



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

***Accident Investigation Report
HQ-2018-1262***

***BNSF Railway (BNSF)
Oswego, Montana
Saturday, April 7, 2018***

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 April 7, 2018, at approximately 6:08 a.m., MDT, westbound BNSF Railway (BNSF) loaded unit grain train G-DRATAC-9-05H derailed 30 loaded covered hopper cars. The derailed cars were in train consist positions 72 through 101. The train was operating at a recorded speed of 52 mph at the time of the derailment. The derailment occurred near the town of Oswego, Montana, which is located at Milepost (MP) 239.2 on the single main track of BNSF's Glasgow Subdivision of the Montana Division. Oswego is approximately 196 miles east of Havre, Montana. The initial derailment occurred at MP 237.1, followed by an ensuing general pile-up of cars at MP 237.8.

The derailment resulted in 28 of the 30 derailed cars (in derailed positions 2 through 29) derailing on their sides in an accordion-style derailment. Two of the derailed cars (in derailed positions 1 and 30) derailed in an upright position. The train consisted entirely of loaded grain (corn) cars, and there was a release of corn onto the ballast.

BNSF reported \$1,524,279 in equipment damages and \$961,881 in track, signal, way, and structure damages -- for a total of \$2,486,160 in reported damages.

The BNSF's Glasgow Subdivision is an Amtrak route, and there were delays to Amtrak trains No. 7 and No. 8. Amtrak instituted a bus bridge (a temporary system of shuttle buses) to transport passengers around the accident site.

The crew from the G-DRATAC-9-05H was not injured, and no civilian injuries were reported. No hazardous materials were released, and no evacuation ensued.

At the time of the accident, it was dawn, clear, with winds from the east-northeast at 10 mph, and the ambient temperature was 12° F.

The Federal Railroad Administration's (FRA) investigation determined the probable cause of the accident was a shattered rim on the R1 wheel of rail car BNSF 472359. FRA Accident/Incident Code: E61C - broken rim.

FRA did not identify any possible contributing factors to this accident.

TRAIN SUMMARY

| | | |
|--|-----------------------------|---|
| 1. Name of Railroad Operating Train #1 BNSF Railway Company | 1a. Alphabetic Code BNSF | 1b. Railroad Accident/Incident No. MT-0418-103 |
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GENERAL INFORMATION

| | | |
|---|---|--|
| 1. Name of Railroad or Other Entity Responsible for Track Maintenance BNSF Railway Company | 1a. Alphabetic Code BNSF | 1b. Railroad Accident/Incident No. MT-0418-103 |
| 2. U.S. DOT Grade Crossing Identification Number | 3. Date of Accident/Incident 4/7/2018 | 4. Time of Accident/Incident 6:08 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 Glasgow |
| 11. Nearest City/Town Oswego | 12. Milepost (to nearest tenth) 237.1 | 13. State Abbr. MT |
| | | 14. County VALLEY |
| 15. Temperature (F) 12 °F | 16. Visibility Dawn | 17. Weather Clear |
| | | 18. Type of Track Main |
| 19. Track Name/Number Single Main Track | 20. FRA Track Class Freight Trains-80, Passenger Trains-90 | 21. Annual Track Density (gross tons in millions) 60.62 |
| | | 22. Time Table Direction West |
| 23. PTC Preventable N/A | | |

