

National Transportation Safety Board

Office of Railroad, Pipeline and Hazardous Materials Investigations

Washington, DC 20594



RRD25FR006

SURVIVAL FACTORS- CRASHWORTHINESS

Group Chair's Factual Report

December 10, 2025

Table of Contents

A. ACCIDENT.....	4
B. SURVIVAL FACTORS- CRASHWORTHINESS GROUP.....	4
C. SYNOPSIS.....	4
D. DETAILS OF THE INVESTIGATION.....	4
E. THE INVESTIGATION.....	5
1.0 GEOGRAPHICAL OVERVIEW.....	5
2.0 THE INCIDENTS.....	6
2.1 SEPTA Commuter Train 3223.....	6
2.2 The Train Crew.....	7
2.3 The Passengers.....	8
3.0 CRASHWORTHINESS.....	9
3.1 Basic Rail Car Layout.....	9
3.1.1 Interior Seating and Window Locations.....	9
3.2 Inspection and Documentation of Rail Cars.....	12
3.2.1 Single Rail Cars.....	13
3.2.2 Married Pair.....	13
4.0 EMERGENCY RESPONSE.....	17
4.1 Delaware County Emergency 911 Center “Delco Dispatch”	18
4.2 Emergency Responders.....	18
4.2.1 Fire and Emergency Medical Services Response.....	18
4.2.2 Law Enforcement Response.....	19
4.3 Event Timeline.....	19
4.3.1 Train Crew and Passenger Event Timeline.....	19
4.3.2 Emergency Responder Event Timeline.....	23
4.3.3 SEPTA Operations Control Center (ROCC) Event Timeline.....	24
4.4 Emergency Access, Signage, Egress and Safety Equipment.....	25
4.4.1 Train Car Emergency Access.....	25
4.4.2 Signage and Emergency Egress.....	26
4.4.3 Emergency Exit Windows.....	27

4.5	Occupant Protection.....	29
4.6	Emergency Management Planning.....	29
	4.6.1 SEPTA Emergency Preparedness Planning and Employee	
Training.....		29
	4.6.2 Outside Emergency Responder Training	31
	4.6.3 After-Action Activity.....	33
4.7	Emergency Responder Interviews.....	33
	4.7.1 Ridley Park Fire Chief, Incident Commander.....	33

passenger evacuation from the train and the emergency response by the local responders as well as personnel from the transit rail agency. Lastly, the investigation examined the adequacy of SEPTA's emergency response planning, and the training provided to its employees as well as local emergency responders.

E. THE INVESTIGATION

1.0 Geographical Overview

The incident occurred in the unincorporated community of Crum Lynne in the Ridley Park borough, Delaware County, Pennsylvania. The community of Crum Lynne occupies an area of approximately 1.1 square miles and is located 5 miles south of Philadelphia along Interstate 95 corridor in the southeastern portion of the state. The local population is approximately 7,500 individuals.

The Southeastern Pennsylvania Transportation Authority (SEPTA) is a regional public transportation authority that operates bus, rapid transit, light and commuter rail services. The transit agency serves nearly four million people in five counties around Philadelphia, Pennsylvania. The incident occurred on the transit agency's West Trenton to Newark line. South of the Philadelphia City Center, SEPTA 3223 enters Amtrak's Northeast Corridor, using tracks adjacent to Amtrak's system tracks. The incident train had just serviced the Crum Lynne station and moved south when smoke entered the passenger compartment forcing the engineer to bring the train to a halt and evacuate the train. **Figure 1** is an image of the SEPTA Regional Rail System map that shows the station stops for SEPTA 3223 starting south of Philadelphia City Center where the train enters Amtrak's Northeast Corridor to continue south to Newark.

SEPTA's identification of their trains is based on the route and the sequence of the train that day. For the incident train, the number 3223 indicated that the train originated in West Trenton (the "3" indicating West Trenton) and scheduled to terminate in Newark, New Jersey (designated by the second digit, the number 2.) The last two digits indicate the train order on a specified day. Prior to incident, SEPTA 3223 experienced a mechanical issue and stopped at the Wayne Junction shop for maintenance at about 4:19 p.m. The shop was located north of the city center and prior to the train entrance onto the Northeast Corridor. At the facility, the train was inspected by maintenance personnel and departed the yard at 4:45:41 to continue its passenger service to Newark. At the time of the initial incident, there were 325 passengers and 4 SEPTA crew members on board. **Table 1** shows the timeline of SEPTA 3223 as it traveled to the incident site.

Table 1 Timeline of SEPTA 3223 arrival at Crum Lynne Station

STATION STOP	SCHEDULED ARRIVAL TIME	ACTUAL ARRIVAL TIME
Sharon Hill	4:52:00	5:27:43
Folcroft	4:54:00	5:30:42
Glenolden	4:56:00	5:34:08
Prospect Park	5:00:00	5:41:07
Ridley Park	5:02:00	5:44:48
Crum Lynne	5:05:00	5:48:28

The train crew was first made aware of an issue when passengers in the forward cars complained of a "foul" odor. This resulted in the movement of some passengers out of the first car into the second and ultimately moving into the third car as the smell moved throughout the first couple of cars. Eventually, the odor was detected by passengers in the third car though none of the passengers appeared overly alarm or concerned about it.

SEPTA 3223 arrived at the Crum Lynne station platform and departed approximately 5 minutes later. The train traveled approximately one minute, traversing south for about 1800 feet, when the engineer brought the train to a stop. The engineer exited the train from the front of the lead train car. When the engineer discovered the fire underneath the first car, he alerted the train conductors. The conductors began the process of evacuating the 325 passengers. The passengers were evacuated onto the tracks where they were assisted by local emergency responders. Initially none of the 325 passengers reported any injuries though later it was discovered that four passengers had reported sustaining injuries during the incident. Another passenger suffered a medical emergency, that was non-life-threatening and was treated on the scene. That passenger elected to drive to the hospital in their personally owned vehicle (POV).

2.2 The Train Crew

The train crew was comprised of an engineer, one conductor and two assistant conductors. On the day of the incident, the conductor was riding in the fourth car. Typically, the conductor rides in the last car to facilitate the boarding and disembarking of passengers from the train. However, the 6-car incident train was too long for some station platforms which resulted in passengers having to board or disembark the train from the fourth, rather than the last, car. As a result, the conductor was positioned in Car 278 rather than in the last car, Car 288.

