

# National Transportation Safety Board

Office of Highway Safety

Washington, DC 20594



HWY24FH004

## **FACTUAL REPORT OF INVESTIGATION**

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. FACTUAL REPORT OF INVESTIGATION GROUP**

Group Chair / IIC	Dennis Collins National Transportation Safety Board Washington, D.C.
Group Member	Michael LaPonte National Transportation Safety Board Washington, D.C.
Group Member	Trooper Brian Young West Virginia State Police Grantsville, West Virginia
Group Member	Superintendent Michael Fitzwater Calhoun County Board of Education Millstone, West Virginia

## **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**

The Factual Report of Investigation is a collection of information on the vehicle, emergency response, and roadway for the March 4, 2024, crash in Millstone, West Virginia. For information on the school district, see the *Motor Carrier Factors Group Chair's Factual Report*. For information on the driver, see the *Human Performance Factors Group Chair's Factual Report*. For information on the school bus video evidence and occupant safety, see the *Video and Occupant Safety Group Chair's Factual Report*.

## 1.0 Vehicle

VIN:	4DRBUC8N8NB468614
Manufacturer:	IC Bus
Model:	PB 105
Manufactured:	9/2020
Mileage	59,143
Front GAWR	10,000 lbs.
Rear GAWR	21,000 lbs.
GVWR	31,000 lbs.
Engine	Cummins 6.7L Diesel
Transmission	Allison 3000 6-speed
Brake System:	Bendix pneumatic disc

The bus involved in the crash was purchased new by the Calhoun County School District in 2021<sup>1</sup> and placed into service on January 29, 2021. It is a conventional (type C), 77-passenger school bus. It is equipped with cruise control and a Bendix ABS/Auto traction/ESP system. District policy provides for preventative maintenance on this bus every 3,000 miles. Records from the school district indicate this maintenance was performed as scheduled.<sup>2</sup>

The vehicle was last serviced on the day of the crash (March 4, 2024). Records indicate the following maintenance was performed:

- Scheduled preventative maintenance for 59,000 miles
  - Engine oil was changed
  - Other fluids were topped off
  - The shift rod universal joint, throttle relay, clutch shaft pedal, spring hanger & shackle pins, slack adjusters, brake camshaft bushing drag link ends, king pin bushings, tie rod ends, shift rod bushings, door motor pivot arm, drive line universal joints, and drive line slip joints were greased
- The rear shocks were replaced
- A light bulb was replaced<sup>3</sup>

A service door inspection was performed as part of the standard preventative maintenance checklist and found to be "OK".<sup>2</sup>

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<sup>1</sup> Factual Attachment: IC Bus Build Sheet.

<sup>2</sup> Factual Attachment: Bus Number 5 Preventative Maintenance Records.

<sup>3</sup> Factual Attachment: Work Order, Bus Number 5, March 4, 2024.

The build sheet for the bus specified the use of 11R22.5 tires.<sup>4</sup> Records from the maintenance performed on the day of the crash indicates tire pressures were checked and marked as “okay”.<sup>5</sup> A tire tread depth measurement was performed; recorded tread depths are listed in Table 1.<sup>6</sup>

**Table 1.** Measured Tread Depths on March 4, 2024.

Tire Location	Tread Depth (inches) <sup>7</sup>
Left Front	10/32
Right Front	12/32
Left Rear Outside	19/32
Left Rear Inside	18/32
Right Rear Outside	15/32
Right Rear Inside	19/32

West Virginia law requires all school buses be inspected by a qualified bus inspector employed by the state Department of Education annually between July 1 and June 30.<sup>8</sup> This inspection was last completed in December of 2023. A check of recalls with the National Highway Traffic Safety Administration (NHTSA) indicated no unrepaired recalls associated with the Vehicle Identification Number (VIN) of the bus.<sup>9</sup>

A level 5 post-crash<sup>10</sup> inspection performed by the West Virginia Public Service Commission did not find any pre-crash defects on the bus.<sup>11</sup>

A review of recorded video of the interior of the bus revealed no issues during the morning run. During the afternoon run, the loading doors stopped being held closed. This resulted in the doors opening slightly and closing repeatedly as the bus was moving. No record of the driver reporting this issue to the maintenance staff upon the completion of the afternoon run was located. The video of the after-school route showed that the loading doors were still not functioning correctly. The students

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<sup>4</sup>See *IC Bus Build Sheet*.

