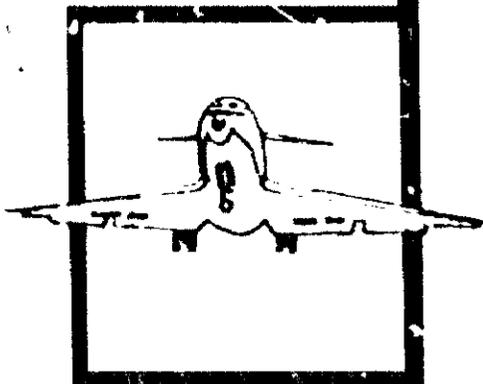
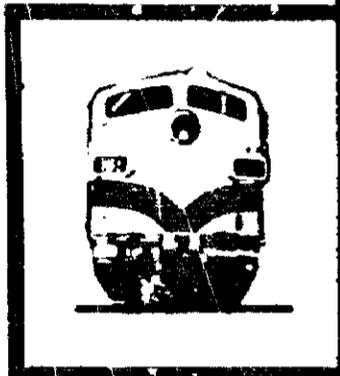


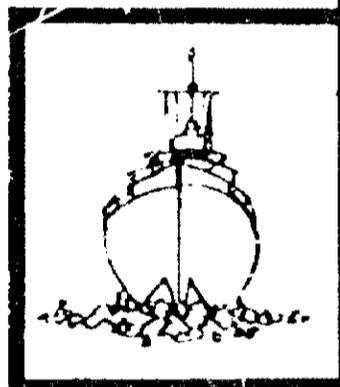
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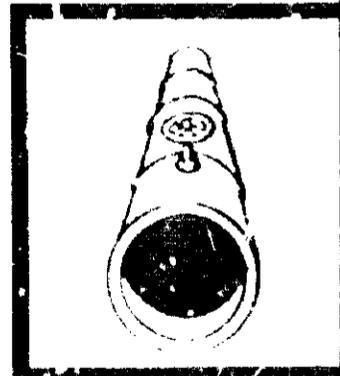


WASHINGTON, D.C. 20594



HIGHWAY ACCIDENT REPORT

**TRACTOR-SEMITRAILER/SCHOOLBUS
COLLISION AND OVERTURN**



RUSTBURG, VIRGINIA

MARCH 8, 1977

REPORT NUMBER: NTSB-HAR-78-1



UNITED STATES GOVERNMENT

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TECHNICAL REPORT DOCUMENTATION PAGE

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16. Abstract <p>About 7:50 a.m., on March 8, 1977, a southbound tractor-semitrailer struck the rear of a stopped schoolbus on U.S. Route 29 near Rustburg, Virginia. Three of the 33 occupants of the schoolbus died as a result of the collision. The other occupants, including the busdriver, sustained injuries ranging from bruises to fractures. The truckdriver sustained chest injuries.</p> <p>The National Transportation Safety Board determines that the probable cause of the accident was the failure of the truckdriver, due to inattention and carelessness, to perceive and avoid the stopped schoolbus. Contributing to the accident was the stopping of the schoolbus in the traveled way of the high-speed highway, a practice of the Commonwealth of Virginia which was contrary to the provisions of Federal Highway Safety Program Standard No. 17. Contributing to the fatalities and injuries was the lack of occupant restraints in the schoolbus which allowed one occupant to be ejected, resulting in fatal injuries, and others to be propelled into sharp or unyielding interior components.</p> <p>The Board made recommendations to the Virginia State Board of Education, the National Highway Traffic Safety Administration, the Bureau of Motor Carrier Safety, and the State of North Carolina.</p>					
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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

HIGHWAY ACCIDENT REPORT

Adopted: February 23, 1978

TRACTOR-SEMITRAILER/SCHOOLBUS
COLLISION AND OVERTURN
RUSTBURG, VIRGINIA
MARCH 8, 1977

SYNOPSIS

About 7:50 a.m., on March 8, 1977, a southbound tractor-semitrailer struck the rear of a stopped schoolbus on U.S. Highway 29 near Rustburg, Virginia. Three of the 33 occupants of the schoolbus died as a result of the collision. The other occupants, including the busdriver, sustained injuries ranging from bruises to fractures. The truckdriver sustained chest injuries.

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the truckdriver, due to inattention and carelessness, to perceive and avoid the stopped schoolbus. Contributing to the accident was the stopping of the schoolbus in the traveled way of the high-speed highway, a practice of the Commonwealth of Virginia which was contrary to the provisions of Federal Highway Safety Program Standard No. 17.

Contributing to the fatalities and injuries was the lack of occupant restraints in the schoolbus which allowed one occupant to be ejected, resulting in fatal injuries, and others to be propelled into sharp or unyielding interior components.

The Board made recommendations to the Virginia State Board of Education, the National Highway Traffic Safety Administration, the Bureau of Motor Carrier Safety, and the Interstate Commerce Commission.

INVESTIGATION

The Accident

About 7:35 a.m., e.s.t., on March 8, 1977, the driver of a Campbell County (Virginia) Public Schools schoolbus started her regular route to pick up students for school, after making a routine safety check of the bus. She had driven about 3.5 miles and had made about eight stops before stopping to pick up other passengers just south of Brown's Store on U.S. Highway 29 (U.S. 29), near Rustburg, Virginia. On leaving Brown's Store she had 32 passengers on the bus. The busdriver said she accelerated

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in second gear, shifted to third, and drove at about 25 mph toward the next stop, approximately 980 feet to the south. She said she did not see any southbound traffic ahead of or behind her between the stops. About 200 feet from the next stop, shortly after the schoolbus entered a 1° curve to the right she started to decelerate, and activated the schoolbus flasher lights. She stopped the bus in the right lane, close to the right edge of the traveled way, with the entrance door opposite the waiting passenger. Just as she opened the door, the bus was struck in the rear by a tractor-semitrailer.

The impact lifted the rear of the bus, driving it forward onto the shoulder. The bus was forced to the left across the southbound lane, overturned onto its right side, and stopped partially on the median and partly in the roadway about 222 feet from the point of impact. The tractor-semitrailer veered to the right, ran off the road, and stopped 191 feet from the point of impact. (See appendix B.)

The truckdriver stated that when he was 3 or 4 miles north of the accident site, he had heard on his CB radio that there was a schoolbus ahead in the southbound lane picking up children, and that he was looking for it. As he approached the accident area, he had shifted up to the eleventh gear and was looking in his rearview mirror to see if he could move over into the left lane. He estimated his speed at about 50 mph. When he looked ahead, the schoolbus was three or four tractor-semitrailer lengths (160 to 220 feet) ahead of him. The lights on the schoolbus were flashing. He applied the truck brakes as the truck struck the bus.

A southbound truckdriver who witnessed the accident stated that as he came over a hill north of Brown's Store, he saw the tractor-semitrailer ahead of him in the right lane, traveling about 50 mph. The witness' truck was moving at the same speed about 600 to 700 feet behind the tractor-semitrailer. He saw the schoolbus ahead of the tractor-semitrailer as the bus followed the right curve in the road. The tractor-semitrailer was about six or seven car lengths behind the bus and the schoolbus flasher lights and brakelights were activated. The witness did not see the semitrailer brakelights illuminate and realized that the vehicle was not slowing. The witness said there was no other southbound traffic between his vehicle and the tractor-semitrailer; a car was about 100 feet behind him in the right lane. The witness activated his vehicle's flashers, started to decelerate, pulled off the road, and stopped as the tractor-semitrailer struck the schoolbus.

U.S. 29 is an asphalt-surfaced, four-lane, divided highway. It runs north-south through gently rolling terrain. The area is rural with widely spaced homes and business locations along each side of the highway. There are frequent median crossovers, side-road intersections, and private and

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business driveways along the road. A 55-mph speed limit is posted for all vehicles. The average total daily traffic count on this section of roadway is 8,240 vehicles.

The north-south lanes are separated by a 40-foot-wide, depressed, grass median. Painted broken white lane lines delineate the center of the 22-foot-wide southbound traveled way. The median edge of the pavement is marked by a painted solid yellow edgeline, and the outside shoulder edge is marked by a painted solid white edgeline. There is a 10-foot-wide, dirt and gravel shoulder beside the outside southbound lane. The pavement was well maintained. At the time of the accident, the pavement was dry and the sky was clear.

The collision occurred on a 1.6 percent downgrade. The downgrade began at a point 2,120 feet north of the point of collision, continued approximately 1,300 feet, leveled out, and began again about 450 feet north of the collision point. The right curve began 660 feet north of the point of collision. (See appendix C.)

There were no obstructions or traffic within the highway right-of-way that could have obscured the truckdriver's view of the schoolbus as it preceded him from its stop at Brown's Store to the point of collision. Likewise, the schoolbus driver's view of the overtaking tractor-semitrailer in the rearview mirrors of the bus was not obscured by roadside obstructions or other traffic from the time she departed Brown's Store until the schoolbus reached the point of collision. (See figure 1.)