Once the decision was made to evacuate the train, the conductor made an announcement to the passengers and determined the safest route off the train. Most of the passengers were moved to the last car, Car 288, and evacuated from the train. The initial survey performed by the conductor of the environment outside of the train resulted in the conductor's determination that the safest evacuation route was through Door 2. Door 2, which faced the track side, was location at a point where the terrain was more even. However, due to the proximity to Track 3, an Amtrak high-speed rail track, and the unexpected presence of another train, the conductor quickly revised his decision and began to evacuate the passengers through Door 1, on the roadway side. On that side of the train, the terrain dropped off sharply, making walking hazardous because of the loose ballast and the restricted space available between the train and the security fence that sealed off the track area from the adjacent commercial properties. Arriving emergency responders cut the security fence to access passengers and extricate them from the track area. After the last passenger was evacuated, the conductor re-boarded the train, walked back through the train towards the first car to confirm that all passengers had been evacuated. The conductor conferred with emergency responders who had boarded the train at the first car and were walking back searching for victims. Once the conductor was certain that all passengers had been evacuated, the conductor exited the train.

2.3 Passengers

At the time of the incident, approximately 325 passengers were on board the train. The passengers ranged in age and possessed varying degrees of mobility. SEPTA trains are not equipped with emergency evacuation devices, such as step stools or ladders, to assist passengers navigate the gap between the bottom step and the ground. Despite the lack of these types of devices on SEPTA 3223 to assist with the passenger evacuation, the train crew was able to evacuate the passengers without any major incident. Though days later, some passengers would report minor injuries related to the evacuation. Once removed from the train, the passengers were instructed by the crew to walk northward, away from the train towards the station platform until arriving emergency responders had breached the fence to access the track area. Before the crew had initiated the evacuation, several passengers self-

evacuated by activating the emergency door release in one of the front train cars to exit the train.

3.0 Crashworthiness

Crashworthiness is the ability of a vehicle to protect its occupants during an impact by maintaining its shape and keeping the occupant within the confines of the vehicle. An inspection of the train cars was conducted to determine not only the extent of the damage caused by the fire but to what degree this compromised the structural integrity of the train car.

3.1 Basic Rail Car Layout

For the purposes of this report, the interior of the train car is divided into three sections. The front section will be designated as the end facing forward in the direction of travel of the train. Each train car has two ends, the "A-end" and a "B- end" and an associated vestibule that contains an operator's station or position. The train brake is in the vestibule at the B-end of the train car. The platform doors are number 1 through 4. Door 1, located in the B-end vestibule, is opposite the brake with Door 2 adjacent to the brake. Door 3 is on the same side of the car as Door 1 and located in the A-end vestibule. Door 4 is also located in the A-end vestibule, on the same side as Door 2 and adjacent to the engineer's controls. A collision door is located at the end of each train car and separates the cars. A "parlor" door is located at each end of the train car and is used to separate the passenger compartment of the car from the vestibule area.

3.1.1 Interior seating and window locations

The train car is divided by a center aisleway. There are a total of 33 double seats and 18 triple seats in each train car for a total of 120 passenger seats. When facing the A-end vestibule, both the left and right sides of the train car have thirteen seats. Starting at the front of the car on the left side and closest to the A vestibule, the first seat, L1, is a double occupant seat that faces to the rear. L2, the second seat, is also a double occupant seat but faces forward. L3-12 are triple occupant seats that face front, and L13 is a double occupant seat that faces forward and abuts the front of the middle partition on the left, herein designated as LP2. On the right side, the first seat, R1, is also a double seat that faces to the rear. R2-12 are double seats that face forward towards the A-end and R13 is a double seat that abuts the front of the middle partition on the right, herein referred to as RP2.

The center of the train car is divided by two partitions, one in the front and the other to the rear. Between the middle partitions is a small seating area that contains one double seat on each side of the train car that faces to the rear.

When facing the A-end of the train, in the rear section, there are 12 seats on the left side. Starting from the seat closest to the B-end vestibule, seat #1 (L1) is a double seat that faces towards the A-end of the train. Seats L2- L12 are double seats that face to the rear towards the B- end vestibule. Seat L12 abuts the rear partition, herein referred to as LP2. On the right side, facing forward towards the A-end, there are 11 seats. Seat #1, R1, is a double seat that faces towards the A-end. Seat #2, R2, is a double seat that faces to the rear towards the B-end of the train car. Seats R3- R10 are triple seats that face the B-end. Seat R11 faces the B-end and abuts the rear partition on the right side, herein referred to as RP2.

Each train car has eleven windows on each side. Five windows are present in both the front and rear sections of the train car. On the left, Seats #3 and #4 share a window. Seats #5 and #6 share a window, Seat #7 and #8, Seats #9 and #10 and Seats #11 and #12. The thirteenth seat does not have an adjacent window. On the right side of this section of the car, the same seats share access to the windows. In the middle section of the car, between the partitions and adjacent to each seat is a window. In the rear section of the car and on the left side, the first window is located behind Seat #2 but in front of Seat #3. Seats #4 and #5 share a window as do Seats #6 and #7, #8 and #9 and #10 and #11. On the right side, the first window is closest to the B-End, and immediately adjacent to the ADA Seat #2. The remaining windows are located between Seats #3 and #4, #5 and #6, #7 and #8, #9 and #10 with no window immediately adjacent to Seat #11. **Figure 2** is a photograph looking from the B- end vestibule into the interior of the train car. **Figure 3** shows the middle section seats in the car and looks forward to the A- end of the train car.



Figure 2 Photograph taken from the B- end vestibule looking into the interior of the train car. (Source: NTSB)



Figure 3 Photograph taken from the last row of seats in the B-end looking towards the A-end of the train car and shows the middle section seats and the A-end sitting in the background. (Source: NTSB)

During the on-scene investigation, measurements were obtained from the train cars that were not affected by the fire. The inspection also examined the use of basic crashworthiness techniques such as compartmentalization in the train car's design to provide occupant protection. **Table 2** details the results of the train car examination.

