Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch

Accident Investigation Report
HQ-2017-1223

Montana Rail Link (MRL)
Heron, MT
August 13, 2017

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 August 13, 2017 at approximately 10:43 p.m., MST, westbound Montana Rail Link (MRL) Train No. C-NAMSPB0-03 derailed 33 loaded coal cars at milepost (MP) 76.8 on the MRL Fourth Subdivision. MRL MP 76.8 is located approximately four miles east of the town of Heron, Montana, in a very remote area of Montana along the Clark Fork River. Heron itself is located 178.9 railroad miles west of the City of Missoula, Montana, and approximately six miles east of the Montana/Idaho state border. The 33 coal cars in car positions four through 36 (train consist positions seven through 39), derailed with 1 car remaining in the upright position, 3 cars laying on their sides, and the remaining 29 cars in various positions stacked up in an accordion pattern. Two of the railcars in the accordion stack derailed at the edge of the Clark Fork River, which runs parallel to and near the track in this area. The two railcars spilled a small amount of their contents, low-bituminous coal from Wyoming's Powder River Basin, into the river.

The method of operations on the Fourth Subdivision is by signal indications of a traffic control system (TCS), on a single main track, controlled by a MRL dispatcher located in the MRL's dispatching center in Missoula.

There was no hazardous material release, no evacuation ensued, and this is not an Amtrak route. MRL reported $1,456,475 in equipment damages and $335,000 in track, signal, way, and structure damages, for a reported $1,791,475 in total damages.

At the time of the derailment, it was dark, with cloudy skies, light rain showers, and a temperature of 60°F.

The Federal Railroad Administration’s investigation determined that the probable cause of the derailment was FRA Cause Code T215 -- Joint bar broken (non-insulated). FRA did not identify any contributing causal factors.

U.S. Department of Transportation
Federal Railroad Administration

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2017-1223

TRAIN SUMMARY

1. Name of Railroad Operating Train #1	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
Montana Rail Link	MRL	2017104

GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
Montana Rail Link	MRL	2017104

2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident	4. Time of Accident/Incident
	8/13/2017	10:43 PM

5. Type of Accident/Incident
Derailment

6. Cars Carrying HAZMAT	7. HAZMAT Cars Damaged/Derailed	8. Cars Releasing HAZMAT	9. People Evacuated	10. Subdivision
0	0	0	0	MRL Fourth Subdivision

11. Nearest City/Town	12. Milepost *(to nearest tenth)*	13. State Abbr.	14. County
Heron	76.8	MT	SANDERS

15. Temperature (F)	16. Visibility	17. Weather	18. Type of Track
60 ˚F	Dark	Cloudy	Main

19. Track Name/Number	20. FRA Track Class	21. Annual Track Density *(gross tons in millions)*	22. Time Table Direction
Single Main Track	Freight Trains-60, Passenger Trains-80	57.4	West

U.S. Department of Transportation
Federal Railroad Administration

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2017-1223

OPERATING TRAIN #1

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
Freight Train	Yes	C-NAMSPB0-03

4. Speed (recorded speed, if available) R - Recorded E - Estimated	Code	5. Trailing Tons (gross excluding power units)	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
43.0 MPH	R	16587		0

6. Type of Territory

Signalization: Signaled

Method of Operation/Authority for Movement: Signal Indication

Supplemental/Adjunct Codes: Q

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.)*	DLRX 60305	7	yes		0	0
(2) Causing *(if mechanical, cause reported)*				9. Was this consist transporting passengers?		N/A

10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End e. Remote	11. Cars (Include EMU, DMU, and Cab Car Locomotives.)	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	3	0	0	0	1	(1) Total in Equipment Consist	116	0	0	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	33	0	0	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
1456475	335000

14. Primary Cause Code: T215 - Joint bar broken (noninsulated)

15. Contributing Cause Code:

Number of Crew Members

16. Engineers/Operators	17. Firemen	18. Conductors	19. Brakemen
1	0	1	0

Length of Time on Duty

20. Engineer/Operator	21. Conductor
Hrs: 9 Mins: 43	Hrs: 9 Mins: 43

Casualties to:	22. Railroad Employees	23. Train Passengers	24. Others
Fatal	0	0	0
Nonfatal	0	0	0

