NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Materials Laboratory Division
Washington, D.C. 20594

August 18, 2015

FIRE GROUP FACTUAL REPORT Report No. 15-058

A. ACCIDENT INFORMATION

Location:	Commerce Street Grade Crossing on the Metro-North Harlem Line, Valhalla, Westchester County, New York
Vehicle #1:	2011 Mercedes ML350
Vehicle #2:	Metro-North passenger train 659
Operator #2:	Metro-North Railroad
Date:	February 3, 2015
Time:	Approximately 06:26 p.m. EST
NTSB #:	**DCA15MR006**

Group Members:

Nancy B. McAtee
Fire and Explosion Specialist
National Transportation Safety Board
Group Chairman

Dwight Sowden
Director-Equipment Capital Engineering
Metro-North Railroad

B. ACCIDENT NARRATIVE

For a summary of the crash, refer to the *Crash Summary Report* in the docket for this investigation.

C. NOMENCLATURE / ABBREVIATIONS IN REPORT

1. F-End: Forward facing end of rail car where Operator's compartment is located
2. B-End: Non-forward facing end of rail car
3. Operator's or Engineer's Side: Right side of car when facing direction of travel
4. Non-Operator's Side or Observer's Side: Left side of car when facing direction of travel
5. Married Pair: Two semi-permanently coupled, electrical multiple unit (EMU) locomotives which cannot be operated independently of each other. In the case of

an M-7 married pair, it consists of one A and one B car with both having a forward facing operating compartment.

D. RAIL CAR EXAMINATION

1. MN 4333 Exterior-Non-Operator's (Left) Side

The lead rail car in the consist was MN 4333. This was the B-car in a married pair with MN 4332 (A-car). The B-car was the only rail car to sustain fire damage. A photograph of the F-end of MN 4333 is shown in Figure 1.

Figure 1. F-end and left side of MN 4333

The fiberglass (fiber reinforced plastic or FRP) covering (end cap) over the F-end of MN 4333 had thermal damage over the entire surface of the end cap with the resin consumed in the fire and leaving behind only the glass fiber matting. The rail car exterior at the F-end forward facing structure was comprised of stainless steel sheathing. The sheathing underneath the fiberglass end cap was thermally discolored and sooted. The rail car exterior sheathing on the both the right and left sides at the F-end were thermally discolored and exhibited some areas of deformation. There was burned debris from the SUV still attached to the lower portion of the F-end, on left side where the skirt was attached to the forward facing structure. The three forward facing windows (the glass Operator's and Observer's windows and the polymeric body end door window) were

missing[1]. Some glass was found in the Operator's compartment and on the SUV. Solidified remnants of the melted polymeric window were still present in the window frame. The pneumatic horn and other accessories mounted on the F-end underframe area were either missing or heavily fire damaged. The casing of the pneumatic horn was found on the ground on-scene after the SUV was separated from the rail car. A portion the outer casing remained.

The thermal damage on the left side of the F-end underframe equipment extended from the forward face of the car to the F-end truck assembly as shown in Figures 2-3.

