Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch

Accident Investigation Report
HQ-2014-9

Wisconsin & Southern Railroad, L.L.C. (WSOR)
Slinger, WI
July 20, 2014

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.

U.S. Department of Transportation
Federal Railroad Administration

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2014-9

TRAIN SUMMARY

1. Name of Railroad Operating Train #1	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
Wisconsin & Southern Railroad, L.L.C.	WSOR	D754514
2. Name of Railroad Operating Train #2	2a. Alphabetic Code	2b. Railroad Accident/Incident No.
Wisconsin Central Ltd. (also Railway)	WC	820595

GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
Wisconsin Central Ltd. (also Railway)	WC	820595
2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident	4. Time of Accident/Incident
	7/20/2014	8:34 PM

5. Type of Accident/Incident
Side Collision

6. Cars Carrying HAZMAT	7. HAZMAT Cars Damaged/Derailed	8. Cars Releasing HAZMAT	9. People Evacuated	10. Subdivision
31	1	1	124	Waukesha

11. Nearest City/Town	12. Milepost *(to nearest tenth)*	13. State Abbr.	14. County
Slinger	N/A122.6N/A	WI	WASHINGTON

15. Temperature (F)	16. Visibility	17. Weather	18. Type of Track
70 ˚F	Dark	Clear	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	55	South

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OPERATING TRAIN #1

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
Freight Train	Yes	T003-20

4. Speed (recorded speed, if available) R - Recorded E - Estimated	Code	5. Trailing Tons (gross exluding 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
3 MPH	R	4431		0

6. Type of Territory

Signalization:

Signaled

Method of Operation/Authority for Movement:

Signal Indication

Supplemental/Adjunct Codes:

Q, N/A

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.)*	TTZX867029	61	yes		0	0
(2) Causing *(if mechanical, cause reported)*	N/A 0	0	no	9. Was this consist transporting passengers?		No

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	2	0	0	0	0	(1) Total in Equipment Consist	22	0	42	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	5	0	0	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
219844	0

14. Primary Cause Code

H306 - Shoving movement, absence of man on or at leading end of movement

15. Contributing Cause Code

H403 - Movement of engine(s) or car(s) without authority (railroad employee)

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: 5 Mins: 34	Hrs: 5 Mins: 34

Casualties to:	22. Railroad Employees	23. Train Passengers	24. Others	25. EOT Device?	26. Was EOT Device Properly Armed?
				Yes	Yes
Fatal	0	0	0	27. Caboose Occupied by Crew?	
Nonfatal	0	0	0		N/A

28. Latitude	29. Longitude
43.000000000	-88.000000000

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OPERATING TRAIN #2

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
Freight Train	Yes	A44481 20

4. Speed (recorded speed, if available) R - Recorded E - Estimated	Code	5. Trailing Tons (gross exluding 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
32 MPH	R	10155		0

6. Type of Territory

Signalization:

Signaled

Method of Operation/Authority for Movement:

Signal Indication

Supplemental/Adjunct Codes:

Q, N/A

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 2191	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 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	0	(1) Total in Equipment Consist	71	0	27	0	0
(2) Total Derailed	3	0	0	0	0	(2) Total Derailed	4	0	0	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
1864948	1100000

14. Primary Cause Code

H306 - Shoving movement, absence of man on or at leading end of movement

15. Contributing Cause Code

H403 - Movement of engine(s) or car(s) without authority (railroad employee)

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: 9 Mins: 34	Hrs: 9 Mins: 34

Casualties to:	22. Railroad Employees	23. Train Passengers	24. Others	25. EOT Device?	26. Was EOT Device Properly Armed?
				Yes	Yes
Fatal	0	0	0	27. Caboose Occupied by Crew?	
Nonfatal	2	0	0		N/A

28. Latitude	29. Longitude
43.000000000	-88.000000000

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CROSSING INFORMATION

Highway User Involved		Rail Equipment Involved
1. Type N/A		5. Equipment N/A
2. Vehicle Speed *(est. mph at impact)* 0	3. Direction *(geographical)* N/A	6. Position of Car Unit in Train 0
4. Position of Involved Highway User N/A		7. Circumstance N/A
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.
N/A

9. Type of Crossing Warning	10. Signaled Crossing Warning	11. Roadway Conditions
1. Gates 4. Wig wags 7. Crossbucks 10. Flagged by crew 2. Cantilever FLS 5. Hwy. traffic signals 8. Stop signs 11. Other *(spec. in narr.)* 3. Standard FLS 6. Audible 9. Watchman 12. None N/A		N/A