<sup>5</sup> See *Work Order, Bus Number 5, March 4, 2024*.

<sup>6</sup> *Bus Number 5 Preventative Maintenance Records*, page 2.

<sup>7</sup> Nominal tread depths are 18/32 or 19/32, depending on brand. Minimum tread depths are 2/32 for the drive axles and 4/32 on the steer axle.

<sup>8</sup> See [Section 126-92-26 - Inspection and Maintenance of Buses, W. Va. Code R. § 126-92-26 | Casetext Search + Citor](#), accessed June 4, 2024.

<sup>9</sup> See [Check for Recalls: Vehicle, Car Seat, Tire, Equipment | NHTSA](#), accessed April 30, 2024.

<sup>10</sup> A level 5 inspection includes brake systems; cargo securement; coupling devices; driveline/driveshaft; exhaust systems; frames; fuel systems; lighting devices (headlamps, tail lamps, stop lamps, turn signals and lamps/flags on projecting loads); steering mechanisms; suspensions; tires; van and open-top trailer bodies; wheels, rims and hubs; windshield wipers; emergency exits, electrical cables and systems in engine and battery compartments, and seating, See [All Inspection Levels - CVSA - Commercial Vehicle Safety Alliance](#), accessed August 19, 2024.

<sup>11</sup> See *Motor Carrier Attachment - West Virginia Public Service Vehicle Inspection Dated March 7, 2024*.

needed to manually open the doors to board the bus, at the direction of the driver, and the doors were flapping open and closed while the bus was in motion.

The bus was equipped with a National 2000 air suspended driver seat with a three-point lap-shoulder restraint. The passenger seats were 39 inch wide high-back bench seats with no restraints, and 39-inch-wide crash barriers at the front row, dividing the passenger seats from the driver seat and the entrance stairs.

## **1.1 Vehicle Damage**

NTSB investigators conducted a visual examination of the bus at the Calhoun County Schools maintenance facility on March 13, 2024. A mechanical inspection was performed the West Virginia Public Service Commission, as previously noted.<sup>12</sup>

None of the windows on the bus were broken. Post-crash, on-scene photographs by the West Virginia State Police show the rear emergency exit is open at that time, as are both emergency roof exits. No damage to the bus seats was observed during a visual inspection by NTSB investigators.

Investigators noted the bus had sustained damage to the right rear corner, right side, right roof, and undercarriage during the crash.

At the right rear corner, the bus bumper was bent away from the bus body and twisted, with the top of the bumper closer to the body and the bottom of the bumper further away (Figure 2).

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<sup>12</sup> Available in the docket for this investigation as an attachment to the *Motor Carrier Group Chair's Factual Report*.



**Figure 1.** Damage to the right rear corner off the bus. (Source: WVSP)

The right side of the bus was scraped. The left loading door was detached and missing. The right loading door remained attached, but the door glass was cracked. The steps were deformed towards the rear of the bus (Figure 3). The right side of the roof was damaged and dented.



**Figure 2.** Damage to the right side and right-side roof of the bus. (Source: WVSP)

The undercarriage of the bus sustained a fractured driveline and broken rear axle shackles (Figure 4).



