Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch

Accident Investigation Report
HQ-2013-11

Metro North Commuter Railroad Company (MNCW)
Bridgeport, CT
May 17, 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.

U.S. Department of Transportation
Federal Railroad Administration

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2013-11

TRAIN SUMMARY

1. Name of Railroad Operating Train #1	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
Metro North Commuter Railroad Company	MNCW	2013051720
2. Name of Railroad Operating Train #2	2a. Alphabetic Code	2b. Railroad Accident/Incident No.
Metro North Commuter Railroad Company	MNCW	2013051720

GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
Metro North Commuter Railroad Company	MNCW	2013051720
2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident	4. Time of Accident/Incident
	5/17/2013	12:00 AM

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	No.7

11. Nearest City/Town	12. Milepost *(to nearest tenth)*	13. State Abbr.	14. County
Bridgeport	53.3	CT	FAIRFIELD

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

19. Track Name/Number	20. FRA Track Class	21. Annual Track Density *(gross tons in millions)*	22. Time Table Direction
Track 4	Freight Trains-80, Passenger Trains-90		East

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OPERATING TRAIN #1

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
EMU	Yes	1548

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
74 MPH	R			0

6. Type of Territory

Signalization:

Signaled

Method of Operation/Authority for Movement:

Signal Indication

Supplemental/Adjunct Codes:

Q, A, B

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.)*	MNCW9309	2	yes		0	0
(2) Causing *(if mechanical, cause reported)*	0	0		9. Was this consist transporting passengers?		Yes

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	0	0	0	0	0	(1) Total in Equipment Consist	0	8	0	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	0	8	0	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
11000000	100000

14. Primary Cause Code

T213 - Joint bar broken (compromise)

15. Contributing Cause Code

T001 - Roadbed settled or soft

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: 10 Mins: 48	Hrs: 10 Mins: 48

Casualties to:	22. Railroad Employees	23. Train Passengers	24. Others	25. EOT Device?	26. Was EOT Device Properly Armed?	
				No		N/A
Fatal	0	0	0	27. Caboose Occupied by Crew?		
Nonfatal	5	72	0			N/A

28. Latitude	29. Longitude
41.000000000	-73.000000000

U.S. Department of Transportation
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FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2013-11

OPERATING TRAIN #2

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
EMU	Yes	1581

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
24 MPH	R			0

6. Type of Territory

Signalization:

Signaled

Method of Operation/Authority for Movement:

Signal Indication

Supplemental/Adjunct Codes:

Q, A, B

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.)*	MNCW9193	1	yes		0	0
(2) Causing *(if mechanical, cause reported)*	0	0		9. Was this consist transporting passengers?		Yes

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	0	0	0	0	0	(1) Total in Equipment Consist	0	8	0	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	0	1	0	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
7000000	0

14. Primary Cause Code

T213 - Joint bar broken (compromise)

15. Contributing Cause Code

T001 - Roadbed settled or soft

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: 1 Mins: 13	Hrs: 1 Mins: 13

Casualties to:	22. Railroad Employees	23. Train Passengers	24. Others	25. EOT Device?	26. Was EOT Device Properly Armed?	27. Caboose Occupied by Crew?
				N/A	N/A	N/A
Fatal	0	0	0			
Nonfatal	4	50	0			

28. Latitude	29. Longitude

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CROSSING INFORMATION

Highway User Involved		Rail Equipment Involved
1. Type		5. Equipment
2. Vehicle Speed *(est. mph at impact)*	3. Direction *(geographical)*	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	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

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

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

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

SYNOPSIS

On May 17, 2013, at 6:08 p.m., EST, a Metro-North Railroad (MNCW) accident in Bridgeport, Connecticut, involved a derailment and near simultaneous collision with a train on an adjacent track. The derailment and collision resulted in personal injury, a small fire at an overhead catenary substation, equipment damage of approximately $11 million dollars, track damage of approximately $100,000, and severe disruption of service on the North East Corridor.

The accident occurred when MNCW Passenger Train Number 1548, operating timetable eastward direction at 74 mph with a consist of 8 electric multiple-unit (EMU) locomotives, derailed all EMUs as Train Number 1548 traversed a compromise rail joint on Main Track Number 4. When it came to rest, Cars 3 and 4 were leaning to the north in the foul of the dynamic envelope of the adjacent track. Approximately 20 seconds later, MNCW Train Number 1581, operating westward timetable direction at 74 mph on the adjacent Main Track Number 2 with a consist of eight EMU locomotives, collided with derailed Train 1548. The lead EMU 9193 struck the third car, 9246, and impacted the rear-end of the fourth car, 9247, of Train 1548 at 24 mph causing the front truck of EMU 9193 to derail and separate from the car body. The impact tore open a triangular section of the rear end of car 9247. The damage encompassed the area from the rear collision post, the corner post, and the side of the car to the quarter point door. The lead car, 9193, of the Train 1581 sustained damage to the left front corner. The accident occurred in Bridgeport, on the New Haven Line, Subdivision 7. As a result of the accident, 72 passengers and 5 crew members were transported to local hospitals on the day of the accident. MNCW estimated there were about 250 passengers on each train at the time of the accident.

At the time of the accident, it was daylight and cloudy with the temperature reported as 71 degrees F with no precipitation.

FRA investigation determined the accident was caused by a broken suspended compromise rail joint on Main Track Number 4 at MP 53.3. A contributing factor was determined to be poor support under the crossties which allowed vertical movement (pumping) of the joint bar to occur which contributed to the joint bar failure.