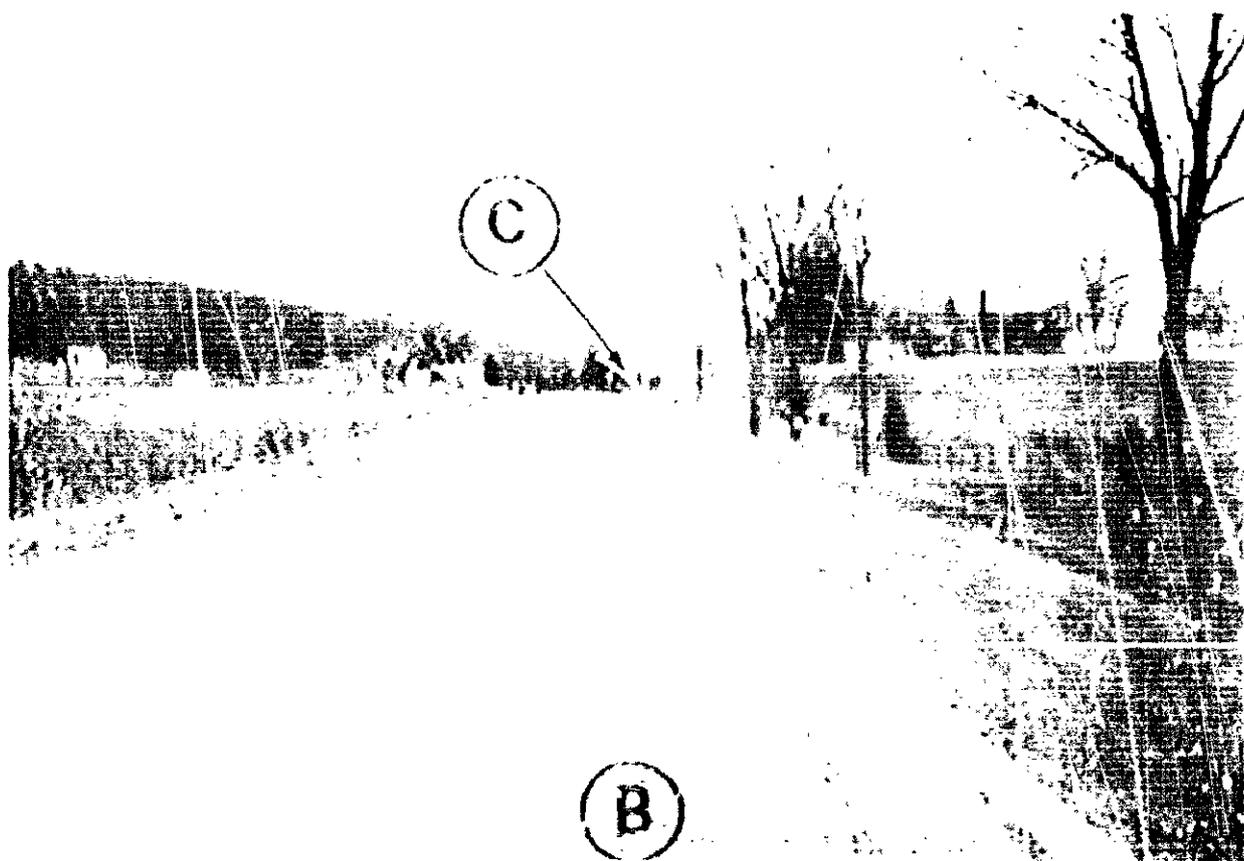
Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>	<u>Passengers</u>	<u>Other</u>
Fatal	0	3	0
Nonfatal	2	25	0
None	0	4	

Damage to Vehicles

The back of the bus body was deformed 56 inches forward of its original position on the left side and about 12 inches on the right side. Maximum deformation occurred on the left side between the upper windowsill and the bottom of the body. The glass in both rear body panel windows and the emergency door window was missing. The bus body parts at the rear were stripped forward and clear of the vehicle's chassis frame siderails. (See figure 2 and 3.) Red paint transfers were found in the area of the rearmost roof panels. An imprint of the tractor radiator grill and red paint transfers were found on the emergency door panel. The emergency door was not attached to the door frame, having been removed during rescue operations. The rear bumper and siderails were bent approximately 10 inches toward the

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displaced rearward 17 1/2 inches. The right-front tire was flattened and badly cut. The inside edge of the right-front wheel rim was gouged. The radiator was displaced rearward with maximum displacement at the left edge. The windshield was missing and its centerpost was deflected rearward. The forward edge of the cab roof was deformed toward the right and rearward. Yellow and black paint transfers were found on the front surfaces of the tractor cab, and on the bumper. (See figure 4.)

The upper part of the tractor frame-mounted sliding fifth wheel assembly separated from its lower components. Three teeth on the left side of the upper assembly showed evidence of extremely high loadings. The front tooth had sheared at its outboard end. The left side channel in which the upper slide plate moves fore and aft, had been deformed upward and inboard. (See figures 5 through 8.) Wear marks on the lower ratchet teeth indicate that the fifth wheel had been positioned 4 inches aft of the bogie axle centerline. The fifth wheel stop plate, mounted at the forward end of the assembly, failed at the attachment welds.

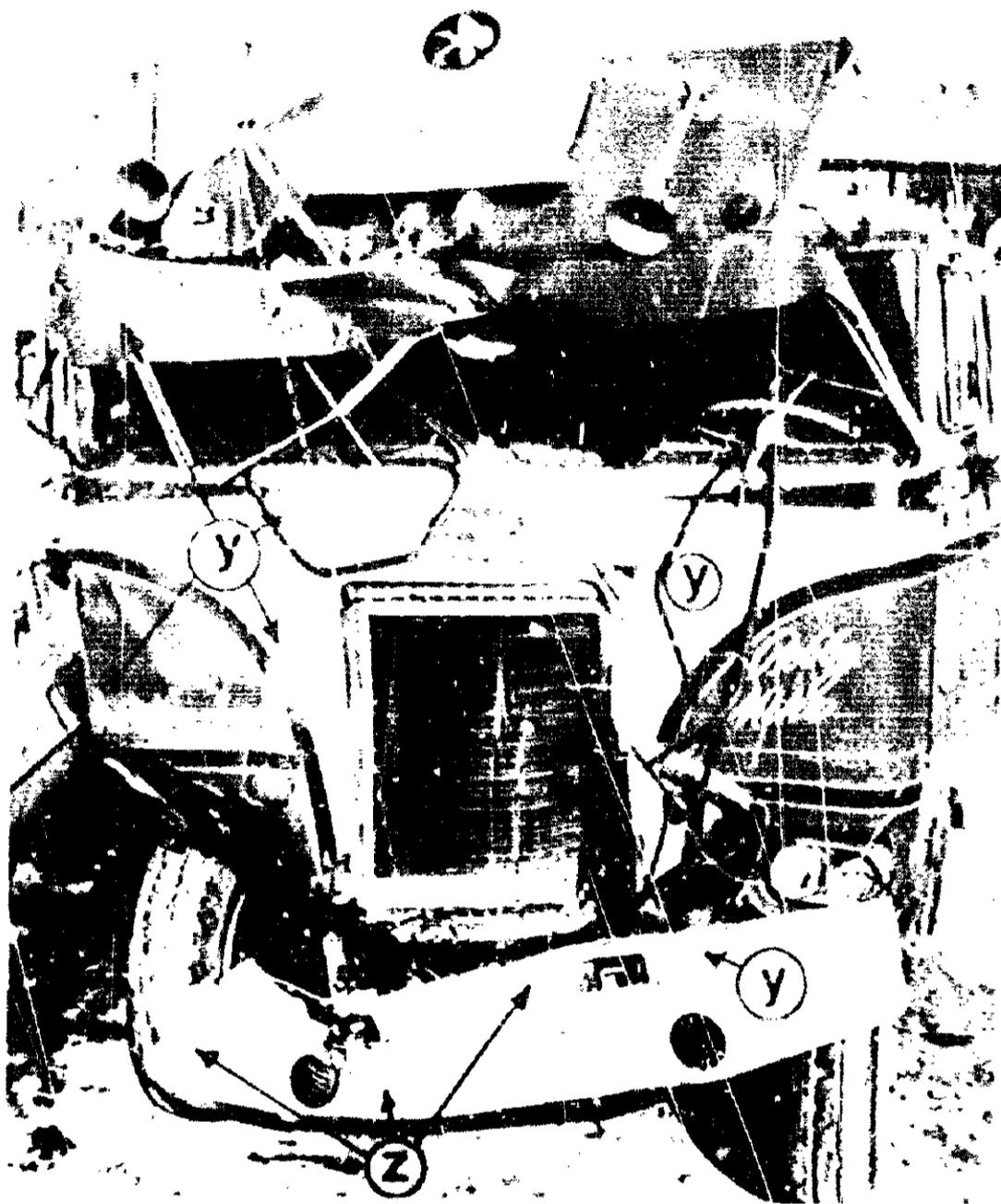
Driver Information

The 57-year-old schoolbus driver had a valid Virginia operator's license, restricted to corrective lenses, with a Class S endorsement that authorized her to operate a schoolbus. She was physically certified under the requirements of the Motor Vehicle Laws of the Commonwealth of Virginia. At the time of the accident she was wearing glasses. She was operating under contract as a schoolbus driver for the Campbell County School Board and had been so employed since September 1963. She did not have a traffic violation record. She was involved in two minor accidents while driving a schoolbus on February 27, 1973, and on September 17, 1974.

