40:16	CP W528	Track circuit 12 indicates unoccupied by Train MGRCY-04
7:46:56	CP W528	Track circuit 12, track block requested Track circuit 13, track block requested
7:47:09	CP W528	Track circuit 12, track block indication Track circuit 13, track block indication

Table 2 – UP Defect Detector Data Logs

Defect Detector	Speed/Direction	Train	Time	Date
W559-2	13 mph Eastbound	MGRCY-04	5:38 pm	10-04-2018
W945-1	26 mph Eastbound	MGRCY-04	6:53 pm	10-04-2018
W534-1	21 mph Eastbound	MGRCY-04	7:26 pm	10-04-2018

1.3 Postaccident Signal System Examination and Testing

The postaccident investigation found all wayside signal equipment and appurtenances between CP W528 and MP 526.9 locked and secured with no indications of tampering or vandalism. Following the accident, UP railroad signal personnel sealed the CP W528 signal bungalow as requested by FRA and NTSB.

At CP W528, switch indication locking tests for main track crossover switches were conducted. No defects were noted during the examination. Track codes and color indications were also verified.

2. Description of Track

The Laramie Subdivision consists primarily of double main track territory between milepost 513 and milepost 544 and triple main track territory between 544 and 550 with passing sidings. In the accident area, the two main tracks are spaced with 13-foot 8-inch track centers. UP documentation indicates the 2017 total tonnage figure for each main track between milepost 519.11 and milepost 545.56 was about 125.8 million gross tons.

Eastbound freight trains traverse a descending grade ranging from .0 to 1.58 % beginning at milepost 540.49 to milepost 510. From milepost 530 to the point-of-collision at 527.2, trains are on a slightly descending grade of 1.55%. At milepost 527.5 on main track one trains traverse a one degree, 47 second left hand curve (in relation to direction of travel).

UP inspects and maintains the main track on this portion of the Laramie Subdivision to Federal Railroad Administration (FRA) Track Safety Standards (TSS) for Class 4 track, which allows for a maximum operating speed of 60 mph for freight trains and 80 mph for passenger trains. However, maximum authorized speed for this subdivision is 55 mph for freight and 70 mph for passenger trains, as designated in UP Timetable No. 5. UP does not operate any regularly scheduled passenger trains on the subdivision.

Significant track structure damage in the immediate area of the derailment prevented detailed inspection of an intact track structure in the disturbed track area. During post-accident observations indicate that the track construction consists of primarily 133-pound RE, continuously welded rail (CWR), controlled cooled and manufactured by CF & I. The CWR was seated in 16-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 spikes. The spiking pattern used by UP prior to the derailment consisted of a standard spiking pattern.

2.1 Postaccident Track Examination and Testing

On October 6, 2018 investigators conducted a walking inspection from the POC to MP 530.8. The FRA inspector completed an inspection report showing no defects noted in the derailment footprint.

2.2 Geometry Tests

UP operated a geometry car over the Laramie Subdivision on August 17, 2018. UP provided NTSB the requested data for milepost 510 to milepost 566. Data of that test show that the car began its inspection and measured the track structure, which included the portion of track east and west of the immediate derailment footprint. There were no

geometry defects noted from a review of the data within mileposts 522.11 to 528.75. No exceptions to the data were noted.

2.3 Internal Rail Tests Data

The Track Group reviewed the last two ultrasonic internal rail test data conducted by UP with detector car No. DC 48. According to UP's documentation that NTSB requested, DC 48 operated and tested rail on the main one track of the Laramie Subdivision beginning on August 22, 2018. During the last internal rail flaw inspection, there were no defective rails marked in the immediate area of the POC or throughout the derailment footprint.

2.4 Regulatory Track Inspection History

On August 22, 2018, an FRA track safety inspector conducted a routine walking/hyrail inspection that began in Cheyenne, WY at milepost 605.35 and ended at Laramie, WY at milepost 565.4 and that included the area through the derailment site. During this inspection, there were no defects noted in the accident area.

2.5 FRA Automated Track Inspection Program (ATIP)

FRA provided data from their last ATIP geometry test that occurred on November 1, 2017. The exception data indicates there were no class restrictive defects between mileposts 530.52 and 520.15, which includes the immediate and surrounding areas for this accident.

2.6 Track Inspection Records

FRA regulations in Title 49 Code of Federal Regulations, Part 213 require rail carrier track inspection records be prepared and signed on the day of the inspection for frequency of compliance with the FRA Track Safety Standards (TSS). FRA track inspection records are required to reflect actual field conditions and deviations from the FRA TSS. UP elected to operate at FRA Class 4 speeds requiring UP's personnel to inspect the main track at least twice per calendar week.

As part of the investigation, a qualified FRA track safety inspector conducted an review of the UP track inspection records for compliance with federal regulations. Track inspection records for one month (September 1, 2018 to October 4, 2018) between MP 519.09 to MP 545.58 on the Laramie Subdivision were reviewed.

- All twice weekly main track inspection frequencies were met
- All once weekly siding inspection frequencies were met
- All bi-weekly main track traversal frequencies were met
- Once monthly siding traversals were completed

The track in the area of the derailment was last inspected on October 3, 2018 by a FRA qualified UP track inspector. The track inspection record noted no defects between milepost 519.09 to milepost 545.58, an area that includes the derailment footprint.

3. Postaccident Estimate of Damages

UP engineering personnel estimate initial damages for engineering damages are \$186,352. The estimate includes costs for the installation of 36 track panels², associated

² UP uses pre-built 40-foot track panels.

ballast and on-track materials and renewal of the CWR. This does not include additional costs associated with environmental remediation efforts.

The signal system damages are estimated at \$4,000.

TRACK & ENGINEERING / SIGNAL & TRAIN CONTROL GROUP
END OF FACTUAL REPORT