NARRATIVE

The crew of Metro-North Railroad (MNCW) Train Number 1548 included a locomotive engineer, a conductor, and three assistant conductors. The entire crew reported for duty at MNCW's New Haven Terminal, New Haven, Connecticut. This was their home terminal. The Locomotive Engineer, the Conductor, and one of the assistant conductors went on duty at 7:20 a.m. (EST). One assistant conductor went on duty at 6:52 a.m., and the other assistant conductor went on duty at 8:20 a.m. All the crew members had received more than the statutory off-duty rest period prior to reporting for duty.

Their assigned Train Number 1548 was a consist of eight electric multiple-unit (EMU) locomotives, model M8. The train originated in Grand Central Terminal, New York, New York, and was scheduled to travel to its final destination of New Haven Station, New Haven. The train departed Grand Central Terminal on time and made multiple station stops en route. The equipment had received all required inspections and tests prior to starting its daily operating cycle.

As the eastbound Train Number 1548 approached the accident area, the Locomotive Engineer was seated at the controls on the south side of the leading EMU locomotive. The Conductor was working in Cars 7 and 8 (the rearmost cars). One assistant conductor was working Cars 3 and 4, while the other two assistant conductors were working Cars 1 through 6.

In the area of the accident, the New Haven Line consists of four main line tracks. The tracks are geographically oriented in a north to south direction and timetable east to west. The tracks are numbered from north to south 3, 1, 2, and 4. Tracks 3 and 1 are primarily used for westbound movement and Tracks 2 and 4 are primarily used for eastbound movement. The Milepost (MP) numbering increases in the eastward direction. Approaching the accident site from the west, MP 50.0 to MP 54.0, Track 4 undulates between MP 53.0 to MP 53.8; the grade ascends 0.46 percent and the tracks travel under the Interstate 95 Bridge. There is a curve at MP 53.1 that is 1,290 feet long and curves to the right 1.05 degrees with a super-elevation of 1.5 inches.

The track center spacing in the area of the accident at MP 53.3 is less than 13 feet. Between MP 48.8 to MP 55.1, both Tracks 1 and 3 were out of service for catenary wire and bridge replacements at the time of the accident.

Train Number 1548 made a station stop at the Fairfield Metro Station, Fairfield, Connecticut, which was the last station stop prior to the derailment. When Train Number 1548 departed the station, the event recorder shows it accelerated to a speed of 74 mph, the Engineer acknowledged the cab signals twice and he manipulated the master controller to minimum power setting and then returned to maximum power setting about 12 seconds before the accident. The train was operating on Track Number 4 at 74 mph when the derailment occurred. MNCW established the tracks as Class 4 with a maximum allowable operating speed for passenger trains of 80 mph with a timetable speed of 70 mph between MP 52.5 to MP 54.7 as designated in the current MNCW Timetable Number 1 effective April 7, 2013. There were no posted speed restrictions in effect at the time of the accident.

The Accident:

As Train Number 1548, operating at 74 mph, approached the right-hand curve under the Interstate 95 Bridge at MP 53.3, the Locomotive Engineer said he thought he saw something "unusual" on the left rail of the track on which he was operating. Specifically, he said, "at the last second, I might have [seen] something was unusual that caught my eye, that might have been a broken rail, and by the time I saw it, I was on top of it. It was definitely too late to stop or anything and then the next thing that I know, the cars behind me were on the ground." There was a compromise rail joint in the left (north) rail at the location he referenced. The lead car passed over this rail joint without incident but the second car derailed and pulled the rear truck of the lead EMU off the track. As the train continued forward, it continued to derail as each wheel traversed the rail joint. As the trailing cars derailed they shifted left of track center, breaking the brake pipe which initiated an emergency brake application. Train Number 1548 careened through 714 feet of rail bed before coming to rest with the third and fourth cars leaning to the north in the foul of the dynamic envelope of the adjacent track, Main Track Number 2. All the cars were derailed and remained upright.

When the train came to rest, the engineer, who was seated at the controls in the south side of the cab, looked back out his side window and saw passengers evacuating onto the south side of the right-of-way. He then initiated an emergency broadcast, "Emergency - Emergency - Emergency" to which he did not receive a response from the Rail Traffic Controller (RTC). He made two additional emergency broadcasts. While in the cab at the radio he observed a westbound train pass him on the adjacent Track Number 2 and then strike one of the cars in his train behind him.

Approximately 20 seconds after Train Number 1548 derailed and came to rest, westbound Train Number 1581 approached the location where eastbound Train Number 1548 was derailed on Track 4. The Locomotive Engineer of westbound Train Number 1581 saw the overhead catenary wires fall down and "explode" and saw a large cloud of smoke/dust. He applied the emergency brake, felt the train braking and as his train was decelerating he heard an emergency call broadcast over the radio. Train Number 1581 slowed to 24 mph before it sideswiped Cars 3 and 4 of the derailed eastbound Train Number 1548.

The Engineer of derailed Train Number 1548 exited his cab and assisted passengers. He then walked back to the rear of the train to survey the track area where he suspected the derailment occurred.

The Conductor was in the rear of the train and heard the emergency broadcast from Train 1548 (his own train) over the radio. He cut his hand on the plastic lens to access the emergency door release, but was able to assist in the passenger evacuation.

An assistant conductor was positioned in the fourth car (9247) and when the Train Number 1548 derailed he was knocked to the floor, but was also able to assist the passengers.

Another assistant conductor was in the sixth car (9311) and was collecting tickets. He described the train starting to shake and fill with what appeared to be smoke, which became very thick. He was knocked down to the floor in the middle of the car. There was panic and screaming, and violent shaking of the car. He engaged passengers directing them to "come this way" (to the south side of the train) to stop them from evacuating onto the north side of the train. He enlisted the help of fellow passengers (two men) to assist with the evacuation onto the right-of-way.

