



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

***Accident Investigation Report
HQ-2015-1006***

***Metro North Commuter Railroad Company (MNCW)
Valhalla, NY
February 3, 2015***

Note that 49 U.S.C. §20903 provides that no part of an accident or incident report, including this one, made by the Secretary of Transportation/Federal Railroad Administration under 49 U.S.C. §20902 may be used in a civil action for damages resulting from a matter mentioned in the report.

SYNOPSIS

On February 3, 2015, at 6:26 p.m., EST, in Valhalla, New York, northbound Metro-North Railroad (MNCW) Passenger Train Number 659 (the Train) consisting of eight electric-powered M-7 passenger cars struck a 2011 Mercedes Benz ML350 SUV (the SUV) at the Commerce Street Grade Crossing on MNCW's Harlem line. The collision resulted in a fire to the SUV and the lead passenger car, Car MNCW 4333. The lead car was carrying an estimated 20 passengers at the time of the accident and there were five passenger fatalities, all in the first car. The driver of the SUV was also fatally injured.

The National Transportation Safety Board (NTSB) and the Federal Railroad Administration (FRA), along with State and local authorities, investigated the accident.

The SUV, headed in an easterly direction, was stopped on the crossing partially fouling Track Number 2 when the railroad crossing lights and gates activated. A witness directly behind the SUV at the time of the accident described the driver of the SUV as being "stopped in the crossing prior to the gates lowering." When the crossing arm lowered, it struck the rear portion of the SUV. The driver exited the SUV to look at the area that had been struck by the gate, touched the crossing gate, and then got back in the SUV and pulled forward slightly before being struck by the Train. The witness to the accident said the SUV just "disappeared from the crossing."

Review of event recorder data showed the Train was traveling at 59 mph prior to initiating emergency braking. The maximum allowable speed on this section of track is 60 mph. The data also showed proper horn operation on the approach to the crossing. The Engineer initiated emergency braking approximately 300 feet before the collision after observing what he described as a vehicle partially fouling the crossing. The event recorder download also showed one long horn blast upon initiation of emergency braking by the Engineer.

Event recorder data indicated the train slowed from 59 mph to 51 mph in 4 seconds before striking the SUV. The Train and SUV came to rest approximately 650 feet from the point of collision. The continued momentum of the Train and the SUV resulted in damage to the electrified third rail. The third rail detached from its mounts, pierced the SUV, and entered under Car MNCW 4333 in two locations adjacent to the left-side passenger doorway. The third rail entered the passenger car introducing molten insulation which ignited Car MNCW 4333's seats resulting in the car catching fire.

An estimated 480 feet of third rail was damaged, much of which ended up inside Car MNCW 4333 in 39 foot long sections. Twelve sections of third rail were piled up inside the car and the entire car interior was eventually consumed by fire. Approximately 650 passengers were on board the train at the time of the accident. The weather at the time of the accident was reported as 16 degrees Fahrenheit with very light wind, clear skies, good visibility, and snow on the ground. The road and crossing were clear of any snow. Damage has been estimated by MNCW at approximately \$3.6 million dollars for equipment and track.

The probable cause of this accident was the SUV driver's failure to clear the crossing before the arrival of the Train. This resulted in the Train striking the SUV, pushing it down the right of way and causing it to come into contact with the third rail, which ultimately enter the lead car of the Train. The introduction of the third rail into the lead passenger car caused the deaths of five passengers and the injury to 57 other passengers.

A contributing factor may have been the SUV driver's unfamiliarity with railroad highway grade crossings.