**Figure 3.** Undercarriage of the bus showing a fractured driveline and broken rear axle shackles (Source: WVSP)

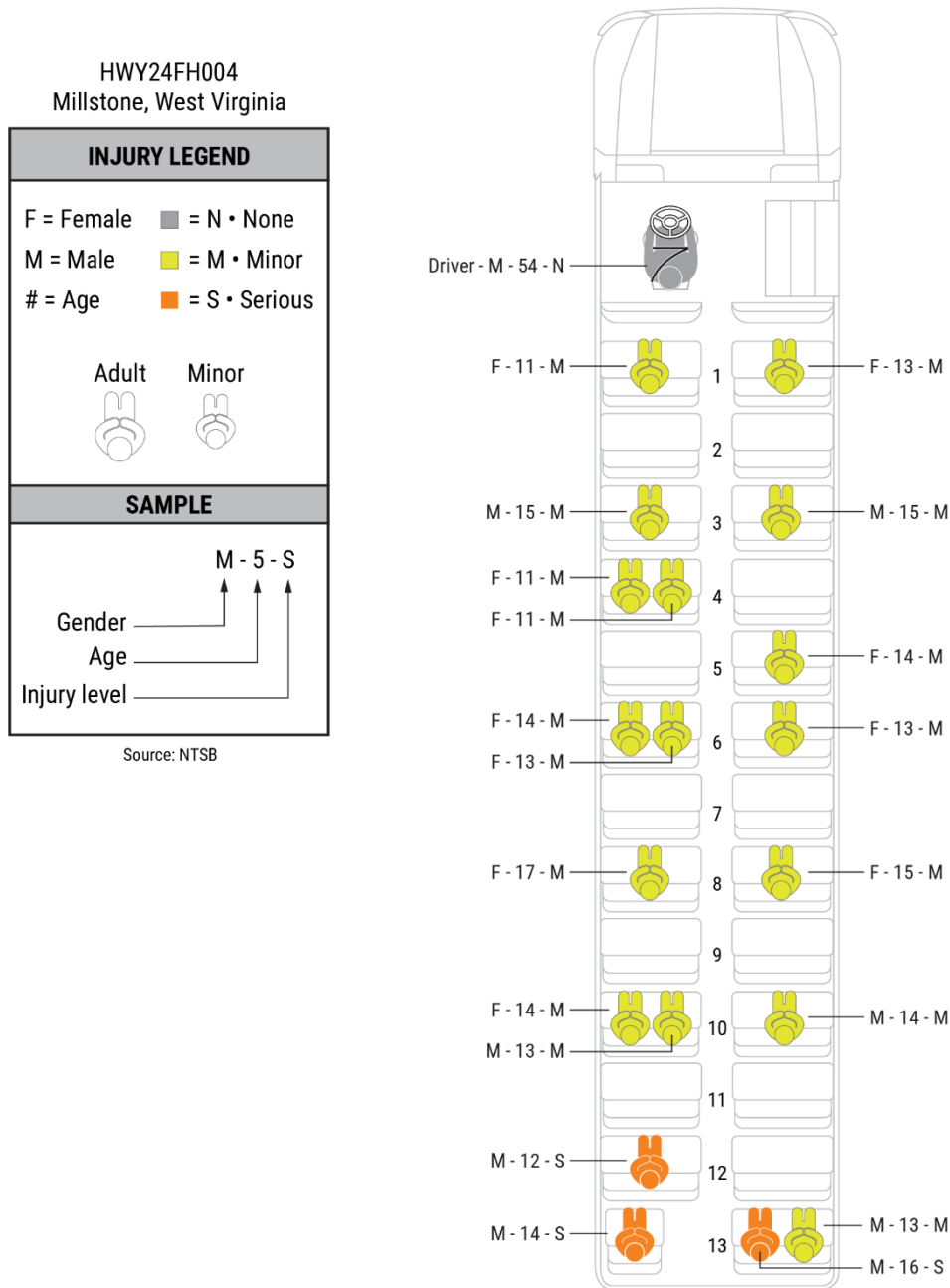
## 1.2 On-Board Video System

The 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 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 the 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).