25. EOT Device?	26. Was EOT Device Properly Armed?
Yes	Yes

27. Caboose Occupied by Crew? N/A

28. Latitude	29. Longitude
48.050000000	-115.891000000

SKETCHES

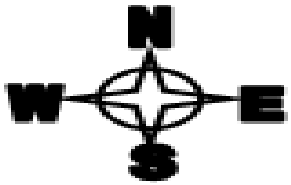
HQ-2017-1223 Sketch

Report # HQ-2017-1223

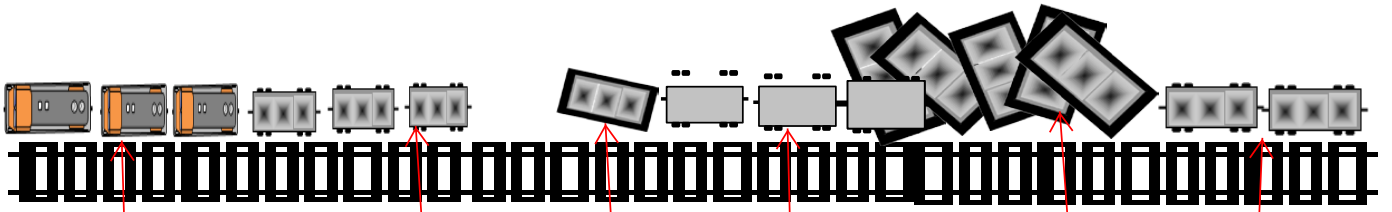
Montana Rail Link

Heron Derailment

8-13-2017



Drawing not to scale / Westward movement



3 degree, 30 minute curve on single main track on a 0.47% ascending grade

Train Identification CNAMSPBO-03

Three locomotive consist not part of the derailment

Three railcars not part of the derailment

DLRX 60305 upright part of the derailment

PGEX 724
PGEX 720
GEMX 5180
On their side part of the derailment

29 Railcars
Cars 8 – 37 of the train consist
derailed laying accordion style

Remaining 80 cars not part of the derailment

NARRATIVE

Circumstances Prior to the Accident

The crew of Montana Rail Link (MRL) Unit Coal Train C-NAMSPB0-03 (the train) consisted of an engineer and conductor. Both crew members reported for duty on August 13, 2017, at 1:00 p.m., MST, at the MRL Missoula Rail Yard in Missoula, Montana. Both employees had received a statutory off-duty period prior to reporting for duty. Missoula is the home terminal for this crew. The crew was assigned to operate from Missoula to Spokane, Washington. The train consisted of four locomotives (three locomotives on the head-end and one locomotive on the rear of the train in Distributive Power (DP) configuration) and 116 loaded coal cars. The train had 16,587 trailing tons and measured 6,450 feet in total length. The train received a 1,500-mile extended haul air brake test at Missoula Rail Yard and departed the yard at 2 p.m. MST. The geographic direction was west, and the railroad timetable direction for the train was west. Timetable directions are used throughout this report.

Approaching the derailment site from the east beginning, at milepost (MP) 75.5 on the single main track heading toward Heron, Montana, there are a series of curves and tangents. At MP 75.5 there begins a 1,990 foot 2-degree curve to the right, followed by 700 feet of tangent track that leads into a 900 foot 1-degree 45-minute curve to the left, followed by 230 feet of tangent track that leads to a 2-degree 1 minute curve to the right, followed by 1,440 feet of tangent track. From this point, the train traveled approximately 740 feet to the point of derailment (POD) at MP 76.8, which is nearing the end of an 800 foot 3-degree 30-minute curve to the left with 4 inches of super elevation on a 0.47 percent ascending grade.

Approaching the POD, the engineer was seated at the controls on the right (north) side of the locomotive. The conductor was seated in the conductor's seat on the left (south) side of the locomotive. In the area of the derailment, trains operate on a single main track by signal indications of a Traffic Control System (TCS) controlled by a MRL dispatcher located in Missoula. Having passed the intermediate signal at MP 75.2, the train was operating on a proceed (green) signal indication at a recorded speed of 43 mph.

The Accident

In post-accident interviews, the Engineer and Conductor stated the trip had been uneventful and the train was handling normally while traveling at a recorded speed of 43 mph. The maximum authorized timetable speed for loaded coal trains in this area is 45 mph, per the instructions of MRL Timetable No. 18, effect 0001, on April 1, 2015, CMT.

Upon approaching MP 76.8, the train experienced a non-engineer induced emergency application of its air brake system at 10:43 p.m. MST. Once their train had come to a stop the Engineer contacted the MRL Dispatcher via the train radio and notified him their train had went into emergency. The Conductor disembarked the leading locomotive and walked back to investigate and discovered several railcars had derailed in an accordion-style pile-up. The Conductor immediately notified the Engineer who re-contacted the MRL Dispatcher to notify him of the derailed cars. The Dispatcher replied he had been

monitoring the radio, had heard the Conductor inform the Engineer of the derailed cars, and would make the necessary phone calls to get personnel to the accident site. Meanwhile, upon further investigation the Conductor discovered the fourth car behind the locomotive consist, DLRX 60305, was derailed and still up-right, with the next 3 cars -- PGEX 724, PGEX 720, and GEMX 5180 -- having derailed on their sides, and the following 29 railcars derailed in various positions in an accordion-style pile. The trailing 80 cars were not involved in the derailment.

