

# National Transportation Safety Board

Office of Highway Safety

Washington, DC 20594



HWY24FH004

## **VIDEO AND OCCUPANT SAFETY**

Group Chair's Factual Report

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## **A. CRASH**

Location: Millstone, Calhoun County, West Virginia  
Date: March 4, 2024  
Time: 5:50 p.m. Eastern Standard Time

## **B. VIDEO AND OCCUPANT SAFETY GROUP**

Group Chair / IIC Kristin Poland, Ph.D.  
National Transportation Safety Board  
Washington, D.C.

## **C. CRASH SUMMARY**

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

## **D. DETAILS OF THE INVESTIGATION**

### **1.0 School Bus Video Details**

The 2022 IC Bus, model PB105, school bus was equipped with an AngelTrax V12 Vulcan series mobile digital video recorder (DVR) system. The system consisted of 7 cameras - (1) rear facing at front of bus showing driver, loading door, and the first three passenger rows; (2) forward-facing at front of bus showing the roadway; (3) right facing at front of bus showing driver from above, loading door, and first two rows of seats; (4) right facing at middle of bus (centered above row 8 on left side of bus) showing all passenger rows; (5) overhead view above the rear emergency exit door showing the last three passenger rows; (6) left facing at middle of bus (centered above row 5 on left side of bus) showing all passenger rows; and (7) left facing exterior to the bus showing passing traffic (to record stop arm violators).

NTSB reviewed videos from the day of the crash from the three school bus routes (morning, afternoon, and afterschool) to document driver and student actions. The crash occurred less than 3 minutes after the bus left the school on the after-school activity route and before any school bus stops to off load students on that route.<sup>1</sup>

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<sup>1</sup> The bus departed the school at a video time stamp of 5:47:08 pm and the roadway departure immediately before the crash was at 5:49:58.

The after-school activity school bus video began with bus driver approaching the school. Once the bus stopped at the school, children approached the bus door shortly thereafter. The driver was unable to open the door with the bus controls and waved the students to manually open the door and enter the bus. After nineteen students boarded the school bus, the driver pushed a button to the right of the steering wheel several times with no result. The driver departed the school with the loading doors fully open. As the bus reached about 14 mph, the doors began to slowly close but then opened and closed multiple times. Although the driver occasionally glanced toward the loading doors, the driver did not appear to take further action regarding the doors.

The 2022 IC bus was equipped with a lap/shoulder belt at the driver's seating position. The passenger seats were designed with compartmentalization as the only passenger occupant protection system. The school bus was not equipped with passenger lap or lap/shoulder belts.

## **2.0 Vehicle Motion**

The school bus departed the paved roadway traveling at 39 mph. It impacted a culvert off the right side of the roadway. The bus began a counterclockwise yaw, reentered the roadway, and overturned ¼ turn onto the loading door side blocking most of the roadway, see Figure 1.



**Figure 1. The school bus at its final rest position across the southbound lane of the roadway. View is looking toward the north. (Source: West Virginia State Police)**



**Figure 2: Interior of the school bus post-crash (after the bus was righted) looking from front toward the back.**

### **3.0 Occupant motion and seating positions from video review**

The interior of the school bus post-crash is shown in Figure 2. Little damage was noted to the interior seats, sidewall structure, windows, or roof. The school bus driver was restrained by the available lap/shoulder belt although the belt webbing was visibly twisted near the buckle (visible in the onboard video) such that the lap and shoulder portion were twisted together. The student passengers were seated facing forward throughout the trip in a position associated with the best performance of compartmentalization. The passenger seats were high-back bench seats with no restraints. Occupant injury information described in Figure 3 was obtained from the West Virginia State Police and a review of medical records by NTSB investigators, as noted in the Factual Report of Investigation.

#### **3.1 Occupant Motion for Passenger Seated on Left Side of School Bus**

The bus reached a maximum speed of 42 mph as recorded on the video during the trip and prior to the roadway departure. At the location of the crash, West Virginia Route 16 is a two-lane, two-way roadway with a 55-mph speed limit. As the bus departed the roadway, impacted the culvert, and overturned onto the bus's right side across the roadway, the student passengers seated on the left side of the bus were thrown initially out of the seating compartment toward the right and then upward toward the interior roof of the bus. The upward motion was more pronounced for the student passengers seated at the back of the bus and initially seated on the left side. Those students impacted the roof of the bus during this motion. As the bus continued to roll, this upward motion was followed quickly by an extremely sudden occupant motion toward the windows on the right side of the bus. Student passengers on the left side of the bus impacted the side of seats, other passengers, and the windows and sidewall structure of the bus on the right side (loading door side) during the crash sequence.