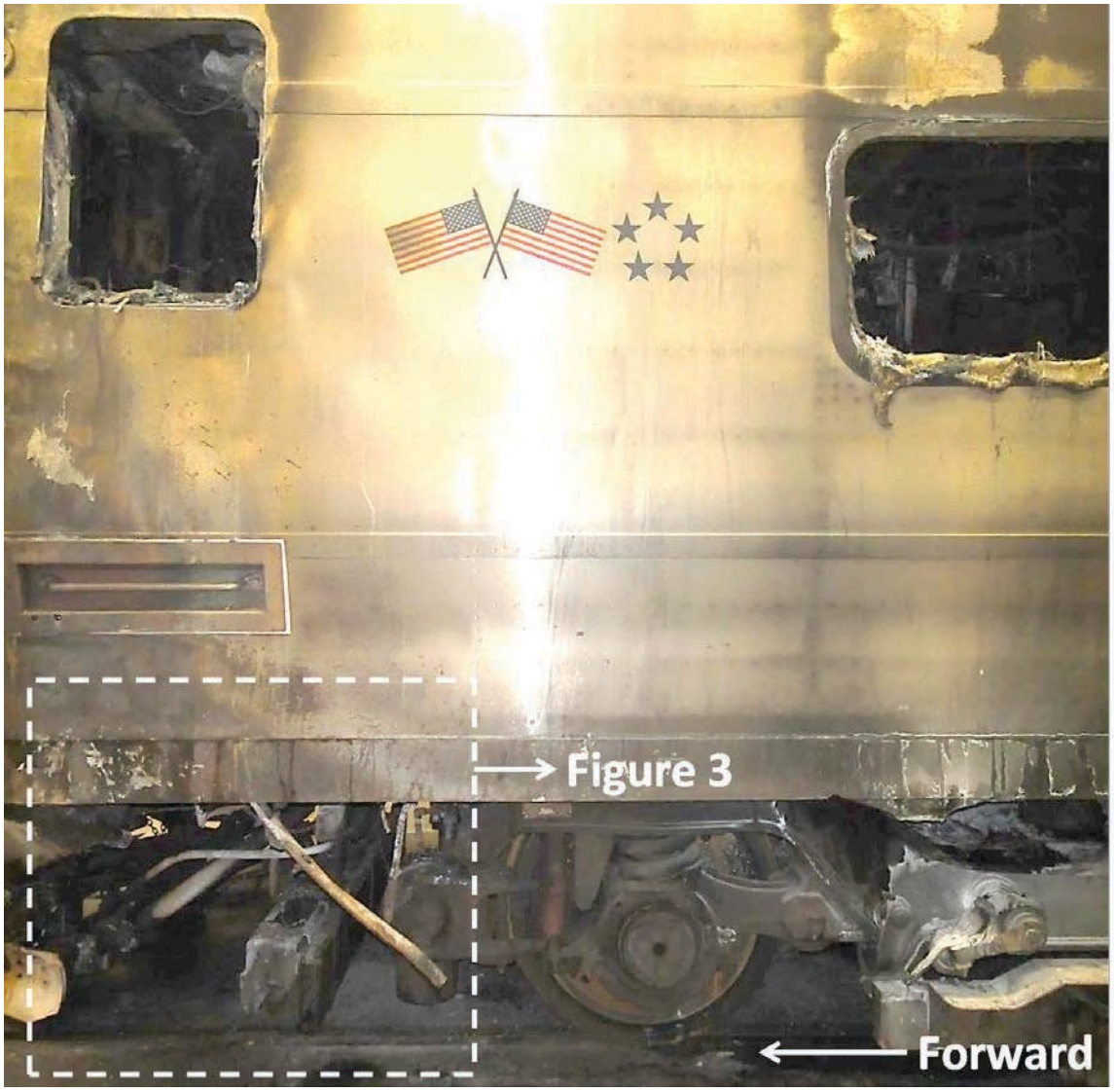

Figure 2. F-end left side of MN 4333 and F-end truck.

[1]The polymeric windows located on the train ends were made of a polycarbonate material.

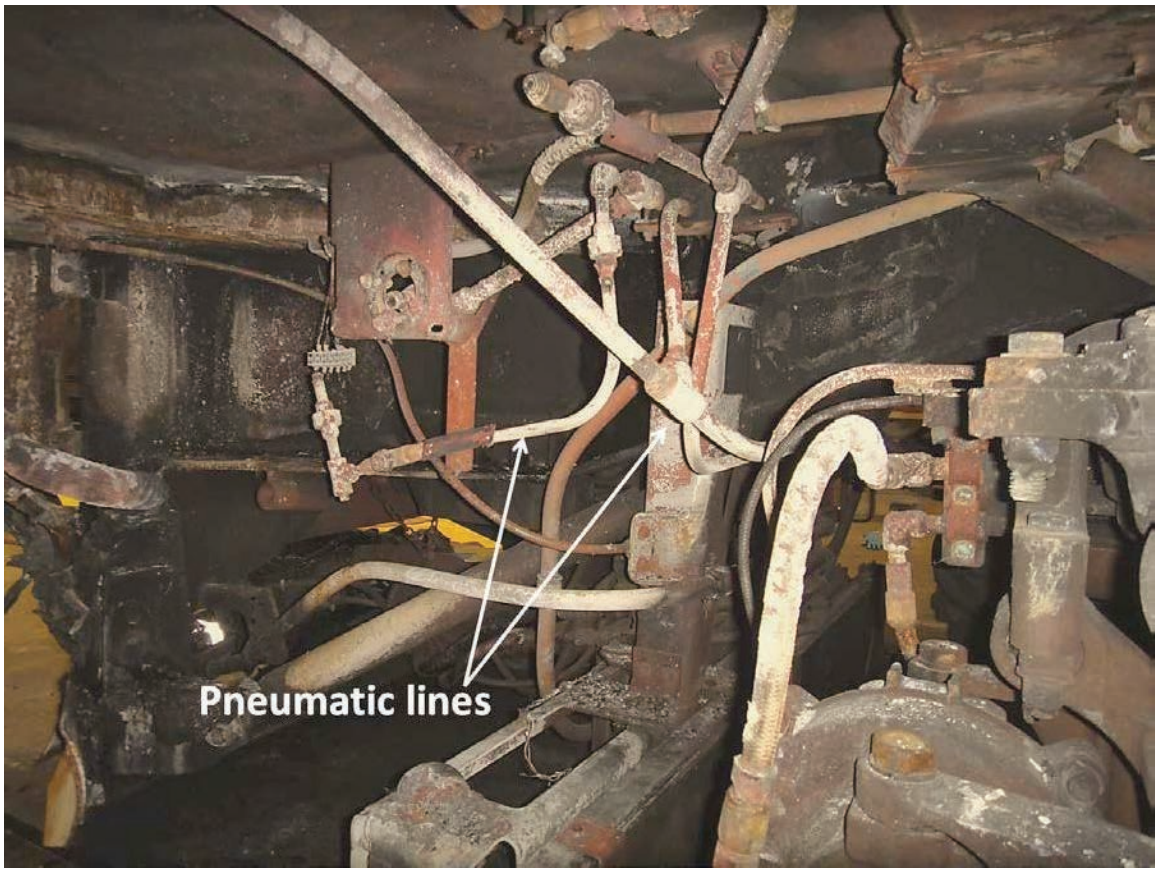

Figure 3. F-end left side underframe area of MN 4333.

Several pneumatic lines in this underframe area (lines for automatic coupler, air horn, brake pipe; fabricated of carbon steel) were dislodged, severed and exhibited brown to white thermal discoloration. In addition, truck-mounted components such as the disc brake unit (DBU), pneumatic and electrical connections exhibited similar thermal discoloration. There was extensive sooting in this area as well. The thermal damage did not extend past the midline of the undercarriage. The third rail was force-fit between the truck frame and vertical link of the front truck. There were no visual indications of erosion or localized melting after the rail was removed from this location

The area between the F-end forward face corner of the car to the F-end passenger door is shown in Figures 4-6.