12. Location of Warning	13. Crossing Warning Interconnected with Highway Signals	14. Crossing Illuminated by Street Lights or Special Lights
N/A	N/A	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
0	N/A	N/A	N/A

19. Driver Passed Standing Highway Vehicle	20. View of Track Obscured by *(primary obstruction)*
N/A	N/A

Casualties to:	Killed	Injured	21. Driver was	22. Was Driver in the Vehicle?
			N/A	N/A
23. Highway-Rail Crossing Users	0	0	24. Highway Vehicle Property Damage *(est. dollar damage)* 0	25. Total Number of Vehicle Occupants *(including driver)* 0

26. Locomotive Auxiliary Lights?	27. Locomotive Auxiliary Lights Operational?
N/A	N/A
28. Locomotive Headlight Illuminated?	29. Locomotive Audible Warning Sounded?
N/A	N/A

10. Signaled Crossing Warning

1 - Provided minimum 20-second warning
2 - Alleged warning time greater than 60 seconds
3 - Alleged warning time less than 20 seconds
4 - Alleged no warning
5 - Confirmed warning time greater than 60 seconds
6 - Confirmed warning time less than 20 seconds
7 - Confirmed no warning
N/A - N/A

Explanation Code

A - Insulated rail vehicle
B - Storm/lightning damage
C - Vandalism
D - No power/batteries dead
E - Devices down for repair
F - Devices out of service
G - Warning time greater than 60 seconds attributed to accident-involved train stopping short of the crossing, but within track circuit limits, while warning devices remain continuously active with no other in-motion train present
H - Warning time greater than 60 seconds attributed to track circuit failure (e.g., insulated rail joint or rail bonding failure, track or ballast fouled)
J - Warning time greater than 60 seconds attributed to other train/equipment within track circuit limits
K - Warning time less than 20 seconds attributed to signals timing out before train's arrival at the crossing/ island circuit
L - Warning time less than 20 seconds attributed to train operating counter to track circuit design direction
M - Warning time less than 20 seconds attributed to train speed in excess of track circuit's design speed
N - Warning time less than 20 seconds attributed to signal system's failure to detect train approach
O - Warning time less than 20 seconds attributed to violation of special train operating instructions
P - No warning attributed to signal systems failure to detect the train
R - Other cause(s). Explain in Narrative Description