The schoolbus driver had completed a course in defensive driving as required of all Campbell County schoolbus drivers by the Virginia State Board of Education. The Campbell County "Regulations Governing Pupil Transportation" dated July 1, 1975, includes a section on schoolbus driver responsibilities and the defensive driving course outline. The regulations and outline do not explain the actions a schoolbus driver should take when preparing to stop to pick up or discharge passengers. Nothing is said about checking traffic approaching from the rear to make sure it is safe to stop or what to do if it is not safe.

The 35-year-old truckdriver had a valid North Carolina chauffeur's license with no restrictions. The records indicated that he was first licensed in North Carolina in the early 1960's with his latest license renewal on May 24, 1976. He also had a valid Florida driver's license issued on November 8, 1972, with an expiration date of May 31, 1977. He had been issued a Maryland chauffeur's license on August 9, 1963, which expired August 8, 1965, and which he did not renew. He also had been issued a Class 1, South Carolina driver's license on December 5, 1969, which expired December 4, 1973, and which he did not renew. He

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Figure 5. Left-side slide rail of tractor-mounted fifth wheel assembly showing deformed slide rail (A), and sheared slide rail positioning tooth (B). (Upper component.)



Figure 6. Right-side slide rail of tractor-mounted fifth wheel assembly. (Upper component.)

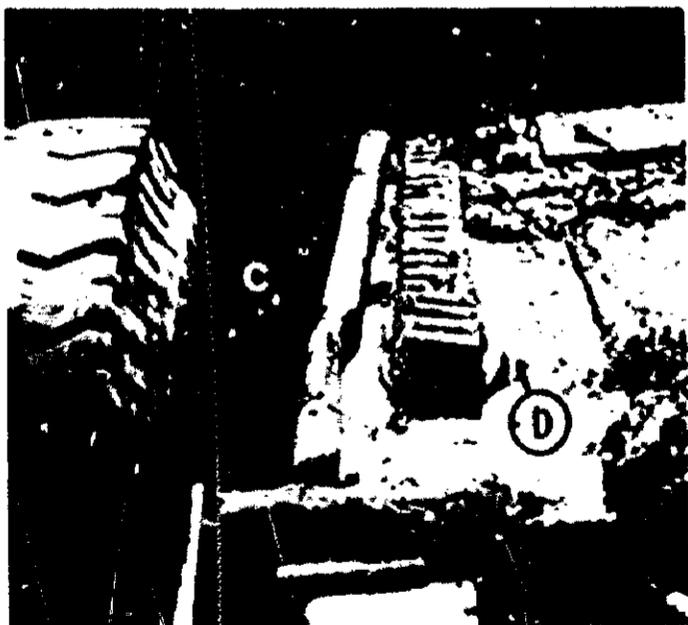


Figure 7. Left-side stationary rail of tractor-mounted fifth wheel assembly showing deformed sliding rail channel (C), and twisted fifth wheel positioning rail (D). (Lower component.)

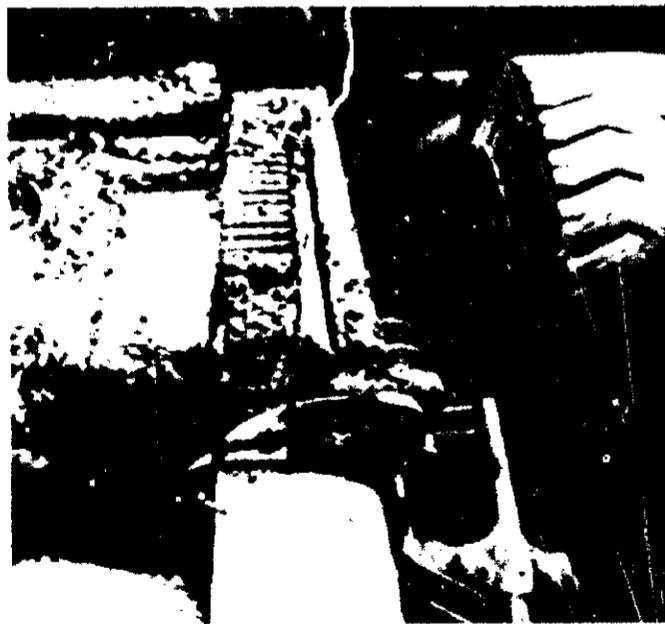


Figure 8. Right-side stationary rail of tractor-mounted fifth wheel assembly. (Lower component.)

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Chapter 6 of the Uniform Vehicle Code (UVC) states:

"No person shall receive a drivers license unless and until he surrenders to the department all valid licenses in his possession issued to him by this or any other jurisdiction...no person shall be permitted to have more than one valid driver's license at any time."

The National Highway Traffic Safety Administration (NHTSA) Highway Safety Program Standard (HSPS) No. 5, "Driver Licensing," states that each State shall have a driver licensing program to provide that:

"Each driver holds only one license, which identifies the type(s) of vehicle(s) he is authorized to drive; there is a driver improvement program to identify problem drivers for record review and other appropriate actions designed to reduce the frequency of their involvement in traffic accidents or violations."

His driving record, from June 20, 1960, through March 14, 1977, revealed 38 traffic violation convictions, accumulated in eight states, and six driver's license suspensions in North Carolina. (See appendix A.) Records of involvement, if any, in accidents in the several jurisdictions through which he commonly drove were not readily available to Safety Board investigators. However, North Carolina records revealed he had been involved in four accidents in that State. The records do not identify whether he was driving a truck or an automobile when the accidents occurred.

Vehicle Information

The 8-foot-wide, 1972 Thomas Built Buses schoolbus body was mounted on a 1972 International Harvester Company two-axle chassis. It had a six-cylinder engine, manual transmission, and hydraulic brakes. The tare weight of the schoolbus was 13,274 pounds. The gross weight of the bus at the time of collision was calculated to have been 16,594 pounds.

The bus was painted chrome yellow with black trim. The rear of the bus bore the legend "SCHOOL BUS - STOP - STATE LAW" in 8-inch-high black letters. Two 7-inch-diameter, red schoolbus warning lights were mounted on the front and the rear of the bus at the upper right and left of the bus body. Red brake and amber directional signal lights, in addition to the standard equipment brake taillights, were located on the rear of the bus, in the lower half of the bus body. All lights and signaling devices were tested and found to be operational.

The bus was equipped with 22 bench-type passenger seats, 11 on each side of the central aisle. It had a seating capacity of 66 school children, 3 to a seat. The upper horizontal seatback frame members

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were upholstered. The passenger seats were attached to the floor and sidewall with metal screws. The busdriver's adjustable seat was equipped with a seatbelt. The vertical and horizontal stanchion members behind the driver's seat were padded. There were left- and right-side outside rearview mirrors, as well as an inside rearview mirror.

The tractor was a red, 1974 Peterbilt, three-axle, sleeper cab-over-engine, equipped with a Caterpillar diesel engine, a 13-speed RTO-913 transmission, a 4:11 ratio rear axle, a Holland ratchet-type sliding fifth wheel assembly, air mechanical brakes, and 10:00 X 22 tires. The tare weight of the tractor was 15,063 pounds. The odometer reading was 34,318 miles.

The tractor performance characteristics as determined by the manufacturer were as follows:

Gear	MPH	Gear	MPH	Gear	MPH
1st	5	6th	26	11th	55
2nd	7.5	7th	30	12th	64.5
3rd	10.5	8th	35.5	13th	74
4th	14.5	9th	41		
5th	19	10th	48.5		

The semitrailer was a 1973 American, tandem-axle, 42-foot, insulated van, equipped with air mechanical brakes, a Thermoking refrigeration unit, and 10:00 X 22 tires. The tare weight of the semitrailer was 15,763 pounds.

Both the tractor and semitrailer were owned by the truckdriver who leased his equipment and services to shippers in interstate commerce.

The cargo consisted of cartons of plastic pellets loaded on skids. The weight of the cargo was 44,117 pounds. The gross weight of the tractor-semitrailer and cargo was 74,943 pounds.

Roadway Information

Roadway features did not cause or contribute to the collision.

Meteorological Information

Weather and light conditions did not cause or contribute to the collision.

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Medical and Pathological Information

Three of the 33 occupants of the schoolbus died as a result of the collision; autopsies were not performed. The schoolbus driver sustained head, arm, and leg injuries, multiple abrasions, and contusions. Twenty-five of the 29 other schoolbus occupants received minor to serious injuries. The types of injuries received by each occupant are shown in figure 9. The truckdriver sustained chest and abdominal injuries, as well as multiple abrasions and contusions.

No blood alcohol test was made on the schoolbus driver. The blood alcohol test on the truckdriver was negative.

Survival Aspects

The seating arrangement of the schoolbus occupants is shown in figure 9. The schoolbus driver was using her seatbelt, which performed as intended during the accident. The bus was not equipped with seatbelts for the passengers nor were such restraints required. One passenger was ejected and was killed when the bus overturned and pinned the child under the right side of the bus. According to the coroner's report, two of the three occupants of the rearmost row of seats died as a result of their injuries. The third sustained a fractured wrist and lacerations.