Figure 4. F-end left side corner and Observer's side drop sash window.

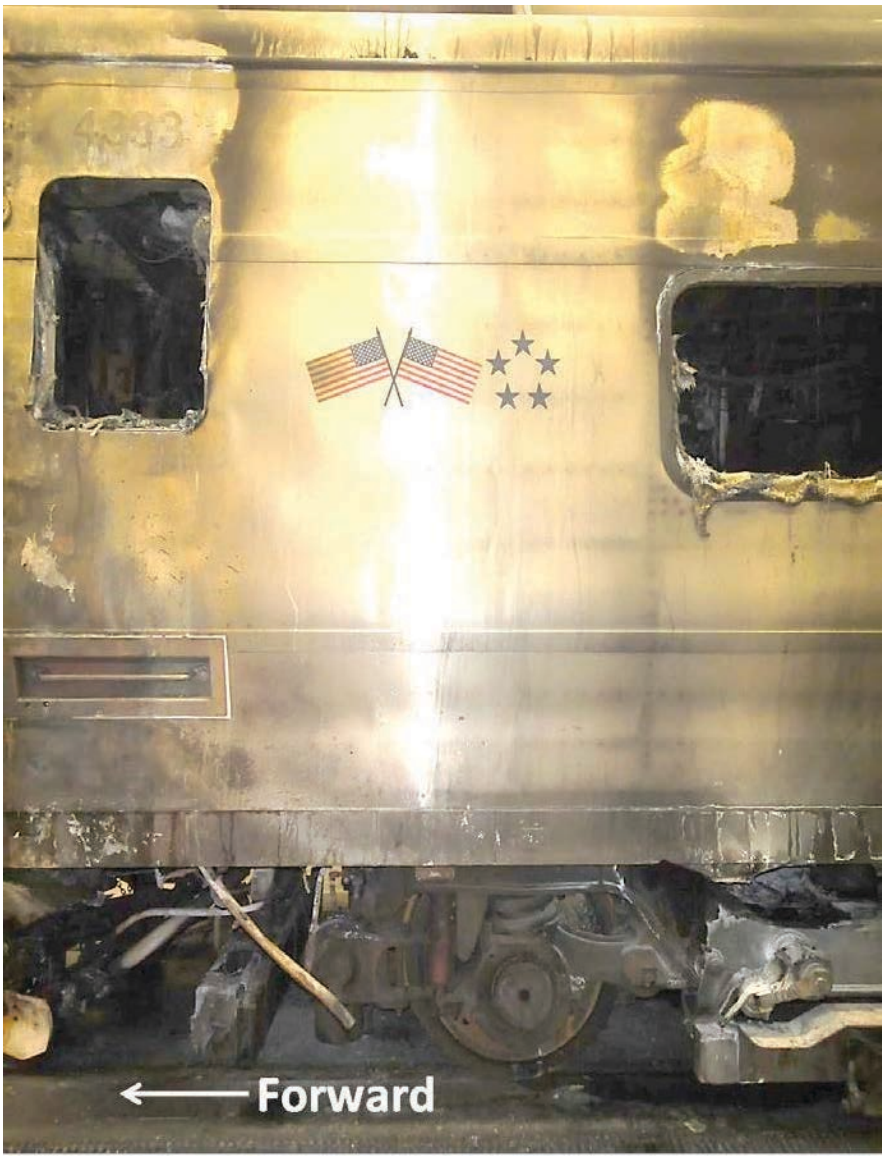

Figure 5. Left side section of exterior car body between Observer's drop sash window and first passenger compartment (L1) window.

Figure 6. Left side section of exterior car body between L1 window and F-end passenger door.

The Observer's drop sash window (window glazing) was melted and solidified remnants of the polymeric window remained in the window frame[2]. The left side sheathing of the side frame structure located above the Observer's drop sash window displayed signs of distortion and sooting that extended down to the side sill of the side frame structure. The area between the Observer's drop sash window and the first passenger compartment (L1) window was sooted but had no other visible damage. The L1 window had melted and solidified remnants were present in the window frame[3]. Above the window, the side frame sheathing was heavily sooted and was deformed beginning at the forward edge of the window frame and extended to the midline of the window. There was sooting at the fresh

[2] The control compartment windows were made of a polycarbonate material.
[3] The passenger compartment windows were made of a polycarbonate material.

air grille located between the first window and the door. The window for the forward passenger door was missing with no signs of melted material in the frame. There was sooting on the exterior above the door.

Similar damage extended the entire length of the left side of the exterior side frame as shown in Figures 7-9.

Figure 7. Left side exterior from F-end passenger door to fourth (L4) window.

Figure 8. Left side exterior from second (L2) window to sixth (L6) window.

