



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

***Accident Investigation Report
HQ-2017-1201***

***Canadian National - North America (CN)
Money, MS
April 30, 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

At 9:43 a.m., CDT, on April 30, 2017, southbound Canadian National Railway (CN) Train A420 (A 42071 30) collided with the rear-end of CN Train U760 (U 76051 24). The collision and subsequent derailment occurred on CN main track at Milepost (MP) 112.5, near Money, Mississippi.

Train U760 consisted of 2 locomotives, 1 lead and 1 Distributive Power (DP) locomotive located on the rear, and 114 loaded tank cars containing Petroleum Crude Oil and 2 loaded (sand) buffer cars. Train U760 was stopped on the main track waiting for a northbound train ahead to clear the main track as it pulled into the siding at South Money. The rear of the Train U760 was located at MP 112.5.

Train A420 consisted of 3 locomotives on the head-end pulling 145 mixed freight cars. Train A420 passed a restricting signal at the North Money control point at an estimated speed of 44 mph. Train A420 collided with the rear end of Train U760 at an estimated speed of 34 mph.

As a result of the collision, Train A420 derailed all 3 locomotives and 13 freight cars. Additionally, U760 derailed the rear DP locomotive and rear three cars. Tank car XCRX 210220 was breached and leaked approximately 197,221 liquid pounds of petroleum crude oil which ignited and burned. The fire was contained by emergency responders.

One minor injury was reported by the A420 Conductor in the days following the accident. There were no other injuries and no evacuation. This accident was PTC-preventable.

The weather conditions at the time of the accident were 55 °F and cloudy with heavy rain and high winds.

Equipment damages from the accident totaled \$4,062,987 and the track and signal damages totaled \$353,072.

FRA determined the probable cause of the accident was cause code H222- Automatic block or interlocking signal displaying other than a stop indication – failure to comply.

A contributing cause was identified as cause code H605 – Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal.

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 Canadian National - North America	1a. Alphabetic Code CN	1b. Railroad Accident/Incident No. 921033_
2. Name of Railroad Operating Train #2 Canadian National - North America	2a. Alphabetic Code CN	2b. Railroad Accident/Incident No. 921033_

GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance Canadian National - North America		1a. Alphabetic Code CN	1b. Railroad Accident/Incident No. 921033	
2. U.S. DOT Grade Crossing Identification Number		3. Date of Accident/Incident 4/30/2017	4. Time of Accident/Incident 9:43 AM	
5. Type of Accident/Incident Rear End Collision				
6. Cars Carrying HAZMAT 155	7. HAZMAT Cars Damaged/Derailed 2	8. Cars Releasing HAZMAT 1	9. People Evacuated 0	10. Subdivision Yazoo
11. Nearest City/Town Money, MS		12. Milepost (to nearest tenth) MP112.5	13. State Abbr. MS	14. County LEFLORE
15. Temperature (F) 55 °F	16. Visibility Day		17. Weather Rain	18. Type of Track Main
19. Track Name/Number Single Main		20. FRA Track Class Freight Trains-60, Passenger Trains-80		21. Annual Track Density (gross tons in millions) 42.71
				22. Time Table Direction South