Table 2 Documentation of the Overall Rail Car Dimensions

SINGLE CARS	MEASUREMENTS	REMARKS
Length	85 Feet	
Width	10 Feet 6 inches	
Car Height	6 Feet 7 ¼ inches	Interior car measurement
Height of overhead baggage rack	5 Feet 9 inches	Measured from floor to baggage rack.
Aisle width	22 inches	
SEATS- Double		
Seat Back		
Length	3 Feet 1 inch	Across the center of the seat
Height	2 Feet 2 ½ inches	From the top to where the seat back meets the seat pan
Seat Pan		
Length	3 Feet 1 ¾ inches	
Width	1 Foot 4 inches	
Distance between double seats	3 Feet 5 ½ inches	ADA Priority seating area B-end
Distance between double seats across from ADA seating (B-end)	1 Foot 1 inch	Measured from edge of seat pan to edge of seat pan for facing seats.
SEATS- Triple		

Seat Back		
Length	4 Feet 8 ¾ inches	
Height	2 Feet 3 inches	
Seat Pan		
Length	4 Feet 9 inches	
Width	1 Foot 4 ½ inches	
Height from floor to seat pan	1 Foot 1 inch	
Height from top of seat to floor	3 Feet 5 inches	
Distance from the front of the seat to the seat back (directly in front)	2 Feet 4 inches	
Distance from edge of seat pan to seatback (directly in front)	1 Foot	
Aisleway width at end of train car	1 Foot 9 inches	The width of the center aisle widens at the end of and middle of car.
MIDDLE SECTION SEATING		
Length	9 Feet 4 inches	Left sidewall to right sidewall
Width	2 Feet 4 inches	Partition to partition
Aisle width	2 Feet 7 ½ inches	
Middle car seat to partition	2 Feet 3 ½ inches	Measured from edge of seat pan to partition
Vestibule width	3 Feet 3 ½ inches	Measured from “collision” door to “parlor” door
WINDOWS		
Train car windows	16 inches height by 4 Feet in length	
Train car windows height above ground	7 Feet 2 inches	
Platform door window	2 Feet 3 ¼ inches x 2 Feet 3 ½ inches wide	
DOORS		
Platform door height	9 Feet 4 inches	
Platform door width	2 Feet 7 inches	
Platform door -step width	2 Feet 9 inches	
Collision door width	2 Feet 8 inches	
Parlor door height	6 Feet 6 ½ inches	
Parlor door width	2 Feet 4 ½ inches	

3.2 Inspection and Documentation of Train Cars

A detailed inspection of the train cars involved in the incident was conducted to determine the adverse effects of the heat/fire on the structural integrity of the train car and the resulting compromise to the train car’s crashworthiness.

3.2.1 Single Rail Cars

The four single rail cars sustained no direct damage from the fire or the resultant heat. During the inspection of the cars, it was determined that some of the damage and/or alterations observed were because of the evacuation of the passengers and the fire suppression operation. The following chart outlines the observations made during the inspection of the four single rail cars. **Table 3**

Table 3

TRAIN CAR	SEQUENCE	ALTERATION/DAMAGE	ORIENTATION AND REMARKS
407	Car 3	Forcible entry damage to Door 2. Emergency door release handle pulled for Door 4. On left side between seat L2 and L3 at LW1, emergency exit window handle pulled; gasket removed but window remained in frame.	A-End" leading
278	Car 4	Forcible entry damage to Door 3. Emergency door release handle pulled for Door 4.	S/A
287	Car 5	Door 2 found open. * Documented that Door 4 was used by several passengers to self-evacuate. Activated emergency door release at panel, opened floor trap in vestibule to lower steps. The conductor closed door and trap.	S/A *See Event Timeline as captured on in-car camera.
288	Car 6	Emergency door release handle pulled at Door 3. Door partially open.	S/A

3.2.2 Married Pair

A married pair is comprised of two rail cars that are coupled together and share components necessary for full operation. Car 132 and Car 131 were operating as a married pair with Car 132; the lead car, being operated with its "B- end" leading. The "A- end" of Car 132 was coupled to the "A- end" of Car 131, which as the trailing car for the married pair. The source of the ignition and the bulk of the fire was contained within Car 132. The car sustained extensive damage to the interior structure and fixtures such as the partitions that housed electronics and the car seats. The intense heat and direct flame impingement compromised the car's structural integrity such as the roof supports, melted and deformed the train car windows, the in-car cameras as well as damaged electronic components such as the in-car DVRs housed underneath the car seats. The fire left holes in the floor and roof areas in the left front ("B- end") and middle side of the car. This seemed to be the most concentrated area of the fire and sustained the most significant heat damage. **Table 4** outlines the inspection and documentation of damage to Car 132 and Car 131.

Table 4 Documentation of the Damage to Car 132 and Car 131

TRAIN CAR	LOCATION	EXEMPLAR MEASUREMENT	DAMAGE/ALTERATION MEASUREMENT	DEVIATION	REMARKS
132					Facing "B-End" (leading end of car)

SEATS	Distance across the top of the seats	2 Feet 9 ½ inches			
	L1 and L2		All material padding burned away but metal support frame for seat back and seat pan still present		
	Between Seat L3- L6	S/A	No deviation		L3- L5 seat padding burned away but metal frame for seat back and seat pan still present.
	Between L6- L7	S/A	2 Feet 7 inches	- 2 ½ inches	Seat L6 bowed towards L7 and the left side, middle of the train. L6 padding and support frame for seat are burned away.
	Between L7- L8	S/A	2 Feet 6 ¾ inches	-2 ¾ inches	L7 bowed back towards L8. Both L7 and L8 seat padding and metal support frame for seat back and seat pan are burned away.
	Between L8- L9	S/A	2 Feet 6 ¼ inches	-3 ¼ inches	L8 bowed back towards L9. Both sustained loss of padding and metal support frames.
	L9- L10	S/A	2 Feet 6 1/8 inch	- 3 3/8 inches	Seat L9 bowed back towards L10. No padding or seat back or seat pan metal support frame is left on L9. L10. Padding has been burned away but a portion of the metal seat frame is still present.
	L11	Obvious signs of deformation	N/A		The seat bowed back into partition space LP2. Partition has been burned away.
	R1- R2		No deviation		Padding burned away but metal support for seat back and seat pan still present
	R3- R4	S/A	No deviation	N/A	S/A
	R4- R5	S/A	2 Feet 7 inches	-2 ½ inches	S/A
	R5- R6	S/A	2 Feet 7 inches	- 2 ½ inches	S/A