Passing motorists and nearby residents began to rescue the trapped occupants of the bus almost immediately. However, they were delayed by their inability to gain ready access to the interior of the bus. The schoolbus was lying on the right-side entrance door, the rear emergency door was deformed and could not be opened, and none of the left-side windows was open. A passing nurse first entered the bus through the broken window in the deformed emergency door and climbed over the dislocated rear seats to render aid. The right half of the divided windshield was then pried open with a crowbar; most of the injured were removed through the windshield opening. Four local volunteer rescue units arrived within minutes, administered first aid, and transported the injured to a hospital.

An amendment to NHTSA Federal Motor Vehicle Safety Standard (FMVSS) No. 217, which became effective October 26, 1976, states:

"Each schoolbus shall comply with either one of the following minimum emergency exit provisions chosen at the option of the manufacturer:

- (a) One rear emergency door that opens outward...; or
- (b) One emergency door on the vehicle's left side in the rear half of the bus passenger compartment..., and a push-out rear window that provides a minimum clearance of 16 inches high and 48 inches wide."

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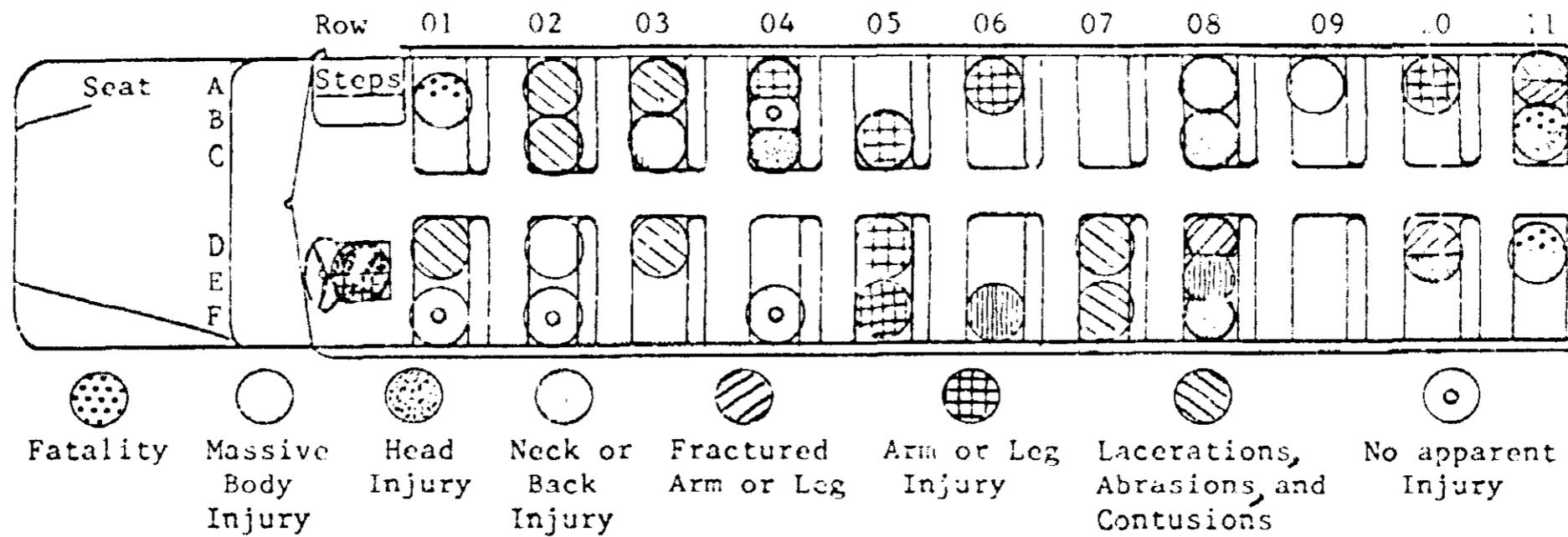


Figure 9. Locations of bus occupants and indications of types of injuries.

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The accident schoolbus was in compliance with the standard because of the rear emergency door.

The truckdriver was not using his seatbelt at the time of the collision. The tractor chassis and cab, though greatly deformed, provided some protection to the truckdriver. The right-side door was badly buckled and inaccessible to the driver. The left-side door was jammed and had to be pried open before the truckdriver could be released from the cab.

Tests and Research

Inspections of the electrical and mechanical systems on the schoolbus and the tractor-semitrailer revealed that no defects existed before the collision which would have contributed to the accident.

The tractor service brake system was tested. Brake operations and adjustments were measured with 60 psi air pressure chamber applications and found to be within acceptable limits. Brake linings were within acceptable limits of 1/2-inch to 5/8-inch thickness. (Linings are 3/4-inch thick when new.)

Three collision impact-induced discrepancies were discovered in the tractor's brake system: (1) The tractor protection valve mounted directly below the cab (or sleeper) surface had been torn loose. This failure caused a postaccident air leak and automatically actuated the trailer brakes. (2) The cab floor buckled in such a manner as to hold the foot-brake pedal in the "on" position. (3) An air and oil distribution block-type manifold located forward of the brake pedal, and directly behind the cab's front body panel was displaced by impact, causing an air leak at the manifold.

The semitrailer service brake system and the emergency brake air system were tested and found to be in good working condition. The brake operations and adjustments were measured with 60 psi air pressure chamber application and found to be within acceptable limits. Brake linings were within acceptable limits. The semitrailer tandem-axle tires were not damaged and were in good condition.

Events Preceding the Accident

On March 4, 1977, at about 1:30 p.m., the truckdriver began a trip lease for Specialty Transport, Inc., of Palmer, Massachusetts. The log which the carrier required him to prepare shows that he left the Federal Paper Company at Riegelwood, North Carolina, and completed the trip at 11:30 a.m. on March 7, 1977, at Bennington, New Hampshire. This 915-mile trip was made over a 70-hour period during which he drove for 21 1/2 hours, was on duty (not driving) for 3 1/2 hours, and was off duty 45 hours. On

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March 7, he drove from midnight to 2:00 a.m., at which time he arrived at Bennington. He was off duty from 2:00 a.m. to 11:00 a.m.; was on duty (not driving) from 11:00 a.m. to 11:30 a.m.; and then was off-lease at Bennington. He did not prepare a log for March 8.

During this trip, the truckdriver telephoned a contact at the Quality Process Shippers (Quality) in Chicago, Illinois, to ask about the availability of a cargo for his next trip. He was referred to the Candy Box Farm Agricultural Marketing, Inc., (Candy Box) of Coventry, Rhode Island, who arranged for the truckdriver to transport a cargo of plastic pellets from the Teknor Apex Company (Teknor) in Pawtucket, Rhode Island, to the Anaconda Wire and Cable Company in Eden, North Carolina. The informal arrangement was for Candy Box to pay the Quality representative who, after taking a commission, was to pay the truckdriver.

The truckdriver left Bennington about 11:30 a.m. on March 7 and arrived at Teknor about 3:15 p.m. The truckdriver identified himself as the "Candy Box truck," and Teknor used the initials "CBF" to identify the carrier on the shipping papers. (After the accident, Candy Box sent a tractor to pick up the slightly damaged semitrailer and deliver the cargo to Eden.) The semitrailer was loaded and he left Pawtucket about 3:15 p.m. for Eden.

The truckdriver said he made the following stops between Pawtucket and the accident site:

- (a) 10:30 p.m., March 7, 1/2 hour, on Interstate 84 near the Connecticut-New York State line;
- (b) time not recorded, 1/2 hour, for fuel, on Interstate 78 at Bethel, Pennsylvania;
- (c) between 3:00 a.m. and 3:30 a.m., March 8, 5 or 10 minutes, on U.S. 29 south of Charlottesville, Virginia;
- (d) 4:00 a.m. or 4:30 a.m., 2 or 3 hours, for sleep, north of Lynchburg, Virginia, awoke at 6:00 a.m. or 7:00 a.m.;
- (e) time not recorded, 5 minutes, about 5 miles south of Lynchburg. The collision occurred shortly thereafter about 10 miles south of Lynchburg.

Other Information

Candy Box claims to be doing business under the provisions of Section 203(b)(5) of the Interstate Commerce Act. The association's primary business as stated in its "Notification of Intent to Perform," filed with the Interstate Commerce Commission (ICC) is the "production, marketing,

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and transporting of agricultural products." The Interstate Commerce Act provides for "incidental back-haul" of nonmember shipments of various regulated commodities by agricultural associations. It stipulates, however, that "incidental back-haul" can be performed only by the same vehicle employed by the association in a prior or subsequent trip in the primary transportation operation of the association. Candy Box had not used the vehicle involved in this accident before. Teknor was not a member of the association. The ICC is currently investigating Candy Box's entitlement to an exempt classification.

ICC regulation of interstate carriers is confined to the economic aspects of the industry, such as granting of operating authority and routes, and rate setting. The safety aspects of the carriers' vehicles or operations are the responsibility of the Bureau of Motor Carrier Safety (BMCS) of the U.S. Department of Transportation (DOT).

Virginia law requires a motorist to stop when approaching a stopped schoolbus which has its flashing signals on. Virginia law permits schoolbuses to stop on the traveled way and not on the shoulder as other vehicles are required to do. According to Virginia State Board of Education regulations, it is standard operating procedure for schoolbuses to stop to pick up and discharge passengers in the right lane of traffic, provided that the bus can be seen from a safe distance by approaching traffic.