Due to the remoteness of the area the train crew had to wait for an MRL Road Foreman to travel to the derailment site via a high-rail vehicle. The crew was then transported to Spokane, Washington, for drug and alcohol testing under MRL company policy.

Post-Accident Investigation

On August 14, 2017, the Federal Railroad Administration (FRA) began an investigation of this accident. FRA's Region 8 management assigned an Operating Practices Safety Inspector as Investigator-in-Charge (IIC) of this investigation. The IIC was assisted in this investigation by an FRA Motive Power & Equipment Safety Inspector and an FRA Track Safety Inspector. Also, later in the week an FRA Rail Integrity Specialist joined FRA's investigation team. Upon commencing its investigation FRA's investigators inspected the accident/incident site, including the track approaching and at the point of derailment (POD). FRA also conducted a detailed inspection of all the pertinent and associated equipment involved in the accident. After their on-site inspection and investigation, FRA’s investigators conducted interviews with the train crew members and the MRL dispatcher who was on-duty at the time of the accident. FRA's investigators also requested all necessary records, forms, and other documentation necessary to conduct their final analysis and reach conclusions concerning the pertinent facts of the accident. The following analysis and conclusions, as well as the probable cause, represent the findings of FRA's investigation. FRA did not determine any possible contributing factors for this accident.

Analysis and Conclusions

Analysis-FRA Post-Accident Toxicological Testing: This accident/incident met the criteria for FRA Post-Accident Toxicology Testing as required under Title 49 Code of Federal Regulations (CFR) Part 219 (Subpart C). MRL did not meet the testing requirements, however, because it conducted the drug and alcohol testing under MRL company guidelines instead of Subpart C. FRA obtained the MRL testing results for the crewmembers, both of which were negative.

Conclusion: FRA determined drug and alcohol use did not contribute to the cause or severity of this accident.

Analysis-Crew Fatigue: FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis. At or above this baseline, FRA does not consider fatigue as probable for any employee. FRA obtained a 10-day work history for the Engineer and Conductor involved in this accident. Default software sleep settings and information from the fatigue-related questionnaires were used for each

employee. Upon analysis of that information with FRA's Fatigue Avoidance Scheduling Tool (FAST) program, FRA concluded that fatigue was not probable for either of the crewmembers involved in this accident.

Conclusion: FRA determined fatigue did not contribute to the cause or severity of this 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. Nevertheless, FRA inspected the leading locomotives, the three railcars ahead of the derailed cars, and all the derail cars which were accessible. The fourth through 20th cars behind the locomotive consist were inspected and all wheels inspected were found to be in compliance with 49 CFR § 215.103. The fourth car (DLRX 60305) had to have the No. 1 truck and wheels re-railed with no damage found. The fifth car was on its side and had most of the truck and wheel components within view, presenting no evidence that could be attributed to the cause of the derailment. (NOTE: the L3 wheel tread did have significant shell-out areas but nothing that would be defective under § 215.103(f), which specifies when a slid flat or shelled spot makes a wheel defective under FRA regulations.) All other car wheels and truck components that were possible to inspect were inspected, with no components found that could have been a contributing factor to the accident.

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

Analysis-Employee Performance: FRA obtained and analyzed a copy of the locomotive event recorders for leading locomotive BNSF 8285. Upon analysis of the event recorders, FRA determined that the train was traveling at a recorded speed of 43 mph when the non-engineer induced emergency brake application occurred at 10:43 p.m. MST.
The Engineer and Conductor of the train were both in the cab of the locomotive, operating the train in full compliance with MRL's train handling rules, MRL's operating rules and standards, and all applicable Federal standards and regulations concerning train handling. The length of time the Engineer had operating on the territory where the derailment occurred is 13 years. He had operated over this territory 35 times in the previous 60-day period. The length of time the Conductor had operating on the territory where the derailment occurred is 11 years. He had operated over this territory 20 times in the previous 60-day period.

Conclusions: FRA determined employee performance did not contribute to the cause or severity of the accident.

Analysis-Track: FRA conducted an investigation of track conditions at the Point-of-Derailment (POD) and east (in approach) and west (in advance) of the POD.