	R6- R11	S/A	No deviation	N/A	S/A
	R12		No deviation		S/A
MIDDLE SECTION					
	Left side double seat facing "B-end"	Obvious signs of deformation			Seatback is bowed back into the space where the partition behind the seat was burned away. Extensive fire and heat damage with both padding and metal frame burned/melted away.
	Right side double seat facing "B-end"	N/A	N/A		No signs of deformation. Padding and metal support for seatback and seat pan have been burned/melted away.
					Facing "A- end"
	R13	Obvious deformation to seatback	N/A		Seatback bowed backward towards the middle of the train car and encroached into partition space RP2 which had been burned away.
WINDOWS					Facing "B-ending"
LW-1	Adjacent L2		Missing- out of frame		Partial remnant of melted window found on train car seat.
LW-2	Between L3 and L4		Extreme melting- still in frame		Exposure to extreme heat
LW-3	Between L5 and L6		S/A		S/A
LW-4	Between L7- L8		Exposure to extreme heat- melted away		Remnant of window found adjacent to frame. Deformation due to heat on the exterior roof over top window.
LW-5	Between L9- L10		Exposure to extreme heat- out of frame		The window found intact lying on seat L9. Deformation due to heat exposure to exterior of train car roof located directly above window.

MIDDLE SECTION					Facing "B- end" and direction of travel of train
LW-6	Adjacent to left side double seat in the middle of car		Missing- out of frame		Signs of significant heat and fire damage to the window frame and exterior roof directly above window.
RW-6	Adjacent to right side double seat in middle of train car		Missing- out of frame		Signs of heat exposure but no real damage to window frame
					Facing "A- end"
RW-1	Between seat R3 and R4		Missing- out of frame		
RW-2	Between R5 and R6		Missing- out of frame		
RW-3	Between R7 and R8		S/A		
RW-4	Between R9-10		S/A		
RW-5 Emergency exit window	Between R11- and R12		S/A		Signs of extreme heat exposure was observed on the exterior roof of train car directly above window.
LW-1 Emergency exit window	Between seats L3 and L4		Missing		
LW-2	Between L5 and L6		S/A		
LW-3	Between L7 and L8		S/A		
LW-4	Between L9 and L10		S/A		
LW-5	Between L11- L12		S/A		
CAR 131					"A- end" forward
OVERALL					Significant smoke damages the A-end vestibule. A-end "parlor" door frame slightly bowed outward but door and frame still intact. No damage to the train car seats.
WINDOWS					
LW-1			Window removed. No sign of fire/heat related damage		Facing the direction of travel for the train
LW-2			S/A		
LW-3 LW-4	Between L7 and L8.		Windows intact and still in their respective frames		

	Between L9 and L10.				
LW-5			Window removed. No sign of fire/heat related damage.		
LW 7-11			All the windows were removed.		
RW 1-5			All the windows were removed		
RW 7-11			All the windows were removed.		
MIDDLE SECTION					
LW- 6			The window is intact and still in its frame.		
RW- 6			The window is intact and still in its frame.		



Figure 4 Photograph of the burned-out interior of Car 132. (Source: NTSB)

(For more information related to the fire investigation, see Fire Investigator's Factual Report)

4.0 Emergency Response

Delaware County is approximately 191 square miles and is the fifth most populated county in the state of Pennsylvania with a population of over 576,000 individuals. The county is made up of 49 municipalities that include one city, 27

boroughs, 21 townships as well as 18 Census-designated places² and 12 unincorporated communities. As a result, multiple agencies overlap in providing emergency services to the various communities. Within the unincorporated community of Crum Lynne, the primary provider of fire and emergency medical services is the Ridly Park Fire Department. The Ridly Park Police Department provides law enforcement services. Both agencies are located within blocks of the Crum Lynne SEPTA station stop. Emergency communications is provided by the county's emergency communications center, Delco Dispatch. A discussion of each element of the emergency response is provided below.

4.1 Delaware County Emergency 911 Center "Delco Dispatch"

Delaware County Emergency 911 Center, "Delco Dispatch" is the county's emergency communications center. Delco Dispatch operates 24 hours a day, 7 days a week and uses Computer-Aided Dispatch (CAD) as well as geographical information systems (GIS) as well as an integrated communications platform to facilitate the receipt of calls and dispatch requests for emergency services.

4.2 Emergency Responders

4.2.1 Fire and Emergency Medical Services Response

Regarding the emergency response for the first incident, the Ridley Park Fire Department was the first due fire company for the incident. The fire station is located less than one mile from the Crum Lynn SEPTA station. Upon arrival, the Ridley Park Fire Chief established control of the scene as the Incident Commander and implemented the Incident Command System (ICS). Additional resources were sent from adjacent jurisdictions in response to the incident. In addition to the Ridley Park Fire Department, six other fire departments provided support to the fire suppression operation. These agencies included the Prospect Park Fire Department, Eddystone Fire Department, Tinicum Fire Department, Springfield Fire Department, Aston Township Fire Department and Woodlyn Fire Department.

During the incident, in preparation for casualties, the Incident Commander oversaw the notification to five local hospitals which provided a count of the number of patients they could support in the event of mass casualties. In addition, emergency medical services were dispatched to the scene in preparation for casualties. EMS resources were provided by Norwood EMS, Eddystone EMS, CCMC West, and the Brookhaven Fire Department which provided an ambulance.

² Census-designated Places (CDP) is a concentration of population defined by the United States Census Bureau that provides statistical data but are not legally incorporated by law in the states for which they are located.

The second incident occurred approximately two miles north of the Crum Lynne SEPTA station in the borough of Prospect Park. During that incident, the Prospect Park Fire Department as well as the Ridley Park Fire Department were dispatched to the scene for fire suppression operations.

4.2.2 Law Enforcement Response

Delco Dispatch dispatched law enforcement officers from the Ridley Park Police Department to the scene. The Amtrak Police Department was notified of the incident by SEPTA's Railroad Operations Control Center (ROCC) and responded. The Ridley Park Police Department was the first law enforcement agency to arrive. The police station is located .3 miles from the Crum Lynne SEPTA station and officers arrived approximately 5 minutes after being dispatched to the scene.