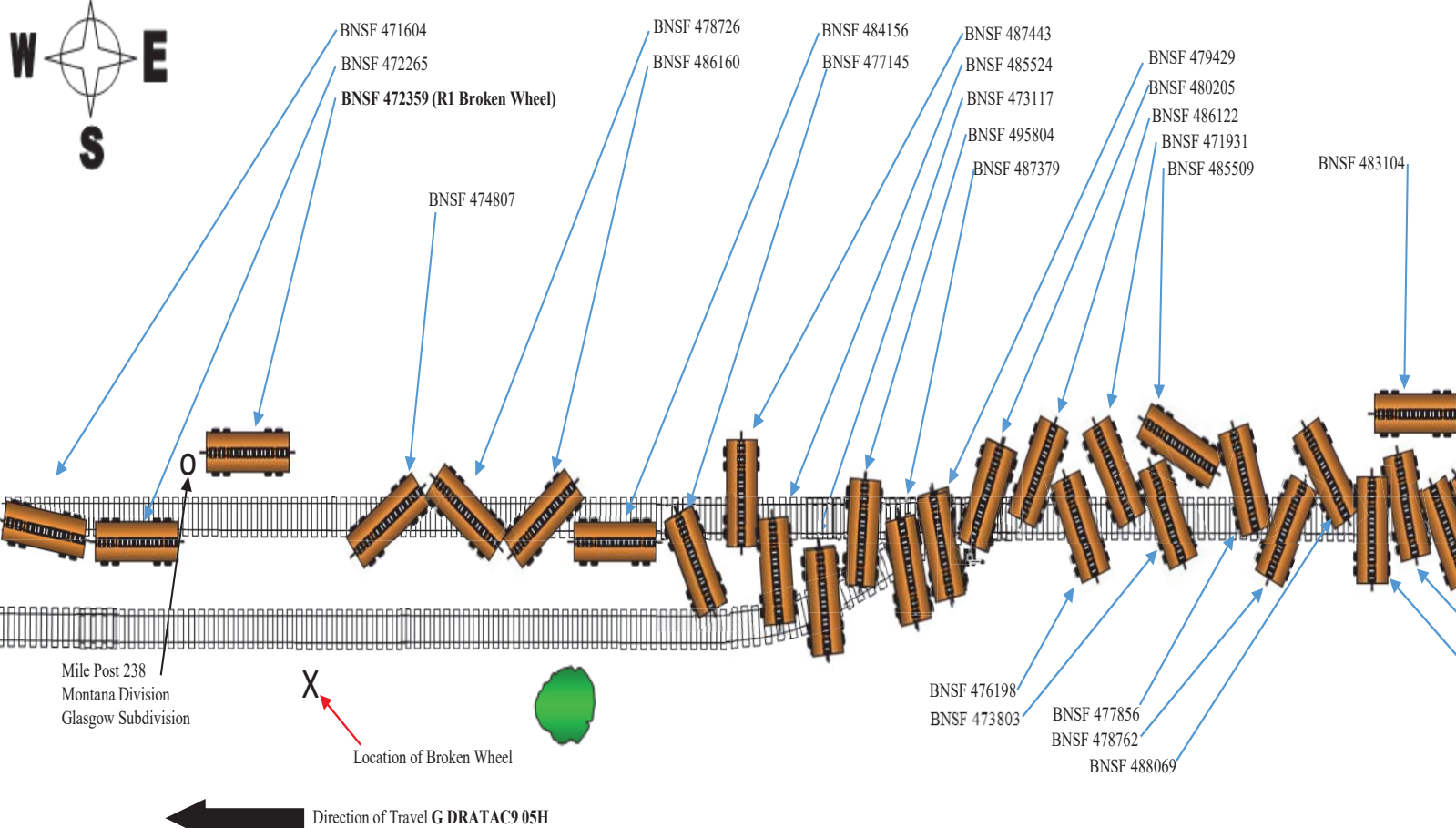
OPERATING TRAIN #1

| | | | | | | | | | | | |
|---|-------------|------------------------|---|---------------------------------|---|---|--|---|--------------------------------|---|------------|
| 1. Type of Equipment Consist: Freight Train | | | | | 2. Was Equipment Attended? Yes | | 3. Train Number/Symbol G-DRATAC-9-05H | | | | |
| 4. Speed (recorded speed, if available) R - Recorded 52.0 MPH E - Estimated | | Code R | 5. Trailing Tons (gross excluding power units) 16444 | | 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</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.) | | BNSF471604 | 72 | yes | | | | | | | |
| (2) Causing (if mechanical, cause reported) | | BNSF472359 | 74 | yes | 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 | | | | | | (1) Total in Equipment Consist | 115 | |
| (2) Total Derailed | | | | | | (2) Total Derailed | 30 | 0 | 0 | 0 | 0 |
| 12. Equipment Damage This Consist 1524279 | | | 13. Track, Signal, Way & Structure Damage 961881 | | | | | | | | |
| 14. Primary Cause Code E61C - Broken rim | | | | | | | | | | | |
| 15. Contributing Cause Code N/A - N/A | | | | | | | | | | | |
| Number of Crew Members | | | | | Length of Time on Duty | | | | | | |
| 16. Engineers/Operators 1 | | 17. Firemen 0 | | 18. Conductors 1 | | 19. Brakemen 0 | | 20. Engineer/Operator Hrs: 10 Mins: 38 | | 21. Conductor Hrs: 10 Mins: 38 | |
| Casualties to: | | 22. Railroad Employees | | 23. Train Passengers | | 24. Others | | 25. EOT Device? Yes | | 26. Was EOT Device Properly Armed? Yes | |
| Fatal | | | | | | | | 27. Caboose Occupied by Crew? | | N/A | |
| Nonfatal | | | | | | | | | | | |
| 28. Latitude 48.059937000 | | | | 29. Longitude -105.854892000 | | | | | | | |

SKETCHES

Sketch - HQ-2018-1262 Sketch

Drawing not to scale



BIA Route 1

NARRATIVE

Circumstances Prior to the Accident

On April 6, 2018, the crew of westbound freight train G-DRATAC-9-05H (the train) went on duty at 7:30 p.m., MDT, at Burlington Northern Santa Fe's (BNSF) General Office Building (GOB), in Minot, North Dakota. The two-person crew consisted of an Engineer and a Conductor. This was the away-from-home terminal for both crew members (their home terminal is Glasgow, Montana). Both crew members had received more than the statutory off-duty