OPERATING TRAIN #1

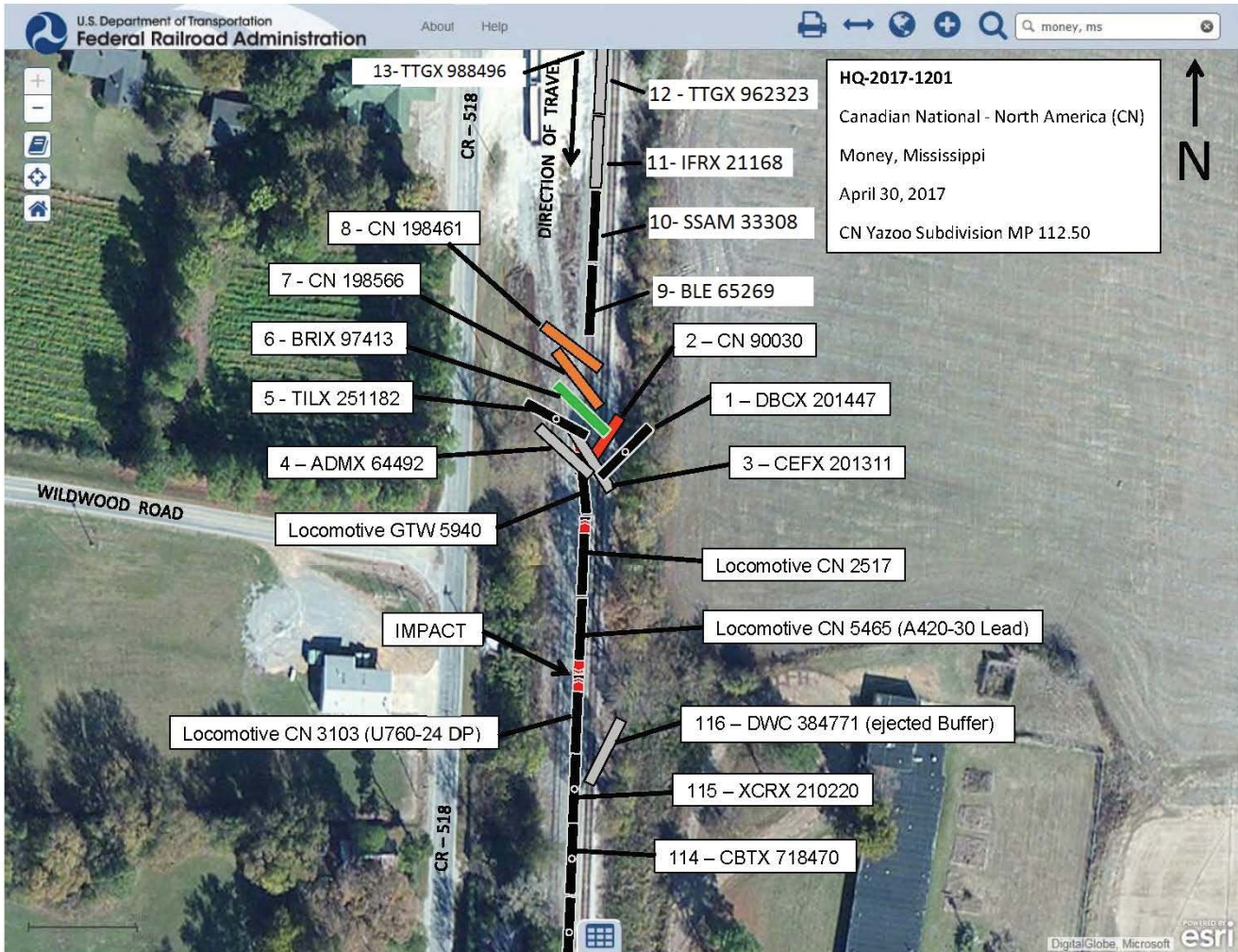
1. Type of Equipment Consist: Freight Train					2. Was Equipment Attended? Yes			3. Train Number/Symbol A 42071 30			
4. Speed (recorded speed, if available) R - Recorded 34.0 MPH E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 8991		6a. Remotely Controlled Locomotive? 0 = Not a 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.)		CN 5465		1		no				0	0
(2) Causing (if mechanical, cause reported)		NA		0		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	0	0	0	(1) Total in Equipment Consist	46	0	99	0	0
(2) Total Derailed	3	0	0	0	0	(2) Total Derailed	7	0	6	0	0
12. Equipment Damage This Consist 2242078			13. Track, Signal, Way & Structure Damage 353072								
14. Primary Cause Code H222 - Automatic block or interlocking signal displaying other than a stop indication - failure to comply.*											
15. Contributing Cause Code H605 - Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal.											
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: 4 Mins: 43		Hrs: 4 Mins: 43	
Casualties to:		22. Railroad Employees		23. Train Passengers		24. Others		25. EOT Device?		26. Was EOT Device Properly Armed?	
Fatal		0		0		0		N/A		N/A	
Nonfatal		1		0		0		27. Caboose Occupied by Crew?		N/A	
28. Latitude 33.650755000				29. Longitude -90.208315000							