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 Metro North Commuter Railroad Company	1a. Alphabetic Code MNCW	1b. Railroad Accident/Incident No. 2015-0203-43
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GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance Metro North Commuter Railroad Company		1a. Alphabetic Code MNCW	1b. Railroad Accident/Incident No. 2015-0203-43	
2. U.S. DOT Grade Crossing Identification Number 529902V		3. Date of Accident/Incident 2/3/2015	4. Time of Accident/Incident 6:26 PM	
5. Type of Accident/Incident Hwy-Rail Crossing				
6. Cars Carrying HAZMAT 0	7. HAZMAT Cars Damaged/Derailed 0	8. Cars Releasing HAZMAT 0	9. People Evacuated 0	10. Subdivision Harlem Line
11. Nearest City/Town Valhalla		12. Milepost (to nearest tenth)	13. State Abbr. NY	14. County WESTCHESTER
15. Temperature (F) 16 °F	16. Visibility Dark		17. Weather Clear	18. Type of Track Main
19. Track Name/Number Track No. 2		20. FRA Track Class Freight Trains-40, Passenger Trains-60		21. Annual Track Density (gross tons in millions)
				22. Time Table Direction North

OPERATING TRAIN #1

1. Type of Equipment Consist: EMU		2. Was Equipment Attended? Yes		3. Train Number/Symbol 659							
4. Speed (recorded speed, if available) R - Recorded E - Estimated	Code R	5. Trailing Tons (gross excluding power units)	6a. Remotely Controlled Locomotive? 0 = Not a remotely controlled operation 1 = Remote control portable transmitter 2 = Remote control tower operation 3 = Remote control portable transmitter - more than one remote control transmitter			Code 0					
6. Type of Territory Signalization: <u>Signaled</u> Method of Operation/Authority for Movement: <u>Signal Indication</u> Supplemental/Adjunct Codes: <u>A, B, 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 (<i>derailed, struck, etc.</i>)	MNCW 4333	1	yes								
(2) Causing (if mechanical, cause reported)	N/A	0		9. Was this consist transporting passengers?	Yes						
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	8	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	0	0	0	0
12. Equipment Damage This Consist 3600000		13. Track, Signal, Way & Structure Damage 100000									
14. Primary Cause Code M399 - Other causes (Provide detailed description in narrative)											
15. Contributing Cause Code M303 - Highway user misjudgment under normal weather and traffic conditions											
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: 8	Mins: 48	Hrs: 8	Mins: 48				
Casualties to:		22. Railroad Employees	23. Train Passengers	24. Others	25. EOT Device?		26. Was EOT Device Properly Armed?				
Fatal		0	5	1	N/A				N/A		
Nonfatal		2	57	0	27. Caboose Occupied by Crew?		N/A				
28. Latitude 41.086275600			29. Longitude -73.788032900								

CROSSING INFORMATION

Highway User Involved		Rail Equipment Involved	
1. Type Other (Spec. In Narrative)		5. Equipment EMU Locomotive(s)	
2. Vehicle Speed (<i>est. mph at impact</i>) 0	3. Direction (<i>geographical</i>) East	6. Position of Car Unit in Train 1	
4. Position of Involved Highway User Stopped on Crossing		7. Circumstance Rail Equipment Struck Highway User	
8a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? Neither		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 1. Gates 4. Wig wags 7. Crossbucks 10. Flagged by crew 2. Cantilever FLS 5. Hwy. traffic signals 8. Stop signs 11. Other (<i>spec. in narr.</i>) 3. Standard FLS 6. Audible 9. Watchman 12. None 1, 3, 7		10. Signaled Crossing Warning 1, 1	11. Roadway Conditions Dry
12. Location of Warning Both Sides		13. Crossing Warning Interconnected with Highway Signals Yes	14. Crossing Illuminated by Street Lights or Special Lights Unknown
15. Highway User's Age 49	16. Highway User's Gender Female	17. Highway User Went Behind or in Front of Train and Struck or was Struck by Second Train No	18. Highway User Stopped on crossing
19. Driver Passed Standing Highway Vehicle No		20. View of Track Obscured by (<i>primary obstruction</i>) Not Obstructed	
Casualties to:	Killed	Injured	21. Driver was Killed 22. Was Driver in the Vehicle? Yes
23. Highway-Rail Crossing Users	1	0	24. Highway Vehicle Property Damage (<i>est. dollar damage</i>) 29600 25. Total Number of Vehicle Occupants (<i>including driver</i>) 1
26. Locomotive Auxiliary Lights? N/A		27. Locomotive Auxiliary Lights Operational? N/A	
28. Locomotive Headlight Illuminated? N/A		29. Locomotive Audible Warning Sounded? Yes	

