



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

***Accident Investigation Report
HQ-2013-19***

***BNSF Railroad Co. (BNSF)
Rushville, MO
July 20, 2013***

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.

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 BNSF Railway Company	1a. Alphabetic Code BNSF	1b. Railroad Accident/Incident No. NE0713107
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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. NE0713107	
2. U.S. DOT Grade Crossing Identification Number		3. Date of Accident/Incident 7/20/2013	4. Time of Accident/Incident 10:10 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 St. Joseph
11. Nearest City/Town Rushville		12. Milepost (<i>to nearest tenth</i>) 49.5	13. State Abbr. MO	14. County BUCHANAN
15. Temperature (F) 85 °F	16. Visibility Dark	17. Weather Cloudy		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 (<i>gross tons in millions</i>) 141.4
				22. Time Table Direction East

OPERATING TRAIN #1

1. Type of Equipment Consist: Freight Train				2. Was Equipment Attended? Yes		3. Train Number/Symbol CETMLRTOA								
4. Speed (recorded speed, if available) R - Recorded E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 19172		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>Direct Train Control</u> Supplemental/Adjunct Codes: <u>N/A</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 (<i>derailed, struck, etc.</i>)		BNBX503045	107	yes			0	0						
(2) Causing (<i>if mechanical, cause reported</i>)		BNBX503045	107	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		2	0	0	0	0	(1) Total in Equipment Consist		134	0	0	0	0	
(2) Total Derailed		0	0	0	0	0	(2) Total Derailed		9	0	0	0	0	
12. Equipment Damage This Consist 216552			13. Track, Signal, Way & Structure Damage 1317723											
14. Primary Cause Code E68C - Loose wheel														
15. Contributing Cause Code														
Number of Crew Members							Length of Time on Duty							
16. Engineers/Operators		17. Firemen		18. Conductors		19. Brakemen		20. Engineer/Operator			21. Conductor			
1		0		1		0		Hrs: 6 Mins: 55			Hrs: 6 Mins: 55			
Casualties to:		22. Railroad Employees		23. Train Passengers		24. Others		25. EOT Device?			26. Was EOT Device Properly Armed?			
Fatal		0		0		0		Yes			Yes			
Nonfatal		0		0		0		27. Caboose Occupied by Crew?			No			
28. Latitude 40.000000000				29. Longitude -95.000000000										

CROSSING INFORMATION

Highway User Involved

Rail Equipment Involved

1. Type		5. Equipment	
2. Vehicle Speed (<i>est. mph at impact</i>)	3. Direction (<i>geographical</i>)	6. Position of Car Unit in Train	
4. Position of Involved Highway User		7. Circumstance	
8a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? N/A		8b. Was there a hazardous materials release by N/A	
8c. State here the name and quantity of the hazardous material released, if any.			
9. Type of Crossing Warning 1. Gates 4. Wig wags 7. Crossbucks 10. Flagged by crew 2. Cantilever FLS 5. Hwy. traffic signals 8. Stop signs 11. Other (<i>spec. in narr.</i>) 3. Standard FLS 6. Audible 9. Watchman 12. None N/A		10. Signaled Crossing Warning	11. Roadway Conditions N/A
12. Location of Warning N/A		13. Crossing Warning Interconnected with Highway Signals N/A	14. Crossing Illuminated by Street Lights or Special Lights N/A
15. Highway User's Age	16. Highway User's Gender	17. Highway User Went Behind or in Front of Train and Struck or was Struck by Second Train	18. Highway User
19. Driver Passed Standing Highway Vehicle		20. View of Track Obscured by (<i>primary obstruction</i>)	
Casualties to:	Killed	Injured	21. Driver was
23. Highway-Rail Crossing Users		24. Highway Vehicle Property Damage (<i>est. dollar damage</i>)	22. Was Driver in the Vehicle?
26. Locomotive Auxiliary Lights? N/A		25. Total Number of Vehicle Occupants (<i>including driver</i>)	
28. Locomotive Headlight Illuminated? N/A		27. Locomotive Auxiliary Lights Operational? N/A	
29. Locomotive Audible Warning Sounded? N/A			

SYNOPSIS

On July 20, 2013, at 10:10 p.m. CDT, on the BNSF Railway Company (BNSF) Nebraska Division, St. Joseph Subdivision near Rushville, Missouri, Train Symbol C-ETMLRTO-17A with 2 locomotives, 134 loaded coal cars, 19,172 trailing tons and 7,262 feet long, derailed 9 cars, Line Nos. 105, and 109 through 116 inclusive, on Main Track No. 1 at MP 49.5. The train was traveling at a recorded speed of 15 mph. Maximum authorized track speed per BNSF Timetable No. 8 is 45 mph.

A loose wheel at the Left No. 3 (L3) location on Car No. BNBX 503045, Line No. 105 in the train consist, caused the wheel to drop to the inside of the rail at MP 49.5 resulting in major damage to over 5 miles of concrete ties and breaks in the rail in numerous places. Eight other cars derailed at MP 44.2 which resulted in an emergency application of the train brakes.