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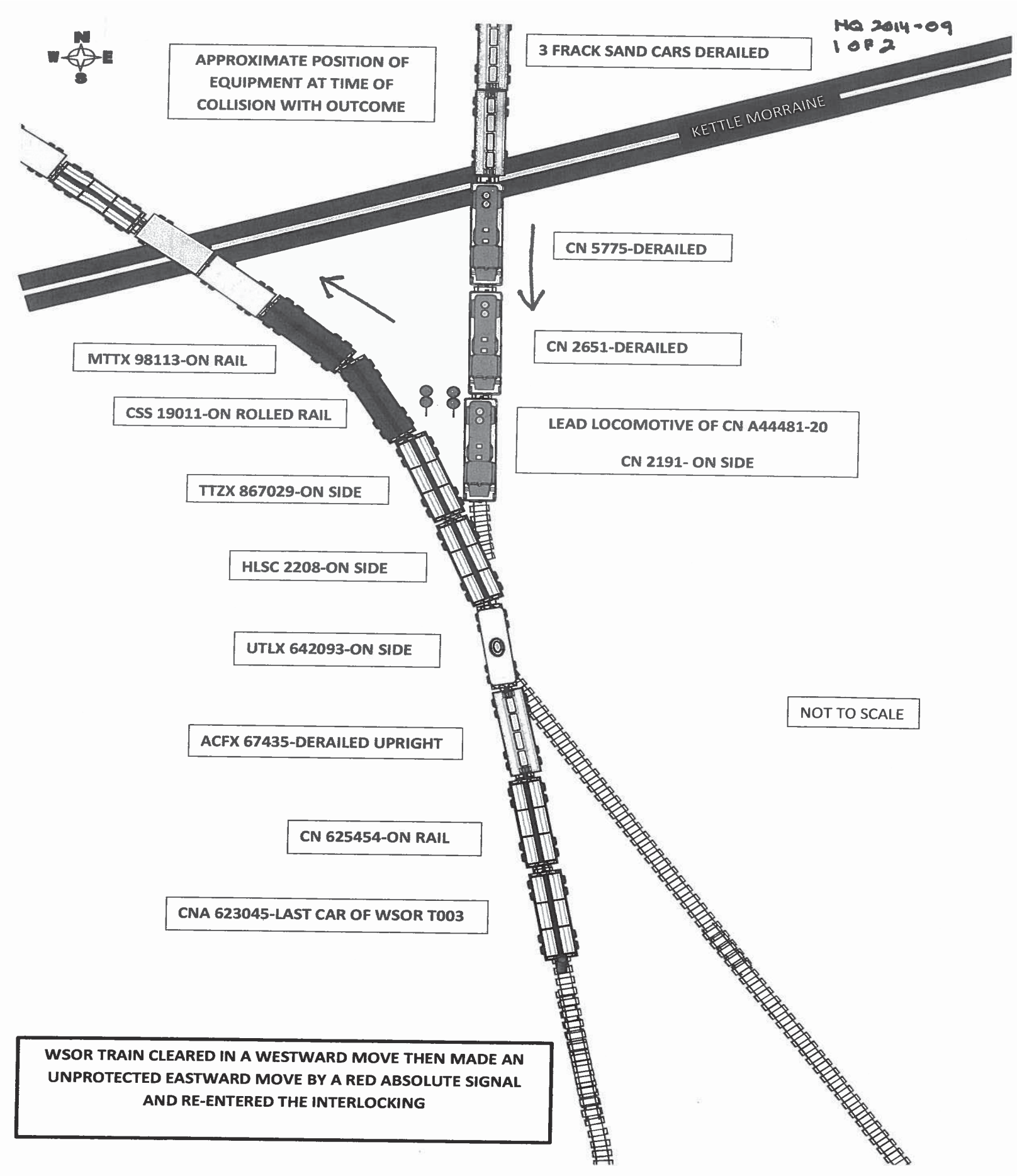
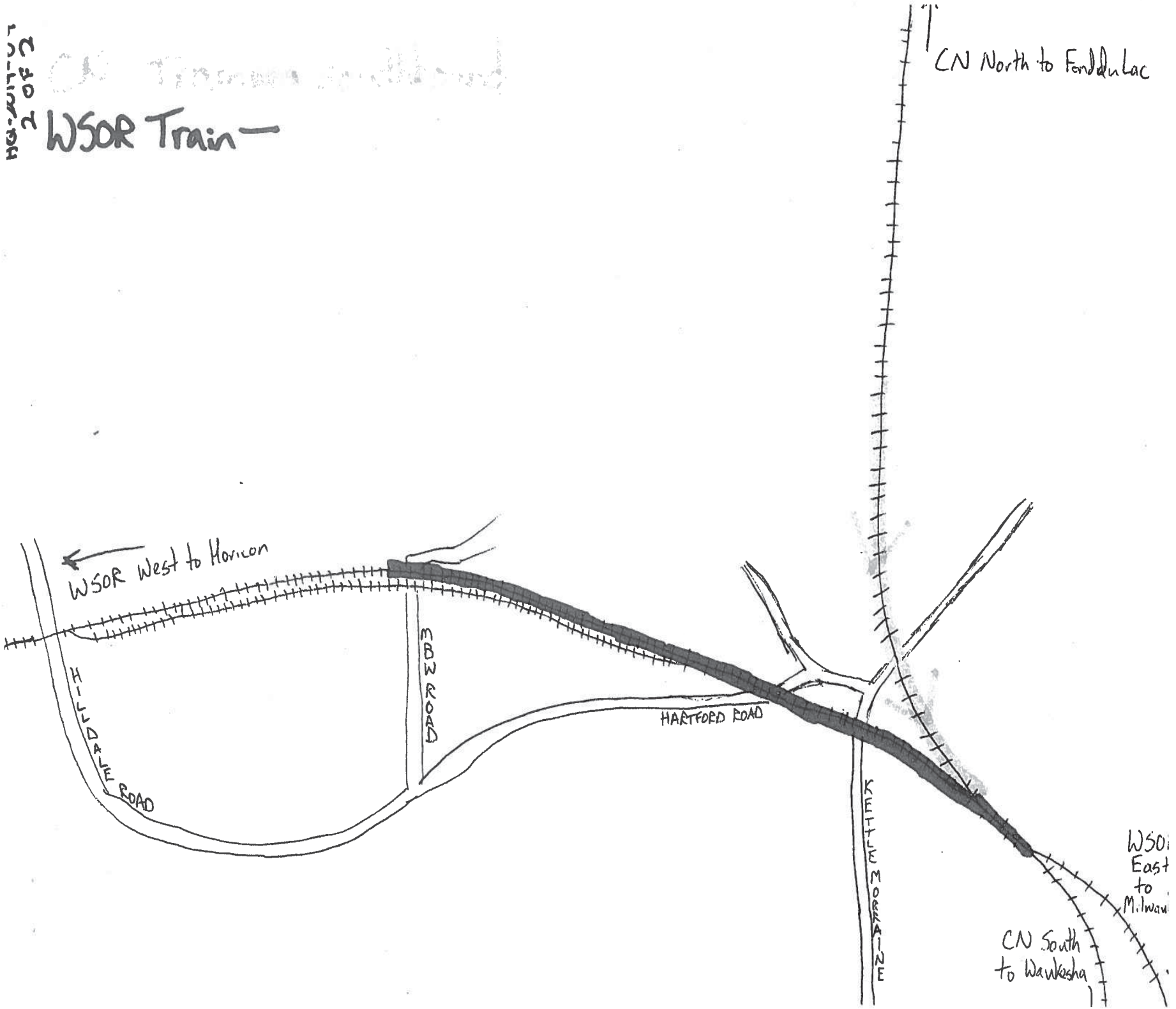
SKETCHES

