National Transportation Safety Board
Office of Research and Engineering
Washington, DC 20594

RRD25FR006

MATERIALS LABORATORY

Factual Report 25-085

December 1, 2025

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A. ACCIDENT INFORMATION

Location: Ridley Park, Pennsylvania/ Paoli, Pennsylvania
Date: February 6, 2025/July 22, 2025
Vehicle: SEPTA Silverliner IV railcars MU132 and MU114
Investigator: Michael Bachmeier
IIC-RPH-12

B. COMPONENTS EXAMINED

Train cars MU132 and MU114

C. EXAMINATION PARTICIPANTS

Specialist Nancy B. McAtee
National Transportation Safety Board
Washington DC

D. DETAILS OF THE EXAMINATION

On February 6, 2025, about 5:56 p.m. local time, the lead railcar (MU132) of Southeastern Pennsylvania Transportation Authority (SEPTA) Regional Rail train 3223 caught fire as the train departed Crum Lynne Station in Ridley Park, Pennsylvania. Train 3223 was traveling from West Trenton, New Jersey, to Newark, Delaware. There were about 325 passengers and 4 crew members on board the train. A similar fire occurred on July 22, 2025, about 10:53 p.m., when the fifth railcar (MU114) of SEPTA train 3553 caught fire as the train stopped at Paoli Station in Paoli, Pennsylvania.

Both railcars were examined after each incident to assess the fire-related damage.

Car 132

Car 132 was part of a "married pair" that consisted of Car 131 and 132[1]. The exterior of the car bodies was stainless steel. Car 131 (exterior and interior) was undamaged by fire. Car 131 did have some light sooting on the exterior car body due to exposure to smoke.

Car 132 sustained fire damage to both sides of the exterior, mainly around the center of the car. The right side was heavily sooted with some warping to the lower skirt area near the undercarriage as well as near the roof as shown in Figures 1 and 2. All undercarriage components found on the right were intact with moderate sooting and

[1] For the purpose of this report, description orientations are with Car 131 as the forward car and Car 132 as the aft car with the two cars were coupled together at the aft end of Car 131 and the forward end of Car 132.

evidence of thermal exposure. The left side of the Car 132 car body sustained damage to the same area centerline as the right; however, the thermal damage was more severe with a distinct thermal pattern originating at the undercarriage and extending up the side of the car body and roof as shown in Figures 3 and 4. The car body warpage, particularly at the roofline, extended further forward on the left than on the right, the left side shown in Figure 5 . The aft section of Car 132 exhibited light sooting on both sides of the car body along the undercarriage that extended to the uncoupled end of the car. Nearly all windows on Car 132 were missing, either damaged or destroyed during the fire or removed during firefighting efforts. Two windows on the left side near the forward end of the car were still intact. These windows were heavily sooted and exhibited thermal related damage. The four windows on both ends (two on each end) of Car 132 were intact and showed discoloration consistent with thermal exposure.

Underneath the car, components, particularly the blowers and associated metallic hardware sustained significant thermal damage and heavy sooting as shown in Figure 6. Painted components in this area showed large areas of missing or blistered paint. Ferrous components showed large spread areas of reddish-brown oxidation. Aluminum components showed melting and missing material as shown in Figure 7. All electrical wiring found in this area exhibited melted or missing insulation. All the visible electrical wiring conductors were still intact. Several sections of electrical wiring showed evidence of electrical arcing activity (beading, welding of conductors, etc.): 1) Several wires directly adjacent to the blower location showed evidence of beadings on several conductor ends as shown in Figure 8; 2) the 31MD (motor #1 field winding) and 31MA (motor #1 armature winding) wires, located in an area aft of the intake to the double-end blower on the left side of the car as shown in Figure 9, exhibited erosion and welding on the conductor surfaces and the two wires were welded together and 3) the 31MC (motor #1 field) and 31MF (motor #1 armature winding), directly across the car on the right side, were also found electrically damaged. Most of the nonmetallic components in the left center section of the undercarriage were missing and presumed destroyed by fire. The interior of control boxes located adjacent (forward and aft) of the center area were heavily sooted and polymeric components and electrical insulation showed signs of melting but were otherwise intact as shown in Figure 10.

The center roof section was heavily sooted and the roof panels were significantly warped. The roof panels were removed during the examination to access the components located in the center section of the roof. The components in the roof section sustained significant thermal damage as shown in Figure 11. The lower floor of the roof compartment was warped and thermally discolored. The fiberglass ducting located in this compartment was destroyed with only glass fiber mat remaining. Electrical conductors found in the area were missing insulation but were otherwise intact and showed no signs of electrical arcing activity.