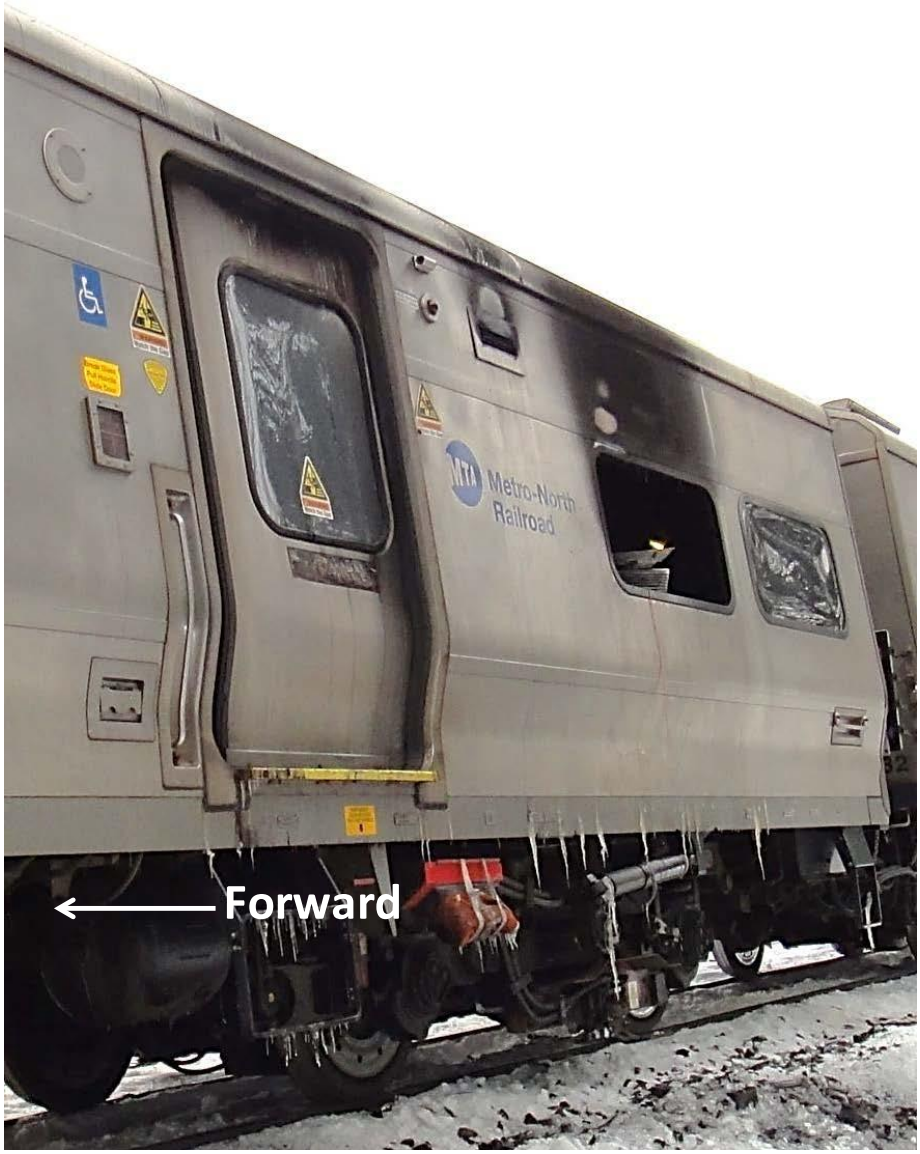

Figure 9. Left side rear passenger door and rear two (L7 and L8) windows.

All passenger compartment windows on the left side were missing with the exception of the eighth (L8) window which was still intact. The second passenger compartment (L2) window (Fig. 8) was partially melted and was still attached to the window frame. The third passenger (L3) window was missing with no signs of melted material in the frame. The fourth, fifth and sixth passenger compartment (L4, L5 and L6) windows had melted and solidified remnants were present in the window frame. The window in the B-end passenger side door was intact and heavily sooted. The seventh (L7) window was missing with no signs of melted material in the frame. The intact L8 window was heavily sooted. The areas above the L3, L4 and L5 windows exhibited deformed car body side sheathing extending from the window to the roof. Areas above the second, sixth and seventh windows and the rear passenger door window exhibited sooting.

2. Exterior-Operator's Side (Right Side)

The right side of the rail car exterior exhibited similar thermal damage and sooting similar to that found on the left side. The damage is shown in Figures 10-14.

Figure 10. Right side exterior from F-end corner to first passenger compartment (R1) window.

Figure 11. Right side exterior from F-end passenger side door to fifth passenger compartment (R5) window.

Figure 12. Right side exterior from second (R2) to fifth (R5) passenger compartment windows.

Figure 13. Right side exterior from fifth (R5) to seventh (R7) window.

Figure 14. Right side exterior including seventh (R7), eighth (R8) and ninth (R9) windows and rear passenger door.

The right side, Operator's drop sash window was melted and solidified remnants of the polymeric window remained in the window frame. The exterior body panel was deformed starting from above the Operator's compartment drop sash window and extending down to the lower edge of the side structure, side sill. A lower area of sooting (from the lower edge of the body to approximately midline of the body) between the Operator's compartment drop sash window and the first passenger compartment window was present but this area had no other visible damage. The first passenger compartment (R1) window had melted and solidified remnants were present in the window frame. Above the window, the passenger information display (PID) was missing and the exterior side sheathing was heavily sooted and was deformed beginning at the forward edge of the window frame. Discoloration on the side sheathing was evident above the PID located above the window. There was sooting at an exhaust grille located between the F-end passenger side door and second passenger compartment window. All of the passenger compartment windows on the right side were missing with the exception of the last two (eighth (R8) and ninth (R9)) windows which were still intact but heavily sooted. The second passenger compartment (R2) window was missing. This window was removed during the evacuation. The third, fourth, fifth and seventh passenger compartment (R3, R4, R5 and R7) windows had melted and solidified remnants were present in the window frame. The areas above these

windows exhibited deformed car body extending from the window from to the roof. There was sooting below the seventh window. The sixth (R6) window was missing and the exterior car body above this window was deformed. The window in the B-end passenger side door was partially melted and heavily sooted. There was sooting above the door.

3. Interior

An overall floorplan of the rail car is showing in Figure 15. The interior of the Operator's and passenger compartments exhibited significant fire damage. The damage to the passenger compartment is shown in Figures 16-17.