10. Signaled Crossing Warning

Explanation Code

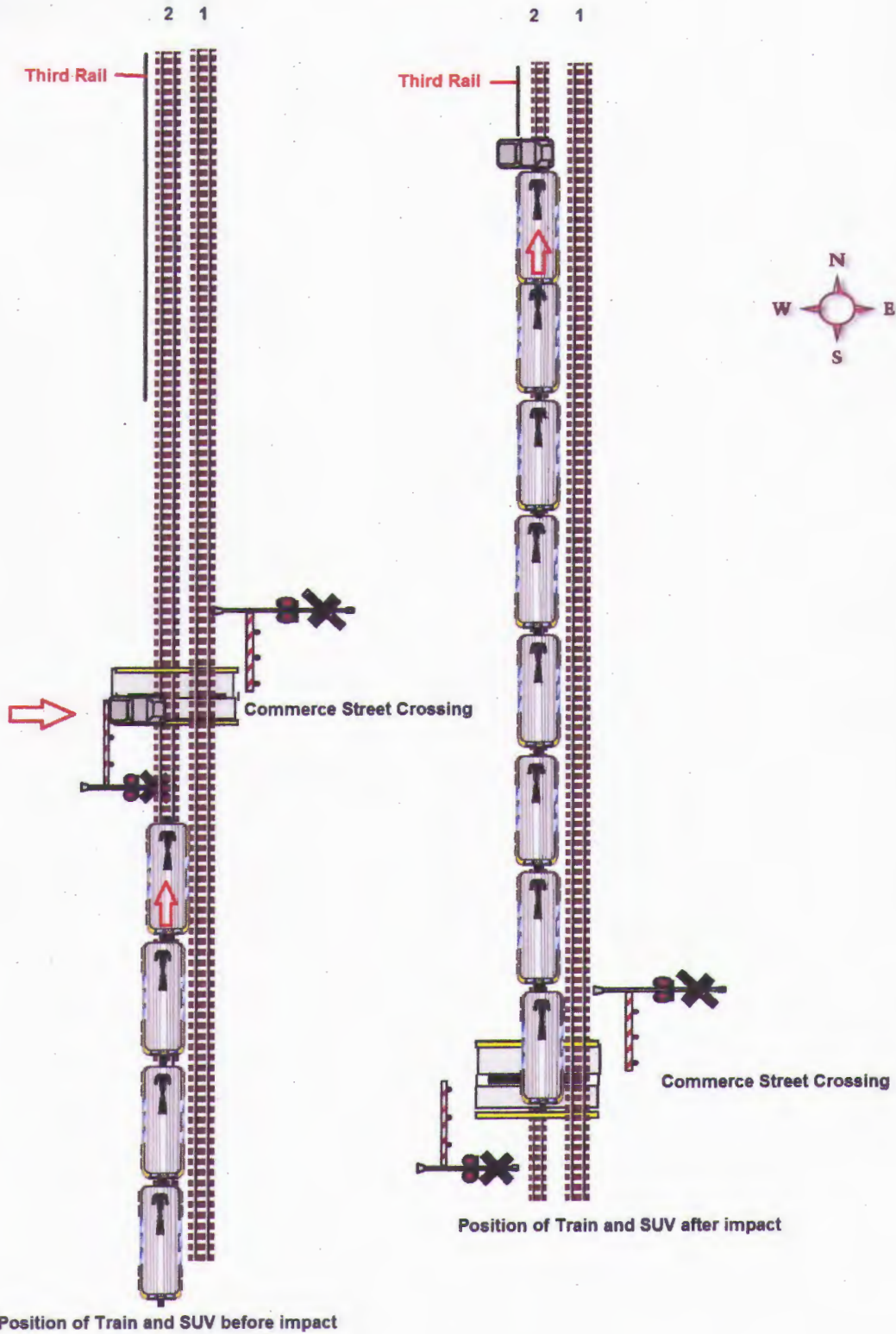
- 1 - Provided minimum 20-second warning
- 2 - Alleged warning time greater than 60 seconds
- 3 - Alleged warning time less than 20 seconds
- 4 - Alleged no warning
- 5 - Confirmed warning time greater than 60 seconds
- 6 - Confirmed warning time less than 20 seconds
- 7 - Confirmed no warning
- N/A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