The school district reviews bus video when they receive a complaint about safety violations, driver or student misconduct, and violation of policies or procedures.

## 2.0 Occupants and Injuries

At the time of the crash, the bus was occupied by 19 student passengers and one adult driver. Occupant seating locations were provided by the West Virginia State Police following unrecorded passenger interviews (Figure 5). The Video and Occupant Safety Group Chair's Factual Report provides more information about occupant seating and injuries.



**Figure 4.** Seating Positions with age, gender, and injury level (Source: WVSP).

The injuries sustained by the occupants are listed in Table 2.

**Table 2.** Bus Occupant Injuries<sup>13</sup>

Row	Side	Position	Injury
		Driver	None
1	Left		Minor head injury
1	Right		Contusions
3	Left		Right elbow contusion
3	Right		Right wrist sprain, abrasions
4	Left	Window	Minor head injury, abrasions, contusions
4	Left	Aisle	Minor head injury, neck strain
5	Right		Minor head injury, neck strain
6	Left	Window	Concussion, right-side acromioclavicular pain
6	Left	Aisle	Possible concussion, chest bruising
6	Right		Minor head injury
8	Left		Minor head injury, neck strain
8	Right		Minor head injury, neck strain
10	Left	Window	Minor head injury
10	Left	Aisle	Minor head injury
10	Right		Concussion, contusions
12	Left		Fracture of fifth right metatarsal bone, chest wall contusion
13	Left		Tibia and fibula fracture with artery dissection (resulted in amputation)
13	Right	Aisle	Broken nose, broken left hand, broken left leg
13	Right	Window	Musculoskeletal chest pain, abrasions, right ankle sprain

### 3.0 Roadway

The crash occurred on State Highway 16 (also known as South Calhoun Highway and SH-16), Calhoun County, West Virginia, approximately 1.1 miles south of Calhoun County Middle/High School. In the area of the crash, State Highway 16 was a two-lane asphalt roadway with one 12-foot-wide lane in each direction (northbound and southbound). A paved shoulder existed adjacent to each of the travel lanes that was about 2-foot-wide. The northbound lane was separated from the southbound lane by a double yellow line and both travel lanes were separated from the shoulders by a 6-

<sup>13</sup> NTSB investigators obtained and reviewed medical records for the injured persons. The injury levels were evaluated according to 49 Code of Federal Regulations (CFR) 830.2, which defines fatal injury as "any injury which results in death within 30 days of the accident" and serious injury as "any injury which: (1) requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received; (2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); (3) causes severe hemorrhages, nerve, or tendon damage; (4) involves any internal organ; or (5) involves second- or third-degree burns, or any burn affecting more than 5 percent of the body surface."

inch solid white line. The posted speed limit of the roadway was 55 mph in the area of the roadway departure.

A one-direction large arrow (W1-6),<sup>14</sup> pointing to the left, is posted prior to the curve the bus was traversing (Figure 6).



**Figure 5.** One-direction large arrow sign (W1-6).

Table 3 summarizes the daily traffic volume and classifications for SH-16.<sup>15</sup>

**Table 3.** Traffic Volume and Vehicle Classification on SH-16

Year	Average Daily Traffic Volume	Passenger Cars	Trucks
2004	1675	1566 (93.5%)	109 (6.5%)
2007	1640	1548 (94.4%)	92 (5.6%)
2010	1600	1499 (93.7%)	101 (6.3%)
2013	1718	1538 (89.5%)	180 (10.5%)
2016	1564	1414 (90.4%)	150 (9.6%)
2019	1373	1212 (88.3%)	161 (11.7%)
2022	1471	1300 (88.4%)	171 (11.6%)

#### 4.0 Emergency Response

The first 9-1-1 call was received at 5:53 p.m. and was from a motorist. In Calhoun County, police, fire/rescue and EMS are dispatched by the Calhoun County Emergency Management Center located in Mount Zion, West Virginia. Two units from the Arnoldsburg Volunteer Fire Department (VFD), three units from the Grantsville VFD, one unit from the Calhoun County Sheriff, two units from the West Virginia State Police, five units from the Minnie Hamilton Health System (MHHS), one unit from the Roane County Emergency Squad (ES), and one unit from HealthNet Aeromedical Services were dispatched to the crash, for a total of 15 units - five fire units, three law enforcement units, and seven rescue units. Key times for each responding unit are listed in Table 4.