Damage costs were \$216,552 for equipment, and \$1,317,723 for track and signal. The weather was calm and 85 degrees at the time of the derailment.

The Federal Railroad Administration's (FRA) investigation revealed the probable cause to be E68C - loose wheel at the L3 location on Car No. BNBX 503045.

NARRATIVE

Circumstances Prior to the Accident:

The crew of Train Symbol C-ETMLRTO-17A included a locomotive engineer and a conductor. On July 20, 2013, after receiving the required statutory off-duty rest period, the crew reported for duty at 3:15 p.m. CDT at their home terminal BNSF Hobson Yard in Lincoln, Nebraska. Their assigned freight train consisted of 2 locomotives on the head-end, and 134 loaded coal cars. The train was 7,262 feet long and weighed 19,172 tons. At Hobson Yard the train received a Class I air brake test by the mechanical department employees. The train departed Lincoln at 4:41 p.m. bound for Kansas City, Missouri.

Approaching the accident area, the engineer was seated at the controls on the south side of the cab of the lead locomotive, and the conductor was seated on the north side of the cab of the lead locomotive. As the train approached the signal at French Siding, milepost (MP) 56.6, the engineer was in light dynamic brake operating the train at a recorded speed of 15 mph as noted in the event recorder download taken from the lead locomotive, and preparing to stop at East Armour to meet a westbound train.

Mile post locations when traveling from west to east are in descending order. From MP 56.7 to MP 45.2, the track is single main track territory and from MP 45.2 to MP 41.9 the track is double main track territory. Prior to the derailment, the train had traversed 5 grade crossings and 4 curves, 2 right hand and 2 left hand curves with 20 degree turnouts. Traveling from west to east there is a slight ascending grade.

The railroad timetable direction of the train was east. The geographical direction was south. Timetable directions are used throughout this report.

The Accident:

The train dispatcher observed a track indication light appear on his centralized traffic control (CTC) screen behind Train Symbol C-ETMLRTO-17A at East Halls, MP 49.5. Around the same time, BNSF Resource Operations Center (ROC) received a call from a private citizen stating a train was throwing sparks and pulling up crossing pavement at MP 45.9 near Davies, a distance of 3.6 miles from East Halls. At 10:10 p.m., as the engineer was preparing to stop at East Armour an undesired emergency (UDE) application of the trainbrakes occurred. The head-end of the train came to a stop at MP 43.18 on Main Track No. 1. The crew notified the train dispatcher of the emergency brake application. The train dispatcher alerted the westbound train that the eastbound train was stopped. The conductor of Train Symbol C-ETMLRTO-17A placed flares/fusees out on the adjacent track and proceeded to do a walking inspection of his train. He discovered 9 derailed cars, Line Nos. 105, and 109 through 116 of the consist. Four of these cars were laying on their sides at MP 44.2, blocking both main tracks. The conductor notified the train dispatcher of the situation.

Inspection by the BNSF mechanical and maintenance-of-way (MOW) employees identified the point of derailment (POD) as East Halls, MP 49.5. According to BNSF, there were 148 broken rails, and significant castle (the casting on top of the concrete tie where the ties attach to the base of the rail) damage between MP 49.5 and 47.3. The BNSF Track inspection indicated that there was evidence of fresh impact on the northeast corner of the crossing at MP 54.29. Each subsequent crossing was hit on the same corner until East Halls, at MP 49.5, where there was evidence of a wheel dropping inside of the rail. FRA identified the marks on the inside of the track at MP 49.5 on the single main track as the point of derailment (POD). Damage to rail clips, castles and ties, with numerous rail breaks, occurred from this point to the pileup of equipment at MP 44.2 which occurred on Main Track No. 1 in double main track territory. The Left No. 3 wheel (L3) on Car No. BNBX 503045, Line No. 105 in the train consist, came loose from the axle seat, and caused the wheel to drop to the inside of the rail resulting in extensive damage to the concrete ties and rail from MP 49.5 up to the point at which the other 8 cars derailed at MP 44.2. The crew was transported via company vehicle to an area hospital for FRA Post Accident Toxicological testing.

Damages include \$216,552 to equipment and \$1,317,723 for track which includes replacement costs for 13,992 concrete ties, 148 broken rails and a Automated Equipment Identifier (AEI) detector.

Analysis and Conclusions:

Analysis - Locomotive Inspections An FRA records inspection was conducted of the recent daily inspection reports made on Locomotive Nos. BNSF 9972, and BNSF 9545. Forms FRA F 6180.49A were reviewed for any defects. The inspections and testing details were reviewed to ensure all records were up-to-date.

Conclusion No defects were noted by the FRA on the daily inspections performed by the BNSF, and all of the Forms FRA F 6180.49A indicated all inspections and tests were up-to-date. No exceptions were noted.