An assistant conductor was in the third car (9246) walking towards the end door heading to the second car when Train Number 1548 started to shake. She was knocked to the floor and after the train stopped and settled she said there was a lot smoke in the car. She went to the radio to initiate an emergency broadcast and heard one already being made. She helped open windows to clear out the smoke/dust and moved passengers up through the train to evacuate out the first door of the train. She showed passengers how to use the handholds and dismount the train. She was later transported to the New Haven Hospital with shoulder and back pain.

The crew described a state of panic among the passengers, but the evacuation was orderly and first responders arrived within minutes.

Circumstances prior to the collision, Train Number 1581:

The crew of MNCW Train Number 1581 included a Locomotive Engineer, a conductor and two assistant conductors. The Locomotive Engineer and the Conductor reported for duty at MNCW's New Haven Terminal, New Haven, at 4:55 p.m. One of the assistant conductors went on duty at 12:35 p.m. in MNCW's Stamford Yard, Stamford, Connecticut, and one assistant conductor went on duty at 6:37 a.m., at MNCW's Grand Central Terminal, New York. All the crew members had received more than the statutory off-duty rest period prior to reporting for duty.
There was also an off duty MNCW assistant conductor on board the train. He was commuting to his starting location of Stamford.

Their assigned Train Number 1581 was a consist of eight EMU locomotives, model M8. The train originated in New Haven Terminal, New Haven, and was scheduled to travel to its final destination of Grand Central Terminal, New York. The train departed New Haven Terminal on time and made multiple station stops en route. The equipment had received all required inspections and tests prior to starting its daily operating cycle.

As the westbound train approached the accident area, the Locomotive Engineer was seated at the controls on the north side of the leading EMU locomotive. The Conductor was working in the seventh car collecting tickets. The assistant conductors were working Cars 1 through 6.

In the area of the accident the New Haven Line consists of four main line tracks. The tracks are geographically oriented in a north to south direction and timetable east to west. Tracks are numbered from north to south 3, 1, 2, and 4. Tracks 3 and 1 are primarily used for westbound movement and Tracks 2 and 4 are primarily used for

west. Tracks are numbered from north to south 3, 1, 2, and 4. Tracks 3 and 1 are primarily used for westbound movement and Tracks 2 and 4 are primarily used for eastbound movement. The milepost numbering increases in the eastward direction.

Approaching the accident site from the east on Track Number 2, in the direction of Train Number 1581 and starting at the Bridgeport Station (MP 55.4) there are in succession: tangent track for 1,584 feet; a 4-degree, 29 minute curve to the right for 2,204 feet with 4 inches of super-elevation in the south rail; tangent track for 7,255 feet; a 1.05-degree curve to the left for 1,290 feet with 1.5 inches of super-elevation in the north rail. The track is tangent for 626 feet west of the 1.05 degree curve. Between MP 55.1 to MP 48.8 both Tracks 1 and 3 were out of service for catenary wire and bridge replacements at the time of the accident. MNCW established the tracks as Class 4 with a maximum allowable operating speed for passenger trains of 80 mph with a timetable speed of 70 mph between MP 52.5 to MP 54.7 as designated in the current MNCW Timetable Number 1 effective April 7, 2013. There were no speed restrictions in effect on Track Number 2 at the time of the accident.

The Collision:

While operating on Track Number 3, Train Number 1581 made a station stop at the Bridgeport Station, Bridgeport, Connecticut, which was the last station stop before the accident. The train departed the station at 5:58 p.m., and crossed over to main Track Number 2 at Control Point (CP) 255. Review of the event recorder shows it accelerated to a recorded speed of 74 mph and during the minute before the accident, the Engineer acknowledged the cab signals twice and made multiple manipulations to the master controller. The collision occurred at 24 miles per hour. While traveling on Track Number 2, the Engineer of Train Number 1581 observed eastbound Train Number 1548 traveling around a curve on Track Number 4.

As Train Number 1581 approached the location where eastbound Train Number 1548 was derailed on Track 4 (the adjacent track), the Locomotive Engineer of westbound Train Number 1581 saw the catenary wire moving and applied a full service brake application. He then looked ahead again at the catenary wire and saw the overhead catenary wires fall down and “explode” and saw a large cloud of smoke. He applied the emergency brake, and felt the train decelerating.

According to event recorder data, at 6:01:14 p.m., the Engineer made a full service brake application, and one second later at 6:01:15 pm he made an emergency brake application. As his train was decelerating he heard an emergency call over the radio. He thought the emergency call was from Train Number 1548 ahead of him. At 6:01:35, Train 1581 slowed to 24 mph and sideswiped the third car and collided with the fourth car (9247) of the derailed eastbound Train Number 1548. The lead EMU (9193) of Train Number 1581 derailed and the front truck separated from the car body.

When the train came to rest, the Engineer who was standing at the controls in the north side of the cab had sustained an injury to his head and right side of his body as he was thrown against the wall of the cab.

At the time of the collision, the Conductor was collecting tickets in the seventh car (9191); he felt the impact and was knocked down. He got up and went to the last car (9190) and tried to contact the Engineer with no success. He made an announcement over the public address (PA) system to the passengers. He then asked an off duty employee who was onboard the train to assist by making additional announcements. His assistant conductor met with him in the eighth car (9190) as well. He also gained the assistance of a passenger who was an off duty EMT and exited the rear of the train to circle around to the head end to check on the status of his engineer. While on the ground he interacted with various crew members of Train Number 1548 as he circled the accident scene to gain access to the lead car of his own train (Train Number 1581). When he reached the head end he met with his Engineer who he thought needed medical attention.