Sketch



WSOR Train—


CN North to Fond du Lac
WSOR West to Horicon
MBW ROAD
HARTFORD ROAD
HILLDALE ROAD
KETTLE MORAINE
WSOR East to Milwaukee
CN South to Waukesha

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SYNOPSIS

At 8:34 p.m., CDT, July 20, 2014, Wisconsin and Southern Railroad (WSOR) Freight Train T003-20 (T003) made an unprotected eastward movement on WSOR's Milwaukee Subdivision. Train T003 passed an absolute signal displaying a stop aspect and entered Canadian National Railway (CN) main track at Slinger, Wisconsin, at Milepost (MP) 122.57 on CN's Waukesha Subdivision without permission. Southbound CN Freight Train A44481-20 (A444) struck Train T003.

Three locomotives and the first four cars of Train A444 and five cars of Train T003, derailed. The Engineer and Conductor on Train A444 sustained non-life threatening injuries. CN's total reported damage was $1,864,948 to the train consist, and $1,100,000 to track, signals, and structures. WSOR reported $219,844 in total damage.

Train T003 consisted of 2 locomotives and 64 cars of mixed freight. Five cars were derailed; one hazmat car, UTLX 642093, on its side leaked a minimal amount of thick pitch product. Train A444 consisted of a total 98 cars of mixed freight with three locomotives. Three locomotives and the first four cars of frack sand derailed.

Lead Locomotive CN 2191 of Train A444 was destroyed and leaked approximately 5,000 gallons of diesel fuel. The two other locomotives leaked an additional 2,000 gallons of diesel fuel. A precautionary evacuation of 124 people was placed, but lifted 2 hours after the initial time of the derailment.

The probable cause of the accident was Train T003's crew making an unprotected shove in yard limits beyond a signal displaying a stop aspect without permission.

NARRATIVE

Circumstances Prior to the Accident

Train T003-20

The crew of Train T003 included a locomotive engineer and a conductor. They went on duty at 3:00 p.m., CDT, July 20, 2014, at Janesville, Wisconsin. This is the home terminal for both employees. Both employees received 59 hours off duty time prior to reporting for duty.
Their assigned freight train consisted of 2 locomotives, 64 cars; 22 loads, and 42 empties. Their train was 3,873 feet long and weighed 4,431 tons. The train was scheduled to operate to Horicon, Wisconsin. Train T003 received a Class I air brake test at Janesville on July 20, 2014, at 2:30 p.m.

The train departed Janesville at 3:40 p.m., entered Canadian National Railway (CN) at Waukesha, then operated under trackage rights on the main track, CN's Waukesha Subdivision, to Slinger. The timetable direction on CN's Waukesha Subdivision was north. The geographic direction was north. At the location where Train T003 entered WSOR's ([define]) Milwaukee Subdivision at Slinger, WSOR's timetable direction is west and the geographic direction is west. The railroad timetable direction is used throughout this report.