The interior of Car 132 sustained significant fire damage as shown in Figures 12 and 13. The center section of the interior was destroyed with only ferrous components (such as seat frames) and electrical wiring remaining. The remaining components were heavily oxidized. The fire damage extended through the car floor with areas of the flooring missing. The seats located forward and aft of the center section had varying levels of padding remaining on the seats. The interior wiring was largely intact but devoid of insulation. The power cabling that ran from the roof to the undercarriage was located left center. The metal compartment bulkheads for the cabinet were intact but heavily oxidized as shown in Figure 14. The panels were removed to access the wiring located within the compartment. The insulation was largely missing from the conductors, but the conductors were intact and undamaged, showing no sign of electrical arcing activity on the surface of the conductors as shown in Figure 15.

Car 114

Car 114 was the aft car in a married pair with Car 113. Car 113 was undamaged. Car 114 sustained damage to both sides of the exterior, mainly around the center area like the damage found on Car 132. A narrow vertical soot pattern was located near the front left door extending up from the undercarriage with another wider pattern on the left side of the train located around the center of the car that extended from the underside of the car to the roof as shown in Figure 16. On the right side, soot extended midline (between the forward door and center of the car) to the center section of the car, extending from the undercarriage to the roof as shown in Figure 17. The windows on the left side were intact and in place forward of the centerline of the car. From the center going aft, the windows were not in their installed positions. On the right side, all of the windows were missing from the frames, however, the windowpanes were still present and intact consistent with the windows being removed during firefighting operations. Most of the windows were missing from their frames on the left side. Several intact windowpanes were located inside the railcar. Sooting on one side of the windowpanes indicated that the windows were in place at some point during the fire and were likely removed during firefighting options.

The roof panel and ducting located beneath sustained thermal damage as shown in Figure 18. The exterior roof panels were warped. The ducting located underneath the panels was relatively intact. The upper surface of the duct had thermal discoloration and the resin within fiberglass composite material exhibited thermal discoloration and degradation.

The interior of Car 114 was partially destroyed by fire as shown in Figure 19. The thermal damage extended from the ceiling area to the top half of the seats. The overhead panels were warped, and the ceiling liners were either missing or hanging from the overhead, partially melted/burned. The overhead luggage racks were still

attached to the car sidewall. The intact windows exhibited light crazing near the top of the window frame and were heavily sooted. The intact window gaskets exhibited thermal damage. The upholstery and padding along the top edges of the seats were thermally damaged or missing all together. Dripped material from the overhead was accumulated on the lower section of the seats.

Underneath the car, components, particularly the blowers, cooling reactors and associated metallic hardware sustained significant thermal damage and heavy sooting as shown in Figure 20. The span of damage was narrower than the damage found on Car 132. The thermal damage was concentrated to the center section of the undercarriage. Painted components in this area exhibited large areas of missing or blistered paint. Ferrous components exhibited large spread areas of reddish-brown oxidation. Aluminum components exhibited melting and missing material as shown in Figure 21. All electrical wiring located in this area exhibited melted or missing insulation. All the visible electrical wiring conductors were still intact. An example is shown in Figure 22. No electrical damage was found to any of the wire harnesses examined. The thermal damage was concentrated to the center section of the undercarriage. The cooling reactor showed more damage than the one on Care 132. The damage is shown in Figure 23.

Submitted by:

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Fire and Explosion Specialist

Figure 1. Right side of Car 132 facing forward. (NTSB)