OPERATING TRAIN #2

1. Type of Equipment Consist: Freight Train					2. Was Equipment Attended? Yes			3. Train Number/Symbol U 76051 24				
4. Speed (recorded speed, if available) R - Recorded 0.0 MPH E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 16258		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.)		CN 3103		118		no				0	0	
(2) Causing (if mechanical, cause reported)		N/A		0		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	0	0	1		116	0	0	0		
(1) Total in Train	0	0	0	1	(1) Total in Equipment Consist	3	0	0	0	0		
(2) Total Derailed	0	0	0	1	(2) Total Derailed	0	0	0	0	0		
12. Equipment Damage This Consist 1820909				13. Track, Signal, Way & Structure Damage 0								
14. Primary Cause Code H222 - Automatic block or interlocking signal displaying other than a stop indication - failure to comply.*												
15. Contributing Cause Code H605 - Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal.												
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		1		Hrs: 5 Mins: 43		Hrs: 5 Mins: 43		
Casualties to:		22. Railroad Employees		23. Train Passengers		24. Others		25. EOT Device?		26. Was EOT Device Properly Armed?		
Fatal		0		0		0		No		N/A		
Nonfatal		0		0		0		27. Caboose Occupied by Crew?				N/A
28. Latitude 33.650755000				29. Longitude -90.208319000								

SKETCHES

Sketch



NARRATIVE

Circumstances Prior to the Accident*A4207130*

The crew of southbound Canadian National (CN) Train A42071 30 (train 1) consisted of a locomotive engineer and a conductor. The crew went on duty at 5:00 a.m., on April 30, 2017, at Memphis, Tennessee. This was the home terminal for both employees. The Engineer received 16 hours and 44 minutes of off-duty time prior to reporting for duty. The Conductor was off 4 days prior to reporting for duty.

Train 1 consisted of 3 locomotives, 46 loads, and 99 empty cars. It was 8,168 feet long and weighed 8,991 tons. The train originated in Memphis, and was scheduled to travel to New Orleans, Louisiana. Train 1 received a Class 1 air brake test and pre-departure mechanical inspection in Memphis prior to departure from CN Harrison Yard in Memphis at 6:55 a.m., on April 30, 2017.

As train 1 approached the accident area, the Locomotive Engineer was seated at the controls on the west side of the lead locomotive (CN 5465). The Conductor was seated on the east side of the lead locomotive.

U7605124

The crew of southbound CN train U76051 24 (train 2) consisted of a locomotive engineer, conductor, and conductor trainee. The crew went on duty at 4:00 a.m., on April 30, 2017, at Memphis, Tennessee. This was the home terminal for all crew members. The Engineer was off duty for 4 days prior to reporting for duty. The Conductor was off 1 day prior to reporting for duty. The Conductor Trainee was off 26 hours and 45 minutes.

Train 2 consisted of 2 locomotives, 114 loaded tank cars, and 2 loaded (sand) buffer cars. It was 6,869 feet long and weighed 16,258 tons. The train originated in Memphis, and was scheduled to travel to New Orleans. Train 2 received a Class 1 air brake test and pre-departure mechanical inspection in Memphis prior to departure from CN's Harrison Yard in Memphis at 6:09 a.m., on April 30, 2017, and operated southward until stopping at Milepost (MP) 114 to meet northbound Train U75771 30 (passing train) at Money, Mississippi.

Locomotive Engineer on train 2 was seated at the controls on the west side of the lead locomotive (CN 3013). The Conductor was seated on the east side of the lead locomotive.

The accident location is on the Yazoo Subdivision and has a maximum speed of 79 mph for passenger trains and 60 mph for freight trains. Timetable direction of the train was south. Trains are governed and authorized by signal indication. The method of operation is traffic control. The train dispatcher sets routes at control points with intermediate automatic block signals located at intervals between control points.