<sup>14</sup> *Manual on Uniform Traffic Control Devices*, 11<sup>th</sup> Edition, Chapter 2C. See [MUTCD 11th Edition - Chapter 2C\(dot.gov\)](#), accessed September 26, 2024.

<sup>15</sup> Attachment: West Virginia Department of Transportation Traffic Counts. The counting location was approximately 1.9 miles south of the crash location.

**Table 4.** Key Responding Fire, Law Enforcement, and Rescue Unit Times<sup>16</sup>

<b>FIRE</b>					
<b>Arnoldsburg VFD</b>					
<u>Unit</u>	<u>Dispatch</u>	<u>Enroute</u>	<u>On-Scene</u>	<u>To Hospital</u>	<u>Clear</u>
306	17:58	17:58	18:04		21:40
302	18:04	18:04			21:44
<b>Grantsville VFD</b>					
<u>Unit</u>	<u>Dispatch</u>	<u>Enroute</u>	<u>On-Scene</u>	<u>To Hospital</u>	<u>Clear</u>
106	18:12	18:12			21:44
102	18:13				18:56
104	18:13		18:21		20:12
<b>LAW ENFORCEMENT</b>					
<b>Calhoun County Sheriff</b>					
<u>Unit</u>	<u>Dispatch</u>	<u>Enroute</u>	<u>On-Scene</u>	<u>To Hospital</u>	<u>Clear</u>
031	18:26	18:26	18:43		23:15
<b>West Virginia State Police</b>					
<u>Unit</u>	<u>Dispatch</u>	<u>Enroute</u>	<u>On-Scene</u>	<u>Hospital</u>	<u>Clear</u>
04311	17:56	17:57	18:11	23:24	23:36
04278	19:58			22:06	23:15
<b>RESCUE</b>					
<b>MHHS</b>					
<u>Unit</u>	<u>Dispatch</u>	<u>Enroute</u>	<u>On-Scene</u>	<u>To Hospital</u>	<u>Clear</u>
505	17:55	17:55	18:06	18:27	22:05
501	17:57	17:57	18:04		19:57
520	18:03	18:04			18:05
522	18:04	18:05			19:30
504	18:06	18:06	18:16		19:28
<b>Roane County ES</b>					
<u>Unit</u>	<u>Dispatch</u>	<u>Enroute</u>	<u>On-Scene</u>	<u>To Hospital</u>	<u>Clear</u>
771	18:00	18:00	18:19	18:40	19:32
<b>HealthNet Aeromedical Services</b>					
<u>Unit</u>	<u>Dispatch</u>	<u>Enroute</u>	<u>On-Scene</u>	<u>To Hospital</u>	<u>Clear</u>
HN 2	18:11	18:14	18:37	18:52	19:33

<sup>16</sup> Attachment: Calhoun County Computer-Aided Dispatch (CAD) Records / EMS Run Sheets.

**E. LIST OF ATTACHMENTS**

Attachment: IC Bus Build sheet.  
Attachment: Bus Number 5 Preventative Maintenance Records.  
Attachment: Work Order, Bus Number 5, March 4, 2024.  
Attachment: West Virginia Department of Transportation Traffic Counts.  
Attachment: Calhoun County Computer-Aided Dispatch (CAD) Records / EMS Run Sheets.

Submitted by:

Dennis J. Collins  
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