- 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

SKETCHES

Valhalla Crossing

HQ-2015-1006



NARRATIVE

Circumstances Prior to the Accident

The crew of Metro-North Railroad (MNCW) Train Number 659 consisted of an Engineer located on the head-end car, Car MNCW 4333, and the Conductor who rode the last car of the multiple-unit operated electric locomotive (MU) train. The Engineer was called at 7:30 am for the assignment, which originated in Brewster, Connecticut, after receiving the minimum statutorily mandated time off. The Conductor reported at 8:30 am after also receiving the minimum statutorily mandated time off.

Train Number 659 (the "Train") consisted of eight M-7 passenger cars; 4333 (controlling end) - 4332 - 4197 - 4196 - 4175 - 4174 - 4309 - 4308. The Train was given a proper Class 1 air brake test, cab signal test, and daily inspection. There were no exceptions taken to the equipment. The Train was operating north on Track Number 2 (tangent track) on the MNCW Harlem Line and was approaching the Commerce Street Highway Grade Crossing at a recorded speed of 59 mph. The Engineer sounded the horn for the crossing as required and again when he saw a vehicle in the crossing.

The vehicle was a black 2011 Mercedes Benz ML 350 Sport Utility Vehicle (the SUV) driven by a 49-year-old female who was alone in the vehicle. The SUV was traveling east on Commerce Street when the crossing gates activated for the approaching train. The SUV was stopped between Track Number 2 and the west crossing gate. The traffic light at Taconic Parkway, which runs parallel to the train track, has a preemption feature to allow cars to clear the highway grade crossing. Prior to the Train striking the SUV there were no cars ahead of the SUV to prevent it from clearing the crossing.

Approaching Commerce Street Highway Grade Crossing northbound, the railroad track is tangent with a slight ascending grade. The time-table maximum authorized speed (MAS) at this location is 60 mph. Operating eastward on Commerce Street, a vehicle would encounter several signs along the road with markings painted on the road indicating that a railroad crossing is ahead. One of those signs states, "Do Not Stop On Tracks." Commerce Street is a right-hand curve approaching from the west, perpendicular while crossing the tracks and a left-hand curve exiting the crossing and entering Taconic Parkway.

The Accident:

The driver of the SUV was stopped on the crossing with other cars ahead of her when the crossing gates activated. Her SUV was located between Track Number 2 and the crossing gate at the west side of the crossing. The gate descended on the rear portion of the vehicle coming to rest on the rear windshield. The driver got out of the vehicle while stopped on the crossing and inspected, then touched the crossing gate arm. She then re-entered her SUV and began moving forward when the Train hit the SUV broadside. A witness located in a vehicle directly behind her stated the driver of the SUV did not appear to be moving with any sense of urgency.

The MAS for this area is 60 mph. The Train was operating at 59 mph northward on Track Number 2 approaching Commerce Street Highway Grade Crossing when the Engineer noticed what appeared to be a vehicle fouling Track Number 2 at the crossing. The Engineer sounded his horn and placed the Train into emergency braking. He observed there were no cars ahead of the stopped vehicle. Just prior to impact, the SUV began to move forward pulling further into the path of the Train. On impact the SUV was pushed along the right of way by the front of the Train as the Train proceeded northward. The SUV caught fire at this point.