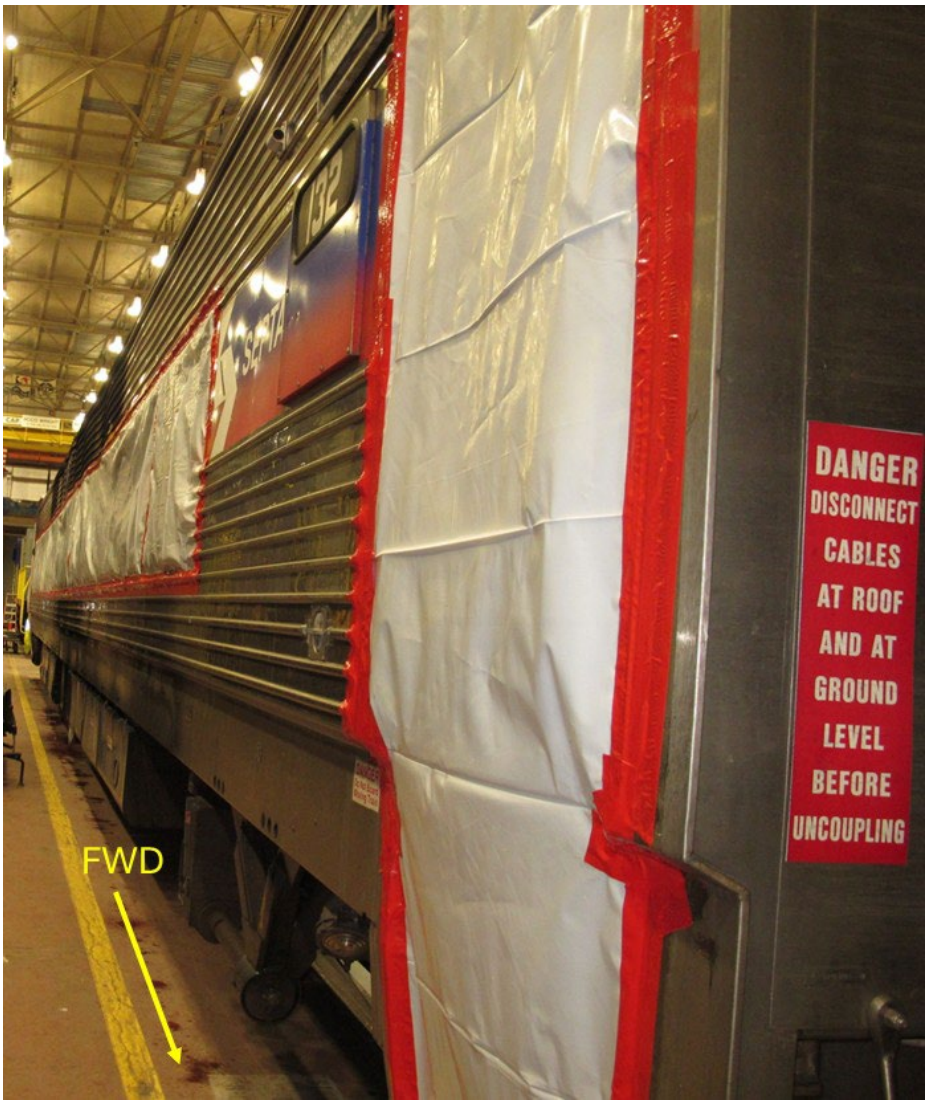

Figure 2. Right side of Car 132 facing aft. (NTSB)

Figure 3. Left side of Car 132 facing forward. (NTSB)

Figure 4. Left side of Car 132 facing aft. (NTSB)

Figure 5. Roofline warping damage. (NTSB)

Figure 6. Undercarriage around the blowers. (NTSB)

Figure 7. Thermal damage to aluminum cable trays. (SEPTA)

Figure 8. Beading (indicated by yellow arrows) on electrical conductor ends found on the left side of the undercarriage. (NTSB)

Figure 9. Arcing damage (circled in red) on the 31MD (motor #1 field winding) and 31MA (motor #1 armature winding) wires, found in an area aft of the intake to the double-end blower on the left side of the car. (NTSB)

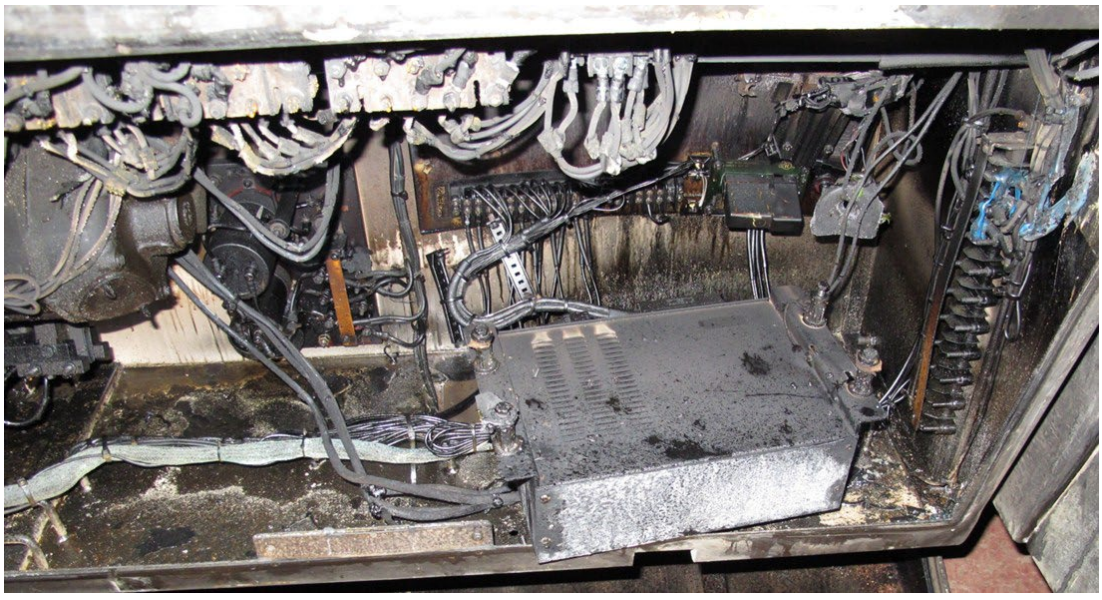

Figure 10. Thermal damage to adjacent control equipment. (NTSB)