Train T003 entered the Milwaukee Subdivision on WSOR in a westward direction. Yard limits are in effect from MP 117.57 to MP 119.20 where the method of operation becomes Track Warrant Control. An absolute signal is located at MP 117.57 for eastward movement from WSOR's Milwaukee Subdivision to CN's Waukesha Subdivision single main track. The method of operation on the Waukesha Subdivision is Traffic Control System controlled by a Rail Traffic Controller in Homewood, Illinois. Movements in the accident area are conducted on a single main track signaled for bidirectional movement. Maximum track speed is 50 mph.

At the time of the accident, the Engineer of Train T003 was at the control stand on the lead locomotive and the Conductor was on the ground waiting to be picked up.

Train A44481-20

The crew of Train A444 included a locomotive engineer and a conductor. They went on duty at 11:00 a.m., July 20, 2014, at North Fond du Lac, Wisconsin. This is the home terminal for the Engineer. The Engineer received 12 hours and 25 minutes of off duty time prior to reporting for duty. The conductor's home terminal was Kirk Yard, Gary, Indiana, and received 18 hours and 30 minutes off duty prior to reporting for duty.

Their assigned freight train consisted of 3 locomotives and 98 cars of mixed freight. The trains' length was 5,102 feet without locomotives and weighed 10,155 tons. The train was scheduled to operate to Chicago, Illinois, with a final destination of Memphis, Tennessee. The train received a Class I air brake test in North Fond du Lac, on July 20, 2014, at 3:00 a.m.

The train departed North Fond du Lac at 2:26 p.m., and traveled southward to Marsh Siding where, due to locomotive problems, the crew picked up another locomotive. They proceeded southward at 8:11 p.m. At the time of the accident, 8:34 p.m., the crew was in the cab of the lead locomotive.

The Accident

Train A444 was operating south on CN's Waukesha Sub toward Control Point (CP) Slinger. Train T003 was operating in a northward direction on CN's Waukesha Subdivision towards CP Slinger. T003 entered WSOR's Milwaukee Subdivision in a westward direction at CP Slinger, MP 122.6.

Train T003 had an undesired brake application while still occupying CP Slinger. The Conductor walked to the rear of the train and conducted a visual inspection of the cars. He boarded the last car and instructed the Engineer to operate a westward direction. Train T003 was to stop at a road crossing and the Conductor would dismount. Train T003 was to then make a reverse move to allow the Conductor to board the head-end of the train.

Train T003 cleared CP Slinger at approximately 8:24 p.m., and an approach diverging aspect was displayed at CP Slinger for Train A444 to proceed south through the CP on to CN's Waukesha Subdivision. At approximately 8:27 p.m., Train T003 began an unprotected reverse move to pick up the Conductor. At approximately 8:31 p.m., southbound Train A444 encountered and passed the approach signal to CP Slinger at MP 124.3, which displayed an advance approach indication. At approximately 8:32 p.m., the rear car of Train T003 entered the track circuit at CP Slinger which in turn set the southbound home signal at CP Slinger to a stop indication. At approximately 8:34 p.m., the Locomotive Engineer of Train A444 saw the stop signal at CP Slinger and Train T003 occupying the CP. He placed the train in emergency and collided with Train T003.

Analysis and Conclusions

Analysis-Post accident Toxicological Tests

The crew of Train T003 was toxicologically tested under Title 49 Code of Federal Regulations (CFR) Part 219, Subpart C. The following paperwork and collection problems were noted.

Train A444's crew was not tested as they had been treated and released from the hospital prior to testing being completed. A violation for noncompliance of 49 CFR Part 219 was issued to CN.

Conclusion:

Federal Railroad Administration (FRA) Post-Accident Forensic Toxicology result reports indicate the crew of Train T003 had negative test results. Intoxication was not a factor.

Analysis-Signal System

The last signal passed by Train A444 prior to the collision was an advanced approach at MP 124.3 with an indication of, "proceed prepared to stop at second signal". This would inform the crew the signal at CP Slinger would be more favorable than a stop indication. Due to Train T003 making an unprotected reverse move into CP Slinger, the southward home signal at CP Slinger downgraded to a stop indication.

Post-accident inspection/Testing of Signal System

An FRA signal and train control inspector's investigation of the signal system and data downloads from the vital controller at CP Slinger determined the signal system was working as designed.