During the second incident, officers from the Prospect Park Police Department were dispatched to that scene to assist. The first arriving officer confirmed that no one was on board the train which had visible fire venting from the top of the train car.

4.3 Event Timeline

4.3.1 Train Crew and Passenger Event Timeline

An examination was conducted of the event timeline as experienced by the train crew and the passengers to determine the perception-reaction time and the response to the incident. This examination helped to determine the appropriateness of the response based on the moment the train crew and the passengers were alerted to or became aware of danger, the timing of their reactions and as well as their actions in response to the situation.

Each of the SEPTA train cars carries its own DVR which stores images from the in-car cameras and Global Position Satellite (GPS) capabilities that permit the reporting of the exact location of a specific train car. The DVRs for Car 131 and the trailing single cars were recovered and the videos reviewed by investigators. It was determined that though the GPS location of the train car could be verified by other independent sources, the time stamp data on the images could not. It was apparent that the DVRs on the various train cars were not synchronized, and thus even though the cameras captured the same event, the time stamp for the images did not match. The videos, however, provided a basic timeline of the location of the train and information regarding the events that occurred. Investigators were particularly interested in the perception-reaction of the individuals involved. **Table 5** outlines the significant events captured on the various train car DVRs with the associated time stamp provided by the module. The exact time of the events captured by the various DVRs could not be verified because of the lack of synchronization between the modules.

Table 5 Train Crew and Passengers Event Timeline

TRAIN CAR	TIME	EVENT	LOCATION	REMARKS
CAR 131	17:58:22	Passengers are seen moving from Car 132 (first car) into Car 131.		Passengers moved by crew due to complaint of unpleasant odor.
	17:59:01	Passengers are seen being moved from Car 131 into 407		Captured on Camera 11 and 12 at Door 1 on B-end
	18:05:59	A crew member follows the last passenger out of the train car and into Car 407		
CAR 407	17:41	The train stops at Prospect Park station. No indications of problem from passengers observed.		
	17:51:09	The train arrives at Ridley Park station.		No indications from passengers
	17:51:14	Several passengers are seen covering their mouths and noses.		Two female passengers get up and relocate to another train car.
	17:52	People are seen entering Car 407 from Car 131		
	17:54:34	Platform door closes and train continues southward		
	17:56:30	Conductor seen walking quickly through train car-moving towards the front of the train		
	17:58:16	Conductor drops the local		The conductor lowers the pantograph to shut off power to the car.
	17:58:56	All power is shut off		
CAR 278				NO VIDEO RECOVERED
CAR 287	17:41:23	Train stops at Prospect Park station		
	17:42:33	Train departs station		
	17:45:16	The train arrives at Ridley Park station		
	17:46:24	Train departs station		
	17:48:46	Train arrives at Crum Lynne station		
	17:54:54	Train departs station		
	17:56:16	Conductor opens platform door and looks outside while train is moving		
	17:56:30	The conductor is seen hurrying towards the front of train		

	17:58:56	Conductor is seen in front of Car 287 when the power is shut off		
	17:59:40	Initially passengers move forward to evacuate train		
	17:59:57-18:00:05	A male passenger is seen pulling the emergency door release and opening Door 4, at the A-end of the car.		A passenger is seen initially unable to find trap door. Eventually the passenger finds the "trap" to lower the stairs. Several passengers self-evacuate.
	18:04:28	The conductor closes platform door and trap door.		
	18:19:34	The last passenger is seen leaving the train.		Female passenger was observed stopping to take pictures on her cellphone and blocking fire department personnel
	18:19:40	Fire Department personnel conduct secondary searches for passengers.		
CAR 288		Approximately 19 passengers are observed riding in the train car.		NO GPS Available
	17:41:28	Train at Prospect Park station.		Evident by landmarks visible outside platform door.
	17:42:32	Train departs from the station		
	17:43:19	N/B Amtrak train passes SEPTA 3223		
	17:45:03	The train arrives at Ridley Park station. N/B SEPTA train meets up at this location.		Pantograph camera shows smoke and visible flame roof level of train car.
	17:48	The train arrives at Crum Lynne station		
	17:49:19	S/B Amtrak train passes SEPTA 3223		Pantograph camera shows a large plume of smoke coming from the top of the train.
	17:55:01	SEPTA 3223 leaves Crum Lynne station		
	17:56:10	The engineer stops the train south of station.		
	17:58:36	Car pantograph was up		

	17:58:48	Pantographs are brought down		Train line- removed from all cars
	17:58:54	Power off		Amtrak shuts down power
	17:59:40	The conductor initiates evacuation procedures.		
	18:00:00	Trailing SEPTA train arrives and stops at Crum Lynne station platform.		Trailing SEPTA train remains at station platform and offloads passengers.
	18:05:16	The conductor enters the last car and opens platform Door 1.		
	18:06:59	Conductor makes announcement		Passengers are seen walking orderly to the rear of the train.
	18:08	Emergency responders can be seen arriving through open platform door.		
	18:09:09	S/B Amtrak passes stopped SEPTA 3223		
	18:10:03	The conductor begins to evacuate passengers.		Initial evacuation was on track side adjacent to Amtrak high speed Track 3. The conductor is seen observing the approaching train (trailing SEPTA) and decides to reboard passengers for their safety.
	18:11:03	Once back on board, the conductor re-initiates evacuation from Door 2, on the roadside.		
	18:13:34	Law enforcement officers arrive on the scene and are observed approaching the train from the north, walking on Track 4.		
	18:19	Fire Department onboard train		
	18:22:08	Conductor makes a check of the train cars for any remaining passengers.		The conductor meets up with fire department personnel on board doing the same check and exits the train 1 minute later after determining that no other passengers remained on board.

	18:23	Fire has engulfed the first train car.		
	18:44:30	Report that fire contained but not fully extinguished.		

4.3.2 Emergency Responder Event Timeline

An overview of the Delco Dispatch CAD and Incident Reporting for both incidents is provided in **Table 6** below.