Figure 11. Damage to ducting and wiring found on the roof of Car 132. (FRA)

Figure 12. Damage to interior of Car 132 approximately centerline (facing forward). (NTSB)

Figure 13. Damage to interior of Car 132 approximately centerline (facing forward). (NTSB)

Figure 14. Thermal damage to power cable cabinet (location in car shown in Figure 12). (NTSB)

Figure 15. Electrical cabling found within power cable cabinet shown in Figure 14. (NTSB)

Figure 16. Left side of Car 114. (NTSB)

Figure 17. Right side of Car 114. (NTSB)

Figure 18. Rooftop damage to Car 114. (NTSB)

Figure 19. Interior damage to Car 114 (facing forward). (NTSB)

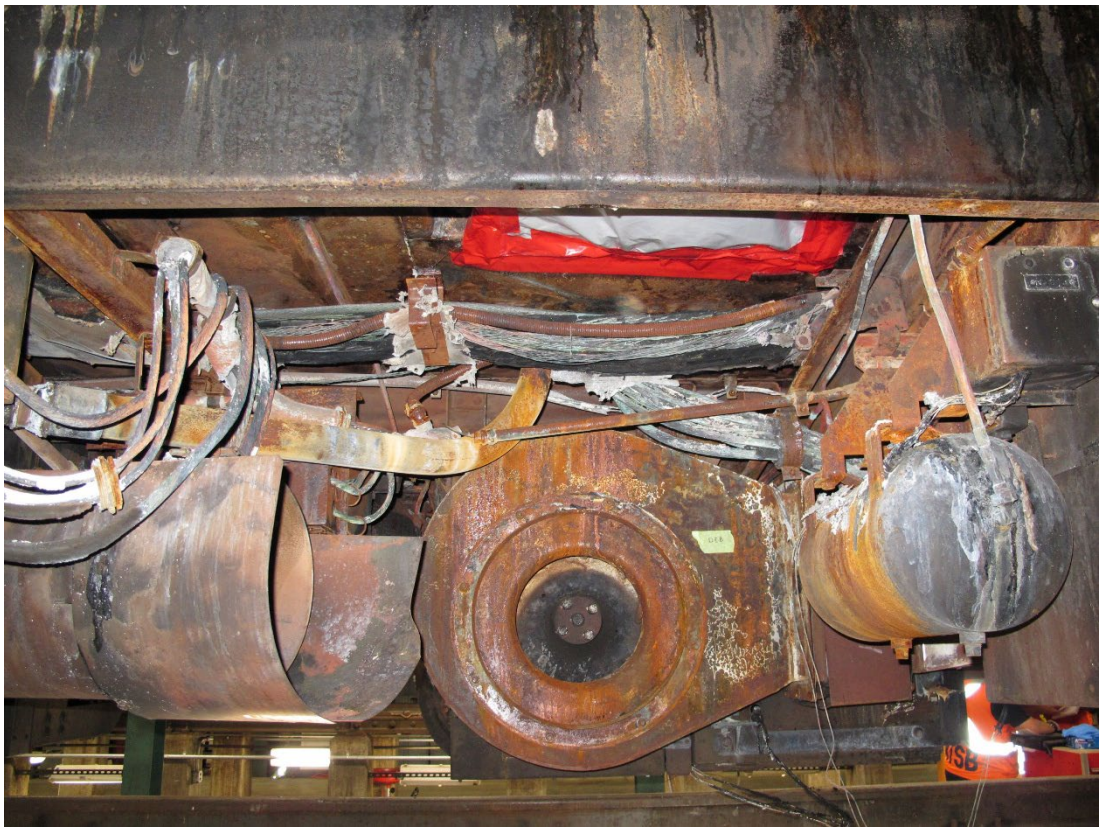

Figure 20. Thermal damage to undercarriage approximately centerline. (NTSB)

Figure 21. Thermal damage to polymeric and aluminum components found in the undercarriage approximately centerline. (NTSB)

Figure 22. Section of thermal damage to wiring underneath Car 114.

Figure 23. Damage to smoothing reactor cooling coil insulation. (NTSB)