An assistant conductor was working Cars 1 through 6 with another assistant conductor. He instructed passengers to remain calm while he investigated. Passengers seated in the third car were unaware of what was going on and were asking questions as to when they would be underway again. He proceeded forward in the train where he met the Engineer who emerged from the cab with a cut on his arm. After confirming with each other that they were not seriously injured, he headed back to find the conductor. He said emergency responders arrived “very quickly” and he helped to evacuate the train. He did not recall seeing the other assistant conductor (who had sustained injuries and was hospitalized for several days) during his trip forward to the Engineer and back to the conductor.

An off duty MNCW employee who holds a position as an assistant conductor and is also qualified as a conductor was riding on the last car (Car 8; 9190) of Train Number 1581 commuting to his starting location in Stamford. He heard the emergency brake application just out of Bridgeport Station and approximately 5 to 10 seconds later he heard a loud bang. After the train stopped he looked out the window and could see a large cloud of dust. The Conductor of Train Number 1581 came into the car and asked him to assist. He assisted by first making passenger announcements over the public address system telling passengers that “the train is being delayed indefinitely, and to remain seated” The passengers were moved forward through the train to evacuate to the north side of the second car (9192) due to the fact that the rear of the train was on a bridge. He swept the cars with the first responders to ensure nobody was left behind. The evacuation was reported as very orderly.

Post-Accident/Incident Investigation:

The Federal Railroad Administration’s (FRA) post-accident investigation included an in-depth review of all aspects of the train operation including equipment, signal, operating practices, human factors and track. Inspection of the equipment included review of records of tests and maintenance performed prior to the accident. Inspection of the signal system included review of records of tests and maintenance performed prior to the accident. Review of the train operation for compliance with the railroads applicable rules and timetable instructions was performed. The crews’ status with regard to physical exams, training and hours of service was established. Measurements of the post-accident track geometry were made and previous automated track geometry records in the vicinity of the derailment were reviewed. MNCW Track Inspection Reports, Periodic Continuous Welded Rail (CWR) Joint Bar Inspection Reports and Rail Inspection Records were reviewed.

The National Transportation Safety Board (NTSB) conducted an independent investigation of this accident concurrently with FRA. These investigations were supported by parties or public entities as follows:

MNCW Railroad
MTA Police
Connecticut Department of Transportation
Kawasaki Heavy Industries, Ltd.
Volpe National Transportation Systems Center
Association of Commuter Rail Employees
Brotherhood of Locomotive Engineers and Trainmen
United Transportation Union

Analysis and Conclusions:

Analysis: As parties to the investigation, a representative from the NTSB and representatives from MNCW and FRA reviewed the derailment area and determined the point of derailment (POD) to be located on Track Number 4, north rail, at MP 53.3 (GPS coordinates 41.16711 degrees Latitude: -73.22015 degrees Longitude). At this location there was a pair of compromise joints bars that were broken in the center. The gage side compromise joint bar appeared to have a completely rusted fracture face with metal transfer on the fracture face from the web of the adjoining rail. The field side compromise joint bar appeared to have an overstress failure. The east rail end appeared to have impact batter where two pieces of the rail head were broken out. There were wheel flange marks emanating from the location of the broken compromise joint bars to the general pileup. The east rail (with two halves of the broken compromise bars) was separated from the west rail (and the other two halves of the broken compromise bars) by 4 feet and 8.5 inches.

The group noted that the compromise joint bars had been installed on a plug rail insulated joint. The insulated plug rail was a 136-pound RE VT insulated joint plug, serial number 462185, and constructed by Koppers with rail manufactured by Mittal in October 2011. The insulated joint plug measured 30 feet and 10.5 inches in length and it was attached on either end by compromise joint bars to track constructed with 131.22-pound OH CWR manufactured by Carnegie USA in June 1946.

The group also noted that there was a difference in rail height between the 131.22 and the 136 pound rails. This difference in rail height was compensated for by the compromise joint bars that match up the rail head profiles. The cross ties under the joint were placed near each rail end creating a suspended joint. The top of the ties were at different heights. A straight edge was placed across the tops of the ties to determine the difference in heights and the distance was measured at 1.5 inches.

Conclusion: The review of the derailment area disclosed that the POD was located on Track Number 4, north rail, at MP 53.3 (GPS coordinates 41.16711 degrees Latitude: -73.22015 degrees Longitude). The compromise joint bars located on the west end of the insulated joint plug were broken in the center. The gage side compromise joint bar had a completely rusted facture face and the field side compromise joint bar appeared to have an overstress failure. The broken compromise joint bars are the probable cause of the derailment.

of the derailment.

Analysis: Post-accident track geometry measurements were taken for 49 stations west of the POD. The stations were laid out at 15.5 feet apart and a 31-foot and 62-foot cord was used to collect mid-ordinate measurements. Crosslevel and gage measurements were also taken. During the walking inspection it was noted that the track was box anchored for CWR joint compliance at every tie for 195 feet per § 213.119 requirements. FRA took no exceptions to the track geometry measurements approaching the POD.

Track centers were also taken at the POD and they were discovered to be:

• Between Track Number 3 and Track Number 1: 12 feet 3 inches
• Between Track Number 1 and Track Number 2: 12 feet 3.5 inches
• Between Track Number 2 and Track Number 4: 12 feet 4 inches.