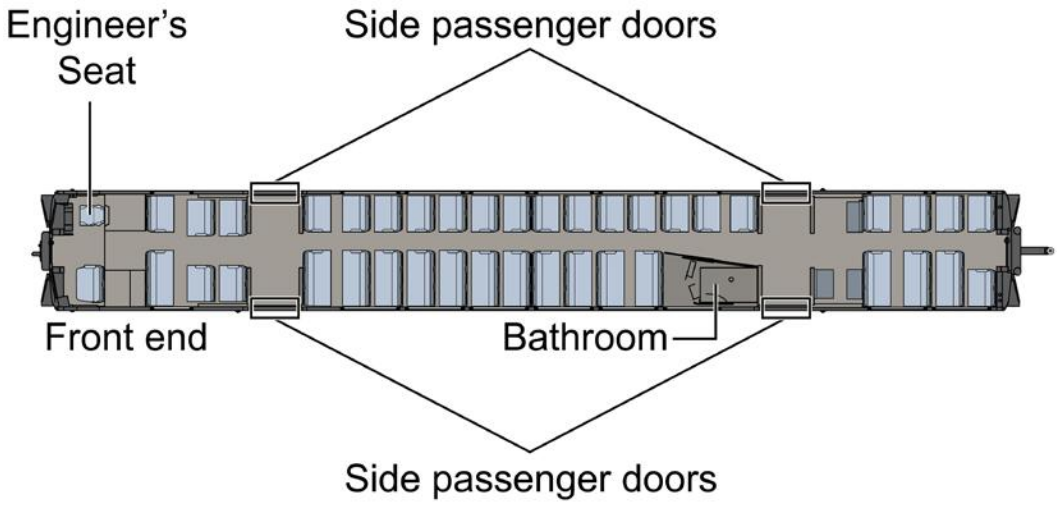

Figure 15. Floorplan of "B"-car (MN 4333).

Figure 16. Passenger Compartment - Overall interior of MN 4333 at accident site.

Figure 17. Passenger Compartment - Overall interior of MN 4333 after the removal of the injected rail.

Operator's Compartment

Within the Operator's compartment, most of the non-metallic, interior material was destroyed as shown in Figure 18.

Figure 18. Engineer's seat in Operator's compartment.

The engineer/operator's seat cover was destroyed[4]. Most the seat and back cushions were still present but exhibited scorching and sooting. There was no visible damage to the seat frame. For the flip-down/observer seat across the aisle, most of the cushion material had been consumed, exposing the seat frame and internal support structure as shown in Figure

[4] The operator's seat module consisted of the following components: 1) FRP laminate back shell, collision post shroud, and drop sash window armrest; 2) a steel seat frame with an aluminum support for the back cushion; 3) polychloroprene latex seat and back cushions and 5) vinyl seat and back covering.

19[5]. Most of the wall and window masks and all of the ceiling panels were consumed in the fire as were the door panels for the compartment door[6]. All of the control panels were also destroyed.

Figure 19. Observer's seat in control compartment.

[5] The observer's seat module consisted of the following components: 1) a silicone foam seat cushion; 2) a polychloroprene latex back cushion; 3) a polyvinyl chloride/acrylic seat and back shell; 4) vinyl seat and back covering.

[6] The sidewall and window masks were made of FRP. The ceiling and door panels were made of a melamine-aluminum panel with an aluminum honeycomb core.

Passenger Compartment

Eleven (11) sections of 3rd rail entered the first car. The approach or nose section penetrated the rail car floor between rows 1 Left (L) and 2L (located between the Operator's compartment and the F-end vestibule) as shown in Figure 20.

Figure 20. Nose piece of 3rd rail.

This section was wedged in the floor and held up by the handhold between the two passenger seat frames. The remainder of the rails entered Car MN 4333 through a penetration located in the left side, F-end vestibule in front of passenger side door. These rails came to rest in various locations inside the car. Several of the rails struck the B-end bulkhead end sheathing, leaving impact marks on the in the end sheathing. One rail penetrated the B-end end sheathing at the upper right side corner of MN 4333 and entered the B-end sheathing of car MN 4332.

There were no obvious signs of electrical arcing/activity to the surrounding rail car structure. There were two rails that exhibited atypical, localized thermal damage on the surface of the rail. One rail was the nose piece and the damage is shown in Figure 21. The second rail was the rail removed from the SUV as shown in Figure 22.

Figure 21. Localized thermal damage (highlighted with red arrow) to surface of nose piece rail.

Figure 22. Localized thermal damage (highlighted with red arrow) to surface of rail removed from SUV.

Inside the passenger compartment, most of the compartment exhibited significant fire damage. Damage to the individual seats is shown in Table 1. There were two seat frames found under the 3rd rail in the aisle. Identification of the exact location of these seat frames could not be determined exactly, however these seats most likely belong in the 5L and 6L locations.