Table 6 Delco Dispatch Emergency Responder Event Timeline

TIME	EVENT	REMARKS
INCIDENT 1		
18:01:13	Call received by Delco Dispatch reporting train fire	Dispatched to FD at 18:01:35
18:02:08	Call Dispatched to law enforcement	
18:04:13	Additional information provided to Delco Dispatch and relayed to emergency responders	Train occupied and riders are being moved to the rear
18:04:48	Report of visible fire showing	
18:06:11	First police officer on the scene	
18:07:39	First arriving officer provides status report to dispatcher	Train still occupied
18:09:53	Amtrak notified to shutoff power	This notification was by emergency responder
18:10:08	Request SEPTA supervisor to the scene	
18:13:45	Opening fence to evacuate passengers from track area	
18:23:06	Passenger evacuated from train	
18:24:20	Delco Dispatch reports that Amtrak representative enroute. ETA 10 minutes.	
18:41:08	Incident Command requests that local hospitals be notified and provide number of patients that they can accept.	
18:43:32	Power was secured to all 4 tracks, awaiting the arrival of the crew to ground.	
18:49:27	Second request for MCI notification to hospitals and capabilities	
18:53:34	Notification was made to the five local hospitals which reported the number of patients each could accommodate.	
18:58:34	Notification to I.C. that both northbound tracks are operating under restricted speed (15 mph)	
19:01:34	The search of the first two cars was completed. No victims.	
19:07:12	Secondary search of train cars completed. No victims.	
19:08:27	Command was notified that a northbound train is approaching.	
19:09:13	Report provided no injuries and no transports	
19:19:22	Report that one passenger is being transported to hospital by POV	
19:19:49	I.C. reports that fire is under control	
19:35:25	I.C. reports that all passengers have been transported off the scene.	

19:52:57	Advised that second disabled train was being evacuated. Approximately 63 passengers on board.	Evacuation of uninvolved train completed at 20:11:33
20:11:11	I.C. report: Track 4 grounded. Track 3 shut down and Tracks 1 and 2 are operational.	
INCIDENT 2		
02:15:26	Call received reporting a train fire at the Prospect Park SEPTA station	The dispatcher advised that this is the same train involved in the earlier incident
02:15:49	Delco Dispatch advised that fire is venting from the top of the train.	
02:16:40	SEPTA Dispatcher 8668 called and provided Delco Dispatch with additional information	
02:16:49	Units dispatched to the scene.	
02:18:37	First unit, police officer arrives of scene.	
02:20:00	The officer confirms that train is unoccupied.	
02:50:26	Delco Dispatch notes that incident is closed.	

4.3.3 SEPTA Railroad Operations Control Center (ROCC) Event Timeline

SEPTA services 2,200 square miles within the city of Philadelphia and surrounding counties. SEPTA's Railroad Operations Control Center (ROCC) oversees the daily rail service to 80,000 customers and the 160 passenger stations. The agency has 135 route miles of electrified territory that includes a portion of Amtrak's Northeast Corridor. SEPTA's ROCC monitors train operations, train movement and incident management. **Table 7** details the event timeline as captured by SEPTA's Railroad Operations Control Center.

Table 7 SEPTA Communication Center Event Timeline

TIME	EVENT	REMARKS
5:58 p.m.	SEPTA 3223 reported a fire underneath the first car and stopped north of Baldwin.	Amtrak Police Department (APD) as well as fire department notified. Passenger count 300
6:05 p.m.	Fire and Police reported on scene	
6:09 p.m.	Protection on Track 3.	
6:18 p.m.	SEPTA supervisor on scene	Reports Baldwin Fire Department also on scene
6:25 p.m.	All tracks are on hold by the Fire Department. Power is off.	ET sent to the scene to ensure that power is off.
6:34 p.m.	Crew reported that all passengers were off the train. Will walk back to Crum Lynne station	MTO Brian Pearce on scene.
6:42 p.m.	Crew reports that all passengers are walking via the street to the station	
7:12 p.m.	Fire Department releases hold on Track 1 and 2. SEPTA to remain shut down	Only Amtrak uses Track 1 and 2.
7:13 p.m.	ET to take Track 3 and 4 out of service	
7:14 p.m.	Reported that EMS was called to the scene to assist with a passenger having a medical emergency	

8:09 p.m.	Fire on SEPTA 3223 has been reported extinguished.	Pantograph reported down.
9:42 p.m.	SEPTA 7241 to be coupled to 3223 to take to yard.	
2:14 a.m.	Report that SEPTA 3223 is on fire again.	APD and fire department notified.
3:23 a.m.	Fire once again is reported extinguished. Power restored and SEPTA 3223 is moving north.	

4.4 Emergency Access, Signage, Egress and Safety Equipment

An inspection of the train cars was conducted to determine the availability and adequacy of emergency egress points for passengers, the accessibility for emergency responders, the required markings or signage to provide passengers with emergency instructions, and notification of the availability of emergency equipment such as fire extinguishers and extrication tools. The inspection also included miscellaneous safety features such as emergency call buttons, intercom systems and cameras present in each car. An inspection of Car 132 was not conducted due to the extensive fire damage to the interior of the train car.

4.4.1 Train Car Emergency Access

The investigation also explored the challenges faced by the emergency responders during the incident and the potential effects on survivability of the train occupants. One issue that was discussed by both the emergency responders and representatives from SEPTA was the inability to access the interior of the train cars from the exterior without a key. Unlike other equipment in SEPTA's fleet, the design and age of the Silver Liner IV train cars, resulted in the cars not being equipped with an exterior emergency door release mechanism. SEPTA provides the information about their system and the details on their equipment to emergency responders through training material made available to the various agencies as well as hands-on training opportunities during training sessions when conducted by the transit agency. SEPTA representatives advise that keys are not provided to emergency responders prophylactically. During the post-incident examination of the various train cars, evidence of forcible entry by the fire department was found on Door 4 on Car 131 where a reciprocating saw and prying tools were used to access the car. Additional evidence of forcible entry was found on Door 3 in Car 278 and Door 2 in Car 407. The emergency door release handles were pulled for Door 4 in Car 278 and Car 407 and for Door 3 in Car 288. It was undetermined whether the door release mechanisms were activated by the emergency responders during the rescue and fire suppression operations or by the occupants of the train. Door 2 in Car 287 was found open at the time of the inspection. **Figure 5** is a photograph of Door 4 on Car 131 and shows the damaged resulting from the forcible entry operation by the fire department.