NHTSA's HSPS No. 17, "Pupil Transportation Safety," states in part: "Each State shall develop plans for minimizing highway use hazards to school vehicle occupants, (and) other highway users...including but not limited to...providing loading and unloading zones off the main traveled part of the highway, wherever it is practicable to do so...."

ANALYSIS

The Accident

The truckdriver's statement concerning the events leading to the collision are not supported by the statement of the witness and the facts. The estimated average time of travel for the schoolbus for the 980 feet from Brown's Store to the point of impact was about 40 seconds. The tractor-semitrailer, traveling at 50 mph (72.5 feet per second (fps)) would have been approximately 1,960 feet north of Brown's Store when the schoolbus was leaving the store. From that point up to the point of collision, according to the plan and profile of the highway, the truckdriver would have had a continuous and unobstructed view of the highway and the schoolbus ahead of him.

The roadway began a 1° right curve 660 feet before the point of impact. The truckdriver negotiated this section of the curve safely.

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Since he saw and negotiated the curve, he should have seen the schoolbus which was visible in front of him and in view of the other truckdriver who was 600 to 700 feet behind him.

When the schoolbus driver turned on the flashing lights and began to decelerate, the schoolbus was about 11 seconds or 200 feet from the point of impact, and was 460 feet into the 1^o curve. Traveling at 73.5 fps, the truck would have been 608 feet behind the bus, and 148 feet from the curve at this time. The curve presented no visibility problem to the witness who was about 700 to 800 feet from the curve and behind the truck. The witness could see the tractor-semitrailer 600 to 700 feet ahead and the schoolbus ahead of the truck. He saw the flashing lights activated on the schoolbus but did not see brakelights illuminate on the semitrailer. The witness had time to activate his vehicle's flashing lights, slow down, and stop as the tractor-semitrailer struck the schoolbus. If this driver could see the schoolbus and recognize that it was stopping, the truckdriver should have been able to see the schoolbus in time to stop behind it.

The Safety Board concludes that the truckdriver had ample time and distance to make a normal stop behind the schoolbus if he had been attentive to his driving.

The truckdriver could have turned into the left lane long before entering the right curve because there were no southbound vehicles in the left lane. The closest vehicle was 600 to 700 feet behind him. He could have swerved into the unoccupied left lane to avoid the schoolbus in the last seconds before impact if he had been attentive. The absence of skidmarks indicates that the tractor-semitrailer's wheels were still rolling at impact. The tractor's front wheels were not equipped with brakes, which could have locked up, so the wheels were steerable.

Because the fifth wheel failed at impact, the trailer overrode the tractor until the trailer supports contacted the tractor's rear tires, effectively braking the tractor. Also, as the tractor protection valve was damaged, the trailer brakes were automatically applied. This combined action prevented the trailer from moving farther forward and crushing the tractor cab.

Based on the truckdriver's statements and information from Teknor, the truckdriver departed Bennington about 11:30 a.m. on March 7 and drove 820 miles to the scene of the collision, in approximately 20 1/2 hours. The Safety Board estimates that during the 20 1/2 hours he drove 13 1/2 hours, was on duty (not driving) 4 hours, and was off duty 3 hours. For the distance and driving time estimated, he would have had to drive at an average speed of 60 mph for the 820 miles.

The calculations relating to the accident trip as well as the earlier trip indicate that the truckdriver was traveling at a rate of speed that

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was greater than legal or would be considered reasonable for the distance, time, highways, and the traffic conditions he would have encountered, or that he did not have as many hours off duty as indicated, both on his logs and in his statement.

The truckdriver had a history of driving at speeds in excess of the legal limits as confirmed by past traffic violations (see appendix A) and the two trips related above. There is a need for uniform enforcement of the national 55-mph speed limit by law enforcement agencies in all jurisdictions. While these speed violations did not directly contribute to the collision, it may have contributed to the driver's fatigue and lack of alertness.

A review of his activities from March 4, 1977, until the time of the collision suggests that he was not getting regular rest or meals. The rest he was getting was not under the best of conditions and probably was not as much as he indicated.

The schoolbus driver should have been able to see, in her rearview mirror, the overtaking truck from the time she left Brown's Store until she began to negotiate the right curve. It should be a practice, especially on relatively straight, high-speed highways, to look in the rearview mirror for following or overtaking traffic before beginning to decelerate for a stop. There was certainly a safe distance for the bus to be seen by overtaking motorists. However, the school board's manual does not tell the busdriver what to do if an overtaking vehicle appears not to be decelerating. There was a 10-foot-wide shoulder beside the road, but a child was standing there waiting for the schoolbus. If the schoolbus driver had seen the approaching truck and decided that it was not going to stop, she would have had to swerve to the right and possibly strike the waiting child or continue straight ahead trying to accelerate ahead of the truck. It is doubtful that the schoolbus had such acceleration capability.

Virginia law permits schoolbuses to stop in the traffic lane to pick up and discharge passengers, provided the bus can be seen from a safe distance. Stopping in the travel lane exposes the schoolbus and its occupants to a high level of hazard, especially on high-speed highways, in spite of the distinctive schoolbus color, the warning light system, and the legal requirements for approaching traffic to stop. HSPS No. 17 recognizes this hazard and calls for each State to provide loading and unloading zones off the main traveled way wherever it is practicable to do so.

Virginia safety officials do not concur in this thinking. They point out the added hazards of slowing and pulling off of the traveled way and the problem of reentering the flow of high-speed traffic with the slow acceleration capability of a schoolbus. The Safety Board disagrees with

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this view. There should not be a reentry problem if all traffic in both directions stop for a loading or unloading schoolbus. The added protection of pulling off the traveled way would reduce the probability of rear end collisions. If the State maintains its procedure of permitting schoolbuses to stop in the travel lane, the defensive driving course required by the Virginia State Board of Education should explain the actions a schoolbus driver should take when preparing to stop.

Licensing and Driving Record of the Truckdriver

At the time of the accident, the truckdriver held a valid Florida operator's license which was issued while a valid North Carolina license was in effect. The Florida Motor Vehicle Administration may not have been aware of the valid North Carolina license because the truckdriver may have concealed its existence, falsifying his application, or Florida may not have required that it be surrendered. Both the UVC and HSPS No. 5 provide that each State have a program that permits a driver to hold only one license which identifies the type(s) of vehicle(s) the licensee is authorized to drive.

Over the past 17 years of driving experience, 14 of which were in commercial vehicles, the truckdriver accumulated a driving record that included 38 traffic violation convictions in eight States, six driver license suspensions, and four traffic accidents. Twenty-two of the traffic violation convictions, the six suspensions, and the four traffic accidents occurred in North Carolina. This raises the question of why he was allowed to continue to drive a commercial vehicle. HSPS No. 5 also provides that each State shall have a driver improvement program to identify problem drivers for appropriate actions designed to reduce the frequency of their involvement in traffic accidents and violations.

Such a driving record identifies a problem driver. However, there is no evidence that any corrective action was taken or that the suspensions had an impact on the driver inasmuch as he continued to drive and violate the law while at least two suspensions were in effect.

More than 50 percent of the drivers whose driving licenses are suspended continue to drive during the suspension. ^{1/} Obviously greater emphasis needs to be placed on the enforcement of driver license suspensions at all levels of the criminal justice system and at all levels of government.

Because the truckdriver's FMCSR-required medical certificate had expired, he should not have been driving in interstate commerce. As an owner-operator, he was self-employed and under the supervision of a carrier only when under a lease arrangement. Under the circumstances, he was the only person fully aware of his driving record and in all probability, he did not bring it to the attention of a prospective leasor to whom he tried to sell his services. He operated nationwide in a very

^{1/} Traffic Offense Sentencing Processes and Highway Safety, Volume 1, Summary Report, DOT-HA-4-00970, April 1977, NHTSA.

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loose carrier/owner-operator/lesor relationship. This enabled him to circumvent the FMCSR which require carriers to investigate the driver's background, keep his log, inspect his vehicle(s), and supervise and control his driving practices.

Trip lease arrangements do not provide a leasing carrier much time to do more than inspect the vehicles. The evidence available indicates that the driver had a trip lease arrangement with Candy Box, an exempt carrier not required to enter into formal, written signed leases. His arrangements with Candy Box were made by telephone and they never saw the driver or his equipment.

Under the circumstances, the only supervision of this driver would be provided through the BMCS roadside inspection of motor vehicles in operation. The BMCS has the authority and the responsibility for periodic surveys of vehicles operating in interstate commerce. Such inspections include not only the vehicle, but also the driver's logs and medical certificate. In this case, an inspection could have detected that this truckdriver had driven several thousands of miles at speeds in excess of the national limit, that he had inadequate rest periods during the trips, that he was not maintaining a log, and that his medical certificate had expired. However, the BMCS does not have the necessary resources to provide roadside surveys for the number of commercial vehicles in service. In 1975, the BMCS inspected less than 1 percent of the estimated 4 million interstate commercial vehicles. ^{2/} The small number of inspections is attributed to the fact that in 1975, there was only one safety inspector for every 32,000 interstate commercial vehicles. ^{3/} Also, motor vehicle inspection is only one of many responsibilities assigned to the safety inspectors.