Table 1. Seat Damage Assessment

			Damage assessment						
Row	**Side of Car**	**Seat location**	**Seat cover**[7]	**Seat & Back Cushion**[8]	**Internal Support Structure**[9]	**Seat Back Cover**	**Head Rest**[10]	**Arm Rest**[11]	**Seat Frame**[12]
1	Right	Aisle	None	None	Partially melted	Present/ Damaged	None	No cover/ intact	Intact
		Window	None	Partial back & seat	Intact	Present/ Damaged	Partial	n/a[13]	Intact
1	Left	Aisle	None	None	None	None	None	Cover gone/ metal end melted	Intact
		Center	None	None	Partial approx. 1/3	Present/ damaged	None	n/a	Intact
1	Left	Window	None	Partial seat	Melted in areas	Present/ damaged	None	n/a	Intact
2	Right	Aisle	None	Partial back & seat	Lower half missing	Partial	Partial	Small amount of cover present	Intact
		Window	None	Partial back & seat	Lower half missing	Partial	Partial	n/a	Intact
2	Left	Aisle	None	Partial seat	Intact	Present/ damaged	Partial	Small amount of cover present-end melted	Intact

[7] The seat (headrest, backrest and seat) covers in the passenger area were vinyl material.
[8] The passenger seatback cushions were polychloroprene latex and the seat cushions were cotton covered silicone rubber foam.
[9] The back support structure consisted of a perforated aluminum panel on which the back and seat cushions rested.
[10] The headrest cushions in the passenger area were polychloroprene latex.
[11] The aisle armrest was made of silicone rubber
[12] The passenger area seat frames were steel.
[13] The "n/a" designation indicates that the seat component was not a normally installed component in the seat assembly.

			Damage assessment						
Row	**Side of Car**	**Seat location**	**Seat cover**[7]	**Seat & Back Cushion**[8]	**Internal Support Structure**[9]	**Seat Back Cover**	**Head Rest**[10]	**Arm Rest**[11]	**Seat Frame**[12]
		Window	None	Partial back & seat	Intact	Present/ damaged	Partial	n/a	Intact
3	Right	Aisle	None	Partial back & seat	Small piece remain	Present/ damaged	None	No cover/ intact	Intact
		Window	None	Partial back & seat (more than aisle)	Small piece remain	Present/ damaged	None	n/a	Intact
3	Left	Aisle	None	Partial back & seat	Intact	Present/ damaged	Partial	No cover/ intact	Intact
		Window	None	Partial back & seat	Intact	Present/ damage	Partial	n/a	Intact
4	Right	Aisle	Small areas	Most seat & back	Intact	Present/ damaged	Intact	No cover/ intact	Intact
		Window	Small areas	Most seat & back	Intact	Present/ damaged	Intact	n/a	Intact
4	Left	Aisle	Small areas	Most seat & back	Intact	Present	Intact	Some cover/ intact	Intact
4	Left	Center	Small areas	Most seat & back	Intact	Present	Partial	n/a	Intact
		Window	Small areas	Most seat & back	Intact	Present	Partial	Some cover/ intact	Intact
5	Right	Aisle	None	Some seat	Partial	None	None	No cover/ intact	Intact
		Window	None	Some seat and back	Partial	None	None	n/a	Intact
5	Left	Aisle/ Center/ Window	Missing	Missing	Missing	Missing	Missing	Missing	Missing
6	Right	Aisle	None	Some seat	Partial	None	None	No cover/ intact	Intact
		Window	None	Some seat and back	Partial	Partial	None	n/a	Intact
6	Left	Aisle/ Center/ Window	Missing	Missing	Missing	Missing	Missing	Missing	Missing
7	Right	Aisle	None	None	Partial	Partial	Partial	No cover/ intact	Intact
		Window	None	No seat/ partial back	Partial	Partial	Partial	n/a	Intact

			Damage assessment						
Row	**Side of Car**	**Seat location**	**Seat cover**[7]	**Seat & Back Cushion**[8]	**Internal Support Structure**[9]	**Seat Back Cover**	**Head Rest**[10]	**Arm Rest**[11]	**Seat Frame**[12]
7	Left	Aisle/ Window	Missing	Missing	Missing	Missing	Missing	Missing	Only seat legs present
8	Right	Aisle	None	Partial back	Intact	Present/ damaged	Partial	No cover/ intact	Intact
8	Right	Window	None	Partial back	Intact	Present/ damaged	Partial	n/a	intact
8	Left	Aisle	Most of seat not accessible due to debris	Most of seat not accessible due to debris	Most of seat not accessible due to debris	Most of seat not accessible due to debris	Most of seat not accessible due to debris	No cover/ intact	Intact/ impact damage
		Center	None	Partial - Most of seat not accessible due to debris	Partial - Most of seat not accessible due to debris	Seat not accessible due to debris	None	n/a	Intact/ impact damage
		Window	None	None	None	Partial	None	n/a	Intact/ impact damage
9	Right	Aisle	None	none	Partial	Present/ damaged	Partial	No cover/ intact	Intact
9	Right	Window		Partial back/ no seat	Small pieces missing	Present/ damaged	Partial	n/a	Intact
9	Left	Aisle	Most of seat not accessible due to debris	Most of seat not accessible due to debris	Most of seat not accessible due to debris	Most of seat not accessible due to debris	Most of seat not accessible due to debris	Partial melting	Intact/ impact damage
		Center	None	None	Partial	None	None	n/a	Intact/ impact damage
		Window	None	None	Partial	None	None	n/a	Intact/ impact damage
10	Right	Aisle	None	Partial back	Intact	Present/ damaged	partial	No cover/ intact	intact
		Window	None	Partial back	Intact	Present/ damaged	partial	n/a	intact
10	Left	Aisle	None	Partial back	Upper ½	Present/ damaged	None	Not access.	Intact
		Center	None	Partial back	Upper ½	Present/ damaged	None	n/a	Intact