period before reporting for duty. Upon reporting for duty, the crew waited for the train to arrive. When the train arrived, they relieved the inbound crew on the North Inspection Track, in Minot. They then waited for the mechanical department to complete an Extended Haul Air brake test. During the test, a mechanical department employee (carman) replaced the End-of Train (EOT) device.

The train consisted of three head-end locomotives and 115 loaded covered hopper cars. The train consisted entirely of loaded grain (corn) cars. It was 6,733 feet in length and consisted of 16,444 trailing tons. The crew was assigned to operate the train from Minot to Glasgow, approximately 277 rail miles. The train departed Minot at 9:57 p.m.

The crew had no work assigned to their train en route from Minot to Glasgow.

The method of operation in the area of the accident is by signal indications of a Traffic Control System (TCS), on a single main track, controlled by a BNSF train dispatcher located in Fort Worth, Texas. Per BNSF's Montana Division Timetable No. 10, dated October 25, 2017, in the area of the accident, the maximum authorized timetable speed is 70 mph. The train was restricted, by instructions of Montana Division Timetable No. 10, to a maximum authorized speed of 55 mph, based on the train's Tons per Operative Brakes (TOB).

The track through the accident area consists of Continuous Welded Rail (CWR) on hardwood ties with double shoulder tie plates and six-inch cut spikes. The rails on the tangent track are 132-pound, RE profile rail, manufactured in 1984. The rail lays on double-shoulder tie plates that are 7 3/4 inches wide and 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 with an average spacing of 19 1/2 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. The track sits on 6 to 8 feet of fill.

As the westbound train approached the accident area, the Engineer was seated at the controls on the north (right) side of the controlling locomotive. The Conductor was seated in the conductor's seat on the south (left) side of the controlling locomotive.

The Glasgow subdivision, approaching the accident site from east to west, is tangent track with no

curvature. The geographic and timetable direction for the train were west. Timetable directions are used throughout this report.