A representative from the NTSB and FRA reviewed the automated track geometry inspection records of the New Haven Line in the vicinity of the derailment. The review disclosed MNCW conducted two automated track geometry inspections of the New Haven Line. The last automated track geometry inspection was conducted on January 23, 2013, and the previous was conducted on October 18, 2012. Neither of the automated track geometry inspection records indicated an exception for the track in the vicinity of the derailment.

Conclusion: The review of the post-accident track geometry measurement and automated track geometry records in the vicinity of the derailment site disclosed that the track geometry was in compliance with the Federal Track Safety Standards (FTSS) for Class 4 track. Track geometry in the vicinity of the derailment site was not a factor in this derailment.

Analysis: Previously on March 12, 2013, FRA had conducted a routine compliance inspection of the MNCW Daily Track Inspection Reports for Subdivision Number 7, of the New Haven Line, MP 41.6 to MP 72.9, from July 1, 2012, to January 31, 2013. FRA did not take any exception to the MNCW Daily Track Inspection Reports for Subdivision Number 7 of the New Haven Line.

On May 21, 2013, FRA conducted a routine compliance inspection of the MNCW Daily Track Inspection Reports for Subdivision 7, of the New Haven Line, MP 41.6 to MP 72.9, from January 1, 2013, to May 17, 2013. FRA did not take any exception to the MNCW Daily Track Inspection Reports for the New Haven Line. FRA noted that the MNCW Daily Inspection Report dated January 28, 2013, indicated a broken joint bar at MP 68.11 on Track Number 2. FRA further noted that the MNCW inspectors took the appropriate remedial action by placing a speed restriction on the broken joint bar and replacing it.

FRA discovered that MNCW Subdivision Number 7 was inspecting the New Haven Line three times a week by hi-rail and/or walking. FRA noted that the MNCW inspectors mostly rode on Track Number 2 and inspected Track Number 4 from Track Number 2. FRA also noted that this practice was in compliance with § 213.233(b)(1)(3) of the FTSS4. FRA noted that the frequency at which MNCW was inspecting the New Haven Line was more often than that required by the FTSS. The last track inspection prior to the derailment was performed on May 15, 2013, by hi-rail. The inspection noted an insulated joint with hanging ties and pumping under load at catenary Number 734 on Track Number 4. This was the same insulated joint plug rail that was involved in the derailment.

Conclusion: The inspection of MNCW Track Inspection Reports revealed that MNCW was in compliance with the FTSS for frequency of inspections. In fact MNCW was inspecting the New Haven Line more often than the FTSS required. The MNCW inspectors were reporting exceptions to the FTSS and taking the required remedial action. The last track inspection prior to the derailment was performed on May 15, 2013, and did note some vertical movement of the insulated joint. The vertical movement of the insulated joint may be contributing facture in the failure of the compromise joint bars.

Analysis: On May 20, 2013, FRA reviewed the CWR Joint Bar Fracture Reports from May 1, 2012, to December 31, 2012, for previously reported joint bar failures. The review discovered one CWR Joint Bar Fracture Report describing a failed joint bar at MP 59.04 on October 01, 2012.

On May 21, 2013, while FRA was reviewing MNCW Daily Track Inspection Reports for Subdivision Number 7 of the New Haven Line, FRA discovered two CWR Joint Bar Fracture Reports. The first report dated March 20, 2013, indicated that a joint bar had failed at MP 57.8, on Track Number 4 and was replaced. The second report dated April 4, 2013, indicated that both compromise bars at MP 53.25 had failed on Track Number 4 and both bars were replaced. These were the same compromise joint bars that were discovered broken in the center at the POD.

FRA also reviewed the Periodic CWR Joint Bar Inspection records for Subdivision Number 7 of the New Haven Line. FRA discovered there were three inspection reports. The reports revealed that two of the inspections were conducted on October 16, and October 18, 2012, and the third inspection was conducted on April 4, 2013. The October 2012 inspection reports revealed that there were no broken joint bars reported. The April 4, 2013, inspection report noted two exceptions. The first exception was a defective insulated joint at MP 51.6 that was replaced and the joint was surfaced. The second exception noted that both compromise bars at MP 53.25 were broken. These were the same compromise joint bars that were discovered broken in the center at the POD. The inspection report also noted that the bars were replaced by the MNCW track inspection foremen. The MNCW foremen also re-plugged and re-spiked the ties and hand tamped the joint.

Conclusion: The review of MNCW CWR Joint Bar Fracture Reports and Periodic CWR Joint Bar Inspection records disclosed that MNCW was in compliance with the FTSS § 213.119(g)(6) and (7)(ii) for the frequency of inspection and the reporting of exceptions discovered in CWR joints. Note: The compromise joint bars that were discovered broken in the center at the POD were also reported as broken as a result of an inspection performed on April 4, 2013.

Analysis: On May 20, 2013, FRA inspected the rail inspection records for MNCW Subdivision Number 7 of the New Haven Line from January 1, 2013, to May 1, 2013. The inspection revealed MNCW had conducted a rail inspection for internal defects through the derailment area on February 5, 2013. The inspection discovered two rail defects: a Head-Web separation in the joint bar area of 1-inch was reported at MP 53.2 and a defective plant weld of 5 percent was reported at MP 53.1. Both rail defects were repaired on the day they were discovered.

On May 21, 2012, FRA inspected the MNCW rail inspection records for Subdivision Number 7 for the calendar year 2012. FRA took no exceptions to the rail inspection records.

Conclusion: The inspection of MNCW Rail Inspection Records revealed that on February 5, 2013, two rails with internal defects were discovered in the vicinity of the derailment site. The record further indicates that the rails were replaced on the same day they were discovered. The inspection of the rail inspection records also revealed that MNCW was in compliance with the FTSS.