			Damage assessment						
Row	**Side of Car**	**Seat location**	**Seat cover**[7]	**Seat & Back Cushion**[8]	**Internal Support Structure**[9]	**Seat Back Cover**	**Head Rest**[10]	**Arm Rest**[11]	**Seat Frame**[12]
		Window	None	Partial back	Upper ½	Present/ damaged	None	n/a	Intact
11	Right	Aisle	None	Partial seat	Intact	Present/ damaged	None	No cover/ intact	Intact
11		Window	None	Partial seat	Intact	Present/ damaged	None	n/a	Intact
11	Left	Aisle	Only back assessable-none	Only back assessable-partial	Only back assessable-partial	Partial	None	Not accessible	Intact
		Center	Only back assessable-none	Only back assessable-partial	Only back assessable-partial	Partial	None	n/a	Intact
		Window	None	Partial back & seat	Intact	Present/ damaged	None	n/a	Intact
12	Right	Aisle	Small areas	Partial back & seat	Missing areas	Present/ damaged	Intact	No cover/ intact	Intact
		Window	Small areas	Most back/ no seat	Intact	Present/ damaged	Intact	n/a	Intact
12	Left	Aisle	None	Partial back & seat	Intact	Present/ damaged	None	No cover/ intact	Intact
12	Left	Center	None	Partial back & seat	Intact	Present/ damaged	Partial	n/a	Intact
		Window	None	Partial back & seat	Intact	Present/ damaged	Partial	n/a	Intact
13	Right	Aisle	None	Partial back/ no seat	Intact	Present/ damaged	Partial	No cover/ intact	Intact
		Window	None	Partial back/ no seat	Intact	Present/ damaged	Partial	n/a	Intact
13	Left	Aisle	Small areas	Intact w/ some bare spots	Intact	Present/ damaged	Intact	No cover/ intact	Intact
		Center	None	Intact w/ some bare spots	Intact	Present/ damaged	Intact	n/a	Intact
		Window	None	Intact w/ some bare spots	Intact	Present/ damaged	Intact	n/a	Intact
14	Right	Aisle	Small areas	Back intact/ seat partial	Intact	Present/ damaged	Intact	No cover/ intact	Intact
		Window	Small areas	Back intact/ seat missing	Intact	Present/ damaged	Intact	n/a	Intact
14	Left	Aisle	Small areas	Partial back & seat	Intact	Present/ damaged	Intact	No cover/ intact	Intact

			Damage assessment						
Row	**Side of Car**	**Seat location**	**Seat cover**[7]	**Seat & Back Cushion**[8]	**Internal Support Structure**[9]	**Seat Back Cover**	**Head Rest**[10]	**Arm Rest**[11]	**Seat Frame**[12]
		Center	Small areas	Partial back & seat	Intact	Present/ damaged	Intact	n/a	Intact
		Window	Small areas	Partial back & seat	Intact	Present/ damaged	Intact	n/a	Intact
15		Aisle	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
		Window	Partial	Intact	Intact	Present/ damaged	Intact	n/a	Intact
16		Aisle	Small areas	Partial back/ seat missing	Intact	Present/ damaged	Partial	Not accessible	Intact
		Window	Small areas	Partial	Intact	Present/ damaged	Partial	n/a	Intact
17		Aisle	None	None	None	None	None	No cover/ intact	Intact
		Window	None	None	None	None	None	n/a	Intact
ADA	Left		Intact but charred	Present	Intact	n/a	n/a	n/a	Intact
ADA	Right		Intact but charred	Present	Intact	n/a	n/a	n/a	Intact
18	Right	Aisle	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
		Window	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
18	Left	Aisle	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
		Center	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
		Window	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
19	Right	Aisle	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
		Window	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
19	Left	Aisle	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact

			Damage assessment						
Row	**Side of Car**	**Seat location**	**Seat cover**[7]	**Seat & Back Cushion**[8]	**Internal Support Structure**[9]	**Seat Back Cover**	**Head Rest**[10]	**Arm Rest**[11]	**Seat Frame**[12]
		Center	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
		Window	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
20	Right	Aisle	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
		Window	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
20	Left	Aisle	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
		Center	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
		Window	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
21	Right	Aisle	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
		Window	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
21	Left	Aisle	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact
		Window	Partial	Intact	Intact	Present/ damaged	Intact	Partial cover/ intact	Intact

All of the ceiling panels were missing[14]. All of the overhead storage racks forward of the rear passenger doors were missing[15]. Two racks were found underneath the 3rd rails. The wall and vestibule panels were mostly missing and those remaining were heavily damaged[16]. The only remaining sidewall panels found were located below the lower edge of the window frames. Where windows were either open, or burned through, the damage was more extensive. The B-end Body door was deformed and the polymeric window in the door was missing.

[14] The ceiling panels were made of a melamine-aluminum panel with an aluminum honeycomb core.
[15] The overhead rack module consisted of aluminum racks with polycarbonate ends (end stoppers) that attached to a ceiling panel.
[16] Window sidewalls and armrest were made of FRP with polyvinyl fluoride polymer (Tedlar®). End wall panels and door pocket panels were melamine-aluminum paneling with an aluminum honeycomb core.

All of the cable runs in the ceiling were present. An example is shown in Figure 23.

Figure 23. Section of cable run near the right rear passenger door.

However, all of the insulation had been burned away. The conductors to the cables appeared to be mostly intact with several mechanical breaks present. These breaks were concentrated in the areas where the cables ran through the aluminum cable run hangers and in areas where 3rd rails came into contact with the ceiling and walls. There were no obvious signs of electrical arcing on any of the visible conductors. One cable run hanger was melted with a significant portion of the inboard side missing as shown in Figure 24. All other cable run hangers were intact.

Figure 24. Damaged cable run hanger located above the toilet.

The toilet module[17] was located near the left rear passenger door. The module exhibited severe fire damage. The door and most of the non-metallic components in the bathroom were destroyed as shown in Figure 25. The resin was burned out of FRP leaving behind the glass fiber mat.