The Safety Board has commented on these inadequacies in previous reports of investigations. In a recent report of an accident in Valley View, Ohio, ^{4/} the Board recommended that the DOT provide additional resources for the BMCS and that the BMCS, upon receipt of the resources, give added priority to roadside inspections of vehicles in operation.

Owner-Operators in Interstate Commerce

Prior to this accident the operations of neither the owner-operator, the truckdriver, nor the carrier, Candy Box, were a matter of record with the BMCS. Neither had ever been served with a copy of the FMCSR. The

^{2/} Report to Congress by the Comptroller General of the United States, May 6, 1977: "The Federal Motor Carrier Safety Program: Not Yet Achieving What the Congress Wanted."

^{3/} Ibid.

^{4/} "Highway Accident Report: Long Transportation Company Tractor-Semitrailer Collision With Multiple Vehicles, Valley View, Ohio, August 20, 1976: (NTSB-HAR-77-3).

BMCS declined to charge either the driver or the carrier for violation of hours of service, maintaining logs, and driving without a medical certificate on the basis that until they had been officially made aware of their responsibilities as interstate operators under the FMCSR, they could claim ignorance of the law. This is an unrealistic interpretation since the truckdriver maintained logs while under trip lease to Specialty Transportation, Inc., because the carrier told him he had to, and at one time he had a valid FMCSR medical certificate. He was aware of the requirement and the procedure.

If the carrier, Candy Box, had fulfilled its safety responsibility it would not have entered into an agreement with the driver to haul the cargo because he did not have a valid medical certificate.

The enforcement policy practiced by the BMCS may be justified when violations are discovered in a routine safety check. But when the violation is directly related to the occurrence of a multi-fatality highway accident, some discretion in the enforcement policy should be permitted. In this case there are three dead children, 29 other school children and a busdriver injured, the trauma and loss experienced by their families, and a destroyed schoolbus. Yet the truckdriver and carrier escaped penalties of any kind. If the accident had not occurred, both would still be operating without the knowledge of the BMCS and in violation of the FMCSR.

The BMCS has records of about 160,000 carriers who have all been served with copies of the FMCSR. However, there may be more than 250,000 owner-operators hauling in interstate commerce, subject to the FMCSR, but unknown to BMCS and who have not been served. The only way in which BMCS can now learn of their existence is through observation, facility surveys, and roadside inspections of vehicles in operation. With its current resources, the rate at which the BMCS is able to conduct these vital functions is limited. The BMCS needs additional field resources and needs to assign a higher priority to these functions. The ICC has records of carriers who are unknown to the BMCS. Closer cooperation between these two agencies could provide an exchange of such information. Candy Box was registered as an exempt carrier with the ICC several years before the accident. All carriers operating vehicles in interstate commerce are required to comply with the FMCSR and should be known to the BMCS. Some procedure which would inform the BMCS of the identity of carriers, vehicles, and drivers under its jurisdiction is needed. This would enable the BMCS to serve these carriers and/or owner-operators with the safety regulations and make them aware of their responsibilities under the FMCSR. It would also provide the BMCS with more accurate information concerning the carriers to be supervised and inspected, and enable it to budget and plan for a more effective and efficient safety program.

The Commonwealth of Virginia charged the truckdriver with three counts of manslaughter as a result of this accident. He was acquitted in a court

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of record. Since there was no conviction, the Virginia Department of Motor Vehicles (DMV) took no action against either the driver's Florida or North Carolina driver license. Both the Florida and North Carolina DMV's were informed and are cognizant of the accident, but there is no official record in the truckdriver's driving records.

Consequently, any future inquiries concerning the truckdriver's driving record by a law enforcement agency, a prospective employer, the ICC, the BMCs, or any investigating agency would not disclose his involvement in this accident. It is possible that the truckdriver may have been involved in more than the four accidents of record during his 14 years of commercial driving.

Survival Aspects

The unrestrained movement of the passengers within the schoolbus during the collision and overturn contributed to the number and severity of injuries sustained. The restrained busdriver was not thrown about and sustained only minor injuries. If restrained, the one ejected passenger would have been contained within the schoolbus and probably would have survived. The Safety Board believes that passenger containment in schoolbuses must be considered because of the number and severity of injuries sustained in this and other accidents. Also, passengers should not be allowed to occupy the front or rear seats of a bus until all other seats have been occupied. This procedure would reduce the severity of injuries sustained in a rear end collision.

Following its investigation of a railroad/highway grade crossing collision at Congers, New York, ^{5/} the Safety Board recommended that the NHTSA assess the human factors involved in using seatbelts in schoolbuses through a demonstration project (Safety Recommendation H-73-14). NHTSA on July 30, 1974, issued a Notice of Proposed Rulemaking (NPRM), titled "School Bus Passenger Crash Protection." This NPRM contained performance requirements for schoolbus seats and other components to reduce injuries to schoolbus passengers. In anticipation of the issuance of a final rule, NHTSA did not initiate a demonstration project. On October 26, 1976, NHTSA issued FMVSS No. 222 establishing specific seating, restraining barrier, and impact zone requirements for schoolbuses. The requirements provide a degree of compartmentalization, and support and anchorages for seatbelts should they be installed. The standard requires a restraining barrier forward of any designated seating positions that do not have the rear surface of another seat within 20 inches ahead of it. In this accident, the right front modesty panel failed to perform as a restraining barrier and failed to prevent the ejection of the passenger. The accident schoolbus, manufactured in 1972 did not have the improved seating or restraining barrier installed. The standard did not call for retrofit after its October 26, 1976, effective date.

^{5/} "Railroad/Highway Accident Report: Penn Central Freight Train/Schoolbus Collision Near Congers, New York, March 24, 1972" (NTSB-RHR-73-1).

Rescue and the administration of first aid to the occupants of the bus were hampered by the lack of immediate and easy access to the interior of the bus. It was not possible for any of the occupants to escape quickly from the damaged and overturned bus.

The bus emergency door had been deformed at the time of collision so it could not be opened. The rear seats were blocking the broken-out rear windows. The overturned bus was on its right side, and the entrance door was blocked. All bus windows were closed. The distance from the right (down side) to left side (up side) of the bus was too great for any of the occupants to reach and manipulate the window-opening devices. Rescuers did not break out the left side windows from the outside for fear of causing further injury to the occupants.

Had there been a fire involving the bus, the bus occupants probably would not have survived or would have sustained more serious injuries because of the inability of rescuers to gain immediate access to the interior of the bus. These circumstances demonstrate the inadequacy of the FMVSS No. 217 provisions for emergency exits on schoolbuses. The standard needs to be modified to provide for additional means of escape as well as access by emergency services personnel with the schoolbus in all attitudes.

CONCLUSIONS

Findings

1. The truckdriver traveled for a period of about 40 seconds and 2,950 feet with an unobstructed view of the schoolbus on the road ahead of him and did not perceive it in sufficient time to take evasive action.
2. The truckdriver made no brake application until immediately before impact.
3. There was no obstacle in the left lane to prevent the truckdriver from driving around the schoolbus if he had seen it sooner.
4. There were no mechanical or electrical defects associated with either the schoolbus or the truck that caused or contributed to the occurrence of the collision.
5. The truckdriver should not have been driving a commercial motor vehicle in interstate commerce because his medical certificate had expired.

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6. The State of Florida was not in compliance with HSPS No. 5, "Driver Licensing," because it issued the truckdriver an operators license without requiring him to surrender a valid North Carolina operator's license.
7. The States of Maryland and South Carolina were not in compliance with HSPS No. 5, "Driver Licensing," because they issued the truckdriver an operator's license without requiring him to surrender his valid North Carolina operator's license.
8. The schoolbus driver was not aware of overtaking traffic before starting to decelerate.
9. The availability and use of occupant restraints or containment in the bus could have reduced the number and severity of injuries sustained by the bus occupants.
10. The availability of occupant restraints and the presence of an adequate restraining barrier would have prevented the ejection of the schoolbus passenger.
11. Additional emergency exits in the schoolbus would have made escape by able occupants possible and would have facilitated rescue work and first-aid treatment. In this accident, they would not have reduced fatalities or injuries.
12. The seats in the 1972 schoolbus were not required to be in compliance with the 1976 FMVSS No. 222. Higher backs and controlled deformation may have provided sufficient compartmentalization to have restrained the occupants and reduced the severity of injuries.
13. The Commonwealth of Virginia was not in compliance with HSPS No. 17, "Pupil Transportation Safety," inasmuch as its statutes permit schoolbuses to stop on the traveled way to pick up or discharge passengers.
14. Had the schoolbus stopped off of the traveled way, the accident may not have happened.
15. The truckdriver's 820-mile trip which culminated in the collision was made at an average speed of 60 mph which is above the national speed limit.
16. The State of North Carolina's driver improvement program was not effective since the truckdriver's North Carolina license was renewed despite numerous traffic violations and suspensions of record.