Analysis: A review of the Track Chart indicated that the following major track work was performed:

• 131-pound fit rail was installed in 1975
• Wooden ties were installed in 2005
• Surfacing was performed in 2005 with a Jackson Tamper
• Rail grinding was performed in 1995
• Ballast cleaning was performed in 2004

Conclusion: The review of the track chart revealed the last major track work, tie installation, and surfacing that could have affected the track in the area of the derailment, was performed 8 years ago. Major track work was not a factor in this derailment.

Analysis: A representative from the NTSB and representatives from MNCW and FRA conducted interviews of MNCW's Engineer of Track, Track Supervisor, Assistant Track Supervisor, and the two Track Inspection Foremen at the MNCW Bridgeport Headquarters, Bridgeport.

The interviews of the Track Inspection Foremen revealed the majority of track inspections were conducted from the two inside tracks and all four tracks were simultaneously inspected by the two track inspectors riding together. When the track inspectors did get an opportunity to inspect from the outside tracks they had to rush along. The inspectors stated that if they felt that they did not have enough time to do a proper inspection they would inform the RTC, they would wait until they could get more time, or they would walk the territory. When the track inspectors were asked which track they inspected from on May 15, 2013, neither were sure. However, the MNCW Form M, Movement Permit record from the dispatcher's office showed that they were given permission to occupy Track Number 2 from CP 242 to CP 261. The track inspectors were asked if the compromise joint bars they used to replace the broken compromise bars they discovered on April 4, 2013, were new or used. They had conflicting statements; one said new and the other said used. When asked about the number of joint bars the inspectors had in their inspection territory, only one of the track inspectors had an inventory

said new and the other said used. When asked about the number of joint bars the inspectors had in their inspection territory, only one of the track inspectors had an inventory of the joint bars. The inspector stated there were 161 joint bars and 8 of those were compromise joint bars.

The interviews of the Track Supervisor and the Assistant Track Supervisor revealed that the Track Supervisor had been in his present position about a month and the Assistant Track Supervisor had been in his position about 2 years. The Assistant Track Supervisor stated that he knew of the problem with track time as the track inspectors had brought this to his attention and that he experienced this when he rode with them twice a month. The Assistant Track Supervisor further stated that he had instructed his track inspectors to go back and walk the areas they felt required a closer inspection.

When asked about joint elimination, the Assistant Track Supervisor stated he had a track welding gang working in his territory. The Assistant Track Supervisor stated that the gang tries to weld 4 joints per day, but that is still not enough to reduce the number joint bar rail connections because more are created through maintenance repairs and construction.

MNCW managers had stated during their interviews that since the accident they were inventorying the number of joint bars and compromise joint bars on the New Haven Line. The inventory is not complete, but so far 84 compromise joints have been identified. The MNCW managers stated that the compromise joints are being prioritized for welding so the bars would be eliminated.

Conclusion: The interviews with MNCW's Engineer of Track, Track Supervisor, Assistant Track Supervisor, and the two Track Inspection Foremen revealed the majority of track inspections were conducted from the two inside tracks with a hi-rail vehicle and on occasion there is a problem with getting enough track time to do a proper inspection. MNCW Assistant Track Supervisor is aware of the problem and has experienced it himself. The Track Supervisor and the Assistant Track Supervisor have instructed the Track Inspection Foremen to walk any areas they feel need a closer inspection. MNCW is in compliance with the FTSS as the FTSS allow this procedure for high density commuter railroad lines. This practice may be a contributing factor in the derailment because the inspectors cannot see the joint bars behind the rails on the adjacent tracks.

The NTSB sent the following items to its laboratory in Washington, DC, for further analysis:

- 1-44-inch piece of rail with fractured compromise bars attached
- 1-82-inch piece of rail with fractured compromise bars attached
- 3-Broken track bolts
- 1-Pair compromise joint bars
- 1-Pair of exemplar compromise joint bars
- 4-New track bolts
- 2-Pieces of broken rail head

The NTSB Lab performed detailed examination of the fracture face on the gage and field side of the compromise joint bars, which revealed crack arrest marks indicative of fatigue cracking.
Many areas on the fracture face showed mechanical damage as a result of relative movement between the mating fracture faces.

Examination of two pieces of the rail head fragments which fractured from the plug rail revealed a fracture that extended between the web and head portion. The fracture face of the web contained a river pattern typical of overstress separation that emanated from the field side inner transition radius located between the underside of the head and web.

The fracture face in the general area of the field side inner transition radius was obliterated by mechanical damage as a result of relative movement between mating fracture faces. The river pattern fracture was through the cross section of the web and head. The fracture face of the plug in the area of the head showed batter deformation damage. The NTSB laboratory report is attached.

Analysis: 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 the employees involved.

Conclusion: Upon analysis of fatigue-related information, FRA concluded that fatigue was not probable for the engineers and conductors of trains 1548 and 1581.

Analysis: MNCW employee hours of service records. MNCW utilized a paper form to maintain an hours of duty record as required pursuant to Title 49 Code of Federal Regulations (CFR) Part 228. MNCW employees were required to update their record on a two week cycle. This accident occurred at the start of the two week cycle and therefore hours of duty records were unavailable for review.

Conclusion: The investigation determined hours of duty was not a factor in this accident. All the crew members were on their regular assignments and their work schedules were available for review. MNCW has since stopped using a paper process to record hours of duty and has adopted an electronic hours of duty form/record, which went into effect at 00:01 hours, on March 5, 2014.

Analysis: This passenger train accident resulted in reportable injuries and exceeded FRA damage criteria threshold of $9,900 and therefore met the criteria for 49 CFR Part 219, Subpart C, Post-accident toxicological testing. In accordance with Federal regulations, following the accident operating crewmembers from both commuter trains were required to undergo post-accident toxicological testing. This required all crew members from both trains directly involved in the accident to be tested. MNCW only tested three of the nine crew members from Trains 1581 and 1548.

Conclusion: Drug or alcohol use was not a factor in this accident. Specimens were collected from the Engineer and Conductor of the Train Number 1581 and the Engineer of Train Number 1548. Their results were negative. The Conductor of Train 1548 and the assistant conductors from both trains were not tested. The investigation determined post-accident toxicological testing performed under FRA post-accident authority was not conducted properly. MNCW failed to properly test the crew members in accordance with 49 CFR Part 219.

Analysis: This accident met the criteria for 49 CFR Part 219. In accordance with Federal regulations, following the accident operating crewmembers from both commuter trains were required to undergo post-accident toxicological testing. MNCW's Director, Operating Practices Rules oversees the railroads drug and alcohol program. He concluded that the engineers were the only crewmembers who needed to be toxicologically tested.

Conclusion: Drug or alcohol use was not a factor in this accident. Specimens were collected from the Engineer and Conductor of the Train Number 1581 and the Engineer of Train Number 1548. Their results were negative. The Conductor of Train Number 1548 was not tested.

Analysis: Review records of equipment periodic inspections, tests and qualifications of personnel performing these tests and inspections.

Conclusion: Review of pertinent records show that all the EMUs received proper periodic, interior and exterior calendar day inspections and Class 1 brake tests by qualified maintenance persons.

Analysis: The wheels from Train Number 1548 that had been on the north rail were inspected as closely as possible. Only one wheel displayed anything of note.

Conclusion: The right Number 3 wheel on Car 9309 had a transverse abrasion mark about 3/8-inch long in the center of the tread. The abrasion was about 1/8-inch deep and appeared to have been freshly made. This mark on the wheel may have been caused by the condition of the compromise rail joint.

Analysis: Both trains were given a cursory inspection at their initial point of rest. Nothing significant was observed on any undercarriage component because they were obscured by ballast and debris. As the individual cars were raised during the re-railing operations, the running gear was inspected.

Conclusion: The investigation and analysis determined that the derailment and collision of the two trainsets was not the result of any mechanical failure of parts or components found on this equipment.

Analysis: The EMU locomotive event recorders from both trains were reviewed.

Analysis: The EMU locomotive event recorders from both trains were reviewed.

Conclusion: The locomotive engineers in both trains were manipulating the controls and the equipment responded as designed.

Analysis: It was discovered that the Assistant Conductors on Train Number 1581 joined the train while it was already en route. The Engineer and Conductor went on duty at New Haven Yard and performed a job briefing and all associated airbrake tests and then shoved out from the New Haven Yard to State Street Station where the train entered revenue service taking on passengers. The two assigned Assistant Conductors joined the Train Number 1581 crew at New Haven Station, which is the next stop after State Street Station.

During the interview, the Conductor mentioned that one of the assistant conductors came back and conducted a job briefing with him while the train was en route to Milford Station. He further explained that this is not always the case, and it is fairly common for him to make the trip without any job briefing when the assistant conductors board.

MNCW Operating Rule A - Safety (2) states:

When reporting for duty, employees whose duties require coordination with other employees must hold a safety briefing to review operational and safety conditions. If these conditions change, employees must hold an additional job briefing to discuss the new conditions.

Conclusion: While the lack of a job briefing in this case was not a contributing factor, it has been identified as being non-compliant with the railroads own operating rule. Failure of a train crew to conduct a proper job briefing (e.g., other trainmen joining the crew) with all crew members could become a contributing factor in other scenarios that may result in the loss of life due to the crew having no clear understanding of the crew size, operational conditions, etc. Furthermore, job briefings should be conducted prior to commencing work (the train continuing en route).

Analysis: The Engineer of Train Number 1548 was a certified engineer in possession of a valid certificate with an expiration date of June 6, 2015. He has worked as an engineer for 24 years and although this was not his normally assigned job, he was fully qualified to work the territory where the incident occurred. His last operational rules class occurred on February 5, 2012. FRA reviewed this individual's training history and noted no exceptions. FRA personnel also analyzed the event recorder data from Train Number 1548 and took no exception as to how the train was handled prior to the time of the derailment. The Engineer was operating on cab signal indication at approximately 74 mph when he placed a full service application on the trains braking system approximately 2 seconds before derailing on a compromised joint. The Engineer immediately initiated an emergency broadcast over the radio and subsequently left the operating compartment of the control car and began assisting with the evacuation of passengers. The Engineer then broadcast an additional emergency call after which he self-evacuated from the train and assembled with passengers and other crew members.

Conclusion: The Locomotive Engineer of Train Number 1548 was operating his train in compliance with MNCW operating rules at the time of the incident. FRA took no exception with regards to the Engineer's performance or actions leading up to or during the incident.

Analysis: The Engineer of Train Number 1581 was a certified engineer in possession of a valid certificate with an expiration date of August 18, 2014. He has worked as an engineer for 7 years and was working as an extra board employee at the time of the collision. He was fully qualified to work the territory where the incident occurred. His last operational rules class occurred on September 4, 2012. FRA reviewed this individual's training history and noted no exceptions. FRA personnel also analyzed the event recorder data from Train Number 1581 and took no exception as to how the train was handled prior to the time of impact. The Engineer was operating on cab signal indication at approximately 74 mph on Track Number 2. The Engineer stated he observed a large volume of dust ahead of him and the overhead catenary wires arc immediately after which he saw Train Number 1548 derailed and fouling the track he was operating on. The Engineer immediately initiated an emergency application of the train's air brakes which allowed Train Number 1548 to slow to a speed of 24 mph prior to impact. Upon impacting the fourth car of Train Number 1581 the Engineer sustained injuries, however he was able to self-evacuate from the control compartment of the lead car.

Conclusion: The Locomotive Engineer of Train Number 1581 was operating his train in compliance with MNCW operating rules at the time of the incident. FRA took no exception with regards to the Engineer's performance or actions leading up to or during the incident.

Analysis: The Conductor of Train Number 1548 was a certified conductor in possession of a valid certificate with an expiration date of March 1, 2015. He has worked as a conductor for 26 years and was working his normal assignment. He was fully qualified to operate on the territory where the incident occurred. His last operational rules class was December 12, 2012. FRA reviewed this individual's training history and noted no exceptions. The Conductor was performing job related duties in Cars 7 and 8 (9174 and 9175) in the train when the derailment occurred. The Conductor was recovering from the derailment and heard the emergency broadcast that was issued by the Engineer when Train Number 1581 struck the fourth car in his train. After recovering from the collision he sustained injuries to his hand after breaking the plastic lens covering the emergency release for the doors of the car he was occupying. He then assisted passengers evacuating from the train and moved to a safe location away from the collision site.

Conclusion: FRA took no exceptions to the Conductor's performance prior to and during the incident.

Analysis: The Conductor of Train Number 1581 was a certified conductor in possession of a valid certificate with an expiration date of March 1, 2015. He has worked as a conductor for 15 years and was working his normal assignment. He was fully qualified to operate on the territory where the incident occurred. His last operational rules class was December 11, 2012. FRA reviewed this individual's training history and noted no exceptions. The Conductor was collecting tickets from passengers in Car 7 (9191) of the train when the Engineer initiated the emergency application of the train's braking system. The Conductor stated that several seconds later there was an impact and he was knocked to the floor. The Conductor recovered and attempted to contact the train's Engineer without success. He then began to address the passengers in the car and asked them to remain calm and began discussing the situation with one of the train's assistant conductors. He then exited the last car and began to walk forward to check the condition of the train's Engineer fearing he had been seriously injured. Upon verifying the Engineer was not seriously injured, the Conductor returned to the rear of the train where he assisted with the evacuation of passengers.

Conclusion: FRA took no exceptions to the Conductor's performance prior to and during the incident.

Analysis: A simulated reenactment of the Engineer's view of derailed Train Number 1548 from the cab of Train Number 1581 was performed using train equipment that was similar in design to the equipment involved.

Conclusion: FRA took no exceptions to the Engineer's ability to view the catenary wire arcing and subsequent derailment of eastbound Train Number 1548.

Analysis: Signal system tests were performed. Periodic inspection records and the Train track event recorder were reviewed.

Conclusions: The investigation determined that the signal system displayed the proper signal up to the time of the derailment/collision and did not contribute to or play a role in this accident.

FRA dispatched a separate team to analyze damaged passenger cars and to make a correlation between the nature and extent of the passenger and crewmember injuries and the equipment damage involved. The forensic team is focusing on the B-end corner post strength and the truck attachment of the M8 EMU locomotive. The findings of this investigation will be issued under a separate report.

Overall Conclusions:

FRA's post-accident inspection of the equipment involved, including review of records of tests and maintenance performed prior to the accident, revealed no contributing cause. Inspection of the signal system, including records of tests and maintenance performed prior to the accident, indicated the signal system was working as intended. Review of the train operation determined the trains were operated in compliance with the railroads applicable rules and timetable instruction. The crews were current with regard to physical exams and training. Human factors of the crew with regard to required rest periods and fatigue were analyzed with no exceptions taken. Measurements of the post-accident track geometry and review of previous automated track geometry records in the vicinity of the derailment site disclosed that the track geometry was in compliance. Review of MNCW Track Inspection Reports, Periodic CWR Joint Bar Inspection Reports and Rail Inspection Records revealed that MNCW was in compliance with the frequency of inspections, reporting exceptions, and taking the required remedial action.

Although noncompliance with CFR regulations was not identified with track or operating practices, there were signs or early warnings of a developing problem. The plug rail was installed February 2013, and on April 4, 2013, the joint bars were replaced because they broke and the area was hand tamped to correct pumping. On May 15, 2 days before the accident, track inspectors reported pumping at this same joint, with no corrective action noted. On May 17, at 3:54 p.m. (before the accident), Amtrak Train Number 55 traversed the accident area traveling westward on the adjacent Main Track Number 2. Locomotive ATK 947 was the controlling locomotive on Train Number 55

Number 55 traversed the accident area traveling westward on the adjacent Main Track Number 2. Locomotive ATK 947 was the controlling locomotive on Train Number 55 and was equipped with a nose camera. The nose camera video captured the condition of the north rail of Main Track Number 4 and showed a discontinuity in the north rail of Main Track Number 4 at MP 53.3. In the following 2 hours and 48 minutes, 4 MNCW trains traversed the joint on Track Number 4 and did not report a problem with the condition of the rail.

Probable Cause and Contributing Factors:

FRA investigation determined the accident was caused by a broken suspended compromise rail joint on Main Track Number 4 at MP 53.3. A contributing factor was determined to be poor support under the crossties which allowed vertical movement (pumping) of the joint bar to occur which contributed to the joint bar failure.