Conclusion:

The signal system was operating as designed.

Analysis-Locomotive Engineer and Conductor Certificate and Training:

Train T003 Engineer- The Locomotive Engineer was issued a certificate on July 22, 2013, and received a monitoring ride on May 15, 2014, with no exceptions noted. Prior to the accident, the Engineer was decertified on June 11, 2014, for occupying a segment of main track without authority and reinstated on June 26, 2014, after completing remedial training. Documents indicate that part of the training received was on General Code of Operating Rules (GCOR) rule 6.6 "Picking Up a Crew Member," GCOR 6.4 "Reverse Movements," and GCOR 6.5 "Shoving Movements."

Train T003 Conductor- The Conductor was issued a certificate on March 27, 2013, and received a qualifying unannounced operational test in 2013 and 2014. Prior to the

Train T003 Conductor- The Conductor was issued a certificate on March 27, 2013, and received a qualifying unannounced operational test in 2013 and 2014. Prior to the accident, the Conductor was decertified on June 11, 2014, for occupying a segment of main track without authority and reinstated on June 26, 2014, after completing remedial training. Documents indicate that part of the training received was on GCOR rule 6.6 "Picking Up a Crew Member," GCOR 6.4 "Reverse Movements," and GCOR 6.5 "Shoving Movements." The Conductor was operational tested for properly protecting shoving movement a total of seven times in 2014.

Conclusion

Certificate, training, monitoring rides and qualifying operational testing was current and not a factor in the collision.

Analysis-Locomotive Engineer Operating Performance T003

The event recorder data indicates that Train T003's lead locomotive WSOR 4001 and trailing Locomotive WSOR 4002 recorded that they continued their westbound move on WSOR's Milwaukee Subdivision after an undesired brake application. The movement was completed at approximately 8:27:13 p.m.

The eastbound unprotected reverse movement to pick up the Conductor, at or near MBW Road, began at approximately 8:28 p.m., and stopped at approximately 8:34 p.m. The Pneumatic Control System opened placing the train into emergency. The distance traveled was 3,944 feet, train length was 3,873 feet.

Conclusion:

The Engineer on Train T003 was not in compliance with WSOR Operating Rules, GCOR Rule 6.5 and 6.6 and 49 CFR Section 218.99. The unauthorized reverse movement was still within yard limits, and as such, prohibited by WSOR rules and Federal regulations.

Analysis-Locomotive Engineer Operating Performance Train A444

The event recorder data indicates that the Locomotive Engineer on Train A444 was operating in accordance with speed restrictions and signal indications and placed the train into an emergency brake application just prior to impact.

Conclusion:

The actions taken by the engineer on Train A444 were not a factor in the accident.

Analysis-Conductor Operating Performance Train T003

The Conductor, after riding the rear end of the train, instructed the Engineer to stop the westward movement at the wrong road crossing. He then instructed the Engineer to begin the unprotected eastward shoving movement to pick him up.

Conclusion:

The Conductor was not aware of his geographic location, and due to this miscalculation was not in compliance with WSOR Operating Rules and Federal regulations. He failed to comply with provisions of the rules and regulations requiring employees to visually determine that the section of track to be used for the shoving movement is clear. An unauthorized movement was made into interlocking limits. The movement exceeded the length of the train and was still within yard limits, which is prohibited by WSOR rules and Federal regulations.

Conclusion:

The train crew on Train T003 was not in compliance with WSOR Operating Rules, GCOR 6.5 and 6.6, and 49 CFR Section 218.99, in that he failed to comply with: provisions of the rules and regulations in regard to unprotected movements that would prohibit entering or fouling a public or private road crossing, movement was made into interlocking limits, the movement exceeded the length of his train, and the unprotected reverse move was still within yard limits, which is prohibited by WSOR rules and Federal regulations.

Fatigue Analysis:
FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis, which is considered equivalent to blood alcohol content (BAC) of 0.05. At or above this baseline, the agency do not consider fatigue as probable for any employee. Software sleep settings 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 two of employees involved in the accident: the Locomotive Engineer and Conductor of T003.

Conclusion:

FRA concluded fatigue was not a probable cause for the Engineer and Conductor assigned to Train T003.

Probable Cause and Contributing Factors

The probable cause of the accident was Train T003's crew making an unprotected shove in yard limits beyond a signal displaying a stop aspect.