Figure 5 Photograph of the platform door on Car 131 damaged during the fire department's forcible entry into the train car. (Source: NTSB)

4.4.2 Signage and Emergency Egress

49 Code of Federal Regulation 238.125 outlines the requirement for "Markings and Instructions for Emergency Egress and Rescue Access" for passenger rail cars. The regulation requires that signage be posted in each passenger car and provide emergency instructions such as providing information about emergency egress and potential hazards to the occupants. An examination of the train cars found the required signage was present in each car end and was clearly visible to passengers. This included emergency instructions to passengers on how to operate the platform doors during a power failure and where to find the various access panels. **Figure 6** is a photograph of the emergency instruction signage located at the end of each train car. **Figure 7** is a photograph showing the emergency instructions and location of the emergency train car door release.



Figure 6 shows the posted emergency instructions found on each end of the train car. (Source: NTSB)



Figure 7 Photograph of the emergency instructions and the emergency door release inside one of the train cars. (Source: NTSB)

4.4.3 Emergency Exit Windows

The examination of the exterior of the train cars found that on each side of the train car two windows are designated for emergency egress. The windows were found to be clearly and appropriately marked. On the interior, the front and rear

sections of the train have two emergency exit windows, located on opposite sides of that car end, one located in the front and the other one in the rear on the opposite side of the aisle. Facing the A-end of the train, the emergency exit windows were located adjacent to seats L3 and L4 (left side) and seats R11 and R12 (on the right). In the rear section of the car, the emergency windows are located adjacent to the American with Disabilities Act seat R2 and L10 and L11 when facing the A-End of the train car. The windows located in the middle section of the train cars are not emergency exit windows. **Figures 8** and **9** show the markings for the windows designed as an emergency exit window as displayed on the exterior and the interior of the train car.



Figure 8 Photograph showing the emergency exit window markings as seen from the exterior of the train. (Source: NTSB)



Figure 9 Photograph of the emergency exit window markings as seen from the interior of the train car. (Source: NTSB)

4.5 Occupant Protection

As part of the crashworthiness standards, many rail cars use compartmentalization as a method of providing occupant protection by closely spacing the seats together to limit the forward or rearward movement of a seated passenger. The height and composition of the seatback as well as the presence of padding designed to absorb energy during a crash provides protection and minimizes the severity of injury to the occupant. Though some level of compartmentalization is present in the SEPTA train cars, standing or unrestrained occupants would decrease the effectiveness of compartmentalization. Each SEPTA train car is designed to accommodate 120 seated passengers and 130 standing for a maximum passenger capacity of 250 persons per car.

4.6 Emergency Management Planning

4.6.1 SEPTA Passenger Train Emergency Preparedness Plan

In conjunction with AMTRAK, SEPTA prepares a Passenger Train Emergency Preparedness Plan (PTEPP) which is submitted to the Federal Railroad Administration for review and approval. The last plan was approved by the FRA on October 21, 2022. The PTEPP provides the operational guidelines used by SEPTA to prepare for and conduct operations during an emergency to include the training of SEPTA personnel as well as emergency response agencies that potentially would respond to

an incident involving SEPTA equipment or on their property. As part of their emergency response, SEPTA employees are trained in the Incident Command System (ICS) to assist SEPTA personnel's ability to integrate smoothly into the on-scene incident command and incorporate the four major tenets of ICS, to facilitate the effective implementation of communications, coordination, command and control on the scene of an incident.

49 Code of Federal Regulation (CFR) Part 239.105 requires each railroad that operates a passenger rail service to conduct a debriefing and incident critique session after each train "emergency situation" or full-scale simulation to determine the effectiveness of the railroad's emergency preparedness plan and to determine the need to amend or improve the plan as appropriate. At a minimum, the debriefing and critique shall determine the effectiveness of the on-board communications, the time elapsed between the occurrence and notification to emergency responders, the effectiveness of the communications between the railroad's communications center and that of the emergency responders and the timeliness, effectiveness and efficiency of the emergency response and passenger evacuation.

On April 16, 2025, SEPTA conducted a post-incident debrief and critique regarding the train car fire and the emergency response. Present at the debriefing were representatives of the FRA, SEPTA management and various labor unions, the Ridley Park Fire Chief, the Incident Commander on the scene, members of the train crew including the engineer and the conductor as well as the NTSB. Though the debrief and incident critique and the subsequent report met the minimum requirements outlined in 49 CFR 239.105, the process failed to meet the nationally recognized minimum standards for an effective after-action critique with the goal of improving future emergency response performance. The Federal Emergency Management Agency (FEMA) and the National Fire Protection Association (NFPA) are just two nationally recognized organizations that provide guidance to emergency responder agencies and transit agencies on the proper method of conducting a post-incident debrief and critique reporting. The minimum requirements for an effective post-incident debrief and critique reporting process with the goal of improving future emergency response should include the following.

- All agencies that participated in the incident and/or drill must be permitted to take part in the post-incident debriefing and critique reporting with every entity being afforded the opportunity to provide input and commentary.
- At a minimum, the subsequent report should include what went right, what went wrong, and lessons learned for each party. The report should include a plan that outlines the steps to be taken by the various participating agencies to enhance or improve future emergency response.
- Lastly, the report generated pursuant to the after-action critique process should be distributed to all participating agencies to be used as a learning tool for the improvement of future emergency response.

The fire department incident commander advised the NTSB that SEPTA had invited him to the meeting at the last minute, but this was the first time that SEPTA had ever invited the fire department to participate. The meeting agenda, generated by SEPTA, covered topics such as communications between the Railroad Operation Control Center and the Delaware County emergency communications center, as well as the transit agency's operations which included the response of supervisors and transit employees to the scene as well as the response of the train crew to the emergency. However, several important topics were not discussed during the session or included in the final report.