#### **3.2 Occupant Motion for Passenger Seated on Right Side of School Bus**

Student passengers initially seated on the right side of the bus generally remained on that side of the bus throughout the crash sequence. Multiple student passengers were initially thrown forward impacting the seat back in front of them and were then impacted by the students originally on the left side, as well as backpacks and athletic equipment (baseball bats/shoes) as the bus rolled ¼ turn onto its right/loading door side. The student passengers in the last several rows of the bus and on the right side were also thrown upward and impacted the roof of the bus before being thrown

back to the right-side wall/windows. Once at final rest, all the student passengers were on top of each other on the right/loading door side of the school bus.



### **3.3 Bus Driver Motion**

The bus driver, restrained by the lap/shoulder belt, was jerked side to side during the crash sequence but remained in his seat throughout. Once the bus came to final rest, the driver released his seat belt and fell to the loading doors (since the bus was now rolled  $\frac{1}{4}$  turn onto its right/loading door side).

### **3.4 Seating Diagram**

Figure 3 shows the occupant seating position, age, gender, and injury. Three students sustained serious injuries, and 16 sustained minor injuries. The three students with serious injuries were seated in the last rows of the bus. The driver was not injured.

HWY24FH004  
Millstone, West Virginia

INJURY LEGEND	
F = Female	■ = N • None
M = Male	■ = M • Minor
# = Age	■ = S • Serious
Adult	Minor
	
SAMPLE	
	M - 5 - S
Gender	↑
Age	↑
Injury level	↑

Source: NTSB

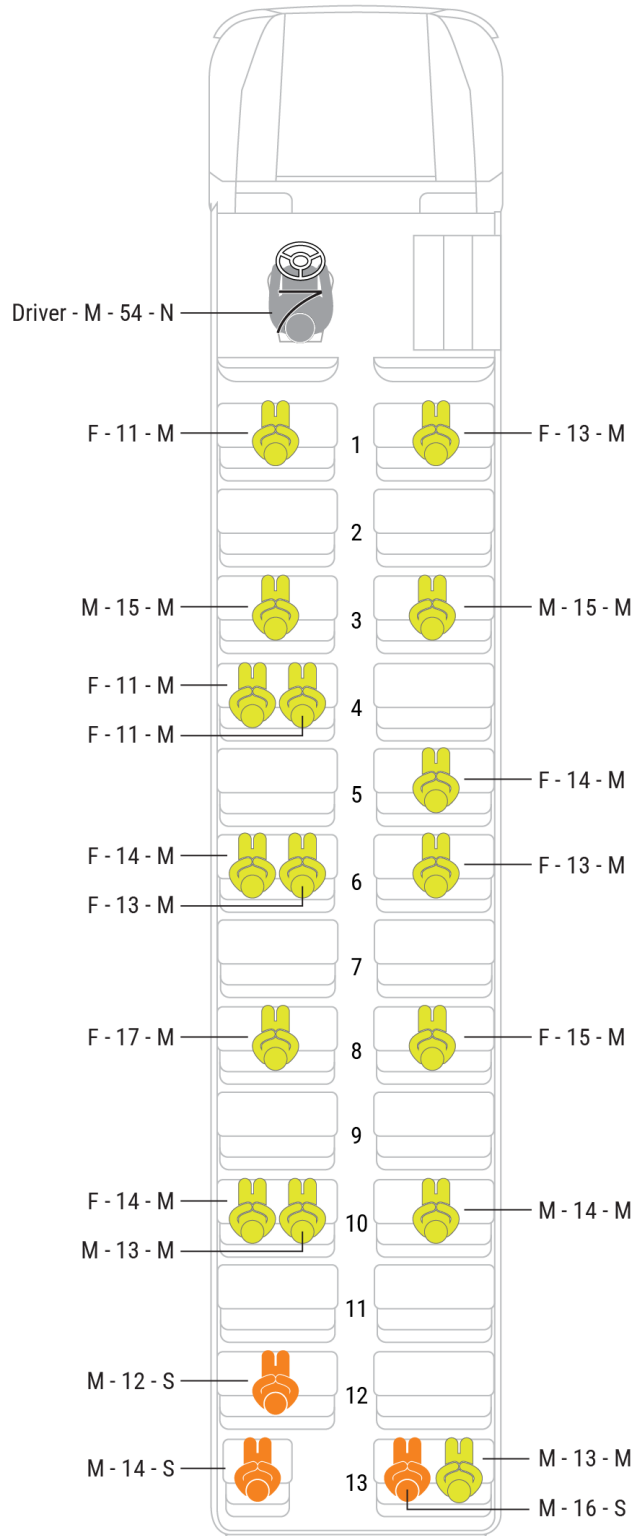


Figure 3: Seating chart with age, gender, and injury severity noted.

#### **4.0 Submitted by:**

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