Analysis - Evaluation and Testing of Equipment Involved The FRA reviewed the Repair history, Wheel Profile Readings and Wheel Impact Load Detector (WILD) readings for Car No. BNBX 503045. The records indicated that Car No. BNBX 503045 had not been on a repair track since June 6, 2012. At that time, the BNSF Alliance Car Shop replaced the B- end coupler, yoke and draft gear. Car No. BNBX 503045 did not have any known defects. BNSF's System Mechanical Alert- Maintenance Advisory MA 11-21-06 dated November 21, 2006, and revised January 4, 2007, entitled "Loose Wheel Sets on Wheels Mounted by Canadian National Railway" described the need to inspect the wheels and bearings for CNPU markings which would indicate the Canadian National Railway mounted the wheels at their Winnipeg Shop. These wheels have been the root cause of several derailments where the wheel came loose on the axle. The Alliance Shop did not detect the CNPU markings in their inspection. The right and left No. 3 wheel mounting date records indicate the wheels were manufactured at Griffin, Transcona in June 1999. The wheels were mounted by CNPU in August 1999. Car No. BNBX 503045 (former Car No. CHTT 503045) did not have any early warnings or maintenance advisories associated with the car. The Brenco roller bearing on the L 3 location was reconditioned by Quality Bearing Service (QBSLR, now defunct), Little Rock, Arkansas, and mounted by ABC Kansas City Wheel Shop (ABCK, now defunct) in June 2001. The information on the bearing locking plate would not have alerted anyone of the wheel being under a maintenance advisory, however the BNSF Alliance Mechanical Shop should have inspected the wheels for the Winnipeg Shop mounting. The wheel profile readings of July 20, from the detector located at Aurora, Nebraska, were reviewed to see if there was any indication that the L3 wheel on Car No. BNBX 503045 had started to come loose by looking at the back-to-back (B2B) measurements of the L3 wheel set. The readings from the WILD detector located at Amazonia, Missouri, were reviewed for impact readings. Wheel profile readings showed readings that were not consistent with any of the parameters; flange height, flange thickness, rim thickness and B2B. None of the numbers made any sense. The manager of the BNSF detector equipment was contacted and given the information for interpretation. BNSF stated that the detector had been recently installed but not yet calibrated so when the car passed the detector, the detector was not yet operational.

Conclusion The Alliance Shop did not detect the CNPU markings in their inspection. The WILD readings were normal, and did not show any wheel impacts that would indicate anything was wrong with the L3 wheel or any of the other wheels. No usable information could be extracted from the wheel profile readings because the detector was not yet operational.

Analysis- Lab Analysis of Wheel The L3 wheel and axle were sent to the BNSF Research & Development (R&D) lab in Topeka, Kansas. The lab results were not completed as of the time of this report, but it was confirmed by E-mail from the lab that the L3 wheel did come loose prior to the derailment as evidenced by the "battering" marks on the wheel. FRA inspected the L3 loose wheel from Car No. BNBX 503045 at the BNSF Argentine Repair Track in Kansas City, Missouri (Form FRA F 6180.96, RMM-213).

Conclusion The wheel came loose from the axle prior to the derailment and did not come loose as a result of the derailment. The damage to the wheel tread, flange and front rim indicated that the L3 wheel had been on the ground for quite some time prior to the derailment. The wheel damage/batter was consistent with the type of batter which would have been evident for a wheel hitting tie clips and anchors.

Analysis - Inspection of the remaining non derailed cars: The BNSF mechanical employees inspected the remaining non-derailed cars but did not find any defects. .

Conclusion No defects were noted upon the BNSF mechanical employees inspection of the remaining non derailed cars.

Analysis - Track inspections Records of recent track inspections were reviewed. There were no exceptions noted by the BNSF track inspector. One defect was found by the rail detector on July 10, 2013.

Conclusion There was one known shelled/spalled/corrugated track defect at MP 45.30, but this was not a contributing factor to the derailment. FRA has determined that the conditions of the track did not contribute to the derailment.

Analysis - Locomotive Engineer Operating Performance; The lead locomotive was equipped with a speed indicator and an operative event recorder. The manager of operating practices (MOP) downloaded the event recorder at the derailment site and it was analyzed by BNSF officials.

operating practices (MOP) downloaded the event recorder at the derailment site and it was analyzed by BNSF officials.

Conclusion The locomotive engineer was found to be operating the train in compliance with both Federal regulations and the BNSF operating rules.

Analysis - Toxicological Testing Federal Railroad Administration Post-Accident Forensic Toxicology testing was conducted on both crew members. Federal Railroad Administration Post-Accident Forensic Toxicology Result Reports indicate that the two employees tested had negative test results.

Conclusion Drug or Alcohol use was not a factor.

Analysis - Fatigue Analysis The FRA obtained fatigue-related information for the 10-day period preceding this accident/incident, including the 10-day work history (on-duty/off-duty cycles) for all of the employees involved.

Conclusion Upon analysis of the information, the FRA concluded fatigue was probable for one or more of the employees, and the employee or employees may have been working at a diminished level of safety (effectiveness) due to mental and/or physical attributes associated with fatigue. Although fatigue was probable for one or more of the employees tested, FRA has determined that it did not play a part in the train accident.

Overall Conclusion: It was determined that the L3 wheel became loose on the axle prior to the derailment. **Probable Cause & Contributing Factors:** The FRA's investigation revealed the probable cause was E68C, loose wheel at the L3 location on Car No. BNBX 503045.