FRA conducted four consecutive days of track inspections, beginning on Monday, August 14, 2017, and

continuing through Thursday, August 18, 2017. Inspections were conducted with the use of a hi-rail vehicle and/or by walking inspections from MP 75.50 to MP 82.4.
All track inspections in the immediate area of the accident were conducted by walking inspections.

Beginning at MP 75.5 and continuing to MP 76.8, the track starts at level grade and begins ascending an average of 0.42 percent moving toward MP 76.8. Approaching the derailment site by rail from the east, beginning at MP 75.5 and traveling westward on the single main track heading toward Heron, Montana, there are a series of curves and tangent tracks the train traversed. The first was a 1,990 foot 2-degree curve to the right, followed by 700 feet of tangent track that leads into a 900 foot 1-degree 45-minute curve to the left, followed by 230 feet of tangent track that leads to a 2-degree 1 minute curve to the right, followed by 1,440 feet of tangent track. From this point, the train traveled approximately 740 feet to the POD at MP 76.8, which is nearing the end of an 800 foot 3-degree 30-minute curve to the left (MRL C-76B) with 4 inches of super-elevation on a 0.47 percent ascending grade.

The track through the accident area consists of Continuous Welded Rail (CWR). Both the north rail (high rail) and the south rail (low rail) of MRL curve-76B are 136 pound-RE rail sections with the north (high rail) manufactured by CF&I, and the south (low rail) manufactured by ERMS Steel. The north (high rail) was manufactured in April of 1995 with no date ascertained for installation. The south (low rail) was manufactured in November of 2014 and installed in 2015. The track area was last machine surfaced and lined in 2014. The track ballast is crushed stone consisting mostly of trap rock. The tie cribs appear to be full of an average of 12 inches of shoulder ballast. The track on average is 4 to 6 feet above the ditch line.

The track through the derailment area is constructed with treated mixed wood crossties that are 7 by 9 inches by 8-feet 6-inches. The rail rests on tie plates with an average spacing of 19 1/2 inches between tie centers. Both the north (high rail) and south (low rail) rests on conventional double-shoulder tie plates that are 7-3/4 inches wide and 16 inches long. They are secured to the crossties with five 6-inch long *Common Standard* track chisel-tip cut spikes to fasten the rail to the plate with two rail-holding and two anchor spikes with two placed on the field side of the crosstie on curves 2-degrees and above.

On August 14 and 15, 2017, MRL and an FRA MP&E inspector conducted a joint track inspection at the derailment site and in the immediate vicinity east and west of the POD. During these inspections, no witness marks were discovered that could have indicated a damaged wheel striking the rail. In addition, no other rail damage was discovered in approach to the POD, and there were no indications discovered that would suggest that track surface conditions or rail misalignment were causal or contributing factors to the accident. These findings were further confirmed by an FRA Rail Integrity Specialist who had arrived on scene to join the FRA's inspection team.

It was later determined by the FRA track inspection team that a rail joint in the CWR, located in the high side (north rail) of the 3-degree, 30-minute curve at MP 78.6 (MRL C-76B) had failed, thereby creating an unsecured rail end. This was the probable cause of the accident. This joint failure caused the running

rail to move outward, thereby compromising the rail wheel interface which allowed the flange of a wheel to contact the blunt face of the receiving rail, causing possible rail fracture and unrestricted wheel climb under dynamic loading of the rail.

Conclusion: FRA determined the failed rail joint was the probable cause of this train accident.

Overall Conclusions

FRA determined that the train crew of the train was in full compliance with the MRL's train handling rules, the railroads operating rules and standards, and all applicable Federal standards and regulations concerning train handling. FRA's investigation and associated inspections of railcars and track structure were extremely difficult due to access to the equipment and track being blocked by piled up railcars and dispersed piles of coal. FRA's investigation team conducted walking and hi-rail vehicle inspections of the track structure in approach and in advance of the derailment site. As the derailment site became more accessible with the clean-up of derailed cars and coal, they also conducted a walking inspection of the derailment sight. FRA was then able to determine that a non-insulated rail joint located on the high side (north rail) of MRL curve-C-76B had failed under dynamic loading of the rail as the train traversed over the joint. The MRL investigators were in agreement with FRA's determination of the cause of this accident.

Probable Cause and Contributing Factors

The FRA investigation determined the probable cause of this accident to be a failed joint bar located in the high side (north rail) of MRL curve C-76B -- FRA Cause Code T215, Joint bar broken (non-insulated). FRA did not determine any possible contributing factors for this accident.