[17] The toilet module walls were FRP with polyvinyl fluoride polymer (Tedlar®) and the door was melamine paneling with an aluminum honeycomb core.

Figure 25. Damaged toilet module.

The forward-face of B-end body end door on MN 4332 that faced the B-end body end door of MN 4333 was heavily sooted but had no other thermal damage. Other than the sooting on the forward door, MN 4332 had no fire related damage[18].

E. SPORTS UTILITY VEHICLE EXAMINATION

The SUV sustained heavy fire and mechanical damage over the entire structure as shown in Figure 26[19].

[18] In order to assess the flammability of exposed interior materials in MR 4333, several components and assemblies were removed from the interior of MN 4332. Details of this testing are found in Material Laboratory Report 15-068-Flammability Test Report Review in the docket for this accident.

[19] For further information on the damage to the SUV, refer to the Survival Factors Highway Factual Report in the accident docket.

Figure 26. Driver's side of the SUV on-scene.

The two front tires were partially intact. The rear passenger tire was partially consumed leaving only the metal reinforcements. A portion of the interior lip of the tire rim was missing as shown in Figure 27. The rear driver's side tire was completely destroyed.

Figure 27. Rear passenger side tire with fire damaged rim.

The only component to receive little or no fire damage was the driver's side door. Damage was limited to the upper window frame as shown in Figure 28. The door exhibited mechanical damage.

Figure 28. Front driver's side door.

The underside of the SUV exhibited thermal discoloration on metallic components. Most non-metallic components were damaged or destroyed including the fuel tank. The 3rd rail penetrated through the entire width of the SUV, running underneath the passenger area as shown in Figure 29.

Figure 29. Entry point for 3rd rail into SUV.

At the rail's entry point, there was an eroded area on the steel car frame underneath the left floorboard of the SUV, forward of the left rear wheel and adjacent to the left lobe of the fuel tank. The erosion pattern on the car frame was consistent with electrical arcing. A close-up of this area is shown in Figures 30-31.

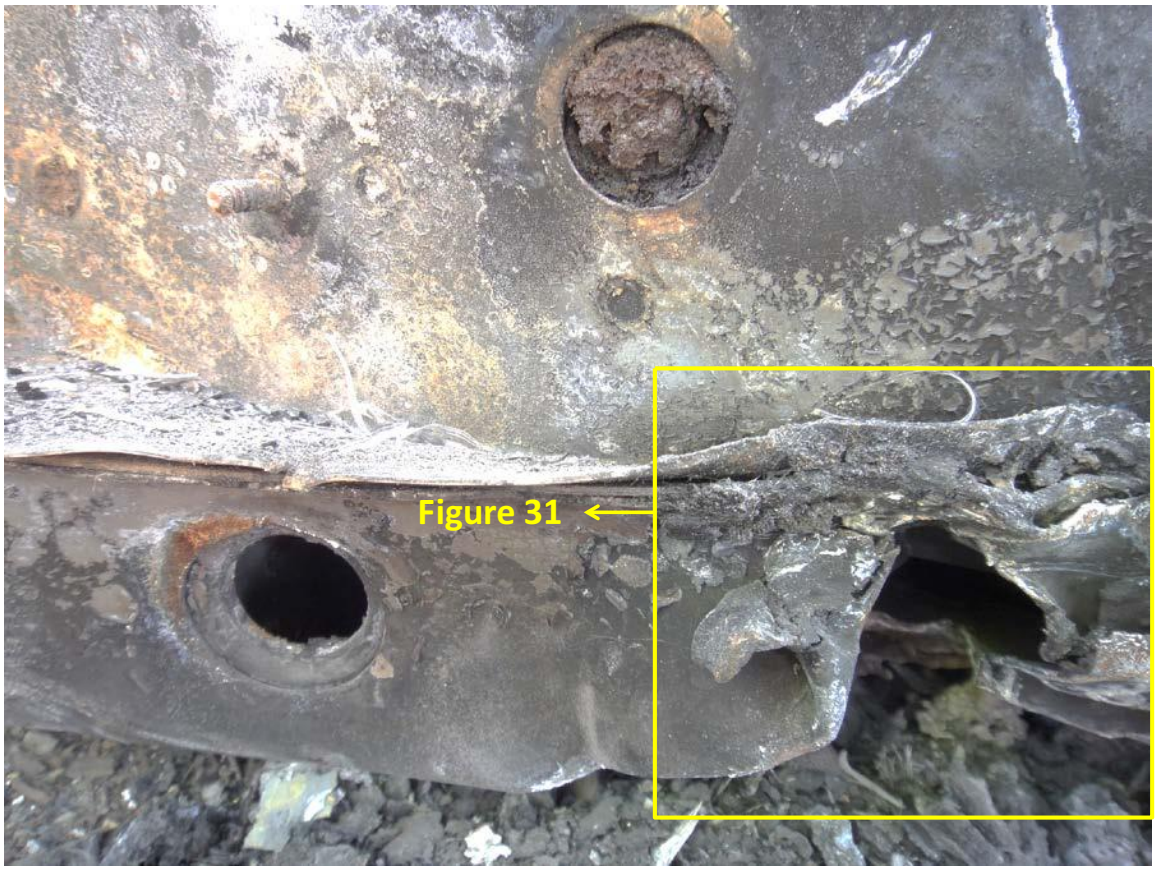

Figure 30. Erosion damage to underside of SUV.

Figure 31. Close-up of erosion of SUV frame.

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