- The incident commander advised that transit agency employees responded to the scene quickly, however, he was reluctant and unaware of how to use these individuals during the incident. The fire chief advised that the local emergency responders had not received any training from SEPTA related to handling transit rail emergencies. The local fire departments were unfamiliar with the transit agency's Emergency Response Plan which outlined the roles, responsibilities, and training of the arriving SEPTA employees to include their knowledge and ability to integrate into the Incident Command System.
- A major hazardous material exposure occurred because of the train fire but no discussion was held during the debrief and critique session regarding the timeliness of the discovery of the hazard, the notification process, and the effectiveness of any hazard mitigation strategies implemented to minimize the threat to emergency responders as well as transit employees. The final critique report fails to include any conversation about this topic or document the number of exposure victims and the plan to follow up to ensure that all victims were identified and the effectiveness of the training provided to both transit employees and emergency responders regarding hazard exposure and whether there is a need to revise training or protocols to enhance safety and mitigate exposure threat in the future.

4.6.2 Outside Emergency Responder Training

In Delaware County, Pennsylvania, two agencies can provide training to emergency responders at their request. The Delaware County Emergency Services Department is a county run agency that has the responsibility to support public safety agencies by providing dispatch capabilities for most police, fire and emergency ambulance services, to provide emergency preparedness planning and training for emergency responders, and the public and to provide support whenever an emergency impacts two or more municipalities. The Emergency Services Department serves Delaware County's 575,000 residents, 65 fire departments, 42 law enforcement agencies and numerous emergency medical providers. The second organization, the Delaware County Fire Training Center also provides training for emergency responders. The Fire Training Center is run by a volunteer non-profit

organization and provides training for some emergency responders in Delaware County. Both agencies operate independently of one another and the participation of county emergency responders in the training offered is voluntary.

SEPTA's System Safety Division is responsible for the development and implementation of the agency's Passenger Train Emergency Preparedness Plan (PTEPP)³ and through liaison with agencies within the 5 counties that are expected to respond to emergencies involving SEPTA property, contact the various emergency response agencies directly or by letter or through the individual county fire training centers to facilitate training and provide copies of the transit agency's PTEPP to the emergency responders. The training will, at a minimum, cover the following items.

- Familiarization of SEPTA's passenger train operations system, to include passenger equipment and facilities
- Familiarization of specific railroad facilities (tunnels, elevated structures, etc.)
- Familiarization of the overhead catenary system
- Familiarization with the duties of key railroad operations personnel with contact information

The transit agency provides a copy of the PTEPP to the county Emergency Management Agencies such as the Delaware County Emergency Services Department. During the investigation, investigators found that SEPTA does provide the current PTEPP as well as conduct full-scale training exercises once a year in conjunction with the Delaware County Emergency Services Department. In November 2024, in conjunction with the Delaware County Emergency Service Department, SEPTA conducted a full-scale exercise in Trainer, PA. The training exercise included Amtrak, SEPTA, multiple fire departments, representatives from the pipeline industry and the local refinery.

SEPTA's PTEPP mandates that the transit agency maintains communications with emergency responders through the individual county "fire training center," however, Delaware County has two training facilities and SEPTA only communicates with one, the County operated Delaware County Emergency Services Department. However, the Ridley Park Fire Department uses the other training facility, the Delaware County Fire Training Center. Agencies that use the other facility, the Delaware County Fire Training Center, do not have access to the transit agency's PTEPP or the training opportunities provided by SEPTA.

³ See Survival Factors- Crashworthiness attachment- SEPTA PTEPP

The NTSB contacted the directors of both training facilities in Delaware County, PA to discuss the issues related to the inaccessibility of training and the lack of information provided to some county fire departments due to their use of the facility not operated by the county and the need to make available to both emergency responder training facility the information and training provided by the transit agency. The directors of the two training centers agreed to further discussions on the most effective method to coordinate the training of emergency responders and the coordination between the various railroads (SEPTA, Amtrak, CSX) to facilitate the best way to disseminate information regarding handling rail emergencies and enhance the accessibility of training to all Delaware County emergency responders.

4.6.3 After-Action Activity

SEPTA has initiated a corrective action plan to address the gaps in the emergency responder training and the post-incident debriefing and critique process. The proactive actions undertaken by SEPTA include the following.

- SEPTA has begun the process of hiring a new fire marshal to complete the agency's Emergency Management Team.
- In the interim, an experienced safety officer will reach out to the emergency responders to facilitate training.
- Current improvement efforts will include better coordination between the various entities in Delaware County as well as ensuring proper communication with surrounding counties.
- SEPTA is reaching out to various organizations with expertise on the post-incident debriefing and critique reporting to improve and enhance future emergency response performance.

4.7 Emergency Responder Interviews

4.7.1 Ridley Park Fire Chief, Incident Commander

- The Ridley Park police department arrived first on the scene and reported the working fire while the fire chief was still responding. The chief upgraded the response to include a ladder truck to assist with evacuation, 2 rapid intervention teams for search and rescue and additional fire suppression units.
- Upon arrival, fire was visible coming from underneath the first car and a large group of passengers were observed standing against the fence that separated the track from the adjacent commercial properties.
- The chief credited the train crew with the rapid evacuation of the passengers noting that evacuating the passengers off the train to the Track 3 side was the best option given the hazard associated with

evacuating the passengers on the Track 4 side due to the uneven terrain.

- The fire chief advised that representatives from SEPTA and Amtrak quickly arrived on the scene, identified themselves to the Incident Commander and offered their assistance.
- The fire chief advised that neither SEPTA nor Amtrak have provided training to local emergency responders. This resulted in the emergency responders not knowing or understanding the roles, responsibilities and training of the railroad representatives that arrived on the scene and the failure to obtain important information regarding emergency access and evacuation from the Silver Liner IVs train cars, namely that these older train cars did not possess an emergency release mechanism on the exterior of the train car to assist emergency responders with accessing the interior of the car. Access from the exterior is only possible via the use of a key. SEPTA has never provided a copy of that key to emergency responders for use in the event of an emergency onboard the train.
- There was a delay in fire suppression operations because neither SEPTA nor AMTRAK could confirm the removal of power from the train. The delay was caused by the need to wait for the arrival of a crew from Wilmington, Delaware to ensure the removal of power from the train. The crew arrived approximately 30 minutes later, and it took another 10-15 minutes before they confirmed that the power had been removed.
- Once the power had been confirmed as being removed from the train, the fire was extinguished in about 30 minutes.

Sheryl Harley
Survival Factors- Crashworthiness Group Chairman