Railroad operations in the accident area are conducted on a single main track with a passing siding located at Money, between control points at each end. Money siding is between MP 112.3 (North Money) and MP 114.2 (South Money). Money siding is 9,330 feet long and is regularly used to meet trains.

The track at MP 112.50 is single main tangent track with a .08-percent descending grade for

approximately .65 of a mile before the derailment location at MP 112.50.

The weather conditions at the time of the accident were 55 °F and cloudy with heavy rain and high winds.

The Accident

Train 2 was operating on the main track passed the North Money control point (CP) at 9:31 a.m., and proceeded toward the South Money CP stopping in the clear of the switch. The passing train was lined up to enter the south-end of Money Siding causing train 2 to stop, allowing the passing train to clear the South Money switch before proceeding south.

Train 1 was traveling southward at 40 mph, and passed an intermediate signal at MP 107.8. The time was 9:37:20 a.m., and an advance approach signal aspect was displayed. This signal indication requires the train to proceed prepared to stop at the second signal. At this time, the weather consisted of heavy rainfall.

Train 1 continued south and passed the approach signal (yellow over red) for North Money at MP 110.2, at 9:40:30 a.m. traveling 46 mph. This signal requires the train to proceed prepared to stop at the next signal. The Engineer and Conductor on this train both stated that they thought the signal was an advance approach. The rainfall remained heavy.

Train 1 approached the North Money CP at MP 112.3 and both members of the crew stated that they were expecting an advance approach or an approach signal at North Money. The train was traveling approximately 44 mph as it came to the North Money CP. They could not see the signal until they were close to it due to heavy rain, and as they passed the signal, they thought it displayed restricting (flashing red over red). At this time, the crew saw the locomotive on the rear of train 2 and initiated an emergency brake application.

Following the emergency air brake application, train 1 traveled 877 feet and struck the Distributive Power (DP) Locomotive, CN 3103, on the rear of train 2 at MP 112.5 while traveling 34 mph at 9:43 a.m. The rear DP locomotive and three rear cars of train 2 derailed, and the three locomotives and 13 cars of train 1 derailed.

The coupler and wheel set on train 1 (CN 3103) struck and punctured loaded crude oil Tank Car XCRX 210220, which was loaded with 197,221 gallons of petroleum crude oil. The result was a total loss of contents which ignited and burned. CBTX 718470, another loaded petroleum crude oil tank car, was found upright with jacket and tank damage, but it did not leak. CN 3103, XCRX 210220, and CBTX 718470 were destroyed.

The lead locomotive (CN 5465), middle locomotive (CN 2517), trailing locomotive (GTW 5940), and the first 13 cars of train 1 derailed. Locomotives CN 5465, GTW 4940, and the first seven cars of train 1 were destroyed.

The equipment damages from the accident totaled \$4,062,987 and the track and signal damages totaled \$353,072.

Analysis and Conclusions

Analysis-Toxicological Testing: This accident met the criteria for Title 49 Code of Federal Regulations Part 219, Subpart C, Post Accident Toxicological Testing. Both train crew members of train 1 were tested under this authority. All tests were negative.

Conclusion: Alcohol and drugs were not a factor in the accident.

Analysis-Signal System: On Monday, May 1, 2017, a Federal Railroad Administration (FRA) Signal and Train Control (S&TC) Inspector inspected the intermediate signal at MP 107.8 and the approach signal at MP 110.2.

On Wednesday, May 3, 2017, shunt tests replicating the same scenario that occurred on the day of the accident were performed, as well as an inspection of the signal at North Money CP (MP 112.3).

The order of shunting sequence to verify signal aspects and indications during testing observed by FRA's S&TC Inspector is as follows:

1. Lined a SB signal at N. Money (main to main) - Facing Signal Aspect Yellow/Red
1. Put a shunt down on the FT (facing track) - Facing Signal Aspect Yellow/Red
1. Put a shunt down on the OS (over switch) - Facing Signal Aspect Red/Red
1. Put a shunt down on the TM (trailing main) - Facing Signal Aspect Red/Red
1. Picked the shunt up on the FT (facing track) - Facing Signal Aspect Red/Red
1. Picked the shunt up on the OS (over switch) - Facing Signal Aspect Red/Red
1. Left shunt down on TM (trailing main) - Facing Signal Aspect Red/Red
1. Lined a SB signal at N. Money (main to main) - Facing Signal Aspect Flashing Red/Red

The order of the shunting sequence 1–7 replicated the movement of train 2 through North Money and occupying the trailing main between North Money and South Money until the passing train, with a diverging route into the siding at South Money, cleared the CP at South Money. Number 8 replicated the dispatcher lining the facing signal southbound at North Money for train 1.