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17. If the carrier, Candy Box, had carried out its safety responsibilities it would not have hired the driver for this trip because he did not have a current medical certificate.
18. There is ample evidence of violations of the FMCSR by the carrier, Candy Box, and the truckdriver. The BMCS should file complaints covering these charges.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the truckdriver, due to inattention and carelessness, to perceive and avoid the stopped schoolbus. Contributing to the accident was the stopping of the schoolbus in the traveled way of the high-speed highway, a practice of the Commonwealth of Virginia which was contrary to the provisions of Federal Highway Safety Program Standard No. 17. Contributing to the fatalities and injuries was the lack of occupant restraints in the schoolbus which allowed one occupant to be ejected, resulting in fatal injuries, and others to be propelled into sharp or unyielding interior components.

RECOMMENDATIONS

As a result of its investigation of this accident, the National Transportation Safety Board made the following recommendations:

-- to the Virginia State Board of Education:

"Revise its schoolbus operating regulations to eliminate the procedural requirement for the stopping of schoolbuses on the main portion of a roadway when picking up or discharging passengers, and add a requirement that conforms with Highway Safety Program Standard No. 17 which calls for loading and unloading zones off the main traveled portion of the highway wherever practicable. (Class II, Priority Action) (H-78-6)

"Revise its Schoolbus Driver Training Program to place greater emphasis on defensive driving procedures as they relate to observing surrounding traffic before stopping to pick up or discharge passengers. (Class II, Priority Action) (H-78-7)"

-- to the National Highway Traffic Safety Administration:

"Determine whether the States of Florida, Maryland, North Carolina, and South Carolina are in compliance with Highway Safety Program Standard No. 5, "Driver Licensing," and if found not in compliance, take necessary action to encourage them to modify their programs to comply. (Class II, Priority Action) (H-78-8)

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"Expand Highway Safety Program Standard No. 17, "Pupil Transportation Safety", to provide that no passengers occupy seats in either the foremost or rearmost rows of passenger seats until all other seats have been occupied. (Class II, Priority Action) (H-78-9)

"Modify Federal Motor Vehicle Safety Standard No. 217 to provide for additional emergency exit points to facilitate escape from and access to schoolbuses regardless of the vehicle's attitude following a collision or overturn. Such exits shall be in addition to the current options set forth in FMVSS No. 217. (Class II, Priority Action) (H-78-10)

"Review available accident statistics involving 1975 and later model schoolbuses equipped with seating arrangements that comply with Federal Motor Vehicle Safety Standard No. 222 to determine if the specific seating, restraining barrier, and impact zone requirements for schoolbuses have reduced the injuries sustained by occupants on these schoolbuses when involved in collisions and rollovers. A report of the findings should be submitted to the National Transportation Safety Board at the earliest opportunity. (Class II, Priority Action) (H-78-11)"

-- to the Bureau of Motor Carrier Safety of the Federal Highway Administration:

"Revise its enforcement policy which now precludes the filing of charges against drivers and carriers in violation of the Federal Motor Carrier Safety Regulations unless they have previously been served with a copy of the safety regulations, to permit the filing of charges for violations under severe circumstances such as preventable, fatal highway accidents. (Class II, Priority Action) (H-78-12)

"Request from the Interstate Commerce Commission the identity and categories of all current ICC-registered carriers operating in interstate commerce and of future registrants as soon as possible following their registration. (Class II, Priority Action) (H-78-13)"

-- to the State of North Carolina:

"Review its driver improvement program, required by Highway Safety Program Standard No. 5, to identify problem drivers and insure that such drivers are not permitted to operate commercial vehicles. (Class II, Priority Followup) (H-78-14)"

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BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ KAY BAILEY
Acting Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ PHILIP A. HOGUE
Member

/s/ JAMES B. KING
Member

February 23, 1978

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APPENDIX A

VIOLATIONS AND SUSPENSIONS RECORD
OF THEODORE N. TEMPLETON

State of License	Violation Convictions	Date	Suspensions	Violations While under Suspensions	
North Carolina	Improper Lights	6-18-60			
	Speed	3-19-61			
	Speed	6-30-61			
	Illegal Passing	5-17-63			
	Speed	12-22-64			
	Improper Lights	3-7-65			
	Speed	6-16-65			
				9-13-65 to 11-13-65 (2 mos)	10/19/65 Driving Under Suspension
				5-2-66 - 5-2-67 (1 year)	
	Speed	7-17-67			
	Illegal Pass	9-27-67			
	Illegal Pass	2-10-68			
	Speed	5-29-68			
				7-15-68 - 8-16-68 (1 mos)	
	Speed	10-28-68			
	Speed	11-7-68			
	Improper Lights	11-15-68			
	Speed	10-7-69			
	Follow Too Close	10-11-69			
				11-30-69 - 1-29-70 (1 mos)	
Speed	2-19-70				
Speed	4-24-70				
Speed	7-9-70				
			8-14-70 - 12-14-70 (4 mos)		
Speed	2-16-71				
Speed	12-29-72				
Speed	4-11-73				
Speed	6-27-73				
Speed	1-29-74				

(continued)

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(Cont'd) Violations & Suspensions

State of License	Violation Convictions	Date	Suspensions	Violations While Under Suspensions
North Carolina ↓	Exceeding Safe Speed	3-12-74	3-9-75 - 11-9-75 (8 mos)	6-24-75 Speed (Fla. Lic.)
	Exceeding Safe Speed	12-26-74		
	Speed	11-24-75		
South Carolina	Speed	3-12-73		
	Speed	1-21-76		
	Speed	2-20-77		
Florida ↓	Speed	6-24-75		
	Speed	1-12-76		
	Speed	2-16-76		
	Overload	5-18-76		
	Speed	4-12-76		
	Speed	5-27-76		
	Speed	1-12-77		
	Speed	3-1-74)	appears on Virginia record, but not elsewhere	
Speed	8-12-74)			

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OF

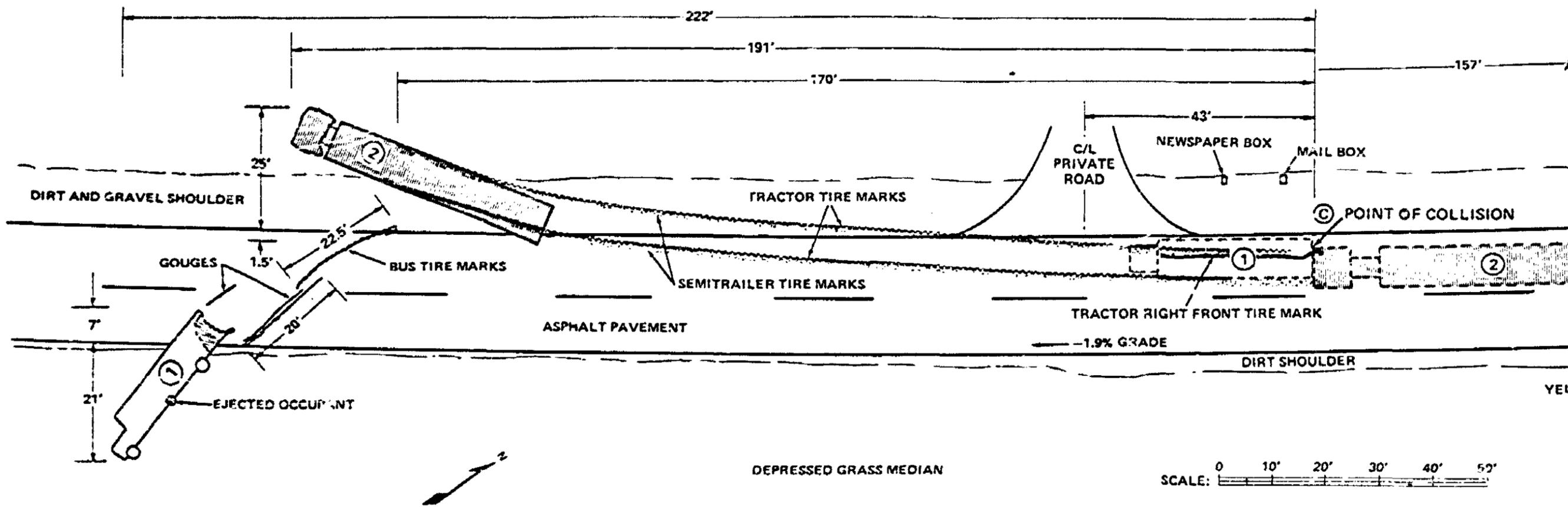
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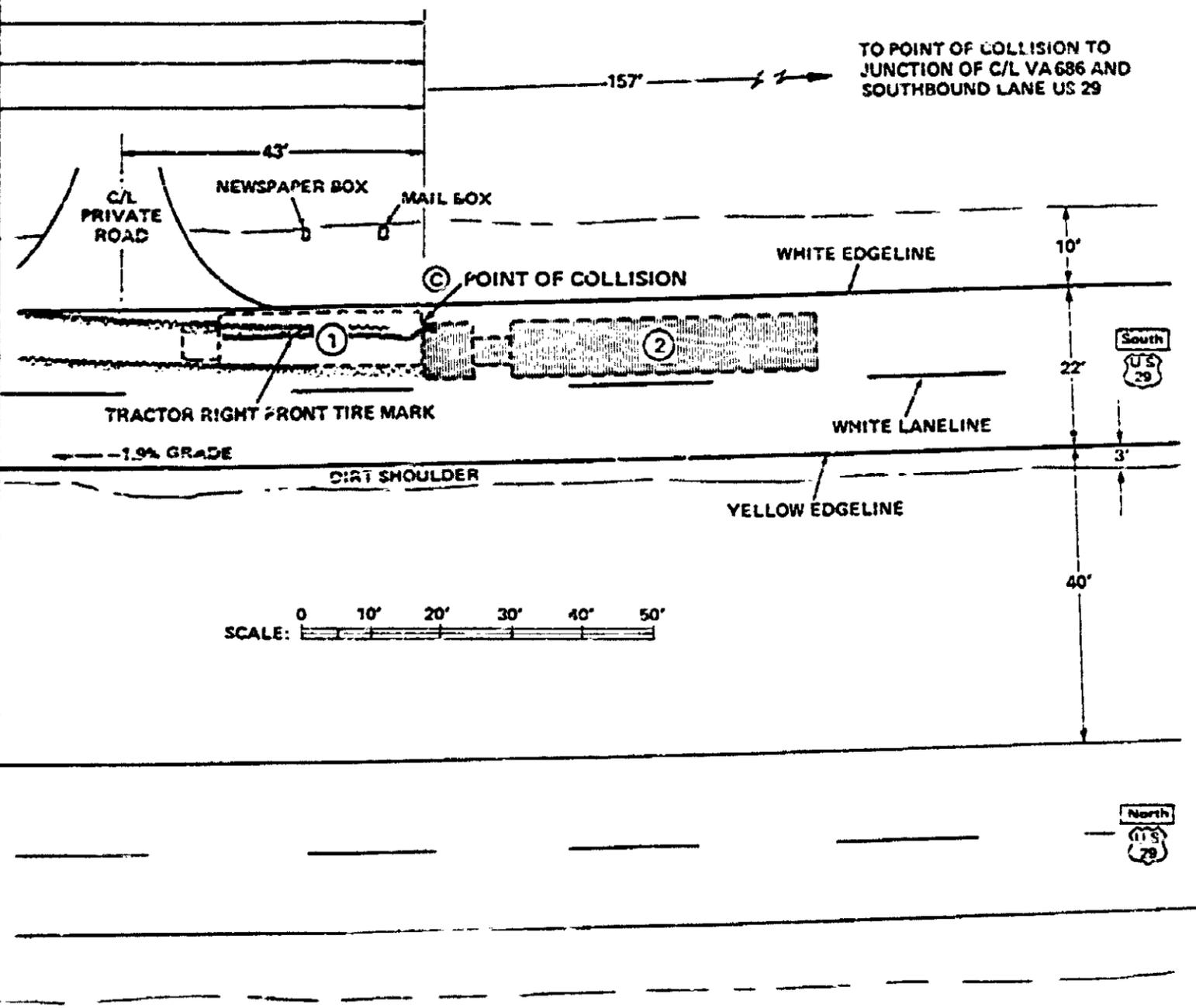
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- LEGEND:
- ① SCHOOL BUS
 - ② TRACTOR-SEMITRAILER
 - Ⓒ POINT OF COLLISION