After the Train impacted the SUV, the forward momentum caused the SUV to attach to the front of the Train. The third rail is located on the west side of Track Number 2. The "end approach" of the third rail pierced the SUV above the rear wheel on the driver's side lifting it in an upward position. The third rail exited the SUV above the rear wheel on the passenger's side of the SUV in an upward position. The "end approach" section of the third rail (6 feet long) then entered the floor of Car MNCW 4333 between the first and second seat on the left side. The third rail broke at the joint bar and subsequently twelve 39 foot sections of the third rail pierced the car adjacent to the first left side door of Car MNCW 4333 (L-1 door). These third rail sections passed through the burning SUV which melted the insulation covering of the third rail. The molten plastic insulation dripped on Car MNCW 4333's seats causing a fire inside the coach.

This accident caused the deaths of the driver of the SUV and five passengers in Car MNCW 4333 by blunt force trauma due to the third rail entering the coach. There were 57 other passenger injuries reported to MNCW. The Train was carrying approximately 650 passengers at the time of the accident.

ANALYSIS AND CONCLUSION:

Analysis-Toxicological Testing: No Post Accident drug or alcohol testing was performed.

Conclusion: Post accident drug and alcohol testing of the crew or dispatchers was not required under Title 49 Code of Federal Regulations (CFR) 219.201(b) criteria.

Analysis-Highway Grade Crossing: The highway grade crossing at Commerce Street, Valhalla, New York, on MNCW's Harlem Line is equipped with gates and flashers. This crossing is also equipped with a preemptive feature connected with the highway traffic lights located on the Taconic Parkway. This causes the traffic lights northbound and southbound on the Taconic Parkway to display stop to allow traffic on the Commerce Street Highway Grade Crossing to exit the crossing with a proceed signal.

Conclusion: The traffic lights and the highway crossing warning devices were inspected by MNCW, the New York State Department of Transportation, the National Transportation Safety Board (NTSB) and the Federal Railroad Administration (FRA). The signals were found to be working as designed. The Engineer had witnessed that there were no cars in front of the SUV at the time of impact. The highway grade crossing apparatus and highway traffic signal preemption feature were operating as intended and did not contribute to this accident.

Analysis-Equipment: The eight M-7 MU cars were inspected prior to and after the accident. The event recorder was downloaded by the NTSB, MNCW, and FRA and results are included in this report. All required daily inspection documents were also reviewed.

Conclusion: Prior to service, the Train was given a daily inspection, Cab Signal Inspection, and a Class I air brake test required by Federal regulation. There were no exceptions noted. After the accident, the equipment was tested to the extent possible and no exceptions were taken. Testing included headlight, auxiliary lights, and horn. Equipment failure was not a cause of this accident.

Analysis-Locomotive Engineer: Review of the Train's event recorder indicated that the Train was approaching the Commerce Street Crossing at 59 mph. When the Engineer saw the SUV at the crossing, he initiated an emergency application of the air brakes. The estimated speed at impact was calculated at 51 mph. Proper use of the Train horn was also noted. Immediately after impact, the Engineer called an "emergency" over the radio and alerted the train dispatcher.

Conclusion: The Engineer performed his duties in full compliance with the railroad's operating rules and Federal regulations. The Engineer was not the cause of this accident.

Analysis-Fatigue: Both the Engineer and Conductor were properly rested in compliance with 49 CFR 228.405. According to the SUV driver's husband, the SUV driver had enough sleep and was not tired the day of the accident. A fatigue analysis report is not required when the accident involves a train and a vehicle at a highway grade crossing.

Conclusion: Fatigue for highway user or train crew was not a factor this accident.

Analysis-Third Rail: MNCW controls the design, installation, and maintenance of their Electric Propulsion wayside system. There are no current Federal regulations addressing design, installation or maintenance of these systems. Currently there are two types of third rail systems employed by MNCW and another area railroad. One design has the contact shoe on the equipment collecting the power from the third rail by using the top of the third rail and the other system uses the bottom of the third rail to provide electric power to the propulsion equipment. These are referred to as top running and bottom running contact shoes. MNCW uses the bottom running type of third rail system. This third rail is installed next to the track. Third rail may be located on the left or right of the train depending on topography. Where it changes sides, an "end approach" piece of third rail is used. This is a 6-foot section tapered piece of rail to make the transition of the equipment pick up "shoe" more precise. The deaths and the serious injuries to the passengers in Car MNCW 4333 were caused by the third rail entering the car after impact. Research has shown this was an anomaly and there is no record of third rail ever entering a lead car after a crossing accident before this accident.

Conclusion: While the severity of the accident was compounded by the introduction of the third rail into the lead car after impact, it was not reasonably foreseeable. This type of accident has not occurred in the past. MNCW followed its own installation and maintenance procedures for their third rail propulsion system, which were

followed its own installation and maintenance procedures for their third rail propulsion system, which were developed years ago and utilized throughout the industry. After the collision at the crossing, the SUV was positioned just right to be impaled by the end approach of the third rail causing the third rail to rise in an upward direction and enter the lead passenger car. The intrusion of the third rail into Car MNCW 4333 directly caused the five passenger deaths in that car, as well as the serious injuries to the other surviving passengers.

Analysis-Fire: The third rail has a protective rubberized plastic coating on the top of the rail. This is to protect a person from coming in direct contact with the energized third rail. As the third rail penetrated the SUV above the driver's side rear wheel, it passed through the SUV and exited out the SUV's passenger side above the rear wheel and entered through the floor of Car MNCW 4333. The SUV was on fire at this point from the collision with the Train at the crossing. The protective coating from the third rail was burning as it entered Car MNCW 4333 and the molten coating dripped onto the rail cars seats causing them to catch fire. This resulted in the entire Car MNCW 4333 being consumed by fire.

Conclusion: According to passenger statements, there was a burning electric or plastic smell in Car MNCW 4333. This was likely caused by the burning insulation of the third rail. It should be noted that all the deaths and serious injuries in Car MNCW 4333 were the result of blunt force trauma by the third rail entering the car and not fire. All passengers capable of exiting the car were out safely before the car was totally engulfed in flames. While smoke inhalation injuries may have been caused by smoke from the fire, the fire itself was not the cause of any additional serious injuries.

Analysis-Driver of SUV: The SUV driver's phone records were examined to determine if she was distracted by using her cell phone at the time of the accident. FRA and NTSB investigators also interviewed her husband to try to piece together her state of mind at the time of the accident. Investigators asked questions to understand how familiar she was with the SUV since she had only owned it since December 2014. General questions about her familiarity with railroad crossings and what he thought might have happened that day at the crossing were asked of him. He was noticeably upset and became irritated. Investigators explained he knew her best and apologized for having to resort to this line of questioning but explained the questions were necessary.

Conclusion: Review of the cell phone records indicated the SUV driver was not using her cell phone at the time of the accident. Her husband indicated she was in good spirits and was anxious to meet with a new client that day. He said the SUV was her primary car and she was very familiar with the vehicle. He indicated that her normal route between home and work or shopping did not give her an opportunity to use railroad crossings. He could only guess what happened but his thoughts were that she was unaware that she was stopped on a railroad crossing. This was supported by a witness stating she didn't appear concerned by the crossing warning being activated and showed no sense of urgency. It would be impossible to determine why the driver of the SUV remained on the crossing even after the traffic in front of her cleared and she was able to clear the crossing before the arrival of the Train. However, the driver remaining in the foul of Track Number 2 at the grade crossing while the crossing warning devices were activated clearly indicating the approach of a train. This directly caused the accident and the resulting entry of the third rail into Car MNCW 4333.

OVERALL CONCLUSION:

The SUV driver failed to clear the highway grade crossing before the arrival of northbound Train Number 659 resulting in the death of the SUV driver. This resulted in the SUV being struck by the Train and coming into contact with the third Rail causing it to enter the lead car of the Train. The introduction of the third rail into the lead car caused the deaths of five passengers and injuries to 57 other passengers.

A contributing factor may have been the SUV driver's inexperience with railroad highway grade crossings.