At the time of the accident, it was dawn, clear, with winds from the east-northeast at 10 mph, and the ambient temperature was 12° F.

The Accident

Approaching the accident site, the train was being operated at a recorded speed of 52 mph. Per post-accident interview statements from the train crew, "the train departed off the North Inspection Track in Minot. At Snowden, [Montana,] and Bainville, Montana, their train received roll-by inspections and no defects were noted." The train stopped at Wolf Point, Montana, to meet an empty grain train. Upon departing Wolf Point, the Engineer stated that "the train felt normal." Upon approaching Oswego, Montana (located at Milepost (MP) 239.2), both crew members stated that the trip had been uneventful, when suddenly their train experienced an unexpected non-engineer induced emergency brake application of the train's air brake system at about 6:08 am, on April 7, 2018. The crew immediately announced "emergency" over the radio and then informed the dispatcher that their train had gone into emergency. The dispatcher radioed back to the crew and informed them that he had track occupancy indication lights showing for both the main track and the siding track at East Oswego (MP 237.8). Upon hearing this, the conductor walked back to investigate and discovered the derailment. The Conductor stated over the radio "that lines 1 through 69 were on the rail and 70 through 101 were derailed." Later, upon further investigation by the Federal Railroad Administration (FRA), it was determined that the conductor was incorrect in his assessment, and actually it was rail cars in line positions 72 through 101 which had derailed.

The point of derailment was later determined to have occurred at MP 237.1 with the ensuing pile-up occurring at MP 237.8.

BNSF reported \$1,524,279 in equipment damages and \$961,881 in track and signal damages, for a total of \$2,486,160 in reported damages. No employees or civilians were injured in this derailment. No hazardous materials were released (although there was a release of corn onto the ballast), and no evacuation required.

Per post-accident interview statements from the crew, a crew van transported the crew following the derailment to Glasgow, to tie up. The crew further stated that post-accident toxicology testing was not mentioned by BNSF management at the time of their tie up.

The BNSF's Glasgow Subdivision is an Amtrak route, and there were delays to Amtrak trains #7 and #8. Amtrak instituted a bus bridge (a temporary system of shuttle buses) to transport passengers around the accident site.

Post-Accident Investigation

On April 7, 2018, the FRA began an investigation of this accident. FRA's Region 8 management assigned a Motive Power & Equipment (MP&E) Safety Inspector as Investigator-In-Charge (IIC) of the

investigation. They also assigned a Track Inspector and an Operating Practices (OP) Inspector to assist in the investigation.

After their on-site inspection and investigation, FRA's investigators conducted interviews with the train crew. FRA's investigators also requested all necessary records, forms, and other documentation necessary to conduct their final analysis and conclusions concerning the pertinent facts of the accident.

The following analysis and conclusions, as well as the probable cause and any possible contributing factors, represent the findings of FRA's investigation.

Analysis and Conclusions Analysis—FRA Post-Accident Toxicological Testing: The accident met the criteria for FRA Post-Accident Toxicology Testing as required under Title 49 Code of Federal Regulations (CFR) Part 219, Subpart C. However, the crew was not tested because the crew had been relieved and completed tie-up before BNSF management personnel arrived on scene to assess the amount of damages. BNSF's local management, upon realizing that the crew tied-up before specimens for Post-Accident Toxicological Testing could be collected, contacted FRA's Drug and Alcohol Specialist and was informed that they could not call the crew back for Post-Accident Toxicological Testing.

FRA's investigation otherwise discovered no evidence that drugs or alcohol contributed to the cause or severity of the accident.

Conclusion: FRA was not able to make a positive determination due to toxicological testing not being performed. FRA believes it is unlikely, however, that drugs and alcohol contributed to the cause or severity of this accident.

Analysis—Crew Fatigue: FRA performed a fatigue analysis using the Fatigue Avoidance Scheduling Tool (FAST). FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis. At or above this baseline, the FRA does not consider fatigue as probable for any employee. Inputs into the FAST software vary based on information obtained from each employee. 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 either employee involved in this accident.

Conclusion: FRA determined fatigue did not contribute to the cause or severity of the accident.

Analysis—Locomotive Event Recorder: FRA obtained and analyzed downloads of the Locomotive Event Recorder from the leading locomotive (BNSF 6289) of the train. FRA's analysis of the locomotive event recorder downloads concurred with BNSF's analysis. Train speed was 52 mph when an undesired emergency application of the train's air braking system was initiated and the ensuing derailment occurred. FRA's analysis noted no exceptions to proper train handling on the part of the train crew.

Conclusion: FRA determined train handling did not contribute to the cause or severity of the accident.

Analysis—FRA Track Inspection: FRA conducted an inspection of track conditions at the accident site

and east (in advance) of the accident site. FRA's inspection determined that the initial Point-of-Derailment (POD) was at MP 237.1. A walking inspection of track was performed from MP 236.4 to MP 238.8 with track measurements noted at the determined POD (MP 237.1). An inspection from the POD (MP 237.1) east to public road crossing DOT#059576V (MP 233.4) was also performed with a high rail vehicle. FRA's Track Inspector noted witness marks (scratches or similar marks) on the head of the south rail, just prior to the POD, that were consistent with damages caused by a broken wheel striking the rail. Other than derailment-caused track damages, no track defects were noted.

Conclusion: FRA determined track condition did not contribute to the cause or severity of the accident.

Analysis—Mechanical inspection of locomotives and derailed cars: FRA's mechanical inspector arrived on scene in the beginning of cleanup, when access to equipment was very limited. The locomotives and head 68 cars of the train had been moved and were en route to Tacoma, Washington. FRA determined that wheel (R1) on BNSF 472359, in position 74 in the train consist, failed. The failed R1 wheel on BNSF 472359 contained a shattered rim type failure. A shattered rim is a fatigue crack which originates at an inclusion or void in the steel which then grows parallel to the tread surface. Shattered rims are a common failure type among wheels manufactured prior to the late 1990s. The R1 wheel was manufactured in October 2007 by Standard Steel. The rim thickness for the R1 wheel at the time of failure was 19/16 inches. The suspect wheel from BNSF 472359 (R1) was inspected on-site by FRA's mechanical inspector. The rear 17 cars (line 102 to 118) were also inspected in Wolf Point, with five non-contributory deficient items noted. All other car wheels and truck components that were possible to inspect were inspected, with no components found which could be believed to have been a contributing factor to the accident.

Conclusion: FRA determined the failure of the R1 wheel of BNSF 472359 was the probable cause of the derailment.

Overall Conclusions:

FRA determined the train crew assigned to the train was in full compliance with the BNSF's train handling rules, the railroad's operating rules and standards, and all applicable Federal standards and regulations. FRA's investigation and associated inspections of railcars and track structure were extremely difficult due to limited access to the equipment and track. FRA's investigation team conducted walking and hi-rail inspections of the track structure at the POD and in advance of the derailment site. FRA was able to determine that wheel (R1) on BNSF 472359 failed. The failed R1 wheel sustained a shattered rim-type failure. A shattered rim is a fatigue crack which originates at an inclusion or void in the steel which then grows parallel to the tread surface. Shattered rims are a common failure type among wheels manufactured prior to the late 1990s. The R1 wheel was manufactured in October 2007 by Standard Steel. The rim thickness for the R1 wheel at the time of failure was 19/16 inches. The BNSF's investigators agreed with FRA's determination of the probable cause of this accident.

Probable Cause:

FRA's investigation determined the probable cause of the accident was a shattered rim on the R1 wheel of rail car BNSF 472359. FRA Accident/Incident Code: E61C - broken rim.

Possible Contributing Causal Factors:

FRA did not identify any possible contributing causal factors to this accident.