APPENDIX B. DIAGRAM OF COLLISION SITE.

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TRACTOR-SEMITRAILER/SCHOOL BUS
 COLLISION AND OVERTURN
 RUSTBURG, VIRGINIA
 MARCH 8, 1977

SEQUENTIAL

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OF

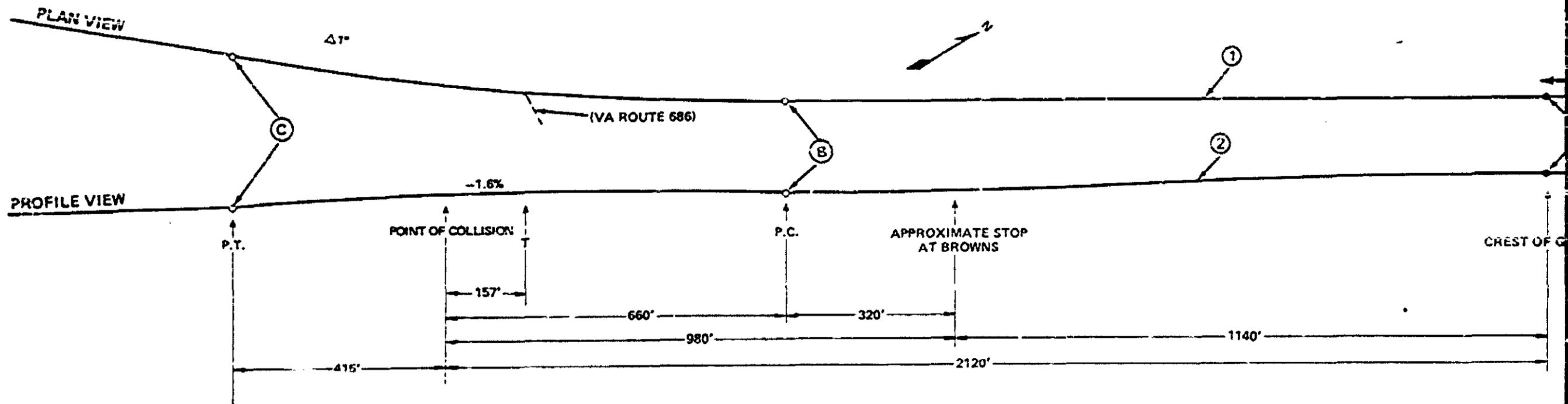
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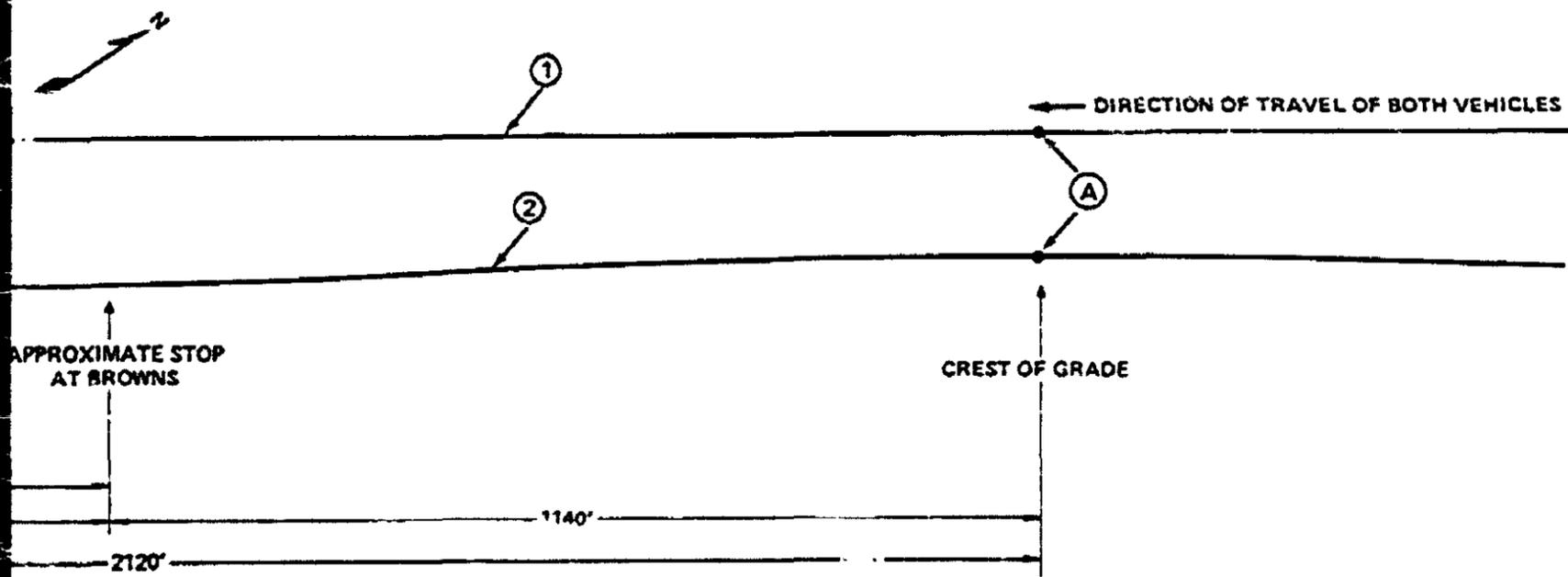


APPENDIX C. PLAN VIEW, CENTERLINE, AND PROFILE OF SOUTHBOUND LANE OF U.S. 29.

LEGEND:

- 1 PLAN VIEW, CENTERLINE SOUTHBOUND LANE - U.S. 29
- 2 PROFILE, SOUTHBOUND U.S. 29
- A CREST OF GRADE
- B BROWN'S SCHOOL BUS STOP
- C POINT OF COLLISION
- P.C. POINT OF CURVE
- P.T. POINT OF TANGENT
- T JUNCTION CENTERLINES OF VA 686 AND U.S. 29 (SOUTHBOUND)

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.D LANE - U.S. 29
 AND U.S. 29 (SOUTHBOUND)

TRACTOR-SEMITRAILER/SCHOOL BUS
 COLLISION AND OVERTURN
 RUSTBURG, VIRGINIA, MARCH 8, 1977