During the shunt test, all signal aspects and indications at the intermediate signal at MP 107.8, approach signal at MP 110.2, and FAS signal at North Money CP at MP 112.3 worked as intended.

Conclusion: All shunt test, signal aspects, and indications worked as intended and were not causal for this accident.

Analysis-Equipment and Mechanical Inspections: The Locomotive Engineer of train 1 was interviewed by FRA. He reported no issues with train braking or handling. Train air brake test and pre-departure mechanical inspection records were reviewed with no exceptions noted. Reports indicate that 92-day inspections of the locomotives in the consist of train 1 were current. Daily inspection records were also current with no non-complying conditions noted.

Conclusion: Equipment and braking systems were not a factor in the collision.

Analysis-Locomotive Engineer Operating Performance: Signal recorders were downloaded and analyzed by FRA and CN officials. Train 1 passed an approach signal at MP 110.2 and received an “approach restricting” signal. Train 1 received a restricted proceed signal at the CP at MP 112.3 and went by this signal at a train speed of 44 mph. After receiving the restricted proceed signal, train 1 should not have exceeded 20 mph and been prepared to stop in one-half the range of vision, as indicated by CN United States Operating Rule (USOR) 518.

Upon review of cell phone records by FRA inspectors, it was discovered that the personal phone of the Conductor on train 1 appeared to be turned on during the hour preceding the accident. There was no record of phone calls or text during that time. Cell phone records of the Engineer on train 1 do not indicate any activity prior to or during the accident.

Conclusion: The Engineer of train 1 was not in compliance with CN Operating Rules. The Engineer failed to comply with signal indications and restricted speed.

Analysis-Hazardous Materials: FRA inspected the train consists (hazardous materials documentation) for train 1 and train 2 that had been in possession of the crews at the time of the accident. The train consists were compliant.

FRA inspected and conducted damage assessments of Tank Cars CBTX 718470 and XCRX 210220, in positions 114 and 115 of train 2 respectively.

XCRX 210220, built as a DOT111A100W1 in August 2014, received extensive damage. Primary damage was sustained at the A-end (trailing) head where it impacted train 2 DP Locomotive CN 3103. The impact dented and punctured the head and resulted in a complete loss of product and subsequent fire.

CBTX 718470, approved and stenciled as a DOT111A100W1 in March 2015 but built to a DOT117J standard, received extensive damage but was not punctured and did not lose product. Primary damage was sustained at the B-end (trailing) where it impacted the B-end of XCRX 210220. The impact caused the B-end bolster and stub sill to shear and buckle towards the center of the car. The jacket received extensive tearing. The underside of the tank itself at the B-end bolster was dented upwards/inwards about 18 inches. However, the tank was not punctured or opened in any way.

Conclusion: Hazardous Materials was not a causal factor. However, the effect of the accident was intensified by the failure of Tank Car XCRX 210220.

Analysis-Fatigue: FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis, which is equivalent to a blood alcohol content of 0.05. At or above this baseline, we do not consider fatigue as probable for any employee. Software sleep setting 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 a 10-day work history for the two employees involved.

Conclusion: FRA concluded that fatigue was not present and was not a causal or contributing factor in this accident.

Overall Conclusions

The operating crew of train 1 failed to control their train speed in accordance with approach and restricting signal indications. As a result, train 1 struck the rear of standing train 2.

Probable Cause

FRA determined the probable cause of the accident was cause code H222- Automatic block or interlocking signal displaying other than a stop indication – failure to comply.

A contributing cause was identified as cause code H605 – Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal.